

REIGN Architecture

PROJECT SPECIFICATION

Pope Residence

28 Kirimoko Crescent
Wanaka

Issued for Tender

0357

PROJECT OVERVIEW

Scope

Proposed new 2 storey home. Timber framed construction on concrete slab on grade.

Mix of Colorsteel cladding, composite weatherboards & Insulated plaster system, Aluminium thermally broken joinery, Colorsteel roof.

Address

Site Address	28 Kirimoko Crescent
City	Wanaka
Lot #	3
DP #	540932

Site Conditions

Wind Zone	H - High Wind Speed
Earthquake Zone	Zone 3
Exposure Zone	Zone B - Low
Snow Loading Zone	Zone N5

Related Parties

Structural Engineer

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1 PRELIMINARIES & GENERAL

1.1 Project Specifics

1.1.1 Nominated Subcontractors

There are no Nominated Subcontractors within this Contract.

1.1.2 Separate Contractors

There are no Separate Subcontractors

1.1.3 Contingencies Sums

There are no Contingencies Sum within this Contract - any adjustments to the contract works will be handled as Variations to the Contract.

1.1.4 Provisional Sums

The following Provisional Sums are included in this Contract. Note that Provisional Sums are for the carrying out of defined sections of work and thus they include for the Contractor's costs, margins, overheads and profit in association with the actual item.

Interior Joinery / Cabinetry. Includes kitchens, wardrobes, laundry. Provisional Sum - $75,000.00

1.1.5 Separate Sections

The works are not divided into Separate Sections.

1.1.6 Contractor's Performance Bond

A Contractor's Performance Bond is not required.

1.1.7 Principal's Bond

A Principal's Bond is not available.

1.1.8 Principal Supplied Items

The Principal is not supplying any items to be incorporated into the works.

1.1.9 Defects Liability Period

The Defects Liability Period is 12 months, commencing on the date that Practical Completion is achieved.

1.1.10 Fluctuations

Fluctuations are not allowed in this Contract. (This will be a Fixed Price Contract. The Contract Sum will not be subject to fluctuations resulting from variations which give rise to an extension of time, and the Preliminary and General Costs Allowance and the Contractor's Margin will not be adjusted unless the scope of the Contract is substantially changed).

1.1.11 Retentions

No retentions will be deducted from amounts that are certified as payable to the Contractor.

1.1.12 Contract Sum

The Contract Sum will be established by negotiation pre-contract.

1.1.13 Insurance of the Works

Insurance of the works is at the risk of the Contractor, and shall be completely in accordance with the Conditions of Contract.

1.1.14 Other Insurance

The minimum amount of the Contractor's public liability insurance shall be $2,000,000, the minimum amount of the Contractor's motor vehicle liability insurance shall be $200,000, the Contractor shall insure all appliances, machinery and apparatus required for the Contract Works but not incorporated into the Contract Works, and no Contractor's professional indemnity (design) insurance is required.

1.1.15 Sundry

The Contractor is responsible for accurate setting out of the works. It is recommended that the Contractor engage a Registered Surveyor to establish the basic site set-out and the floor levels.

A Registered Surveyor, engaged by the Contractor, shall check and confirm the accuracy of the Contractor's detailed setting out of the works and shall certify this in writing to the Architect/Designer.

Note that the 'Project North' direction is identified on the Site Plan, and that all direction or orientation references within this specification or on the drawings are in terms of this Project North.

A competent foreman shall be constantly on the works and any instructions or explanations given to such persons shall be deemed to have been given to the Contractor.

Notify the Principal each time it is necessary to isolate sections of the heat detectors system. Ensure that the duration or these periods of isolation are absolutely minimised.

Contractor and Subcontractors must familiarise themselves with egress routes from the building, and must ensure that egress routes are NEVER obstructed with construction materials such as to prejudice egress.

Power, water and cable communucations services are already on the site. Arrange and pay for adequate temporary connections to these services for the duration of the contract.

1.1.16 Warranties

1.1.16.1 Provision of Warranties

Provide executed warranties in favour of the Principal covering, but not limited to, materials, components, service, application, installation, finishing, etc., required for that section of work.

- The terms and conditions of the warranty provided shall not negate the minimum remedies available under common law as if no warranty had been offered.
- Failure to provide the required warranty does not reduce liability of warranty conditions required for that section of work.
- Where an Installer/Applicator warranty is included in this specification, it shall be provided in lieu of the warranty otherwise required, but only when it is subject to similar conditions and warranty period stated in the Schedule of Warranties.
- Conform to the Warranty Agreement form included in the conditions of contract.
- Commence all warranties from the date of practical completion of the contract works (unless otherwise stated).
- Maintain the effectiveness of all warranties for the period stated.
- Provide all warranties before practical completion of the contract works.

1.1.16.2 Schedule of Warranties

The following schedule is a summary of warranties and warranty periods required for the following sections of work:

1.1.16.3 Warranty for Weathertightness and Watertightness

The Contractor shall provide a warranty, for a minimum period of 2 years, covering the weathertightness of the completed building envelope and the watertightness of all liquid supply and liquid disposal systems and fittings.

1.1.16.4 Installer/Applicator Warranties

Provide Installer/Applicator warranties in favour of the Principal, covering execution and materials of proprietary products or complete installations.

- An Installer/Applicator warranty may be offered in lieu of the warranty otherwise required for that section of work, but only when it is subject to similar conditions and period stated in the Schedule of Warranties.
- The terms and conditions of the Installer/Applicator warranty shall not negate the minimum remedies available under common law as if no warranty had been provided.
- Failure to provide the required Installer/Applicator warranty does not reduce liability for execution and materials required for that section of work.
- Conform to the Installer's/Applicator's standard warranty form, or to the Warranty Agreement form included in the contract documents if a standard form is unavailable.
- Commence all Installer/Applicator warranties from the date normally applicable for the work.
- Maintain the effectiveness of all Installer/Applicator warranties for the period stated.
- Provide all Installer/Applicator warranties before practical completion.

1.1.16.5 Manufacturer/Supplier Warranties

Provide Manufacturer/Supplier warranties in favour of the Principal, covering materials, equipment, appliances, proprietary products, etc.

- The terms and conditions of the Manufacturer/Supplier warranty provided shall not negate the minimum remedies available under common law as if no warranty had been offered.
- Failure to provide the required Manufacturer/Supplier warranty does not reduce liability for execution and materials required for that section of work.
- Conform to the Manufacturer's/Supplier's standard warranty form.

- Commence all Manufacturer/Supplier warranties from the date normally applicable.
- Maintain the effectiveness of all Manufacturer/Supplier warranties for the period stated.
- Provide all Manufacturer/Supplier warranties before practical completion.

1.2 Project Overview - NZS 3902

1.2.1 Contract Documents

The Contract Documents are complementary and comprise this Specification, the accompanying drawings, the NZ Standards Contract NZS 3902 together with Schedules as specified below, any written documentation clarifications issued during tendering/estimating, any manufacturer/supplier information issued with this Specification, any list of agreed Subcontractors, the contract establishment letter and any other relevant correspondence, and any Site Instructions or additional details or instructions issued as Variations. (The NZS 3902 Contract will be emailed upon request).

If the Architect/Designer has not been engaged to administer the Contract or observe the works, then the term Architect/Designer, where referred to in this specification, means Contract Administrator.

These Project Specific Conditions supersede the Standard Conditions where they are in conflict. Refer any ambiguity or apparent discrepancy within or between any Contract Documents to the Architect/Designer, whose interpretation shall be binding on all parties.

Ensure that all Trades are aware of all Conditions and that subcontract prices are accepted on this basis, and in a form acceptable to the Registered Master Builders Federation or the Certified Builders Association. Ensure that all persons engaged on the works are aware of all items in this specification and on the drawings that may in any way affect their section of the works.

1.2.2 Site

Relevant site conditions are believed to be correctly represented in the Contract Documents, however the Contractor (and Subcontractors where appropriate) are requested to inspect the site to ascertain for themselves the nature and extent of the works and the rights and interests that may be interfered with in the execution of the works, as no claims for additional payment will be recognised on the grounds of insufficient description.

1.2.3 Adjacent Owners

Carry out whatever actions or precautions are required to avoid or to absolutely minimise noise, dirt, dust, access, etc. inconvenience or disruption of any nature to the adjacent owners or tenants. Indemnify the Principal against any claims arising from this source.

1.2.4 Protection

Take all appropriate precautions to protect all third party property, services, etc., and indemnify the Principal against any claims arising from the construction operations. Any damage to third party property caused by construction activities or failure to protect shall be rectified as soon as possible by the person causing the damage, or by appropriately qualified trades-persons employed by the person responsible for the damage if necessary.

Suspend operations during weather which would affect the quality of work in progress.
Secure the works as soon as possible against adverse weather, dust and vandals. Avoid structural damage that is caused by overloading.
Adequately protect all finished work and maintain until the date of Practical Completion. Each trade shall protect the work of all other trades, and each trade is responsible for making good any damage they cause to finished works. Arrange special protection as required for windows and doors, finished timber work, plumbing fittings and hardware, cabinets and other joinery, and similar items.

1.2.5 Responsibility

The Contractor will be held responsible for the full period of their legal responsibility in connection with this Contract for ensuring that all work execution, materials, and fittings, are completely in accordance with Contract requirements.
The Contractor is responsible to the Principal for the appropriateness and fitness, in relation to a reasonable expectation or requirement, of all of the materials and workmanship incorporated into the works by themselves or their subcontractors; for this reason few specific guarantees are required in these contract documents. The terms and conditions of any warranty or guarantee required or provided shall not in any way negate the minimum remedies available under common law as if no warranty or guarantee had been furnished.
No apparent expression of the Architect's/Designer's reasonable satisfaction shall be deemed to be acceptance of defective materials or workmanship within the terms of the Contract or to be an authority for any Variation except where such Variation is authorised as provided for in the Contract. Instructions that are given verbally are deemed to be instructions for proper execution of the works and do not involve extra charges.

Workmanship in all trades is required to be equal to or better than recognised good trade practice.
The Contractor shall provide all necessary setting out information and component dimensions for subcontractors and shall check and be responsible for the accuracy of their work.

Should any tradesperson consider that the surface finish or general conditions of previous work are unsatisfactory to ensure a proper finish for their own work thereon, that tradesperson shall give immediate notice to the Contractor or Architect/Designer as appropriate and shall not proceed until all necessary improvements have been made. Failing such notice the trade concerned will not be relieved of responsibility for a poor finish due to such unsatisfactory condition.
Specialist Finishes Subcontractors are responsible for ensuring that substrates are completely appropriate for them to achieve first class results, and to this end shall, in sufficient time, instruct the Contractor with regard any fixings, primings, sealings or whatever for the substrate that vary in any way from the substrate manufacturer's standard recommendations. The Contractor shall advise the Architect/Designer with regard these variances, and not proceed until the Architect/Designer has agreed to them.

The Contractor and all Subcontractors affected shall be jointly and severally responsible for completion of the whole of the works in a completely watertight condition and shall therefore examine all details to be satisfied that this condition can be achieved. If any detail is considered unsatisfactory the Architect/Designer shall be notified immediately and he/she will

then either interpret the detail to the Contractor's satisfaction, or accept responsibility for watertightness at the points in question, always assuming reasonable workmanship.

Ensure that all materials or items incorporated into any particular construction or finish are compatible and that their individual use is approved by the manufacturers and/or suppliers of the other parts of the system.
For all electronic/electrical/mechanical operating systems all work and all necessary materials and items incidental to the primary item specified, that are incorporated into the works, shall be such as to leave a neat, efficient, easily maintained and robust installation, completely in accordance with all of the recommendations of the primary items' manufacturers. Where appropriate, source all parts of a system from a single supplier or manufacturer.

The Contractor shall make provision for all temporary works and services required for the satisfactory completion of the contract works. The Contractor shall pay all associated costs and fees; carry out all necessary maintenance, alterations and servicing requirements; and remove temporary works and services on completion of the contract works. Temporary works and services shall comply with the requirements New Zealand Building Code.

1.2.6 Specification

This Specification covers contract administration, standards, materials quality, workmanship and the scope of works only: the exact nature of the works and all specialist items, descriptions, etc., are contained on the drawings, which also take full precedence.
All clauses in all specification sections apply to their full extent and meaning to the entire Contract.
Trade sections and paragraphs have been introduced into this specification for reference only and it shall not be construed that each trade section is a complete segregation of the materials and labour of that trade. The onus is on all trades to be conversant with any and all clauses which in any way affect their work.
(Be aware that the ‘scope’ noted in the ‘Project Overview’, and scope and general extent clauses within this specification, are included to provide a general indication only and must NOT be interpreted as schedules of quantities - the exact nature and extent of all aspects of the works are shown on the drawings).

1.2.7 Standards

New Zealand Standards (NZS), Australian Standards (AS), Joint Standards (AS/NZS), British Standards (BS), Acts of Parliament, Regulations made thereunder, Codes of Practice, and any specific Manufacturer's Instructions or Manufacturer's Recommendations that are referred to in these Contract Documents shall all be deemed to be the latest published edition thereof at the time of drawings issue, and shall be followed by the Contractor and all Subcontractors to the full extent applicable consistent with the intent of this Contract.
Documents cited within other cited publications are deemed to form part of this specification.
Where Standards have a number of Divisions, e.g. AS/NZS 3500.1, AS/NZS 3500.2, etc., each of the Divisions relevant to this project is deemed to form part of this specification.
Retain current copies of significant cited documents and manufacturer's technical literature on the site.

1.2.8 Authorities and Charges

Comply with all relevant provisions of the NZ Building Code, and with all relevant territorial or statutory authority regulations, by-laws, obligations, etc. Give all required notices.

The Principal has obtained a Land Use Consent. The Principal has applied for and paid for the Project Information Memoranda, the Building Consent and other approvals required for the works to start. The PIM and Building Consent will be forwarded to the Contractor as quickly as possible after they are issued by the Territorial Authority. Note: It is an offence under the Building Act to carry out work not in accordance with a Building Consent.
Should the Building Consent be subject to any conditions which modify the requirements of the Contract Documents in any way, the Architect/Designer reserves the right to negotiate any or all of these modifying conditions with the Building Consent Authority. If after these negotiations additional work is required, it will be handled as a Variation to the Contract.

1.2.9 Code Compliance Certificate

The Principal will apply for the Code Compliance Certificate (CCC) and any other licenses or approvals for the building to be used. The Contractor is to obtains all required certificates, guarantees, Producer Statements, as-built drawings, etc., required for the CCC application as work proceeds, to facilitate application for the CCC as soon as the works are completed. For their part, the Principal hereby undertakes to apply for the CCC within one day of all required material being in hand. Likewise, the Contractor should have capacity available to attend as quickly as possible to any items identified by the Building Consent Authority as being required prior to the issue of the CCC.

1.2.10 Coordination of the Works

Coordinate the works of all trades to ensure efficient progress of the works. Ensure that all holes, sleeves, penetrations, supports, etc., that are required for services are correctly incorporated as work proceeds. Identify and sufficiently forward-notify the appropriate persons of all deadlines for the supply of fittings, components, information, etc.

1.2.11 Documents Interpretation

Except where they are clearly to the contrary, all dimensions are deemed to be to the bare surface of concrete, masonry, timber framing or other basic construction material. All figured dimensions take precedence over scaled sizes. Where any detail is included in more than one drawing the larger scale detail takes precedence. Where any ambiguity exists refer to the Architect/Designer for interpretation.
The word ‘provide' and the word ‘fix' used separately in the Documents shall be taken to mean ‘provide and fix' unless otherwise stated.
When the term ‘allow' occurs in the Documents, except with reference to Monetary Allowances, the cost of the item shall be at the risk of the Contractor.
The terms ‘approved', ‘directed', and ‘selected' when used in the Documents refers to the approval, direction or selection of or by the Architect/Designer. Please give adequate notice of when these decisions are required. ‘Architect/Designer' shall mean the Architect or Designer, their representative or any Consulting Engineer engaged by the Architect/Designer.

1.2.12 Work Shown and Mentioned

The Contract Documents show the extent and nature of the works but there is no warranty expressed or implied that they show each and every minor detail or item required to be included by the Contractor. Should any material, structural member, fixing, or item or work appear to be inadequately described, yet obviously necessary for the neat, strong and satisfactory completion of the work, it shall be incorporated into the Contract Works.

1.2.13 Site Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance. Comply with the relevant provisions of the New Zealand Building Code, in particular Clause F5.

So far as is reasonably practicable and according to a PCBU's (person conducting a business or undertaking) primary duty of care, take all necessary steps required to make the site and the contract works safe, and to provide and maintain a safe working environment. Ensure that all those working on or visiting the site are aware of the site safety rules and are not unnecessarily exposed to hazards.

Each PCBU, so far as is reasonably practicable, must ensure the health and safety of workers, and that other people are not put at risk by its work. If more than one PCBU has a duty in relation to the same matter, each PCBU with the duty must, so far as is reasonably practicable, consult, co-operate with, and co-ordinate activities with all other PCBUs who have a duty in relation to the same matter. PCBUs can enter reasonable agreements with other PCBUs to meet their duties, but cannot contract out of their duties.

Notify WorkSafe as soon as possible when a notifiable event occurs. Take all reasonable steps to preserve the site of the notifiable event in accordance with WorkSafe requirements. Ensure that the site of the event is not disturbed until authorised otherwise by WorkSafe. Keep records of all notifiable events.

Scaffolding shall comply with all Statutory and Local Authority Regulations, with the WorkSafe 'Best Practice Guidelines for Scaffolding', AS/NZS 1576 (Scaffolding equipment), AS/NZS 4576 (Guidelines for Scaffolding), and AS/NZS 4994 (Roof edge scaffolding), and shall be maintained for the duration and removed on completion.

The use of ballistic fixings must absolutely comply with all relevant safety recommendations at all times. No rubbish fires are allowed on site. Portable/personal disc/tape players, radios and iPods must not be used anywhere on the site. No smoking on site, except in the designated location in accordance with the Smoke Free Environments Act 1990, the location of which will be determined by the Contractor, with the approval of the Principal.

A PCBU's primary duty of care includes, but is not limited to, so far as is reasonably practicable:
- providing and maintaining a work environment that is without risks to health and safety;
- providing and maintaining safe plant and structures;
- providing and maintaining safe systems of work;

- ensuring the safe use, handling and storage of plant, structures and substances;
- providing adequate facilities for the welfare at work of workers in carrying out work for the business or undertaking, including ensuring access to those facilities;
- providing any information, training, instruction, or supervision that is necessary to protect all persons from risks to their health and safety arising from work carried out as part of the conduct of the business or undertaking;
- monitoring the health of workers and the conditions at the workplace for the purpose of preventing injury or illness of workers arising from the conduct of the business or undertaking.

Before commencing work on the site, the Contractor shall prepare and submit to the contract administrator a health and safety plan. The health and safety plan shall include, but not be limited to:
- the health and safety of all people on the site and on other properties, and the general public;
- identification of existing and potential construction hazards and risks;
- safety procedures to eliminate, isolate or minimise construction hazards;
- the equipment to be used to minimise the hazards;
- the maintenance of a register of hazards for the site;
- the name and qualifications of the site safety person;
- emergency procedures;
- first aid facilities and safety equipment;
- the methodology for notifying, recording and investigating accidents and injuries.

Carry out all construction operations in accordance with the submitted health and safety plan.

1.2.14 Variations

The Architect/Designer will issue Site Instructions (SI) to amend or clarify the works. Upon receipt of a SI the Contractor shall immediately notify the Architect/Designer if they believes there are price or timing adjustment implications. The Architect/Designer will then issue a Variation Price Request (VPR) for pricing of the possible Variation by the Contractor, within the time stipulated, or within 10 days if no time is stipulated. If the Contractor does not return the VPR within the time stipulated the Architect/Designer will assess it at reasonable rates. Once agreement is reached on price and/or timing a Variation Order (VO) for the item will be issued. Note that works covered by a SI or a VPR must NOT be actioned until the VO is issued.

When a Variation is contemplated and timing does not allow SI and VPR action the Contractor is to advise, and record in the site diary, an estimate of price and timing implications. If accepted by the Architect/Designer, a VO will be issued immediately. The Contractor shall then co-operate with the Architect/Designer to establish agreed pricing. Claims for Variations neither priced nor estimated prior to being put in hand (but considered valid) will be incorporated into Progress Payment Certificates or the Draft Final Accounts as claimed and accepted but with a proviso allowing 5 (five) days for written objections by either the Principal or the Contractor, to any aspect of them, for further consideration.

The Main Contractor's Variations Margin agreed pre-contract will be the maximum accepted for any trade unless higher rates are nominated pre-contract and are accepted. The Main Contractor's agreed Variations Margin shown shall be deemed to include all preliminary and

general costs, overheads, variation processing costs, and profit. If no margin is given, a 5% overall margin will be applied.
Note that 'loss of anticipated profit' claims consequent upon reduction of works extent will NOT be recognised, and that the cost of processing Variations is deemed to be included in the P & G Allowance.
Also note that for Variations pricing all materials shall be charged at the actual net invoiced cost plus margin; i.e. recognised 'Trade Price', volume discounted where appropriate.

1.2.15 Cleaning and Completion

Clear construction debris and rubbish from the works at regular intervals, and additionally if so instructed by the Architect/Designer. Clean each space thoroughly before commencing any finishing works.

In preparation for the Practical Completion inspection carry out the following:
- Clean the works thoroughly, removing all debris, surplus materials, splashes, marks, temporary markings, etc. (All cleaning methods and materials shall be as recommended by the manufacturer of the item being cleaned).
- Remove protective wrappings and coverings unless otherwise directed.
- Touch up minor painting faults, carefully matching colour, and brushing out edges. Repaint any badly marked surfaces back to suitable break-lines.
- Adjust, ease and/or lubricate as required all doors, drawers, controls and other moving parts to ensure their efficient operation.
- Any other works required to leave all spaces ready for immediate occupation and all electronic/electrical/mechanical systems fully operational.
- Clean out all spoutings, gutters, downpipes, and gullies and flush out all drains.
- Clean all sanitary appliances and check all aspects of the water services.
- Thoroughly re-inspect all aspects of the works (and have any defects fully rectified) to be certain that the works are completely ready for the Practical Completion inspection - if an unreasonable number of items are noted by the Architect/Designer during the inspection it will be terminated and then rescheduled for at least a week forward to allow proper completion to be achieved.

(Note that a Code Compliance Certificate must be obtained before Practical Completion will be certified. Obtain all required certificates, guarantees, as-built drawings, etc., as work proceeds to enable the CCC application to be submitted as soon as construction is completed).

1.3 Establishment & Enabling

1.3.1 Site Establishment

1.3.1.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, in particular the 'Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry'.

Carry out all construction operations in accordance with the Contractor's project-specific Health and Safety Plan.

1.3.1.2 Site Inspection Assessment

The Contractor (and sub-contractors where appropriate) shall be deemed to have examined and inspected, prior to tender, the site and its surroundings, and to have satisfied themselves as regards to access to the site, the form and nature of the site, all existing services, structures and features on the site, the risk of injury or damage to property, and the nature and extent of the work and materials and methodologies necessary for the execution of the works.

1.3.1.3 Site Boundaries

Establish the accurate location of property boundaries prior to setting out the works.

1.3.1.4 Regulatory Authorities

Comply with all statutory obligations and regulations required by the Regulatory Authority controlling the execution of the works.

The work shall be carried out in strict compliance with the relevant consents and approvals issued by the controlling Territorial Authority (TA). No work shall be undertaken until all necessary consents and approvals have been obtained.

Accept responsibility for notifying the Territorial Authority and arranging for any inspections and testing and commissioning procedures required by them at various stages of construction.

1.3.1.5 Network Utility Operators

The work shall also be carried out in accordance with all network utility operators having jurisdiction over utilities in or around the site.

Notify the network utility operators of the proposed works, and ascertain and become familiar with any particular requirements and the location of existing services prior to commencing site operations.

Attend on network utility operators as necessary to obtain approvals (in addition to Building Consent approval) for the satisfactory completion of the works.

Accept responsibility for notifying network utility operators and arranging for any inspections and testing and commissioning procedures required by them at various stages of construction.

1.3.1.6 Existing Services

Locate all existing services before commencing work in any area, and locate all underground services affected by the contract works. Any detail of an existing private underground service provided by the owner is done so in good faith.

As necessary:

- obtain all records of existing underground services held by the relevant utility network

operators;
- give all required notices to the service authorities or companies and the Territorial Authority, and pay all relevant fees and charges;
- carry out a detection survey of the site to ensure there are no buried operative electric cables;
- protect existing services on the site, and rectify any damage or interference to them, and provide temporary services while repairs are being carried out;
- extinguish and remove existing services designated redundant by the contract works.

1.3.1.7 Permitted Access & Work Hours

Permitted access and work hours is restricted to the following limitations:

1.3.1.8 Permitted Work Zone

Confine construction operations within the site boundaries and within the permitted work zone identified on the drawings.

The permitted work zone is restricted to the following designated areas:

1.3.1.9 Access to Existing Buildings undergoing Alterations

Control access at all times to working areas within existing buildings where alterations are included in the scope of the contract work. Liaise with the building owner to establish any site limitations required while the work is being carried out.

1.3.1.10 Access to Existing Buildings NOT undergoing Alterations

Liaise with the building owner to establish requirements for access to the areas of existing buildings which are not part of the contract work.

1.3.1.11 Temporary Buildings & Site Amenities

As necessary, make arrangements for the provision of all site services and amenities and facilities required for the works and site staff, including storage sheds, offices, lunch rooms, sanitary facilities and other temporary buildings and facilities required for storage and the management of the works.

These temporary services and amenities shall be for the use of site staff while on site, and as required by the relevant Regulations and Acts, and shall be located in a position within the site boundaries - refer to the Site/Enabling drawings for designated area(s).

Rubbish and contained wastewater from site amenities and facilities shall be removed from the site as appropriate and at least on a weekly frequency.

1.3.1.12 Temporary Roads & Surfaces

Make all necessary provisions for site-related temporary roads, tracks, crossings, hard standing, etc., required for the execution of the works. Maintain these temporary surfaces at the required standard throughout the duration of the works.

1.3.1.13 Hoardings, Gantries, Lighting

Provide temporary fencing, hoardings, planked footways, guard rails, gantries and lighting as necessary to protect the public and others, for the proper execution of the works and to meet the requirements of the Regulatory Authority and relevant Regulations and Acts.

1.3.1.14 Project Sign Board

Obtain approval for and provide and erect for public display, a timber-framed printed Project Sign Board measuring ---mm wide x ---mm high.
The project sign board shall include images and graphics to the Architect's/Designer's design, and display the following:
- the Project name; and
- the Principal's name; and
- the Project Consultants' names; and
- the Main Contractor’s name; and
- if requested by the Contractor, the names of their Sub-Contractors.

1.3.1.15 Setting Out

Accept responsibility for the correct and accurate setting out of the works to conform to the drawings, and that specified locations, orientations, depths and levels are strictly adhered to.

As necessary, locate and verify survey marks and datum points and maintain their accurate position.

Establish reference points, datums, profiles or similar clear of excavations and to allow for easy and accurate checking at all stages of construction. Ensure these are not damaged or dislodged during construction operations.

Where required, employ a licensed cadastral surveyor to establish and set out the positions of the foundations, grid lines and floor levels.

Where required, issue to the Building Consenting Authority a copy of the surveyor's certificate (Pegging Certificate or Building Location Certificate) in accordance with the conditions of the Building Consent.

1.3.2 Temporary Works & Services

1.3.2.1 General

Make provision for all temporary works and services required for the satisfactory completion of the contract works.

Pay all associated costs and fees; carry out all necessary maintenance, alterations and servicing requirements; and remove temporary works and services on completion of the contract works. Temporary works and services shall comply with the requirements New Zealand Building Code.

1.3.2.2 Site Water

Make all necessary arrangements for the provision and reticulation of clean, fresh potable water required for site amenities and for the construction works.

1.3.2.3 Site Electricity

Make all necessary arrangements for the availability and connection of temporary electrical power required for operating site facilities and amenities, health and safety and security requirements, and plant operation and general construction use in strict accordance with electrical regulations.

Comply with the network utility operators requirements, and be responsible for maintaining and servicing temporary electrical distribution plant and equipment as necessary.

1.3.2.4 Site Phone & Data Facilities

Make all necessary arrangements for the availability and connection for temporary site telephones, facsimiles and computer email and internet services required for the sending and receiving and printing of communications to and from the site.

1.3.2.5 Site Perimeter Fencing

Provide and maintain all necessary fencing at the perimeter of the site in accordance with NZBC F5/AS1, prior to commencing the works, in order to prevent unauthorised entry by the public onto the site.

Site fences adjacent to public spaces shall:
- extend at least 2.0m from ground level on the side accessible to the public; and
- have a maximum 100mm gap between bottom of the fence and ground; and
- be constructed of galvanised chainlink netting with maximum 50 x 50mm grid size; and
- have posts spaced apart at maximum 2.5m.

1.3.2.6 Site Perimeter Hoardings

Provide and maintain all necessary hoardings at the perimeter of the site in accordance with NZBC F5/AS1, prior to commencing the works, in order to prevent unauthorised entry by the public onto the site.

Site hoardings adjacent to public spaces shall:
- extend at least 2.0m from ground level on the side accessible to the public; and
- have a maximum 100mm gap between bottom of the hoarding and ground; and
- have continuous cladding in any of the following materials:
  - close-butted timber at least 19mm thick; or
  - 6mm exterior-grade plywood on studs spaced at maximum 600mm centres; or
  - 9mm exterior-grade plywood on studs spaced at maximum 1000mm centres; or
  - continuous metal cladding constructed with studs and rails to provide comparable strength and rigidity.

1.3.2.7 Site Cleaning & Waste Management

Accept responsibility for and make all necessary provisions for periodic site cleaning, and for the management and disposal of all construction waste material, recyclable waste, and materials requiring special disposal during the contract period.

The Contractor and their subcontractors shall:
- conform to applicable regulations for disposal and removal of common and hazardous waste; and

- handle and dispose of all hazardous and banned materials in accordance with national and local regulations - such materials include, but are not limited to asbestos, underground storage tanks, polychlorinated biphenyls (PCBs), abandoned chemicals (petrol, pesticides, herbicides, flammable and combustible substances), freon from cooling equipment, lead-based paints, smoke detectors and mercury-containing switches; and
- pay all associated disposal fees.

If a project-specific waste management plan is to be implemented and deployed, ensure that all site personnel, including management and staff, subcontractors and material suppliers, are fully aware of the specific procedures and requirements and have access to or copies of the waste management plan.

The disposal of rubbish and construction waste materials by burning on the site is NOT permitted under any circumstances.

1.3.2.8 Site Security

Accept responsibility for the security of the site, the works, plant and materials during and after working hours, over the period of the contract, and:
- take all reasonable precautions and make provision for the general security of the site, including unauthorised access to the site, to the works and to adjoining properties; and
- safeguard the site, the works, plant and materials from damage and theft.

1.3.2.9 Dust & Noise Control

Take measures to minimise nuisance from dust, noise and other causes affecting adjoining properties and the public.

Dust:
- The effects of dust shall be appropriately managed within the boundary of the site.
- Comply with the conditions of the Resource Consent/Building Consent related to dust control.

Noise:
- Permitted construction noise levels shall be less than the maximum limits required by the Territorial Authority and NZS 6803.
- Comply with the conditions of the Resource Consent/Building Consent related to noise control.
- As required, prepare a site-specific Construction Noise Management Plan.

1.3.2.10 Stormwater & Sediment Control

Carry out excavation and construction works and operations to ensure that they fully comply with the relevant controlling environmental authority's sediment control and stormwater discharge guidelines.

Provide suitable measures to prevent or minimise sediment generation and silt runoff. If at any time the performance of the stormwater and sediment control works, or ongoing review of them, indicates that they need to be extended or modified, the design modification and construction shall be undertaken at no extra cost to the Principal.

1.3.2.11 Concrete & Cement Wash-Water Control

Carry out construction works and operations to ensure that they fully comply with the relevant controlling environmental authority's requirements for concrete and cement wash water control.

Provide suitable protective measures necessary to prevent the runoff of concrete/cement wash-water or slurry from entering drains and waterways, and contaminating existing paved or landscaped areas and adjoining properties (public or private). Such measures shall be maintained and remain in place as necessary for the duration of the works.

1.3.2.12 Construction Vibration

Comply with the conditions of the Resource Consent/Building Consent related to vibration control. Where required, prepare a site-specific Construction Vibration Management Plan.

Construction vibration monitoring shall be undertaken and assessed during construction in accordance with DIN 4150-3:1999; to demonstrate that vibrations to third-party buildings and structures generated from on-site construction activities are less than the maximum limits recommended in DIN 4150-3:1999 and conform to the conditions of the Resource Consent/Building Consent. Peak particle velocity (ppV) limits applied shall be as required by the Resource Consent/Building Consent.

Vibration monitoring shall be carried out at the property boundary. Additional monitoring inside the neighbouring property shall be carried out where the vibration limits at the boundary exceed the permitted level or when complaints are received. Where access is granted such additional monitoring shall be carried out either outside the building but connected to the building foundation or inside the building.

1.3.2.13 Shoring

Accept responsibility for and make all necessary arrangements, for the provision and maintenance of shoring required during the course of the contract works to prevent subsidence and collapse of adjacent ground, structures and public and private property, and to ensure the safety of site personnel and the public.

Shoring shall remain in place as necessary and until foundations and below ground structures have been completed, and the stability of adjacent ground, structures and public and private property is secured.

Shoring - generally:
- Shoring shall be undertaken in accordance with the 'Approved Code of Practice for Safety in Excavation and Shafts for Foundations'.
- Shoring must be designed in accordance with sound engineering practice, and materials used must be suitable and of sound quality.
- Shoring for large and extensive excavations shall be designed by a Registered Engineer.
- Shoring must be placed in a proper and workmanlike manner.
- Drawings of the temporary works must be available at the job site.
- The shoring of a face must be carried along with the excavation with the least possible delay between the excavation of the face and the completion of the shoring.

- Shoring must not be altered, dismantled or interfered with, except on the instructions of the Contractor.

1.3.2.14 Construction-Keyed Locksets

Locksets shall be temporarily keyed alike for construction use to access approved spaces, and replaced with master-keyed cylinders in accordance with the Door Hardware Schedule and security requirements.

1.3.3 Protection of Existing Features

1.3.3.1 Survey Marks

Preserve and maintain in their true position all survey marks other than marks which are required to be covered or removed by the contract works. Accept responsibility to reinstate/replace any survey mark that is disturbed or obliterated by the works.

1.3.3.2 Adjacent Sites

Take all necessary care to prevent damage to adjoining public and private property, such as existing buildings, existing roads, footpaths, fences, site services, trees, landscaping site features, until completion of the works. Any adjoining public or private property damaged by the Contractor's construction activities, or failure to protect these, shall be reinstated/made good to the required standard.

Accept responsibility for keeping all public thoroughfares clear and free of debris and contamination from the contract works.

1.3.3.3 Existing Trees & Site Features

Take all necessary precautions and make appropriate provisions to protect from damage existing trees, gardens, fences, walls, gates, hard paving or other existing site feature designated to remain intact while the contract works are being carried out.

Requirements when working around protected trees:
- comply with Territorial Authority requirements and with the requirements of the Resource Consent/Building Consent.
- provide and erect protective fencing around the drip line of all existing trees to be protected. Note: for fastigiate species (those with erect, almost parallel branches) the tree-protection zone equals half the height of the tree and the tree root zone may extend well beyond the canopy drip-line.
- if any protected tree requires pruning to allow for scaffold installation, crane or vehicle movements, or materials' storage, notify the Contract Administrator and seek written instruction before undertaking any pruning.
- when operating plant or machinery near the tree-protection zone all care must be taken to avoid damage to the trunk and branches of the tree.
- no vehicles may be parked within the tree-protection zone.
- no construction materials, equipment or liquids may be stored within or near the tree-protection zone and care must be taken to stop run-off from construction debris, fuel or rinsing of plant and equipment from entering the soil in or around the root zone.
- do not attach notice boards, telephone cables, taps or other services to any part of a protected tree.
- Cconcrete mixing should not be carried out within 10m of the tree-protection zone.

- any excavation inside the drip line or root zone of a protected tree shall be dug by hand, air-spade or hydro jet.
- any roots exposed during excavation must not be ripped, pulled or torn by machinery, and should be immediately covered with sacking or similar material and kept moist.
- should roots larger than 20mm be discovered during excavation inside the drip line of a protected tree, notify the Contract Administrator and only recommence work when written approval has been obtained from them.

1.3.3.4 Existing Site Services

Take all necessary precautions and make appropriate provisions to protect from damage and contamination existing services (buried, fixed, suspended) within the works area that are designated to remain intact while the contract works are being carried out.

Accept responsibility to:
- as required, cooperate with the requirements of the utility network operators; and
- provide as necessary all temporary covers, caps, etc., to prevent any moisture, dust and other contaminants entering service ducts, conduits, pipes, control boards, etc.; and
- ensure that manholes, pits, hydrants, tobys and other surface openings in the vicinity of the works are not concealed by construction amenities, plant, materials, etc.

1.3.3.5 Access Routes

Take all necessary precautions and make appropriate provisions to protect access routes through the building(s) and areas adjacent to work area(s) that are designated to remain in place and operational while the contract works are being carried out, and in accordance with any staging plan(s) programmed for the execution of the works.

Comply with Fire Egress and Territorial Authority requirements and conditions of the Building Consent at all times.

1.3.3.6 Explosives

The use of explosives in the contract works is prohibited.

1.3.4 Traffic Control, Crossings & Plant

1.3.4.1 Traffic Control & Management

Comply with all Resource Consent/Building Consent conditions related to vehicular and pedestrian traffic movements and control.

The normal flow of traffic, including pedestrian traffic, on any public road or private access road, or railway, or property affected by the works, shall not be unreasonably interrupted during any operations covered by the contract.

Adequate safeguards to the public in respect of temporary fences, signals, signs and lights shall be provided by the Contractor at all times. Where traffic signs are necessary, these shall be provided and operated in accordance with the Regulatory Authority or NZ Transport Agency (NZTA) guidelines, as applicable, but erected only with the prior written approval of the Regulatory Authority or NZTA and the Contract Administrator.

Where a Traffic Management Plan (TMP) is required, prepare, operate and update this plan as necessary throughout the duration of the works. The TMP shall conform to the requirements of the Regulatory Authority or the NZTA, as applicable. Obtain TMP prior-approvals, and maintain the TMP for the entire construction duration.

Vehicle movements shall only take place during the hours of work specified elsewhere herein.

Provide adequate signs, safety cones, barriers, etc., to control on-site traffic entering restricted and dangerous areas, and as necessary for the movement and control of on-site traffic.

Remove dirt and contamination deposited on public or private thoroughfares from vehicles servicing the site to the satisfaction of the appropriate authorities.

1.3.4.2 Temporary Vehicle Crossings

Form a temporary vehicle crossing for use by construction traffic for the duration of the contract. Refer to the drawings for designated location. Comply with Regulatory Authority requirements for the construction of temporary vehicle crossings. Ensure the temporary vehicle crossing is capable of supporting the heaviest loads to be delivered to the site.

Maintain temporary vehicle crossings to the required standard until it is no longer required for construction traffic. When obsolete, remove crossing and reinstate surfaces as specified and as shown on the drawings.

1.3.4.3 Protect Existing Vehicle Crossing

Provide protection to existing vehicle crossings designated for use by construction traffic for the duration of the contract.

Comply with Regulatory Authority requirements for the installation of any temporary protection required for the crossing. Ensure the temporary protection is capable of supporting the heaviest loads to be delivered to the site.

Maintain the crossing to the required standard until it is no longer required for construction traffic. Carry out any required remedial/replacement work to the crossing, as a result of damage caused by the works during the contract period, in accordance with the requirements of the Regulatory Authority.

1.3.4.4 Wheel-Wash Area

Where required, either due to the nature of the work or as a condition of the Resource Consent/Building Consent, establish, service, maintain and use a suitable wheel-wash system for all vehicles exiting the site so that mud is not tracked off site onto sealed roads.

1.3.4.5 Plant & Equipment

Provide suitable temporary stormwater contamination control provisions in areas designated for the refueling and overnight parking of plant and equipment as will prevent pollution to stormwater courses, natural water ways and groundwater. Take all necessary measures to ensure that no hydrocarbons or other contaminants are allowed to drain to ground during any operation.

Any soils which may have been contaminated by hydrocarbons must not be spread on-site, but shall be disposed of in a controlled manner suited to the type and level of contamination, including, but not limited to, double bagging and disposal at a registered contaminated landfill, if appropriate.

Ensure all plant and equipment fully complies with relevant health and safety requirements at all times of operation.

2 CONCRETE

2.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

2.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1170.0:2002(AS/NZS)	Structural design actions - Part 0: General principles
1170.1:2002(AS/NZS)	Structural design actions - Permanent, imposed and other actions
1170.2:2011(AS/NZS)	Structural design actions - Wind actions
1170.5:2004(NZS)	Structural design actions - Earthquake actions - New Zealand
1554.3:2014(AS/NZS)	Structural steel welding - Part 3: Welding of reinforcing steel
3101.1&2:2006(NZS)	Concrete Structures Standard
3104:2003(NZS)	Specification for concrete production
3109:1997(NZS)	Concrete construction
3112.1:1986(NZS)	Methods of test for concrete - Tests relating to fresh concrete
3112.2:1986(NZS)	Methods of test for concrete - Tests relating to the determination of strength of concrete
3114:1987(NZS)	Specification for concrete surface finishes
3121:2015(NZS)	Water and aggregate for concrete
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
3124:1987(NZS)	Specification for concrete construction for minor works
3125:1991(NZS)	Specification for portland-limestone filler cement
3404.1&2:1997(NZS)	Steel Structures Standard
3604:2011(NZS)	Timber-framed buildings
4455.1:2008(AS/NZS)	Masonry units, pavers, flags and segmental retaining wall units - Masonry units
4672.1:2007(AS/NZS)	Steel prestressing materials - General requirements
4680:2006(AS/NZS)	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles

2.3 ICF Insulating Blockwork

2.3.1 Scope

Supply, install and construct IFC Insulating Block walls, including block modules, reinforcement and infill concrete, to the locations and details identified on the design drawings, complete with all necessary components and accessories and equipment required for proper installation and performance. All aspects of this work shall be carried out in

accordance with the IFC system manufacturer's design and installation manuals and guidelines, in compliance with the New Zealand Building Code and the design documentation, and other relevant product manufacturers' recommendations.

For the purpose of this specification, the ICF system manufacturer's publications, including design guidelines, installation manual, detail drawings, etc., are collectively referred to as the 'Technical Literature'.

This section should be read in conjunction with other specification sections, in particular, Concrete and Reinforcing Steel, as they are interrelated.

The following is a list and/or general description of the extent of ICF Insulating Blockwork works, which are more specifically defined in the contract documents, required for the completion of the contract works:

2.3.2 Requirements

2.3.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

2.3.2.2 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades, as required, to construct ICF Insulating Blockwork elements to the required standard.

2.3.2.3 Workmanship

Where required by the NZ Building Act 2004 it is the building Contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner. On request, submit evidence of experience, relevant qualifications, LBP Licence. Upon completion, the installing LBP shall complete and sign a Restricted Building Work (RBW) memorandum and shall issue a copy to the Building Consent Authority and, where applicable, to the Main Contractor.

Installation of ICF blockwork shall only be carried out by suitably trained and skilled personnel, approved by the ICF system manufacturer to install the ICF system, familiar and experienced with the ICF system's construction and installation techniques, in accordance with the ICF block system manufacturer/distributor Technical Literature.

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of the works are carried out to the highest standard.

All cutting, drilling and notching of ICF blocks and blockwork shall be exactly as recommended by the manufacturer and carried out using suitable tools and equipment.

Except where specified otherwise in the design documents, construction tolerances of ICF blockwork shall be as stated herein. All walls shall be constructed true to line, level and plumb, and to the dimensions indicated on the design drawings. Where there is any discrepancy, obtain clarification from the Contract Administrator before proceeding.

ICF Blockwork Limits:
- Deviation from plan location: 20mm.
- Deviation from vertical within a storey: 10mm per 3.0m.
- Relative displacement between load-bearing walls in adjacent stories intended to be in vertical alignment: 5mm.

Deviation from Line to Plan:
- Any length up to 10 metres: 5mm.
- Any length over 10 metres: 10mm.

Deviation from Horizontal:
- Any length up to 10 metres: 5mm.
- Any length over 10 metres: 10mm.

2.3.2.4 Delivery & Handling

Take delivery of materials and accessories undamaged. Reject any item found to be defective or damaged and contact the supplier for replacement.

Store ICF block materials off the ground, undercover and out of direct sunlight, on a flat, even surface in accordance with the manufacturer's requirements. Keep stored ICF block materials dry and protected from imposed loads and physical damage and contamination. Keep ICF blocks away from ignition sources and open flame at all times. Do not allow solvents to come into contact with ICF blocks.

Do not use damaged or defective materials and products, or products that are beyond the designated shelf life.

Handle ICF block modules in accordance with the manufacturer's requirements as set out in the relevant Technical Data Sheets, and in a manner that prevents damage to the modules and does not reduce or impinge on the construction or performance of the ICF blockwork elements.

Installers shall be familiar with and comply with the manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

Installers shall conform to all relevant WorkSafe NZ Guidelines and Codes of Practice - including the Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

2.3.2.5 Inspections & Reporting

BCA inspections of the works shall take place at each of the stages scheduled in the Building Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

All stages of ICF blockwork shall be reviewed in accordance with the requirements of NZS 3109: Section 1.3, and the conditions of the Building Consent.

All inspections shall be properly documented by the Contractor. Provide all necessary quality control checklists prior to pouring and in sufficient time for pre-pour inspection.

Give notice and provide reasonable opportunity to inspect the section of work prior to pouring. Before placing any section of ICF infill concrete, give at least 24 hour's notice for the inspection of the works. Any instructions issued shall be carried out to the satisfaction of the Contract Administrator and/or BCA before placement of infill concrete. Unless approval is given by the Contract Administrator and/or BCA, no concrete shall be placed in that section of work.

Carry out all necessary pre-installation and installation inspections for each area of the works.

Complete all necessary Pre-Installation Checklists, and all necessary Installation Checklists.

Complete all necessary Sign-Off Certificates before handing over completed work.

2.3.2.6 Temporary Propping System

Provide and maintain adequate propping and support to ICF block walls until the walls have been filled and the infill concrete has cured and achieved the specified design strength, and the walls are adequately built into the final structure. All temporary propping and bracing requirements shall be in accordance with the ICF system manufacturer's specifications. Any damage resulting from failure or neglect to provide adequate propping and support to ICF blockwork during construction shall be repaired to the satisfaction of the Contract Administrator.

2.3.2.7 Producer Statement

Furnish a fully completed Producer Statement when the works are sufficiently complete and ready for application for a Code Compliance Certificate. The Producer Statement shall cover the construction of the ICF Insulating Blockwork elements indicated on the design drawings.

2.3.2.8 Tanking & Waterproofing of ICF Blockwork

Tanking & Waterproofing of ICF Blockwork - by others, refer to separate specification section, Waterproofing.

2.3.2.9 Acrylic Plaster Finishes to ICF Blockwork

Acrylic Plaster Finishes to ICF Blockwork - by others, refer to separate specification section, Plasterwork.

2.3.3 ICF Blocks

2.3.3.1 250 Series ICF Blocks

250mm Series ICF Blocks. 250mm wide, proprietary ICF Straight Block modules and Corner Block modules (LH, RH) with 50mm thick preformed face shells manufactured from fire-retardant H-Grade EPS (expanded polystyrene) with a nominal density of 24-26 kg/m³. The polystyrene face shells are assembled together by the installer using the manufacturer's proprietary spacer ties/bridges to form individual block modules. The face shells are formed

with interlocking edges, which when assembled as block modules are snapped together on site to form the ICF blockwork elements.

Installed in accordance with the ICF system manufacturer's Technical Literature, complete with all components and accessories required for the construction of ICF walls identified on the design drawings.

Refer to structural engineers drawings for sizes and brand.

2.3.4 Reinforcement

2.3.4.1 Reinforcement

Reinforcement - refer to separate specification section, Reinforcing Steel. ICF blockwork reinforcement shall be as specified on the design drawings and placed in accordance with NZS 3109. Reinforcing bars shall conform to AS/NZS 4671.

2.3.5 Concrete Infill

2.3.5.1 Concrete Infill

Concrete Infill - refer to separate specification section, Concrete. Unless specified otherwise herein or on the design drawings, Concrete infill shall achieve a minimum compressive strength of 20 MPa (at 28 days), and have a maximum aggregate size of 14mm. Concrete slump shall comply with the ICF system manufacturer's requirements. Expansive admixtures must not be used under any circumstances. The concrete shall be produced in accordance with NZS 3104 from a New Zealand Ready Mixed Concrete Association audited plant.

2.3.6 Installation

2.3.6.1 Blockwork

Assemble and construct ICF block walls in accordance with the ICF block system manufacturer's Technical Literature to the locations, layout and details indicated on the design drawings.

Install ICF blockwork on a level concrete footing or foundation wall or floor slab - which must be level to within 5mm in 5m, and shall be dry and clean, free from all moisture, laitance, dirt and other materials/contaminants.

Install all necessary temporary propping and bracing required to hold the blockwork inplace during concrete placement and consolidation, and until the concrete has sufficiently cured.

Assemble ICF block modules together using the manufacturer's proprietary spacer ties/bridges in accordance with the Technical Literature.

The bottom course of blocks shall be accurately positioned inplace and fixed and sealed to the concrete base with the use of a suitable adhesive expanding foam, and with end-joints butted together without gaps.

Install successive block courses in a running-bond pattern with vertical joints staggered by at least 150mm as permitted by the interlocking rebates, ensuring the blocks are correctly

interlocked and aligned with the blocks below, and end-joints are butted together without gaps.

Keep block spacer ties/bridges vertically aligned so as to form uninterrupted vertical cavity stacks. As modules are installed, routinely check that the blockwork is true to line, level and plumb, and ensure the correct wall dimensions are achieved.

As necessary, adequately seal the blockwork along the bottom course and at corner junctions, cut joints, service penetrations, etc, against concrete leakage with an adhesive expanding foam.

Install blockwork at corner junctions and 'T' intersections in accordance with the Technical Literature to allow concrete infill to flow into the adjoining wall without interruption, and with reinforcing steel correctly placed as per the design drawings.

Install blank stop-ends to block modules where the end of a wall does not intersect and/or is terminated with a vertical edge.

Window and door opening locations, sizes and edge profiles shall be as indicated indicated on the design drawings, and the head/lintel and jambs formed, propped and braced with timber formwork. Sills shall be formed as per the ICF system manufacturer's recommendations and as detailed on the design drawings.

As the work proceeds, place all required reinforcing steel according to the design drawings, and tie off at intersections, rebar laps, joints etc.

Take all necessary care to ensure no debris is dropped into the wall cavity during installation. Any debris at the base of the wall must be removed via clean-out ports cut into the base of the wall prior to concreting.

Before concreting, build in all necessary bolts, straps and fixings for structural and non-structural fittings, and other items required for the work. Any cast-in fixings should have polystyrene removed to provide the minimum required concrete cover around the fixing as per the Technical Literature or as specified on the design drawings. Only as indicated on the design drawings, ensure all required penetration sleeves and ducts for piped/cabled/other services, as indicated on the drawings, before concreting. Ensure any built-in services fittings are correctly fitted and secured, and are sealed against concrete/grout leakage.

Blockwork should be built up to full height, no higher than recommended by the ICF system manufacturer, before any infill concrete is poured.

2.3.6.2 Concreting

Concreting shall not commence until the ICF blockwork stage, reinforcement and built-in items are complete, and the blockwork cavity is clean and free from debris, and the work has been inspected by the relevant parties and written approval to proceed has been received.

The maximum extent of the pour and the maximum height of individual lifts in the pour shall be no more than as specified by the ICF system manufacturer. Each lift must have gone 'plastic' before the next lift is poured on top.

Infill concreting shall be carried out in accordance with NZS 3109 and the ICF system manufacturer's guidelines. Consolidation of infill concrete shall be by rodding only, or where permitted by the ICF system manufacturer, with the use of a pencil vibrator as per their recommendations.

When filling around reinforcement, ensure that the correct position of the reinforcing is maintained and not displaced. Prevent any movement of projecting reinforcement while the concrete is setting.

Where a construction joint is formed between pours, the concrete must be wire-brushed to an acceptable roughness and the exposed surface washed clean.

Clean down exposed blockwork surfaces to remove concrete splashes and grout seepage before the concrete sets.

2.3.6.3 Completion

Only when the infill concrete has cured and authorisation given, shall the ICF blockwork bracing, propping and formwork be dismantled and removed.

Clean down exposed blockwork surfaces as necessary to remove adhesive foam and any concrete splashes etc. Cut flush any protruding wire ties etc.

Check for damage and defects, and repair or make good as necessary to the required standard.

Leave this work complete and structurally sound, and to the required standard.

Clean up thoroughly, and leave adjacent surfaces and finished work clean and free of damage and contamination. Remove all associated rubbish and excess material from site.

Provide all associated Producer Statements.

2.4 Concrete

2.4.1 Scope

This section sets out the requirements for the supply, forming, casting and finishing of all concrete and concrete elements, including precast concrete elements if required, and the building in of all cast-in items, required for the satisfactory completion of the works. All aspects of this work shall be carried out to comply with the requirements of the New Zealand Building Code and relevant Standards, and in accordance with the project design documentation, and with any relevant product manufacturers' recommendations.

The supply and fixing of reinforcing for concrete is covered in separate specification Reinforcing Steel.
The supply and placing of blockwork grout is covered in separate specification section Blockwork.

The following is a list and/or general description of the extent of Insitu Concrete works, which are more specifically defined in the contract documents, required for the completion of the contract works:

2.4.2 Requirements

2.4.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, in particular the 'Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry'.

Precast concrete shall be handled in accordance with the WorkSafe 'Approved Code of Practice for The Safe Handling, Transportation and Erection of Precast Concrete'.

Carry out all construction operations in accordance with the Contractor's project-specific Health and Safety Plan.

2.4.2.2 Quality Assurance - Option 1

Ensure that the construction of all concrete work complies in all respects with the design drawings and the specifications.

Prepare and submit details of the quality assurance procedures for concrete work for approval. These procedures should encompass all aspects of concrete construction.

The quality assurance procedure shall encompass all aspects of concrete construction including, but not limited to:
- concrete quality; and
- formwork quality; and
- construction tolerances; and
- reinforcing steel placement; and
- cast-in items; and
- concrete finishes.

Notify the name of the concrete construction representative to be responsible for the quality control of concrete work. The nominated representative shall complete and sign a written quality control checklist for each on-site concrete pour. A copy of each completed checklist shall be submitted to the Contract Administrator before pouring commences, and in sufficient time for pre-pour inspections to be carried out. The format and detail of the checklist shall be agreed to prior to the commencement of any concrete work.

Supply evidence of concrete production quality standards in advance of construction in accordance with the requirements of NZS 3109.

2.4.2.3 Tolerances

Unless specified otherwise, dimensional tolerances of concrete work shall conform to NZS 3109: Table 5.2 - 'Tolerance for insitu construction', and NZS 3109: Table 5.1 - 'Tolerance for precast components', and to NZS 3114 for off-the-form and unformed surface tolerances.

To ensure that elements such as external cladding, precast items, and lifts will properly fit the building, maintain responsibility for the accurate control of the overall set-out of the concrete structure and concrete elements.

An absolute tolerance on the position of all structural elements of 15mm shall be maintained over the full height of the structure in all directions.

Employ a registered surveyor to reset all gridlines and column positions at every second floor. Column locations, slab edge positions and positions of openings shall be adjusted to ensure that each in within 10mm of the correct position through the height of the building.

Take particular care to ensure that individual members and the building structure as a whole do not twist over the height of the building.

2.4.2.4 Erection & Temporary Works

Maintain responsibility for all erection, propping and temporary support of the works, and any other works required for the completion of the contract works, including lifting design, rigging analysis, propping and shoring design.

The extent and details of the erection systems, propping, etc., will be dependent on proposed construction methods, transport and handling methods, and construction programme. Where required, engage a Chartered Professional Engineer experienced in this type of work to undertake the design and supervision of erection systems, propping, etc. Provide written confirmation that this has been done to the Contract Administrator.

Any additional reinforcement to suit temporary erection or support methods shall be the responsibility of the Contractor.

2.4.2.5 Inspections

All stages of the concrete construction work shall be reviewed in accordance with the requirements of NZS 3109: Section 1.3, and the conditions of the Building Consent.

All inspections shall be properly documented by the Contractor. Provide all necessary quality control checklists prior to pouring and in sufficient time for pre-pour inspection.

Give notice and provide reasonable opportunity to inspect the section of work prior to pouring. Give at least 1 working day's notice of intent to place concrete in any area.

Any instructions issued shall be carried out before concrete placing commences. Unless approval is given by the Contract Administrator and/or BCA, no concrete shall be placed in that section of work. Any concrete placed without authorisation may require removal from the works at the Contractor's expense.

2.4.2.6 Materials & Workmanship

Adhere to the requirements of NZS 3109, except where specified otherwise or instructed by the Contract Administrator.

2.4.2.7 Samples

Prepare and submit for approval sample reference panels as specified - refer to Samples clause.

2.4.2.8 Producer Statement

Furnish a fully completed Producer Statement when the works are sufficiently complete and are ready for application for a Code Compliance Certificate. The Producer Statement shall cover all concrete construction work completed under this section of the specification - Concrete.

2.4.3 Reinforcement

Refer to separate section Reinforcing Steel.

Store reinforcing steel material flat, clear of the ground, on evenly spaced bearers, in a secure area clear of the building works. Keep materials protected from damage and contamination at all times. Do not use damaged, distorted or defective material.

Ensure that all reinforcing is adequately supported off the ground and remains clean from delivery until placing. Before placing reinforcing steel, check that it is free of any loose mill scale and any contamination that may impair bonding to concrete.

Take all necessary measures to ensure that reinforcing steel is not damaged or displaced during concreting.

2.4.4 Formwork

Formwork shall conform to NZS 3109: Section 5, and comply with the provisions of NZS 3114 applicable to the class of surface finish specified.

Formwork and falsework shall have sufficient strength to retain and support the wet concrete being placed to the required profiles and tolerances.

The formwork surface finish shall be of suitable quality necessary to produce the specified concrete finish. Any formwork with a deteriorated or damaged surface that does not meet the requirements of the surface finish shall not be used.

Fair-faced concrete formwork shall be constructed so as to provide straight and true angles and so as to produce cast surfaces within a maximum tolerance of 5mm of the given dimensions, and without visible offsets, bulges, or misalignment of the concrete. Form neat, clean arrised edges, except where chamfers are indicated on the drawings or required to match existing detail - in which case the fillets shall form part of the mould and not be loosely placed.

Plywood formwork shall be constructed from Formply plywood sheets or C-grade faced standard plywood sheets (according to concrete finish), placed in a regular pattern and tightly butted together to avoid grout loss. The joints shall be sealed to prevent grout loss. Plywood formwork shall not be permitted to stain visually exposed concrete. Unless indicated otherwise on the drawings, timber or plywood formwork shall have 20mm fillets at the inside corners of beams, columns and walls.

The formwork face shall be adequately clean and treated with a general purpose concrete form release agent in accordance with the manufacturer's requirements. Diesel oil based products are not permitted. Care shall be taken to ensure that the release agent is kept out of contact with the reinforcement and is compatible with any subsequent paint or finish system applied to the finished concrete.

All ties and spreaders shall be of an approved type and placed so as to leave a regular, neat pattern on the concrete surface when withdrawn and filled. The ends of cast-in ties shall be set at least 40mm from the concrete surface. Wire ties are not permitted for the purpose of restraining, securing or supporting formwork.

Steel formwork shall be used where specified or appropriate, with all joints welded and ground smooth and flush to a uniform surface. All internal corners shall be formed by folding the steel, not butting.
Any surface required with a ribbed or grooved surface shall be formed by adhering battens of the appropriate profile to the form bed and/or mould, and treated generally as above.

Erected formwork shall be set and checked for dimensional accuracy and alignment before, during and after concreting, and any damaged formwork replaced. All debris shall be removed from the formwork immediately before concrete is placed.

When not in use, formwork shall be cleaned, oiled and stored flat on an even surface, and protected from exposure to moisture and contamination on all sides.

Formwork shall be removed without shock or vibration and in such a manner as to prevent damage and to permit the concrete to take the imposed stresses gradually. Do not permit bars or other tools to lever against set concrete when removing formwork. Any damage to the concrete occurring during removal shall be repaired by an approved method at the Contractor's expense.

Removal of formwork in multi-storey structures shall conform to NZS 3109: Section 5.4.5.

2.4.5 Finishes

2.4.5.1 NZS 3114

Unless specified otherwise in this specification or on the drawings, concrete finishes shall comply with the provisions of NZS 3114 applicable to the surface finish class specified.

Concrete surface finishes not specified in this specification or on the drawings shall be in accordance with Table 1 or Table 2 of NZS 3114 according to surface type, location and application/use.

2.4.5.2 Schedule of Surface Finishes

Schedule of Surface Finishes (according to application):
- Slabs to take plaster or tiles: *U2 Class Finish.*
- Other slabs: *U3 Class Finish*.
- Top surfaces of foundation beams and pads: *U2 Class Finish*.
- Concrete below ground: *F1 Class Finish*.
- Concrete to take plaster or tiles: *F2 Class Finish*.

- Concrete surfaces not exposed in the finished building: *F3 Class Finish*.
- Concrete surfaces exposed inside or outside the finished building: *F5 Class Finish*.
- Precast concrete surfaces exposed finishes: *F5 Class Finish & U3X Class Finish* - as described herein (sample required).
- Feature architectural finish: *F6X Class Finish* - as described herein (sample required).
- External walkways and landings: *U5 Class Finish (soft broom)*.
- Exterior paving: *U2E Class Finish* - exposed aggregate as described herein (sample required).

Description of Specific Concrete Finishes:

2.4.6 Concrete

2.4.6.1 Normal Concrete

Unless specified otherwise herein, all concrete except for 'no fines' concrete shall be Normal Concrete (N) Grade as defined by NZS 3109, produced in accordance with NZS 3104 from a New Zealand Ready Mixed Concrete Association audited plant, with sufficient cement quantity to ensure satisfactory finish and durability.

Normal Concrete maximum aggregate size shall be 19mm. Calcium chloride shall not be used.

Cement shall comply with:
NZS 3122: 'Specification for Portland and blended cements (General and special purpose)';
NZS 3125: 'Specification for portland-limestone filler cement'.

Chemical admixtures use in Normal Concrete shall comply with AS 1478.

'No fines' concrete shall be coarse aggregate/cement/water mix without sand but with selected aggregate where necessary.

The aggregate used, and overall mix design (including the use of additives) of Normal Concrete, shall meet the provisions of Section 2 of CCANZ TR 3 Alkali Silica Reaction. Evidence of this may be required by the Contract Administrator. Use of low alkali cements or aggregates from an alternative source may be required where the aggregate contains deleterious material.

Normal Concrete used in the works shall have the following minimum strengths at 28 days unless noted otherwise on the drawings:
- Blinding concrete: *10 MPa*.
- 'No fines' concrete: no minimum strength.
- Bored piles: *25 MPa*.
- Foundation pads and strip footings: *25 MPa*.
- Floor slab-on-grade: *30 MPa*.
- Superstructure generally: *30 MPa*.
- Precast concrete: *30 MPa*.
- Toppings to proprietary suspended floor systems: *30 MPa*.

- All other structural concrete not specifically mentioned: *25 MPa*.
- Driveways, pavements, landscaping: *20 MPa*.

Supply details of Normal Concrete mix designs for review prior to the ordering of any concrete.

Where a mix from the Normal Concrete range is specified with a special requirement as specified in NZS 3109, then it becomes a Special Concrete (S) - refer to Special Concrete.

2.4.6.2 Prescribed Concrete

Prescribed Concrete (P) as defined by NZS 3109, shall conform to the provisions outlined in NZS 3104.

Production of Prescribed Concrete is limited to 10, 15, 17.5, 20, and 25 MPa nominal strengths at 28 days. Prescribed Concrete mixes of 10 MPa and 15 MPa shall not be used for reinforced concrete applications.

Prescribed Concrete mixes shall comply with NZS 3104:Table 3.1. On request, the concrete producer shall certify compliance with the the batching requirements of Table 3.1.

Prescribed Concrete shall be batched using Builder's Mix aggregate with a maximum aggregate size of 19mm, and conform to NZS 3104: Table 3.2 - Combined grading requirements.

Unless specified otherwise herein or on the drawings, where a Prescribed Concrete mix uses separate aggregate and sand materials instead of builder’s mix, the individual proportions shall be specified by a mix designer employed by the concrete producer. Coarse aggregate shall have a nominal maximum size 19mm or greater, but not exceed 37.5mm, and shall be graded in accordance with NZS 3104: Table 2.1.

Prescribed Concrete used in the works shall have the following minimum strengths at 28 days unless noted otherwise on the drawings:
- Site concrete and bedding concrete: *10 MPa*.
- General purpose applications, footpaths, implement sheds: *15 MPa*.
- As required for NZS 3604 or NZS 4229: *17.5 MPa and 20 MPa*.
- As required for NZS 3604 and NZS 4229 for exposed concrete in a sea spray zone: *25 MPa.*

2.4.6.3 Concrete Tests & Non-Compliant Concrete

The Ready Mix Supplier shall carry out and evaluate control tests in accordance NZS 3104, and shall pay the costs of such tests. Tests shall be made at the site at the discretion of the Contract Administrator if dissatisfied with the plant testing procedure. Submit all test results to the Contract Administrator.

In addition to the tests required by NZS 3104, allow to take test cylinders on site at random for each pour of concrete, in accordance with NZS 3112.2: Clause 3. Make four standard cylinders for the first 25m³ of concrete placed, or part thereof and test in an approved laboratory. Make four standard cylinders for each subsequent 100m³ of concrete placed, or

part thereof and test in an approved laboratory. Test results for breaking one cylinder at 7 days and the remaining three cylinders at 28 days shall be forwarded to the Contract Administrator on completion of the test together with details of where the concrete was placed in the structure.

Delivery dockets and other certified records of concrete quality shall be kept on site for inspection.

Failure to conform with the requirements of this specification or failure to provide or complete the concrete manufacturer's delivery docket could result in ready mix concrete being subject to rejection at time of delivery.

In accordance with the Contract Administrator instructions, rejected placed concrete shall be cut out, removed from site and replaced with new concrete.

2.4.7 Concreting

2.4.7.1 Handling, Placing & Compaction

All concreting shall conform to NZS 3109 unless modified in this specification.

Concrete shall be transported, handled, placed and compacted so as to:
- Prevent segregation or loss of materials;
- Produce a monolithic mass between planned joints or the extremities of members, or both;
- Completely fill the formwork to the intended level, expel entrapped air, and closely surround all reinforcement, tendons, ducts, anchorages and embedments; and
- Provide the specified finish to the formed surfaces of the member;
- Ensure there is no contamination of the concrete;
- Ensure that the transporting, handling, placing and compaction of the concrete is complete before setting reactions have passed the point which prevents the concrete from attaining its potential fully cured properties.

Concrete shall not be pumped without the Contract Administrator's approval. Where such approval is given, only a standard 'structural' concrete mix design may be used - the use of a pump mix design will not be accepted.

Vibrators shall be used for the compaction of all concrete, including floor slabs. Immersion vibrators shall be moved to new positions as frequently as necessary to ensure uniform vibration of the whole mass and fully compacted concrete. On no account shall immersion vibrators be allowed to come into contact with the face of formwork. Vibrators shall not be used to transport concrete along the forms.

2.4.7.2 Curing & Protection

All concrete shall be cured in accordance with NZS 3109:Section 7.8.

The use of concrete curing compounds shall be only as agreed with the Contract Administrator (specifically for each occasion before it is used). Ensure that any agreed concrete curing compound is compatible with subsequent floor coverings or surface treatments, including any sealers, paints, waterproofing membranes, etc.

All concrete elements shall be protected from damage at all times. Any damaged items shall be repaired or remade to the satisfaction of the Contract Administrator.

2.4.7.3 Unfavourable Conditions

Take all necessary precautions and measures during unfavourable conditions, as required by NZS 3109: Section 7.2, to ensure quality and finish of the concrete is not compromised or reduced in any manner.

2.4.8 Construction Joints

2.4.8.1 Construction Joints

The location, type and detail of construction joints shall be as specified and shown on the drawings. Construction joints shall not be repositioned or eliminated from the locations shown on the drawings without approval. Where a construction joint is not specified or shown on the drawings, the location, type and detail of the joint must be approved before work commences.

2.4.8.2 Type A Construction Joint

Type A construction joints shall conform with NZS 3109:Section 5.6.3, used only in areas of low shear stress only. Locate Type A construction joints as shown on the drawings. Where a Type A construction joint is not shown on the drawings, the location of the joint must be approved before work commences.

At each Type A construction joint, concrete shall be placed against previously hardened concrete where the interface for shear transfer is clean, free of laitance, and has been intentionally roughened.

Before concrete pouring commences, give notice and provide reasonable opportunity to inspect preparatory work and formwork etc.

2.4.8.3 Shrinkage-Control Joints - Saw Cutting

Shrinkage-control joints shall be formed in concrete slab-on-grade floors by saw-cut grooves to the layout and details shown on the drawings.

Saw cutting shall be carried out as soon as possible, after the concrete has set and before shrinkage cracking has occurred - typically within 24 hours of pouring, and without excessive chipping, spalling or tearing of the concrete. Saw cuts shall be straight and true and within 10mm of the true joint alignment.

Unless shown otherwise on the drawings, saw cut grooves shall extend to one quarter of the of the slab thickness, and be between 3-5mm in width. Under no circumstances shall the reinforcement through the joint be cut by saw cutting.

As detailed on the drawings, the joint shall be sealed with the specified sealant.

2.4.9 Penetrations and Detailing

Form all penetrations, rebates, fillets, nibs, upstands, and other detailing as shown on the drawings. Sleeves, conduits, pipes, cores or other penetrations shall not be cast in concrete unless they are indicated on the drawings. If not indicated, they must be approved by the

Contract Administrator. All penetrations and concrete detailing shall be accurately positioned and formed at the time of pouring the concrete (without movement or displacement).

Set concrete shall not be cut, hacked or cored unless specific approval is obtained from the Contract Administrator.

2.4.10 Building In

As the work proceeds, build in all anchors, bolts, fixings, and other built-in items as shown on the drawings and as necessary for the satisfactory completion of the works.

Build in all necessary pockets, chases, grooves, pipe and cable sleeves, conduits, fixings, fittings, etc., required by other trades. Liaise with other trades and confirm the requirements and supply of all built-in items related to their work, and shall ensure that such items are supplied and/or positioned.

Unless specified as supplied by another trade or other party, all items specified or indicated on the drawings as built-in shall be supplied by the Contractor.

Where an item is not specified or shown on the drawings as built-in, submit all necessary details for approval before proceeding. Such items shall only be built-in when approved by the Contract Administrator.

Built-in items shall not be repositioned or eliminated from the locations shown on the drawings without prior approval.

Ensure that all built-in items are correctly positioned and that they are not displaced during concreting. Ensure suitable personnel are on call during concreting to correct any displacement that may occur. Advise the Contract Administrator immediately if any built-in item has been positioned incorrectly or left out.

No claim will be recognised for cutting away or drilling concrete work already executed as a result of not conforming to these requirements and making the necessary provisions beforehand.

2.4.11 Cast-In Structural Steelwork Items

All cast-in steelwork that is exposed to weather or water vapour on completion shall be hot-dip galvanised. If welding to the cast-in item is necessary, grind off the galvanising in area of welding, carry out welding, and protect the exposed bare steel with an approved cold galvanising (cold-galv) treatment in accordance with the manufacturer's requirements.

Ensure that all cast-in structural steel items are correctly positioned and that they are not displaced during concreting. Ensure that suitable personnel are on call during concreting to correct any displacement that may occur. Advise the Contract Administrator immediately if any cast-in structural steel item has been positioned incorrectly or left out.

2.4.12 Tanking Below-Ground Concrete

Tanking Below-Ground Concrete - refer to separate Waterproofing section for specification for tanking of below-ground concrete structures.

2.4.13 Foundations

Form concrete foundations to the layout and details shown on the drawings. Concrete foundations shall be cast against formwork on each side unless otherwise approved by the Contract Administrator. Where approval is given to cast against ground, an additional 25mm thickness of concrete will be required on each unformed face to provide additional cover.

Allow to underpin or otherwise support adjacent foundations as necessary to ensure complete stability and no damage to adjacent structures at all times.

Cast in sleeves for all pipes and cables that pass through foundations - coordinate the location of each sleeve with the relevant trade.

Give notice and provide reasonable opportunity to inspect all foundation excavations before placing any tidy concrete or hardfill.

2.4.14 On-Ground Floor Slabs

2.4.14.1 Concrete Floor Slab-on-Grade

Unless specified or shown otherwise, cast ground-bearing concrete floor slabs on a damp proof membrane (DPM) sheet concrete underlay, laid over maximum 25mm thick layer of compacted sand blinding.

The concrete mix should be designed to ensure durability and shrinkage. The use of low sand percentage, a low water content, superplasticiser and air entrainment is required.

Cement content shall not be less than 300 kg/m³, regardless of the minimum specified concrete strength.

The slab shall be constructed between formed construction joints as shown on the drawings, and in a sequence so that two adjacent sections are not poured one after the other.

Immediately after screeding the slab shall be smoothed using a bull float. Finishing shall be carried out with the use of a power float; initially operated with the blades flat, and finally operated with the blades slightly tilted.

All slabs shall have construction joints or saw-cuts at not more than 5.0m intervals in each direction, unless shown otherwise on the drawings.

Along lines of saw-cuts accurately cut out alternate bars of the floor reinforcement and mark the proposed line of saw-cut from outside the pour area. The time of sawing will vary depending on weather conditions, and shall be such as to prevent uncontrolled cracking of the slab. Sawing of the joints shall commence as early as possible, typically within 12-18 hours, and when the concrete has sufficiently hardened to permit cutting without excessive chipping, spalling and tearing. Saw-cuts shall be to the depth shown on the drawings and shall be made using a self-propelled diamond-tipped floor saw machine.

2.4.14.2 Damp-Proof Membrane

Damp-Proof Membrane (DPM) - refer to separate section Waterproofing for specification of damp proof membrane.

Damp-proof membrane shall be continuous under slabs-on-ground and under foundations. Sheet DPM joints shall be overlapped minimum 150mm and continuously sealed with a pressure-sensitive tape or as recommended by the manufacturer.

Damp-proof membrane shall be turned up or down against foundations, walls and columns as appropriate, and tape-seal around protrusions and service pipes.

Protect the DPM during all operations until the floor slab is complete. Repair any damage that may occur or replace damaged DPM with new sections.

2.4.14.3 Under-Slab Insulation

Under-Slab Insulation - refer to separate specification section - Insulation.

Where thermal insulating material is indicated under the concrete slab-on-grade, it shall be accurately positioned so that there is no reduction of any concrete thickness dimension (as indicated on the drawings). Tape-seal sheet joints with a suitable pressure-sensitive tape.

2.4.14.4 Shrinkage-Control Joints - Saw Cutting

Shrinkage-control joints shall be formed in concrete slab-on-grade floors by saw-cut grooves to the layout and details shown on the drawings.

Saw cutting shall be carried out as soon as possible, after the concrete has set and before shrinkage cracking has occurred - typically within 24 hours of pouring, and without excessive chipping, spalling or tearing of the concrete. Saw cuts shall be straight and true and within 10mm of the true joint alignment.

Unless shown otherwise on the drawings, saw cut grooves shall extend to one quarter of the of the slab thickness, and be between 3-5mm in width. Under no circumstances shall the reinforcement through the joint be cut by saw cutting.

2.4.15 Repair & Cleaning of Concrete

2.4.15.1 Proposed Remedial Works

When the exposed concrete surfaces of the building are complete, they shall be closely inspected for faults in surface finish, damage to corners or edges, dirty marks, splashes or dribbles and visible imperfections of every kind.

Submit any proposed remedial work procedures to the Contract Administrator for approval. If proposed remedial work procedures are not approved, remedial work shall be as specified herein.

2.4.15.2 General Repair & Cleaning

All defects and imperfections shall be removed and rectified to the satisfaction of the Contract Administrator.

The removal of surface markings shall be carefully carried out with the use of wire brushing, pumice stone, carborundum stone, or washing and scrubbing - such as will remove the marks without scratching, discolouring or otherwise affecting the surrounding or underlying concrete.

Patching or filling of fair faced concrete and making good broken edges and corners shall be done with coloured sands and cement where necessary to match the colour of the surrounding concrete when dry.

Epoxy or similar adhesives shall be used when required.

2.4.15.3 Repair of Concrete

Conditions for the repair of concrete work shall include, but not be limited to:
- No repair of concrete shall be undertaken without approval of the Contract Administrator.
- Advise the presence of any defective concrete.
- The repair of concrete shall be only be carried out by skilled personnel familiar with the repair techniques and materials required.
- Except when inspection is waived, the repair of concrete shall be carried out in the presence of the Contract Administrator or their representative.
- All filling shall be bonded tightly to the cavity surfaces and shall be sound and free from shrinkage cracks and drumming after the filling has dried and cured.
- The protection of and curing of concrete repairs shall be carried out in accordance with the repair-product manufacturer's requirements.
- If the appearance of the repaired concrete surface lacks uniformity, the Contract Administrator may give direction to apply a bag-rubbed finish to the surface, carried out to the satisfaction of the Contract Administrator.

2.4.15.4 Concrete Repair Using Epoxy Resin

Epoxy resin or epoxy resin bonded repairs shall be used when repairs have not been made within 24 hours after the removal of formwork, or not made within 24 hours after placing unformed concrete. Such repairs shall not be undertaken until the parent concrete has had a minimum of 3 weeks curing.

Imperfections to be repaired with epoxy resin shall be chipped back to sound concrete and the edges of the cavity trimmed square for a minimum depth of 3mm.

Immediately prior to carrying out a repair, the surface of the cavity shall be cleaned of all contaminants by sandblasting, or etching with a 5% solution of hydrochloric acid or other approved method. If acid-etch is used, immediately the foaming ceases the cavity shall be thoroughly flushed and cleaned with clean, fresh water, then completely dried using an appropriate heat source.

Following preparation, the surface of the cavity shall be primed with one or more coats of an approved unfilled epoxy resin prepared and cured in accordance with the manufacturer's requirements.

A compatible epoxy resin with an approved filler, or wet concrete, shall be prepared, applied to the primed surface and trowelled to a smooth finish and allowed to cure. Epoxy resin shall

only be used in accordance with the manufacturer's requirements. Ensure to leave the surrounding surface clean and free from contamination.

The finished repair surface shall conform NZS 3114. Any grinding required shall be carried out using a silicon carbide or other suitable abrasive with water (wet grind).

2.5 Materials

2.5.1 Damp Proof Membrane

Polythene damp proof membrane shall be 0.25mm thick and shall be continuous under slabs on grade or fill and under foundations. All joints lapped 200mm and continuously sealed with pressure sensitive tape. Tape seal around penetrations. Inspect immediately before pouring concrete and repair any holes or other damage.

Trim Polythene DPM neatly to the formwork top edge (apart from at retaining walls where it is trimmed 100mm higher than the formwork), and remove slurry spill etc. before striking formwork, and install rigid sheet DPM protection full height from base of foundation to top of slab, installed section by section as the formwork is removed to avoid concrete chips getting between the DPM and the foundation, and held in place with hardfill that is sufficiently deep to ensure the top of the rigid sheet is held firmly against the slab edge.

Shall be continuous under slabs on a 50mm thick site concrete screed and applied exactly in accordance with the manufacturer's recommendations. Immediately after laying DPM to site screed, overline protect with fibre cement board. Seal around all penetrations.

2.5.2 Reinforcement

Reinforcing grades are identified by bar diameters prefixed with letters thus:

D indicates Grade 300E deformed bar
R indicates Grade 300E plain round bar
HD indicates Grade 500E deformed bar
HR indicates Grade 500E plain round bar
RB indicates Grade 500 Reidbar (uniquely deformation patterned bars)

Imported reinforcing steel will not be accepted without the prior approval of the Engineer. Reinforcing free of loose rust, mill scale, dirt, paint, oil, etc. and stored clear of the ground. Accurately place reinforcing and tie securely to prevent displacement during pouring of concrete. Tie wires must not project into specified concrete cover. Welding of reinforcing is not permitted unless specifically approved by the Engineer.

All terminal ends of reinforcing bars shall be hooked. Intersecting walls, beams and foundations shall contain return longitudinal reinforcement, as detailed for the intersecting members, all to NZS 3109 unless shown otherwise on the drawings.

Unless detailed otherwise all bars assumed to be continuous, with lap lengths not shown otherwise to be 40 diameters for grade 300 steel, 60 diameters for grade 500 steel, 250mm for mesh. Bars shall generally have minimum bends of five times their diameter.

Support slab steel at 1 metre maximum centres. Use plastic spacers for fairface concrete. Co-operate with others to accurately place all block/brick starters, as the bending of starters to the core position will not be permitted.

2.5.3 Concrete Cover

Concrete cover not shown otherwise to be:
- Foundations - 75mm where poured against ground, 50mm elsewhere.
- Beams and columns - 40mm (for main reinforcing).
- Slabs - 50mm where poured on ground, 40mm where exposed to weather, 30mm elsewhere.
- Walls - 40mm where exposed or against ground, 30mm elsewhere.

2.6 Reinforcing Steel

2.6.1 Scope

Supply, bend, tie, place, fix, etc. all reinforcing steel required for concrete work and reinforced blockwork, as indicated on the approved drawings and as required for proper completion of the works, complete with accessories. All aspects of this work shall be carried out to comply with the requirements of the New Zealand Building Code and relevant Standards, and in accordance with the approved project design documentation, and with any relevant product manufacturers' recommendations.

All materials and workmanship shall conform to the requirements of NZS 3109, the New Zealand Building Code, and conditions of the Building Consent.

Reinforcing steel for concrete work shall be placed by the Reinforcing Steeworker.
Reinforcing steel for concrete blockwork shall be placed by the Concrete Blockworker.
Reinforcing steel and stressing strand/wire for precast concrete and prestressed precast concrete shall be placed by the Precast Concrete Manufacturer.

2.6.2 Requirements

2.6.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, in particular the 'OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry'.

Carry out all construction operations in accordance with the Contractor's project-specific Health and Safety Plan.

2.6.2.2 Quality Assurance

Ensure that the reinforcement placed complies in all respects with the design drawings and specification. The reinforcing steelworker shall nominate a foreman reinforcing steel placer, or equivalent, for approval by the Contract Administrator before commencement on site. The foreman reinforcing steel placer shall inspect all completed sections of reinforcing steelwork

and confirm that the work has been carried out in accordance with the design drawings and specification.

The foreman reinforcing steel placer will be required to sign a pre-pour reinforcing check list prepared by the Contractor prior to concrete being placed for that section of the works. A copy of the completed pre-pour checklist must be given to the Contract Administrator prior to observing the finished section of work.

During pouring, the reinforcing steelworker shall be available to correct any displaced or damaged reinforcing.

2.6.2.3 Inspections

Inform the Contract Administrator when reinforcing steel is being fixed. Give at least 1 working day's notice for the inspection of fixed steel reinforcing before concreting.

2.6.2.4 Testing

Provide reinforcing steel manufacturer's certificates of origin to the Contract Administrator. Should such certificates indicate the requirements of this specification may not be met, pay for such tests as required by the Contract Administrator to establish its compliance.

2.6.2.5 Producer Statement

Furnish a fully completed Producer Statement when the works are sufficiently complete and are ready for application for a Code Compliance Certificate. The Producer Statement shall cover all work completed under this section of the specification.

2.6.3 Reinforcing Steel

2.6.3.1 Reinforcing Steel

Reinforcing bars shall conform to AS/NZS 4671 Grade 300E or Grade 500E, except that the use of Grade 250N or Grade 500N is permitted where specifically indicated in the drawings and specifications. The use of Grade 500L bars is not permitted.

Grade 500E reinforcement shall be manufactured by Pacific Steel micro-alloy process. Alternative manufacturers of Grade 500E reinforcement will only be approved if written evidence is provided, including test certificates, verifying the product. The use of Grade 500E reinforcement manufactured by a quench and tempered process is not permitted.

All mesh shall be factory made and machine welded and conform to AS/NZS 4671.

Hard-drawn reinforcing mesh shall be Grade E complying with AS/NZS 4671.

Ductile reinforcing mesh shall be Grade E complying with AS/NZS 4671 in accordance with the requirements of NZBC B1/VM1.

Mill certificates must be provided to the Contract Administrator for all reinforcing steel used.

All bundles of reinforcing steel supplied to the job shall be clearly marked with numbers relating to the Bending Schedule and related drawing.

2.6.4 Prestressing Steel

2.6.4.1 Compliance

All high tensile prestressing wire, strand or bars shall be tested and shall comply with the test criteria given in AS/NZS 4672, BS 5896 or BS 4486 as applicable. Test certificates, including the stress/strain or load/extension plots, complying with the relevant Standard shall be supplied by the manufacturer for all wire, strand and bars to be used in the work, and copies shall be made available for inspection to the Contract Administrator if required.

2.6.4.2 High-Tensile Steel Wire

All high-tensile wire, shall comply with the requirements of AS/NZS 4672 or BS 5896. All wire shall be stress relieved, and may be stabilised to reduce relaxation under stress. The wire may be either plain or indented, but shall not be crimped.

2.6.4.3 High-Tensile Steel Strand

Prestressing strand shall be 7-wire stress-relieved high-tensile steel strand complying with all requirements of AS/NZS 4671, AS 1311 or BS 5896. Prestressing strand shall be clean and free from deleterious substances. Superficial rust is acceptable, however strand with corrosion that has caused surface pitting shall be rejected.

2.6.4.4 Cold Worked High Tensile Alloy Steel Bars

Cold worked high tensile alloy steel bars used as tendons shall comply with AS/NZS 4672 or BS 4486.

2.6.5 Galvanising of Bars

2.6.5.1 Galvanising of Bars

Reinforcing bars specified on the drawings as being galvanised shall be hot-dip galvanised in accordance with AS/NZS 4680. In addition, the following shall be complied with:
- The material used for hot dip galvanising shall be zinc metal specifically made for this purpose and shall be 99.5% pure.
- Bars shall be galvanised before bending to give a zinc coating of at least 700 grams/m².
- Bars with galvanising damage may be rejected or accepted by the Contract Administrator - at their discretion.
- If a damaged bar is accepted, the damaged surface or welded area shall be made good with DULUX Zincgalv 1 or approved equivalent zinc-rich coating, applied in strict accordance with the manufacturer's requirements.

2.6.6 Bending of Bars

2.6.6.1 Bending of Bars

Bars shall be cut and bent in accordance with NZS 3109:Section 3 and to the dimensions and shapes indicated on the drawings.

Bend diameters for main reinforcing bars and of stirrups shall be as given by NZS 3109:Table 3.1.

Stirrups shall be bent to standard shapes as shown in NZS 3109.

Cranks or sets at laps shall have their inclined portions 12 diameters or a minimum of 300mm long unless specifically shown otherwise on the drawings.

Bars with bends or kinks not shown on the drawings shall not be used.

Bent bars shall not be rebent in the reverse direction unless specifically called for on the drawings. Rebending of steel reinforcement must be carried out to the steel manufacturer's requirements and only with approval of the Contract Administrator. Rebending of Grade 500E reinforcing steel is not permitted.

2.6.6.2 Bending Schedules

Where bending schedules are not included in the contract documents, it is the reinforcing steelworker's responsibility to produce a Bending Schedule for review by the Contractor before bending and cutting commences. Inform the Contract Administrator of any discrepancies in the contract drawings, before cutting and bending commences.

2.6.6.3 Bend Diameters

Unless otherwise noted on the drawings, main reinforcing bars shall be bent to the following internal diameters:

Steel Grade	Bar Size	Min. Bar Diameters
300E & 500E	6mm - 20mm	5 bar diameters
300E & 500E	25mm - 40mm	6 bar diameters

Bend diameters for stirrups and ties shall be to suit the diameter of the enclosed bar with a minimum of 2 bar diameters for plain bars and 4 bar diameters for deformed bars. Grade 500E steel for stirrups and ties shall be bent as for Grade 300E steel.

2.6.7 Laps, Cover & Tolerances

2.6.7.1 Laps in Reinforcing

The positions of reinforcing bar laps shall be as shown on the drawings. The positions of reinforcing bar laps other than those detailed must be approved in writing by the Engineer/Designer before cutting and bending commences. All lapping bars shall be tied to each other.

Lap lengths shall generally be as detailed on the drawings, but in any case not less than 400mm. Where laps have not been specifically detailed, laps shall comply with the table below.

Bar Diameter	Grade 300E Deformed	Grade 500E Deformed
10mm	400mm	600mm
12mm	480mm	720mm
16mm	640mm	960mm
20mm	800mm	1200mm
25mm	1000mm	1500mm
32mm	1280mm	1920mm

Lap lengths for plain round bars shall be two times the length given in the table above for the corresponding grade of deformed bar.

Laps to reinforcing mesh shall fully comply with the requirements of NZS 3101 but shall not be less than 225mm at all edges, and in any case give a minimum of 2 overlapping cross wires plus 50mm. Where Ductile 500E mesh is lapped, the lap length between outer cross bars shall be to the manufacturer's requirements.

2.6.7.2 Cover

Minimum cover shall be as specified on the drawings or otherwise as specified in NZS 3109. Covers specified on the drawings shall take precedence over those specified in NZS3109.

The ends of wire ties shall be turned away from the concrete face to maintain cover. Wire ties shall not be tied to formwork.

2.6.7.3 Tolerances

Tolerances for bending and fixing of reinforcing steel and fixing of prestressing tendons, ducts and strands shall comply with NZS 3109.

Unless tighter tolerances are specified the following tolerances shall apply:

Bending tolerances:
- Cranks stirrups and ties where -
  the member depth is less than 200mm: +0mm, -5 mm;
  the member depth is 200mm or more: +0mm, -10mm;
- Other steel: +0mm, -15mm;
- Length of straight bars: +0mm, -15mm;
- Length of straight bars where length fitment is not critical: +20mm.

Tolerances on bar spacing/position:
- Spacing of main bars in beams and columns: ±10mm;
- Distance between layers of main steel except it shall not be less than 25mm: ±5mm;
- Distance between bars along the face of walls or slabs: ±20mm;
- Spacing of stirrups or ties in beams and columns: ±20mm;
- Longitudinal position of splice: ±30mm.

Tolerances on concrete cover relative to the values specified and shown on the drawings are:
- In slabs and walls: +10mm; -0mm;
- In beams and columns: +10mm; -0mm;
- At ends of members: +25mm; -0mm.

2.6.8 Placing & Fixing

2.6.8.1 Fixing

Reinforcement shall prior to commencement of concrete placement, be placed, supported and secured against displacement in accordance with the specified tolerances.

Metal supports and tie wires to the reinforcing shall not extend into the concrete cover zone.

Reinforcement shall be supported by appropriate proprietary chairs or spacers, or tied up with wire, such that the durability and strength of the structure is not compromised. The types of distance pieces and spacers to be used shall be such as to firmly hold the steel against displacement. Cementitious spacers shall at least match the quality of the concrete being cast and shall have a minimum compressive strength of 40 MPa.

Fixing of reinforcing steel shall conform to NZS 3109. Bars shall be positioned accurately according to the drawings and securely tied with wire ties to form a rigid cage. Particular attention shall be paid to the correct lapping of all steel and laps shall be checked after fixing.

Take all necessary care when handling and fixing Grade 500E reinforcing bars. Do not use or place any excessively damaged Grade 500E bar, such damaged bars shall be rejected and replaced.

Reinforcing steel shall not be cut or bent on site without the Contract Administrator's specific approval.

All starters shall project the minimum distance prescribed for lap lengths unless detailed otherwise. All starters and other reinforcing protruding from a concrete pour shall be securely braced to prevent any movement during concreting. Starters shall NOT be placed into concrete after it has been poured.

Clean reinforcement prior to concreting to remove any dirt, release agent, slurry and other contaminants likely to affect bonding to concrete. Thoroughly clean all projecting cast-in starter bars before installing subsequent reinforcing steel.

2.6.8.2 Concrete Slab-on Grade Floor

Supply and place mesh to the slab-on-grade or the toppings over precast concrete floor units as detailed. Mesh laps shall fully comply with NZS 3101 but shall not be less than 225mm minimum at all edges, and in any case give a minimum of 2 overlapping cross wires plus 50mm. Sheets shall be cut at 4-sheet overlapping corner junctions so as to limit the overlapping to two of the four sheets.

All mesh is to extend to within 75mm of the perimeter of the building floor edges.

Mesh shall be continuous over pads and foundation beams unless additional compensating lap bars are placed across the top to lap with the mesh reinforcement each side. Unless noted otherwise, all saddle bars and other steel shown over the beams on the drawings are additional to the mesh and cannot be included in the required area of compensating steel.

Place topping tie bars as detailed on the drawings.

2.7 Workmanship

2.7.1 Qualifications

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All work shall be carried out to the latest and best trade practise standards by experienced and competent tradesmen, familiar with the materials specified and installation techniques.

2.7.2 Formwork

Provide all necessary formwork to produce finished concrete to the required dimensions, surface finishes and structural tolerances (NZS 3109 table 4, note that slab surfaces shall not vary by more than 3mm from a 3m straightedge placed anywhere on the surface, and that this maximum variation shall extend over a minimum distance of 1m).

Design and construct formwork to withstand total weights and all construction loads. Formwork constructed tightly to prevent undue slurry leaks, with no wire formwork ties, and no part of the formwork ties left within required concrete cover. 20 x 20mm fillet corners. Any release agents used shall be non staining and shall be compatible with all subsequently applied finishes.

Position construction/crack control joints (except where shown otherwise) under walls or elsewhere as approved, in accordance with the following maximum criteria:
- Slabs on ground - area 50 sq.m, length 7.5m.
- Suspended slabs - area 150 sq.m, length 15m.
- Walls - length 10m, lift 4m.

Retarders only to provide a scabbled surface at construction joints.

Formwork suitable for required F2 finish to exposed locations for subsequent rendering.

Coordinate with all trades to build in all necessary starters, fixings, anchorages, chases, sleeves, bolts, conduits, electrical / plumbing devices etc., and check their exact positioning before pouring. Coordinate with all trades to form all necessary holes, openings etc. with their positions and sizes exactly as required.

Strike formwork without shock or vibration, and without disturbing, damaging or overloading the structure. Fill all bolt holes as soon as practicable.

2.7.3 Concreting & Curing

All concrete shall be power mixed in a plant approved by the Ready Mixed Concrete Association for required grade. All structural concrete shall have a compressive strength of 25MPa at 28 days. 19mm max aggregate, 80mm slump, and with a maximum water cement ratio of 0.55.

Where considered desirable the manufacturer may add an air entrainment agent complying with NZS 3109 and 3119. No other additives may be used without specific approval of the engineer. Mixes shall be capable of being readily placed and compacted and finished as specified. The manufacturer shall carry out quality control testing to NZS 3104. All other concrete 20 MPa Ordinary Grade with maximum water cement ratio 0.7.

Note that appropriate cold weather pouring and curing techniques MUST be adopted if construction timing/temperatures so dictate.

Advise for inspection 24 hours before placing any concrete. Sequence and size of concrete pours to approval. No concrete pouring in wet weather. Clean out all formwork thoroughly before pouring. Handling, placing and vibration/compaction of concrete shall all be exactly to NZS 3109 requirements, and carried out by skilled operatives. Slabs power float finished to NZS 3114 U2 surface by kelly float, with steel troweling to a similar finish in corners etc., and to a U3 finish localized to resilient flooring areas.

Scabble the face of construction joints to 20mm from edges.

Cure all concrete for 14 days. Do not use sprayed membranes. As soon as practicable pond all horizontal surfaces, or fully cover with polythene or hessian (kept wet). Periodically hose down all formwork. Stripped vertical surfaces shall be kept wet with perforated hoses or similar.

Form shrinkage control joints in concrete floor slabs-on-ground by saw cutting, without chipping, spalling and tearing the surface, to the locations and layout shown on the drawings. Saw cuts shall extend to a quarter of the depth of the slab. Saw cutting shall take place no later than 24 hours after initial set for average ambient temperatures above 20°C, and 48 hours for average ambient temperatures below 20°C.

2.7.4 Surface Finishes

General floor slabs - U3 finish.

Top surface of foundations not exposed on completion - U2.

Interior wall panel surfaces - U3.

Foundation sides exposed to view - F5.

Exposed locations for subsequent rendering - F2.

2.7.5 Documentation

Concrete delivery dockets shall state job, date and time of mixer loading, grade, strength, and slump. Dockets shall be kept and forwarded to the Architect/Designer. Water must NOT be added after the concrete leaves the plant.

3 STRUCTURAL STEELWORK

3.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

3.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1163:2016(AS/NZS)	Cold-formed structural steel hollow sections
1252.1:2016(AS/NZS)	High-strength steel fastener assemblies for structural engineering - Bolts, nuts and washers - Part 1: Technical requirements
1252.2:2016(AS/NZS)	High-strength steel fastener assemblies for structural engineering - Bolts, nuts and washers - Part 2: Verification testing for bolt assemblies
14341:2012(AS/NZS)	Welding consumables – Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels – Classifications
1554.1:2014 (AS/NZS)	Structural steel welding - Part 1: Welding of steel structures
1554.1:2014(AS/NZS)	Structural steel welding - Part 1: Welding of steel structures
1554.2:2003(AS/NZS)	Structural steel welding - Stud welding (steel studs to steel)
1554.4:2014(AS/NZS)	Structural steel welding - Part 4: Welding of high strength quenched and tempered steels
1554.5:2014(AS/NZS)	Structural steel welding - Part 5: Welding of steel structures subject to high levels of fatigue loading
1554.6:2012(AS/NZS)	Structural steel welding - Part 6: Welding stainless steels for structural purposes
1554.7:2014(AS/NZS)	Structural steel welding - Part 7: Welding of sheet steel structures
16834:2013(AS/NZS)	Welding consumables - Wire electrodes, wires, rods and deposits for gas shielded arc welding of high strength steels - Classification (ISO 16834:2012, MOD)
1897:1976(AS)	Electroplated coatings on threaded components (metric coarse series)
21952:2012(AS/NZS)	Welding consumables - Wire electrodes, wires, rods and deposits for gas shielded arc welding of creep-resisting steels - Classification
2312.1:2014(AS/NZS)	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Part 1: Paint coatings
2312.2:2014(AS/NZS)	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Part 2: Hot dip galvanizing
3404.1&2:1997(NZS)	Steel Structures Standard
3404:2018(SNZ TS)	Durability requirements for steel structures and components

3678:2016(AS/NZS)	Structural steel - Hot-rolled plates, floorplates and slabs
3679.1:2016(AS/NZS)	Structural steel - Part 1: Hot-rolled bars and sections
3679.2:2016(AS/NZS)	Structural steel - Part 2: Welded I sections
3750(AS/NZS):Parts 1-23	Paints for steel structures
4600:2018(AS|NZS)	Cold-formed steel structures
4680:2006(AS/NZS)	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
4781:1973(NZS)	Code of practice for safety in welding and cutting
5131:2016(AS/NZS)	Structural steelwork - Fabrication and erection

3.3 Materials

3.3.1 Materials

All steel shall be completely free from defects such as laminations, rust or pitting. Any defective material found will be rejected before or after fabrication and must be removed from site and replaced with approved materials at the Contractor's expense.

All steel shall comply with the relevant following specification and grades, unless noted specifically otherwise : AS 1204: Grade 300

3.4 Structural Steelwork

3.4.1 Scope

Supply, fabricate, install and erect all Structural Steelwork as shown on the drawings and as required for the satisfactory completion of the works, complete with accessories, including all necessary weld plates, cleats, bolts, etc., for building into concrete and concrete blockwork. All aspects of this work shall be carried out to comply with the requirements of the New Zealand Building Code and relevant Standards, and in accordance with the project design documentation, and with any relevant product manufacturers' recommendations.

The following is a list and a general description of the extent of Structural Steelwork, which are more specifically defined in the contract documents, required for the completion of the contract works:

3.4.2 Requirements

3.4.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, in particular the 'Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry'.

Carry out all construction operations in accordance with the Contractor's project-specific Health and Safety Plan.

3.4.2.2 Quality Assurance - Option 1

Construction of all structural steelwork shall comply in all respects with the design drawings and the specifications.

Prepare and submit details of the fabrication and erection quality assurance procedures for approval. These procedures should encompass all aspects of fabrication.

The quality assurance procedures shall encompass all aspects of the structural steel construction including, but not limited to:
- compliance of materials; and
- welding procedures; and
- steel preparation prior to painting; and
- quality of painting/coatings; and
- erection of structural steelwork.

Maintain and adhere to the quality control procedures for the fabrication and erection of structural steelwork at all times, and ensure that work is performed to the required standard in accordance with the contract documents.

Notify the name of the Structural Steelworker's representative responsible for the quality control of all structural steelwork.

3.4.2.3 Quality Assurance - Option 2

Construction of all structural steelwork shall comply in all respects with the design drawings and the specifications.

The quality assurance procedures for structural steelwork fabrication and erection shall comply with AS/NZS ISO 9001.

Prepare and maintain a Quality Assurance Plan that sets out in detail how the quality control of all aspects for structural steelwork shall be achieved. Submit the Quality Assurance Plan for review prior to commencing any fabrication work.

The Quality Assurance Plan shall include, but not be limited to:
- objectives of the plan; and
- key personnel, their qualifications and responsibilities; and
- communication paths; and
- the management of documents, including receiving and recording of amended drawings; and
- the preparation and approval of any shop drawings including review and coordination of Architectural, Structural and Building Services drawings; and
- fabrication and erection procedures; and
- checking and recording procedures for elements of work, including subcontractors work; and
- reporting.

Maintain and adhere to the procedures set out in the Quality Assurance Plan at all times, and ensure that the work is carried out to the required standard in accordance with the contract documents, and shall ensure that subcontractors and suppliers do likewise.

The quality assurance procedures shall encompass all aspects of the structural steel construction including, but not limited to:
- compliance of materials; and
- welding procedures; and
- steel preparation prior to painting; and
- quality of painting/coatings; and
- erection of structural steelwork.

3.4.2.4 Shop Drawings

Prior to commencing steelwork fabrication, prepare and submit for review shop drawings of structural steelwork. The drawings shall provide complete details of each assembly in the steelwork together with all information relative to their fabrication, surface treatment and erection. Each component and connection shall show the relevant work points.

Allow 10 working days for the review of shop drawings. The review of shop drawings shall not relieve the Contractor of the responsibility for the accuracy of the shop drawings and for the correctness of the fabrication, setting out and erection of the steelwork. The cost of rectifying any errors shall be at the Contractor's expense.

Shop drawings shall be coordinated between disciplines and incorporate specific requirements shown on the Architectural, Structural and Building Services drawings.

Shop drawings shall include, but not be limited to:
- Design calculations;
- Fully dimensioned plans, elevations and sections of all structural steelwork elements relative to project grid and levels (at a suitable scale);
- Complete details of construction, connections and support systems relative to project grid and levels (at a suitable scale);
- Dimensions of all elements;
- Jointing details and method of fixing between individual elements and adjacent work;
- Provision for thermal movement;
- Provision for seismic movement and movement under wind loads;
- Installation sequence;
- Coordination requirements with other work and trades, including penetrations, fixings, etc.
- A full schedule of materials, finishes, and fasteners.

3.4.2.5 Materials & Workmanship

Adhere to all relevant requirements of NZS 3404, AS/NZS 1554.1 and AS/NZS 1554.2 for the supply of all materials and in workmanship both on and off site. The use of materials complying with any other Standard equivalent to those stated herein shall only be permitted with the prior approval of the Contract Administrator.

3.4.2.6 Welding Qualifications

All welders shall be suitably qualified to AS/NZS 2980, and familiar with the specified materials and welding techniques required in accordance with AS/NZS 1554. No welder shall carry out work for which he/she is not certified/qualified.

On request, provide evidence of welding qualifications, including a list of proposed welders and their welding certificates, prior to any welding being carried out.

3.4.2.7 Inspections

Provide opportunity to inspect the work on site, and give at least 24 hour's notice for the work to be inspected. Should further inspections and tests by a specialist inspector be required due to concerns about the quality of workmanship, then these shall be at the Contractor's expense.

3.4.2.8 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected structural steelwork shall be repaired and/or replaced to the satisfaction of the Contract Administrator - without delay, and at the expense of the Contractor.

If a field-weld is used to substitute (in place of) a shop-weld, the field-weld shall be deemed defective, unless it is subject to specific non-destructive examination (NDE) in accordance with AS/NZS 1554 and to the satisfaction of the Contract Administrator.

3.4.2.9 Producer Statement

Furnish a fully completed Producer Statement when the works are sufficiently complete and ready for application for a Code Compliance Certificate. The Producer Statement shall cover all structural steelwork completed under this section of the specification - Structural Steelwork.

3.4.3 Materials

3.4.3.1 Bolts, Nuts & Washers

Mild steel (black) bolts, nuts and washers shall comply with the requirements of AS 1110, AS 1111 and AS 1112.

High-strength bolts, nuts and washers shall comply with AS/NZS 1252.

Bolts, nuts and washers which form a permanent part of a structure subject to weather exposure shall be hot-dipped galvanised. Hot-dipped galvanised bolts shall be limited to those received from the bolt manufacturer. Where these are not available, the bolts, nuts and washers shall be electro-galvanised, but only in accordance with AS 1897.

Where necessary to ensure even bearing, tapered washers complying with BS 4320 shall be used.

Bolts and bolting procedures to be used shall be as noted on the drawings in abbreviated form, in accordance with the abbreviation list shown on the drawings.

All bolts shall be installed with one washer and one nut unless specified or shown otherwise on the drawings. A washer shall be placed under the rotating component.

Hardened or plate washers shall be used under both the bolt head and nut for any slotted and oversize holes.

Methods of tensioning bolts shall conform to the requirements of AS/NZS 5131.

3.4.3.2 Welding Consumables

Welding electrodes shall comply with the requirements of AS/NZS 1554.1 or AS/NZS 1554.5 as appropriate for the grade of steel being welded.

Welding wire type shall be as recommended by the manufacturer of the steel being joined and for the welding position. Wire showing signs of rust or contaminated with oil shall not be used.

Welding flux used from sealed containers must be dry. The use of unused flux recovered from welds shall only be as approved by the Contract Administrator. The use of reground flux is not permitted.

Material and welding of studs shall comply with AS 1554.2.

3.4.3.3 Alternative Sizes

The substitution and use of alternative steel section sizes is not permitted under any circumstance without prior written approval from the Contract Administrator. Any additional cost resulting from the use of alternative sizes shall be at the Contractor's expense.

3.4.3.4 Steel

All mild steel shall comply with the requirements of AS/NZS 3679.1.

Except where specified otherwise on the drawings, hot-rolled steel sections shall be Grade 300 complying with OneSteel 300PLUS specification and AS/NZS 3679.1. OneSteel 300PLUS specification shall take precedence where conflict exists with AS/NZS 3679.1.

Except where specified otherwise on the drawings, cold-formed structural steel hollow sections shall be Grade C350, and shall comply with AS/NZS 1163.

Except where specified otherwise on the drawings, structural steel welded I sections (welded beams and welded columns) shall be Grade 300, and shall comply with AS/NZS 3679.2.

Structural steel hot-rolled plate shall comply with AS/NZS 3678.

All structural steel to be welded shall be suitable for welding in accordance with the specified welding procedures of AS/NZS 1554: Parts 1, 2, 5 and 7.

The surface condition of steel shall be no worse than Rust Grade C in accordance with International Standard ISO 8501-1 or Swedish Standard SIS 05 5900.

Any unidentified steel shall not be used unless approved by the Contract Administrator. When the use of unidentified steel is approved for use, it shall only be used as specified in NZS 3404: Section 2.2.3.

Submit all mill certificates to the Contract Administrator prior to fabrication for all steel to be used.

3.4.4 Fabrication

3.4.4.1 General

Fabrication of steel structures shall comply with the requirements of AS/NZS 5131.

Verify design dimensions against site measurements prior to fabrication of steelwork. Where new steelwork is being installed on or connecting to an existing structure, check and verify site dimensions and levels prior to fabrication of new steelwork. Refer any discrepancy between the drawings and the site dimensions to the Contract Administrator.

Fabrication tolerances shall be as given in AS/NZS 5131 Appendix F unless specified otherwise on the drawings.

As necessary and required, coordinate with other trades with regard to dimensions and setting-out of built-in items and fixings, etc., for peripheral elements. Supply and install all associated sundry fixings, weld plates, brackets, etc., necessary for the satisfactory completion of the contract works.

All steel members capable of holding water shall be provided with weep holes to prevent accumulation of water during construction or of condensation afterwards.

3.4.4.2 Holing

Comply with AS/NZS 3404.1 requirements for holing, including round and slotted holes, nominal sizes, alignment, finishing, punching and flame cutting of holes. Hand flame-cutting of a bolt hole is not permitted, except only when authorised by the Contract Administrator as a site rectification measure for holes in column base plates.

3.4.4.3 Splices

All members shall be in one length with splices only at positions shown on the drawings. If the Contractor requires additional splices or wishes to relocate a splice from the design position, formally submit such proposals to the Contract Administrator for review. Do not proceed with fabrication until the review has been completed and approval from the Contract Administrator given.

3.4.4.4 Camber

Beams and trusses without a specified camber shall be fabricated so that after erection any camber due to rolling or shop fabrication is upward.

3.4.5 Welding

3.4.5.1 Welding Quality Management System (WQMS)

The structural steelworker shall implement and maintain a Welding Quality Management System (WQMS) for all welding procedures as recommended by NZS 3404.1 and in accordance with AS/NZS ISO 3834 according to the appropriate quality level. A copy of the WQMS shall be submitted to the Contract Administrator for review prior to commencing fabrication.

3.4.5.2 Welding

Weld quality shall be Category Structural Purpose (SP) unless specific reference is made on the drawings for a specific weld to be Category General Purpose (GP).

Welding shall comply with AS/NZS 1554.1 or AS/NZS 1554.5, as appropriate and in conjunction with AS/NZS 5131.

Submit for approval, details of the welding procedures to be used including details of the equipment and consumables before any welding is carried out.

All welding shall be shop-welds unless specified otherwise on the drawings. Shop-welds shall be welding carried out under controlled conditions, in an approved facility, by certified welders under the continuous supervision of certified welding inspectors.

Any field-weld made without prior written approval from the Contract Administrator will be deemed defective and subject to rejection - refer to Requirements clause.

All weld runs shall be as specified and not finish with a concave surface. Welds shall have proper penetration, with all slag deposits removed as work proceeds and the runs are completed. Welds shall be continuous around joints to prevent the ingress of moisture.

Butt welds shall be full penetration unless specified otherwise on the drawings, and shall be ground flush.

Welding of hollow sections shall incorporate internal sections or backing plates as necessary to complete the specified weld.

Open-ended hollow sections shall be capped using 3mm plate and seal welded unless specified otherwise on the drawings.

3.4.5.3 Qualification of Welding Procedures and Personnel

All welding procedures as a minimum shall be in accordance with AS/NZS 1554.1 or AS/NZS 1554.5 as appropriate. Welding of studs shall comply with AS/NZS 1554.2.

Welding supervisors shall hold Welding Supervisor qualifications from the New Zealand Institute of Welding or an equivalent qualification recognised by HERA NZ Welding Centre. In addition all personnel involved in welding shall only be employed on the types of weld for which they are suitably qualified and they shall hold current Welding Certificates in accordance with AS/NZS 2980. Should qualification testing be required it shall be the Contractor's responsibility for arranging and payment of such tests.

3.4.5.4 Welding Testing & Inspection

The minimum extent of inspection of welding shall be as specified below and in accordance with AS/NZS 1554.1, AS/NZS 1554.5, and AS/NZS 5131 Appendix I. All welds shall be subject to inspection and testing. The testing of welds will commence with the first joints to be fabricated. Test inspections shall be carried out by a CBIP Certified Welding Inspector (CWI). The cost of testing shall be borne by the Contractor. Give at least 24 hour's notice of any welding that will be closed in by subsequent work that will prevent its inspection afterwards.

Non-Destructive Testing (NDT) and Non-Destructive Examination (NDE).
Visual Scanning:
- The minimum level of testing shall be 100% visual scanning as defined by AS/NZS 1554: Parts 1 and 5.
- At the completion of the work, the welding supervisor shall complete and submit a written statement verifying that the visual scanning has been carried out and completed.

Visual Examination:
- A visual examination shall be carried out in accordance with AS/NZS 1554.1 to determine whether the required weld quality has been achieved.
- Where the proportion of visual examination required is less than 100%, agree on a programme of testing with the Contract Administrator prior to the commencement of any welding.
- The programme shall involve full testing a specified percentage of welds, in order to pick up and correct the cause of any major defect at the commencement of welding.
- The frequency of testing may be progressively reduced on the basis of continuing compliance with the agreed testing programme and this specification.
- Welds with a Category A weld-failure-consequence shall be subject to a 100% visual examination in accordance with AS/NZS 1554.1.
- A record of all welds examined and tested shall be kept and made available on request.

Extent of Non-Destructive Examination (%)			
Weld Category	**Weld Failure Consequence Category**	**Visual Means**	
		Visual Scanning	**Visual Examination**
GP	C	100%	25% min.
SP	B or C	100%	25% min.
SP	A	100%	100%

Other Means:
- Other means of NDE include ultrasonic or radiographic (UT), magnetic particle (MT), liquid penetrant (LP).
- The extent of other means of non-destructive examination of welds shall be as indicated on the drawings and in accordance with AS/NZS 5131 and AS/NZS 1554.1.
- Agree on a programme of testing by other means with the Contract Administrator prior to the commencement of any welding.
- A record of all welds examined and tested shall be kept and made available on request.

3.4.5.5 Repair of Welding Defects

When a welding defect is disclosed by inspection or other investigation, the weld shall be cut out, remade and re-tested. The repair and re-testing of defective welds shall be carried out in accordance with AS/NZS 1554.1 or AS/NZS 1554.5, as appropriate, and to the satisfaction of the Contract Administrator. The cost of testing and repairs to all welding defects shall be at the Contractor's expense.

The welding inspector shall examine all seams from which defects have been cut out and their approval obtained prior to re-welding. Re-welding shall be carried out in a manner and by practices acceptable to the Contract Administrator, and where practicable, shall be by the same process used in the original welding.

The inspection records and re-testing records of all repaired welding defects shall be kept and made available on request.

3.4.5.6 Welding of Shear Studs

Stud welding shall comply with the requirements of AS/NZS 1554.2, and shall be carried out by personnel qualified in accordance with AS/NZS 1554.2.

The surface of the member to which the studs are to be welded, the studs, and steel decking where included, shall be clean and dry, and free of rust, scale, slag, paint, oil and other contaminants. As shown on the design drawings, the studs shall be welded directly to the steel or through no more than one thickness of the steel decking.

The testing of stud welds shall be in accordance with the requirements of AS/NZS 1554.2.

Furnish a fully completed Producer Statement verifying the procedures required by AS/NZS 1554.2 have been complied with.

3.4.6 Erection

3.4.6.1 Delivery & Handling

All steelwork components shall be suitably stacked clear of the ground, on bearers aligned so as to prevent any twisting, bending or other distortion of the items. Keep steelwork dry and protected from damage, moisture and contamination at all times while stored.

Store fasteners in watertight premises. Handle and store electrodes, electrode wire and flux in accordance with the manufacturer's recommendations.

As necessary, make all provisions to protect steelwork components from distortion during delivery and handling.

Do not use damaged, distorted or defective steelwork components, materials and accessories.

Handle steelwork components in a manner that prevents distortion and damage. Ensure that components maintain their manufactured shape and the integrity of corrosion protection at all times during handling.

Handlers shall be familiar with and comply with safe handling requirements, and shall use appropriate safety gear while handling steelwork.

Steelwork riggers and installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice.

3.4.6.2 Assembly

Erection of steel structures shall comply with the requirements of AS/NZS 5131.

Structural steelwork components shall be assembled free of damage and distortion, and so that any specified camber is maintained.

Erection tolerances shall be as given in AS/NZS 5131, Appendix F unless specified otherwise on the drawings.

Check all seatings for steelwork to ensure that they are at the correct level, truly flat and in a condition to receive the steelwork.

Field errors must not be corrected by gas cutting except with the approval of the Contract Administrator.

Each component of the structure shall be aligned as soon as practicable after it has been erected. Permanent connections shall be made when sufficient structure has been erected and the components temporarily connected and accurately aligned, levelled and plumbed, and to ensure that the structure will not be displaced during the erection or alignment of subsequent stages.

3.4.6.3 Temporary Bracing

Provide sufficient temporary bracing to keep the structure plumb and in true alignment until the structure is permanently braced. Failure to make proper and adequate provision against damage during erection shall be the full responsibility of the Contractor. All temporary bracing and guying shall be capable of resisting all loading, Including wind, liable to occur on the structure during the erection period.

Submit for review the method of erection and assembly of structural steelwork. The review shall not limit the Contractor's responsibility to ensure the safety and accurate alignment of the structure.

Connections for temporary bracing and temporary members shall be made so as not to weaken the permanent structure or reduce its performance.

Bracing shall not be used to force the structural frame into its correct position. Tighten bracing only after the frame has been squared, aligned and plumbed or, if inserted at an earlier time, loosen to permit these operations and tighten on completion.

3.4.6.4 Temporary Support of Existing Structure

Where the steelwork of an existing structure is to be removed or strengthened, provide all the necessary support required to prevent distortion of the existing structure and excessive loads being placed on other parts of the structure.

3.4.6.5 Holding Down Bolts

Unless specified on the drawings, holding down bolts shall be of the size, number and length required to achieve the correct embedment and allow the final fixing to the base plate. To ensure correct placement and alignment, a template for each holding down bolt type and configuration shall used for placement. The bending or displacing of holding down bolts is not permitted.

All holding down bolts, nuts and washers which form a permanent part of a structure subject to weather exposure or contained within exterior wall framing shall be galvanised.

3.4.6.6 Bolting

Comply with AS/NZS 3404.1 requirements for bolting. All bolts and associated nuts and washers shall comply with the material properties specified - refer to Materials clause. All material within the grip of the bolt shall be steel and no compressible material shall be permitted in the grip.

Unless specified otherwise on the drawings, all bolts shall be:
- Strength Grade 8.8, Bolting Category 8.8S, complying with AS/NZS 1252; and installed to a snug-tight condition as specified in NZS 3404.1:Section 4.2.6.2(a).
- At least one clear thread run out shall be clear beneath the nut after tightening the bolts.
- Each bolt and nut shall be assembled with at least one washer.

Bolted connections specified on the drawings with the suffix /TB (bearing-type) or /TF (friction-type) shall be fully tensioned in accordance with NZS 3404.1:Sections 4.2.5 and 4.2.6.
- Bolts used for a fully tensioned bearing-type (/TB) connection shall be Strength Grade 8.8, Bolting Category 8.8/TB, complying with AS/NZS 1252
- Bolts used for a fully tensioned friction-type (/TF) connection shall be Strength Grade 8.8, Bolting Category 8.8/TF, complying with AS/NZS 1252.
- The contact surfaces of fully tensioned connections shall be prepared in accordance with NZS 3404.1:Section 4.2.4.3.

For fully tensioned bolts, the minimum number of clear threads run out beneath the nut after tightening shall be:
- Five threads for a bolt length up to and including 4 diameters;
- Seven threads for a bolt length over 4 diameters but not exceeding 8 diameters;
- Ten threads for a bolt length over 8 diameters.

The tightening pattern of fully tensioned joints shall proceed from the stiffest point, typically the centre, towards the outer free edges of the joint, to ensure that all bolts carry an equal proportion of the load.

The re-tensioning of Strength Grade 8.8 bolts that have been fully tensioned is not permitted without the written approval of the Contract Administrator, and shall only be carried out in accordance with the Contract Administrator's instruction.

3.4.6.7 Proprietary Fasteners

Proprietary fasteners shall be as specified on the drawings and installed strictly in accordance with the manufacturer's requirements.

3.4.6.8 Grouting

Grouting of baseplates and other steelwork, where noted on the drawings, shall be carried out with the use of an approved proprietary non-shrink, pourable, cementitious grout with a minimum compressive strength of 60 MPa, in accordance with the manufacturer's recommendations. Provide all necessary holes and grout tubes to ensure the complete filling of the grout spaces.

Unless shown otherwise on the drawings, the edges from the underside of the baseplate shall be formed with a nominal 20 x 20mm chamfer. Exposed grout surfaces shall be finished smooth, free of surface defects and imperfections. Remove all leave steelwork and surrounding surfaces free of grout splashes and leakage.

3.4.6.9 Drypack

All base plates to concrete surfaces shall be grouted with drypack of Portland cement mortar, with a minimum 28 day compressive strength of 60 MPa, and mixed with an expansive admixture in accordance with the manufacturer's instructions.

Drypack shall be mixed as dry as possible, have a minimum thickness of 20mm unless otherwise shown on the drawings, and be thoroughly compacted in position by ramming to ensure the complete filling of the grout space. Exposed drypack surfaces shall be finished smooth, free of surface defects and imperfections. Unless shown otherwise on the drawings, the edges from the underside of the baseplate shall be formed with a nominal 20 x 20mm chamfer.

3.4.7 Corrosion Protection

3.4.7.1 General

Comply with the requirements of NZS 3404.1 and SNZ TS 3404 for corrosion protection. Surface preparation and application and inspection of coating systems shall be in accordance with the requirements of AS/NZS 2312.1 and/or AS/NZS 2312.2 as appropriate.

All welds shall have slag removed, and welds exposed in the finished work shall have spatter removed and be ground to a neat, clean finish.

Steelwork to be sprayed for fire protection or to be cast more than 50mm into concrete shall have all rust and mill scale, etc., removed by power or manual wire brushing and shall be left unprimed.

Surface preparation shall be carried out after the fabrication of components has taken place, and the specified coating shall be applied as soon as possible after preparation in accordance with the manufacturer's specification. Surfaces that will be in contact or near-contact after fabrication or erection should receive the specified surface preparation and treatment prior to assembly. In all cases, the total coating shall be applied in the workshop in accordance with the manufacturer's instructions.

Where site-welds are necessary, protect adjacent surfaces during welding procedures, and prepare and coat site-welds in accordance with the coating manufacturer's instructions and as approved by the Contract Administrator.

3.4.8 Painting

3.4.8.1 Painting

Comply with the requirements of AS/NZS 2312.1 for corrosion protection of structural steel using paint coatings. All structural steel which is not to be treated otherwise shall be primed before delivery to the site.

Paint coating system for structural steel shall be as specified below and in accordance with AS/NZS 2312.1: Table 6.3.

The coating manufacturer may suggest alternative paint coating systems for the protection of structural steelwork in accordance with AS/NZS 2312.1 to meet specification requirements. The use of any such alternative paint coating system shall be subject to approval by the Contract Administrator.

All coating products shall be the of the same manufacturer, and supplied in unbroken packages clearly labelled with the product name and manufacturer. Do not used damaged or defective products, or products that are beyond their designated shelf life.

Maintain and comply with industry-recognised quality assurance procedures to ensure that all sections of the work are carried out in accordance with the manufacturer's requirements.

The preparation for and application of the specified coating systems and coatings shall be carried out by experienced and skilled specialist applicators, in strict accordance with the manufacturer's technical literature and to fully comply with the manufacturer's warranty requirements. All substrate preparation and coating application and finishing techniques shall be exactly as recommended by the manufacturer.

Ensure compatibility of the substrate material and the environmental exposure conditions with the protective coating system prior to commencing.

Handle coating products in accordance with the manufacturer's requirements as set out in the manufacturer's Product Data Sheets and in a manner that prevents deterioration of the product.

Applicators shall be familiar with and comply with the manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling products.

The coating manufacturer's requirements for substrate material, substrate preparation, and coating system application methods and details, and coating thicknesses, as specified in the manufacturer's coating system specification sheet and product data sheets, shall be strictly adhered to during all stages of painting structural steelwork.

Carry out all substrate preparation and protective coating application under cover, in a well lit and ventilated, stable and weatherproof environment within the permitted temperature range. Comply with the manufacturer's parameters for application conditions for air temperature, substrate surface temperature, and relative humidity.

For on-site applications, mask off and adequately protect surrounding finished work and fixtures and fittings from contamination prior to substrate preparation and/or coating application.

Apply each coat in the manufacturer's specified sequence, uniformly to the recommended dry film thickness (DFT), and allow each coat the full drying time between coats. All over-coating and recoating must be undertaken within the manufacturer's specified recoat timeframe.

Adequately protect all work in progress from damage, contamination and exposure to the environment until complete and fully cured.

Leave finished coated surfaces clean, free from defects and blemishes of any kind, and to the required standard in accordance with manufacturer's requirements.

Dispose of coating products in accordance with local government requirements. Do not permit products to enter or contaminate the stormwater system.

Provide the completed Product Warranty and Applicator Warranty upon completion of the work.

3.4.8.2 Inspections

Allow to inspect the paint coating work at each stage. Provide a Schedule of Inspections, including notification of when each section and stage of the work is ready for inspection, prior to the work commencing. Permit the coating manufacturer's technical representative to inspect the work in progress and to take samples of their products from site.

3.4.8.3 ACRYLIC System ACL1 - Latex, single pack

ACRYLIC System ACL1 - Latex, single pack. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ACL1 Coating System Details (in accordance with AS/NZS 2312.1: Table 6.3 - Painting System for Steel):

- Surface Preparation:
  - St 3.
- 1st Coat:
  - Type: Alkyd primer.
  - PRN: C05.
  - Nominal DFT: 40µm.
- 2nd Coat:
  - Type: Alkyd latex.
  - PRN: C21.
  - Nominal DFT: 40µm.
- 3rd Coat:
  - Type: Alkyd latex.
  - PRN: C21.
  - Nominal DFT: 40µm.

- Total DFT:
  • 120µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.4 ACRYLIC System ACL2 - Latex, single pack

ACRYLIC System ACL2 - Latex, single pack. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ACL2 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  • Sa 2½.
- 1st Coat:
  • Type: Zinc primer.
  • PRN: C01, C02.
  • Nominal DFT: 75µm.
- 2nd Coat:
  • Type: Alkyd latex.
  • PRN: C21.
  • Nominal DFT: 40µm.
- 3rd Coat:
  • Type: Alkyd latex.
  • PRN: C21.
  • Nominal DFT: 40µm.
- Total DFT:
  • 155µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.5 ACRYLIC System ACL3 - Latex, single pack

ACRYLIC System ACL3 - Latex, single pack. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ACL3 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  • Sa 2½.
- 1st Coat:
  • Type: Zinc primer.

  - PRN: C01, C02.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 125µm.
- 3rd Coat:
  - Type: Alkyd latex.
  - PRN: C21.
  - Nominal DFT: 40µm.
- Total DFT:
  - 240µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.6 ACRYLIC System ACL4 - Latex, single pack

ACRYLIC System ACL4 - Latex, single pack. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ACL4 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 250µm.
- 3rd Coat:
  - Type: Alkyd latex.
  - PRN: C21.
  - Nominal DFT: 40µm.
- Total DFT:
  - 290µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.7 ACRYLIC System ACC1 - Two pack, solvent-borne

ACRYLIC System ACC1 - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ACC1 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - St 3.
- 1st Coat:
  - Type: Epoxy mastic.
  - PRN: C32.
  - Nominal DFT: 125µm.
- 2nd Coat:
  - Type: Acrylic 2-pack.
  - PRN: C33.
  - Nominal DFT: 50µm.
- Total DFT:
  - 175µm.

Product - 1st Coat: T.B.C
Product - 2nd Coat: T.B.C
Steelwork Location: Deck posts

3.4.8.8 ACRYLIC System ACC2 - Two pack, solvent-borne

ACRYLIC System ACC2 - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ACC2 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Epoxy primer.
  - PRN: C02, C06.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: Acrylic 2-pack.
  - PRN: C33.
  - Nominal DFT: 50µm.
- Total DFT:
  - 125µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.9 ACRYLIC System ACC4 - Two-pack, solvent-borne

ACRYLIC System ACC4 - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ACC4 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Epoxy primer.
  - PRN: C02, C06.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 125µm.
- 3rd Coat:
  - Type: Acrylic 2-pack.
  - PRN: C33.
  - Nominal DFT: 50µm.
- Total DFT:
  - 250µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.10 ACRYLIC System ACC5 - Two pack, solvent-borne

ACRYLIC System ACC5 - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ACC5 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Zinc rich primer.
  - PRN: C01, C02.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 125µm.
- 3rd Coat:
  - Type: Acrylic 2-pack.
  - PRN: C33.
  - Nominal DFT: 50µm.
- Total DFT:
  - 250µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.11 ACRYLIC System ACC6 - Two-pack, solvent-borne

ACRYLIC System ACC6 - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ACC6 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Zinc rich primer.
  - PRN: C01, C02.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 200µm.
- 3rd Coat:
  - Type: Acrylic 2-pack.
  - PRN: C33.
  - Nominal DFT: 50µm.
- Total DFT:
  - 325µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.12 ALKYD System ALK1

ALKYD System ALK1. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ALK1 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - St 3/Sa 2.
- 1st Coat:
  - Type: Alkyd primer.
  - PRN: C05.
  - Nominal DFT: 40µm.
- Total DFT:
  - 40µm.

Product - 1st Coat:
Steelwork Location:

3.4.8.13 ALKYD System ALK3

ALKYD System ALK3. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ALK3 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - St 3/Sa 2.
- 1st Coat:
  - Type: High build alkyd primer.
  - PRN: C04.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: Alkyd gloss.
  - PRN: C20.
  - Nominal DFT: 40µm.
- Total DFT:
  - 115µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.14 ALKYD System ALK6

ALKYD System ALK6. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

ALK6 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - St 3/Sa 2.
- 1st Coat:
  - Type: Alkyd primer.
  - PRN: C05.
  - Nominal DFT: 40µm.
- 2nd Coat:
  - Type: Alkyd MIO.
  - PRN: C17.
  - Nominal DFT: 40µm.
- 3rd Coat:
  - Type: Alkyd MIO.
  - PRN: C17.
  - Nominal DFT: 40µm.
- Total DFT:
  - 120µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.15 EPOXY System EVH1 - Very high build (DFT 250-500µm per coat)

EPOXY System EVH1 - Very high build (DFT 250-500µm per coat). As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

EVH1 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Very high build epoxy.
  - PRN: C13a.
  - Nominal DFT: 250µm.
- Total DFT:
  - 250µm.

Product - 1st Coat:
Steelwork Location:

3.4.8.16 EPOXY System EVH2 - Very high build (DFT 250-500µm per coat)

EPOXY System EVH2 - Very high build (DFT 250-500µm per coat). As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

EVH2 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Very high build epoxy.
  - PRN: C13a.
  - Nominal DFT: 400µm.
- Total DFT:
  - 400µm.

Product - 1st Coat:
Steelwork Location:

3.4.8.17 EPOXY System EVH3 - Very high build (DFT 250-500µm per coat)

EPOXY System EVH3 - Very high build (DFT 250-500µm per coat). As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

EVH3 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Epoxy primer.
  - PRN: C06.
  - Nominal DFT: 475µm.
- 1st Coat:
  - Type: Very high build epoxy.
  - PRN: C13a.
  - Nominal DFT: 400µm.
- Total DFT:
  - 475µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.18 EPOXY System EHB3 - High build (DFT 125-200µm per coat)

EPOXY System EHB3 - High build (DFT 125-200µm per coat). As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

EHB3 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Epoxy primer.
  - PRN: C06.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 200µm.
- Total DFT:
  - 275µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.19 EPOXY System EHB4 - High build (DFT 125-200µm per coat)

EPOXY System EHB4 - High build (DFT 125-200µm per coat). As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

EHB4 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Zinc rich primer.
  - PRN: C01, C02.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 200µm.
- Total DFT:
  - 275µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.20 EPOXY System EHB6 - High build (DFT 125-200µm per coat)

EPOXY System EHB6 - High build (DFT 125-200µm per coat). As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

EHB6 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Zinc rich primer.
  - PRN: C01, C02.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: Epoxy MIO.
  - PRN: C13.
  - Nominal DFT: 125µm.
- 3rd Coat:
  - Type: Epoxy MIO.
  - PRN: C13.
  - Nominal DFT: 125µm.
- Total DFT:
  - 325µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.21 EPOXY MASTIC System EPM2 - Surface tolerant

EPOXY MASTIC System EPM2 - Surface tolerant. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

EPM2 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - St 3.
- 1st Coat:
  - Type: Epoxy mastic.
  - PRN: C32.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: Epoxy mastic.
  - PRN: C32.
  - Nominal DFT: 75µm.
- Total DFT:
  - 150µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.22 EPOXY MASTIC System EPM3 - Surface tolerant

EPOXY MASTIC System EPM3 - Surface tolerant. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

EPM3 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - St 3.
- 1st Coat:
  - Type: Epoxy mastic.
  - PRN: C32.
  - Nominal DFT: 200µm.
- 2nd Coat:
  - Type: Epoxy mastic.
  - PRN: C32.
  - Nominal DFT: 200µm.
- Total DFT:
  - 400µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.23 INORGANIC ZINC SILICATE System IZS1

INORGANIC ZINC SILICATE System IZS1. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

IZS1 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - SA 2½.
- 1st Coat:
  - Type: Inorganic zinc silicate, solvent-borne.
  - PRN: C01a.
  - Nominal DFT: 75µm.
- Total DFT:
  - 75µm.

Product - 1st Coat:
Steelwork Location:

3.4.8.24 INORGANIC ZINC SILICATE System IZS2

INORGANIC ZINC SILICATE System IZS2. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

IZS2 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Inorganic zinc silicate, water-borne.
  - PRN: C01b, C01c.
  - Nominal DFT: 75µm.
- Total DFT:
  - 75µm.

Product - 1st Coat:
Steelwork location:

3.4.8.25 INORGANIC ZINC SILICATE System IZS3

INORGANIC ZINC SILICATE System IZS3. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

IZS3 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - SA 2½.
- 1st Coat:

  - Type: Inorganic zinc silicate, water-borne.
  - PRN: C01b, C01c.
  - Nominal DFT: 125µm.
- Total DFT:
  - 125µm.

Product - 1st Coat:
Steelwork Location:

3.4.8.26 INORGANIC ZINC SILICATE System IZS4

INORGANIC ZINC SILICATE System IZS4. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

IZS4 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - SA 2½.
- 1st Coat:
  - Type: Inorganic zinc silicate, solvent-borne.
  - PRN: C01a.
  - Nominal DFT: 125µm.
- Total DFT:
  - 125µm.

Product - 1st Coat:
Steelwork Location:

3.4.8.27 MOISTURE CURED URETHANE System MCU1

MOISTURE CURED URETHANE System MCU1. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

MCU1 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - St 3.
- 1st Coat:
  - Type: MCU sealer primer.
  - Nominal DFT: 50µm.
- 2nd Coat:
  - Type: MCU MIO.
  - PRN: C39.
  - Nominal DFT: 75µm.
- 3rd Coat:
  - Type: MCU finish coat.
  - PRN: C40.
  - Nominal DFT: 75µm.

- Total DFT:
  • 200µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.28 MOISTURE CURED URETHANE System MCU2

MOISTURE CURED URETHANE System MCU2. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

MCU2 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  • Sa 2½.
  • 1st Coat:
  • Type: Zinc rich MCU primer.
  • PRN: C38
  • Nominal DFT: 75µm.
- 2nd Coat:
  • Type: MCU MIO.
  • PRN: C39.
  • Nominal DFT: 75µm.
- 3rd Coat:
  • Type: MCU finiosh coat.
  • PRN: C40.
  • Nominal DFT: 75µm.
- Total DFT:
  • 225µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.29 POLYSILOXANE System PSL1

POLYSILOXANE System PSL1. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

PSL1 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  • Sa 2½.
  • 1st Coat:
  • Type: Zinc rich primer.
  • PRN: C01, C02.

  • Nominal DFT: 75µm.
- 2nd Coat:
  • Type: Epoxy polysiloxane.
  • PRN: C37.
  • Nominal DFT: 125µm.
- Total DFT:
  • 200µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.30 POLYSILOXANE System PSL2

POLYSILOXANE System PSL2. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

PSL2 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  • Sa 2½.
  • 1st Coat:
  • Type: Zinc rich primer.
  • PRN: C01a, C02.
  • Nominal DFT: 75µm.
- 2nd Coat:
  • Type: High build epoxy.
  • PRN: C13.
  • Nominal DFT: 175µm.
- 3rd Coat:
  • Type: Organic polysiloxane.
  • PRN: C37.
  • Nominal DFT: 755µm.
- Total DFT:
  • 325µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.31 POLYSILOXANE System PSL3

POLYSILOXANE System PSL3. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

PSL3 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  • Sa 2½.

  - 1st Coat:
  - Type: Epoxy primer.
  - PRN: C06.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 175µm.
- 3rd Coat:
  - Type: Organic polysiloxane.
  - PRN: C37.
  - Nominal DFT: 755µm.
- Total DFT:
  - 325µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.32 POLYURETHANE System PUR1 - Two pack, solvent-borne

POLYURETHANE System PUR1 - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

PUR1 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - St 3.
- 1st Coat:
  - Type: Epoxy mastic.
  - PRN: C32.
  - Nominal DFT: 125µm.
- 2nd Coat:
  - Type: Polyurethane gloss.
  - PRN: C26.
  - Nominal DFT: 50µm.
- Total DFT:

200µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.33 POLYURETHANE System PUR2 - Two pack, solvent-borne

POLYURETHANE System PUR2 - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

PUR2 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Epoxy primer.
  - PRN: C06.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: Polyurethane gloss.
  - PRN: C26.
  - Nominal DFT: 50µm.
- Total DFT:
  - 125µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.34 POLYURETHANE System PUR2a - Two pack, solvent-borne

POLYURETHANE System PUR2a - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

PUR2a Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Zinc rich primer.
  - PRN: C01a, C02.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: High build polyurethane.
  - PRN: C26.
  - Nominal DFT: 75µm.
- Total DFT:
  - 150µm.

Product - 1st Coat:
Product - 2nd Coat:
Steelwork Location:

3.4.8.35 POLYURETHANE System PUR4 - Two pack, solvent-borne

POLYURETHANE System PUR4 - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

PUR4 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Zinc rich primer.
  - PRN: C01, C02.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 125µm.
- 3rd Coat:
  - Type: Polyurethane gloss.
  - PRN: C26.
  - Nominal DFT: 50µm.
- Total DFT:
  - 250µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.36 POLYURETHANE System PUR5 - Two pack, solvent-borne

POLYURETHANE System PUR5 - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

PUR5 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Zinc rich primer.
  - PRN: C01, C02.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 200µm.
- 3rd Coat:
  - Type: Polyurethane gloss.
  - PRN: C26.
  - Nominal DFT: 50µm.
- Total DFT:
  - 325µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.37 POLYURETHANE System PUR6 - Two pack, solvent-borne

POLYURETHANE System PUR6 - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

PUR6 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - St 3.
- 1st Coat:
  - Type: Epoxy mastic.
  - PRN: C32.
  - Nominal DFT: 75µm.
- 2nd Coat:
  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 75µm.
- 3rd Coat:
  - Type: High build polyurethane gloss.
  - PRN: C15.
  - Nominal DFT: 75µm.
- Total DFT:
  - 225µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.4.8.38 POLYURETHANE System PUR7 - Two pack, solvent-borne

POLYURETHANE System PUR7 - Two pack, solvent-borne. As specified below. Applied to properly prepared substrates in accordance with the manufacturer's requirements and AS/NZS 2312.1.

PUR7 Coating System Details (in accordance with AS/NZS 2312.2: Table 6.3 - Painting System for Steel):
- Surface Preparation:
  - Sa 2½.
- 1st Coat:
  - Type: Epoxy zinc primer.
  - PRN: C02.
  - Nominal DFT: 75µm.
- 2nd Coat:

  - Type: High build epoxy.
  - PRN: C13.
  - Nominal DFT: 75µm.
- 3rd Coat:
  - Type: High build polyurethane gloss.
  - PRN: C15.
  - Nominal DFT: 75µm.
- Total DFT:
  - 225µm.

Product - 1st Coat:
Product - 2nd Coat:
Product - 3rd Coat:
Steelwork Location:

3.5 Workmanship

3.5.1 Scope

The work to be done under this Section comprises the supply of all labour, materials and plant for the fabrication and erection of all structural steelwork and the supply only of sundry metalwork shown or implied on drawings or in this specification.

3.5.2 Workmanship

Co-ordinate steelwork with Concretor, Carpenter, and all services subcontractors as appropriate with regard dimensions and setting-out of built-in items and fixings for peripheral elements. Supply and install all associated sundry fixings, weld plates, brackets, etc. necessary to complete the contract. Hollow sections ends sealed with 6mm plate unless noted otherwise.

Steelwork fabrication and welding shall be by personnel qualified and certified in accordance with AS/NZS 1554.1. Confirm all dimensions with the Main Contractor before fabrication. Allow for minimal erection tolerances - excessive will not be accepted. All items true to line and detail, with no welding or shaping distortion. Flame cutting of steel generally unacceptable.

3.5.3 Fabrication & Erection

All bolts and fasteners shall be fitted with appropriate washers and shall be thoroughly tightened (to torque settings as recommended by manufacturers). Protruding ends of bolts to be centre-punched against nuts to prevent loosening.

Dry packing under baseplates shall be undertaken using an approved non-shrink grout, mixed to consistency suitable for the nature of the application. Clean surfaces before grouting, pack the grout tightly, and smooth the edges.

Steelwork shall be erected plumb, true to line, square and without strain, and shall be temporarily braced, as necessary, to provide adequate stability during erection.

All welding to be Category SP in accordance with AS/NZS 1554.1. Butt welds full penetration with seal runs or backing strips. Fillet welds 5mm continuous unless otherwise noted. Welds exposed to weather and welds subject to hand contact shall be finished to a smooth even surface.

All steelwork fabricated and erected in accordance with the requirements of AS/NZS 5131.

4 WATERPROOFING

4.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

4.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3740:2010(AS)	Waterproofing of domestic wet areas
4858:2004(AS/NZS)	Wet area membranes

4.3 Mapei Liquid Applied Waterproofing Systems

4.3.1 Scope

Supply and install the specified Waterproofing Systems from Mapei to the locations identified on the drawings, complete with accessories. All aspects of this work shall be in complete accordance with Mapei product technical literature (check www.mapei.co.nz, or call 09 921 1994 for the latest editions), associated Mapei BRANZ Appraisals, other relevant product manufacturers' recommendations, and as shown the drawings.

No substitutions are permitted for the specified Waterproofing Systems from Mapei.

4.3.2 Interior Wet-Area Waterproofing Membrane

Mapei Mapelastic AquaDefense. A ready-to-use, ultra- quick drying, flexible liquid membrane for internal waterproofing applications.

Where to use:
To form waterproofing layers before applying ceramic, stone and mosaic coatings in:
- bathrooms and shower cubicles;
- laundry rooms;
- saunas and damp interior environments in general.

Mapelastic AquaDefense may be applied on:
- concrete;
- cementitious screeds and screeds made using special binders (Topcem or Mapecem);
- H3 treated plywood (internal applications only);
- plasterboard (internal applications only);
- existing coatings in ceramic, terrazzo and stone;
- cementitious render.

Technical characteristics:
- Mapelastic AquaDefense is a totally solvent-free, ready-to-use ultra-quick drying, one-component light blue synthetic resin based paste in water dispersion.

- Mapelastic AquaDefense is easy to apply using a long-haired roller, brush or trowel on horizontal, sloping and vertical surfaces.
- Mapelastic AquaDefense is resistant to water, lime-water (ph >12), water containing chlorine and detergents commonly used for cleaning residential environments.

Recommendations:
- Do not apply Mapelastic AquaDefense if the temperature is lower than +5°C.
- Mapelastic AquaDefense must always be covered with ceramic, mosaic or stone.

Application of the product:
- Mapelastic AquaDefense must be applied in two even, coats (approx. 0.4 mm per coat) with a long-haired roller, brush or trowel.
- Wait until the first coat is dry, making sure the product becomes darker with a matt finish, before applying the second coat diagonally to the first (approximately 1 hour at +23°C and 50% relative humidity of the air and with substrates having residual humidity lower than 3%).
- The final thickness of the two coats of Mapelastic AquaDefense must be at least 0.8 mm in order to create a robust, flexible and continuous film.
- If Mapelastic AquaDefense is applied to form an anti-fracture membrane on cracked substrates, embed Mapetex Sel reinforcement in the first coat while it is still fresh.
- Ceramic, stone and mosaic tiles may be laid 4 hours after applying the second coat (at +23°C - 50% RH).

Application data (at +23°C and 50% RH):
- Minimum filming temperature: +5°C.
- Application temperature range: from +5°C to +35°C.
- Waiting time between 1st and 2nd coat: approx. 60 minutes.
- Waiting time before laying coating: 3-4 hours.
- Completely dry (1mm thickness): 12 hours.
- Colour: light blue.

Apply Mapelastic AquaDefense to properly prepared substrates in strict accordance with the manufacturer's requirements and BRANZ Appraisal No.484.

Installed location:

4.3.3 System Accessories

4.3.3.1 Mapetex Sel N - reinforcing fabric

Mapei Mapetex Sel N. A non-woven fabric for reinforcing waterproofing membranes.

Description:
- Mapetex Sel N is a macro-holed polypropylene fabric reinforcement used together with Mapelastic and Mapelastic Smart flexible cementitious membranes for waterproofing and protecting new concrete surfaces or concrete units particularly subject to large deformations and, therefore, at risk of cracking.
- Mapetex Sel N is also suitable for use on surfaces at risk of cracking following repair with products from the Mapecem and Planitop product groups.
- Mapetex Sel N can increase crack-bridging capability up to 3 mm.

Features and benefits:
- Mapetex Sel N features a series of 1 mm holes that enhance the bond between layers of Mapelastic while remaining flexible and breathable;
- Mapetex Sel N improves the performance of Mapelastic waterproofing and protective membranes with respect to toughness, durability, punch-resistance, crack-bridging and elongation;
- Dimensionally stable, light, easy to handle and install.

Where to use:
- Large-scale containment basins, retaining walls, columns, spandrel beams and foundations;
- Balconies or terraces;
- Swimming pools;
- Bathrooms, showers and steam rooms;
- To replace Mapei fiberglass mesh for improved membrane tensile strength and crack-bridging/isolation properties of >3 mm.

Technical data:
- Type of fibre: polypropylene.
- Weight: 80g/m².

Use Mapetex Sel N in strict accordance with the manufacturer's requirements.

4.3.3.2 Mapeband Easy - waterproof joint tape

Mapei Mapeband Easy. A rubber tape sandwiched between two layers of non-woven polypropylene fabric, designed to form elastic joints in waterproofing systems.

Where to use:
- Waterproofing corners between adjacent walls and between walls and floors before applying waterproofing products such as Mapelastic, Monolastic, Mapegum WPS, or products from the Aquaflex Roof range.
- Flexible waterproofing of expansion joints on terraces and balconies, etc. before treating with Mapelastic or Mapelastic Smart;
- Sealing pipes and drains in bathrooms, showers and kitchens in conjunction with Mapeband gaskets;
- Sealing expansion joints in precast panels.
- Joints between Mapeband Easy strips must overlap by at least 5 cm and be bonded with the chosen waterproofing product.

Technical characteristics:
- Mapeband Easy is made from a central core of vapour-proof and waterproof elastic rubber sandwiched between two layers of alkali-resistant, non-woven polypropylene fabric;
- It is elastic and deformable, with a series of holes along the edges to improve wetting with the waterproofing product applied;
- May be coated with the chosen waterproofing product or with the adhesive used to bond floor or wall coverings.

Technical data:
- Tensile strength (EN12311-2, Method B) (N/mm²): >2.

- Ultimate elongation(EN12311-2, Method B): ≥300%.
- Tear resistance (EN 12310-2) (N): ≥100.
- In-service temperature range: from -20°C to +60°C.

Install Mapeband Easy in strict accordance with the manufacturer's requirements.

Installed location:

4.3.3.3 Mapeband SA - waterproof joint tape

Mapei Mapeband SA. A self-adhesive butyl tape with alkali-resistant, non-woven fabric for elastic waterproofing systems.

Where to use:
- Mapeband SA is a self-adhesive butyl rubber tape used to waterproof fillets between horizontal and vertical surfaces on terraces, balconies and in bathrooms and showers.
- Mapeband SA is a complementary product for Mapelastic Smart, Mapegum WPS and Mapelastic AquaDefense waterproofing systems.

Application examples:
- Waterproofing corners and fillets between floors and walls on terraces, balconies and in bathrooms.
- Sealing different types of material (bitumen membranes, metal, ceramic and cementitious screeds).
- Sealing small, hard-to-reach fillets such as those between window and door fittings, ledges and substrates.

Technical characteristics:
- Mapeband SA is a self-adhesive tape made from butyl rubber with alkali-resistant, non-woven polypropylene fabric bonded on the outer surface that guarantees excellent adhesion for the waterproofing system to be applied over it.
- Mapeband SA adheres to various types of non-absorbent substrates such as aluminium, copper, steel, plastic, bitumen waterproofing membranes, ceramic and to absorbent substrates such as concrete, masonry, aerated concrete, fibre-reinforced cement and render.

Technical data:
- Tape width: 100mm.
- Tape thickness: approx. 2mm.
- Colour: grey.
- Application temperature range: from +5°C to +30°C.
- Service temperature range: from -30°C to +80°C.

Install Mapeband SA in strict accordance with the manufacturer's requirements.

4.3.3.4 Mapeflex Roll

Mapei Mapeflex Roll. A thermoplastic elastomer (TPE) tape for flexible sealing and waterproofing of expansion joints and cracks subject to movement.

Where to use:

- Waterproofing expansion joints in roadworks, tunnels, hydraulic structures, and other areas subject to movement.
- Sealing joints in precast panels and structural facades.
- Waterproofing joints in basements, underground garages, storage tanks, drains, depuration plants, swimming pools, mines, tunnels, power stations, roofs, and façades.

Application examples:

- Flexible waterproofing seal of expansion joints subject to significant movement.
- Sealing structural joints in various civil and industrial constructions.
- Waterproofing joints in hydraulic works, such as channels, basins, drains, and pipework.

Technical characteristics:

- Mapeflex Roll consists of a TPE tape reinforced with polyester non-woven fabric along the sides.
- It is heat-weldable and highly expandable, ensuring excellent adhesion to epoxy adhesives such as Adesilex PG4, Adesilex PG2, or Adesilex PG1.
- The tape is flexible and deformable, even at low temperatures, with good tensile properties.
- It offers high watertightness and is resistant to UV rays, atmospheric agents, aging, and a wide range of chemical products.
- Mapeflex Roll is non-flammable and provides long-term resistance to microbes and hydrolysis.

Technical data:

- Available widths: 200 mm, 300 mm, 400 mm, 600 mm, and 800 mm.
- Thickness: 2 mm.
- Length of roll: 20 m.
- Tensile strength (EN 12311-2): ≥ 8 MPa (longitudinal), ≥ 6 MPa (transversal).
- Elongation at failure (EN 12311-2): ≥ 400% (longitudinal and transversal).
- Tear strength (EN 12310-2): ≥ 50 N (longitudinal and transversal).
- Watertightness (EN 1928): up to 8 bar.
- Service temperature range: from -30°C to +70°C.
- Foldability at low temperature (EN 495-5): ≤ -30°C.
- Resistance to UV rays (EN 1297): Pass (> 5000 h).
- Reaction to fire (EN 13501-1): Euroclass E.
- Hardness Shore A (ISO 868): approx. 80.

Install Mapeflex Roll in strict accordance with the manufacturer's requirements.

4.3.4 Flexible Sealant

Mapeflex PU40. A one-component, paintable, thixotropic polyurethane sealant with a low modulus of elasticity, designed for sealing expansion and distribution joints in horizontal and vertical surfaces.

Where to use:

- Mapeflex PU40 has been developed for sealing expansion and contraction joints in horizontal and vertical surfaces, including those subject to movement up to 25% of the average width of the joint.
- Suitable for sealing internal and external joints in various substrates such as concrete, wood, metal, and glass.

Application examples:

- Sealing expansion and distribution joints in:
  - Façades on civil and industrial buildings.
  - Pre-fabricated concrete panels.
  - Industrial floors subject to vehicular traffic.
  - Concrete floors for car parks, supermarkets, shopping centres, and warehouses.
  - Concrete walls and general internal and external vertical structures where the use of a thixotropic product is required.
- Sealing cracks and general fillet joints.

Application data (at +23°C and 50% RH):

- Application temperature range: from +5°C to +35°C.
- Dust dry: 60 minutes.
- Final setting: 3 mm per 24 hours; 4 mm per 48 hours.
- Colour: white and 111 grey (other colours available upon request).
- Shore A hardness (DIN 53505): 30.
- Resistance to UV rays: excellent.
- In-service temperature: from -40°C to +70°C.

Use Mapeflex PU40 in strict accordance with the manufacturer's requirements.

4.3.5 Warranty

4.3.5.1 Product Warranty

Mapei New Zealand Ltd Product Warranty Terms (Updated as of 1 November 2024):

Mapei New Zealand Ltd (Mapei NZ Ltd), through its exclusive distributor MBP (NZ) Limited, provides product warranties for MAPEI and POLYGLASS products distributed in New Zealand. These warranties apply when products are installed in accordance with the product's Technical Data Sheet (TDS), relevant plans and specifications, and in compliance with the New Zealand Building Code.

As of 1 November 2024, the standard warranty periods have been updated:

- Most products are covered by a **10-year warranty.**
- **MAPEI liquid waterproofing membranes** are eligible for up to a **15-year warranty.**
- **POLYGLASS waterproofing systems** may qualify for up to a **20-year warranty.**

To be eligible for the extended 15- or 20-year warranties, the applicator must hold a valid MBP-issued Trained Applicator Card, obtained through the Mapei Academy program. Applicators can apply for these warranties by completing the online application form available on the Mapei New Zealand website.

Please note that applicators are independent contractors and not agents or employees of Mapei NZ Ltd. Therefore, Mapei NZ Ltd assumes no responsibility or liability for their workmanship. Warranties do not cover installation, workmanship, or product mixing and preparation, which are the responsibility of the applicator.

Information regarding the application and use of Mapei products is provided in good faith, based on Mapei's current knowledge and experience of its products when they are appropriately stored, handled, and applied under recommended conditions as outlined in the product's TDS.

For detailed warranty terms and conditions, please refer to the Product Warranty and Warranty Periods PDFs available on the Mapei New Zealand website.

4.3.6 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All installation work shall be carried out by experienced Mapei Approved Applicators, familiar with the specified products and installation techniques, to fully comply with all Mapei NZ Ltd warranty requirements and in accordance with the manufacturer's installation requirements, relevant Mapei BRANZ Appraisals, and as noted and detailed on the drawings. All work shall be such as to leave a neat, efficient, robust and waterproof installation.

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-ordinate with other trades to install Mapei waterproofing products as required.

Application of the specified product(s) shall not be undertaken when the ambient temperature is outside the manufacturer's permissible temperature range. Exterior applications shall not be undertaken during inclement weather. As necessary, protect completed exterior work from rain and from hot dry winds and direct sunlight to aid proper drying and curing.

Protect adjacent finished work and surfaces from damage and contamination during installation. Leave completed surfaces clean, sound, and free of defects and damage.

4.3.7 Storage & Handling

Store Mapei waterproofing materials undercover, away from direct sunlight, on a flat, clean and dry surface. Keep Mapei products dry, out of direct sunlight and protected from damage, moisture and contamination while stored.

Do not use damaged, defective or contaminated products, or products that are beyond their designated shelf life.

Handle Mapei products in accordance with the manufacturer's requirements as set out in the relevant Technical Data Sheet(s) and in a manner that prevents contamination or deterioration of the material or reduces its performance.

Installers shall be familiar with and comply with the manufacturer's Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

4.3.8 Preparation

Requirements of substrates for the application of Mapei Liquid-Applied Waterproofing Membranes:
All substrates to be waterproofed shall be structurally sound, even and smooth, clean, dry, and free from dirt, dust, grease, oil, wax, paint residue, loose plaster and laitance, curing compounds and other materials and contaminants likely to affect the bonding and performance of the specified waterproofing membrane(s).

Carry out all necessary inspections and preparatory work to all substrates in accordance with the product's Technical Data Sheet prior to application.

Check that the substrate is free of voids and depressions, and is in correct alignment - true to line, level and/or plumb and to the falls indicated on the drawings.

Check that all embedded items are correctly installed, and that all substrate edges are completed as detailed.

Confirm the location of any movement control joints prior to commencement of the works, and ensure that they are appropriately trimmed - do not cover or bridge control joints with waterproof membranes - use only the manufacturer's recommended proprietary bond breaker tapes, flexible waterproofing bands, corners, sleeves and sealants.

Allow floor levelling compounds and mortar screeds to properly cure in accordance with the manufacturer's recommendations before commencing waterproofing.

The commencement of work on each section of waterproofing shall be deemed to indicate full acceptance by the Membrane Applicator that all preparatory works by other trades are appropriate to achieve the required finished results.

Preparation of Insitu Concrete Slabs for Mapei Liquid-Applied Waterproofing Membranes - check all aspects of preparatory works, including but not limited to:
- Check that the slab has been laid to the levels and falls indicated on the drawings.
- Concrete slab surface finishes must be compliant with NZS 3114 'U3 Surface Finish'.
- New concrete must have aged for a minimum of 28 days prior to application of the specified waterproof membrane(s).
- Old concrete must be thoroughly cleaned and washed and allowed to dry prior to application of waterproof membranes.
- Grind off any high spots, and using a proprietary levelling compound repair flush with feathered edges any low spots or damaged areas then grind smooth.
- Lightly grind any surface that is glazed to the extent that may compromise membrane adhesion.
- Leave the surface clean and free of dust and contaminants etc.
- Check that any protruding or exposed bare metal has been treated with a suitable corrosion-inhibiting primer.

Preparation of Cement Screeds & Renders for Mapei Liquid-Applied Waterproofing Membranes - check all aspects of preparatory works, including but not limited to:
- Check that screeds and/or renders have been formed and finished to the levels and falls indicated on the drawings.
- Screeds and/or renders must conform with the appropriate standard and should be finished a wooden float and left to cure for at least 24 hours for every 25mm of thickness.
- Check that the substrate is dry.
- Check that screeds have been laid to the levels and falls indicated on the drawings.
- Remove any excess mortar, loose material and surface projections.
- Check junctions with all other substrates and elements, ensuring that all necessary works have been completed as detailed.

Preparation of Compressed Fibre Cement Sheet substrates for Mapei Liquid-Applied Waterproofing Membranes - check all aspects of preparatory works, including but not limited to:
- Check that the fibre cement sheets have been correctly installed in accordance with the manufacturer's requirements, and that all sheet edges are fully supported.
- Check that all fibre cement sheet joints are flush and even, and that all fixings are countersunk and filled with a compatible filler.
- Check junctions with all other substrates and elements, ensuring that all necessary works have been completed as detailed.
- Using a proprietary levelling compound, repair flush with feathered edges any damaged areas of the compressed fibre cement sheet surface.
- Mechanically sand to remove all surface irregularities and contaminants likely to effect

adhesion.
- Vacuum clean leaving the surface clean and free of dust and contaminants etc.

Preparation of Plywood Sheet Substrates for Mapei Liquid-Applied Waterproofing Membranes - check all aspects of preparatory works, including but not limited to:
- Check that the plywood is CD grade (C face up), and is to the specified treatment.
- Check that the plywood sheets have been correctly installed in accordance with the manufacturer's requirements, and that all sheet edges are fully supported.
- Check junctions with all other substrates and elements, ensuring that all necessary works have been completed as detailed.
- Using a proprietary levelling compound, repair flush with feathered edges any damaged areas of the plywood surface.
- Mechanically sand to remove all surface irregularities and contaminants likely to affect adhesion.
- Vacuum clean leaving the surface clean and free of dust and contaminants etc.
- Check that all plywood sheet joints are flush and even, and that all fixings are countersunk and filled with a compatible filler.

Preparation of Fibre Cement Sheet Wet-Area Lining/TileUnderlay for Mapei Liquid-Applied Waterproofing Membranes - check all aspects of preparatory works, including but not limited to:
- Check that the fibre cement sheets have been correctly installed in accordance with the manufacturer's requirements, and that all sheet edges are fully supported.
- Check that all fibre cement sheet joints are flush and even, and that all fixings are countersunk and filled with a compatible filler.
- Check junctions with all other substrates and elements, ensuring that all necessary works have been completed as detailed.
- Check that all apertures, openings, edges and expansion and movement control joints are completed as detailed.

Preparation of Water-Resistant Plasterboard Wet-Area Lining for Mapei Liquid-Applied Waterproofing Membranes - check all aspects of preparatory works, including but not limited to:
- Check that the plasterboard sheets have been correctly installed in accordance with the manufacturer's requirements, and that all sheet edges are fully supported.
- Check that all sheet joints and fastening heads are flush-filled with a suitable stopping compound.
- Check junctions with all other substrates and elements, ensuring that all necessary works have been completed as detailed.
- Check that all apertures, openings, edges and expansion and movement control joints are completed as detailed.

4.3.9 Application

4.3.9.1 Control Joints - liquid-applied membrane

Control joints in the substrate shall be extended through the tiling, and installed and completed to the layout and details shown on the drawings. Do not bridge control joints with underlays, membrane, adhesive or tiles. Confirm the location of all control joints before commencing installation.

4.3.9.2 Mapeband

Mapeband Waterproofing Joint Tape. Apply a uniform layer of Mapegum WPS or Mapelastic Smart waterproofing membrane, at least 1mm thick and sufficiently wider than the Mapeband tape, to the corner junctions and expansion joints to be waterproofed with Mapeband tape. Keep expansion joint gaps clean and free of Mapegum WPS.
While the waterproofing membrane is still wet, lay the Mapeband tape into the membrane firmly with a smoothing trowel. The tape must be sufficiently drooped into expansion joints to allow for potential movement.
Apply subsequent coats of Mapegum WPS to form a continuous waterproof membrane over the required area.

Repeat the application process for installing Mapeband pipe seal gaskets.

4.3.9.3 Mapeband PE 120

Mapeband PE 120 Waterproofing Joint Tape. Apply a uniform layer of Mapegum WPS waterproofing membrane, at least 1mm thick and sufficiently wider than the Mapeband PE 120 tape, to the corner junctions and expansion joints to be waterproofed with Mapeband PE 120 tape. Keep expansion joint gaps clean and free of Mapegum WPS.
While the Mapegum WPS membrane is still wet, lay the Mapeband PE 120 tape into the membrane firmly with a smoothing trowel. The tape must be sufficiently drooped into expansion joints to allow for potential movement.
Apply subsequent coats of Mapegum WPS to form a continuous waterproof membrane over the required area.

Repeat the application process for installing Mapeband PE 120 pipe seal gaskets.

4.3.9.4 Mapelastic AquaDefense

Mapelastic AquaDefense Liquid-applied Waterproofing Membrane. Apply Mapelastic AquaDenense uniformly, by brush, roller or trowel, onto properly prepared, clean and dry substrates, in at lest two even, thin coats (approx. 0.5mm per coat). While the first layer is still wet, embed Matex Sel reinforcing fabric into the first layer and leave to dry before applying further coats diagonally to the first coat. Ensure to eliminate any wrinkles and air bubbles as the Mapetex Sel fabric is laid.
Eliminate pin holes or surface defects by applying a further coat over the local area.

Allow to dry for minimum 24 hours before flood testing and installation of subsequent finishes.

4.3.10 Completion

Check that the specified Mapei liquid-applied waterproofing membrane has been installed correctly, with all edges, penetrations, outlets, movement control joints and other detailing correctly finished.
Check the installed membrane for defects, surface damage and punctures - carry out any repairs in accordance with the manufacturer's instructions.
As necessary, flood test the membrane after the manufacturer's recommended time frame - carry out any additional works necessary as a result of the testing.
Ensure that the membrane is adequately protected from damage and contamination until installation of subsequent finishes.

Leave this work complete, watertight and leak-free in accordance with Mapei NZ Ltd requirements.
Leave adjacent surfaces and finished work clean and free of contamination. Remove all rubbish from site.

Issue to the Owner a copy of the manufacturer's maintenance requirements and a copy of the Mapei NZ Ltd Product Warranty and the Mapei-approved Applicator's Application Warranty for the completed works.

5 CARPENTRY

5.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

5.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1170.0:2002 SUPP1(AS/NZS)	Structural design actions - General principles - Commentary
1170.2:2011(AS/NZS)	Structural design actions - Wind actions
1170.5:2004(NZS)	Structural design actions - Earthquake actions - New Zealand
1491:1996(AS/NZS)	Finger jointed structural timber
1859.1:2017(AS|NZS)	Reconstituted wood-based panels - Specifications - Part 1: Particleboard
1859.2:2017(AS|NZS)	Reconstituted wood-based panels - Specifications - Part 2: Dry process fibreboard
2270:2006(AS/NZS)	Plywood and blockboard for interior use
2271:2004(AS/NZS)	Plywood and blockboard for exterior use
2295:2006(NZS)	Pliable, permeable building underlays
2588:2018(AS|NZS)	Gypsum plasterboard
2589:2017(AS/NZS)	Gypsum linings - Application and finishing
2728:2013(AS|NZS)	Prefinished/prepainted sheet metal products for interior/exterior building applications - Performance requirements
2904:1995(AS/NZS)	Damp-proof courses and flashings
2908.2:2000(AS/NZS)	Cellulose-cement products - Flat sheets
3601:1973(NZS)	Metric dimensions for timber
3602:2003(NZS)	Timber and wood-based products for use in building
3603:1993(NZS)	Timber Structures Standard
3604:2011(NZS)	Timber-framed buildings
3617:1979(NZS)	Specification for profiles of weatherboards, fascia boards, and flooring
3622:2004(NZS)	Verification of timber properties
3631:1988(NZS)	New Zealand timber grading rules
3640:2003(NZS)	Chemical preservation of round and sawn timber
4200.1:2017(AS|NZS)	Pliable building membranes and underlays - Part 1: Materials
4200.2:1994(AS/NZS)	Pliable building membranes and underlays - Installation requirements
4219:2009(NZS)	Seismic performance of engineering systems in buildings

4389:2015(AS/NZS)	Roof safety mesh
4600:2018(AS|NZS)	Cold-formed steel structures
AS/NZS 1080.1:2012	Timber - Methods of test - Method 1: Moisture content
AS/NZS 1604.2:2012	Specification for preservative treatment - Part 2: Reconstituted wood-based products
AS/NZS 2269.0:2012	Plywood - Structural - Part 0: Specifications
AWCI Code of Practice	For Design, Installation and Seismic Restraint of Suspended Ceilings
NASH Standard	Residential and Low-rise Steel Framing - Part 1: Design Criteria
NZBC B1/VM1	Structure
NZBC B2/AS1	Durability
NZBC C/AS1-AS6	Protection from Fire
NZBC C/AS2-AS6	Protection from fire
NZBC C/AS2-AS6	Protection from Fire
NZBC E2/VM1	External Moisture
NZBC F2	Hazardous Building Materials
NZBC G6	Airborne and Impact Sound
NZMRM Code of Practice	NZ Metal Roof and Wall Cladding Code of Practice - Version 3.0
SNZ HB 3604:2011	Timber-framed buildings - Selected extracts from NZS 3604:2011

5.3 General

This section includes the receiving, stacking and storage of all Carpenter's materials and the fabrication, erection and fixing of all framing, sheathings and finishing timbers, including all work incidental to neatly finishing in other trades and all temporary work and temporary bracing.

The Carpenter shall attend upon all trades, and shall supply and fix all obviously necessary but not specifically mentioned fixings and materials.

5.4 Ecoply Roofing Substrate

5.4.1 Scope

Ecoply Flooring (CD Grade) roofing substrate to the areas shown on the Roof Plan. All aspects of this work shall be in complete accordance with the Ecoply Specification and Installation Guide (Ph 0800 326 759 to confirm date of the most recent edition).

5.4.2 Properties

19mm Ecoply, F11 Stress Grade, 600mm max. frame centres.

5.4.3 Preparation

Check that the roof framing complies with NZS 3604, has rafters (or trusses) at the required centres, is trimmed at edges and openings as required for the Ecoply roofing substrate, is

accurate to plane, has provision for roofspace ventilation as required in the 'Ecoply Specification and Installation Guide', and has a maximum moisture content of 18% at the time of Ecoply roofing substrate installation.

5.4.4 Workmanship

All Ecoply roofing substrate installation work shall be carried out by tradesmen experienced in sheet material work. Upon delivery store the Ecoply on four evenly spaced level bearers, and protect from rain dirt etc. Handle the plywood carefully, and reject any sheets with damaged edges or faces.
For treated ply observe the recommendations within the Material Data Safety Sheet for H3 CCA Ecoply.

5.4.5 Installation

Sheets setout with the face grain at right angles to the rafters (or trusses), in staggered layout, in accurate alignment, and with all sheets continuous over at least two spans (three rafters) (if this is not possible at a roof edge then add boxing to support the sheet edges). Add boxing at ridge and gutter lines, and add boxing to tongued edges in maintenance access areas. Allow a 2 -3mm expansion gap at the end of each sheet. Fixings at 150mm centres to every rafter, and at 8 - 14mm in from the sheet ends. Fix with nails or screws, with all fixings in strict accordance with Sections 2 and 6 of the 'Ecoply Specification and Installation Guide', and to suit the exposure zone etc.

5.5 Ecoply Plywood Flooring

5.5.1 Scope

Long edge tongue and grooved plywood flooring to the areas shown on the Floor Plan. All aspects of this work shall be in complete accordance with the Ecoply Specification and Installation Guide (Ph 0800 326 759 to confirm date of the most recent edition).

5.5.2 Location

5.5.2.1 21mm Domestic Internal Wet Area (1.5kPa floor load)

21mm CD Longspan H3.2 CCA treated on joists at 600mm maximum centres to all internal wet areas as detailed on the drawings.

5.5.3 Preparation

Check that the subfloor framing complies with NZS 3604, has joists at the specified centres, is trimmed at edges and openings as required for the Ecoply Flooring, is accurate to level, and has a maximum moisture content of 18% at the time of Ecoply Flooring installation.

5.5.4 Workmanship

All Ecoply Flooring installation work shall be carried out by skilled tradesmen experienced in sheet material work. Upon delivery store the Ecoply Flooring on four evenly spaced level bearers, and protect from rain dirt etc. Handle the plywood carefully, and reject any sheets with damaged edges or faces.
For treated ply observe the recommendations within the Material Data Safety Sheet for H3 CCA Ecoply.

5.5.5 Installation

Sheets set out with the face grain at right angles to the joists, in a staggered layout, in accurate alignment, and with all sheets continuous over at least two spans (three joists) (if this is not possible at a floor edge, blocking must support the sheet edges). Allow a 2-3mm expansion gap at the end of each sheet. Fixings at 150mm centres to sheet edges (at least 7mm in from square sheet edges, or 15mm from tongue and groove edges) and at 300mm centres to intermediate joists. Fix with nails or screws, or a combination of mechanical fixings and adhesives, with all fixings in strict accordance with Sections 2.2, 2.3, and 5.2 of the 'Ecoply Specification and Installation Guide', and to suit the exposure zone etc.

5.5.6 Completion

Protect the floor from dirt and moisture to the maximum reasonably possible throughout the balance of the construction programme, and instruct that it be only lightly sanded before final covering/finishing.

5.6 Deck

5.6.1 Preparation

Ensure that all bolts, nails, screws and structural brackets as noted for use in the deck construction are appropriate for the Exposure Zone, timber treatment etc. Ensure that all cut or drilled surfaces of H4 and H5 treated timbers are flood coat re-treated, with the product recommended by the original treatment plant, before installation. All foundations taken down to firm undisturbed ground, concrete 20MPa, and with all aspects as specified in Concretor. Bearers spaced off adjacent supporting walls and fixed as detailed, and sill junction to adjacent access doors drained, flashed, sealed and finished as detailed.

5.6.2 Installation

Accurately set up, temporarily brace, and fix as noted or detailed all timber posts, beams, joists, braces, etc. as shown on the drawings, with all joints neatly fitted to ensure close contact over the full surface of the joint. Bolt holes 1mm larger than the bolt, and bolts re-tightened just prior to completion to remove any slack consequent on timber shrinkage. Very slightly arris timber edges where appropriate to avoid splintering, and cut any required rebates, grooves, etc. before erection.

5.6.3 Decking

Decking set out and fixed as noted, with butt joins staggered, slightly undercut, and drilled for nailing.

Steps down to adjacent ground, timber handrails (fully complying with NZBC-D1) and deck edge bench seats where drawn, shall all be exactly as detailed.

Where deck timbers are scheduled to be left natural keep them clean and ensure timber treatment marks are on the ends rather than timber faces.

5.7 Timber Framing

5.7.1 Scope

Supply and install timber framing to the floors, walls, roofs, and other timber framed elements, as identified and detailed on the drawings. All aspects of this work shall be in accordance with NZS 3604, product manufacturers' recommendations, and as shown on the drawings and the specification.

5.7.2 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All work shall be carried out to current best trade practise by experienced and competent tradesmen, familiar with the materials and installation techniques, in accordance with NZS 3604 and as shown on the drawings.

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings prior to installing timber framing. Co-ordinate with other trades to install timber framing as required.

5.7.3 Timber Framing

5.7.3.1 Timber Grade and Quality

Unless otherwise noted or specified on the drawings or specification, all framing timber shall be minimum structural grade SG 8 Radiata pine in accordance with NZS 3622.
Framing timber shall be seasoned or kiln dried, and be straight and true and free from wind, warp and distortion, and in lengths suitable for the members required, and shall have a moisture content of between 12% and 18% before installation.
Do not used damaged, faulty or defective materials.

5.7.3.2 Timber Treatment

All non-durable timber framing shall be appropriately treated against moisture and/or insect decay by treatment plants with recognised quality assurance systems that are administered by the Timber Preservation Council (NZTPC). Treatment of timber and wood-based building products shall be to the requirements of NZS 3602 as an absolute minimum, and all treated timber shall be identified and marked as required.
Carefully manage treated framing during installation to avoid accidental use of timber with a lower performance or durability treatment than that required or specified.

5.7.3.3 Storage & Handling

Check timber framing upon delivery and reject sub-standard or damaged material.
Store timber framing dry under cover, fillet stacked and well clear of the ground, and protect from damage, moisture, and contamination.
Ensure all appropriate personal protection equipment is worn at all times when handling and cutting treated framing.

5.7.3.4 Framing Installation

All timber framing members, including all dwanging, strutting, blocking, bracing etc, shall be sized, setout, fitted and fixed to the requirements of NZS 3604 and as shown on the drawings to accommodate structural loadings, cladding and lining setout and support, and the installation of other building components, fixtures and fittings.

All framing shall be erected without deviation, true to line, level, angle and plumb, and evenly aligned and square, and within the tolerances allowed in NZS 3604 Table 2.1. Framing members accurately cut, lapped, housed, joined, and seated so as to provide full contact over the bearing surfaces.

Temporarily prop, brace, tie, and secure framing members and elements as required until the framing is complete and self supporting. Leave in place for safety purposes as long as required.

Protect timber framing as required during installation against damage and moisture, and against significant variation of moisture content until ready for lining. Avoid ponding of water around floor plates.

5.7.3.5 Concrete Separation

Separate timber framing with an approved continuous damp proof course when in direct contact with concrete or masonry. Ensure that the DPC material is compatible with the timber treatment.
Free draining separations to external vertical faces shall be 12mm minimum and as noted on the drawings.

5.7.3.6 Timber Re-treatment

All cut or drilled surfaces of H4 and H5 treated timber framing shall be flood coat re-treated, with a suitable product recommended by the original treatment plant, before installation.

5.7.3.7 Edge Notching and Centre Holes

The notching, checking, and boring of framing members shall be in strict accordance with the requirements of NZS 3604.
Avoided checking and cutting where possible and keep to such dimensions so as not to prejudice the purpose for which the member is used. Keep edge notching to a minimum and where possible use centrally bored holes instead.
Concealed services pipes and wiring shall not project beyond the framing face and where possible shall be beyond the lining's fixing reach.

5.7.3.8 Framing Protection

Protect timber framing as required during installation against damage and moisture, and against significant variation of moisture content until ready for lining. Avoid ponding of water around floor plates.

5.7.3.9 Built-up Framing Members

Except for jack studs, bottom plates and top plates, framing members may be substituted with built-up members in accordance with the limitations of NZS 3604 2.4.4.7 with the prior approval of the Architect/Designer only.

5.7.4 Steel Fixings

5.7.4.1 Fastenings and Connectors

Unless otherwise noted or specified, timber framing fastenings and connectors shall be as specified in the relevant fixing schedules of NZS 3604 or have an equivalent capacity as specified therein. Timber framing connectors and fixings shall comply with the product information as required in NZS 3604 2.4.6, and shall be used and installed in accordance with the manufacturer's recommendations. Pre-drill nail holes in split-prone framing as necessary.

5.7.4.2 Durability of Fixings & Fastenings

Unless otherwise noted or specified, the minimum durability of timber framing fixings and fastenings, excluding nails and screws, shall comply with the durability requirements of NZS 3604 Table 4.1.
Galvanised steel fixing components, excluding nails and screws, shall have galvanised coating masses in accordance with NZS 3604 Table 4.2.
Unless noted or specified otherwise, the materials for nails and screws shall be as given in NZS 3604 Table 4.3.
Steel fixings and fastenings in contact with timber treated with copper based timber preservatives (H3.2 or higher) shall be in accordance with NZS 3604 4.4.4.
Stainless steel nails shall be minimum Grade 304 unless otherwise specified or noted.

5.7.4.3 Bolts and Coachscrews

Unless specified or shown otherwise, all bolted and coach screwed connections shall be M12 or M16 in accordance with the relevant fixing requirements given in NZS 3604.
Bolted and coach screwed connections shall have either a 50mm x 3mm square, or a 55mm x 3mm round, washer to each head and nut for M12 and M16 fixings. Washers shall be of the same material and durability as the bolt or coach screw.

5.7.5 Sub Floor Framing

Unless specified or shown otherwise, jack studs supporting sub-floor bearers for 1.5 kPa floors shall be to the dimensions and spacings given in NZS 3604 Table 6.3, and be located over a supporting pile, and have the greater sectional dimension parallel with the bearer supported by the jack stud. Fix jack studs to ordinary piles in accordance with NZS 3604 6.5.2.

Jack stud size and spacing:

Unless specified or shown otherwise, bearers for 2 kPa floors (wet service) shall be sized in accordance with NZS 3604 Table 6.4(b).
Bearers shall be continuous over two or more spans and jointed over the centre of an ordinary pile or jack stud in accordance with NZS 3604 6.12.7.
Bearers laid so that any crook will straighten under load.
Bearers shall have a minimum support bearing of 90mm, or 45mm when butt jointed.
Built-up bearers formed to the requirements of NZS 3604 6.12.3.

The sub-floor system shall be supported vertically by bearers directly supported by rows of piles.

Bearer size and span:
Pile type:

Bearers shall be fixed to ordinary timber piles in accordance with NZS 3604 6.5.2.

Fixing:

Bearers shall be fixed to anchor piles with 1/M12 bolt & washers or a proprietary 12kN pile/bearer fixing in accordance with NZS 3604 6.9.3.

Pile/bearer fixing brand name & type:

Cantilevered bearer projections shall not extend beyond the face of the support (pile/jack stud) more than stated in NZS 6.12.4.

Wall plates shall be as shown on the drawings and fixed to the foundation walls with proprietary anchors with 50mm x 3mm square washers at maximum 900mm centres, and within 150mm from the plate ends, in accordance with NZS 3604 7.5.12.2.

Anchor manufacturer, brand name & type: Refer to drawings

Unless specified or shown otherwise, stringers for 1.5 kPa floors shall be to the dimensions and fixing spacings given in NZS 3604 Table 6.5. Stringer fixings shall be M12 bolts set 100mm minimum into the foundation wall, or proprietary anchor with a minimum capacity of 4.5kN vertically, and 7.3kN parallel to the stringer.

Anchor brand name & type:

Unless specified or shown otherwise, stringers for 2 kPa floors shall be to the dimensions and fixing spacings given in NZS 3604 Table 6.5. Slatted timber deck stringer fixings shall be M12 bolts set 100mm minimum into the concrete foundation wall, or proprietary bolt systems with a minimum capacity of 4.5kN vertically, and 7.3kN parallel to the stringer. Stringers packed minimum 12mm off the exterior wall at every bolt as detailed.

Unless specified or shown otherwise, stringers for 2 kPa floors shall be to the dimensions and fixing spacings given in NZS 3604 Table 6.5. Slatted timber deck stringer fixings shall be M12 bolts. Stringers packed minimum 12mm off the wall cladding at every bolt as detailed.

5.7.6 Floor Framing

Unless specified or shown otherwise, timber floor joists shall be to the dimensions and spacings given in NZS 3604 Table 7.1.
Floor joists shall be laid on edge true to line and level, have a minimum support bearing of 32mm (except when cantilevered), and so that any crook will straighten under load.
Floor joists shall be jointed over supports (except when cantilevered beyond the support) in accordance with NZS 3604 7.1.1.7.

Unless specified or shown otherwise, boundary joists shall be continuous 25mm thick x joist depth as lateral support, and fixed to each end of the floor joists in accordance with NZS 3604 Table 7.5.

Boundary joist size: Refer to drawings

Unless specified or shown otherwise, solid blocking shall be 45mm thick x joist depth and installed between joist ends at maximum 1.8m centre spacings as lateral edge support, and fixed in accordance with NZS 3604 Table 7.5. Floor joists supported by by a foundation wall shall have solid blocking over a distance of minimum 1.8m at joist ends.

Floor joists with a span of 2.5m or greater and a depth of at least 4 times the joist thickness shall have 45mm thick continuous solid blocking at mid span, fixed in accordance with NZS 3604 Table 7.5.

Loadbearing walls run parallel to the line of joists shall be supported directly over double joists located at no more than 200mm centre-to-centre from a pile row.

Loadbearing walls run at right angles to the line of joists shall be located at no more than 200mm centre-to-centre from a bearer or subfloor loadbearing wall (running parallel to the loadbearing wall).

Non-loadbearing walls, without a bracing element, within 150mm and parallel to a floor joist, shall be supported by minimum 90mm x 45mm solid blocking on-edge at maximum 1.2m centres and at each side of door openings.

Non-loadbearing walls, with a bracing element, parallel to floor joists and not supported by a floor joist, shall be supported by minimum 90mm x 45mm solid blocking on-edge at maximum 1.2m centres and at each side of door openings.

Unless specified or shown otherwise cantilevered floor joists for 2 kPa floors shall to the dimensions and spacings given in NZS 3604 Table 7.2, and shall be continuous over the outermost support as required by NZS 3604 7.1.5.3(a).

Unless specified or shown otherwise trimmers shall be fixed to trimming joists by proprietary joist hangers in accordance with NZS 3604 7.1.6.5(b).

Hanger brand name & type: Mitek or similar approved

5.7.7 Wall Framing

5.7.7.1 Plates

Top and bottom plates shall be to the dimensions and layout shown on the drawings. Unless specified or shown otherwise, top and bottom plates shall be fixed in accordance with NZS 3604 7.5.12 and Tables 8.18 and 8.19, true to line and level or angle.
Joints in top plates shall be made over a stud or over blocking between studs, and all top plate connections shall be in accordance with NZS 3604 8.7.3. Form all holes and edge notches in top and bottom plates in accordance with NZS 3604 8.7.5.

5.7.7.2 Studs

Studs shall be to the dimensions and spacings shown on the drawings, and installed true to line and plumb in both directions between top and bottom plates.
Unless noted otherwise, non-load bearing wall studs shall be to the spacings given in NZS 3604 Table 8.4, stud width as shown on the drawings.
Form all holes and edge notches in studs in accordance with NZS 3604 8.5.1.5. Do not notch, check, cut, or bore holes in the middle third of any trimming stud.
Should the need arise, studs shall be straightened in accordance with NZS 3604 8.5.3 with prior approval from the Architect/Designer only.

Unless noted otherwise, studs in loadbearing walls for 3 kPa floor loads shall be in accordance with NZS 3604 Table 14.10.

5.7.7.3 Lintels

Lintels shall be to the dimensions and locations shown on the drawings, and installed true to line and level, and shall be supported by a 45mm thick doubling stud or jack stud fixed to a trimming stud, and secured against uplift in accordance with NZS 3604 8.6.1.8 as required.
The thickness of a lintel may be made from two or more members, where each member is the length of the lintel, in accordance with NZS 3604 2.4.4.7.

5.7.7.4 Sill & Head Trimmers

Unless specified or shown otherwise, sill and head trimmers to openings shall be the same width as the wall stud and to the thickness given in NZS 3604 Table 8.15, and installed at the required opening height true to line and level, and supported by a 45mm thick doubling stud or jack stud fixed to a trimming stud.

5.7.7.5 Dwangs

Dwangs shall be the same width and thickness as the wall stud, and installed at the centres noted on the drawings, and accurately cut and fixed in place true to line and level and flush with stud edges. Dwangs fixed in accordance with NZS 3604 Table 8.19.

5.7.8 Roof Framing

5.7.8.1 Rafters

All rafters (including hip, valley and jack rafters) shall be to the dimensions, spacings, pitch, and layout shown on the drawings.
Rafters shall be aligned and paired at the required spacings to ridge boards, ridge beams, hip rafters and valley rafters, and as shown on the drawings, and installed parallel, true to line, pitch and plane, and fixed in accordance with NZS 3604 Table 10.1.
Any required jointing of rafters shall be made over supports shown on the drawings only.
Unless shown otherwise, rafter seating to top plates, beams, and lintels shall have a minimum bearing of 32mm without reducing the rafter depth to less than 65mm, or 80%, at the birds mouth.
Extend rafter ends to form eaves as detailed on the drawings and in accordance with NZS 3604 10.2.1.14.
Fly rafters and outriggers installed to form gable verges as detailed on the drawings and in accordance with NZS 10.2.1.15.3

5.7.8.2 Ceiling Joists

Unless specified or shown otherwise, ceiling joists shall be to the dimensions and spacings given in NZS 3604 Table 10.3.
Ceiling joists shall be installed parallel true to line and plane, and shall be joined directly over framing supports and lapped minimum 300mm, or butted and flitched, in accordance with NZS 3604 10.2.1.6.5.
Do not support ceiling joists from a strutting beam.

5.7.8.3 Purlins

Purlins shall be to the dimensions and spacings shown on the drawings and as required by the cladding material, and fixed to rafters and/or trusses in accordance with NZS 3604 Table 10.10 (purlins on their flat) and/or Table 10.11 (purlins on their edge).
Purlins on their flat shall be continuous over a minimum of two spans.
Provide all necessary blocking and lateral support to purlins laid on edge in accordance with NZS 3604 10.2.1.16.6, and as detailed.
Extend purlins to form gable verges as detailed and in accordance with NZS 3604 10.2.1.15.

5.7.8.4 Roof Trusses

Roof trusses shall be Specific Engineering Design (SED) in accordance with NZBC B1/VM1 and manufactured by an accredited fabricator, and shall comply with all aspects of NZS 3604 10.2.2. Roof trusses shall be fabricated to meet the specific design requirements of the roof including, but not limited to; roof layout, pitch, and details, in accordance with the drawings and specification.
Roof trusses shall be supported and fixed to the truss fabricator's specifications but shall be no less than that required by NZS 3604 Tables 10.14 and 10.15. Roof trusses shall be braced as shown on the drawings and in accordance with NZS 3604 10.3.

5.7.8.5 Roof Bracing

Roof bracing shall be as shown on the drawings and in accordance with NZS 3604 10.3 and 10.4 as necessary.

5.7.9 Ceiling Framing

Ceiling framing shall be to the dimensions, layout, spacings, and details shown on the drawings, and shall be installed true to line, level and plane, and securely fixed in accordance with NZS 3604 Table 13.3.

Unless specified or shown otherwise, timber ceiling battens shall be to the dimensions and spacings shown on the drawings and in accordance with NZS 3604: Table 13.1, and shall be installed true to line, level and plane, and fixed to the underside of floor joists, rafters, ceiling joists or truss chords in accordance with NZS 3604: Table 13.3.

Ceiling battens shall be of Merchantable grade or better timber complying with NZS 3631.

5.8 Workmanship & Materials

5.8.1 Workmanship

5.8.1.1 Supervision

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner. It is the main contractor's responsibility to ensure that the construction of all structural timber complies in all respects with the drawings and the specification.

All non-restricted building work shall be carried out by or under the direct supervision of competent tradespersons, suitably qualified for the work undertaken, and in accordance with the best and latest trade practice.

5.8.1.2 Sub-floor Ground Cover

Just prior to closing-in suspended sub-floor framing, clear all framing offcuts and other rubbish, and rake loose material even with the ground shaped in a manner will allow accumulated moisture to drain to the exterior. Lay 0. 25mm thick black polythene sheeting as a vapour barrier over the prepared sub-floor ground surface. Cut polythene to neatly butt or lay up against foundations. Lap polythene joins minimum 100mm and seal with polythene tape. Hold polythene sheeting in place with pegs, masonry units or similar.

5.8.1.3 Timberwork

All timber shall be worked and cut to be true and square and free from wind and warp with all joints matching and mating to a proper contact fit over the full surface of the joint. All connections whether nailed screwed, glued, mortised or dovetailed shall be accurately made and properly executed to provide sound satisfactory connections for the class of work required.

Timber containing unacceptable defect or distortion shall not be cramped to provide mating at connections but shall be discarded and replaced by true defect-free timber before connections are made. Distribute any acceptable defects in timber so as not to impair the strength or the appearance of the finished work. Do not cut studs across the grain to straighten them.

The checking and cutting away of timbers shall be avoided where possible and shall be limited to such dimensions as will not prejudice the purpose for which the timber is used. Observe NZS 3604 restrictions on holing and checking of timber joists and beams. Concealed services pipes and wiring shall not project beyond the framing face and where possible shall be beyond the linings/claddings fixings reach.

Neatly punch exposed nailing to the diameter of the nail head below the surface. Completley remove bruises and tool marks, and replace all split timbers and hammer-marked finishing timbers.

Fit a 3-ply bituminous DPC or a single layer high impact polyethylene DPC at all timber to concrete junctions to provide complete separation. Ensure that the DPC material is compatible with the timber treatment.

Clean out framing voids before fixing sheathings or linings. Ensure framing voids are fully vermin proofed to the exterior. Build in as necessary all required flashings (supplied by others) to windows, doors, roof edges, etc.

5.8.1.4 Wall Underlay

Install a flexible heavyweight building paper or breathable/absorbent wall underlay behind all exterior wall claddings, fixed horizontally, with minimum 150mm horizontal laps and minimum 150mm vertical joint laps made over a stud, and kept taut without sagging or bulging.
Fix wall underlay at maximum 300mm centres, with 6mm - 8mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary fixings, fixed through nylon vertical strapping at every stud in exposed locations. Provide additional fasteners fixed through the underlay around framed openings. Cut window and door openings just prior to joinery installation; cut underlay at 45º angle away from each corner and return full framing depth and fasten to inside of frame.
Finish wall underlay at edges as detailed, and return full framing depth into window and door openings. Install all necessary flexible flashing tapes to openings, around pipes, ducts and other services penetrating the underlay, parapet and balustrade junctions, along head flashings and inter-storey flashings when installed, as required to seal the underlay, in accordance with wall underlay manufacturer's requirements and as shown on the drawings.
For drained cavity construction to framed walls without a rigid wall underlay and where the studs are at greater than 450mm centres, restrain the underlay with nylon strapping to prevent the underlay from bulging into the cavity space.
Any damaged underlay shall be made good by lapping in a new section.
Do not leave wall underlays exposed before covering with wall cladding for more than the manufacturer's recommended duration.

5.8.1.5 Roof Underlay

Install heavyweight building paper or breathable/absorbent roof underlay behind roof cladding as detailed, with minimum 150mm side and end laps, lapped such that any water will be shed to the outside of the underlay, and sufficiently tensioned in a manner that prevents sagging or ponding.
R1 class roof underlays shall be fully supported on nylon straps or non-corrosive netting/mesh; R2 class self-supporting underlays shall be laid to maximum 1200mm span between adjacent supports.
Run roof underlay horizontally or vertically up the roof slope on roof pitches above 10° pitch, and horizontally on roof pitches 10° or less.
Fix roof underlay at maximum 300mm centres to purlins, with 6mm - 8mm stainless steel staples or 20mm large-head galvanised clouts or proprietary underlay fixings.
For tiled roofs, lay the roof underlay over the anti-ponding board and no-corrosive support netting/mesh, and fix at maximum 300mm centres to the rafters/trusses before the tile battens are installed.
Finish roof underlay along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Carefully cut underlay at roof openings at 45º angle away from each corner and lap-tape closed to framed up-stands, ducts and other services penetrating the underlay in accordance with the underlay manufacturer's requirements and as detailed. Roof underlay must be separated from chimneys and flues in accordance with the requirements of the NZBC C1-C6 Acceptable Solutions.
Any damaged underlay shall be made good by lapping in a new section.

Do not leave roof underlays exposed before covering with the roof cladding for more than the manufacturer's recommended duration.

5.8.1.6 Window Installation

Prepare window and external door framing openings for joinery installation by neatly cutting the building wrap at 45º into corners, returning turning the wrap through the frame depth and fixing to the inside face.
Over-flash the underlay along the sill with a flexible flashing tape, installed full frame depth and length of the opening, returned minimum 100mm up the jambs, and with minimum 50mm return over the outside edge.
Over-flash the underlay at head/lintel corners with a flexible flashing tape, extending minimum 100mm each way from the corner, full frame depth, and with minimum 50mm return over the outside face.

Install external joinery frames with metal flashings as detailed and/or as required to completely weatherproof all frame-to-cladding junctions.
Unless shown otherwise, head flashings shall be carried minimum 75mm up behind claddings, extended at 15º out over the joinery head or facing board and returned down to cover the joinery or facing board minimum 10mm and finished with a 5mm, 45º 'kick out' drip-edge.
Neatly dress down the head flashings at the ends of the facings - for drained cavity construction, also form up-turned stop-ends in-line with the outside edge of cavity above.
Install metal (as specified) head flashings, fixed over the wall underlay, with the flashing upstand over-flashed minimum 50mm with a flexible flashing tape against the underlay, or with an additional piece of underlay extended over and lapped behind the underlay above, behind the inter-storey flashing or sill flashing above, or to the underside of the eaves.
Unless shown otherwise, sill flashings, where required, shall have a minimum 5º slope, minimum 8mm rear upstand with sealed sloping stop-ends, and be carried down minimum 35mm over the lower cladding and finished with a 5mm, 45º 'kick out' drip-edge.

Take delivery of window and door joinery. Check substrates for correct profile and alignment and that the joinery is fabricated to the correct wall construction set-out and depth. Set shims or pack as necessary to install joinery exactly true and square. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim, etc.

Install neat sealant beads as detailed or required.

After joinery installation, install closed cell backing rods as required and expanding foam seal the gap between the opening substrate and joinery liners/reveals (all round, from the inside).

On completion ensure that all sashes and doors neatly fit the openings with regular tolerances to all edges, and that all moving components and hardware are correctly adjusted and operating smoothly, without binding, to the required functionality.

5.8.1.7 Joinery Installation

Take delivery of all scheduled joinery items (doors, cabinets, shelves, etc.) and install in the positions shown, accurately aligned, true to level, plumb and square, and securely fastened

as noted and in accordance with best trade practice and with due regard for adjacent linings, finishes and trim, and anticipated movements.

Cabinets scribed and/or recessed packers scribed to adjacent surfaces as detailed or directed. Protect all installed Joinery from damage including surface marking and contamination, dirt and dust, and moisture until completion. Do not use Joinery items for working supports or platforms or for storage of materials or tools and equipments.

On completion ensure that joinery item doors and drawers all neatly fit the openings with regular tolerances to all edges, and that all moving components and hardware are correctly adjusted and operating to the required functionality.

5.8.2 Timber

5.8.2.1 Timber Materials

All timber shall be graded in accordance with NZS 3631 - Structural Grade MSG8 or better for all framing timber - (to meet the requirements of Table 2.3 of NZS 3603 for mechanically graded timber), and Dressing Grade for all finishing timber. Timber that is deemed below standard, in the opinion of the Architect/Designer, shall be removed from the site.

All non-durable timber, including components in manufactured items, shall be appropriately treated against moisture and/or insect decay by treatment plants with recognised quality assurance systems that are administered by the Timber Preservation Council (NZTPC). Treatment of timber and wood-based building products shall be to the requirements of NZS 3602 as an absolute minimum, and all treated timber shall be identified and marked as required.
Ensure that similar timbers with different treatment levels are carefully managed during construction to avoid accidental use of an H1 treated item where H3 hazard class treatment is required by the NZS 3602.
Do not use LOSP (light organic solvent-based preservative) treated timber that has not adequately 'flashed-off'.
Ensure that all cut or drilled surfaces of H4 and H5 hazard class treated timbers are flood coat re-treated, with the product recommended by the original treatment plant, before installation.

All timber shall be seasoned or kiln dried, to the stable moisture content, be straight and true and free from wind, warp and distortion, and in lengths suitable for the members required and the location in the finished construction. All framing timber shall have a moisture content between 12% and 18 % before being installed. If the use of inadequately seasoned timber results in damage or opening joints in the finished building the timber shall be replaced.
Fixing of internal linings shall be delayed after closing in until the timber framing has dried back below 20% moisture content and to allow for the maximum settling of substrates.

All kiln dried, dressed and/or finishing timbers shall be stacked under cover on delivery to the site, and all timber shall be full to the nominal sizes shown or specified, subject only to normal cutting and dressing tolerances.
All finishing timber shall have machine marks, stains and roughness removed and shall be sanded smooth.

Ensure that enclosed surfaces and ends of paint-finished exterior finishing timbers are fully primed before fixing. If this trade (Carpentry) carries out the priming it shall be to the specification and standard required of the Painter.

Unless specified otherwise, exposed framing timbers shall be unfinished to the exterior, and be fine bandsawn milled, treated with a minimum of discolouration, handled carefully at all times to avoid surface damage, and delivered free of crayon or pencil or other markings. Hazard class treatment markings shall be on the ends, NOT on the faces.

5.8.2.2 Timber Species

Unless noted or specified on the drawings, in the list below, or elsewhere in this specification all timber used shall be Radiata pine.
Other timbers shall be as follows:
- Douglas Fir (*NZ Oregon, Psuedotsuga menziesii*)
- Jarrah Clears (*Eucalyptus marginata*)
- Kwila Clears (*Merbau*)
- Balau (*Shorea spp*)
- Kwila (*Merbau*)
- Cedar Clears (*Western Red Cedar, Thuja plicata*)
- Rimu - (*NZ Red Pine*)
- Vitex Clears - (*Vitex cofassus*)
- Eucalypt Saligna Clears - *(Sydney Blue Gum*)
- Tasmanian Oak - (*Eucalyptus delegatensis / obliqua / regnans*)

Note: the use of alternate grades and varieties to those specified is subject to approval in each instance.

5.8.2.3 Timber Cavity Battens

To wall areas as noted install H3.1 treated ex.50mm x 25mm timber battens to form a drained vertical cavity complying with E2/AS1 in all respects. Ensure that flexible wall underlay and flexible flashing tape are completely and correctly installed before fixing battens in place. Fix the battens with 60mm hot-dip galvanised flat head nails at maximum 400mm centres, ensuring that the batten set-out completely fulfils the cladding's fixing requirements. Install 1:12 sloping horizontal cavity spacers where required to suit claddings, keeping the ends 50mm clear of the vertical battens.

5.8.2.4 Other Materials

Materials shall be delivered to site with the packaging and labelling intact, shall be of the same type, finish or colour to maintain continuity, shall be stored, and conditioned if required, in accordance with manufacturer's recommendations, and shall be protected from damage, contamination, and moisture - as appropriate.
Handle all materials in accordance with best practice and the manufacturer's requirements, and in a manner that prevents damage or deterioration to the material. Do not use damaged or defective materials or products, or products that are beyond their designated shelf life.

5.8.3 Laminated Veneer Lumber

Laminated Veneer Lumber (LVL) shall comply with AS/NZS 4357.0. Each piece of structural LVL shall be branded at least once with the manufacturer's logo and a registered brand or

marking that clearly identifies the structural properties that apply to the product and its limitations on end use; all in conjunction with associated published literature.

Structural properties identified in the associated published literature shall be:
- details of marking specific to the product
- veneer details
- physical properties including
  - modulus of elasticity
  - bending stress
  - tension stress parallel to grain
  - compression stress perpendicular to grain
  - compression stress parallel to grain
  - shear stress
- joint group
- density
- dimensional tolerances
- adhesives used
- limitations on end use

The storage and handling of LVL shall comply with Appendix A of AS/NZS 4357.0. In particular:
- LVL should be kept dry during storage and transit
- LVL should be stacked on bearers well clear of the ground and arranged so that their supporting surfaces are in the one plane
- Bearers should be spaced sufficiently close so that LVL spanning between them does not deflect excessively under its own weight.
- Bearers or spacers within a stack should be located near direct vertical alignment
- Care should be taken in lifting and handling LVL in order to avoid mechanical damage
- Wrapping should avoid and prevent entrapment of moisture
- LVL should not be used in high humidity conditions or exposed to the weather.

5.8.4 Proprietary Sheet Bracing Systems

Proprietary sheet bracing systems to walls, ceilings and sub-floor foundations shall be installed in strict accordance with the manufacturer's technical literature and design guides. No materials specified in the manufacturer's technical literature and design guide can be substituted without the written approval from the Architect/Designer.

5.8.5 Proprietary Roof Trusses

Roof trusses shall be of proprietary design, complying with the requirements of NZS 3603, NZS 3604, and AS/NZS 1170, and manufactured by suitably qualified fabricators.

Make allowance for all notching and holing to timber members to accommodate roof bracing etc., in the design of member sections of the roof trusses. Allow for all additional rafters, purlins, fixings and bracing necessary to complete the roof framing system with all accessories and incidental items necessary for proper installation even where not specifically shown on the drawings.
Proprietary roof trusses shall be designed to carry all imposed gravity and lateral loads. Refer to the approved design drawings for truss set-out and specified design loads. Roof trusses

are assumed to be generally at 900mm centres spanning clear between walls or roof beams as shown on the drawings. The Main Contractor is responsible for the design of proprietary roof trusses, including their layout and interaction with and dependence on adjoining elements.

Provide all necessary design information and shop drawings for all proprietary roof trusses to be incorporated in the works for review prior to fabrication.
Provide Producer Statements from a Charted Professional Engineer covering the design and construction of the roof trusses. Provide all information required by the Territorial Authority for the purpose of obtaining a Building Consent.

5.8.6 Flooring

5.8.6.1 Particleboard Flooring

20mm high density temporary weatherproofed flooring grade particleboard, installed in accordance with the manufacturer's requirements to the locations shown on the drawings.
Use sheets as large as possible, and set out sheets to approval. Accurately cut sheets to size, with the edges shot as necessary to provide tight butt joins. All handling, observation of requirements to accommodate moisture movement, expansion gaps and off-sets from fixed elements, fixings and adhesives and other aspects of this work shall all be exactly in accordance with the manufacturer's recommendations.
Punch nail fastenings and lightly sand particleboard flooring to an even finish over the entire surface before laying floor coverings or clear finishing, taking care to avoid damage to finished adjacent work - do not over-sand flooring.

5.8.6.2 Plywood Flooring - Fully-Supported Square Edge

19mm CD grade square edge plywood flooring, H3.2 Treated (CCA), installed in accordance with the manufacturer's requirements to the locations shown on the drawings.
Use sheets as large as possible, and lay sheets at right angles to the line of floor joists, with staggered sheet join lines, sheets gapped 2mm apart, and with all sheet joins and edges fully supported. Accurately cut to size, with the edges shot as necessary to provide 2mm square butt joins and with a 5mm backset from exterior floor/wall lines. Sheets glued and screwed down to joists. All handling, observation of requirements to accommodate moisture movement, fixings and adhesives, and other aspects of this work shall all be exactly in accordance with the manufacturers recommendations.
Lightly sand plywood flooring to an even finish over the full surface before laying floor coverings or clear finishing, taking care to avoid damage to finished adjacent work - do not over-sand the flooring.

5.8.7 Fixings

5.8.7.1 Nails

Comply with the requirements of NZS 3604 Section 2.4.4 and the Nailing Schedules of NZS 3604 as applicable. Unless noted or specified on the drawings or elsewhere in this specification, all nails fixing exterior timbers shall be Grade 304 or 316 stainless steel. Nails that will be covered with plaster or any similar material shall be hot-dipped galvanised, unless noted or specified otherwise.

Finishing brads to all finishing timbers shall be set out neatly and punched to the diameter of the nail below the surface. Bore slightly undersize holes for nailing that could cause splitting of the timber. Power-driven staples are completely unacceptable in finishing timbers.

5.8.7.2 Screws

Screw fastenings shall be of suitable gauge, head type, thread design, and length to provide secure fastening into the substrate material, and be suitable for the assembly/construction of the fixed item/element and the substrate material.
Unless noted or specified otherwise, screws exposed to the exterior shall be Grade 304/316 stainless steel or hot-dipped galvanised, and hot-dipped galvanised or similar corrosion resistant for damp situations.
Self-drilling screws shall be in accordance with AS 3566 for fastener type and corrosion resistance class.
Unless noted or specified otherwise, screws fixing hardware or similar shall be of the same material and finish as the hardware. Except where raised head screws are shown or specified, screws shall be countersunk flush or recessed where stopped/filled.

5.8.7.3 Bolts

Where bolts are used they shall be complete with nuts and washers unless specified otherwise. All bolts, nuts and washers shall at least meet the durability requirements of NZS 3604 Table 4.1. Where a higher durability material is specified on the drawings, the higher durability material shall be used. The diameter of a hole for a bolt shall not be less than the bolt diameter nor exceed it by 1.5mm.

For the following bolt diameters use washer sizes as below unless noted otherwise on the drawings:
- up to M8: 25x 25 x 1.5mm;
- up to M12: 50 x 50 x 3mm;
- up to M20: 65 x 65 x 5mm;
- up to M20: 75 x 75 x 6mm.

Round washers may be used proving they are of a thickness and area not less than those specified above.

Subfloor framing - unless noted otherwise on the drawings, cast-in holding down bolts for subfloor framing fixed to concrete foundation walls shall be M12 Grade 304 stainless steel, embedded minimum 150mm into concrete, to the spacings required by NZS 3604, and located centrally on the timber.
Bottom plates - unless noted otherwise on the drawings, cast-in holding down bolts for bottom plates fixed to a concrete slab shall be M12 galvanised, embedded minimum 120mm into concrete, to the spacings required by NZS 3604, and located centrally on the timber.
Framing - timber/timber and timber/steel - Unless noted otherwise on the drawings, M16, hexagonal head mild steel and with 50 x 50 x 3mm washers.
Timber/concrete (dry situations) - Unless noted otherwise on the drawings, Ramset Trubolts, T12140 at maximum 900mm centres - for damp or exterior situations use stainless steel Trubolts.
Bolts shall be tightened until the washer just indents the timber surface. Exposed bolts shall

be re-tightened just prior to Practical Completion to remove any slack consequent on timber shrinkage. Allow to countersink bolt heads and nuts as necessary to clear linings.

5.8.7.4 Framing Hardware

Proprietary timber framing hardware and fixings, including multigrips, joist shoes, Z nails, gang nails and similar hardware, may be used where specifically approved, or where required on the drawings or by NZS 3604 schedules, in accordance with the manufacturer's requirements.
Proprietary timber framing structural brackets and ties, including post and bearer brackets, beam supports, angle brackets, tie cleats and similar hardware, shall be as noted on the drawings and installed in accordance with the manufacturer's requirements.
Refer to Metalwork or Structural Steel section of this specification for specific design engineered fabricated steel components that connect structural timber framing.

5.8.7.5 Powder Fastening Systems

Powder powered fasteners are not permitted for fastening structural timber framing unless specifically noted on the drawings. All applications are subject to specific approval.

5.8.7.6 Adhesives

Aliphatic PVA for dry timber applications - all other adhesives for timber jointing are subject to specific approval or as specified. Check surfaces are in appropriate condition to receive adhesive, and that adhesives are used strictly in accordance with the manufacturer's instructions. Clamp adhesive-jointed timber connections and check alignment of members before the adhesive has set.

5.8.8 Flashings

Flashing materials shall be in accordance with the requirements of NZBC E2/AS1 Sections 2.2 Materials, 4.0 Flashings, Table C.1.1.1B: Compatibility of materials in contact , and Table C.1.1.1C: Compatibility of materials subject to run-off, and as noted on the drawings.
All flashings around windows, doors and other openings and apertures, at internal and external corners, inter-storey junctions, soffit junctions, and at junctions with other building elements and cladding systems, etc., shall all be carefully constructed, fixed and finished to the details shown on the drawings.

5.8.9 Sealants

5.8.9.1 Sealants

For critical joints such as primary water/weatherproofing seals, precast panels primary seals, structural floor slab control joints, structural glazing, immersion or hydrostatic pressure seals, etc., either use the sealant noted on the drawings or obtain a reputable sealant manufacturer's recommendation for the precise situation, and submit the manufacturer's specifications covering all relevant criteria and characteristics of the proposed sealant, primers, joint surfaces preparation, etc. to the Architect/Designer for review and confirmation to proceed.
If so requested, additionally submit a sample of the proposed sealant made up into a demonstration joint, incorporating the same materials, preparation, finish tooling, etc. After confirmation to proceed with the proposed sealant install a sample joint to approval, length approximately 2% of the overall length of the joints required, with a minimum length of two

metres; when accepted this joint becomes the quality control sample for all subsequent similar joints.

For less critical joints such as those in covered or protected situations, and bathroom and kitchen ceramics and sanitaryware etc., either use the sealant noted on the drawings or select the sealant from a reputable manufacturer's range for the substrate materials involved, with due regard for the flexibility required, acid or neutral curing, mould resistance, paintability or clear or standard colours, slumping characteristics, temperature range expected, etc. - silicone, polymer or polyurethane sealants are anticipated.
For all simple gap-filling and draught sealing situations, either use the sealant noted on the drawings or select from a reputable manufacturer's range for a paintable acrylic sealant with good adhesion characteristics for the substrates involved - pay particularly care in the sealant selection where bare metal, polycarbonate, polystyrene or similar substrates or where bituminous-based membranes are adjacent or where exposure to solvents is possible.

All joint surfaces preparation and priming and all sealant application work shall be exactly in accordance with the sealant manufacturer's recommendations, and carried out by competent and experienced applicators familiar with the materials and techniques required.
Ensure that the sealant is being used within the manufacturer's stated design parameters, particularly with regard joint design and anticipated cyclic movement.
Check that the joint faces are sound, completely dry, and frost free, clean and free of dirt, rust, oil, grease, laitance, etc., and they are primed to suit the surface porosity - particularly for critical locations.
Insert a polyethylene tape slip layer at the back of the joint or a closed cell polyethylene PEF backer rod where required and to the sealant manufacturer's recommendations. Mask off joint edges where a clean straight finish line is required.
Check the toxicity of the selected sealant and handle it appropriately. Check that the temperature during sealant installation is within the manufacturer's guidelines.
Apply the sealant and tool the filled joint's surface smooth and even, utilising a lubricant as necessary and strictly within the manufacturer's guidelines.
Remove any masking tape immediately after tooling, clean up all adjacent surfaces using the recommended cleaning agents as required, and protect the finished joint until the sealant has properly cured.

5.8.10 Interior Finishing Trim

All interior finishing trim shall be cut to the exact dimensions and fine sanded smooth, and with lightly sanded arrisses, and all fixed with plated finishing pins. Machine staple fixing is NOT acceptable. Note that even traces of planer marks are unacceptable on architraves. Margins between interior trim and other elements shall be exactly even, and all mitres shall be exact and tight.

Scotia to be selected by Interior Designer

Architraves to be selected by interior designer

to be selected by interior designer

5.9 Thermakraft Underlay, DPM, DPC & Tapes

5.9.1 Scope

Supply and install Thermakraft Underlays and Membranes, as specified herein, to the locations identified on the drawings, complete with all accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with Thermakraft Ltd technical information and installation requirements (check www.thermakraft.co.nz, or call 0800 806 595 for the latest editions), other relevant product manufacturers' recommendations, and as shown on the design drawings.

No substitutions are permitted for the specified products from Thermakraft Ltd.

The following is a list and a general description of the extent of the Thermakraft Underlays and Membranes works, which are more specifically defined in the contract documents, required for the completion of the contract works:

5.9.2 Requirements

5.9.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

5.9.2.2 Warranty

Kingspan Thermakraft Product Warranty Statement:

- 15 Years Warranty - for all Thermakraft warranted products installed, according to the warranty conditions.
- Provide the Thermakraft Ltd Product Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of permanent installation.

5.9.2.3 Substitutions

Thermakraft Ltd products shall be as specified herein and as indicated on the approved drawings. The substitution of Thermakraft branded products for alternative brands is not permitted under any circumstances.

The substitution of a specified Thermakraft product for an alternative Thermakraft branded product by the Contractor shall only be permitted with the Contract Administrator's written authorisation, and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate alternative Thermakraft branded products to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

5.9.3 Damp-Proof Membrane

Thermathene Black (250µm). A 250 micron thick (0.25mm), tear resistant, recycled polyethylene film sheet concrete underlay. Coloured black.

Installed over nominal 10mm (max. 25mm) thick compacted sand blinding layer, over a properly prepared base course, as a moisture vapour barrier under concrete slabs on-ground (prior to concreting), in accordance with the manufacturer's requirements and as shown on the drawings (Install Guide).

Thermathene Black must be laid in a continuous manner with all laps minimum 150mm, and penetrations to be taped with Thermakraft White General Purpose Tape. Tape-seal around penetrations. Inspect immediately before pouring concrete and repair any holes or other damage.

Installed Location:

5.9.4 Damp-Proof Course

Supercourse 500 DPC. A 0.75mm thick, high-impact, single-layer Polyethylene film, embossed on both sides. Available in 50mm 75mm, 90mm, 100mm, 150mm, 200mm, 250mm, 300mm, and 500mm roll widths. Supercourse 500 DPC is suitable for use as a separation barrier between most incompatible and dissimilar materials.

Used as a general damp proof course (DPC) for separating timber and wood-based products and metal from concrete, masonry, brick, and stone surfaces, and as a moisture barrier (Install Guide).

Also used as a concealed flashing behind brick veneer cladding in accordance with NZS 4229 and NZBC E2/AS1.

Installed in accordance with the manufacturer's requirements, BRANZ Appraisal No.329, and as shown on the drawings.

5.9.5 Wall Underlay

Covertek 407 is a heavy-duty, self-supporting, fire-retardant, absorbent, breathable, synthetic all underlay.

Covertek 407 can only be used in lined applications and must not be used in unlined buildings, including unlined garages, sheds, warehouses, soffits, canopies, or lean-to designs. Covertek 407 is CodeMark certified under Certificate No. CMNZ30028, Version K, issued by Global-Mark Pty Ltd and BRANZ appraisal No 651 (2019).

Installed as a flexible wall underlay over timber or steel wall framing in accordance with the manufacturer’s requirements, BRANZ Appraisal No. 651, CodeMark Certificate CMNZ30028, and as shown on the drawings.

When used as a standalone flexible wall underlay, Covertek 407 is suitable for NZS 3604 and NASH wind zones up to and including Very High. When installed over a rigid wall underlay, it is suitable for wind zones up to and including Extra High.

Covertek 407 may be used with absorbent or non-absorbent wall claddings, either direct fixed or installed over an 18mm minimum drained cavity, and may also be used with masonry

veneer where installed in accordance with NZBC E2/AS1 or NASH Building Envelope Solutions.

Covertek 407 may also be used in Early Close wall applications allowing works to continue inside the building before the exterior wall cladding is fully in place for up to 120 days, provided it is installed and maintained in accordance with the manufacturer's Early Close Installation Guide. Do not leave Covertek 407 exposed in wall applications for more than a total of 120 days before covering. Covertek 407 Early Close Application is CodeMark certified under Certificate No. CMNZ30028, Version K, issued by Global-Mark Pty Ltd.

Installed Location:

5.9.6 Roof Underlay

Covertek 407. A self-supporting, fire-retardant, absorbent, breathable, synthetic non-woven polyolefin underlay.

Can only be used in lined applications. Section E2 of the NZBC defines a lining as "the rigid sheet covering for a wall, ceiling or other interior surface." Must not be used in unlined buildings such as unlined garages, sheds, soffits or canopies.

Covertek 407 is CodeMark assured with the NZ Building Code: CodeMark Certificate of Conformity No:CM30028-RevI, issued by Global-Mark Pty Ltd.

Installed as a roof underlay over timber or steel roof framing in accordance with the manufacturer's requirements and BRANZ Appraisal No.651.

Covertek 407 roof underlay can be used directly under direct-fixed roof claddings, or directly under roof cavity battens or tile battens in accordance with Thermakraft requirements.

Covertek 407 roof underlay must installed in a manner that prevents ponding of water. Refer to Covertek 407 Installation guide for underlay support requirements. Support requirements are dependent upon pitch, purlin spacing and installation direction of underlay.

Do not leave Covertek 407 exposed on roofs for more than a total of 7 days before covering.

Installed Location:

5.9.7 Underlay Support

Thermakraft AUSNET Hexagonal Wire Mesh. 75mm woven hexagonal, galvanised mild steel wire netting. 1.0mm diameter wire, 150g/m² galvanised coating, Class W10 to AS/NZS 4534. Supplied in 2.0m wide x 25/50m long rolls.

BRANZ appraised as a roof underlay support, and also foil and insulation support, on buildings situated in NZS 3604 Wid Zones up to and including Extra High, within the scope of BRANZ Appraisal No.1029.

Used as a support for roof underlays and non-rigid insulation, and installed in accordance with the manufacturer's requirements and BRANZ Appraisal No.1029 (2018) and as shown on the drawings.

Do not leave AUSNET Hexagonal Wire Mesh exposed to the elements for more than the manufacturer's exposure period (install guide).

Installed Location:

5.9.8 Underlay Penetration Seals

5.9.8.1 OneSeal - Multi-fit pipe and cable penetration seals

Thermakraft OneSeal, multi-fit pipe and cable penetration seals. A range of pipe and service penetration seals consisting of soft, flexible EPDM membrane with a self-adhesive flange.

OneSeal multi-fit pipe and cable penetration seals are part of the Thermakraft ONE WRAP System - a total building wrap solution, and are a patented airtight solution for round or rectangular pipes, cables or conduits when passing through underlay barriers.

Pipe Seals
Four pre-notched rings for pipes sized from 15mm to 110mm diameter.

Cable Seals
1 x conduit – 55mm to 80mm diameter;
OR
2 x cables – 10mm to 22mm diameter; and
4 x cables – 7mm to 10mm diameter.
Installed in accordance with the manufacturer's requirements and BRANZ Appraisal No.942, with stand-alone flexible wall underlay over timber or steel wall framed walls on buildings situated in NZS 3604 Wind Zones up to and including 'Very High'.

Installed in accordance with the manufacturer's requirements and BRANZ Appraisal No.942, with flexible wall underlay used over a rigid wall underlay on buildings situated in NZS 3604 Wind Zones up to and including 'Extra High'.

5.9.9 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to install Thermakraft Underlays, DPMs, and DPCs as required.

5.9.10 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All installation work shall be carried out by experienced and competent tradespersons, familiar with the specified products and installation techniques, in accordance with the manufacturer's requirements, and to fully comply with all warranty requirements.

All cutting, joining, and fixing techniques shall be exactly as recommended by the manufacturer, and carried out with the use of suitable tools and equipment appropriate for the application. All work shall be such as to leave a neat, efficient, and weathertight installation.

5.9.11 Delivery & Handling

Store underlay rolls on end, undercover, on a flat, clean and dry surface. Keep stored materials dry, out of direct sunlight, and protected from damage and contamination at all times.

Handle materials in accordance with the manufacturer's requirements and in a manner that prevents damage to or deterioration of the product.

Do not used damaged or defective materials, or products that are beyond their designated shelf life.

Installers shall be familiar with and comply with the manufacturer's safe handling requirements and precautions for use, and shall use appropriate safety gear when handling materials.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry, as well as the Best practice guidelines for working on roofs for roofing installations.

5.9.12 Preparation

5.9.12.1 General

Prior to installation, carry out all necessary inspections and preparatory work required, and ensure that all preliminary works by other trades has been completed to specification and as shown on the approved drawings.

Do not commence installation until all necessary preliminary works by others is complete and to the required standard. The commencement of work shall be deemed to indicate full acceptance by the installer that all preliminary works by other trades is complete.

Supporting timber framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content of 20% at the time of cladding installation. Allow LOSP treated timber to sufficiently flash-off before installing Thermakraft building underlays and foils.

Supporting light structural steel framing shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. Comply with the light structural steel framing fabricator's specifications and requirements for fixing cladding and roofing components.

Supporting heavy steel structures shall comply with NZS 3404.

5.9.12.2 Under-Slab Basecourse

Under-Slab Basecourse - prior to laying under-slab DPM, check all aspects of preparatory works, including but not limited to:
- Check that the under-slab basecourse has been correctly laid and compacted as specified.
- Check that the surface has been properly prepared and compacted to the required standard, and is smooth and flat.
- Ensure any sand blinding is free of aggregate, sharp protrusions.
- Ensure the final surface is free of hollows and ponded water prior to laying the DPM.

5.9.12.3 Under-Slab Tidy Slab

Under-Slab Tidy Slab - prior to laying under-slab DPM, check all aspects of preparatory works, including but not limited to:
- Check that the tidy slab blinding has been laid and finished to the required standard.
- Ensure the finished tidy slab is dry and free of all loose aggregate and sharp protrusions.
- Ensure the final surface is free of hollows and ponded water prior to laying the DPM.

5.9.12.4 Wall Framing

Wall Framing - prior to wall underlay installation check all aspects of preparatory works, including but not limited to:
- Check that wall framing has been completed as shown on the drawings, complies with the relevant design and construction standards.
- Check that framing is securely fixed, true to line and plane, is plumb and level where required, and is trimmed at edges, openings and penetrations as required.
- Check that there are no projections due to structural bracing and bracketry etc.
- Check that the required clearances from ground, deck, balcony or lower roof to the bottom edge of the underlay/cladding are in accordance with NZBC E2/AS1.

5.9.12.5 Roof Structure

Roof Structure - prior to roof underlay installation check all aspects of preparatory works, including but not limited to:
- Check that the supporting purlins or battens are set-out to the required set-out and spacings, are straight and true to line and plane, and are securely fixed.
- Check that all barge and fascia boards have been installed to the correct line and plane with all edge blocking complete and secure.
- Check that valley gutter and hidden gutter framing is to the required dimensions with solid backing supports securely fixed, true to line and plane.
- Check that internal gutter membrane linings are complete, and dressed back and adhered to a solid substrate along the roof edge as shown on the approved drawings.
- Check that all trimming for roof penetrations, all roof/wall junction blocking, and all necessary work by other trades is complete.
- Check that solid sarking required for fully-supported roofing is complete and securely fixed in accordance with the approved drawings.
- Check that any required anti-ponding boards for tiled roofs have been correctly installed to a minimum 5° (1:12) fall to the eaves gutter.

5.9.13 Installation - Wall Underlay

5.9.13.1 Covertek 407 Wall Underlay

Covertek 407 Wall Underlay shall be installed, printed face out, to the exterior face of the wall framing, run horizontally, starting from the bottom edge and finishing at the top edge, extending 35mm below the bottom plate or bearer, and lapped such that any water will be shed to the outside of the underlay with minimum 150mm horizontal laps and minimum 150mm vertical joint laps made over a stud, and kept taut without sagging or bulging.

Fix at maximum 300mm centres, with 6-8mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary fixings. Provide additional fasteners fixed through Thermakraft Stud Strap around framed openings before cutting Covertek 407 at openings.

Cut window and door openings just prior to joinery installation; cut underlay at 45º angle away from each corner and return full framing depth and fasten to inside of frame. Install Thermakraft Corner Moulded flashings and Thermakraft Window Flashing Tape over the underlay at opening corners and along sill trimmers in accordance with Thermakraft requirements.

For drained cavity wall construction where studs are at greater than 450mm centres, install Thermakraft Stud Strap horizontally at 300mm centres to prevent bulk insulation from pushing the underlay into the cavity space.

Finish Covertek 407 underlay at edges as detailed.

Can only be used in lined applications.

Install all necessary flexible flashing tapes to openings, around pipes, ducts and other services penetrating the underlay, parapet and balustrade junctions, along head flashings and inter-storey flashings when installed, as required to seal the underlay, in accordance with Thermakraft requirements and as shown on the drawings.

5.9.14 Installation - Roof Underlay

5.9.14.1 Covertek 407 - synthetic roof underlay

Covertek 407 synthetic roof underlay shall be installed without support on roofs with slopes 10° or greater (unless specified otherwise), run horizontally across the roof slope and over the purlins, starting from the gutter/lowest point up to the ridge/highest point, extending maximum 20mm into gutters, with minimum 150mm side and end laps, lapped such that any water will be shed to the outside of the underlay, and sufficiently tensioned without sagging.

Fix at maximum 300mm centres to purlins, with 8-12mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary grippers.

For tiled roofs, lay Covertek 407 underlay over the anti-ponding board and rafters/trusses, and fix at maximum 300mm centres to the rafters/trusses before the tile battens are installed.

Can only be used in lined applications

Finish Covertek 407 underlay along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Carefully cut underlay at roof openings at 45º angle away from each corner and lap-tape closed to framed up-stands, ducts and other services penetrating the underlay in accordance with Thermakraft requirements and as detailed. Leave underlay minimum 50mm distance clear of the outer liner of flue stacks.

5.9.15 Completion

Check that all underlays have been installed correctly and are properly supported, and that all underlay edges, joins and ends are correctly finished prior to closing off with claddings - all in accordance with Thermakraft installation requirements.

Check installed membranes and underlays for defective work and damage - replace and/or repair as necessary to the required standard.

Leave all of this work complete, and free of defects, and to the required standard in accordance with the manufacturer's warranty requirements.

Issue to the Owner a copy of the Thermakraft maintenance requirements and the Thermakraft product warranties for the installed products.

5.10 GIB® Rondo® Metal Batten Systems

5.10.1 Scope

Supply and install the specified GIB® Rondo® Metal Batten Systems to the locations identified on the drawings, incorporating all system components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with the GIB® Rondo® Metal Batten Systems - System and Installation Manual publication and the current GIB® Site Guide (check www.gib.co.nz, or call 0800 100 442 for the latest editions), other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for GIB® Rondo® Metal Batten Systems.

This specification section should be read in conjunction with the GIB® Plasterboard Linings specification and relevant GIB® Systems specifications, and other specification sections, as they are interrelated.

For the purpose of this specification, the GIB® Rondo® Metal Batten Systems - System and Installation Manual publication is referred to as the 'GIB® Rondo® Metal Batten Systems Manual'..

5.10.2 Requirements

5.10.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

5.10.2.2 Warranty

GIB® Product & System Warranty:
- 10 Years Warranty - for all GIB® Products and Systems installed, according to warranty conditions.
- Provide the GIB® Product & System Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of practical completion of the contract works.

5.10.2.3 Producer Statement PS1 - GIB® Rondo® 308 Ceiling Suspension System

Producer Statement PS1 - GIB® Rondo® 308 Ceiling Suspension System. Furnish a fully completed Producer Statement PS1 (Design) as confirmation that the GIB® Rondo® 308 Ceiling Suspension System as designed and documented complies with the relevant clauses of the New Zealand Building Code. The PS1 Producer Statement shall not serve as a product warranty or guarantee of compliance.

5.10.3 Performance

5.10.3.1 Fire Rated Assemblies - GIB® Fire Rated Systems

Fire Rated Assemblies - GIB® Fire Rated Systems: Where GIB® Rondo® Metal Batten Systems are a component of a GIB® Fire Rated System, additionally comply with all relevant aspects of the GIB® Fire Rated Systems publication, BRANZ Appraisal No.289, and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Fire Rated Systems.

5.10.3.2 Sound Rated Assemblies - GIB® Noise Control Systems

Sound Rated Assemblies - GIB® Noise Control Systems: Where GIB® Rondo® Metal Batten Systems are a component of a GIB® Noise Control System, additionally comply with all relevant aspects of the GIB® Noise Control Systems (2017) publication, BRANZ Appraisal No.394, and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Noise Control Systems.

5.10.3.3 Ceiling Diaphragms - GIB EzyBrace® Systems

Ceiling Diaphragms - GIB EzyBrace® Systems: Where GIB® Rondo® Metal Batten Systems are a component of GIB EzyBrace® System ceiling diaphragms, additionally comply with all relevant aspects of the GIB EzyBrace® Systems (2016) publication and GIB Ezybrace® Software, BRANZ Appraisal No.928, and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

5.10.3.4 GIB® Rondo® 308 Ceiling Suspension System

The design of the GIB® Rondo® 308 Ceiling Suspension System for ultimate and serviceability limit states shall take into account the action effects arising from dead loads, live loads, wind loads, earthquake loads, and air pressure fluctuation, in accordance with the requirements of AS/NZS 2785, NZS 1170.5, the New Zealand Building Code, and the AWCI 'Code of Practice for Design, Installation and Seismic Restraint of Suspended Ceilings'.

5.10.4 GIB® Rondo® Metal Batten Systems

5.10.4.1 GIB® Rondo® 310 Ceiling Batten System

GIB® Rondo® 310 Ceiling Batten System. Incorporating 35mm deep, concealed metal ceiling battens that are either fastened with proprietary metal support clips (recommended) to the support frame or fixed directly to the support frame.

Suitable for 10mm,13mm,16mm and 19mm thick GIB® plasterboard ceiling linings for residential and commercial applications. Plasterboard ceiling linings are generally screw-fixed directly to the underside of the ceiling battens. Maximum 130mm clearance from the underside of the support frame (joist/rafter) to the top of the ceiling batten.

GIB® Rondo® System Components:
- 310 Batten: 35mm deep, galvanised steel furring channel (batten).
- 340 Perimeter Channel: 35mm deep, galvanised steel perimeter 'U' channel.
- NZ18 Perimeter Angle: 32 x 32mm, galvanised steel perimeter angle.
- 311 Clip: 92mm long, galvanised steel batten fastening clip. Provides 30mm max. clearance from supporting joist or truss.
- 313 Clip: 192mm long, galvanised steel batten fastening clip. Provides 130mm max. clearance from supporting joist or truss.
- A311 GIB Quiet Clip®: 92mm high, galvanised steel batten fastening clip with rubber cushioning grommets.
- 312 Jointer: Galvanised steel batten jointing clip.

GIB® Rondo® 311 or 313 clips can be installed to provide additional restraint and accurate batten alignment when the battens are direct-fixed to the support frame. Use GIB Quiet Clip® for GIB® Noise Control Systems.

When installed as a ceiling diaphragm, the battens must be fixed directly to the support framing. If GIB® Rondo® clips are used, then a timber block (min 300mm) or a continuous timber member must be fixed alongside the support framing to create a direct connection.

Installed with all system components and accessories required for proper installation and performance, in accordance with the GIB® Rondo® Metal Batten Systems Manual, to the locations, layout, levels and details shown on the drawings.

Where electrical earthing of GIB® Rondo® 310 Ceiling Batten System is required, the electrical earthing shall be carried out by a qualified electrician in accordance with the electrical standards and regulations.

Installed Location:

5.10.4.2 GIB® Rondo® 308 Ceiling Suspension System

GIB® Rondo® 308 Ceiling Suspension System. Incorporating 16mm deep, concealed metal furring channels that are suspended by GIB® Rondo® proprietary suspension system using metal suspension rods fastened to the supporting structure.

The GIB® Rondo® 308 Ceiling Suspension System is subject to specific design - refer to the approved design drawings for furring channel layout, spans, supports, etc, and other design requirements. Provide all necessary Producer Statements.

Installed with all system components and accessories required for proper installation and performance, in accordance with the associated Producer Statement and the GIB® Rondo® Metal Batten Systems Manual, to the locations, layout, levels and details shown on the drawings.

Suitable for 10mm, 13mm, 16mm and 19mm thick GIB® plasterboard ceiling linings for residential and commercial applications. Plasterboard ceiling linings are generally screw-fixed directly to the underside of the ceiling battens.

GIB® Rondo® System Components:
- 308 Batten: 16mm deep, galvanised steel furring channel (batten).
- 142 Perimeter Channel: 16mm deep, galvanised steel perimeter 'U' channel.
- NZ18 Perimeter Angle: 32 x 32mm, galvanised steel perimeter angle.
- 127 TCR: 25mm deep, galvanised steel top cross rail (strongback), with GIB® Rondo® 139 Clip.
- 128 TCR: 38mm deep, galvanised steel top cross rail (strongback), with GIB® Rondo® 139 Clip.
- STSU Acoustic Clip: Galvanised steel, resilient mount, acoustic batten fastening clip.
- 121 Rod. 5mm diameter, galvanised, mild steel suspension rod; attached to top and bottom support clips.
- Suspension Rod Attachment Clips (top & bottom). Bottom clips - 2534 Clip and 167 Clip. Top clips - 534 Clip and 547 Clip.
- 138 Jointer: Galvanised steel batten jointing clip.

Carry out all necessary installation inspections and monitoring as the works progress in accordance with the AWCI 'Code of Practice for Design, Installation and Seismic Restraint of Suspended Ceilings'.

Where electrical earthing of GIB® Rondo® 308 Ceiling Suspension System is required the electrical earthing shall be carried out by a qualified electrician in accordance with the electrical standards and regulations.

Installed Location:

5.10.5 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to ensure that the GIB® Rondo® Metal Batten System correctly allows for ceiling lining installation, and for the locations of recessed lights and other fittings installed by others, and to install GIB® Rondo® Metal Batten Systems as required.

Shop Drawings - GIB® Rondo® 308 Ceiling Suspension System: If not already provided, prepare and submit to the Architect/Designer for verification and approval Shop Drawings

covering the following aspects of the GIB® Rondo® 308 Ceiling Suspension System:
- Dimensioned plans of each ceiling showing all essential elements and materials.
- Details of the suspension system between the ceiling and adjacent elements.
- Details of all fixing methods and systems.
- Details of all control joint types - where required.
- All building services associated with the ceiling system - where required.
- Coordination requirements with other work and trades - where required.

The shop drawings shall include design criteria for the ceiling system, including:
- The Building Importance Level, as defined by AS/NZS 1170.0;
- The Classification of Parts in accordance with AS/NZS 1170.5, Section 8.1.2;
- The AWCI Seismic Grade of the ceiling in accordance with the AWCI Seismic Grading System, as defined by the AWCI Code of Practice.

5.10.6 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Installation of GIB® Rondo® Metal Batten Systems shall be carried out by experienced and competent tradespersons, who are familiar with the specified systems and installation techniques, in accordance with the GIB® Rondo® Metal Batten Systems - System and Installation Manual, to fully comply with all warranty requirements, and relevant requirements of AS/NZS 2785 (suspended systems). Submit evidence of experience on request, e.g. National Certificate of Interior Systems, or Certified Business Member of AWCINZ.

All cutting, jointing, fixing and supporting techniques shall be exactly as recommended by the manufacturer. All work shall be such as to leave a neat, efficient and robust installation, to the required standard, free from damage and defects.

5.10.7 Delivery & Handling

Store all materials and accessories indoors, off the floor, on a flat, level surface in accordance with the manufacturer's requirements. Keep materials and accessories dry and protected from damage, distortion, moisture and contamination at all times.

Do not use damaged or defective materials and products.

Handle all materials in accordance with the manufacturer's requirements and Product Data Sheets, and in a manner that prevents damage and distortion to the component.

Installers shall be familiar with and comply with the manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

5.10.8 Preparation

5.10.8.1 General

The building must be fully enclosed, weathertight and suitably dry before installation commences.

Check that all preliminary and preparatory building works have been completed to specification and as shown on the drawings.

Check that any required building services installations, including electrical, plumbing, mechanical, fire, or other service located behind the ceiling line and/or wall line, have been completed.

Supporting timber framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content 18% at the time of installation.

Supporting light structural steel framing shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. All light structural steel framing members shall satisfy the requirements of AS/NZS 1170.

Supporting steel stud partitioning shall comply with AS 1397 and as specified and shown on the drawings.

Supporting steel structures shall comply with NZS 3404.

Supporting concrete structures shall comply with the CCANZ CP 01:2011 or with NZS 3109. New concrete must have aged for a minimum of 28 days.

Supporting concrete masonry structures shall comply with NZS 4229, or with NZS 4230 and AS/NZS 1170 for specific design.

Carry out all necessary substrate inspections and preparatory work in accordance with the GIB® Rondo® Metal Batten System Manual and the GIB® Site Guide prior to installation.

Confirm the location and details of movement control joints, as indicated on the drawings, prior to installation.

The commencement of work on each section/area shall be deemed to indicate full acceptance by the installer that all preparatory works by other trades is complete.

5.10.9 Installation

5.10.9.1 GIB® Rondo® 310 Ceiling Batten System (600mm c/c battens)

GIB® Rondo® 310 Ceiling Batten System. Installed in accordance with the GIB® Rondo® Metal Batten Systems Manual, to the locations, layout, levels and details shown on the drawings. Suitable for 13mm thick, single layer, internal plasterboard ceiling linings for residential applications.

Ceiling Batten Set-out:
- Batten Spacing: Maximum 600mm centreto-centre spacings.
- Batten Span: Maximum 1200mm for multi-span battens. Maximum 900mm for single-span battens (non-jointed), and for garage ceilings.

Confirm the ceiling lining fixing and installation requirements prior to installing GIB® Rondo® 310 Metal Ceiling Battens. Make allowance for the lining thickness when establishing the finished batten datum level.

For Multi-span Battens: Set-out GIB® Rondo® 310 Metal Ceiling Battens at maximum 600mm centre-to-centre spacings, with a maximum batten span of 1200mm, to the areas, levels and details shown on the drawings.

For Single-span Battens (non-jointed): Set-out GIB® Rondo® 310 Metal Ceiling Battens at maximum 600mm centre-to-centre spacings, with a maximum batten span of 900mm.

Screw-fix GIB® Rondo® perimeter angle and/or channel to walls, true to line and level, with 32mm x 8g x GIB® Grabber® wafer head needle tip screws at 300mm centres max.

Fix GIB® Rondo® batten clips along the batten lines, 900mm or 1200mm apart (as above), to the support framing with 32mm x 8g GIB® Grabber® wafer head needle tip screws or pairs of 40 x 2.8mm GIB® Nails. Batten clip fixings and set-out shall be to the manufacturer’s installation requirements for the clip type, batten type and batten set-out.

Securely fasten the clips in place so that the battens are fixed at the correct datum level and are parallel, straight and true to line. Support batten ends on perimeter angle or channel, or alternatively, cut, fold and fix the batten end to the top plate.

Use full length battens. When jointing is necessary, joint battens using the manufacturer's proprietary batten jointer for the batten type.

Do not fix batten clips directly to H3.2, CCA, CuAz or ACQ treated timber - fully separate the clips from timber with DPC or other approved material.

Where required, provide additional battens for ceiling-mounted fixtures and fittings at the set-out shown on the drawings.

Ceiling Diaphragms:
- When installed as a ceiling diaphragm, the battens must be fixed directly to the support framing.
- If GIB® clips are used then a timber block (min 300mm) or a continuous timber member must be fixed alongside the support framing to create a direct connection.

5.10.9.2 GIB® Rondo® 308 Ceiling Suspension System

GIB® Rondo® 308 Suspension System. The GIB® Rondo® 308 Suspension System is subject to specific design - refer to the approved design drawings for furring channel layout, spans, supports, etc, and other design requirements. Installed in accordance with AS/NZS 2785 to the locations, layout, levels and details shown on the drawings.

Confirm the ceiling lining fixing and installation requirements prior to installing GIB® Rondo® 308 Suspended Ceiling System. Make allowance for the lining thickness when establishing the finished batten datum level.

Set-out GIB® Rondo® 308 Suspended Ceiling System components to the areas, layout, levels and details shown on the drawings.

Screw-fix GIB® Rondo® perimeter angle and/or channel to walls, true to line and level, with 32mm x 8g x GIB® Grabber® wafer head needle tip screws at 300mm centres max.

Fix GIB® Rondo® suspension rods, tie clips and top cross rails at the required set-out to the support structure at the required height/level.

Adjust the clips and suspension rods so that the battens are fixed at the correct datum level and are parallel, straight and true to line. Support batten ends on perimeter angle or channel.

GIB® Rondo® 308 suspension system fixings and anchors shall be to the manufacturer’s approved specific design specification - including type, size, material and finish.

Use full length battens. When jointing is necessary, joint battens using the manufacturer's specified proprietary batten jointer.

Do not fix suspension components directly to H3.2, CCA, CuAz or ACQ treated timber - fully separate components from timber with DPC or other approved material.

Provide additional ceiling battens/furring channels and support required at penetrations and for ceiling-mounted fixtures and fittings.

5.10.10 Completion

Carry out a final inspection immediately after installation. Check that the GIB Rondo Metal Batten System has been installed correctly in accordance with the GIB® Rondo® Metal Batten Systems Manual and installation tolerances, to the correct set-out and details shown on the drawings, and that the installations are accurately aligned true to line, level (and/or plumb) and plane.

Check that the installed layout allows for the correct positioning and installation of all penetrations and services fixtures and fittings as indicated on the drawings.

Check for any damage and defective work - repair or replace as necessary to the required standard.

Leave all of this work complete and to the required standard in accordance with the manufacturer's warranty requirements, as shown on the drawings.

Leave completed works and surrounding surfaces clean and free of rubbish and debris. Remove all rubbish and excess material from the site.

Issue to the Owner a copy of the a copy of the GIB® Product and System Warranty.

Provide all necessary Producer Statements.

5.11 GIB® Plasterboard Linings

5.11.1 Scope

Supply and install GIB® Plasterboard Linings specified herein, as sheet lining materials to the walls, ceilings and other elements identified on the drawings, complete with all accessories required for proper installation, finishing and performance. All aspects of this work shall be in complete accordance with the current GIB® Site Guide and relevant GIB® Systems literature (check www.gib.co.nz, or call 0800 100 442 for the latest editions), and other relevant product manufacturers' recommendations.

No substitutions are permitted for GIB® Plasterboard Linings, GIB® Systems or GIB® System components and accessories.

This specification must be read in conjunction with relevant GIB® Systems specifications - GIB® EzyBrace® Systems, GIB® Fire Rated Systems, GIB® Noise Control Systems, GIB® Aqualine® Wet Area Systems, GIB® X-Block® Systems, GIB® Quietline®, GIB® Intertenancy Barrier System, and GIB® Rondo® Metal Batten Systems - and other specifications sections, as they are interrelated. .

5.11.2 Requirements

5.11.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

5.11.2.2 Warranty

GIB® Product & System Warranty:

GIB Systems Durability.
The following systems have, unless stated otherwise in GIB® technical literature, a serviceability life in excess of that stated and satisfy the requirements of NZBC Clause B2 Durability:
15 Years:
- GIB Aqualine® Wet Area Systems.

50 Years:
- GIB® Fire Rated Systems
- GIB EzyBrace® Systems
- GIB X-Block® Systems
- GIB Noise Control® Systems.

Provide the GIB® Product & System Warranty on the manufacturer's standard warranty form. Commence the warranty from the date of practical completion of the contract works.

Include with the warranty: a copy of the completed GIB® Installation Sign-Off sheet, and the GIB® Plasterboard Lining Systems Care and Maintenance bulletin.

5.11.2.3 AWCI Membership

Installation of GIB® Plasterboard Linings and associated GIB® Systems shall be carried out by a registered member of the Association of Wall and Ceiling Industries of New Zealand Inc. (AWCI). If not already provided and if requested, submit evidence of AWCI membership and relevant experience.

5.11.2.4 Quality Assurance

Ensure that the installation and finishing of GIB® Plasterboard Linings and associated GIB® Systems comply in all respects with the approved design drawings and specifications, and Building Consent.

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of work are carried out to the highest standard.

5.11.2.5 Inspection & Acceptance of GIB® Plasterboard Linings

Carry out all necessary pre-installation, installation and finishing inspections of GIB® Plasterboard Linings for each area of work in accordance with the requirements of the GIB® Site Guide and associated industry Code of Practice (AWCI) recommendations.

Complete the GIB® Site Guide Pre-Installation Checklist prior to installing GIB® plasterboard linings, and relevant GIB® Performance Systems Installation Checklists.

Complete the GIB® Interior Plasterer/Stopper Installation Sign-Off Certificate upon completion and before handover for subsequent decoration.

5.11.2.6 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected GIB® Plasterboard Linings and GIB® Systems materials and work shall be repaired and/or replaced to the satisfaction of the Architect/Designer, without delay and at no additional cost to the Principal.

5.11.2.7 Producer Statement (other manufacturer's system)

Producer Statement PS1 - where required. Where GIB® Plasterboard Linings are installed as a component of another manufacturer's proprietary system, the system manufacturer shall furnish a completed Producer Statement PS1 (Design) as confirmation that the specified proprietary system as designed and documented complies with the relevant clauses of the New Zealand Building Code. The PS1 Producer Statement shall not serve as a product warranty or guarantee of compliance.

5.11.2.8 Substitution of GIB® Plasterboard Linings

GIB® plasterboard linings shall be as specified herein and as indicated on the approved drawings. The substitution of GIB® branded plasterboard linings and GIB® System components for alternative brands is not permitted under any circumstances.

The substitution of a specified GIB® plasterboard lining for an alternative GIB® plasterboard lining by the Contractor shall be in strict accordance with the requirements of the GIB® Site Guide: 2.3 - Board Substitution Options, and relevant GIB® Systems literature. Such substitutions shall only be permitted with the Architect's/Designer's written authorisation, and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate alternative GIB® Plasterboard Linings to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

5.11.3 Performance

5.11.3.1 Limitations of GIB® Plasterboard

GIB® plasterboard products must NOT be:
- used in external situations, or
- exposed to water or be installed in situations where extended exposure to humidity above 90% RH can reasonably be expected, or
- exposed to temperatures in excess of 52°C for prolonged periods.

5.11.3.2 Bracing Performance - Timber Framing

Bracing Performance - GIB EzyBrace® Systems - Timber Framing. To the timber framed elements noted as 'Bracing' on the drawings, additionally comply with all relevant aspects of the GIB EzyBrace® Systems (2016) publication and GIB Ezybrace® Bracing Software according to the specified bracing unit rating, BRANZ Appraisal No.928, and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

5.11.3.3 Fire Rating Performance

Fire Rating Performance - GIB® Fire Rated Systems. To the areas noted as 'Fire-rated' on the drawings, additionally comply with all relevant aspects of the GIB® Fire Rated Systems (2018) publication according to the specified fire resistance rating (FRR), BRANZ Appraisal No.289, and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Fire Rated Systems.

5.11.3.4 Sound Insulation Performance

Sound Insulation Performance - GIB® Noise Control Systems. To the areas noted as 'Sound-rated' on the drawings, additionally comply with all relevant aspects of the GIB® Noise Control Systems (2017) publication according to the specified sound transmission class (STC) rating, BRANZ Appraisal No.394, and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Noise Control Systems.

5.11.3.5 Wet Areas

Wet Area Plasterboard Linings - GIB Aqualine® Wet Area Systems. To the areas noted as 'Wet Area' on the drawings, additionally comply with all relevant aspects of the GIB Aqualine® Wet Area Systems publication, BRANZ Appraisal No.427 (2021), and other relevant product manufacturers' recommendations. Refer to separate specification GIB Aqualine® Wet Area Systems.

5.11.4 GIB® Plasterboard Linings

5.11.4.1 GIB® Standard Plasterboard, 10mm

GIB® Standard Plasterboard, 10mm. A 10mm thick standard plasterboard interior lining. Suitable for use in residential and commercial applications on walls. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location: Interior walls unless noted otherwise or in wet areas

5.11.4.2 GIB Ultraline®, 10mm

GIB Ultraline®, 10mm. A 10mm thick, fine, smooth textured plasterboard interior lining, with Pearcoat™ coated paper technology, special plaster mix and fibreglass reinforced core. Suitable for use in residential and commercial applications on walls and ceilings in high visibility spaces where an enhanced finish is required. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location: All ceilings unless noted otherwise

5.11.4.3 GIB Braceline® & GIB Noiseline®, 13mm

GIB Braceline® & GIB Noiseline®, 13mm. A 13mm thick dual purpose plasterboard interior lining, with a high-density core for extra bracing and noise control performance. Suitable for use in residential and commercial applications on walls and ceilings where increased bracing and noise control performance is required. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location: Refer to drawings

5.11.4.4 GIB Aqualine®, 10mm

GIB Aqualine®, 10mm. A 10mm thick moisture resistant plasterboard interior lining, with a water resistant polymer impregnated core to help prevent moisture penetration. Suitable for use in residential and commercial applications on walls and ceilings in spaces at risk from water or moisture damage. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location: All wet areas unless noted otherwise

5.11.4.5 GIB Fyreline®, 10mm

GIB Fyreline®, 10mm. A 10mm thick plasterboard interior lining, with a high-density modified core that resists exposure to fire longer than standard plasterboard. Suitable for use in residential and commercial applications on walls and ceilings in spaces where increased fire resistance performance is required. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location: Refer to drawings

5.11.4.6 GIB Fyreline®, 16mm

GIB Fyreline®, 16mm. A 16mm thick plasterboard interior lining, with a high-density modified core that resists exposure to fire longer than standard plasterboard. Suitable for use in residential and commercial applications on walls and ceilings in spaces where increased fire

resistance performance is required. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location: Refer to drawings

5.11.5 Components & Accessories

5.11.5.1 Metal Ceiling Battens

Metal Ceiling Battens - GIB® Rondo® Metal Batten Systems. Installed in accordance with the manufacturer's requirements to the layout and details shown on the approved drawings. Refer to the GIB® Site Guide, and to separate specification GIB® Rondo® Metal Batten Systems.

5.11.5.2 Plasterboard Fasteners

GIB® Plasterboard Fasteners. Fasteners for fixing GIB® Plasterboard Linings shall be selected and used according to best fixing practices and the GIB® Site Guide and relevant GIB® Systems literature. Fastener heads shall be set slightly below the plasterboard sheet surface without breaking the paper facing.

Screw Fixing to Timber Framing:
- GIB® Grabber® High Thread Drywall Screws: A coarse high-thread screw for fixing into timber with superior holding power and ease of penetration.
- GIB® Grabber® Self Tapping Drywall Screws: A fine self-tapping thread, needle point screw, suitable for fixing to timber and light gauge steel framing.
- GIB® Grabber® Dual Thread Drywall Screws: A dual coarse/fine threaded, needle point screw, as a component of the GIBFix® Framing System and for fixing to timber framing.

Nail Fixing to Timber Framing:
- GIB Nail: Passivated coated, annular grooved, bugle head drywall nails with chequer-keyed head.

Screw Fixing to Light Steel Framing:
- GIB® Grabber® Self Tapping Drywall Screws: A fine self-tapping thread needle point screw, suitable for fixing to light gauge (0.45-0.95mm) steel framing.
- GIB® Grabber® Dual Thread Drywall Screws: A dual coarse/fine threaded, needle point screw, suitable for fixing to light gauge (0.45-0.95mm) steel framing.

5.11.5.3 Adhesives

GIB® Adhesives. In addition to GIB® plasterboard fasteners, fix GIB® Plasterboard Linings using GIB® adhesives in accordance with the requirements of the GIB® Site Guide and GIB® System literature.

GIB® Adhesives:
- GIBFix® One: An acrylic based plasterboard adhesive with ultra low VOC, suitable for use on timber and metal substrates, including all treated timber. Minimum application temperature - 10°C.
- GIBFix® All-Bond: A solvent based plasterboard adhesive, suitable for use on timber and metal substrates, including all treated timber. Do not use on polystyrene surfaces.

5.11.5.4 Metal Trims

GIB® Metal Trims. Perforated metal corner beads and edge trim made from galvanised steel. Installed in accordance with the requirements of the GIB® Site Guide and GIB® Systems literature.

GIB® Metal Trim Profiles:
- External 90° Perforated Corner Trim (P01): GIB® Slim Angle - Standard. Available in 2.4/2.7/3.0/3.6m lengths.
- External 135° Perforated Corner Trim (P01A): GIB® Slim Angle - Off Angle. Available in 2.4/2.7/3.0m lengths.
- Perforated Curvable Corner Edge trim (P10): GIB® Slim Arch Bead. Available in 2.4/3.0m lengths.
- L-Trim for Stopped End Trim: Rondo® Stopping Angle. Profiles available for 10/13/16mm thick plasterboard. Available in 3.0m lengths.
- End Cap Bead - stopped: Rondo® Stopping Bead. Profiles available for 10/13mm thick plasterboard. Available in 2.4/3.0m lengths.
- Reveal or Z-trim: Rondo® Shadowline Stopping Bead. Profile available for 10mm thick plasterboard. Available in 3.0m lengths.
- End Cap Bead - un-stopped (P50): Rondo® Casing Bead. Profiles available for 10/13mm thick plasterboard. Available in 2.4/3.0m lengths.

5.11.5.5 Paper Faced Metal Trims

GIB® Goldline® Paper Faced Metal Trims. Paper-faced metal corner beads and edge trim made with a patented, high quality paper laminated to galvanised steel forms. Paper faced metal trims shall be embedded in jointing compound - do not mechanically fasten paper faced trims. Installed in accordance with the requirements of the GIB® Site Guide and GIB® Systems literature.

GIB® Goldline® Profiles:
- External 90° Corner Trim (G1-W): profile available in 2.4/2.7/3.0m lengths.
- External 135° Corner Trim (G1-O): profile available in 2.4m lengths.
- Internal 90° Corner Trim (G2): profile available in 2.4/2.7/3.0m lengths.
- Internal 135° Corner Trim (G2-O): profile available in 2.4m lengths.
- Bullnose External 90° Corner Trim (G1-B): profile available in 2.4/2.7/3.0m lengths.
- Reveals (GR): profiles available for 10mm thick and 13mm thick plasterboard.
- L-Trims (G4): profiles available for 10mm thick and 13mm thick plasterboard.

5.11.5.6 Paper Faced Composite Trims

GIB® Paper Faced Composite Trims. Flexible, reinforced, cut-to-length, paper faced corner trims, suitable for use on internal and external corners with an angle between 90° and 270°. Paper faced composite trims shall be embedded in jointing compound - do not mechanically fasten paper faced trims. Installed in accordance with the requirements of the GIB® Site Guide and GIB® Systems literature.

GIB® Paper Faced Composite Trims:
- Flexible Composite Trim: GIB® LevelLine™. Available in 70mm roll width.
- High Impact Flexible Composite Trim: GIB® UltraFlex® No Coat. Available in 82mm and 112mm roll widths.

5.11.5.7 Joint & Finishing Compounds

GIB® Compounds. Use the most suitable GIB® Compounds to joint and finish GIB® Plasterboard Linings according to the plasterboard type, location, application, durability, and quality of finish required. GIB® Compounds shall be applied and finished in accordance with the manufacturer's requirements to the specified finish level, and used in conjunction with GIB® Paper Joint Tape and GIB® Plasterboard Trims.

GIB® Compounds:
- GIB TradeSet®: Setting type compound. Suitable for Tape Coat, 2nd Coat. Easy to scrape. 20/45/90/150 minute working/set times.
- GIB MaxSet®: Setting type compound. Suitable for Tape Coat, 2nd Coat. Scrape while 'green'. 90 minute working/set time.
- GIB Lite Blue®: Setting type compound. Suitable for 2nd Coat. Easy sanding. 90 minute working/set time.
- GIB Trade Finish® Heavy Weight: Air drying ready-mix type compound. Suitable for Finishing Coat. Moderate sanding.
- GIB Trade Finish® Multi: Air drying ready-mix type compound. Suitable for Tape Coat, 2nd Coat; Finishing Coat. Easy sanding.
- GIB Trade Finish® Lite: Air drying ready-mix type compound. Suitable for Finishing Coat. Very easy sanding.
- GIB Promix® Lite: Air drying ready-mix type compound. Suitable for Finishing Coat. Very easy sanding.
- GIB® U-Mix: Air drying powder-mix type compound. Suitable for Finishing Coat. Easy Sanding.
- GIB Plus 4®: Air drying ready-mix type compound. Suitable for Tape Coat, 2nd Coat, Finishing Coat. Very easy sanding.
- GIB Promix® All Purpose: Air drying ready-mix type compound. Suitable for Tape Coat, 2nd Coat, Finishing Coat. Moderate sanding.
- GIB-Cove® Bond: Setting type compound. Suitable for bonding GIB-Cove® cornice, back-blocking plasterboard linings, and direct-bonding plasterboard to concrete and masonry walls. Hard to scrape. 45/90 minute working/set times.
- GIB X-Block® Jointing Compound: Used in conjunction with GIB X-Block® plasterboard wall and ceiling linings in accordance with the GIB X-Block® Radiation Shielding publication.

5.11.5.8 Joint Tape

GIB® Paper Joint Tape. A 50mm wide, spark perforated paper joint tape used to strengthen joints between plasterboard sheets. Centre-creased for internal and external corner applications. Recommended for jointing GIB® plasterboard wall and ceiling linings in accordance with the GIB® Site Guide and GIB Systems literature.

5.11.5.9 Acoustic Sealant

GIB Fire Soundseal®. A water-based, low VOC, highly flexible, paintable, acoustic sealant for use in GIB® Noise Control Systems. Applied in accordance with the GIB® Site Guide and relevant GIB® Systems literature.

5.11.5.10 Fire-Resistant Sealant

Fire-Resistant Sealant. Used in accordance with the sealant manufacturer's requirements, and according to the GIB® Site Guide and GIB® System literature.

5.11.5.11 Wet Area Sealant

Wet Area Sealant. A mould resistant, flexible, neutral curing silicone sealant with strong adhesion, suitable for wet area applications and where there is high humidity, including bathrooms, toilets, showers, wash-down areas, kitchens, laundries.

Applied in accordance with the sealant manufacturer's instructions, as required by the GIB® Site Guide and GIB® System literature. Sealant joints shall be in accordance with the sealant manufacturer's joint design width-to-depth ratio.

Manufacturer & Brand:

5.11.5.12 Gap Filler

GIB® Gapfiller. A general purpose, gun applied, one-part water based, paintable acrylic gap filler. Provides excellent adhesion for gaps and cracks and other low movement joints. Used in strict in accordance with the manufacturer's requirements. Refer to the GIB® Site Guide.

5.11.6 Level of Finish

5.11.6.1 Level of Finish

To the areas noted as a specific Level of Finish (3-5) on the drawings, additionally comply with all relevant aspects of the GIB® Site Guide and AS/NZS 2589, complete with all system accessories, and other relevant product manufacturers' recommendations.

NOTE: Unless stated otherwise, Level 4 is the default Level of Finish.

5.11.6.2 Acceptance of Levels of Finish

Carry out all necessary inspections and assessments of completed plasterboard jointing and finishing prior to hand-over for subsequent decoration.

Do not apply surface sealers and decorative treatments until written agreement between the Contractor and Painter/Decorator is given confirming the specified Finish Levels have been achieved and the plasterboard linings are ready for subsequent sealing and decoration.

5.11.7 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-operate with the Decorator to ensure that the specified Finish Levels for plasterboard jointing and finishing is achieved before decorating commences.

Coordinate with other trades to install GIB® Plasterboard Linings as required, and to ensure that:
- appropriate tolerances and clearances allow for adjacent internal linings, fixtures, fittings, services, etc; and
- the linings correctly allow for proper door and window installation; and
- penetrations for building services are correctly handled to maintain sheet integrity and system performance.

5.11.8 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Installation and finishing work of GIB® Plasterboard Linings shall be carried out by qualified and experienced tradespersons, familiar with the specified materials and installation and finishing techniques, in accordance with the GIB® Site Guide and the relevant GIB® product technical literature, and to fully comply with all warranty requirements. Submit evidence of experience on request, e.g. National Certificate of Interior Systems, or Certified Business Member of AWCINZ.

GIB® Plasterboard Linings shall be jointed and finished to the specified Finish Levels in accordance with AS/NZS 2589 and GIB® Site Guide. Make all necessary arrangements for the quality assessment of plasterboard jointing and finishing Finish Levels prior to commencing decorating.

All cutting, fixing, jointing, finishing and sealing techniques shall be exactly as recommended by the manufacturer. All work shall be such as to leave a neat, efficient and robust installation, to the required standard and free from damage and defects.

Protect surrounding surfaces and areas from jointing compound splashes and sanding dust.

5.11.9 Delivery & Handling

Store GIB® Plasterboard Linings indoors, in neat, flat stacks off the floor, in dry conditions and without any sagging or distortion, in accordance with the GIB® Site Guide. Keep plasterboard linings, compounds and accessories dry, out of direct sunlight, and protected from damage, moisture and contamination at all times.

Do not use damaged or defective materials and products, or products that are beyond the designated shelf life.

Should a problem be encountered with any GIB® product during installation or delivery, immediately contact the GIB® Helpline on 0800 100 442. Do not continue to use the product that is not performing to specification or expectation. Keep samples of the product in question and where possible, document batch numbers and/or manufacturing dates.

Handle all products and materials in accordance with the manufacturer's requirements and relevant Product Data Sheets and GIB® Site Guide, and in a manner that prevents damage. Carry plasterboard sheets on edge, and avoid damage to sheet edges, ends, and surfaces.

Installers shall be familiar with and comply with the requirements of the GIB® Site Guide precautions for use, and use appropriate safety gear when handling materials.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

5.11.10 Preparation

5.11.10.1 General

All framing and substrates shall be complete and ready for GIB® Plasterboard Lining installation.

Timber framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content 18% at the time of plasterboard lining installation.

Light structural steel framing shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. All light structural steel framing members shall satisfy the requirements of AS/NZS 1170. Comply with the steel framing fabricator's specifications and requirements for plasterboard installation.

Steel stud partitioning shall comply with AS 1397 and as specified and shown on the drawings. Comply with the manufacturer's specifications and requirements for plasterboard installation.

Concrete substrates shall comply with the CCANZ CP 01:2011 or with NZS 3109. New concrete must have aged for a minimum of 28 days. Ensure that concrete surfaces are within the tolerances specified. For of direct bonded plasterboard linings, concrete substrates must below 75% relative humidity prior to installation.

Concrete masonry substrates shall comply with NZS 4229, or with NZS 4230 and AS/NZS 1170 for specific design. For of direct bonded plasterboard linings, concrete masonry substrates must below 75% relative humidity prior to installation.

Carry out all necessary moisture readings. Do not commence installation until the moisture readings are below the required level.

Carry out all necessary substrate inspections and preparatory work in accordance with the manufacturer's recommendations and the GIB® Site Guide prior to installation. Complete and sign the GIB® Site Guide Pre-Installation Checklist.

Check that the building envelope has been finished at all penetrations including doors, windows, services, etc., and the building is weathertight.

Check junctions to all other building elements and ensure that all necessary works have been completed, including cavity insulation.

Check that all fixtures, fittings and built-in items are correctly installed, and that all framing and substrate edges are completed as detailed.

Confirm the location and details of movement control joints, as indicated on the drawings, prior to installation.

Ensure all pre-wiring and service piping is installed and complete.

Check that any required cavity insulation has been installed correctly and its bulk thickness does not exceed the framing thickness.

Remove all debris and rubbish from framing voids prior to installing linings.

The commencement of work on each section/area shall be deemed to indicate full acceptance by the installer that all preparatory works by other trades is complete.

5.11.10.2 Framing Check

Framing - check all aspects of preparatory works, including but not limited to:
- Check that the framing is straight and true to line, and is plumb/level and correctly aligned.
- Check that the framing is within the required deviation tolerances defined in AS/NZS 2589 according to the specified Finish Level.
- Check that vertical and horizontal framing members are at the spacings shown on the drawings, and that any required battens or furring channels are installed to the required layout.
- Check that the framing has no projections due to structural and bracing bracketry, etc. Ensure that framing brackets, plates, braces, hold-downs, etc., are correctly installed.

5.11.10.3 Work above Ceilings

Check that all building work, mechanical, plumbing, electrical, fire protection and other services installed above the ceiling are completed and independently supported by the building structure - not by the ceiling system.

5.11.11 Installation

5.11.11.1 General

Install GIB® Plasterboard Linings and accessories in accordance with the requirements of the GIB® Site Guide and product technical literature and associated fixing schedules, to the locations and details shown on the drawings. For GIB® Performance Systems, refer to the relevant GIB® system specification.

Prior to installation, confirm:
- The locations and construction details of all movement control joints;
- The locations and installation details of all building services items within framed structures;
- The specified GIB® plasterboard installation and fixing requirements;
- The specified Finish Level(s) for the plasterboard linings.
- Subsequent surface treatments and finishes applied to GIB® plasterboard.

5.11.11.2 Standard Ceiling Fixing - Metal Ceiling Battens

GIB® Plasterboard Ceiling Linings - Standard Ceiling Fixing with Metal Ceiling Battens. Metal ceiling battens shall be from the GIB® Rondo® Metal Batten Systems - refer to separate specification GIB® Rondo® Metal Batten Systems.

Unless independently supported, uniformly distributed loads (fixtures and fittings and/or overlaid insulation) supported by GIB® plasterboard ceiling linings shall not exceed 3.0 kg/m².

Metal ceiling batten spacings shall be shall be as given in the GIB® Site Guide according to the specified plasterboard thickness - 600mm for 13mm or greater thickness, 450mm for 10mm thickness. Ceiling battens shall all run in the same direction within the ceiling area. In no case shall ceiling battens be continuous over movement control joints in the structure.

Install GIB® Plasterboard sheets right angles to ceiling battens, with sheet end-joints staggered minimum 600mm and located off battens and back-blocked. Fully support sheets during positioning and fixing - for ceiling installations, the use of a mechanical lifting machine is recommended.

Plasterboard sheets shall be fixed to ceiling battens in conjunction with GIBFix® adhesive applied at maximum at 200mm centres. Do not apply adhesive at sheet edges or within 200mm of fasteners. Firmly press the plasterboard where adhesive has been applied to ensure full contact.

Fix sheets to timber ceiling battens with GIB® Grabber® Self Tapping Screws in accordance with GIB® Site Guide fastener schedule according to the plasterboard thickness. Position fasteners no closer than 12mm from a tapered edge or 18mm from a cut sheet edge.

Install all necessary paper-faced metal beads, casing beads, shadow and reveal beads and other edge trims to plasterboard corners and edges as necessary and as detailed on the drawings.

Form movement control joints to the locations and details shown on the approved drawings. Where not indicated on the drawings, movement joints shall be positioned at maximum 12m intervals in both directions on any single ceiling, and where there is a change in ceiling lining material, and shall coincide with the junctions between adjoining spaces.

Accommodate recessed light fittings, heating and ventilating diffusers and grilles and other utility fixtures and fittings that penetrate the ceiling lining.

5.11.11.3 Ceiling Diaphragms

Ceiling Diaphragms - refer to separate specification GIB® Ezybrace Systems, and to the GIB EzyBrace® Systems publication.

5.11.11.4 Wall Linings - Horizontally Fixed - Timber Frame

GIB® Plasterboard Wall Linings Horizontally-Fixed to Timber Framing. Install GIB® plasterboard sheets horizontally, at right angles to studs, with any end-joints staggered, and with the bottom edge of the lower sheet gapped 5–10mm off finished floor level.

All joints between sheets shall be touch fitted. Eliminate or minimise the butting of sheet end-joints by using full-length or long-length sheets. Give careful consideration to the placement of sheet joints. Where possible, place joints in situations where they are less likely to be affected by critical lighting.

It is recommended that sheet end joints in horizontally fixed plasterboard be unsupported, off-stud and back blocked - stud centres must not exceed 600mm. For plasterboard linings with Level 3 Finish and Level 4 Finish, sheet end joints can be located on-stud.

Sheet end joints at openings, such as window and door openings, shall not coincide with the vertical edges of the opening - sheets shall be fitted so that the vertical end joint falls minimum 200mm either side of the edge of the opening.

Plasterboard sheets shall be fixed to timber framing in conjunction with GIBFix® adhesive applied at maximum at 300mm centres to intermediate studs. Do not apply adhesive at sheet edges or within 200mm of fasteners. Firmly press the plasterboard where adhesive has been applied to ensure full contact.

Fix sheets to timber framing with GIB® Grabber® High Thread Screws or GIB® Nails in accordance with GIB® Site Guide fastener schedule. Place fasteners at 300mm centres to top and bottom plates and to perimeter studs, and to each stud where the horizontal joint crosses the stud, with screws no closer than 12mm from sheet edges. It is recommended that fasteners at wall corners are placed 50mm in from the corner in each direction (horizontal/vertical).

Install all necessary paper-faced and metal beads, casing beads, shadow and reveal beads and other edge trims to plasterboard corners and edges as necessary and as detailed on the drawings.

Form movement control joints to the locations and details shown on the approved drawings. Where not indicated on the drawings, movement joints shall be positioned at maximum 12m intervals in both directions (horizontally/vertically), and shall coincide with movement joints in the primary structure, and where there is a change in wall lining material.

Accommodate piped and cabled services and other building services fixtures and fittings that penetrate the wall lining.

5.11.11.5 Wall Linings - Vertically Fixed - Timber Frame

GIB® Plasterboard Wall Linings Vertically-Fixed to Timber Framing. Install GIB® plasterboard sheets vertically, parallel with studs, with any end-joints staggered, and with the bottom edge of the lower sheet gapped 5–10mm off finished floor level.

All joints between sheets shall be touch fitted. Eliminate or minimise the butting of sheet end-joints by using full-length or long-length sheets. Give careful consideration to the placement of sheet joints. Where possible, place joints in situations where they are less likely to be affected by critical lighting.

Form sheet edge joints on studs. Short vertical edge joints (400mm or less) such as above windows and door can be made off stud and back blocked.

Sheet joints at openings, such as window and door openings, shall not coincide with the vertical edges of the opening - sheets shall be fitted so that the vertical end joint falls minimum 200mm inside the edge of the opening.

Plasterboard sheets shall be fixed to timber framing in conjunction with GIBFix® adhesive applied at maximum at 300mm centres to intermediate studs. Do not apply adhesive at sheet edges or within 200mm of fasteners. Firmly press the plasterboard where adhesive has been applied to ensure full contact.

Fix sheets to timber framing with GIB® Grabber® High Thread Screws or GIB® Nails in accordance with GIB® Site Guide fastener schedule. Place fasteners at 300mm centres around the perimeter of each sheet, no closer than 12mm from sheet edges. It is recommended that fasteners at wall corners are placed 50mm in from the corner in each direction (horizontal/vertical).

Install all necessary paper-faced and metal beads, casing beads, shadow and reveal beads and other edge trims to plasterboard corners and edges as necessary and as detailed on the drawings.

Form movement control joints to the locations and details shown on the approved drawings. Where not indicated on the drawings, movement joints shall be positioned at maximum 12m intervals in both directions (horizontally/vertically), and shall coincide with movement joints in the primary structure, and where there is a change in wall lining material.

Accommodate piped and cabled services and other building services fixtures and fittings that penetrate the wall lining.

5.11.11.6 Wall Linings - Direct Bonded to Concrete/Masonry (above ground level)

GIB® Plasterboard Wall Linings Direct Bonded to Concrete and Masonry Substrates (above ground level). Install GIB® plasterboard sheets horizontally, with any end-joints staggered, and with the bottom edge of the lower sheet gapped 5–10mm off finished floor level.

All joints between sheets shall be touch fitted. Eliminate or minimise the butting of sheet end-joints by using full-length or long-length sheets. Give careful consideration to the placement of sheet joints. Where possible, place joints in situations where they are less likely to be affected by critical lighting.

Sheet end joints at openings, such as window and door openings, shall not coincide with the vertical edges of the opening - sheets shall be fitted so that the vertical end joint falls minimum 200mm either side of the edge of the opening.

Plasterboard sheets shall be direct bonded to concrete and masonry walls with GIB-Cove® Bond applied in daubs approximately 50mm diameter x 12mm thick, at 300-400mm centres vertically and 500-600mm centres horizontally, and no closer than 25mm from the sheet edges. Position the sheet and press into place. Ensure each sheet achieves proper contact with GIB-Cove® Bond, and is in true alignment over the surface of the sheet before setting.

Install all necessary paper-faced and metal beads, casing beads, shadow and reveal beads and other edge trims to plasterboard corners and edges as necessary and as detailed on the drawings.

Form movement control joints to the locations and details shown on the approved drawings. Where not indicated on the drawings, movement joints shall coincide with movement joints in the primary structure, and where there is a change in wall lining material.

Accommodate piped and cabled services and other building services fixtures and fittings that penetrate the wall lining.

5.11.11.7 Jointing & Finishing

Joint and finish GIB® Plasterboard Linings with GIB® joint and finishing compounds appropriate for the plasterboard type and durability, and the finish level required. Refer to Joint & Finishing Compounds clause.

Carry out jointing and finishing according to the specified Finish Level in accordance with the GIB® Site Guide and GIB® Compounds brochure. Reinforce sheet joints and internal corners with joint tape or paper-faced trim embedded into the Taping (first) Coat.

Sheet joints, internal and external corners, and fastener heads shall be evenly finished with GIB® compounds. When dry, lightly sand to a smooth finish with 220 grit sandpaper or drywall sanding screen to remove tool marks, ridges and other imperfections prior to subsequent sealing and decorating.

5.11.12 Completion

Check that GIB® Plasterboard Linings have been installed in accordance with the GIB® Site Guide and GIB® Systems literature, and are finished to the specified finish levels.

Check for any damage and defective work - repair or replace as necessary to the required standard.

Ensure that inspection and assessment of the plasterboard Finish Level has been carried out, and that written agreement stating the completed jointing and finishing is acceptable for subsequent surface sealing and decoration has been provided.

Ensure that the GIB® Installation Sign-Off Certificate has been completed and signed by the Interior Plasterer/Stopper.

Leave all of this work complete and to the required standard in accordance with the manufacturer's warranty requirements, as shown on the drawings and the conditions of the Building Consent.

Clean up thoroughly and leave the finished work and surrounding surfaces clean and free of contamination from compound splashes and dust. Remove all associated rubbish and excess material from the site.

Issue to the Owner a copy of the GIB® Plasterboard Lining Systems Care and Maintenance bulletin, and a copy of the GIB® Product and System Warranty.

Preparation and painting (by others) of GIB® Plasterboard Linings shall be carried out in accordance with AS/NZS 2311 and with the paint manufacturer's recommendations. Refer to separate specification section Painting & Decorating.

Preparation, including application of under-tile waterproofing membranes, and tiling (by others) of GIB® Plasterboard Linings shall be carried out in accordance with AS 3589.1 and the BRANZ Good Practice Guide: Tiling. Refer to separate specification section Tiling.

5.12 GIB® Fire Rated Systems

5.12.1 Scope

Supply and install the specified GIB® Fire Rated Systems to the locations identified on the drawings, incorporating GIB® plasterboards and all system components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with the GIB® Fire Rated Systems Specification and Installation Manual and the current GIB® Site Guide (check www.gib.co.nz, or call 0800 100 442 for the latest editions), BRANZ Appraisal No.289, other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for GIB® Fire Rated Systems, GIB® Plasterboard Linings, or GIB® System components and accessories.

This specification section must be read in conjunction with the GIB® Plasterboard Linings specification and relevant GIB® Systems specifications, and other specification sections, as they are interrelated.

For the purpose of this specification, the GIB® Fire Rated Systems Specification and Installation Manual (2012) is referred to as the GIB® Fire Rated Systems Manual..

5.12.2 Requirements

5.12.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

5.12.2.2 Warranty

GIB® Product & System Warranty:
- 10 Years Warranty - for all GIB® Products and Systems installed, according to warranty conditions.
- Provide the GIB® Product & System Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of practical completion of the contract works.

Include with the warranty: a copy of the completed GIB® Installation Sign-Off sheet, and the GIB® Plasterboard Lining Systems Care and Maintenance bulletin.

5.12.2.3 AWCI Membership

Installation of GIB® Fire Rated Systems shall be carried out by a registered member of the Association of Wall and Ceiling Industries of New Zealand Inc. (AWCI). If not already provided and if requested, submit evidence of AWCI membership and relevant experience.

5.12.2.4 Quality Assurance

Ensure that the installation and finishing of GIB® Fire Rated Systems comply in all respects with the approved design drawings and specifications, and Building Consent.

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of work are carried out to the highest standard.

5.12.2.5 Inspection & Acceptance of GIB® Fire Rated Systems

Carry out all necessary pre-installation, installation and finishing inspections necessary for GIB® Fire Rated Systems for each area of work in accordance with the requirements of the GIB® Fire Rated Systems Manual, GIB® Site Guide, and BRANZ Appraisal No.289.

Complete the GIB® Site Guide Pre-Installation Checklist prior to installing GIB® plasterboard linings.

Complete the GIB® Plasterer/Stopper Installation Sign-Off Certificate upon completion and before handover for subsequent decoration.

5.12.2.6 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected GIB® Fire Rated System materials and/or work shall be repaired and/or replaced to the satisfaction of the Architect/Designer, without delay and at no additional cost to the Principal.

5.12.2.7 Producer Statement (other manufacturer's system)

Producer Statement PS1 - where required. Where GIB® plasterboard linings are installed as a component of another manufacturer's proprietary system, the system manufacturer shall furnish a completed Producer Statement PS1 (Design) as confirmation that the specified proprietary system as designed and documented complies with the relevant clauses of the New Zealand Building Code. The PS1 Producer Statement shall not serve as a product warranty or guarantee of compliance.

5.12.2.8 Substitution of GIB® Plasterboard Linings

GIB® plasterboard linings shall be as specified herein and as indicated on the approved drawings. The substitution of GIB® branded plasterboard linings and GIB® Fire Rated Systems components for alternative brands is not permitted under any circumstances.

The substitution of a specified GIB® plasterboard lining for an alternative GIB® plasterboard lining by the Contractor shall be in strict accordance with the requirements of the GIB® Fire Rated Systems Manual and GIB® Site Guide: 2.3 - Board Substitution Options. Such substitutions shall only be permitted with the Architect's/Designer's written authorisation, and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate alternative GIB® plasterboard linings to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

5.12.3 Performance

5.12.3.1 Fire Resistance of Clad Walls

Where GIB® Fire Rated Systems are clad (exterior) with any of the following materials, the exterior GIB® plasterboard lining may be left unstopped, unless specified or noted otherwise;
- Timber or wood based products;
- Steel - flat or profiled;

- Fibre cement sheet or board;
- Exterior Insulation and Finish Systems (EIFS).

GIB® plasterboard installed on the exterior face of a frame must be protected from exposure to weather during installation and in-service. Exterior claddings over GIB® plasterboard must comply with the current version of NZBC E2/AS1, and be installed over a flexible wall underlay and drained cavity complying with NZBC E2/AS1.

5.12.3.2 Limitations of GIB® Plasterboard

GIB® plasterboard products must NOT be:
- used in external situations, or
- exposed to water or be installed in situations where extended exposure to humidity above 90% RH can reasonably be expected, or
- exposed to temperatures in excess of 52°C for prolonged periods.

5.12.3.3 Bracing Performance - Timber Framing

Bracing Performance - GIB EzyBrace® Systems - Timber Framing. To the timber-framed elements noted as 'Bracing' on the drawings, additionally comply with all relevant aspects of the GIB EzyBrace® Systems (2016) publication and GIB Ezybrace® Software according to the specified bracing unit rating, BRANZ Appraisal No.928, and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

5.12.3.4 Sound Insulation Performance

Sound Insulation Performance - GIB® Noise Control Systems. To the areas noted as 'Sound-rated' on the drawings, additionally comply with all relevant aspects of the GIB® Noise Control Systems (2017) publication according to the specified sound transmission class (STC) rating, BRANZ Appraisal No.394 (2016), and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Noise Control Systems.

5.12.3.5 Wet Areas

Wet Area Plasterboard Linings - GIB Aqualine® Wet Area Systems. To the areas noted as 'Wet Area' on the drawings, additionally comply with all relevant aspects of the GIB Aqualine® Wet Area Systems (2007) publication, BRANZ Appraisal No.427 (2007), and other relevant product manufacturers' recommendations. Refer to separate specification GIB Aqualine® Wet Area Systems.

5.12.4 Wall Systems - 2-Way FRR

5.12.4.1 GBTL 30c (timber frame, load-bearing, 30/30/30)

GIB® Fire Rated Wall System - GBTL 30c. A two-way fire rated, load-bearing timber frame wall system incorporating one layer of 10mm GIB® Standard Plasterboard each side and minimum 90mm stud depth. Refer to the GIB® Fire Rated Systems literature.

Installed Location: Refer to drawings

5.12.5 Ceiling Systems

5.12.5.1 GBUC 60 (timber or steel frame, load-bearing, 60/60/60

GIB® Fire Rated Ceiling System - GBUC 60. A fire rated, load-bearing ceiling system incorporating timber or steel roof or floor/ceiling framing and two layers of 13mm GIB Fyreline® as ceiling lining. Refer to the GIB® Fire Rated Systems literature.

Installed Location: Refer to drawings

5.12.6 Components & Accessories

5.12.6.1 Components & Accessories

GIB® Fire Rated Systems components and accessories, including, but not limited to:
- GIB® Plasterboard Linings;
- GIB® Plasterboard Fasteners;
- GIB® Metal Trims & Paper Faced Trims;
- GIB® Plasterboard Control Joints;
- GIB® Joint and Finishing Compounds;
- GIB Fire Soundseal® Acoustic Sealant;
- Fire Resistant Sealant.

Refer to the GIB® Fire Rated Systems literature and the GIB® Site Guide for further information.

5.12.7 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-operate with the Decorator to ensure that the specified Finish Levels for plasterboard jointing and finishing is achieved before decorating commences.

Coordinate with other trades to install GIB® Fire Rated Systems to the required set-out and standard, and to ensure:
- appropriate tolerances and clearances allow for adjacent internal linings, fixtures, fittings, services, etc; and
- GIB® plasterboard linings correctly allow for proper door and window installation; and
- penetrations for building services are correctly handled to maintain sheet integrity and system performance.

5.12.8 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Installation of GIB® Fire Rated Systems shall be carried out by experienced and competent tradespersons, who are familiar with the specified materials and installation techniques, in accordance with the manufacturer's installation requirements, and to fully comply with all warranty requirements. Submit evidence of experience on request, e.g. National Certificate of Interior Systems, or Certified Business Member of AWCINZ.

Carry out all necessary installation inspections in accordance with the GIB® Site Guide, and to fully comply with the manufacturer's warranty requirements as the works progress.

All cutting, jointing, fixing and sealing techniques shall be exactly as recommended by the manufacturer. All work shall be such as to leave a neat, efficient and robust installation, to the required standard, free from damage and defects.

Make all necessary provisions to protect adjacent work and surfaces from damage during installation.

On Completion:
- Check that GIB® Fire Rated Systems have been correctly installed and finished in accordance with the requirements of the GIB® Fire Rated Systems Manual and GIB® Site Guide, to the correct set-out, dimensions and details shown on the drawings.
- Check for any damage and defective work - repair or replace as necessary to the required standard.
- Ensure that inspection and assessment of the plasterboard Finish Level have been carried out, and that written agreement stating the completed jointing and finishing is acceptable for subsequent surface sealing and decoration has been provided.
- Ensure that the GIB® Installation Sign-Off Certificate has been completed and signed by the Interior Plasterer/Stopper.
- Leave all of this work complete and to the required standard in accordance with the manufacturer's warranty requirements, as shown on the drawings and the conditions of the Building Consent.
- Clean up thoroughly and leave the finished work and surrounding surfaces clean and free of contamination from compound splashes and dust. Remove all associated rubbish and excess material from the site.
- Issue to the Owner a copy of the GIB® Plasterboard Lining Systems Care and Maintenance bulletin, and a copy of the GIB® Product and System Warranty.

5.12.9 Delivery & Handling

Store all GIB® Fire Rated Systems plasterboard linings and system components indoors, off the floor, on a flat, level surface in accordance with the manufacturer's requirements. Keep stored plasterboard linings and system accessories dry, out of direct sunlight, and protected from damage, moisture and contamination at all times.

Do not use damaged or defective materials and products, or products that are beyond the designated shelf life.

Should a problem be encountered with any GIB® product during installation or delivery, immediately contact the GIB® Helpline on 0800 100 442. Do not continue to use the product that is not performing to specification or expectation. Keep samples of the product in question and where possible, document batch numbers and/or manufacturing dates.

Handle all materials in accordance with the manufacturer's requirements and relevant Product Data Sheets, and in a manner that prevents damage.

Installers shall be familiar with and comply with the manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials. Carry plasterboard sheets on edge, and avoid damage to sheet edges, ends, and surfaces.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

5.12.10 Preparation

5.12.10.1 General

All framing shall be complete and ready for GIB® Fire Rated Systems and associated GIB® plasterboard linings installation.

Timber framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content 18% at the time of plasterboard lining installation.

Light structural steel framing shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. All light structural steel framing members shall satisfy the requirements of AS/NZS 1170. Comply with the steel framing fabricator's specifications and requirements for plasterboard installation.

Steel stud partitioning shall comply with AS 1397 and as specified and shown on the drawings. Comply with the manufacturer's specifications and requirements for plasterboard installation.

Concrete substrates shall comply with the CCANZ CP 01:2011 or with NZS 3109. New concrete must have aged for a minimum of 28 days. Ensure that concrete surfaces are within the tolerances specified.

Concrete masonry structures shall comply with NZS 4229, or with NZS 4230 and AS/NZS 1170 for specific design.

Supporting steel structures shall comply with NZS 3404.

Carry out all necessary moisture readings. Do not commence installation until the moisture readings are below the required level.

Carry out all necessary substrate inspections and preparatory work in accordance with the manufacturer's recommendations and the GIB® Site Guide prior to installation. Complete and sign the GIB® Site Guide Pre-Installation Checklist.

Check that the building envelope has been finished at all penetrations including doors, windows, services, etc., and the building is weathertight.

Check junctions to all other building elements and ensure that all necessary works have been completed, including cavity insulation.

Check that all fixtures, fittings and built-in items are correctly installed, and that all framing and substrate edges are completed as detailed.

Confirm the location and details of movement control joints, as indicated on the drawings, prior to installation.

Ensure all pre-wiring and service piping is installed and complete.

Check that any required cavity insulation has been installed correctly and its bulk thickness does not exceed the framing thickness.

Remove all debris and rubbish from framing voids prior to installing linings.

The commencement of work on each section/area shall be deemed to indicate full acceptance by the installer that all preparatory works by other trades is complete.

5.12.10.2 Framing Check

Framing - check all aspects of preparatory works, including but not limited to:
- Check that the framing is straight and true to line, and is plumb/level and correctly aligned.
- Check that the framing is within the required deviation tolerances defined in AS/NZS 2589 according the specified Finish Level.
- Check that vertical and horizontal framing members are at the spacings shown on the drawings, and that any required battens or furring channels are installed to the required layout.
- Check that the framing has no projections due to structural and bracing bracketry, etc. Ensure that framing brackets, plates, braces, hold-downs, etc., are correctly installed.

5.12.10.3 Work above Ceilings

Check that all building work, mechanical, plumbing, electrical, fire protection and other services installed above the ceiling are completed and independently supported by the building structure - not by the ceiling system.

5.13 GIB® Noise Control Systems

5.13.1 Scope

Supply and install the specified GIB® Noise Control Systems to the locations identified on the drawings, incorporating GIB® plasterboards and all system components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with the GIB® Noise Control Systems Specification and Installation Manual (2017) and the current GIB® Site Guide (check www.gib.co.nz, or call 0800 100 442 for the latest editions), BRANZ Appraisal No.394, other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for GIB® Noise Control Systems, GIB® Plasterboard Linings, or GIB® System components and accessories.

This specification section must be read in conjunction with the GIB® Plasterboard Linings specification and relevant GIB® Systems specifications, and other specification sections, as they are interrelated.

For the purpose of this specification, the GIB® Noise Control Systems (2006) publication is referred to as the GIB® Noise Control Systems Manual..

5.13.2 Requirements

5.13.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

5.13.2.2 Warranty

GIB® Product & System Warranty:
- 10 Years Warranty - for all GIB® Products and Systems installed, according to warranty conditions.
- Provide the GIB® Product & System Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of practical completion of the contract works.

Include with the warranty: a copy of the completed GIB® Installation Sign-Off sheet, and the GIB® Plasterboard Lining Systems Care and Maintenance bulletin.

5.13.2.3 AWCI Membership

Installation of GIB® Noise Control Systems shall be carried out by a registered member of the Association of Wall and Ceiling Industries of New Zealand Inc. (AWCI). If not already provided and if requested, submit evidence of AWCI membership and relevant experience.

5.13.2.4 Quality Assurance

Ensure that the installation and finishing of GIB® Noise Control Systems comply in all respects with the approved design drawings and specifications, and Building Consent.

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of work are carried out to the highest standard.

5.13.2.5 Inspection & Acceptance of GIB® Noise Control Systems

Carry out all necessary pre-installation, installation and finishing inspections necessary for GIB® Noise Control Systems for each area of work in accordance with the requirements of the GIB® Noise Control Systems Manual, GIB® Site Guide, and BRANZ Appraisal No.394.

Complete the GIB® Site Guide Pre-Installation Checklist prior to installing GIB® plasterboard linings.

Complete the GIB® Interior Plasterer/Stopper Installation Sign-Off Certificate upon completion and before handover for subsequent decoration.

5.13.2.6 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected GIB® Noise Control System materials and/or work shall be repaired and/or replaced to the satisfaction of the Architect/Designer, without delay and at no additional cost to the Principal.

5.13.2.7 Producer Statement (other manufacturer's system)

Producer Statement PS1 - where required. Where GIB® plasterboard linings are installed as a component of another manufacturer's proprietary system, the system manufacturer shall furnish a completed Producer Statement PS1 (Design) as confirmation that the specified proprietary system as designed and documented complies with the relevant clauses of the New Zealand Building Code. The PS1 Producer Statement shall not serve as a product warranty or guarantee of compliance.

5.13.2.8 Substitution of GIB® Plasterboard Linings

GIB® plasterboard linings shall be as specified herein and as indicated on the approved drawings. The substitution of GIB® branded plasterboard linings and GIB® Noise Control Systems components for alternative brands is not permitted under any circumstances.

The substitution of a specified GIB® plasterboard lining for an alternative GIB® plasterboard lining by the Contractor shall be in strict accordance with the requirements of the GIB® Noise Control Systems Manual and GIB® Site Guide: 2.3 - Board Substitution Options. Such substitutions shall only be permitted with the Architect's/Designer's written authorisation, and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate alternative GIB® plasterboard linings to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

5.13.3 Performance

5.13.3.1 Limitations of GIB® Plasterboard

GIB® plasterboard products must NOT be:
- used in external situations, or
- exposed to water or be installed in situations where extended exposure to humidity above 90% RH can reasonably be expected, or
- exposed to temperatures in excess of 52°C for prolonged periods.

5.13.3.2 Bracing Performance - Timber Framing

Bracing Performance - GIB EzyBrace® Systems - Timber Framing. To the timber framed elements noted as 'Bracing' on the drawings, additionally comply with all relevant aspects of the GIB EzyBrace® Systems (2016) publication and GIB Ezybrace® Bracing Software according to the specified bracing unit rating, BRANZ Appraisal No.928 (2016), and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

5.13.3.3 Fire Rating Performance

Fire Rating Performance - GIB® Fire Rated Systems. To the areas noted as 'Fire-rated' on the drawings, additionally comply with all relevant aspects of the GIB® Fire Rated Systems (2018) publication according to the specified fire resistance rating (FRR), BRANZ Appraisal

No.289 (2018), and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Fire Rated Systems.

5.13.3.4 Wet Areas

Wet Area Plasterboard Linings - GIB Aqualine® Wet Area Systems. To the areas noted as 'Wet Area' on the drawings, additionally comply with all relevant aspects of the GIB Aqualine® Wet Area Systems (2007) publication, BRANZ Appraisal No.427 (2007), and other relevant product manufacturers' recommendations. Refer to separate specification GIB Aqualine® Wet Area Systems.

5.13.4 Intertenancy Wall Systems - Timber Frame

5.13.4.1 GBTLA 60 (double timber frame, load bearing, STC 60, 60/60/60)

GIB® Noise Control Intertenancy Wall System - GBTLA 60. A two-way fire rated, load bearing, double timber frame wall system incorporating two layers of 10mm GIB Fyreline® each side, and sound control infill (insulation) on one side of the double frame. Refer to the GIB® Noise Control Systems literature.

Installed Location: Refer to drawings

5.13.5 Intertenancy Suspended Grid Systems

5.13.5.1 GBSCA 45 (timber or steel joists, load bearing, STC 56, 45/45/45)

GIB® Noise Control Intertenancy Suspended Grid System - GBSCA 45. A fire rated, load bearing drywall ceiling suspension system incorporating timber floor joists, a proprietary grid suspension system (as specified), and two layers of 13mm GIB Fyreline® as ceiling lining, and sound control infill (insulation). Refer to the GIB® Noise Control Systems literature.

Installed Location:

5.13.6 Components & Accessories

5.13.6.1 Components & Accessories

GIB® Noise Control Systems components and accessories, including, but not limited to:
- GIB® Plasterboard Linings;
- GIB® Plasterboard Fasteners;
- GIB® Metal Trims & Paper Faced Trims;
- GIB® Plasterboard Control Joints;
- GIB® Joint and Finishing Compounds;
- GIB Fire Soundseal® Acoustic Sealant;
- Fire Resistant Sealant;
- Sound Control Infill (insulation).

Refer to the GIB® Noise Control Systems literature and the GIB® Site Guide for further information.

5.13.7 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Co-operate with the Decorator to ensure that the specified Finish Levels for plasterboard jointing and finishing is achieved before decorating commences.

Coordinate with other trades to install GIB® Noise Control Systems to the required set-out and standard, and to ensure:
- appropriate tolerances and clearances allow for adjacent internal linings, fixtures, fittings, services, etc; and
- GIB® plasterboard linings correctly allow for proper door and window installation; and
- penetrations for building services are correctly handled to maintain sheet integrity and system performance.

5.13.8 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Installation of GIB® Noise Control Systems shall be carried out by experienced and competent tradespersons, who are familiar with the specified materials and installation techniques, in accordance with the manufacturer's installation requirements, and to fully comply with all warranty requirements. Submit evidence of experience on request, e.g. National Certificate of Interior Systems, or Certified Business Member of AWCINZ.

Carry out all necessary installation inspections in accordance with the GIB® Noise Control System Installation Checklist and the GIB® Site Guide, and to fully comply with the manufacturer's warranty requirements as the works progress.

All cutting, jointing, fixing and sealing techniques shall be exactly as recommended by the manufacturer. All work shall be such as to leave a neat, efficient and robust installation, to the required standard, free from damage and defects.

Make all necessary provisions to protect adjacent work and surfaces from damage during installation.

On Completion:
- Check that GIB® Noise Control Systems have been correctly installed and finished in accordance with the requirements of the GIB® Noise Control Systems Manual and GIB® Site Guide, to the correct set-out, dimensions and details shown on the drawings.
- Check for any damage and defective work - repair or replace as necessary to the required standard.
- Ensure that inspection and assessment of the plasterboard Finish Level have been carried out, and that written agreement stating the completed jointing and finishing is acceptable for subsequent surface sealing and decoration has been provided.
- Ensure that the GIB® Installation Sign-Off Certificate has been completed and signed by the Interior Plasterer/Stopper.
- Leave all of this work complete and to the required standard in accordance with the manufacturer's warranty requirements, as shown on the drawings and the conditions of the Building Consent.
- Clean up thoroughly and leave the finished work and surrounding surfaces clean and free of contamination from compound splashes and dust. Remove all associated rubbish and

excess material from the site.
- Issue to the Owner a copy of the GIB® Plasterboard Lining Systems Care and Maintenance bulletin, and a copy of the GIB® Product and System Warranty.

5.13.9 Delivery & Handling

Store all GIB® Noise Control Systems plasterboard linings and system components indoors, off the floor, on a flat, level surface in accordance with the manufacturer's requirements. Keep stored plasterboard linings and system accessories dry, out of direct sunlight, and protected from damage, moisture and contamination at all times.

Do not use damaged or defective materials and products, or products that are beyond the designated shelf life.

Should a problem be encountered with any GIB® product during installation or delivery, immediately contact the GIB® Helpline on 0800 100 442. Do not continue to use the product that is not performing to specification or expectation. Keep samples of the product in question and where possible, document batch numbers and/or manufacturing dates.

Handle all materials in accordance with the manufacturer's requirements and relevant Product Data Sheets, and in a manner that prevents damage.

Installers shall be familiar with and comply with the manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials. Carry plasterboard sheets on edge, and avoid damage to sheet edges, ends, and surfaces.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

5.13.10 Preparation

5.13.10.1 General

All framing shall be complete and ready for GIB® Noise Control Systems and associated GIB® plasterboard lining installation.

Timber framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content 18% at the time of plasterboard lining installation.

Light structural steel framing shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. All light structural steel framing members shall satisfy the requirements of AS/NZS 1170. Comply with the steel framing fabricator's specifications and requirements for plasterboard installation.

Steel stud partitioning shall comply with AS 1397 and as specified and shown on the drawings. Comply with the manufacturer's specifications and requirements for plasterboard installation.

Carry out all necessary moisture readings. Do not commence installation until the moisture readings are below the required level.

Carry out all necessary substrate inspections and preparatory work in accordance with the manufacturer's recommendations and the GIB® Site Guide prior to installation. Complete and sign the GIB® Site Guide Pre-Installation Checklist.

Check that the building envelope has been finished at all penetrations including doors, windows, services, etc., and the building is weathertight.

Check junctions to all other building elements and ensure that all necessary works have been completed, including cavity insulation.

Check that all fixtures, fittings and built-in items are correctly installed, and that all framing and substrate edges are completed as detailed.

Confirm the location and details of movement control joints, as indicated on the drawings, prior to installation.

Ensure all pre-wiring and service piping is installed and complete.

Check that any required cavity insulation has been installed correctly and its bulk thickness does not exceed the framing thickness.

Remove all debris and rubbish from framing voids prior to installing linings.

The commencement of work on each section/area shall be deemed to indicate full acceptance by the installer that all preparatory works by other trades is complete.

5.13.10.2 Framing Check

Framing - check all aspects of preparatory works, including but not limited to:
- Check that the framing is straight and true to line, and is plumb/level and correctly aligned.
- Check that the framing is within the required deviation tolerances defined in AS/NZS 2589 according the specified Finish Level.
- Check that vertical and horizontal framing members are at the spacings shown on the drawings, and that any required battens or furring channels are installed to the required layout.
- Check that the framing has no projections due to structural and bracing bracketry, etc. Ensure that framing brackets, plates, braces, hold-downs, etc., are correctly installed.

5.13.10.3 Work above Ceilings

Check that all building work, mechanical, plumbing, electrical, fire protection and other services installed above the ceiling are completed and independently supported by the building structure - not by the ceiling system.

5.14 GIB® Wet Area Systems

5.14.1 Scope

Supply and install the specified GIB Aqualine® Wet Area Systems to the locations identified on the drawings, incorporating GIB® plasterboards and all system components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with the GIB Aqualine® Wet Area Systems publication and the current GIB® Site Guide (check www.gib.co.nz, or call 0800 100 442 for the latest editions), BRANZ Appraisal No.427, other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for GIB Aqualine® Wet Area Systems, GIB® Plasterboard Linings, or GIB® System components and accessories.

This specification section must be read in conjunction with the GIB® Plasterboard Linings specification and relevant GIB® Systems specifications, and other specification sections, as they are interrelated.

For the purpose of this specification, the GIB Aqualine® Wet Area Systems publication is referred to as the GIB® Wet Area Systems Manual..

5.14.2 Requirements

5.14.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

5.14.2.2 Warranty

GIB® Product & System Warranty:
- 10 Years Warranty - for all GIB® Products and Systems installed, according to warranty conditions.
- Provide the GIB® Product & System Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of practical completion of the contract works.

Include with the warranty: a copy of the completed GIB® Installation Sign-Off sheet, and the GIB® Plasterboard Lining Systems Care and Maintenance bulletin.

5.14.2.3 Quality Assurance

Ensure that the installation and finishing of GIB Aqualine® Wet Area Systems comply in all respects with the approved design drawings and specifications, and Building Consent.

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of work are carried out to the highest standard.

5.14.2.4 Inspection & Acceptance of GIB® Wet Area Systems

Carry out all necessary pre-installation, installation and finishing inspections necessary for GIB Aqualine® Wet Area Systems for each area of work in accordance with the requirements of the GIB® Wet Area Systems Manual, GIB® Site Guide, and BRANZ Appraisal No.427.

Complete the GIB® Wet Area Systems Manual and GIB® Site Guide Pre-Installation Checklists prior to installing GIB® plasterboard linings.

Complete the GIB® Interior Plasterer/Stopper Installation Sign-Off Certificate upon completion and before handover for subsequent decoration.

5.14.2.5 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected GIB Aqualine® Wet Area System materials and/or work shall be repaired and/or replaced to the satisfaction of the Architect/Designer, without delay and at no additional cost to the Principal.

5.14.2.6 Producer Statement (other manufacturer's system)

Producer Statement PS1 - where required. Where GIB® plasterboard linings are installed as a component of another manufacturer's proprietary system, the system manufacturer shall furnish a completed Producer Statement PS1 (Design) as confirmation that the specified proprietary system as designed and documented complies with the relevant clauses of the New Zealand Building Code. The PS1 Producer Statement shall not serve as a product warranty or guarantee of compliance.

5.14.2.7 Substitution of GIB® Plasterboard Linings

GIB® plasterboard linings shall be as specified herein and as indicated on the approved drawings. The substitution of GIB® branded plasterboard linings and GIB Aqualine® Wet Area Systems components for alternative brands is not permitted under any circumstances.

The substitution of a specified GIB® plasterboard lining for an alternative GIB® plasterboard lining by the Contractor shall be in strict accordance with the requirements of the GIB Aqualine® Wet Area Systems Manual and GIB® Site Guide: 2.3 - Board Substitution Options. Such substitutions shall only be permitted with the Architect's/Designer's written authorisation, and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate alternative GIB® plasterboard linings to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

5.14.3 Performance

5.14.3.1 Limitations of GIB® Plasterboard

GIB® plasterboard products must NOT be:
- used in external situations, or
- exposed to water or be installed in situations where extended exposure to humidity above 90% RH can reasonably be expected, or
- exposed to temperatures in excess of 52°C for prolonged periods.

In addition to the limitations above, GIB Aqualine® plasterboard must NOT be:
- used for bracing purposes in shower cubicles or above baths; or
- applied directly to solid plaster (gypsum or cement), wood based sheet linings or similar materials, masonry or concrete; or
- installed over a vapour barrier or a wall acting as a vapour barrier.

5.14.3.2 Bracing Performance - Timber Framing

Bracing Performance - GIB EzyBrace® Systems - Timber Framing. To the timber framed elements noted as 'Bracing' on the drawings, additionally comply with all relevant aspects of the GIB EzyBrace® Systems (2016) publication and GIB Ezybrace® Bracing Software according to the specified bracing unit rating, BRANZ Appraisal No.928 (2016), and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

5.14.3.3 Fire Rating Performance

Fire Rating Performance - GIB® Fire Rated Systems. To the areas noted as 'Fire-rated' on the drawings, additionally comply with all relevant aspects of the GIB® Fire Rated Systems (2018) publication according to the specified fire resistance rating (FRR), BRANZ Appraisal No.289 (2018), and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Fire Rated Systems.

5.14.3.4 Sound Insulation Performance

Sound Insulation Performance - GIB® Noise Control Systems. To the areas noted as 'Sound-rated' on the drawings, additionally comply with all relevant aspects of the GIB® Noise Control Systems (2017) publication according to the specified sound transmission class (STC) rating, BRANZ Appraisal No.394, and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Noise Control Systems.

5.14.4 GIB Aqualine® Non-Tiled Wall Systems

5.14.4.1 Non-Tiled Walls - Timber Frame

GIB Aqualine® Wet Area Systems - Non-Tiled Walls - Timber Framing. A timber frame, wet area lining system for non-tiled walls incorporating one layer of 10mm or 13mm GIB Aqualine® on the wet area side. Refer to the GIB® Aqualine® Systems literature.

5.14.5 GIB Aqualine® Tiled Wall Systems

5.14.5.1 Tiled Walls (tile weight - max. 26kg/m²) - Timber Frame

GIB Aqualine® Wet Area Systems - Tiled Walls - Timber Frame. A timber frame, wet area lining system for tiled walls with a maximum tile weight of 26kg/m², incorporating one layer of 10mm GIB Aqualine® on the wet area side. Refer to the GIB® Wet Area Systems literature.

5.14.6 GIB Aqualine® Ceiling Systems

5.14.6.1 Metal Ceiling Battens

GIB Aqualine® Wet Area Systems - Ceilings - Metal Ceiling Battens. A wet area drywall ceiling lining system over metal ceiling battens incorporating one layer of 10mm or 13mm GIB Aqualine®. Refer to the GIB® Wet Area Systems literature.

5.14.7 Components & Accessories

5.14.7.1 Components & Accessories

GIB Aqualine® Wet Area Systems components and accessories, including, but not limited to:
- GIB® Plasterboard Linings;
- GIB® Plasterboard Fasteners;
- GIB® Adhesives - GIBFix® One and/or GIBFix® All-Bond;
- GIB® Rondo® NZ18 Perimeter Angle: shower corner reinforcing, 32 x 32 x 0.55mm thick galvanised steel angle.
- GIB® Metal Trims & Paper Faced Trims;
- GIB® Plasterboard Control Joints;
- GIB® Joint and Finishing Compounds;
- Wet Area Sealant.

Refer to the GIB® Wet Area Systems literature and the GIB® Site Guide for further information.

5.14.8 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-operate with the Decorator to ensure that the specified Finish Levels for plasterboard jointing and finishing is achieved before decorating commences.

Coordinate with other trades to install GIB Aqualine® Wet Area Systems to the required set-out and standard, and to ensure:
- appropriate tolerances and clearances allow for adjacent internal linings, fixtures, fittings, services, etc; and
- GIB® plasterboard linings correctly allow for proper door and window installation; and
- penetrations for building services are correctly handled to maintain sheet integrity and system performance.

5.14.9 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Installation of GIB Aqualine® Wet Area Systems shall be carried out by experienced and competent tradespersons, who are familiar with the specified materials and installation techniques, in accordance with the manufacturer's installation requirements, and to fully comply with all warranty requirements. Submit evidence of experience on request, e.g. National Certificate of Interior Systems, or Certified Business Member of AWCINZ.

Carry out all necessary installation inspections in accordance with the GIB® Wet Area Systems Manual and the GIB® Site Guide, and to fully comply with the manufacturer's warranty requirements as the works progress.

All cutting, jointing, fixing and sealing techniques shall be exactly as recommended by the manufacturer. All work shall be such as to leave a neat, efficient and robust installation, to the required standard, free from damage and defects.

Make all necessary provisions to protect adjacent work and surfaces from damage during installation.

On Completion:
- Check that GIB Aqualine® Systems have been correctly installed and finished in accordance with the requirements of the GIB® Wet Area Systems Manual and GIB® Site Guide, to the correct set-out, dimensions and details shown on the drawings.
- Check for any damage and defective work - repair or replace as necessary to the required standard.
- Ensure that inspection and assessment of the plasterboard Finish Level have been carried out, and that written agreement stating the completed jointing and finishing is acceptable for subsequent surface sealing and decoration has been provided.
- Ensure that the GIB® Installation Sign-Off Certificate has been completed and signed by the Interior Plasterer/Stopper.
- Leave all of this work complete and to the required standard in accordance with the manufacturer's warranty requirements, as shown on the drawings and the conditions of the Building Consent.
- Clean up thoroughly and leave the finished work and surrounding surfaces clean and free of contamination from compound splashes and sanding dust. Remove all associated rubbish and excess material from the site.
- Issue to the Owner a copy of the GIB® Plasterboard Lining Systems Care and Maintenance bulletin, and a copy of the GIB® Product and System Warranty.

5.14.10 Delivery & Handling

Store all GIB Aqualine® Wet Area Systems plasterboard linings and system components indoors, off the floor, on a flat, level surface in accordance with the manufacturer's requirements. Keep stored plasterboard linings and system accessories dry, out of direct sunlight, and protected from damage, moisture and contamination at all times.

Do not use damaged or defective materials and products, or products that are beyond the designated shelf life. Cracked or damaged GIB Aqualine® sheets must never be used.

Should a problem be encountered with any GIB® product during installation or delivery, immediately contact the GIB® Helpline on 0800 100 442. Do not continue to use the product that is not performing to specification or expectation. Keep samples of the product in question and where possible, document batch numbers and/or manufacturing dates.

Handle all materials in accordance with the manufacturer's requirements and relevant Product Data Sheets, and in a manner that prevents damage.

Installers shall be familiar with and comply with the manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials. Carry plasterboard sheets on edge, and avoid damage to sheet edges, ends, and surfaces.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

5.14.11 Preparation

5.14.11.1 General

All framing shall be complete and ready for GIB Aqualine® Wet Area Systems and associated GIB® plasterboard linings installation.

Timber framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content 18% at the time of plasterboard lining installation.

Light structural steel framing shall comply with the the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. All light structural steel framing members shall satisfy the requirements of AS/NZS 1170. Comply with the steel framing fabricator's specifications and requirements for plasterboard installation.

Steel stud partitioning shall comply with AS 1397 and as specified and shown on the drawings. Comply with the manufacturer's specifications and requirements for plasterboard installation.

Concrete substrates shall comply with the CCANZ CP 01:2011 or with NZS 3109. New concrete must have aged for a minimum of 28 days. Ensure that concrete surfaces are within the tolerances specified.

Concrete masonry structures shall comply with NZS 4229, or with NZS 4230 and AS/NZS 1170 for specific design.

Carry out all necessary moisture readings. Do not commence installation until the moisture readings are below the required level.

Carry out all necessary substrate inspections and preparatory work in accordance with the manufacturer's recommendations and the GIB® Site Guide prior to installation. Complete and sign the GIB® Site Guide Pre-Installation Checklist.

Check that the building envelope has been finished at all penetrations including doors, windows, services, etc., and the building is weathertight.

Check junctions to all other building elements and ensure that all necessary works have been completed, including cavity insulation.

Check that all fixtures, fittings and built-in items are correctly installed, and that all framing and substrate edges are completed as detailed.

Confirm the location and details of movement control joints, as indicated on the drawings, prior to installation.

Ensure all pre-wiring and service piping is installed and complete.

Check that any required cavity insulation has been installed correctly and its bulk thickness does not exceed the framing thickness.

Remove all debris and rubbish from framing voids prior to installing linings.

The commencement of work on each section/area shall be deemed to indicate full acceptance by the installer that all preparatory works by other trades is complete.

5.14.11.2 Framing Check

Framing - check all aspects of preparatory works, including but not limited to:
- Check that the framing is straight and true to line, and is plumb/level and correctly aligned.
- Check that the framing is within the required deviation tolerances defined in AS/NZS 2589 according the specified Finish Level.
- Check that vertical and horizontal framing members are at the spacings shown on the drawings, and that any required battens or furring channels are installed to the required layout.
- Check that the framing has no projections due to structural and bracing bracketry, etc. Ensure that framing brackets, plates, braces, hold-downs, etc., are correctly installed.

5.15 GIB® Weatherline® Rigid Air Barrier Systems

5.15.1 Scope

Supply and install GIB Weatherline® Rigid Air Barrier Systems, as specified herein, to the locations and details shown on the design drawings, complete with all necessary components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with the latest GIB Weatherline® Rigid Air Barrier Systems Specification and Installation Manual (check www.gib.co.nz, or call 0800 100 442 for the latest edition), BRANZ Appraisal No.1048, other relevant product manufacturers' recommendations.

No substitutions are permitted for GIB Weatherline® Rigid Air Barrier Systems.

For the purpose of this specification, all associated GIB technical literature and publications, including the GIB Weatherline® Rigid Air Barrier Systems Specification and Installation Manual, installations instructions and drawings, and BRANZ Appraisal, are collectively referred to as the 'Technical Literature'.

GIB Weatherline® Rigid Air Barrier Systems are intended for use as a rigid wall underlay fixed over timber-framed walls to support the wind pressure and to act as a secondary barrier to wind-driven rain. GIB Weatherline® Rigid Air Barrier Systems are suitable for use under wall cladding as an alternative to the rigid wall underlay specified in NZBC E2/AS1, Table 23 on timber-framed buildings, except that claddings must NOT be installed directly over (direct fixed) the GIB Weatherline® Rigid Air Barrier.

Where GIB® plasterboard internal linings are used, this section should be read in conjunction with the GIB® Plasterboard Linings specification and relevant GIB® Systems specifications as they are interrelated..

The following is a list and/or general description of the extent of the GIB Weatherline® Rigid Air Barrier Systems works, which are more specifically defined in the contract documents, required for the completion of the contract works:

5.15.2 Requirements

5.15.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

5.15.2.2 Warranty

GIB® Product & System Warranty - according to the warranty terms and conditions.
- 15 Years Warranty - for GIB Weatherline® Rigid Air Barrier Systems installed where the cladding durability requirement is 15 years.
- 50 Years Warranty - for GIB Weatherline® Rigid Air Barrier Systems installed when used for bracing or fire-rated systems where the cladding durability requirement is not less than 50 years.
- Provide the GIB® Product & System Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of practical completion of the contract works.

5.15.2.3 Substitutions

GIB Weatherline® Rigid Air Barrier Systems shall be as specified herein and on the design drawings. The substitution of GIB Weatherline® Rigid Air Barrier Systems for an alternative brand, system, product or material is not permitted under any circumstances.

The substitution of a specified GIB Weatherline® system or component for an alternative GIB Weatherline® system or component by the Contractor shall only be permitted with the Contract Administrator's written authorisation and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate an alternative GIB Weatherline® system or component to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

5.15.2.4 Inspection & Reporting

BCA inspections shall take place at each of the stages as scheduled in the Building Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Carry out all necessary pre-installation and installation inspections for each area of the works.

Complete all necessary Pre-Installation Checklists prior to installation, and all necessary Installation Checklists.

Complete all necessary Final Checklists and Installation Sign-Off Certificates before handing over completed work.

5.15.2.5 Quality Assurance

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of the work are carried out to the highest standard.

5.15.2.6 Penetrations for Services

Pipes and ducts penetrating GIB Weatherline® Rigid Air Barrier Systems must be sealed with Pro Clima Kaflex/Roflex seals prior to installation of wall claddings. Holes up to 100 x 100mm positioned no closer than 200mm to the edge of a sheet or to another hole may be allowed for services in GIB Weatherline® Rigid Air Barrier Systems without affecting the bracing rating of the panel. Where a penetration occurs in a Fire Resistance Rated wall, the penetration is subject to specific fire engineering design - refer to design drawings.

5.15.2.7 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected GIB Weatherline® Rigid Air Barrier Systems materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator without delay and at no additional cost to the Principal.

5.15.3 Performance

5.15.3.1 Bracing Performance

Bracing Performance - GIB EzyBrace® Systems - Timber Framing. To the timber-framed elements noted as 'Bracing' on the drawings, additionally comply with all relevant aspects of the GIB EzyBrace® Systems (2016) publication and GIB Ezybrace® Software according to the specified bracing unit rating, BRANZ Appraisal No.928, and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

5.15.3.2 Fire Rating Performance

Fire Rating Performance - GIB® Fire Rated Systems. To the areas noted as 'Fire-Rated' on the drawings, additionally comply with all relevant aspects of the GIB® Fire Rated Systems (2018) publication according to the specified fire resistance rating (FRR), BRANZ Appraisal No.289 (2018), and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Fire Rated Systems.

5.15.4 GIB Weatherline® Fire Rated Systems

5.15.4.1 GWTL-30a (30/30/30) - Two-Way FRR External Wall

GIB Weatherline® Rigid Air Barrier Fire Rated System - GWTL-30a. A two-way fire rated, load-bearing/non-load-bearing timber-framed external wall system for use with a drained and vented cavity cladding system incorporating minimum 18mm thick packer cavity battens or structural cavity battens (timber or CLD).

System Details:
- Performance: FRR 30/30/30.
- Timber Wall Framing: Complying with the NZ Building Code; 90mm max stud size; studs at max 600mm crs; nogs/dwangs at max 1350mm crs.
- External Sheathing: One layer of 10mm GIB Weatherline® - refer to Components & Accessories clause.
- Sheathing Fixing: Fix sheets at 300mm crs around sheet perimeter (12mm from bound sheet edge, 18mm from sheet end/cut edges) and at 300mm to all intermediate studs.
- Internal Lining: One layer of 10mm GIB Fyreline®.
- Lining Fixing: Fix sheets at 300mm crs around sheet perimeter (12mm from bound sheet edge, 18mm from sheet end/cut edges) and at 300mm to all intermediate studs.

- Insulation: Pink® Batts® R2.2 (90mm) glass wool insulation.
- Flashing Tape: All GIB Weatherline® sheet joints and screw fixings must be taped with GIB Weatherline® Flashing Tape apart from mid-sheet vertical screw fixings covered with a structural cavity batten (where used).

Assembled and installed in accordance with the Technical Literature to the locations indicated on the design drawings.

Installed Location: Refer to drawings

5.15.5 Components & Accessories

5.15.5.1 Exterior Sheathing

Exterior Sheathing - GIB Weatherline® Sheet. An exterior-grade, glass-fibre fleece wrapped modified-gypsum core sheet material used as a rigid wall underlay and temporary weather protecting sheathing.

Sheet Details:
- Thickness: 10mm and 13mm thick sheets - *to the sheet thickness specified*.
- Width: 1200mm wide, square edge.
- Length: 2700mm and 3000mm standard sheet lengths (custom lengths to order).
- Colour: Purple.
- Mass (approx.): 9.0kg/m² for 10mm, 11.5kg/m² for 13mm (at equilibrium moisture content).

Installation:
- Sheets must be installed purple branded face outwards, vertically with longitudinal sheet edges touch fitted, and must only be joined on framing.
- Sheets may be installed horizontally across the gable end of a building.
- All sheet edges (vertical, horizontal, raked) must be fully supported by wall framing.
- At the base of the wall, the sheathing must extend below the ground floor bottom plate a minimum of 15mm, up to a maximum of 40mm.
- Sheets must not bridge an inter-storey floor level - a horizontal movement control joint must be provided at the intermediate floor level.
- Horizontal sheet joints at inter-storey floor levels must be gapped 10mm apart and support over floor framing.
- Horizontal sheet joints occurring between floor levels must be gapped 5mm apart and supported over horizontal framing.

Installed as a component of GIB Weatherline® Rigid Air Barrier Systems in accordance with the Technical Literature.

Sheet Thickness:

5.15.5.2 Sheathing Fixings

Sheathing Fixings - GIB® Grabber® 41mm x 6g Ceramic Coated High Thread Screws. Used to fasten GIB Weatherline® sheathing to timber wall framing. Screws shall be fixed at the specified fixing centres along vertical and horizontal framing lines according to the GIB Weatherline® Rigid Air Barrier fixing option. Fixings shall commence 75mm in from sheet

corners, and be positioned minimum 12mm from the bound sheet edge and minimum 18mm from the cut sheet edge.

5.15.5.3 Flashing Tape

Flashing Tape - GIB Weatherline® Flashing Tape. Used for weather-sealing GIB Weatherline® sheathing vertical and horizontal sheet joints and edges, internal and external corner joints, exposed screw fixings, and the head and jambs of window and door openings in accordance with the Technical Literature. Available in 30, 60, 100, 150, 200mm wide rolls x 30m long.

GIB Weatherline® Flashing Tape must be installed onto the sheathing as soon as practical to avoid wetting. The sheathing surface must be dry and free from dust and other surface contaminants likely to impinge or reduce tape adhesion. Horizontal flashing tape applications should be installed before vertical flashing tape applications. Use full-length strips of tape where possible. Where jointing is necessary, the tape joint shall be overlapped a minimum of 30mm and the upper strip overlapping the lower strip. The tape must be firmly pressure fitted with the use of a plastic paddle, and any wrinkles/bubbles pressed out.

When used for window and door openings, the width of the tape must be such that it covers the full depth of the framed opening and be returned minimum 50mm over the face of the GIB Weatherline® sheathing.

5.15.5.4 Sill Tape

Sill Tape - GIB Weatherline® Sill Tape. Used for weather-sealing the sills of window and door openings in the GIB Weatherline® sheathing in accordance with the Technical Literature. Available in 150 and 200mm wide rolls x 30m long.

The GIB Weatherline® Sill Tape shall be applied in accordance with the Technical Literature and cover the full length of the sill and returned up each jamb a minimum of 100mm, covering the full depth of the framed opening and returned a minimum of 50mm over the face of the GIB Weatherline® sheathing. Use full-length strips of tape where possible. Where jointing is necessary, the tape joint shall be overlapped a minimum of 100mm. Keep any required jointing to an absolute minimum. The tape must be firmly pressure fitted with the use of a plastic paddle, and any wrinkles/bubbles pressed out. Use GIB Weatherline® Flashing Tape to seal the opening's jambs and head in a similar manner so all sides and edges of the opening are sealed.

5.15.5.5 Penetration Seals

Pro Clima Kaflex and Roflex Grommets. A range of flexible EPDM membrane seals used to seal pipes and conduits that penetrate the GIB Weatherline® sheathing. Installed in accordance with the manufacturer's instructions and BRANZ Appraisal No.953. The penetration seals must be installed before the GIB Weatherline® Rigid Air Barrier is covered by the wall cladding.

5.15.6 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades, as required, the installation of GIB Weatherline® Rigid Air Barrier Systems to the required layout, details and tolerances.

5.15.7 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Installation of GIB Weatherline® Rigid Air Barrier Systems shall be carried out by experienced and competent tradespersons, who are familiar with the specified materials and installation techniques, in accordance with the manufacturer's installation requirements, and to fully comply with all warranty requirements.

Carry out all necessary installation inspections in accordance with the manufacturer's Technical Literature.

All cutting, jointing, fixing and sealing techniques shall be exactly as recommended by the manufacturer's Technical Literature. All work shall be such as to leave a neat, efficient and robust installation, to the required standard, free from damage and defects.

Make all necessary provisions to protect adjacent work and surfaces from damage during installation.

5.15.8 Delivery & Handling

Take delivery of materials and accessories undamaged and in good condition. Reject any item found to be defective or damaged and contact the manufacturer/supplier for replacement.

Store GIB Weatherline® sheet stacked flat, off the ground and supported on a level platform in accordance with the manufacturer's requirements. Keep stored sheets under cover, dry, out of direct sunlight, and protected from damage, moisture and contamination until required for installation.

Do not use damaged or defective materials and products, or products that are beyond the designated shelf life.

Should a problem be encountered with any GIB® product during installation or delivery, immediately contact the GIB® Helpline on 0800 100 442. Do not continue to use the product that is not performing to specification or expectation. Keep samples of the product in question and where possible, document batch numbers and/or manufacturing dates.

Handle all materials in accordance with the manufacturer's requirements and relevant Product Data Sheets, and in a manner that prevents damage and does not reduce its performance.

Installers shall be familiar with and comply with the manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials. Carry GIB Weatherline® sheets on edge, and avoid damage to sheet edges, ends and surfaces.

Installers shall conform to all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

5.15.9 Preparation

5.15.9.1 General

Prior to installation, carry out all necessary inspections of the supporting timber wall framing to ensure all preliminary work is complete. Do not commence installation until all necessary preliminary work by others is complete and to the required standard. The commencement of work on each section of the installation shall be deemed to indicate full acceptance by the Installer that all preliminary work by other trades is complete and to the required standard.

Timber Wall Framing:
- Timber wall framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific-design, and have a maximum moisture content 20% at the time of GIB Weatherline® Rigid Air Barrier Systems installation.
- Studs must be spaced at maximum 400mm or 600mm centres depending on the wind zone and fixing option used - as per the Technical Literature.
- Nog/dwang lines must be spaced at maximum 800mm centres vertically.
- The wall framing must be structurally sound and dimensionally stable and in the correct alignment, true to line and plumb.
- GIB Weatherline® sheets must be joined on wall framing with a finished width no less than 45mm.

Confirm the location and details of movement control joints, as indicated on the design drawings, prior to installation.

5.15.9.2 Framing Check

Framing - check all aspects of preparatory works, including but not limited to:
- Check that the framing is straight and true to line, and is plumb/level and correctly aligned.
- Check that vertical and horizontal framing members are to the spacings shown on the design drawings.
- Check that the framing has no projections due to structural and bracing bracketry, etc.

Ensure that framing brackets, plates, braces, hold-downs, etc, are correctly installed.

5.15.10 Installation

5.15.10.1 Installation

Install GIB Weatherline® Rigid Air Barrier Systems in accordance with the Technical Literature and as indicated on the design drawings.

Install GIB Weatherline® sheets vertically with longitudinal sheet edges touch fitted and with all sheet edges supported by framing.
Sheets joined between floor levels must be installed with a minimum 5mm gap between the sheet ends and must be supported over horizontal framing.
Sheets joined at inter-storey floor levels must have a minimum 10mm gap between the sheet ends to allow for shrinkage of the framing.

Fix GIB Weatherline® sheets to timber wall framing using only GIB® Grabber® 41mm x 6g Ceramic Coated High Thread Screws as per the GIB Weatherline Rigid Air Barrier System's specific fixing placement according to the Technical Literature.

All vertical and horizontal sheet joints and edges, internal and external corner junctions and exposed screw fixings (except where covered by a structural cavity batten) must be covered with GIB Weatherline® Flashing Tape - installed as soon as practical to clean dry sheathing to avoid any wetting. Window and door and other openings in GIB Weatherline® sheathing must be covered with GIB Weatherline® Sill Tape and Flashing Tape in accordance with the manufacturer's instructions.

Pipes and conduits penetrating GIB Weatherline® sheathing must be sealed with Pro Clima Kaflex/Roflex membrane seals, used and installed in accordance with the manufacturer's instructions.

Structural cavity battens, where specified and used as a component of a GIB Weatherline® Rigid Air Barrier System, must be fixed to timber wall framing in accordance with the Technical Literature.

5.15.11 Completion

Check GIB Weatherline® Rigid Air Barrier Systems have been correctly installed with all sheet joints and edges and sheet fixings (where required) covered with GIB Weatherline® Flashing Tape, and joinery openings covered with GIB Weatherseal Sill Tape and Flashing Tape, all in accordance with the Technical Literature and as indicated on the design drawings.

Check the installation for damage and defects. Carry out any necessary repairs in accordance with the manufacturer's requirements to the required standard. Replace sections where repair is not possible or will not be accepted.

Leave all of this work complete, clean and free from damage and defects, and to the required standard as per the Technical Literature.

Leave surrounding surfaces clean and free of rubbish and debris. Remove all rubbish and excess material from the site.

Issue to the Owner a copy of the manufacturer's maintenance requirements and a copy of the associated warranties.

5.16 IBS RigidRAP®

5.16.1 Scope

Supply and install IBS RigidRAP®, as specified herein, to the locations indicated on the design drawings, complete with all system components and accessories required for proper installation and performance. This system can be used as a rigid air barier system or a structural bracing system, or both. All aspects of this work shall be in complete accordance with IBS RigidRAP® Design and Installation Guide (check https://www.ibs.co.nz/product/ibs-rigidrap/, or email info@ibs.co.nz, or call 0800 500 338 for the latest editions), and other relevant product manufacturers' recommendations. IBS RigidRAP® is CodeMark assured

with the NZ Building Code: refer to CodeMark Product Certificate No: CM70035 Issued by Bureau Veritas Australia Pty Ltd.No substitutions are permitted for IBS RigidRAP®
For the purpose of this specification, all IBS RigidRAP® technical literature, including the Design & Installation Guide and CodeMark Certificate, is collectively referred to as the 'Technical Literature'.
This specification section must be read in conjunction with other specification sections and the contract documents, as they are interrelated. For more information, please refer to:
IBS RigidRAP® FAQ's: https://www.ibs.co.nz/wp-content/uploads/2019/08/IBS-RigidRAP-1-Page-FAQ.pdf
IBS RigidRAP® Booklet: https://www.ibs.co.nz/wp-content/uploads/2019/07/RigidRAP-Booklet.pdf
IBS RigidRAP® Design and Installation guide to: https://www.ibs.co.nz/wp-content/uploads/2019/07/RigidRAP-Design-Installation-Guide.pdf
IBS RigidRAP® CodeMark certificate to: https://www.ibs.co.nz/wp-content/uploads/2019/07/RigidRAP-Codemark-Certificate-CM70035.pdf
IBS RigidRAP® approved CAD details to:https://www.ibs.co.nz/download-centre-cad-files/

5.16.2 Requirements

5.16.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

5.16.2.2 Warranty

IBS RigidRAP® Product Warranty - according to warranty terms and conditions:
- 50 Years Warranty for IBS RigidRAP® supplied by IBS.
- Provide the warranty on the supplier's standard warranty form.
- Commence the warranty from the date of practical completion of the contract works.

5.16.2.3 Substitutions

IBS RigidRAP® shall be as specified herein and on the design drawings. The substitution of IBS RigidRAP® for an alternative rigid air barrier material or wall bracing system is not permitted under any circumstances.
For all IBS RigidRAP® Wall Bracing Systems, no product substitution is allowed.
The substitution of a specified IBS RigidRAP® wall bracing system for an alternative IBS RigidRAP® wall bracing system by the Contractor shall only be permitted with the Contract Administrator's written authorisation and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate an alternative IBS RigidRAP® wall bracing system to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

5.16.2.4 Inspections & Reporting

BCA inspections of the works shall take place at each of the stages scheduled in the Building Consent. Confirm a written programme to facilitate these inspections, including notification

when each stage of the work is ready for inspection.
Carry out all necessary pre-installation and installation inspections for each area of the works.
Complete all necessary Pre-Installation Checklists, and all necessary Installation Checklists.
Complete all necessary Sign-Off Certificates before handing over completed work.

5.16.2.5 Quality Assurance

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of the works are carried out to the highest standard.

5.16.2.6 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected IBS RigidRAP® work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional cost to the Principal.

5.16.3 Wall Bracing System

5.16.3.1 SYSTEM 1: IBS RigidRAP® 300 x 2400 mm wall using Gib Handibrac®

SYSTEM 1: IBS RigidRAP® 300 x 2400 mm wall using Gib Handibrac®
- Fixing: 30 x 2.5 Galv clouts @ 150mm centres, 12mm from the edge.
- Fixing: Gib Handibrac® to concrete as per manufacturer's instructions
- Minimum Wall Length: 300mm.
- Lining Requirements: 8mm IBS IBS RigidRAP® fixed to one side.
- BU/m - Wind: Concrete Floor = 49 BU/m. Timber Floor = 49 BU/m.
- BU/m - Earthquake: Concrete Floor = 58 BU/M. Timber Floor = 58 BU/m.

Installed to the locations indicated on the design drawings in accordance with the IBS RigidRAP® Design & Installation guide.
Wall length to not be longer than twice the stated length.
Installed Location: Refer to structural drawings

5.16.3.2 SYSTEM 2: IBS RigidRAP® 400 x 2400 mm wall using Gib Handibrac®

SYSTEM 2: IBS RigidRAP® 400 x 2400 mm wall using Gib Handibrac®
- Fixing: 30 x 2.5 Galv clouts @ 150mm centres, 12mmm from edge.
- Fixing: Gib Handibrac® to concrete as per manufacturer's instructions
- Minimum Wall Length: 400mm.
- Lining Requirements: 8mm IBS IBS RigidRAP® fixed to one side.
- BU/m - Wind: Concrete Floor = 70 BU/m. Timber Floor = 70 BU/m.
- BU/m - Earthquake: Concrete Floor = 79 BU/M. Timber Floor = 79 BU/m.

Installed to the locations indicated on the design drawings in accordance with the IBS RigidRAP® Design & Installation guide.
Wall length to not be longer than twice the stated length.
Installed Location:Refer to structural drawings

5.16.3.3 SYSTEM 3: IBS RigidRAP® 600 mm x 2400 mm wall GIB HandiBrac®

SYSTEM 3: IBS RigidRAP® 600 mm x 2400 mm wall GIB HandiBrac®
- Fixing 30 x 2.5 Galv clouts @ 150mm centres, 12mmm from edge.
- Fixing: Gib Handibrac® to concrete as per manufacturer's instructions

- Minimum Wall Length: 600mm.
- Lining Requirements: 8mm IBS IBS RigidRAP® fixed to one side.
- BU/m - Wind: Concrete Floor = 76 BU/m. Timber Floor = 76 BU/m.
- BU/m - Earthquake: Concrete Floor = 81 BU/M. Timber Floor = 81 BU/m.

Installed to the locations indicated on the design drawings in accordance with the IBS RigidRAP® Design & Installation guide.
Wall length to not be longer than twice the stated length.
Installed Location: Refer to structural drawings

5.16.3.4 SYSTEM 4: IBS RigidRAP® 1200 mm x 2400 mm wall GIB HandiBrac®

SYSTEM 4: IBS RigidRAP® 1200 mm x 2400 mm wall GIB HandiBrac®
- Fixing 30 x 2.5 Galv clouts @ 150mm centres, 12mmm from edge. Intermediate fixing at 600mm along stud @ 300mm centres.
- Fixing: Gib Handibrac® to concrete as per manufacturer's instructions
- Minimum Wall Length: 1200mm.
- Lining Requirements: 8mm IBS IBS RigidRAP® fixed to one side.
- BU/m - Wind: Concrete Floor = 131 BU/m. Timber Floor = 131 BU/m.
- BU/m - Earthquake: Concrete Floor = 107 BU/M. Timber Floor = 107 BU/m.

Installed to the locations indicated on the design drawings in accordance with the IBS RigidRAP® Design & Installation guide.
Wall length to not be longer than twice the stated length.
Installed Location: Refer to structural drawings

5.16.3.5 SYSTEM 5: IBS RigidRAP® 2400 mm x 2400 mm wall with GIB HandiBrac®

SYSTEM 5: IBS RigidRAP® 2400 mm x 2400 mm wall with GIB HandiBrac®
- Fixing 30 x 2.5 Galv clouts @ 150mm centres, 12mmm from edge. Intermediate fixing at 1200mm along stud @ 300mm centres.
- Fixing: Gib Handibrac® to concrete as per manufacturer's instructions
- Minimum Wall Length: 2400mm.
- Lining Requirements: 8mm IBS IBS RigidRAP® fixed to one side.
- BU/m - Wind: Concrete Floor = 108 BU/m. Timber Floor = 108 BU/m.
- BU/m - Earthquake: Concrete Floor = 89 BU/M. Timber Floor = 89 BU/m.

Installed to the locations indicated on the design drawings in accordance with the IBS RigidRAP® Design & Installation guide.
Wall length to not be longer than twice the stated length.
Installed Location: Refer to structural drawings

5.16.3.6 SYSTEM 6: IBS RigidRAP® 1200 mm x 2400 mm without GIB HandiBrac®

SYSTEM 6: IBS RigidRAP® 1200 mm x 2400 mm wall **without** GIB HandiBrac®
- Fixing 30 x 2.5 Galv clouts @ 150mm centres, 12mmm from edge. Intermediate fixing at 600mm along stud @ 300mm centres.
- Fixing: No hold down brackets
- Minimum Wall Length: 1200mm.
- Lining Requirements: 8mm IBS IBS RigidRAP® fixed to one side.
- BU/m - Wind: Concrete Floor = 93 BU/m. Timber Floor = 93 BU/m.

- BU/m - Earthquake: Concrete Floor = 78 BU/M. Timber Floor = 78 BU/m.
Installed to the locations indicated on the design drawings in accordance with the IBS RigidRAP® Design & Installation guide.
Wall length to not be longer than twice the stated length.
Installed Location: Refer to structural drawings

5.16.3.7 SYSTEM 7: IBS RigidRAP® 400 mm x 2400 mm with GIB HandiBrac® and Gib Board lining

SYSTEM 7: IBS RigidRAP® 400 mm x 2400 mm wall with GIB HandiBrac® and Gib Board lining
- Fixing 30 x 2.5 Galv clouts @ 150mm centres, 12mmm from edge.
- Fixing: Gib Handibrac® to concrete as per manufacturer's instructions
- Minimum Wall Length: 400mm.
- Lining Requirements: 8mm IBS RigidRAP® fixed to outside and standard 10mm Gib plasterboard to inside.
- BU/m - Wind: Concrete Floor = 94 BU/m. Timber Floor = 94 BU/m.
- BU/m - Earthquake: Concrete Floor = 104 BU/M. Timber Floor = 104 BU/m.
Installed to the locations indicated on the design drawings in accordance with the IBS RigidRAP® Design & Installation guide.
Wall length to not be longer than twice the stated length.
Installed Location: Refer to structural drawings

5.16.3.8 SYSTEM 8: IBS RigidRAP® 600 mm x 2400 mm with GIB HandiBrac® and Gib Board lining

SYSTEM 8: IBS RigidRAP® 600 mm x 2400 mm wall with GIB HandiBrac® and Gib Board lining
- Fixing 30 x 2.5 Galv clouts @ 150mm centres, 12mmm from edge.
- Fixing: Gib Handibrac® to concrete as per manufacturer's instructions
- Minimum Wall Length: 600mm.
- Lining Requirements: 8mm IBS RigidRAP® fixed to outside and standard 10mm Gib plasterboard to inside.
- BU/m - Wind: Concrete Floor = 130 BU/m. Timber Floor = 120 BU/m.
- BU/m - Earthquake: Concrete Floor = 130 BU/M. Timber Floor = 120 BU/m.
Installed to the locations indicated on the design drawings in accordance with the IBS RigidRAP® Design & Installation guide.
Wall length to not be longer than twice the stated length.
Installed Location: Refer to structural drawings

5.16.3.9 SYSTEM 9: IBS RigidRAP® 1200 mm x 2400 mm with GIB HandiBrac® and Gib Board lining

SYSTEM 9: IBS RigidRAP® 1200 mm x 2400 mm wall with GIB HandiBrac® and Gib Board lining
- Fixing 30 x 2.5 Galv clouts @ 150mm centres, 12mmm from edge. Intermediate fixing at 600mm along stud @ 300mm centres.
- Fixing: Gib Handibrac® to concrete as per manufacturer's instructions
- Minimum Wall Length: 1200mm.
- Lining Requirements: 8mm IBS RigidRAP® fixed to outside and standard 10mm Gib plasterboard to inside.
- BU/m - Wind: Concrete Floor = 150 BU/m. Timber Floor = 130 BU/m.
- BU/m - Earthquake: Concrete Floor = 150 BU/M. Timber Floor = 130 BU/m.
Installed to the locations indicated on the design drawings in accordance with the IBS

RigidRAP® Design & Installation guide.
Wall length to not be longer than twice the stated length.
Installed Location: Refer to structural drawings

5.16.4 Components & Accessories

5.16.4.1 IBS RigidRAP® 8mm OS3 Panel

IBS RigidRAP® (rigid air barrier panel). A 8mm thick, 3-layered, moisture resistant, oriented strand board structural bracing panel (sheet), manufactured in accordance with EN 13986:2004, and designed specifically for the New Zealand building and construction industry. IBS RigidRAP® is Codemarked that it complies with the NZBC.

IBS RigidRAP® is suitable for use:
- As an internal or external wall bracing element when used in conjunction with a specific fixing system - refer to Wall Bracing Systems clause.
- In exterior wall construction as an alternative to light or heavyweight wall wrap or where a rigid air barrier is required.
- As an internal wall substrate where high impact use is expected.

Standard Panel Sizes: 1196mm wide x 2440/2745/3050mm long.
Installed, in accordance with the IBS RigidRAP® Design and Installation Guide, to the locations and details shown on the design drawings.

Application:
Installed Location:

5.16.4.2 Panel Fixings

Refer to Panel Fixing clause for more information.

5.16.4.3 Mechanical Connections and Ties - Wall Bracing Systems

Mechanical Connections and Ties - for IBS RigidRAP® Wall Bracing Systems. Refer to the selected bracing systems in the Wall Bracing Systems clause and the IBS RigidRAP® Design and Installation Guide section 3.3.9, pg 12 for specific requirements.

5.16.4.4 Flexible Flashing Tape

Flexible Flashing Tapes - for exterior applications. Only use flexible sealing tapes approved for use with IBS RigidRAP® , in accordance with the tape manufacturer's instructions and the Technical Literature. Flexible flashing tapes shall be used to seal IBS RigidRAP® panel joints (vertical and horizontal), around framed window and door openings in exterior walls, and to seal pipes, ducts, etc penetrating exterior walls so as to form a weathertight rigid air barrier.

Approved Flexible Flashing Tapes:
- Hydro™ Flashing Tape (Masons)
- Super-Stick® Building Tape (Marshall Innovations)
- Tescon Extora (Pro Clima)
- FlameFlash™ Flashing Tape (Techno Insulation)
- Watertight® Flashing Tape (Techno Insulation)
- 3M All Weather FLashing Tape 8067

5.16.4.5 Z Flashing for Inter-storey Joints

Contractor to ensure a proprietary 'Z' flashing is installed at mid floor level where IBS RigidRAP® is installed on multi levels. Material for flashing to meet NZS3604: 2011 exposure zone requirements. Aluminium or stainless steel is recommended.
Z Flashing:
Material:
Finish:
Location:

5.16.4.6 Gib HandiBrac

GIB HandiBrac® is to be fixed to the 90 x 45mm studs with 4 No. supplied Tek Screws, and to the floor substrate with:
Fixing to timber framed floors: BOWMAC® screw bolt to achieve a characteristic uplift strength of 12kN.
Fixing to concrete slabs: BOWMAC® screw bolt to achieve a characteristic uplift strength of 15kN
Install as per manufacturers instructions. For more information on the system, refer to: https://www.gib.co.nz/assets/Uploads/LiteratureFile/PRODUCTS/GIB-HandiBrac-Brochure.pdf

5.16.5 Panel Fixing

5.16.5.1 Galvanised Nails - Rigid Air Barrier

IBS RigidRAP® Rigid Air Barrier. Fix panels to timber framing with 30 x 2.5mm hot-dip galvanised clouts. Set nail heads flush with the panel surface. Do NOT drive fixings below the surface.

Fixing Pattern:
- Panel Edges: fix at maximum 150mm centres on all sides (vertical and horizontal edges), including around window and door openings.
- Panel Body: fix at maximum 300mm centres to intermediate studs and along nog/dwang lines.

5.16.5.2 Stainless Steel Nails - Wall Bracing

IBS RigidRAP® (rigid air barrier panel) - Wall Bracing. Fix panels to timber framing with 45 x 2.5mm stainless steel annular-grooved flat head nails @ 150mm crs. around the perimeter, to the fixing pattern specified for the bracing system according to the IBS RigidRAP® Design & Installation Guide. Set nail heads flush with the panel surface. Do NOT drive fixings below the surface.

5.16.5.3 Bottom plate fixing

Bottom plate fixing for standard IBS installation shall be installed as per NZ3604:2011 figure 8.12 or as per IBS RigidRap® installation guidance 3.3.13.3

5.16.5.4 Gib Handibrac fixing

For installations where the IBS RigidRAP®system is to be used for bracing, the selected system shall have the studs fixed with Gib Handibrac using the supplied fixings, to the details and locations as shown in the contract documentation ,manufacturers instructions and as per

IBS RigidRAP®installation guidance 3.3.13.3. Gib Handibrac is suitable for all exposure zones.

5.16.5.5 Mechanical hold down and uplift connections

Refer, for more information, to IBS RigidRAP®installation guidance 3.3.14, and to the appropriate proprietary system's installation instructions. Ensure that the mechanical connectors are suitable for the uplift and hold down forces required, the application, the structural engineers requirements, exposure zone requirements. If in doubt, contact IBS RigidRAP®.

5.16.6 Sealing tape

5.16.6.1 General

For joint sealing tape selection, refer for more information to IBS RigidRap® installation guidance 3.4, and to the appropriate proprietary system's installation instructions. The following sealaing tapes are suitable and compatible for use with the IBS RigidRap® system. If unsure, please contact RigidRap®. All joints and penetrations must be sealed including:

- Vertical and horizontal joints
- External and internal joints
- Penetrations
- Window and door joinery

Where sealing a joint, ensure the IBS RigidRAP® joins are centred under the tape joint. Use a 25 mm hard PVC roller to ensure full adhesion.

5.16.6.2 Selection: Hydro Tape (Masons 75 mm)

The contractor is to use, for joint sealing, Hydro Tape (masons 75 mm) refer to:
www.mpb.co.nz/product/hydrowindowtape

5.16.7 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the design drawings and in accordance with the Technical Literature.

Coordinate with trades as necessary to install IBS RigidRAP® as required.

5.16.8 Workmanship

5.16.8.1 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner (LBP). On completion of the installation, the installing LBP shall complete and sign a Restricted Building Work (RBW) memorandum and shall issue a copy to the Building Consent Authority and, where applicable, to the Main Contractor.

Installation and finishing work shall be carried out by suitably qualified and experienced tradespersons, familiar with the specified materials and their installation techniques and cavity

construction, in accordance with the Technical Literature, and to fully comply with all warranty requirements.

All cutting, drilling and notching, jointing and sealing techniques shall be exactly as recommended by the manufacturer and shall be carried out using suitable tools and equipment.

All work shall be such as to leave a neat, efficient, robust and weathertight installation, to the required standard, free from damage and defects.

5.16.9 Delivery and Handling

Upon delivery to site inspect IBS RigidRAP® materials and reject those items found to be damaged, defective or substandard, and contact the supplier immediately. Any strapping and shrink-wrap must be removed from packed IBS RigidRAP® without delay. Allow IBS RigidRAP® to condition and acclimatise for at least 48 hours prior to commencing installation.

Store IBS RigidRAP® panels undercover in a well-ventilated area, stacked flat, off the ground and supported on level bearers spaced at maximum 800mm centres in accordance with the Technical Literature. Keep stored materials dry and protected from damage and contamination, and free from bending and distortion.

Do not use damaged or defective materials, or products that are beyond the designated shelf life.

Should a problem be encountered with any IBS RigidRAP® product, immediately contact IBS on 0800 367 759. Do not continue to use the product that is not performing to specification or expectation. Keep the product in question, and where possible, document numbers and/or manufacturing details.

IBS RigidRAP® must not be exposed to weather (atmospheric conditions) for more than 3 months after installation - remove and replace with new IBS RigidRAP® if 3 months' exposure is exceeded.

Handle materials in accordance with the manufacturer's recommendations, and in a manner that prevents damage and does not reduce its performance.IBS RigidRAP® panels should always be carried manually on edge.

Installers shall be familiar with, and comply with, the manufacturer's safe handling requirements and precautions for use, and shall use appropriate safety gear when handling materials.

Installers shall conform to all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

5.16.10 Preparation

5.16.10.1 Preparation

Prior to installation, carry out all necessary inspections and preparatory work required, and ensure that all preliminary work by other trades has been completed to specification and as shown on the design drawings.

Do not commence installation until all necessary preliminary work by others is complete and to the required standard. The commencement of work shall be deemed to indicate full acceptance by the installer that all preliminary work by other trades is complete.

Timber framed elements shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific-design, and have a maximum moisture content of 18% at the time of IBS RigidRAP® installation.

Lightweight steel framed elements shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. Comply with the light structural steel framing fabricator's specifications and requirements for fixing rigid wall underlay. Note: the installation of IBS RigidRAP® on lightweight steel framing is limited to the use as a rigid air barrier only (when fitted with a thermal break), NOT for structural bracing purposes.

5.16.10.2 Framing Check

Framing Check - prior to installation check all aspects of preparatory works, including but not limited to:
- Check that wall framing has been completed to the layout shown on the design drawings and complies with the relevant design and construction standards.
- Check the framing has studs spaced at maximum 600mm centres, has the required number of rows of horizontal nogs/dwangs at the correct spacings, is plumb and in true alignment,
- Check the framing is securely fixed, true to line and plane, is plumb and level where required, and is correctly trimmed at edges, openings and penetrations as required.
- Check there are no projections due to structural bracing and bracketry etc.
- Exterior walls: check the required clearances from ground, deck, balcony or lower roof to the bottom edge of the rigid air barrier and cladding system are in accordance with NZBC E2/AS1.

5.16.11 Installation

Install IBS RigidRAP® as a rigid air barrier in accordance with the Technical Literature.

General:
- Panels must always be installed vertically when used as a bracing element.
- Always install panels with the printed side showing 'This Side Out' to the exterior of the building.
- Panels joints must be formed on solid framing with panel edges fully supported and gapped minimum 4mm apart (vertical and horizontal).
- Panel fixing - refer to Panel Fixing clause. Do NOT drive fixings below the panel surface.
- All vertical and horizontal panel joints, other than at mid-floor inter-storey junctions, must be sealed with an approved flexible flashing tape
- Allow a minimum of 4 mm between panel joints to accommodate dimension movement.

Horizontal Joints:
- Panel joints on walls greater than 3050mm high (except inter-storey joints) shall be formed on solid blocking, of the same gauge as the studs, with a 4mm gap between upper and lower panels. Panels higher than IBS RigidRAP® 2440 mm must be fixed top plate to bottom plate. When walls are higher than 2440 mm, IBS RigidRAP® 2745 or 3050 mm sheets can be used.
- Inter-storey joints shall be made at each mid-floor level and incorporate a proprietary rigid 'Z' flashing and a 15mm gap between upper and lower panels. The panels must NOT be

fixed to the mid-floor structure (joists, blocking, etc). IBS RigidRAP® must not be exposed to weather (atmospheric conditions) for more than 3 months after installation. Install cladding systems as soon as possible to enclose and protect installed IBS RigidRAP®.
- If the bracing systems requires GIB HandiBrac® hold down brackets, they shall be fixed to each end-to-end studs and to bottom plate with concrete hold downs as per manufacturer's specifications. Refer to the IBS RigidRap® installation guide 3.3.13.3 for more information.

5.16.12 Limitations

When specifying IBS RigidRAP® as a bracing element, the designer must take into account site specific conditions and the building with respect to, but not limited to, the following:
• Environmental (exposure) zone
• Wind zone
• Wall bracing table for wind and EQ demand
• Structural design loads
• Structural framing requirements
• Preparation of substrate
• External envelope

• Other materials likely to affect the performance of IBS RigidRAP®Refer to the IBS RigidRAP® Design & Installation Guide for more information on limitations.
- Allow a minimum of 4 mm between panel joints to accommodate dimension movement.
- Maximum spacings of wall studs must not exceed 600 mm centres.
- Curved walls, minimum radius 2.5 m are allowable, the IBS RigidRAP® panels must be fixed horizontally onto framing studs with spacing and stud centres dependent on the radius.
- A proprietary 'Z' flashing must be installed at mid floor level where IBS RigidRAP® is installed on multi levels. Serviceability of the joints may be affected if - at the time the timber framing is installed - its moisture content is greater than 18%.
- For wall heights greater than 3050 mm horizontal wall joints are permitted, provided the panel joint is over solid blocking of the same gauge as the studs.
- Panels higher than IBS RigidRAP® 2440 mm must be fixed top plate to bottom plate. When walls are higher than 2440mm, IBS RigidRAP® 2745 or 3050 mm sheets can be used.
- All joints, other than mid floor level, (vertical and horizontal) must be sealed with an IBS approved self-adhesive "flashing tape" as specified in section 3.4. IBS recommend 150 mm flashing tape or a proprietary Z flashing for horizontal joins.
- A hole 100 x 100 mm maximum within an envelope of 100 mm from top and vertical edges and 200 mm from the bottom of the IBS RigidRAP® panel will not affect the bracing capacity. Multiple holes of this size are permitted provided the centre lines of the holes are not closer than 600 mm.
- Steel fixings and fastenings must be in accordance with table 4.1, NZS 3604: 2011.
- IBS RigidRAP® must be allowed to acclimatise for at least 48 hours prior to installation.
- Do not install IBS RigidRAP® if the building paper has delaminated from the OSB sheet.

5.16.13 Completion

Check IBS RigidRAP® rigid air barrier and bracing systems have been installed correctly according to the Technical Literature and as indicated on the design drawings.

Check that all IBS RigidRAP® panel joints, window and door openings and panel penetrations are correctly sealed with flexible flashing tape according to the Technical Literature.

Check for damage and defects - replace or repair as necessary to the required standard.

Ensure that the work of other trades does not negatively impact on or reduce the minimum clearances required by the NZ Building Code, between the cladding and ground, roof and/or deck junctures.

Leave all of this work complete and to the required standard in accordance with the Technical Literature and warranty requirements.

Leave the completed works and surrounding surfaces clean and free of debris and rubbish. Remove all rubbish and excess material from the site.

Complete and sign the Restricted Building Work (RBW) memorandum. Issue a copy of the RBW document to the Building Consent Authority and, where applicable, to the Main Contractor.

Issue to the Owner a copy of the IBS RigidRAP® Care & Maintenance requirements, and a copy of the IBS RigidRAP® Product Warranty.

5.17 Forté Millboard - Envello Cladding System

5.17.1 Scope

5.17.1.1 Scope:

Supply and install Forte Millboard Envello Cladding System, as specified herein, to the locations and details shown on the design drawings, complete with all necessary components and accessories required for proper installation and performance. All aspects of this work shall comply with the NZ Building Code, related Forte Millboard Envello Cladding System 'Technical literature' and publications (check http://forte.co.nz, or email camilla@forte.co.nz, or call 0508 356677 for the latest editions), and other relevant product manufacturers' recommendations.

No substitutions are permitted for Forte Millboard Envello Cladding System.

For the purpose of this specification, the ‘Cladding System’ is referred to as ‘Forte Millboard Envello Cladding System’ and all ‘Forte’ associated technical literature and publications, including the Product Technical Statement, installation instructions and drawings, are collectively referred to as the 'Technical literature'.

Forte Millboard Envello Cladding System is designed for residential and commercial buildings as an external cladding system.

5.17.1.2 Extent of Work:

The following is a list and general description of the extent of the Forte Millboard Envello Cladding System works, which are more specifically defined in the contract documents, required for the completion of the contract works:

5.17.2 Requirements

5.17.2.1 Safety:

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

5.17.2.2 Warranty:

Millboard Envello Cladding System Warranty - according to the warranty conditions.

- 15 Years' Warranty for all Millboard Envello Cladding Systems installed.
- Provide this warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of practical completion of the contract works.

5.17.2.3 Substitutions:

The Forte Millboard Envello Cladding System shall be as specified herein and on the design drawings. The substitution of the Forte Millboard Envello Cladding System for an alternative brand, system or product is not permitted under any circumstances.

The substitution of a specified Forte Millboard Envello Cladding System or component for an alternative Forte Millboard Envello Cladding System or component by the Contractor shall only be permitted with the Contract Administrator's written authorisation and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate an alternative Forte Millboard Envello Cladding System or component to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

5.17.2.4 Samples:

Submit a clearly identified full-size sample of the specified Millboard Envello Cladding board and colour, for signed approval by the Contract Administrator - do not proceed until the samples have been approved.

Where a colour has not been specified, submit a clearly identified sample of each colour for the range specified, for colour selection and signed approval by the Contract Administrator.

5.17.2.5 Producer statement (PS3):

The Forte Millboard Envello Cladding System installer shall furnish a fully completed PS3 Producer Statement (Construction) at time of application for Code Compliance Certificate. The Producer Statement shall accurately reflect the scope of the installation of the Forte Millboard Envello Cladding System in accordance with the consented drawings and specifications.

5.17.2.6 Inspection & Reporting:

BCA inspections shall take place at each of the stages as scheduled in the Building Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Carry out all necessary pre-installation and installation inspections for each area of the works.

Complete all necessary Pre-Installation Checklists prior to installation, and all necessary Installation Checklists.

Complete all necessary Final Checklists and Installation Sign-Off Certificates before handing over completed work.

5.17.2.7 Quality Assurance:

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of the works are carried out to the highest standard.

5.17.2.8 Defective materials & workmanship:

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected Forte Millboard Envello Cladding System materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator without delay and at no additional cost to the Principal.

5.17.3 Forté Millboard - Envello Cladding

5.17.3.1 Envello Shadow Line:

Millboard Shadow Line is manufactured from a core of natural minerals bonded together in a polymer resin with long fibre reinforcement. The surface is provided with a resilient Lastane® layer chemically melded to the core with a UV stable 2K coating. The cladding is highly durable, dimensionally stable and does not twist warp or buckle. Suitable for residential and some commercial use, soffits and interior feature walls.

Specification:

- Type: Resin Mineral board
- Dimensions: 200mm wide x 18mm thick x 3600mm long.
- Weight: 8.3KG per board
- Surface Layer: Lastane®.
- Core: Natural mineral + polyurethane resin composite, reinforced with fibre
- Colour: Antique Oak, Golden Oak, Limed Oak, Smoked Oak, Burnt Cedar
- Construction: Resin-mineral composite (RMC)
- Texture: Woodgrain texture (moulded from real Oak)
- Fixing Method: Durafix® hidden screw system.
- Joint Profile: Tongue & groove
- Warranty: 15 Year Residential Warranty - refer to Requirements clause.

Fire Properties:

- Reaction to Fire (cladding) BS EN13502-1, D-S3, dO, NZ fire rating Group 3

Accreditations:

- Formaldehyde Emission E1 – AS/NZS 2098.11
- PEFC certified

Installed in accordance with the manufacturer's installation requirements, to the locations, layout and details shown on the design drawings.

Installed Location: Refer to drawings

5.17.4 Ancillary Components & accessories

5.17.4.1 Millboard Reveal Board:

A proprietary 146mm x16mm x 3600mm Reveal Board colour matched to cladding fixed with Coloured Head screws.

5.17.4.2 Shadow Line Internal Corner Profile:

A proprietary 38mm x 38mm x 3050mm Internal Corner profile colour matched to cladding fixed with 20mm long fixing screws.

5.17.4.3 Cladding accessories Fixings:

Proprietary 3.5mm x 20mm A2 Stainless steel fixing screws.

Quantity - 250 (Box)

5.17.4.4 Cladding Board Fixings:

Proprietary 4.2mm x 75mm A2 Stainless steel fixing screws.

Quantity - 250 (Box)

5.17.4.5 Touch up paint:

Proprietary touch up paint for coating exposed cuts or edges which is matched to selected cladding colour.

5.17.5 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades, as required, the assembly and installation of the Forte Millboard Envello Cladding System to the required layout, details and tolerances.

5.17.6 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Installation of the Forte Millboard Envello Cladding System shall only be carried out by experienced installers, familiar with the specified products and their installation techniques, in accordance with the manufacturer's requirements and ‘Technical Literature’, and with the warranty requirements.

All installation techniques shall be exactly as recommended by ‘Forte’. All work shall be such as to leave a neat, efficient, robust and structurally sound installation, to the required standard and free from damage and defects.

Take all reasonable measures during fabrication and installation to protect the Forte Millboard Envello Cladding System finish from damage and surface marking. Carry out routine cleaning of this work as necessary.

Make all necessary provisions to protect adjacent finished work and surfaces from damage during installation.

5.17.7 Delivery & Handling

Envello cladding boards must always be stored on a flat surface at a maximum of 400mm apart. The boards must be stacked face-to-face, not back-to-face and both external and internal corner profiles should be fully supported along their length.

When loading and unloading by hand, ensure both ends of the board are lifted on the edge to avoid permanent deformation and/or damage.

The boards must only be lifted off the stack, not dragged, to eliminate the risk of marking the surface. The boards must be carried on their side, by two people, for increased rigidity. Gloves and long sleeves should be worn when handling the boards and extra care is taken when lifting and carrying them.

It is recommended that the cladding boards are stored on site at least 72 hours before installation to allow the boards to acclimatise.

Take delivery of materials and accessories undamaged and in good condition.

Should a problem be encountered with any Forte Millboard Envello Cladding System item during use or delivery, immediately contact ‘Forte’ on 0508 356677. Do not continue to use the item that is not performing to specification or expectation. Keep the item in question and where possible, the packaging and/or manufacturer's details.

Installers shall be familiar with, and comply with, the manufacturer's safe handling requirements and precautions for use, and shall use appropriate safety gear as necessary.

Installers shall conform to all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

5.17.8 Preparation

5.17.8.1 Preparation:

Prior to installation, carry out all necessary inspections of the supporting structure to ensure all preliminary work is complete. Do not commence installation until all necessary preliminary work by others is complete and to the required standard. The commencement of work on each section of the installation shall be deemed to indicate full acceptance by the Installer that all preliminary work by other trades is complete and to the required standard.

Supporting structures shall comply with the NZ Building Code, and must be structurally sound and dimensionally stable and in the correct alignment, true to line and level (and grade for sloped balustrades).

Confirm the location of all movement control joints prior to the commencement of the works.

Concrete:
- Supporting reinforced concrete elements shall comply with NZS 3101, or NZS 3604.
- New concrete must have aged for a minimum of 28 days prior to installation.

Concrete Masonry:
- Supporting reinforced concrete masonry elements shall comply with NZS 4229, or NZS 4230 and AS/NZS 1170.

Timber Framing:
- Supporting timber-framed structures shall comply with NZS 3604, or NZS 3603 and AS/NZS 1170.

Structural Steel:
- Supporting steel structures shall comply with NZS 3404.

5.17.9 Installation

5.17.9.1 Installation:

H3.2 treated timber battens are used as the cavity battens for the cladding boards. All cavity battens and details must comply with B2/AS1 as per E2/AS1 9.1.8.4.

The cavity battens must be a minimum size of 18mm thick & 45mm wide, structural castellated cavity battens as shown in the ‘Technical literature’. When standard non-castellated battens are used, install vertical battens structurally fixed to the building with horizontal cross battens structurally fixed to these at the appropriate centres.

The maximum support spacing for the battens is 600mm centres, for areas of high wind loading exceeding 1.0kN/m2, severe weather exposure or where exceptional impact loading requirements are anticipated (i.e. low level applications near pedestrian access, schools, leisure facilities etc.) batten support spacing should be reduced to 400mm centres. The

battens need to be fixed into either the main framework of the building structure or to the noggins at centres suitable for the battens, the battens need to be structurally fixed into the building framework to allow the Envello cladding boards to be fixed to these.

Where there is cladding up into a gable end, there must be castellated battens that run up the diagonals to support the ends of the boards. When using cross battens, ensure that these don’t block the flow of air but allow enough support for the ends of the boards to be fixed to. Refer to ‘Technical literature’.

The batten layout around windows/doors/soffits must allow for continuous airflow behind the boards, a 5mm gap should be left between the underside of the windowsills or soffits and at the head of windows/doors, refer to ‘Technical literature’. The battens at the top and bottom of the window/doors must allow for the board ends to be supported; all horizontal battens should be level.

The perforated closure must be used in all areas where there is an opening to the ventilated cavity, to prevent insects entering. The Millboard Perforated closure is suitable for batten sizes of 25 or 50mm, if battens used are different to these sizes, then perforated closures or flymesh sourced by other suppliers can be used. The perforated closure must be held between the back of the battens and the wall. This must be taken into consideration when fixing the battens, alternatively they can be fixed to the front of the battens using the 20mm accessory fixings.

Determine at what height the cladding is to start at. The bottom of the cladding boards must have sufficient clearances from other surfaces and should be in accordance with E2/AS1 9.1.3.

A minimum clearance of 175mm above unpaved ground and 100mm above paved ground,

An overlap of 50m is necessary.

Above decking, a 35mm gap with a 12mm standoff is required.

Use a laser line or level, mark up a level line around the building or along the wall that is to be clad. This line will be the bottom of the first batten.

Battens must be fixed to the structural wall using suitable external grade fixings.

For fixing to a timber frame, the battens must be fixed into the timber studs of the frame or into the noggins, according to the structural integrity of the battens.

The battens must be fixed level and packers are added when the wall is undulating.

5.17.10 Fixing

5.17.10.1 Fixing:

Millboard Envello cladding boards must be fixed through the tongue with 4.2 x 75mm cladding fixings. There must be one fixing per batten intersection and two per batten when joining boards. The fixings must be inserted through the fixing guide groove on the tongue and angled towards the board slightly with the head sitting flush with the surface. The fixings do not need to be predrilled or countersunk as the boards will naturally allow the head to slightly countersink. Once the first board has been installed, the second board can be installed beside it, with the groove covering the tongue of the previous board.

Check the boards against a level every fourth or fifth board to ensure that the boards are aligned vertically. Adjust the spacings between the boards if required.

When the tongue is taken off the boards to fit around windows and doors, or at the edge of a building, 40mm coloured head screws is required to be used through the board face.

5.17.11 Completion

Check the Forte Millboard Envello Cladding System have been correctly installed in accordance with the manufacturer's requirements to the locations, layout and details shown on the design drawings.

Check the installation for damage and defects, including surface marking. Carry out any necessary repairs in accordance with ‘Forte’ requirements to the required standard. Replace Forte Millboard Envello Cladding System elements where repair is not possible or will not be accepted.

Leave all of this work complete, clean and free from damage and defects, and to the required standard in accordance with the manufacturer's requirements.

Leave surrounding surfaces clean and free of rubbish and debris. Remove all rubbish and excess material from the site.

Issue to the Owner a copy of the manufacturer's maintenance requirements and a copy of the ‘Forte’ Warranty.

Provide all necessary Producer Statements.

5.18 Metalcraft Profiled Metal Wall Cladding (2025)

5.18.1 Scope

Supply and install Metalcraft Profiled Metal Wall Cladding, as specified herein, to the locations and details shown on the design drawings, complete with all necessary components and accessories required for proper installation and performance. All aspects of this work shall comply with the NZ Building Code, related Metalcraft Profiled Metal Wall Cladding technical literature and publications (check http://www.metalcraftgroup.co.nz or call (0800) 766 369 for the latest editions), and other relevant product manufacturers' recommendations.

No substitutions are permitted for Metalcraft Profiled Metal Wall Cladding.

For the purpose of this specification, Metalcraft Profiled Metal Wall Cladding is referred to as 'Wall Cladding', and all 'Metalcraft' associated technical literature and publications, including the 'Metalcraft Product Technical Statement', installation instructions and drawings, are collectively referred to as the 'technical literature'.

Extent of work:

The following is a list and/or general description of the extent of the Metalcraft Profiled Metal Wall Cladding works, which are more specifically defined in the contract documents, required for the completion of the contract works:

5.18.2 Requirements

5.18.2.1 Safety:

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

5.18.2.2 Warranty:

Please refer to Metalcraft specifications for applicable warranty terms and conditions.

5.18.2.3 Substitutions:

The Metalcraft Profiled Metal Wall Cladding shall be as specified herein and on the design drawings. The substitution of the Metalcraft Profiled Metal Wall Cladding for an alternative brand is not permitted under any circumstances.

The substitution of the specified Metalcraft Profiled Metal Wall Cladding or ancillary component for an alternative Metacraft Profiled Metal Wall system or ancillary component by the Contractor shall only be permitted with the Contract Administrator's written authorisation and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate an alternative Metalcraft Profiled Metal Wall Cladding or ancillary component to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

5.18.2.4 Samples:

As required, provide samples of the specified Metalcraft Profiled Metal Wall cladding for verification by the Contract Administrator.

5.18.2.5 Producer statement (PS3):

The Metalcraft Profiled Metal Wall installer shall furnish a fully completed PS3 Producer Statement (Construction) at time of application for Code Compliance Certificate. The Producer Statement shall accurately reflect the scope of the installation of the Metal Wall Cladding in accordance with the consented drawings and specifications.

5.18.2.6 Inspections & reporting:

Inspections shall take place at each of the stages as scheduled in the building consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Carry out all necessary pre-installation and installation inspections for each area of the works.

Complete all necessary pre-installation checklists prior to installation, and all necessary installation checklists.

Complete all necessary final checklists and installation sign-off certificates before handing over completed work.

5.18.2.7 Quality assurance:

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of the work are carried out to the highest standard.

5.18.2.8 Defective materials & workmanship:

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected Metalcraft Profiled Metal Wall Cladding materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator without delay and at no additional cost to the Principal.

5.18.3 Profile

Metalcraft - Espan 340 Wall Cladding - a pan profile; 50mm pan height and 340mm effective cover based on the selected BMT.

Material type - Refer to ‘Wall Sheet Material’ clause.
Thickness - 0.55mm BMT (G300) and 0.9mm BMT Aluminium (H34 5005)
Windload - Refer to 'technical literature'
Mass (KG/M2) - Refer to 'Metalcraft'
Orientation - Vertical

Installed in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

Installed Location: Refer to drawings
Thickness: 0.55mm

5.18.4 Wall Sheet Material

COLORSTEEL® Maxam™ to selected BMT. Pre-painted hot dipped aluminium/zinc/magnesium alloy coated steel coil, with a minimum coating weight of 150g/m², conforming with AS/NZS 2728 Class 6. COLORSTEEL®

Colour: Refer to drawings

5.18.5 Cavity Batten & Closures

5.18.5.1 Cavity Battens - Horizontally Orientated Wall Cladding:

Cavity Battens for horizontally orientated wall cladding over framing should be installed vertically over the wall underlay and directly over studs at maximum spacing to suit the cladding profile and as shown on the drawings. Fix to timber framing with 40 x 2.5mm hot-dipped galvanised flat head nails or fix to lightweight steel framing with 6g x 30mm self-drilling (AS 3566 Corrosion Class 3) countersunk screws. Do not use battens treated with copper azole or AQC treatment. Where shown and as specified on the drawings, install a separation layer over the face of timber cavity battens to ensure isolation of materials between the cladding and the cavity batten. Closures to be UPVC installed as per design details and manufacturers requirements.

5.18.6 Proprietary Battens

5.18.6.1 CAVIBAT Cavity Batten System

Provide castellated cavity battens forming a nominal 20mm in accordance with NZBC E2/AS1 requirements. Install battens in accordance with manufacturer’s requirements and project specifications, including fixing methods, spacing, separation layers, and compatibility requirements.

5.18.7 Wall Ancillary Components & Accessories

Cladding screw fastener type and durability shall comply with AS 3566 Class 4 or Class 5, as appropriate, and be no less than the durability of the material being fixed. Fastener type and placement (frequency) shall be appropriate for the environmental conditions and the specified cladding profile and material and the supporting structure material; all in accordance with the NZMRM Code of Practice and E2 External Moisture.

Metal Flashings. Profiled metal cladding flashings shall be fabricated from material with the same coating as the cladding material, to maintain durability and compatibility requirements. Flashings shall be 0.55BMT G300 steel or H34 Aluminium coated to the same standards as the profiled cladding sheets, and notched/scribed when installed across the cladding profile or provided with a soft edge – in accordance with COLORSTEEL® and NZMRM Code of Practice requirements.

Flashings, flashing fastenings and fastening frequency shall be in accordance with the NZMRM Code of Practice.

Do not construct flashing joints and flashing junctions in a manner that relies entirely on sealant to maintain weathertightness.

Rivet Fastenings. Rivets shall be sealed aluminium minimum 4mm diameter.

Use only neutral-curing silicone or MS polymer sealant, compatible with the specified metal cladding and flashing materials and finishes, that is suitable for the required application and use in accordance with the sealant manufacturer's instructions and to NZMRM Code of Practice requirements. All sealed joints must be mechanically fastened, and excess sealant neatly removed to prevent unnecessary dirt build-up. Sealant shall only be used to seal between two metal surfaces, do not fill holes or gaps with sealant.

Proprietary Collar Flashings. EDPM or silicone-polymer proprietary flexible collar flashings for weatherproofing cladding-penetrating pipes/flues/ducts. Sized to suit the applicable pipe/flue/duct and installed in strict accordance with the manufacturer's requirements and the NZMRM Code of Practice.

Profiled Foam Closure Strip. Non-bituminous, compressible, closed-cell foam strips profiled to fit the specified cladding profile. Installed to the details shown on the drawings and in accordance with NZMRM Code of Practice recommendations.

5.18.8 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades, as required, on the assembly and installation of the Metalcraft Profiled Metal Wall Cladding to the required layout, details and tolerances.

5.18.9 Qualifications & Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All installation work shall be carried out by experienced and competent tradespersons, familiar with the specified products and installation techniques and suitably qualified to install Metal Wall Cladding, to fully comply with all warranty requirements in accordance with the manufacturer's requirements.

All cutting, fixing and installation techniques, fastenings and sealants shall be exactly as recommended by and in accordance with the NZMRM Code of Practice, and carried out with the use of suitable tools and equipment appropriate for the application.

Always maintain isolation of dissimilar materials in accordance with the NZMRM Code of Practice Section 4.10. Isolate dissimilar materials (metal and non-metal) in close proximity as necessary by fitting separator strips. Place isolators between metals and treated timber or cement-based materials. Do not allow unpainted lead-sheet or copper materials to come in contact with, or allow water run-off from these onto Zincalume or galvanised materials.

All work shall be such as to leave a neat, efficient, robust and weathertight installation.

5.18.10 Delivery & Handling

Store Metal Wall Cladding, flashings and accessories clear of level ground, on bearers at evenly spaced centres as recommended by the NZMRM Code of Practice. Keep stored materials and accessories dry and protected from damage and contamination at all times.

Do not use damaged or defective materials or products, or products that are beyond their designated shelf life.

Handle materials in accordance with the manufacturer's requirements and in a manner that prevents damage to or deterioration of the material, including surface marking.

5.18.11 Preparation

Check that the specified building underlay (to NZS 2295) has been installed in accordance with NZBC requirements and the manufacturer's recommendations, and with all finishing tapes, flashings etc. at windows, doors, corners and penetrations all correctly incorporated to provide a continuous seal.

Check that appropriate additional restraint is correctly installed over the underlay to keep bulk insulation from pushing the underlay into the cavity space.

Ensure that all underlays directly behind Metal Wall Cladding are of absorbent type as required in E2/AS1 Table 23. Check that all preparatory materials are lapped such that any water will run down to the exterior.

Check that ground levels and drains are constructed so that there will be no ponding water against the building, and that the ground will always remain clear of the cladding by at least 100mm in accordance with E2/AS1.

5.18.12 Installation

Installers shall be familiar with and comply with the manufacturer's safe handling requirements and precautions for use and shall use appropriate safety gear when handling materials. Installers shall conform with all relevant WorkSafe NZ Guidelines Working at Heights.

Ensure cavity battens and closures are installed in accordance with specifications and suitable separation is provided between treated battens and Profiled Metal Wall Cladding.

Install Metal Wall Cladding in accordance with the design drawings. Confirm the layout and location of all control joints; the layout of the cavity battens; and any specific cladding detailing requirements prior to installation.

Prevent contact with, or run-off from, incompatible materials in accordance with the recommendations in the NZMRM Code of Practice.
Protect the coated surface from damage at all times; replace the whole sheet where a significant depth of the coating has been damaged (including flashings).

Accurately set-out the planned cladding layout prior to fixing to ensure true and accurate cladding lines and incorporate correct relationships with other design features shown on the drawings; maintain this accurate set-out throughout installation.

Keep cladding lines consistent and true along walls and around corners; with side-laps of vertically orientated sheets directed away from the prevailing wind and/or line of sight; to straight, true and accurately aligned lines in both directions - vertical and horizontal. Check for and eliminate any creep and/or spread of sheets during installation.

Cut metal cladding and flashings by shear only - do not use abrasive cutting tools. Do not use black lead pencils for marking pre-finished metal cladding and flashings.

Screw fastenings for pre-painted metal must be pre-painted prior to installation for an accurate colour match.

All cladding jointing techniques and sealants shall be in accordance with the NZMRM Code of Practice and shall be compatible with the cladding material and finish. Joints shall be sealed with an approved neutral-cure sealant or approved closed-cell lap tape.

Install fasteners in a straight line with a consistent fastening pattern on each sheet to achieve a flat surface and resist design wind loads. Fasteners into timber are to have a minimum of 30mm embedment into structural framing. For pierce fastened profiles, fasteners are to be positioned in the pan adjacent to a rib unless otherwise specified.

Install fasteners in a straight line with a consistent fastening pattern on each sheet to achieve a flat surface and resist design wind loads. Fasteners into steel are to have a minimum penetration of three threads through the steel member. For pierce fastened profiles, fasteners are to be positioned in the pan adjacent to a rib unless otherwise specified.

Fasteners are to be set using a snug fitting socket and a setting tool that does not unduly damage the finish coating of the screw. Depth of setting is to be sufficient to achieve slight compression of the sealing washer without distorting the profile or the sealing washer itself. Aluminium rivets are to be sealed type pre-painted to match cladding, minimum 4mm diameter. Clip-fastened sheets shall be fixed with concealed proprietary fastening clips appropriate for the cladding profile and material, substrate/structure and the environment in accordance with the NZMRM Code of Practice recommendations.

Install flashings to internal and external corner junctions, window/door and other openings, eave and soffit junctions, parapets and at junctions with other cladding systems and building elements as detailed on the drawings and in accordance with the Zealand Metal Roofing Code of Practice. All flashings shall be neatly formed and finished, securely fastened to the structure, weatherproof, and lapped such that any water will run down to the exterior. For highly visible flashings, plan each flashing joint and/or junction with specific regard to aesthetic requirements. Penetration flashings shall be as per the design details and shall not rely solely on silicone sealant to achieve weathertightness of the flashing.

Form vertical movement control joints to the locations, layout and details shown on the drawings. Movement control joints shall be aligned with control joints in the structural framing. Confirm the location of movement control joints prior to installation.

Handle sheets carefully to avoid scratching and denting. Do not walk on wall cladding sheets prior to installation. Remove strippable film, if applied, immediately after installation of wall cladding to avoid resin staining. All accessories are to be colour matched prior to installation, do not use colour match paint for repairing any blemishes. Ensure sealant is trapped between joint surfaces and not exposed to the visual surface.

5.18.13 Compatibility

Ensure material is isolated from incompatible materials. It must not be in contact with, or receive run off from, less noble metals such as copper, brass and lead. It should not be in wet

contact with stainless steel. Sustained wet contact with timber, either treated or untreated, must be avoided.

5.18.14 Completion

Check that the Metalcraft Profiled Metal Wall Cladding and associated components and flashings have been installed and finished correctly. Check for defective work, damage and surface marking - replace and/or repair as necessary. Ensure that the work of other trades does not reduce the clearances of the cladding to ground, deck or roof that are required by the NZ Building Code.

Leave all work complete and weathertight and to the required standard. Leave the completed works and surrounding surfaces clean and free of debris and rubbish. Remove all rubbish and excess material from the site.

Maintenance should be carried out in accordance with Metalcraft's maintenance requirements.

6 PLASTER CLADDINGS

6.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

6.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

6.3 StoTherm Insulated Facade System

6.3.1 Scope

The following is a list and/or general description of the extent of the StoTherm Insulated Facade System works, which are more specifically defined in the contract documents, required for the completion of the contract works:

Supply and install StoTherm Insulated Facade System, as specified herein, to the locations identified on the design drawings, complete with all system components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with Stoanz Ltd StoTherm Insulated Facade System technical literature and drawings (check www.sto.co.nz, or email info@sto.co.nz, or call 04 801 4749 for the latest editions), BRANZ Appraisal No.478, and other relevant product manufacturers' recommendations.

No substitutions are permitted for StoTherm Insulated Facade System.

For the purpose of this specification, all Stoanz Ltd StoTherm Insulated Facade System technical literature and drawings and BRANZ Appraisal are collectively referred to as the 'Sto Technical Literature'.

6.3.2 Requirements

6.3.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

6.3.2.2 Sto Warranty, 20 Years

StoArmat Warranty with StoService Assurance - according to warranty terms and conditions:
- 20 Years' Warranty for StoTherm Insulated Facade System incorporating StoArmat Classic mesh-reinforced render.
- Provide the warranty on the supplier's standard warranty form.
- Commence the warranty from the date of practical completion of the contract works.

6.3.2.3 Substitutions

The StoTherm Insulated Facade System shall be as specified herein and on the design drawings. The substitution of the StoTherm Insulated Facade System for an alternative brand, system or cladding materials is not permitted under any circumstances.

The substitution of a specified Sto branded product for an alternative Sto branded product by the Contractor shall only be permitted with the Contract Administrator's written authorisation and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate an alternative Sto branded product to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

6.3.2.4 Samples

Submit a clearly identified 300 x 300mm sample of the specified Sto render system, including finish coat texture and facade paint and colour, for assessment by the Contract Administrator - do not proceed until the samples have been approved.

6.3.2.5 Inspections & Reporting

BCA inspections of the works shall take place at each of the stages scheduled in the Building Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Carry out all necessary pre-installation and installation inspections for each area and stage of the works.

Complete all necessary Pre-Installation Checklists, and all necessary Installation Checklists.

Complete all necessary Sign-Off Certificates before handing over completed work.

6.3.2.6 Quality Assurance

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of the works are carried out to the highest standard.

6.3.2.7 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected StoTherm Insulated Facade System work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional cost to the Principal.

6.3.3 Sto Render System

6.3.3.1 StoMiral Render System

StoMiral Render System. Refer to subsequent Render System clauses.

System Renders & Protective Coatings:
- Base Render: Multiscreed, or StoLevell Novo, or StoLevell Uni - reinforced with Sto European Mesh.
- Finishing Render: Stolit K 1.0mm, or Stolit K 1.5mm, or Stolit K2.0mm, or Stolit K 3.0mm.
- Facade Paint (Stolit K surfaces): StoColor Maxicryl, or StoColor Lastic, or StoColor

Lotusan, or StoColor X-black.
- Base Render Sealer: StoPlex W.
- Waterproofing: StoFlexyl - reinforced with Sto European Mesh.

6.3.4 StoTherm Panels

6.3.4.1 StoTherm+ Panel 50mm

StoTherm+ Panel 50mm thick graphite polystyrene with a nominal density of 24 kg/m3. The panels are supplied in lengths of 2,400, 2,700 and 3,000 mm x 1,200 mm wide and must be manufactured to meet the requirements of AS 1366.3.

Installed as a component of the StoTherm Insulated Facade System in accordance with the Technical Literature. StoTherm+ Panels must be installed full size where possible, vertically orientated with a tight fit. Where horizontal panel joints are unavoidable, the vertical panel joints must be offset from the panels below to avoid continuous vertical joint lines. After fixing, all gaps or voids in the panel joints must be filled with Sto Adhesive Foam before proceeding with rendering.

Installed Location:

6.3.5 Other Components & Accessories

6.3.5.1 StoTherm 20mm VH Cavity Battens

StoTherm 20mm VH Cavity Battens. 50 x 20mm thick, self-adhesive, VH-Grade EPS expanded polystyrene cavity battens with a nominal density of 28kg/m³, manufactured to AS 1366.3 by an approved manufacturer. Walls shall be battened using StoTherm 20mm VH Cavity Battens placed in accordance with Sto Technical Literature.

6.3.5.2 StoTherm 50mm Panel Fixings - Timber Framing

StoTherm 50mm Panel Fixings for Timber Framing. 100 x 3.55mm hot-dip galvanised flat-head nails used in conjunction with a Sto Ø50mm HDPE yellow washer. Nail length must achieve a minimum 30mm penetration into timber framing. All fixings in accordance with Sto requirements.

6.3.5.3 Sto Adhesive Foam

Sto Adhesive Foam. Polyurethane foam for filling any gaps and voids in StoTherm Panel joints (excluding control joints). Ensure the foam does not fill the drained cavity during use.

6.3.5.4 Sto uPVC Mouldings

Sto uPVC Mouldings - Vented Adjustable Foot Tray, Vented Base Cap, End Cap, Jamb and Sill Flashings, Finishing Edge, Control Joint. Installed as components of the StoTherm Insulated Facade System to the locations and details indicated on the design drawings and in accordance with Sto Technical Literature.

6.3.5.5 Sto Pre-Meshed Beads

Sto Pre-Meshed Beads - Corner Angle. uPVC and fibreglass mesh adjustable corner mouldings. Installed as components of the StoTherm Insulated Facade System to the locations and details indicated on the design drawings and in accordance with Sto Technical Literature.

6.3.5.6 Sto Renders

Sto Render System Coatings - refer to subsequent Render System clauses.

6.3.5.7 Sto Facade Paints & Sealers

Sto Facade Paints & Sealers - refer to Protective Coating clause.

6.3.5.8 Stoplex W Primer

Stoplex W Primer. A water-based, siloxane-enhanced all-purpose primer on acrylate base, used in accordance with Sto requirements as a surface primer.

6.3.5.9 Cavity Air Vents

Cavity Air Vents. Surface mounted, pressed aluminium, weather protected vents, used for venting and draining the cavity behind StoTherm EIFS cladding in situations where the bottom edge of the cladding is installed within the rebate of a concrete slab/foundation wall and the cavity is closed to the exterior by a Sto uPVC Control Joint moulding.

Installed to achieve a minimum ventilation area of 1000mm² per lineal-metre of StoTherm EIFS cladding, at maximum 1200mm centres, in accordance with Sto Technical Literature and as indicated on the design drawings.

Installed Location:

6.3.5.10 Sto Joint Seal Tape

Sto Joint Seal Tape. 2mm and 5mm thick, black, compressed polyurethane foam sealing tape for weatherproofing joints. Installed to the locations and details indicated on the design drawings and in accordance with Sto Technical Literature.

6.3.5.11 Flexible Sealant

Flexible Sealant. Paintable, modified silicone sealant covered by a valid BRANZ Appraisal for exterior weather-sealing applications. Used to seal the StoTherm Insulated Facade System to window and door joinery, at junctions with other claddings and trims, control joints, and around meter boxes, pipes and other fixtures penetrating the system. Applied in accordance with the sealant manufacturer's instructions, over a suitably sized PEF backing rod or a low expandable PU foam, and neatly finished flush with the finished surface. Sealant joints shall be in accordance with the manufacturer's joint design width-to-depth ratio.

6.3.6 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the design drawings and in accordance with Sto Technical Literature.

Coordinate with trades as necessary the locations of pipes, outlets, meter boards and other fittings and equipment installed by others, and to install the StoTherm Insulated Facade System as required.

6.3.7 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

This work must be undertaken by a Sto registered LBP Contractor. On completion of the installation, the installing LBP (registered Sto Contractor) shall complete and sign a Restricted Building Work (RBW) memorandum and shall issue a copy to the Building Consent Authority and, where applicable, to the Main Contractor.

All associated work shall be carried out by experienced and skilled PPCS (Proprietary Plaster Cladding Systems) Registered Tradesmen, certified by Stoanz Ltd to install and apply StoTherm Insulated Facade System components and accessories, in accordance with Sto Technical Literature and warranty requirements, to best trade practice.

Carry out and complete all required Pre-cladding, Pre-coating, and Final Checklists, separately and in that order, as each stage is completed and before commencing the next stage.

Make all necessary provisions to protect adjacent finished work and surfaces from damage and contamination during installation. Mask off all windows and doors and other exposed fixtures and fittings before coatings are applied.

All cutting, jointing, fixing, sealing and finishing techniques shall be carried out using suitable tools and equipment and as recommended by Sto.

No plastering shall be undertaken during wet weather or when the air and substrate temperature is outside the range of +5°C to +30°C.

Sto coatings must be protected from rain for the first 24 hours, and from hot dry winds and direct sunlight for the first 16 hours to aid curing.

All work shall be such as to leave a neat, efficient, robust and weathertight installation, to the required standard, free from damage and defects.

The Sto registered LBP Contractor shall supply a PS3 Producer Statement at the time of application for Code Compliance Certificate.

6.3.8 Delivery & Handling

Upon delivery to site, inspect StoTherm Insulated Facade System materials and reject those items found to be damaged, defective or substandard, and contact Stoanz Ltd immediately.

Store all components and accessories undercover in accordance with Sto recommendations. Keep stored materials dry, out of direct sunlight and protected from damage, distortion and contamination.

Do not use damaged or defective materials, or products that are beyond their designated shelf life.

Should a problem be encountered with any product supplied by Stoanz Ltd, immediately contact Stoanz Ltd on 04 801 7794. Do not continue to use the item that is not performing to specification or expectation. Keep the item in question, and where possible, document numbers and/or manufacturing details.

Handle all materials in accordance with the manufacturer's recommendations, and in a manner that prevents damage and does not reduce its performance.

Sto render systems must only be applied when the air and substrate temperature is within the range of +5°C to +30°C.

Installers shall be familiar with, and comply with, the manufacturer's safe handling requirements and precautions for use, and shall use appropriate safety gear when handling materials.

Installers shall conform to all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

6.3.9 Preparation

6.3.9.1 General

Prior to installation, carry out all necessary inspections and preparatory work required, and ensure that all preliminary work by other trades has been completed to specification and as shown on the design drawings.

Do not commence installation until all necessary preliminary work by others is complete and to the required standard. The commencement of work shall be deemed to indicate full acceptance by the installer that all preliminary work by other trades is complete.

Timber Framed Structures:
- Timber framed buildings must comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific-design (max. 2.5kPa ULS), and have a maximum moisture content of 24% at the time of cavity cladding installation.
- For timber-framed buildings situated in NZS 3604 Wind Zones up to and including 'Very High', studs must be at maximum 600mm centres.
- For timber-framed buildings situated in NZS 3604 Wind Zone 'Extra High' and for specific-design buildings, studs must be at maximum 400mm centres.

Steel Framed Structures
- Lightweight steel framed buildings must comply with AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria.
- Comply with the light structural steel framing fabricator's specifications and requirements for EIFS cladding systems.
- For steel-framed buildings situated in NZS 3604 Wind Zones up to and including 'Very High', studs must be at maximum 600mm centres.
- For steel-framed buildings situated in NZS 3604 Wind Zone 'Extra High' and for specific-design buildings, studs must be at maximum 400mm centres.
- Nogs/dwangs must be fitted at maximum 800mm centres.

Control Joints:
- Confirm the locations of all movement control joints in the cladding system. All existing control joints in the supporting structure must be mirrored and carried through the StoTherm Insulated Facade System along the same line.

Services Penetrations:
- Service pipes, conduits and ducts penetrating the wall must be properly supported by framing and set at a minimum 5° downward angle to the outside and sealed to the wall underlay with a flexible flashing tape.

6.3.9.2 Check - Slab & Foundation Wall Rebates

Concrete Slab & Foundation Wall Rebates - check that concrete slabs and foundation walls have been correctly rebated to the dimensions and details shown on the design drawings, and that any required waterproofing membrane has been applied to the rebates.

6.3.9.3 Check - Framing with Rigid Wall Underlay

StoTherm Insulated Facade System - incorporating a 20mm deep drained cavity and installed on timber-framed walls with a rigid wall underlay; check all aspects of preparatory works, including but not limited to:
- Check that the timber wall framing complies with the requirements of the NZ Building Code, and is in accordance with Sto Technical Literature.
- Check the framing members are correctly spaced, and is plumb and in true alignment, includes all blocking required for cavity battens and fixing at openings, joints, corners and soffits etc.
- Check that the rigid wall underlay has been installed in accordance with NZBC E2/AS1 and the manufacturer's requirements.
- Check that flexible wall underlay (if required by RAB manufacturer) has been installed over the rigid wall underlay in accordance with NZBC requirements and the manufacturer’s recommendations, with all finishing tapes, flashings, etc., at windows, doors, corners and penetrations correctly incorporated to provide a continuous seal.
- Check that all preparatory materials are lapped such that any water will run down to the exterior.
- Check that any rigid air barrier to unlined gables and external garage walls is overlaid with an absorbent flexible wall underlay in accordance with E2/AS1 Table 23 and the manufacturer's recommendations.
- Check that the ground levels are sloping away from the building so that there will be no ponding water against the building, and that the ground will remain clear of the cladding by at least 100mm at all times in accordance with E2/AS1.

6.3.9.4 Check - Flashings

Check that all builder-supplied and installed flashings (head flashings, back flashings, etc) are correctly installed in accordance with the design drawings prior to StoTherm Insulated Facade System installation.

6.3.10 Installation

6.3.10.1 General

Install StoTherm Insulated Facade System complete with all system components and accessories required for proper installation and performance, in accordance with Sto Technical Literature and as shown on the design drawings.

Ensure that the current, up-to-date Sto Technical Literature is readily available on site for reference during installation. Where there is any doubt, contact Stoanz Ltd on 04 801 4749.

Confirm the layout and location of movement control joints, the layout of cavity battens, and any specific cladding detailing requirements prior to installation.

StoTherm Panel cladding at windows, doors and other openings, corner junctions, inter-storey junctions, soffit junctions, roof/wall junctions, parapets, pipe penetrations, shall be constructed to the details shown on the design drawings.

Refer to Fixing clause for StoTherm Panel fixing type and placement etc.

6.3.10.2 Drained Cavity

Drained cavities for cavity cladding shall be constructed in accordance with NZBC E2/AS1, 9.1.8 and Sto Technical Literature.

Fix Sto uPVC vented cavity closer and foot tray to the framing, level along the baseline, minimum 50mm, or as detailed, below the bottom plate or floor structure. Ensure that the openings in the cavity closure strip are kept clear and unobstructed at all times. Install Sto uPVC vented cavity closer above joinery openings, roof/wall junctions, and along horizontal drainage joints, etc.

Install vertical cavity battens, including intermediate cavity battens, over the underlay to the required layout, and fix to wall framing. As required, install cavity spacers at minimum 5° (1:2) slope to horizontal framing lines, between vertical cavity battens.

6.3.10.3 StoTherm Panels

Install StoTherm Panels full size and vertically orientated over the cavity battens, with the base of panels properly fitted into the foot tray.

StoTherm Panels must be fixed through the cavity battens and cavity spacers to the wall framing at the required spacings and placement in strict accordance with Sto Technical Literature. Fixings in adjacent sheets must be staggered. Refer to Fixing clause.

StoTherm Panel joints must always occur over a cavity batten on framing, be tightly butted, straight and true and in the same plane. Where horizontal panel joints are unavoidable, the vertical panel joints must be offset from the panels below to avoid continuous vertical joint lines. Always use factory-cut panel edges at corner junctions. Site-cut panels must be accurately measured and cut so as to achieve a tight fit with adjacent panels.

All gaps and voids in StoTherm Panel joints, including internal and external corner junctions, must be filled with Sto Adhesive Foam and rasped flush when cured prior to the application of any coatings. Ensure the foam does not fill the cavity during use.

Install Sto uPVC sill and jamb flashings, builder-supplied aluminium head flashings, vented uPVC head cavity closures to all joinery pre-positioned to sit 3-4mm off the cavity battens, and all other necessary project details when installing the StoTherm Panels.

Seal gaps and voids around pipes and service penetrations in StoTherm Panels with flexible sealant over a PEF backing rod.

6.3.10.4 Vertical Control Joints

Form all vertical control joints in the cladding to the locations and details shown on the design drawings or as per Sto requirements and Technical Literature. Confirm the location of vertical control joints prior to installation.

Vertical control joints shall be spaced at maximum 20.0-metre intervals on any single wall element, and be aligned with control joints in the structural framing, and be provided where the cladding system abuts different cladding types or covers different construction materials.

Vertical control joints shall be formed with a continuous 10mm parallel gap between StoTherm Panels along the joint line, and with a Sto uPVC control joint moulding embedded in the mesh coat - ensuring the mesh coat does not overlay the 'V' joint. Control joints shall be sealed with a flexible sealant to Sto requirements after plastering and before painting.

6.3.10.5 Horizontal Control Joints

Form all horizontal control joints in the cladding to the locations and details shown on the design drawings or as per Sto requirements and Technical Literature. Confirm the location of horizontal control joints prior to installation.

Horizontal control joints shall be provided on facades up to two storeys or 7.0m high including gables, and where the cladding system abuts different cladding types or covers different construction materials. Where a horizontal control joint is formed at an inter-storey level, do not fix StoTherm Panels to the floor joists/blocking.

Horizontal control joints shall be formed with a continuous 10mm parallel gap between StoTherm Panels along the joint line, and with a Sto uPVC control joint moulding embedded in the mesh coat - ensuring the mesh coat does not overlay the 'V' joint. Control joints shall be sealed with a flexible sealant to Sto requirements after plastering and before painting.

6.3.10.6 Horizontal Cavity Drainage Joints

Form horizontal cavity drainage joints on façades over two storeys or 7.0m high (to limit continuous cavity construction to the lesser of 2-storeys or 7.0m) with a folded Z-flashing bridging the drained cavity to the locations and details shown on the design drawings or as per Sto requirements and Technical Literature. Confirm the location of drained cavity joints prior to installation. Where a cavity drainage joint is formed at an inter-storey level, do not fix StoTherm Panels to the floor joists/blocking.

6.3.10.7 Architectural Shapes & Profiles

Architectural shapes used to create decorative detailing shall be correctly cut to size and fitted using StoFlexyl mortar notch-towelled to the back of the shape prior to placing. All rendered horizontal surfaces must have a minimum 10° fall away from the wall face.

As necessary, mechanically fix large or heavy profiles without distorting the shape. Profiles must be butt-jointed together using Sto Crack filler, and any control joints mirrored through the profile. Profiles shall be pre-meshed or receive a StoArmat mesh coat, be fitted after reinforcement of the mesh coat, and with top edges meshed to the wall.

6.3.10.8 Surface Preparation

Following the installation of StoTherm Panel surfaces, rasp back any excess jointing adhesive and surface irregularities before application of Sto render system coatings.

6.3.10.9 Cavity Air Vents

Cavity Air Vents. Surface mounted, pressed aluminium, weather protected vents, used for venting and draining the cavity behind StoTherm EIFS cladding in situations where the bottom edge of the cladding is installed within the rebate of a concrete slab/foundation wall and the cavity is closed to the exterior by a Sto uPVC Control Joint moulding.

Installed to achieve a minimum ventilation area of 1000mm² per lineal-metre of StoTherm EIFS cladding, at maximum 1200mm centres, in accordance with Sto Technical Literature and as indicated on the design drawings.

6.3.11 Fixing

6.3.11.1 StoTherm 50mm Panel Fixing, Timber Frame - Very High Wind Zone

Fix StoTherm 50mm Panels through the cavity battens and cavity spacers into timber framing with 100 x 4.0 mm hot-dip galvanised flat-head nails with a Sto Ø50mm HDPE yellow washer, to the specified spacings for panel edges and intermediate studs in accordance with Sto Technical Literature. Fixings shall be carefully driven home 2-3mm compressing the panel in a skewed manner and achieve a minimum 30mm embedment into timber framing. Where rigid underlays are used, the fixing length shall be increased by a minimum of the thickness of the underlay to maintain the 30 mm embedment.Fixing Positions:

- Panel Edges, Studs, Top & Bottom Plates: maximum 200mm centres.
- Nog/Dwang Lines: 1 x fixing into each nog/dwang at mid-nog/dwang length.
- Locate edge fixings no closer than 50mm from the edge of StoTherm Panels.

6.3.12 Render System - Base Coat

6.3.12.1 StoLevell Uni - StoMiral Render System

StoMiral Render System Meshed Base Coat - StoLevell Uni. StoLevell Uni is a mineral lightweight basecoat for bonding and reinforcing with polystyrene as lightweight aggregate.

To a clean, dry and properly prepared substrate, apply a levelling basecoat of StoLevell Uni render approximately 3-5mm thick and, while still wet, lightly embed Sto European Mesh reinforcing and any Sto uPVC pre-meshed mouldings required. Ensure adjacent drops of Sto European Mesh are overlapped minimum 75mm, and all stress points at joinery corners etc. are reinforced with mesh butterflies to Sto requirements.

Allow the first coat to dry before applying any required StoFlexyl Meshed Waterproofing. All rendered horizontal surfaces must have a minimum 10° fall and have StoFlexyl Meshed Waterproofing applied over the levelling basecoat, extending a minimum 100mm up/down adjacent vertical surfaces. Apply StoFlexyl Meshed Waterproofing to all surfaces requiring waterproofing in accordance with Sto requirements.

Allow to dry, then apply a second coat of StoLevell Uni render approximately 1-2mm thick, and finish to a straight and true surface free from hollows, bumps, ridges and deviations in accordance with Sto requirements.

Allow StoLevell Uni render to dry before rasping off any ridges and bumps and applying Stoplex W Primer.

To clean, dry rendered surfaces, apply one coat of Stoplex W Primer by low-pressure spray or brush in accordance with Sto requirements. Allow Stoplex W Primer to dry before applying the finishing coat.

6.3.12.2 StoLevell Novo - StoMiral Render System

StoMiral Render System Meshed Base Coat - StoLevell Novo. StoLevell Novo is a mineral lightweight basecoat for bonding and reinforcing with polystyrene as lightweight aggregate.

To a clean, dry and properly prepared substrate, apply a levelling basecoat of StoLevell Novo render approximately 3-5mm thick and, while still wet, lightly embed Sto European Mesh reinforcing and any Sto uPVC pre-meshed mouldings required. Ensure adjacent drops of Sto European Mesh are overlapped minimum 75mm, and all stress points at joinery corners etc. are reinforced with mesh butterflies to Sto requirements.

Allow the first coat to dry before applying any required StoFlexyl Meshed Waterproofing. All rendered horizontal surfaces must have a minimum 10° fall and have StoFlexyl Meshed Waterproofing applied over the levelling basecoat, extending a minimum 100mm up/down adjacent vertical surfaces. Apply StoFlexyl Meshed Waterproofing to all surfaces requiring waterproofing in accordance with Sto requirements.

Allow to dry, then apply a second coat of StoLevell Novo render approximately 1-2mm thick, and finish to a straight and true surface free from hollows, bumps, ridges and deviations in accordance with Sto requirements.

Allow StoLevell Novo render to dry before rasping off any ridges and bumps and applying Stoplex W Primer.

To clean, dry rendered surfaces, apply one coat of Stoplex W Primer by low-pressure spray or brush in accordance with Sto requirements. Allow Stoplex W Primer to dry before applying the finishing coat.

6.3.12.3 Multiscreed - StoMiral Render System

StoMiral Render System Meshed Base Coat - Multiscreed. Multiscreed is a basecoat plaster for polystyrene and masonry substrates.

To a clean, dry and properly prepared substrate, apply a levelling basecoat of Multiscreed render approximately 3-5mm thick and, while still wet, lightly embed Sto European Mesh reinforcing and any Sto uPVC pre-meshed mouldings required. Ensure adjacent drops of Sto European Mesh are overlapped minimum 75mm, and all stress points at joinery corners etc. are reinforced with mesh butterflies to Sto requirements.

Allow the first coat to dry before applying any required StoFlexyl Meshed Waterproofing. All rendered horizontal surfaces must have a minimum 10° fall and have StoFlexyl Meshed Waterproofing applied over the levelling basecoat, extending a minimum 100mm up/down adjacent vertical surfaces. Apply StoFlexyl Meshed Waterproofing to all surfaces requiring waterproofing in accordance with Sto requirements.

Allow to dry, then apply a second coat of Multiscreed render approximately 1-2mm thick, and finish to a straight and true surface free from hollows, bumps, ridges and deviations in accordance with Sto requirements.

Allow Multiscreed render to dry before rasping off any ridges and bumps and applying Stoplex W Primer.

To clean, dry rendered surfaces, apply one coat of Stoplex W Primer by low-pressure spray or brush in accordance with Sto requirements. Allow Stoplex W Primer to dry before applying the finishing coat.

6.3.13 Render System - Finishing Coat

6.3.13.1 Stolit K 2.0mm - StoMiral Render System

StoMiral Render System Finishing Coat - Stolit K 2.0mm. Stolit K is an organic, cement-free, tintable, finishing render with a stippled texture - 2.0mm aggregate size. Stolit K is available in standard White colour and can be colour-tinted to the StoColor System or electronically to match selected colours - *to the colour specified*. Stolit K is NOT suitable for horizontal or sloping surfaces subject to weathering.

To a dry, clean meshed basecoat, sealed with Stoplex W Primer, apply a coat of Stolit K 2.0mm with a stainless steel trowel gauging to the thickness of the aggregate size and finished with a plastic float to the requisite pattern in accordance with Sto requirements.

Allow Stolit K to dry and seal before applying StoColor facade paint protective coating.

Colour: Milano colour tint to be confrimed.

6.3.14 Completion

Check that the StoTherm Insulated Facade System has been correctly installed, with render coatings and facade paint applied and finished to the specified texture and colour.

Check that all surfaces, edges, corners, rebates, angles, reveals, drip edges and control joints are complete, true and accurately aligned and as indicated on the design drawings.

Check for damage and defects - replace or repair as necessary to the required standard in accordance with Sto requirements.

Ensure that the work of other trades does not negatively impact on or reduce the minimum clearances required by the NZ Building Code, between the cladding and ground, roof and/or deck junctures.

Leave this work complete and weathertight, and to the required standard in accordance with the Sto Warranty requirements.

Leave completed works and surrounding surfaces clean and free of rubbish and debris. Remove all rubbish and excess material from the site.

Issue to the Owner a copy of the Stoanz Ltd Sto Warranty with StoService Assurance, and a copy of the Stoanz maintenance requirements.

Provide all necessary Producer Statements.

7 ROOFING

7.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

7.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1170.0:2002 SUPP1(AS/NZS)	Structural design actions - General principles - Commentary
1170.2:2011(AS/NZS)	Structural design actions - Wind actions
2295:2006(NZS)	Pliable, permeable building underlays
2728:2013(AS|NZS)	Prefinished/prepainted sheet metal products for interior/exterior building applications - Performance requirements
3604:2011(NZS)	Timber-framed buildings
4200.1:2017(AS|NZS)	Pliable building membranes and underlays - Part 1: Materials
NZBC F2	Hazardous Building Materials
NZBC G12	Water Supplies
NZMRM Code of Practice	NZ Metal Roof and Wall Cladding Code of Practice - Version 3.0

7.3 Metalcraft Longrun Roofing

7.3.1 Scope

Supply and install Metalcraft Longrun Roofing, as specified herein, to the locations and details shown on the design drawings, complete with all necessary components and accessories required for proper installation and performance. All aspects of this work shall comply with the NZ Building Code, related Metalcraft Longrun Roofing technical literature and publications (check http://www.metalcraftgroup.co.nz or call (0800) 766 369 for the latest editions), and other relevant product manufacturers' recommendations.

No substitutions are permitted for Metalcraft Longrun Roofing.

For the purpose of this specification, Metalcraft Longrun Roofing is referred to as 'Longrun Roofing', and all 'Metalcraft' associated technical literature and publications, including the 'Metalcraft Product Technical Statement', installation instructions and drawings, are collectively referred to as the 'technical literature'.

Extent of work:

The following is a list and/or general description of the extent of the Metalcraft Longrun Roofing works, which are more specifically defined in the contract documents, required for the completion of the contract works:

7.3.2 Requirements

7.3.2.1 Safety:

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

7.3.2.2 Warranty:

Please refer to Metalcraft specifications for applicable warranty terms and conditions.

7.3.2.3 Substitutions:

The Metalcraft Longrun Roofing shall be as specified herein and on the design drawings. The substitution of the Metalcraft Longrun Roofing for an alternative brand is not permitted under any circumstances.

The substitution of the specified Metalcraft Longrun roofing or ancillary component for an alternative Metalcraft Longrun Roofing system or ancillary component by the Contractor shall only be permitted with the Contract Administrator's written authorisation and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate an alternative Metalcraft Longrun Roofing or ancillary component to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

7.3.2.4 Producer statement (PS3):

The Metalcraft Longrun Roofing installer shall furnish a fully completed PS3 Producer Statement (Construction) at time of application for Code Compliance Certificate. The Producer Statement shall accurately reflect the scope of the installation of the Metalcraft Longrun Roofing in accordance with the consented drawings and specifications.

7.3.2.5 Inspections & reporting:

Inspections shall take place at each of the stages as scheduled in the building consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Carry out all necessary pre-installation and installation inspections for each area of the works.

Complete all necessary pre-installation checklists prior to installation, and all necessary installation checklists.

Complete all necessary final checklists and installation sign-off certificates before handing over completed work.

7.3.2.6 Quality assurance:

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of the work are carried out to the highest standard.

7.3.2.7 Defective materials & workmanship:

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected Metalcraft Longrun Roofing materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator without delay and at no additional cost to the Principal.

7.3.3 Profile

Metalcraft - Espan 340 roof sheet - a pan profile; 50mm pan height and 340mm effective cover based on the selected BMT.

Material type - Refer to ‘Roof Sheet Material’ clause.
Thickness - 0.55mm BMT (G550) and 0.9mm (Aluminium)
Windload - Refer to 'technical literature'
Mass (KG/M2) - Refer to 'Metalcraft'
Minimum pitch - 3 degrees

- Sheets shall be continuous from ridge to gutter, or where a step is designed into the roof, sheets shall be continuous from ridge to step and step to gutter.
- Sheet ends must be stop-ended under flashings.

Installed in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

Installed Location: Refer to drawings
Thickness: 0.55mm

7.3.4 Roof Sheet Material

COLORSTEEL Altimate® to selected BMT. Pre-painted marine grade aluminium conforming with AS/NZS 2728.

Colour: Refer to drawings

7.3.5 Roof Ancillary Components & Accessories

Fit and lap roofing underlay over the netting/mesh or use a self-supporting underlay. Lay underlay horizontally or vertically with a 150mm side lap, over-sailing the spouting and/or gutters by 10mm, in accordance with 'technical literature'.

Non self-supporting underlay must be supported by hexagonal wire mesh, safety mesh or alternative support, as specified and/or as shown on the approved drawings, in accordance with the roofing underlay manufacturer's recommendations.

Underlay shall be installed in a manner so that it is sufficiently tensioned without sagging, overhangs fascia boards 20mm - 25mm, and finished along roof edges, ridges, valley gutters, roof/wall junctions and at penetrations to the details shown on the drawings.

Underlayment for fully-supported roofing shall be in accordance with NZMRM Code of Practice.

Separate roof underlay from chimneys and flues in accordance with the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 7.5.9.

Cladding screw fastener type and durability shall comply with AS 3566 Class 4 or Class 5, as appropriate, and be no less than the durability of the material being fixed. Fastener type and placement (frequency) shall be appropriate for the environmental conditions and the specified cladding profile and material and the supporting structure material; all in accordance with the NZMRM Code of Practice and E2 External Moisture.

COLORSTEEL Altimate® must be installed with CL 4% screw with 30mm minimum embedment. Screws must be installed through a clearance hole. All fasteners to be fitted with a bonded sealing washer.

Metal Flashings. Profiled metal cladding flashings shall be fabricated from material with the same coating as the cladding material, to maintain durability and compatibility requirements. Flashings shall be 0.55BMT G300 steel or H34 Aluminium coated to the same standards as the profiled cladding sheets, and notched/scribed when installed across the cladding profile or provided with a soft edge – in accordance with selected roof sheet material and NZMRM Code of Practice requirements.

Flashings, flashing fastenings and fastening frequency shall be in accordance with the NZMRM Code of Practice.

Do not construct flashing joints and flashing junctions in a manner that relies entirely on sealant to maintain weathertightness.

Rivet Fastenings. Rivets shall be sealed aluminium minimum 4mm diameter.

Use only neutral-curing silicone or MS polymer sealant, compatible with the specified metal cladding and flashing materials and finishes, that is suitable for the required application and use in accordance with the sealant manufacturer's instructions and to NZMRM Code of Practice requirements. All sealed joints must be mechanically fastened, and excess sealant neatly removed to prevent unnecessary dirt build-up. Sealant shall only be used to seal between two metal surfaces, do not fill holes or gaps with sealant.

Proprietary Collar Flashings. EDPM or silicone-polymer proprietary flexible collar flashings for weatherproofing cladding-penetrating pipes/flues/ducts. Sized to suit the applicable pipe/flue/duct and installed in strict accordance with the manufacturer's requirements and the NZMRM Code of Practice.

Profiled Foam Closure Strip. Non-bituminous, compressible, closed-cell foam strips profiled to fit the specified cladding profile. Installed to the details shown on the drawings and in accordance with selected roof sheet material and NZMRM Code of Practice recommendations.

7.3.6 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades, as required, on the assembly and installation of the Metalcraft Longrun Roofing to the required layout, details and tolerances.

7.3.7 Qualifications & Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All installation work shall be carried out by experienced and competent tradespersons, familiar with the specified products and installation techniques and suitably qualified to install Metalcraft Longrun Roofing, to fully comply with all warranty requirements in accordance with the manufacturer's requirements.

All cutting, fixing and installation techniques, fastenings and sealants shall be exactly as recommended by and in accordance with the NZMRM Code of Practice, and carried out with the use of suitable tools and equipment appropriate for the application.

Always maintain isolation of dissimilar materials in accordance with the NZMRM Code of Practice Section 4.10. Isolate dissimilar materials (metal and non-metal) in close proximity as necessary by fitting separator strips. Place isolators between metals and treated timber or cement-based materials.

Do not allow unpainted lead-sheet or copper materials to come in contact with, or allow water run-off from these onto Zincalume or galvanised materials.

All work shall be such as to leave a neat, efficient, robust and weathertight installation.

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All installation work shall be carried out by experienced and competent tradespersons, familiar with the specified products and installation techniques and suitably qualified to install Metalcraft Longrun Roofing, to fully comply with all warranty requirements in accordance with the manufacturer's requirements.

Installers of COLORSTEEL Maxam® shall be supervised by an accredited COLORSTEEL Maxam® installer.

All cutting, fixing and installation techniques, fastenings and sealants shall be exactly as recommended by and in accordance with the NZMRM Code of Practice, and carried out with the use of suitable tools and equipment appropriate for the application.

Always maintain isolation of dissimilar materials in accordance with the NZMRM Code of Practice Section 4.10. Isolate dissimilar materials (metal and non-metal) in close proximity as necessary by fitting separator strips. Place isolators between metals and treated timber or

cement-based materials. Do not allow unpainted lead-sheet or copper materials to come in contact with, or allow water run-off from these onto Zincalume or galvanised materials.

All work shall be such as to leave a neat, efficient, robust and weathertight installation.

7.3.8 Delivery & Handling

Store Metalcraft Longrun Roofing, flashings and accessories clear of level ground, on bearers at evenly spaced centres as recommended by the NZMRM Code of Practice. Keep stored materials and accessories dry and protected from damage and contamination at all times.

Do not use damaged or defective materials or products, or products that are beyond their designated shelf life.

Handle materials in accordance with the manufacturer's requirements and in a manner that prevents damage to or deterioration of the material, including surface marking.

7.3.9 Preparation

Prior to installation, carry out all necessary inspections and preparatory work required, and ensure that all preliminary works by other trades have been completed to specification and as shown on the approved drawings.

Do not commence installation until all necessary preliminary works by others are complete and to the required standard. The commencement of work shall be deemed to indicate full acceptance by the installer that all preliminary works by other trades are complete.

Supporting timber structures shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content in accordance with the requirements of NZS 3602 at the time of installation.

Supporting light-gauge steel framed structures shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria.

Supporting heavy steel structures shall comply with NZS 3404 and the NZ Building Code.

Roof Structure - check all aspects of preparatory works, including but not limited to:

- Check that the purlins are installed to the required set-out and spacings, are straight and true to line and plane, and are securely fixed.
- Check that all barge and fascia boards have been installed to the correct line and plane with all edge blocking complete and secure.
- Check that valley gutter and hidden gutter framing is to the required dimensions with solid backing supports securely fixed, true to line and plane.
- Check that internal gutter membrane linings are properly dressed back and adhered to a solid substrate along the roof edge as shown on the design drawings.
- Check that all trimming for roof penetrations, all roof/wall junction blocking, and all necessary work by other trades are complete.

- Check that solid backing required for fully supported roofing is complete and securely fixed in accordance with the design drawings.

7.3.10 Installation

Installers shall be familiar with and comply with the manufacturer's safe handling requirements and precautions for use and shall use appropriate safety gear when handling materials. Installers shall conform with all relevant WorkSafe NZ Guidelines Working at Heights.

Prevent contact with, or run-off from, incompatible materials in accordance with the recommendations in the NZMRM Code of Practice.

Protect the coated surface from damage at all times; replace the whole sheet where a significant depth of the coating has been damaged (including flashings).

Accurately set-out the planned cladding layout prior to fixing to ensure true and accurate cladding lines and incorporate correct relationships with other design features shown on the drawings; maintain this accurate set-out throughout installation.

Keep cladding lines consistent and true along the roof; with side-laps of sheets to be straight, true and accurately aligned up and down. Check for and eliminate any creep and/or spread of sheets during installation.

Cut metal cladding and flashings by shear only - do not use abrasive cutting tools. Do not use black lead pencils for marking pre-finished metal cladding and flashings.

Screw fastenings for pre-painted metal must be pre-painted prior to installation for an accurate colour match.

All cladding jointing techniques and sealants shall be in accordance with the NZMRM Code of Practice and shall be compatible with the cladding material and finish. Joints shall be sealed with an approved neutral-cure sealant or approved closed-cell lap tape.

Install fasteners in a straight line with a consistent fastening pattern on each sheet in accordance with 'technical literature' requirements. Fasteners are to be set using a snug fitting socket and a setting tool that does not unduly damage the finish coating of the screw. Depth of setting is to be sufficient to achieve slight compression of the sealing washer without distorting the profile or the sealing washer itself.

Aluminium rivets are to be sealed type pre-painted to match cladding, minimum 4mm diameter. Clip-fastened sheets shall be fixed with concealed proprietary fastening clips appropriate for the cladding profile and material, substrate/structure and the environment in accordance with the NZMRM Code of Practice recommendations.

Install flashings as detailed on the drawings and in accordance with the Zealand Metal Roofing Code of Practice. All flashings shall be neatly formed and finished, securely fastened to the structure, weatherproof, and lapped such that any water will run down to the exterior. For highly visible flashings, plan each flashing joint and/or junction with specific regard to

aesthetic requirements. Penetration flashings shall be as per the design details and shall not rely solely on silicone sealant to achieve weathertightness of the flashing.

Handle sheets carefully to avoid scratching and denting. Do not walk on wall cladding sheets prior to installation. Remove strippable film, if applied, immediately after installation of roof cladding to avoid resin staining. All accessories are to be colour matched prior to installation, do not use colour match paint for repairing any blemishes. Ensure sealant is trapped between joint surfaces and not exposed to the visual surface.

7.3.11 Compatibility

Ensure material is isolated from incompatible materials. It must not be in contact with, or receive run off from, less noble metals such as copper, brass and lead. It should not be in wet contact with stainless steel. Sustained wet contact with timber, either treated or untreated, must be avoided. For more information, see the COLORSTEEL® Installers Guide.

Coated Iron or steel products, that may deteriorate within the lifespan of the COLORSTEEL® material, must be positioned so that they are not in contact with COLORSTEEL Altimate®.

7.3.12 Completion

Check that the Metalcraft Longrun Roofing and associated components and flashings have been installed and finished correctly. Check for defective work, damage and surface marking - replace and/or repair as necessary. Ensure that the work of other trades does not reduce the clearances of the cladding to ground, deck or roof that are required by the NZ Building Code.

Leave all work complete and weathertight and to the required standard in accordance with the New Zealand Metal Roofing Code of Practice.

Leave the completed works and surrounding surfaces clean and free of debris and rubbish. Remove all rubbish and excess material from the site.

Maintenance should be carried out in accordance with Metalcraft maintenance requirements.

7.4 Membrane Roofing

7.4.1 Scope

The following is a list and a general description of the extent of Membrane Roofing work, which are more specifically defined in the contract documents, required for the completion of the contract works.

Supply and install the specified Waterproof Membrane Roofing System, complete with all components and accessories, to the locations shown on the drawings. All aspects of this work shall be in strict accordance with the manufacturer's technical guidelines, installation specifications and details, other relevant product manufacturers' recommendations, and as shown on the drawings.

7.4.2 Membrane Roofing System

7.4.2.1 Thermoplastic Polyolefin (TPO) Membrane Roofing System

Single ply, polyester fabric reinforced, thermoplastic polyolefin (TPO) membrane sheet, installed as a waterproof roofing system to properly prepared substrates in accordance with the manufacturer's requirements and as shown on the drawings.

Manufacturer, brand name & type: Viking Roofspec
Membrane thickness: 1.52mm
Roll width:
Colour: Dark grey
Location: Refer to drawings

7.4.3 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings. Co-ordinate with other trades to install Waterproof Membrane Roofing as required.

7.4.4 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All installation work shall be carried out by experienced contractors, authorised by the manufacturer, familiar with the specified products and installation techniques, to fully comply with all of the manufacturer's warranty requirements in accordance with the manufacturer's installation requirements and as noted and detailed on the drawings.

7.4.5 Delivery & Handling

Store products off the ground on a flat surface undercover, keep materials dry and out of direct sunlight, and protect from damage. Do not use damaged or faulty products, or products beyond the designated shelf life. Handle materials and products in accordance with the manufacturer's recommendations.

7.4.6 Preparation

Ensure that the roof substrates have a minimum fall of 1:30 (and any internal gutters 1:100, preferably 1:60, including allowing for possible deflection and/or settlement), that overflows are provided where the roof drains to an internal gutter, and that penetration flashings and edge upstands are carried above the overflow level (to allow for a drainage blockage). Check that crack control and movement joints are incorporated at the locations shown on the drawings and are constructed as recommended by the membrane manufacturer. Ensure the substrates are clean and free of oil grease etc., and are smooth (with any defects filled to an even surface).

Check that the plywood has been laid with staggered joints, and is supported on framing at maximum 400mm centres, that the plywood is 17mm minimum thickness, is CD grade (C face up), is H3 CCA treated (LOSP treated plywood must NOT be used), is installed and fixed exactly to the Ply manufacturer's and Nuralite recommendations, and complies with E2/AS1 8.5.3 and 8.5.5.

20 x 20 mm H3 fillet deck/wall junctions, and 5mm radius chamfer external edges at turn-downs. Ensure the maximum moisture content is 20%, and that the plywood is surface dry at the time of membrane application.

7.4.7 Batten Detail

Tapered Profiled Roof Battens.
Ex 100 x 50mm with tapered edges as detailed, H3.2 treated timber roof battens, installed to the layout and centres shown on the drawings, fixed with hot-dip galvanized countersunk self-drilling screws in accordance with the system requirements.
Ensure that the roofing membranes are correctly dressed and layered over the battens and that any required membrane saddle flashing is installed.

7.4.8 Primer

Apply the membrane roofing primer to properly prepared substrates for optimum membrane adhesion in accordance with the manufacturer's requirements. Limit priming to no more than can be covered by the membrane in one working day or as recommended by the manufacturer, and allow the primer to properly dry before installing the membrane. Protect the primed surface from contamination until membrane installation.

Manufacturer, brand name & type:

7.4.9 Adhesive

Apply the membrane roofing adhesive to the primed substrate at the recommended application rate to achieve proper membrane bonding, and to membrane joints and folds as necessary, in accordance with the manufacturer's requirements.

Manufacturer, brand name & type: As per Viking TPO spec

7.4.10 Installation

7.4.10.1 Thermoplastic Polyolefin (TPO) Membrane System

Install the thermoplastic polyolefin (TPO) membrane roofing system, including all surface priming, membrane application, jointing, flashing and sealing, etc., and all system supplied fillets and metal edge trims, roof vents and gutter outlets, in strict accordance with the manufacturer's installation requirements and details, and as shown on the drawings.

Unroll the membrane on to the substrate and allow it to relax for at least 20 minutes prior to installation. Do not lay membrane sheets under tension.
Commence membrane installation at sumps and proceed through gutters to the main roof installing the membrane up the roof slope from the lowest edge.
Apply the membrane adhesive to the substrate only to the area where the membrane sheet will be laid, leave adhesive to activate, then fold the sheet along its length over the adhesive, thoroughly roll to remove entrapped air and to achieve full bonding, repeat the process to apply the other half of the sheet along its length. Joints shall be fully hot-air welded, overlapped as recommended by the manufacturer, and neatly finished straight and parallel.
Use neatly cut strips of membrane for gutters and upstands etc., and install system supplied preformed corners, metal edge trims, flanged drains, outlets, and vents etc., as required and/or specified to complete the installation.

Finish any control joints located on the drawings to the manufacturer's requirements.
Consult the manufacturer regarding any detail where a standard system detail does not exist.
Protect installed membrane as required, avoid puncturing or damaging the membrane during installation; repair or replace as necessary.

7.4.11 Completion

Check that the membrane roofing system has been installed correctly, and that all system accessories are correctly installed and finished. Check for damage and repair or replace as necessary.
If reasonably possible, flood test box gutters and low-fall decks with a minimum 40mm water depth for 24 hours, carry out any additional works necessary as a result of the testing.
Leave the completed membrane roofing system leak free and watertight. Completely clean the works area and remove all rubbish and waste material from the site.

Issue to the Owner a copy of the manufacturer's maintenance requirements and a copy of the product and installation warranties for the completed works.

8 EXTERNAL WINDOW & DOOR JOINERY

8.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

8.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1170.2:2011(AS/NZS)	Structural design actions - Wind actions
1734:1997(AS/NZS)	Aluminium and aluminium alloys - Flat sheets, coiled sheet and plate
1866:1997(AS/NZS)	Aluminium and aluminium alloys - Extruded rod, bar, solid and hollow shapes
3604:2011(NZS)	Timber-framed buildings
4211:2008(NZS)	Specification for performance of windows
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4303:1990(NZS)	Ventilation for acceptable indoor air quality
4680:2006(AS/NZS)	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
NZBC B1	Guidance on Barrier Design
NZBC B1/VM1	Structure
NZBC B2/AS1	Durability
NZBC E2/VM1	External Moisture
NZBC F2	Hazardous Building Materials
NZBC F4	Safety from Falling
NZBC G4/AS1	Ventilation
NZBC H1	Energy Efficiency

8.3 APL Residential Aluminium Windows & Doors

8.3.1 Scope

8.3.1.1 APL Aluminium Window & Door Systems

APL Aluminium Window & Door Systems

Supply and install the specified Aluminium Windows and Doors from APL- Window Solutions to the locations and details shown on the drawings; complete with all components (flashings, support mechanisms, brackets, etc) where required, for proper installation and operation; and commissioned to the required performance and functionality. All aspects of this work shall be in strict accordance with the manufacturer's technical literature and installation requirements

(check www.aplnz.co.nz, call 07 849 8888, or email techinfo@aplnz.co.nz for the latest editions), other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for the specified Aluminium Windows and Doors from APL - Window Solutions

8.3.2 Warranty

Warranty APL - Window Solutions Materials & Workmanship Warranty:
- 12 Years Warranty on Materials – AGP® Insulated glass units (Warrant glass under normal environmental and use conditions against failure of materials).
- 5 Years Warranty on Materials and Workmanship - for all APL window and door products.
- 2 Years Warranty on Materials and Workmanship – for all mirror glass and hardware.
- Provide the Materials & Workmanship Warranty on the Manufacturer's Standard Warranty Form.
- Commence the warranty from the date of practical completion of the contract works.

View the "Care and Maintenance for Windows and Doors". Terms and Conditions are here www.AGPL.co.nz

8.3.3 Requirements

Safety
Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

Shop Drawings
Prepare and submit to the Main Contractor for verification and approval prior to the commencement of works, Shop Drawings describing the general arrangement and connection to the building envelope of the specified window & door systems.

These shall include, but not be limited to:
- Design calculations - where required;
- Dimensioned elevations of all aluminium joinery elements (typical scale = 1:50; minimum scale = 1:100);
- Complete details of the installation construction, connections and all support systems (typical scale = 1:2; minimum scale = 1:5);
- Sealant types and backing rods, etc;
- Provision for movement, thermal, wind load and/or seismic - where required;
- Coordination requirements/issues with other works and trades - where applicable;
- A schedule of materials, finishes, componentry, fittings, fixings and fastenings - where required.

Producer Statement PS1
If required, as a component of the consent process APL can provide a "Letter of Intended Design" outlining the evidence used in the selection of the specified window and door systems. Upon request, the successful tenderer/manufacturer shall furnish a completed

Producer Statement PS1 (Design) as confirmation that the specified window and door systems complies with the relevant clauses of the New Zealand Building Code. To ensure accuracy, the PS1 Producer Statement will be prepared as a part of the shop drawing process but will not serve as a product warranty or guarantee of compliance.

Samples
Provide samples of the specified aluminium windows and doors, upon request, including sections (shorts or assembled corners), glazing, reveals, hardware, and colours, all as agreed, for the approval of the Architect/Designer. Manufacture should not commence until approval has been gained.

8.3.4 Performance Criteria - Wind Zone - Durability

General Performance - Wind Zone: High
The specified APL Aluminium Window and Door Systems shall comply with the requirements of NZS 4211 for all relevant clauses.

Wind Load - Non-Specific Design Wind Zone Classification. The specified APL Aluminium Window and Door Systems joinery installation is located in a NZS 3604 Wind Zone: H - High; with a maximum pressure of 0.97kPa SLS and 1.36kPa ULS.

8.3.5 Performance Criteria - Energy Efficiency for All Small Buildings Under 300m2

Thermal Performance - Climate Zone 6
Thermal Performance. The APL Aluminium Residential Window & Doors joinery, installation is located within the boundaries of Climate Zone 6, as defined by H1 Energy Efficiency. Unless specified otherwise, the combination of insulation, should meet the minimum H1 requirements tabled below and in accordance with, H1 Energy Efficiency for this Climate Zone.

Building Element	Construction R-values [m^2K/W] No embedded heating Climate Zone 6		Construction R-values [m^2K/W]
Roof	R6.6	Heated Ceiling	R6.6
Wall	R2.0	Heated Wall	R2.9
Slab-on-ground Floors	R1.7		
Floor other than slab-on-ground floor	R3.0	Heated Floor	R3.0
Window and Doors	R0.50		
Skylights	R0.62		

8.3.6 APL Aluminium Joinery Range

Metro Series ThermalHEART
'Metro Series ThermalHEART' Windows and Doors, fully glazed, finished, and complete with hardware and other specified components - all as specified in the following clauses. Manufactured and installed in accordance with the manufacturer's requirements to the locations, configurations and details shown on the drawings and schedules.

8.3.7 Awning & Casement Windows

Metro Series ThermalHEART
Awning and casement windows shall be manufactured using APL branded Metro Series ThermalHEART frame, with a 44mm platform incorporating a polyamide thermal break, and a cover facing to overlap the wall cladding.
Specification:
- Mullions, Transoms: with/without external fins, with guidance from APL Span Tables, shall be selected by the manufacturer for compliance with the project wind load.
- Maximum Glass Thickness: 32mm IGU
- Thermal Values: U-value 3.683 R-value 0.272
- Performance: Tested to Extra High wind zone
- Sashes: Pocket Glazed or Bead Glazed - as specified below (if not specified, the default shall apply).
- Glass: Double glazed; complying with NZS 4223.1., NZS4223.3 & NZS4223.4 Refer to Glazing and Glass clauses.
- Finish: Refer to Aluminium Finish clause.
- Reveals: Refer to Jamb Liner clause.

Refer to the Window & Door Schedule drawings for specific requirements of individual elements.
Manufactured and installed in accordance with the manufacturer's requirements to the locations, configurations and details shown on the drawings and schedules.

8.3.8 Hinged & French Doors

Metro Series ThermalHEART - Hinged & French Doors
Glazed aluminium hinged doors shall be manufactured from APL-branded Metro Series ThermalHEART hinged door frames incorporating a polyamide thermal break. Outward-opening and/or inward-opening door leaves as detailed in the accompany drawings.
Specification:
- Maximum Glass Thickness: 32mm IGU
- Thermal Values: U-value 3.749 R-value 0.267
- Performance: Tested to Extra High wind zone
- Glass: Single glazed or double glazed; complying with NZS 4223.1., NZS4223.3 & NZS4223.4 Refer to Glazing and Glass clauses.
- Finish: Refer to Aluminium Finish clause.
- Reveals: Refer to Jamb Liner clause.

Refer to the Window & Door Schedule drawings for specific requirements of individual elements.
Manufactured and installed in accordance with the manufacturer's requirements to the locations, configurations and details shown on the drawings and schedules.

8.3.9 Sliding Doors

Metro Series ThermalHEART - Sliding Doors
Sliding doors shall be manufactured from APL-branded Metro Series ThermalHEART sliding door frames.
Metro Series ThermalHEART sliding door frames, incorporating fixed panels and bottom-sliding door panels.
Specification:
- Mullions, Transoms, Stiles, Interlockers: with guidance from APL Span Tables, shall be

selected by the manufacturer for compliance with the project wind load.
- Maximum Glass Thickness: 30mm IGU
- Thermal Values: U-value 4.814 R-value 0.208
- Performance: Tested to Extra High wind zone
- Glass: Single glazed or double glazed; complying with NZS 4223.1., NZS4223.3 & NZS4223.4 Refer to Glazing and Glass clauses.
- Finish: Refer to Aluminium Finish clause.
- Reveals: Refer to Jamb Liner clause.

Refer to the Window & Door Schedule drawings for specific requirements of individual elements.
Manufactured and installed in accordance with the manufacturer's requirements to the locations, configurations and details shown on the drawings and schedules.

8.3.10 Entrance Door

Plasma Entrance Door Range
Entrance doors shall be from the APL 'Plasma' Entrance Door range. Refer to Entrance Door Style clause for the Plasma Entrance Door model/configuration number(s) and details.
Installed in accordance with the manufacturer's requirements to the locations, configurations and details shown on the drawings and schedules.
Dimensions:
Sheet and glass clad panels 3600mm x 1500mm wide, depending on wind load - Pivots essential over 960mm wide
Maximum Glass Thickness: 22mm double glazing as standard

8.3.11 Aluminium Finish

Powder Coated Aluminium - DULUX Duralloy®
The specified aluminium joinery shall be powder coated with DULUX Duralloy® to the specified colour. Nominal 50 - 90 micron thick coating (minimum 50 microns). Duralloy® has a 10-year warranty on film and colour integrity.
DULUX Duralloy® meets the performance requirements for AAMA 2603-05.

DULUX Duralloy® is suitable for use on residential projects, within three floors from the ground, and situated within NZS 3604 Exposure Zone B or C.

DULUX Duralloy® coatings shall be factory-applied by a Dulux Registered Applicator to the requirements of AS 3715 and to fully comply with all Dulux NZ Ltd warranty requirements.
All substrate preparation and treatments, and powder coating application and finishing techniques, shall be exactly as recommended by the manufacturer.
DULUX Duralloy® colour: TBC by Client

8.3.12 Glazing

AGP Clear Float Glass
AGP® Clear Float Glass - Glass type and thickness as specified and in accordance with NZS4223.1, NZS4223.3. & NZS4223.4 Factory-fitted to awning and/or casement windows, sliding and/or bi-fold windows, hinged and/or sliding doors as identified on the drawings and schedules.
Location: ~

Brand/type: AGP
Thickness: ~

AGP PVB Laminated Glass
AGP® PVB Laminated Glass - Glass type and thickness as specified and in accordance with NZS4223.1, NZS4223.3. & NZS4223.4 Factory-fitted to awning and/or casement windows, sliding and/or bi-fold windows, hinged and/or sliding doors as identified on the drawings and schedules.
Location: ~
Brand AGP
Type: PVB
Colour: Clear & Opalescent
Interlayer: 0.38mm Standard
Thickness: ~mm nominal overall

AGP Toughened Glass
AGP® Toughened Glass - Glass type and thickness as specified and in accordance with NZS4223.1, NZS4223.3. & NZS4223.4 Factory-fitted to awning and/or casement windows, sliding and/or bi-fold windows, hinged and/or sliding doors as identified on the drawings and schedules.
Location: ~
Brand/type: AGP Toughened
Thickness: ~mm

8.3.13 Jamb Liner

Paint-Quality Timber - 19mm thick, Architrave - H3.1 Treated
Paint-quality Timber Jamb Liners - for Planted Architraves. Manufactured from 19mm thick, dressing-grade, finger-jointed or clear Radiata pine complying with NZS 3602, H3.1 treated. Mitred corner joints; factory pre-primed on all faces.
Jamb liners shall be straight and true and free of warp or distortion. The depth of the jamb liners shall be sized to suit the wall construction thickness as shown on the drawings. Edges shall be square dressed, without a lining groove, to suit planted architraves.
Except where indicated otherwise on the drawings and schedules, jamb liners shall be fitted to the head, jambs and sill of each aluminium joinery element.

Aluminium Sill Infill (doors/full-height windows) - Powder Coated
APL Aluminium Sill Infill. As shown on the drawings and schedules, doors and/or full-height windows shall have an aluminium infill fitted to the sill to suit the wall construction type and thickness. Manufactured from extruded aluminium. Factory powder coated to the specified colour and coating. Includes adaptors, brackets and clips as necessary.

8.3.14 Flashings & Support Bars

Aluminium Head Flashings
Aluminium Head Flashings shall be selected from the APL range of extruded aluminium flashings, suitably sized to suit the claddings and construction types in accordance with NZBC E2/AS1 and shown on the drawings; and finished and colour-matched with the aluminium windows and doors. All aluminium joinery flashings shall be supplied and installed by the APL aluminium joinery manufacturer.

Aluminium Sill Support Bar - Cavity Construction
Aluminium Sill Support Bar for Installations in Drained Cavity Construction. Extruded aluminium sill support bar, with built-in drainage and ventilation, for continuous support to the window or door unit. Mill finish aluminium. Sill support bars shall be used and installed in accordance with the requirements of NZBC E2/AS1, and comply with BRANZ Evaluation Method EM6, and be sized to suit the cladding thickness and weight of the window or door.

8.3.15 Hardware Range

Elemental Hardware
APL aluminium window and door hardware and furniture shall be selected from the Elemental Hardware range. Made from extruded aluminium; precision machined; and anodised finished to the colour specified - Silver or Black. Supplied and installed by the APL aluminium joinery manufacturer to the windows and doors as indicated on the drawings and schedules.
Anodised colour: To be confirmed by client

8.3.16 Co-operation Workmanship & Delivery

Co-operation
Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to establish exact sizes for all aluminium window and door frames; and to ensure that each element correctly allows for the installation and finishing of exterior claddings and interior linings and any specific detailing shown on the drawings; and generally, to install all APL aluminium windows, doors and accessories as required.

Workmanship
Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Aluminium window and door joinery fabrication, assembly and installation work shall be carried out by experienced and competent tradespersons, authorised to manufacture and install APL - Window Solutions aluminium windows and doors, under controlled supervision and procedures, to fully comply with all warranty requirements and in accordance with the manufacturer's requirements.

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of work are carried out to the highest standard.

All fabrication and assembly processes and techniques, materials and accessories shall be exactly as recommended by the manufacturer and shall be carried out using suitable machinery, tools and equipment, in a factory workshop.

All work shall be such as to leave a neat, efficient, robust and weathertight installation.

Leave aluminium joinery and glazing clean and free from damage and defects of any kind.

Delivery & Handling
Aluminium joinery frames shall be braced and restrained as necessary for transportation and delivery to site. All surfaces, including glass, shall be appropriately protected from marking and damage during manufacture, delivery and installation.

Inspect all aluminium joinery units upon delivery and reject any damaged or defective items. Contact the manufacturer for replacement of rejected items at time of delivery to site. Do not use or install damaged or defective materials, products and joinery elements.

Store aluminium windows, doors and accessories undercover, off the floor, on a flat, even and level surface as recommended by the manufacturer and in a manner that prevents any frame distortion and surface damage and deterioration. Keep stored aluminium joinery dry and protected from damage, moisture and contamination at all times.

Handle aluminium joinery units and accessories in accordance with the manufacturer's requirements and in a manner that prevents distortion to joinery frames and any damage to the elements - including surface marking. Retain manufacturer's protective coverings for as long as possible, and remove them upon completion.

Installers shall be familiar with and comply with the manufacturer's safe handling requirements and precautions for use, and shall use appropriate safety gear and equipment during all stages of manufacture and installation.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the Best practice guidelines for working at height in NZ, and the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

8.3.17 Preparation

General
Prior to installation, carry out all necessary inspections and preparatory work required, and ensure that all preliminary works by other trades has been completed to specification and as shown on the drawings.
Do not commence installation until all necessary preliminary works by others is complete and to the required standard. The commencement of work shall be deemed to indicate full acceptance by the installer that all preliminary works by other trades is complete.
Check that all window openings and door openings are correctly sized for fitting tolerances, are square and correctly aligned, with all sides plumb, level and true to line and plane.
Check window and door openings adjoining other building elements to ensure that all necessary works have been completed that will enable the windows and/or doors to be installed correctly and as shown on the drawings.
Supporting concrete structures shall be within the scope of NZBC E2/AS3, and comply with NZS 3109. New concrete must have aged for a minimum of 28 days prior to installation.
Supporting concrete masonry structures shall be within the scope of NZBC E2/AS3, and shall comply with NZS 4229, or with NZS 4230 and AS/NZS 1170 for specific design, and NZS 4210.
Supporting timber structures shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content in accordance with the requirements of NZS 3602 at the time of installation.

Supporting lightweight steel framed structures shall comply with NZ NASH 3405, or the NZBC for specific design.
Supporting steel structures shall comply with NZS 3404.

Concrete Slab Rebates
Concrete Slab Rebates: check that concrete slabs have been correctly rebated to accommodate door sills and floor-mounted window frames as detailed on the drawings, and that any required waterproofing membrane has been applied to the rebates.

Timber Framed Walls - Rigid Underlay
Timber Framed Walls (within the scope of NZBC E2/AS1) - check all aspects of preparatory works to window and door openings, including but not limited to:
- Check that the timber framing is complete at window and door openings, and is in accordance with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design.
- Check that the timber framing has a maximum moisture content of 20% at the time of joinery installation.
- Check that the rigid wall underlay has been correctly finished around framed window and door openings in accordance with E2/AS1 and the manufacturer’s requirements.
- Where flexible wall underlay is installed over the rigid underlay, check that the flexible underlay has been correctly finished around framed window and door openings in accordance with E2/AS1 and the manufacturer’s requirements.
- Check that flexible flashing tape has been correctly applied and finished to window and door openings in accordance with E2/AS1 and the manufacturer's requirements.

8.3.18 Fabrication

Fabrication
Do not commence production and fabrication of the joinery elements until the 'For Fabrication and Installation' shop drawings have been verified and approved by the Architect/Designer. Fabricate and install aluminium window and door joinery in accordance with the approved shop drawings, design calculations, and the project documentation.

Unless noted otherwise on the approved shop drawings, joinery fabrication shall include the installation of all glazing, hinges, stays, running gear, and other hardware items scheduled on the approved shop drawings.

Glass shall be cut true and square, sized to provide correct edge clearances, blocked into place as required. All glazed joinery units shall be delivered either pressure fit, pocket glaze, or beaded/wedged, unless site glazing is required. Glazing gaskets shall be compatible with all adjacent materials, and cut 1% over-length to absolutely avoid stretching during installation.

Window and door hardware shall be fixed true to line and position, and adjusted and oiled as required for correct operation. The aluminium joinery manufacturer shall notify the Architect/Designer if any scheduled hardware item or fixing position appears incorrect. Account for all keys and deliver separately to the site manager.

Factory-fit safety stays as scheduled to all opening windows, and to opening windows where safety stays are required to comply with the requirements of NZBC F4/AS1.

Factory-fit all required and scheduled passive ventilation systems to NZBC G4/AS1, 1.3.9 - Trickle ventilators, NZS 4303, and the manufacturer's requirements.

As necessary, provide protection and temporary bracing required for the transportation and general handling of the joinery elements. Ensure that all opening doors and windows are temporarily secured for transportation and general handling.

8.3.19 Installation

Flashings - Framed Openings
Install metal flashings to window and door openings, accurately level and plumb, and to the required tolerances as detailed - with the head flashing weathering jamb flashings, jamb flashings weathering sill flashing, and sill flashings open (draining) to the exterior.
Overlap and the top edge of head flashings with flexible flashing tape, or a section of additional flexible wall underlay, along the top edge to ensure water drains to the exterior.
Except where windows and doors are recessed, and where detailed otherwise, all head flashings shall extend minimum 30mm beyond the edge of the window/door frame.

Aluminium Joinery
Installation of aluminium window and door joinery shall be to the requirements of the approved shop drawings and installation details, including fixings and fasteners, flashings, bedding compounds, pointing sealants, weathering sealants, and other components and accessories required for proper installation.
Use only fasteners compatible with the materials involved, as recommended by the window manufacturer and to comply with durability and performance requirements. Fixings and fasteners exposed to weather shall be aluminium or Grade 316 stainless steel. Fixings and fasteners not exposed to weather may be galvanised in accordance with AS/NZS 4680.
Set proprietary plastic packers, sized to the required installation tolerances, to the formed opening at the appropriate fixing spacings for secure installation and allowance for wind loading for windows.
Install aluminium windows and doors exactly square, true to line, plumb and level for proper operation of opening sashes and door leaves, and with fixings fastened through jamb liners and packers.
Door installation shall allow for a minimum clearance gap of 5mm above the specified floor covering in the space that the door opens into.
Form a continuous air-tight seal between the window/door frames and the adjacent structure with a proprietary expanding foam, or appropriate sealant, to a depth of 15mm - 20mm over PEF backing rod at head, jambs and sill.
Commission opening windows and doors, sliding carriage assemblies, and all moving components to the required operation, performance and tolerances, and ensure that all hardware is in full working order.

Weather Sealing
Weather-seal frame jambs etc. to adjacent surfaces (or to each other) as detailed or as required by the window manufacturer, to achieve a fully weathertight installation.
Sealants shall be BRANZ approved for the application and be compatible with all surfaces and any applied finish.
Insert closed cell PEF backing rods or a polyethylene bond breaker tape slip where required and as shown on the drawings.

Ensure substrates are clean and dry; mask off adjacent surfaces; prime substrates and apply sealant in accordance with the sealant manufacturer's requirements and tool finish to a smooth, even surface.
Where required and as shown on the drawings, install aluminium wind deflection or pressure relief angles, over the head and jambs of frames installed within a recessed opening, prior to weather-sealing frames.

Temporary Safety Indicators
As necessary, provide temporary safety indicators to clear glass until completion of adjacent work. Do not use masking tape or materials incompatible with the glass for this purpose.

8.3.20 Completion

Defective Materials & Work
Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected APL Aluminium Windows & Doors work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional cost to the Principal.

Completion
Check that APL aluminium window and door joinery and accessories have been installed, glazed and finished correctly and fully tested for weathertightness.
Check that all opening window sashes, doors, sliding carriage assemblies and all moving components have been commissioned to the required operating performance and functionality.
Check that all hardware, locks, latches and handles are firmly fixed in place without restricting the operation of their moving parts, and that latches and locks fully engage with strikes and keepers and are free of slack when engaged.
Check all aluminium joinery elements for damage, defects, faults and weathertightness - carry out repairs and/or replace elements as necessary in accordance with the manufacturer's instructions to the required standard.
Remove applied safety indicators and protective coverings, and clean all joinery surfaces inside and out and leave perfectly clean.
Leave this work complete, weathertight and leak-free, and in full working order to the required operating performance and functionality in accordance with the manufacturer's warranty requirements. Leave all locking keys with the Contractor.
Leave the surrounding work area clean and free of rubbish. Remove rubbish and waste material from the site.

Complete the manufacturer's warranty and maintenance requirements, online process **FOUND HERE**. APL Product and Installation Warranty for the installed aluminium windows and doors can be **FOUND HERE**.

Provide all necessary Producer Statements.

9 GLAZING

9.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

9.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

2208:1996(AS/NZS)	Safety glazing materials in buildings
4211:2008(NZS)	Specification for performance of windows
4223.1&2:1985(NZS)	Code of practice for glazing in buildings - Code of practice for glazing in buildings
4223.1:2008(NZS)	Code of practice for glazing in buildings - Glass selection and glazing
4223.2:2016(NZS)	Glazing in buildings - Part 2: Insulating glass units
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4223.4:2008(NZS)	Glazing in buildings - Part 4: Wind, dead, snow, and live actions
4223.SUPP1:2008(NZS)	Code of practice for glazing in buildings - Supplement 1 to NZS 4223.1:2008 and NZS 4223.4:2008
AS/NZS 4666:2012	Insulating glass units

9.3 Non-Structural Glazing Systems

9.3.1 Scope

9.3.1.1 Scope:

Supply and install Non-Structural Glazing systems, as specified herein, to the locations and details shown on the design drawings, complete with all necessary components and accessories required for proper installation and performance. All aspects of this work shall comply with the NZ Building Code, related technical standards and other relevant product manufacturers' recommendations.

For the purposes of this specification, Non-Strutural Glazing Systems are referred to as 'Non-Structural Glazing systems', and installation instructions and drawings, are collectively referred to as the 'technical literature'.

Non-Structural Glazing Systems are used in windows, doors, curtain wall systems, canopies , rooflights and other miscellaneous systems which are not subject to structural loads or human impact as defined in the approriate New Zealand Standard. Non-Structural Glazing Systems are used for mirrors, splashbacks or other decorative purposes which are not subject to human impact as defined in the appropriate New Zealand Standard.

The system is not intended to be used for structural glazing (or glass) that is restrained by adhesives or sealants without other restraint.

Extent of work:

The following is a list and/or general description of the extent of the Non-Structural Glazing system works, which are more specifically defined in the contract documents, required for the completion of the contract works:

9.3.2 Requirements:

9.3.2.1 Safety:

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

9.3.2.2 Warranty:

Non-Structural Glazing system Warranty - is to be provided in accordance with the actual Glass suppliers specific warranty terms and conditions.

9.3.2.3 Inspections & reporting:

BCA inspections shall take place at each of the stages as scheduled in the Building Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Carry out all necessary pre-installation and installation inspections for each area of the works.

Complete all necessary Pre-Installation Checklists prior to installation, and all necessary Installation Checklists.

Complete all necessary Final Checklists and Installation Sign-Off Certificates before handing over completed work.

9.3.2.4 Quality assurance:

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of the work are carried out to the highest standard.

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected Non-Structural Glazing System materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator without delay and at no additional cost to the Principal.

9.3.3 Glass Type - External IGU - Double Glazed

9.3.3.1 Double Glazed - Standard IGU

Double Glazed - Standard IGU (Insulating Glazing Unit) glass panel for non-structural glazing applications.

General Details:

- Material - Glass manufactured to applicable glass specification

- Performance:

  - U (U Value with spacer) = Refer to Window or Glass schedule if applicable
  - VLT (Visible Light Reflectance) = Refer to Window or Glass schedule if applicable
  - SC (Shading Co-efficient) = Refer to Window or Glass schedule if applicable
  - SF (solar factor)= Refer to Window or Glass schedule if applicable
  - Tdw (damage weighted transmittance) = Refer to Window or Glass schedule if applicable

- Thickness – as specified to the requirements of NZS 4223, parts 1-4 as applicable.

- Thickness available panel 1 - Refer to Manufacturer

- Thickness available panel 2 - Refer to Manufacturer

- Gap seal - Refer to Manufacturer

- Finishes available: Refer to Window or Glass schedule as applicable
- Frame Fixing: As per the ‘technical literature’ and design drawings – refer to ‘installation’ clause.

Location:

9.3.4 Glass Type - Special External

9.3.4.1 FEP laminated security Glass:

Forced Entry Protection Laminated Security Glass is a Grade 'A' Safety Glass with high grade security inter-layers, complying with AS/NZS 4667 and AS/NZS 2208 and in accordance with NZS 4223.1.

General Details:

- Material - Glass manufactured to the applicable glass specification

- Performance:

- VLR (Visible Light Reflectance) = Refer to Window or Glass schedule if applicable
- U (U Value) = Refer to Window or Glass schedule if applicable
- VLT (Visible Light Reflectance) = Refer to Window or Glass schedule if applicable
- SC (Shading Co-efficient) = Refer to Window or Glass schedule if applicable

- Thickness – as specified to the requirements of NZS 4223, parts 1-4 as applicable.

- Thickness available - Refer to window or glass schedule or to the glass manufacturer for specific sizes.

- Finishes available: Refer to manufacturer.
- Frame Fixing: As per the ‘technical literature’ and design drawings – refer to ‘installation’ clause.

Location:

9.3.5 Glass Type - Internal

9.3.5.1 Mirrors:

Mirror glass is manufactured from silvering quality float glass. Mirror's are supplied cut to the size specified on the drawings. The Mirror may have pre-formed mounting holes or decorative edges. Other specific treatments and finishes can be applied as required.

Refer to drawings for specific details associated with mirrors.

Location:

9.3.6 Co-operation

9.3.6.1 Co-operation:

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades, as required, the assembly and installation of the Non-Structural Glazing Systems to the required layout, details and tolerances.

9.3.7 Workmanship

9.3.7.1 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Installation of the Non-Structural Glazing system shall be carried out by experienced Installers, familiar with the specified products and their installation techniques, in accordance with the Glass Suppliers requirements and 'technical literature', and within the warranty requirements.

All installation techniques shall be exactly as recommended by the Glass Supplier. All work shall be such as to leave a neat, efficient, robust and sound installation, to the required standard and free from damage and defects.

Take all reasonable measures during installation to protect the Non-Structural Glazing system finish from damage and surface marking. Carry out routine cleaning of this work as necessary.

Make all necessary provisions to protect adjacent finished work and surfaces from damage during installation.

9.3.8 Delivery & Handling

9.3.8.1 Delivery & handling:

Take delivery of the glass and accessories undamaged and in good condition. Reject any item found to be defective or damaged and contact the manufacturer/supplier for replacement.

Store components and accessories undercover in a secure and weatherproof space, off the floor, on a flat and level surface in accordance with the Glass Suppliers requirements. Ensure stored items are protected from damage and contamination and imposed loads until required for installation.

Do not use damaged or defective materials, or products that are beyond their designated shelf life.

Should a problem be encountered with any Non-Structural Glazing System item during use or delivery, immediately contact the Glass Supplier. Do not continue to use the item that is not performing to specification or expectation. Keep the item in question and where possible, the original packaging.

Handle materials in accordance with the Glass Suppliers requirements and in a manner that prevents damage and marking and does not reduce its performance.

Installers shall be familiar with, and comply with, the Glass Suppliers safe handling requirements and precautions for use, and shall use appropriate safety gear as necessary.

Installers shall conform to all relevant WorkSafe NZ http://www.worksafe.govt.nzGuidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

9.3.9 Preparation

9.3.9.1 Preparation:

Prior to installation, carry out all necessary inspections of the supporting structure to ensure all preliminary work is complete. Do not commence installation until all necessary preliminary work by others is complete and to the required standard. The commencement of work on each section of the installation shall be deemed to indicate full acceptance by the Installer that all preliminary work by other trades is complete and to the required standard.

Supporting structures shall comply with the NZ Building Code, and must be structurally sound and dimensionally stable and in the correct alignment, true to line and level.

Confirm the location of all movement control joints prior to the commencement of the works.

Concrete:

- Supporting reinforced concrete elements shall comply with NZS 3101, or NZS 3604.
- New concrete must have aged for a minimum of 28 days prior to installation.

Concrete Masonry:

- Supporting reinforced concrete masonry elements shall comply with NZS 4229, or NZS 4230 and AS/NZS 1170.

Timber Framing:

- Supporting timber-framed structures shall comply with NZS 3604, or NZS 3603 and AS/NZS 1170.

Structural Steel:

- Supporting steel structures shall comply with NZS 3404.

9.3.10 Installation

9.3.10.1 Installation to Timber surround:

Install Glazing system in accordance with Standard Glass installation methods and ‘technical literature’.

Ensure all rebates and grooves are clean, dry and unobstructed at time of priming, sealing and glazing.

Ensure that all rebates have been primed with a primer suitable for this purpose and applied to the requirements of the painting section/s.

Before fixing ensure that timber beads are sealed and painted to match the timber surround. Centralise the glass in the rebate opening using setting, location and spacer blocks as required in NZS 4223.1, Section 4 Glazing, to prevent movement of glass in the rebate, and cushion the effect of wind loading on the sealing system. Back putty to give a bedding of not less than 1 to 2mm between the glass and the back of the rebate when the glass has been pressed back. Strip off squeezed out putty at a positive angle. Fix glass to wooden surrounds with diamond points or sprigs at maximum 460mm centres. Fix glass to metal surrounds with spring clips or pins provided by the sash manufacturers. Apply putty to the face to form a triangular fillet stopping 1-2mm below sight line. Finish putty smooth and true to line and face and with a light brushing. Leave all windows and doors if applicable closed until putty has set sufficiently to prevent glass displacement. Prime putty fronting once surface has skinned - normally within 10 - 15 days of completion of glazing, but this can be reduced with special XHP putty.

For bead glazing with a pre-formed strip, apply the preformed tape to the rebate upstand with securely formed (or sealed) butt joints at corners. Place setting blocks, offer the glass and press back against the tape centralised in the opening and apply the second tape. Press the beads against and compressing the tapes and fix true to line and face sufficiently rigid to prevent flexing or movement. Trim off excess strip. If a capping bead is required clean and paint the timber surface and when dry apply sealant capping between bead and glass and tool to a smooth camber.

For bead glazing with non-setting compound - apply compound to the rebate. Push setting blocks into place with distance pieces against the rebate upstand before offering the glass to the surround on setting blocks, centralised in the opening and pushed back into the glazing compound. Fill all voids with compound and apply more compound before setting distance pieces in opposite to the distance pieces already in place. Bed the beads to the glass and rebate and fix true to line and face sufficiently rigid to prevent flexing or movement. Finish compound at an angle both sides of the glass.

For IGU installations, refer to the glazing manufacturer's requirements and before glazing to ensure that the materials forming the opening are strong enough to accept the weight, and the rebates are the correct size and prepared to receive the units to AS/NZS 4666. Fit setting and location blocks and bead glaze units using a compatible sealant to AS/NZS 4666 section 3 Glazing, and to the glazing manufacturer's requirements.

In addition, for reflective and Low E coated glazing refer to the requirements of the glass manufacturer and ensure that the rebate dimensions, clearances and edge cover are sufficient to allow for the movement created by the particular solar glass being used. Check thermal stability for the particular location and ensure any sealant or compound is compatible with the coating.

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9.3.10.2 Installation to Aluminum surround :

Install Glazing system in accordance with Standard Glass installation methods and ‘technical literature’.

Install glass to NZS 4223.1. Bead glaze to Section 4 Glazing. Channel glaze to Section 4 Glazing, and Section 5 for Framed, Unframed, Partly Framed Glass Assemblies.

9.3.11 Completion

9.3.11.1 Completion

Check the Non-Structural Glazing system has been correctly installed in accordance with the Glass Suppliers requirements to the locations, layout and details shown on the design drawings.

Check the installation for damage and defects, including surface marking. Carry out any necessary repairs in accordance with the Glass Suppliers requirements to the required standard. Replace the Non-Structural Glazing system elements where repair is not possible or will not be accepted.

Leave all of this work complete, clean and free from damage and defects, and to the required standard in accordance with the Glass Suppliers requirements.

Leave surrounding surfaces clean and free of rubbish and debris. Remove all rubbish and excess material from the site.

Issue to the Owner a copy of the manufacturer's maintenance requirements if applicable.

10 INSULATION

10.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

10.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3101.1&2:2006(NZS)	Concrete Structures Standard
3104:2003(NZS)	Specification for concrete production
3109:1997(NZS)	Concrete construction
3112.1:1986(NZS)	Methods of test for concrete - Tests relating to fresh concrete
3112.2:1986(NZS)	Methods of test for concrete - Tests relating to the determination of strength of concrete
3114:1987(NZS)	Specification for concrete surface finishes
3121:2015(NZS)	Water and aggregate for concrete
3604:2011(NZS)	Timber-framed buildings
4218:2009(NZS)	Thermal insulation - Housing and small buildings
4220:1982(NZS)	Code of practice for energy conservation in non-residential buildings
4243.1:2007(NZS)	Energy efficiency - Large buildings - Building thermal envelope
4246:2016(NZS)	Energy efficiency - Installing bulk thermal insulation in residential buildings
4671:2019(AS|NZS)	Steel for the reinforcement of concrete
4859.1:2018(AS|NZS)	Thermal insulation materials for buildings - Part 1: General criteria and technical provisions
4859.2:2018(AS|NZS)	Thermal insulation materials for buildings - Part 2: Design
NZBC B1/VM1	Structure
NZBC F2	Hazardous Building Materials

10.3 EXPOL Concrete Slab Insulation

10.3.1 Scope

Supply and install the selected EXPOL concrete slab insulation, complete with all accessories, reinforcing, and construct the concrete slab to the layout and details shown on the drawings. All aspects of this work shall be in accordance with the EXPOL concrete slab insulation specification and guidelines (check www.expol.co.nz or call 0800 86 33 73 for the latest editions), other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for EXPOL concrete slab insulation products.

10.3.2 Requirements

10.3.2.1 Requirements

Safety
Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

Extent of Work
The following is a list and a general description of the extent of the EXPOL Concrete Slab Insulation works, which are more specifically defined in the contract documents, required for the completion of the contract works:

Defective Materials & Work
Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected EXPOL materials and work shall be repaired and/or replaced to the satisfaction of the Architect/Designer, without delay and at no additional cost to the principal.

Should a problem be encountered with any EXPOL product during use or delivery, immediately contact EXPOL on 0800 86 33 73 or email tech@expol.co.nz. Contact EXPOL within 48 hours of finding the defective product. Do not continue to use the product that is not performing to specification or expectation. Keep the product in question, and where possible, the document batch numbers and/or manufacturing details.

Transportation
When transporting, storing or installing, ensure the EXPOL EPS Sheet is not exposed to:
Petroleum based solvents, or
Fire, or
Sustained direct sunlight.

10.3.2.2 Engineering Design

All works are to be constructed as per the architectural and engineering drawings, details, documents and specifications. Work is to be undertaken by experienced and suitably qualified persons to best industry practice and to the NZBC / relevant NZ standards. The contractor shall specifically ensure that works adhere to the information presented in the architectural and engineering design for: site preparation, foundation substrate preparation, grades and details of reinforcing steel, the EXPOL placement and the local authority inspection regime.

10.3.3 Co-operation

Co-operate with all relevant trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with trades, the locations of penetrations, services, drainage fittings and shower set-downs, installed by others, to install the EXPOL Concrete Slab Insulation to the required layout and standard.

10.3.4 Substrate

The soil or fill beneath the foundation is to be prepared to the structural / civil engineer's requirements and to comply with the requirements of NZBC B2. Ensure that the required fill and its compaction meets the requirements of NZS 4431. Ensure that the foundation DPM, laps and details are completed as shown in the contract documents.

10.3.5 Workmanship

All installation work, including preparatory blinding, DPM, formwork, reinforcing, concreting and finishing techniques, shall be carried out by experienced tradesmen under the direct supervision of a LBP, familiar with the specified products and installation techniques, in accordance with the manufacturer's installation requirements, NZS 3109 and NZS 3114, and as noted and detailed on the drawings.
Store and handle all materials and products in accordance with the manufacturer's recommendations.
Notify the BCA for inspection of the excavation and of the slab ready for pouring, keep all records and test results they may require.

10.3.6 EXPOL Concrete Slab Insulation

EXPOL SLABX200 specifically designed for insulating concrete slabs. It delivers an uncompromised compressive strength of 200kPa @ 10% deformation and exceptional Insulation Values. Specifically engineered for residential and commercial projects
Size: 2400x1200mm
Insulation thickness: 100mm
Concrete Finish: U3, F5
DPM: 0.25mm thick polythene
Install as per EXPOL guidance and engineering contract documents. If in doubt, contact EXPOL for more information.

10.3.7 Installation

Refer to EXPOL Building Product Information Sheet (Class 1). See Attached or visit www.expol.co.nz or email tech@expol.co.nz.
Installation shall only be undertaken by suitably qualified and experienced tradespeople.
Ensure that the site has been scraped of organics and topsoil and prepared as directed by the geotechnical engineer or structural engineer, to 'good ground' with the required bearing capacity, or as instructed.
If hardfill is required, ensure it is compacted as shown in the contract documents, to the required depth and in a layer depth as specified. Ensure the observing engineer has approved the preparatory works and fill compaction before carrying on further. Ensure the base is level and finished with 50mm of fine material, such as river blinding or crusher dust.
Before laying all EXPOL products, please observe the followin
• Site ground works must be complete
• Site must be completely level
• 50mm of crusher dust or manufactured sand must be laid on the entire site
• All plumbing is installed and inspected
All electrical cables should not be allowed direct contact with EXPOL EPS Sheet and require PVC sheathing.The boxing can be put in place following the site prep, with the specified DPM installed following this. Ensure all laps are taped and penetrations fully sealed. Care should

be taken to ensure the DPM is installed as per manufacturer's instructions and is not damaged during installation of the EXPOL or reinforcing.
The EXPOL shall be installed as shown in the contract drawings, to the locations, direction of installation, details, methods and EXPOL Building Product Information Sheet (Class 1). EXPOL shall be installed in accordance with the installation instructions and if maintained according to relevant Standards including NZS-4246. All penetrations shall be cut in EXPOL as per instructions.

Reinforce as specified, and as noted and detailed on the drawings. All reinforcing bars, stirrups, links, mesh etc., accurately positioned and firmly secured to the required cover. Install proprietary control joints to the manufacturer's details and as shown on the drawings. Install plumbing waste pipes etc. as required and install the reinforcing mesh over the top of the EXPOL, seated on mesh chairs, install shrinkage control bars across internal corners as noted. Install starters as detailed for any subsequent masonry walls, ensuring accurate positioning (as bending to masonry core positions is not acceptable).

Pour the specified concrete, vibrate, screed, cure and finish as specified or as per notes.

10.3.8 Completion

Check that the concrete slab has been correctly formed and finished, that all cast-in items are correctly installed and positioned and that the DPM has been lapped up as detailed. Check for damage and faults and repair as necessary. Leave the slab and surrounding area clear of rubbish and any EXPOL off-cuts, remove from site.

Complete the EXPOL "XPS 15 YEAR PRODUCT WARRANTY" at EXPOL XPS Warranty.
Or EXPOL "EPS 20 YEAR PRODUCT WARRANTY" at EXPOL EPS Warranty.

10.4 Pink Batts Insulation

10.4.1 Scope

Supply and install Pink® Batts® Insulation, as specified herein, to the locations identified on the drawings, complete with all accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with Tasman Insulation technical information and installation requirements (check pinkbatts.co.nz, call 0800 746 522, or email customer@pinkbatts.co.nz for the latest editions), other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for Pink® Batts® Insulation.

Pink® Batts® insulation is certified under the GREENGUARD Certification Program (UL 2818). Being certified for indoor air quality gives an assurance that products meet strict chemical emissions limits (including minimal levels of VOCs and formaldehyde), to help create healthier indoor environments.

The following is a list and/or general description of the extent of the Pink® Batts® Insulation works, which are more specifically defined in the contract documents, required for the completion of the contract works:

10.4.2 Requirements

10.4.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

10.4.2.2 Warranty - applies to BRANZ Appraised Pink® Batts® Ceiling & Wall products

Pink® Batts® Lifetime Product Warranty:
- 50 Years Warranty for BRANZ Appraised Pink® Batts® ceiling and wall products installed according to the warranty conditions.
- Provide the Pink® Batts® Lifetime Product Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of permanent installation.

10.4.2.3 Substitutions

Pink® Batts® Insulation shall be as specified herein and as indicated on the approved drawings. The substitution of Pink® Batts® branded products for alternative brands is not permitted under any circumstances.

The substitution of a specified Pink® Batts® product for an alternative Pink® Batts® branded product by the Installer (PinkFit® or other) shall only be permitted with the Contract Administrator's written authorisation, and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate alternative Pink® Batts® branded products to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Installer.

10.4.2.4 Inspections

Carry out all necessary pre-installation and pre-line inspections of Pink® Batts® Insulation for each area of work in accordance with the requirements of industry best practice recommendations and manufacturer guidelines.

Complete a Pre-Installation Checklist prior to installation, and a Pre-Line Checklist before handing over for subsequent work.

Note: Pink® Batts® checklist applies only to Pinkfit.

10.4.3 Wall Thermal Insulation

10.4.3.1 Pink® Batts® Ultra® R2.8 Wall

Pink® Batts® Ultra® R2.8 Wall - product code 7127128. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-2.8. 90mm thick x 560mm wide x 1140mm long segments.

BRANZ Appraised for use as a thermal insulating material for framed or part-framed walls, ceilings and roofs of domestic and commercial buildings according to the conditions and limitations of BRANZ Appraisal No.238. Refer to product data -

https://www.pinkbatts.co.nz/assets/Products/April-2022-changes-/Wall-Product-Sheet_April22_1075-RevF.pdf

Pink® Batts® Ultra® R2.8 Wall is licenced with Environmental Choice New Zealand: Thermal Building Insulants Licence No.2504017.

Installed as wall cavity thermal insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location:

10.4.3.2 Pink® Batts® Ultra® R4.0 140mm Wall

Pink® Batts® Ultra® R4.0 140mm Wall - product code 7127140. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-4.0. 140mm thick x 560mm wide x 1140mm long segments.

BRANZ Appraised for use as a thermal insulating material for framed or part-framed walls, ceilings and roofs of domestic and commercial buildings according to the conditions and limitations of BRANZ Appraisal No.238. Refer to product data - https://www.pinkbatts.co.nz/assets/Products/April-2022-changes-/Wall-Product-Sheet_April22_1075-RevF.pdf

Pink® Batts® Ultra® R4.0 140mm Wall is licenced with Environmental Choice New Zealand: Thermal Building Insulants Licence No.2504017.

Installed as wall cavity thermal insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location:

10.4.4 Ceiling Thermal Insulation

10.4.4.1 Pink® Batts® Superbatts® R7.0 Ceiling

Pink® Batts® Superbatts® R7.0 Ceiling - product code 7113170. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-7.0 - 275mm thick x 460mm wide x 1220mm long segments.

Pink® Batts® ceiling insulation is a lightweight flexible glasswool insulation product designed to:

- thermally insulate ceilings in new homes, be retrofitted into existing homes without insulation, or over existing insulation for better performance;
- fit easily into standard ceiling constructions, or be easily cut to fit non-standard constructions;
- meet the requirements of the New Zealand Building Code for different designs and environments.

Pink® Batts® Ultra® R7.0 Ceiling is BRANZ Appraised - refer to BRANZ Appraisal No.238.

Pink® Batts® Ultra® R7.0 Ceiling is licenced with Environmental Choice New Zealand: Thermal

Building Insulants Licence No.2504017. Refer to data - https://www.pinkbatts.co.nz/assets/Uploads/Downloads/Roof-and-RTA-Data-Sheet-February-2023.pdf

Installed as ceiling thermal insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location:

10.4.4.2 Pink® Batts® Skillion Roof R1.0

Pink® Batts® Superbatts®Skillion Roof R1.0 - product code 7113210. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-1.0. 40mm Max. thickness x 580mm wide x 1220mm long segments.

Pink® Batts® Skillion Roof insulation products are specifically designed for skillion roofs, and provide high levels of thermal performance while ensuring the maximum thickness the segments can achieve.

Pink® Batts® Skillion Roof insulation has been BRANZ Appraised for use as a thermal insulating material for timber framed skillion roofs of domestic and commercial buildings - refer to BRANZ Appraisal No.767.

Installed as ceiling thermal insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location:

10.4.4.3 Pink® Superbatts® Skillion Roof R5.0

Pink® Superbatts® Skillion Roof R5.0 - product code 7113250. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-5.0. 180mm Max. thickness x 560mm wide x 1220mm long segments.

Pink® Superbatts® Skillion Roof insulation products are specifically designed for skillion roofs, and provide high levels of thermal performance while ensuring the maximum thickness the segments can achieve.

Pink® Superbatts® Skillion Roof insulation has been BRANZ Appraised for use as a thermal insulating material for timber framed skillion roofs of domestic and commercial buildings - refer to BRANZ Appraisal No.767.

Installed as ceiling thermal insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location:

10.4.4.4 Pink® Superbatts® Skillion Roof R6.0

Pink® Superbatts® Skillion Roof R6.0 - product code 7113260. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-5.0. 230mm Max. thickness x 560mm wide x 1220mm long segments.

Pink® Superbatts® Skillion Roof insulation products are specifically designed for skillion roofs, and provide high levels of thermal performance while ensuring the maximum thickness the segments can achieve.

Pink® Superbatts® Skillion Roof insulation has been BRANZ Appraised for use as a thermal insulating material for timber framed skillion roofs of domestic and commercial buildings - refer to BRANZ Appraisal No.767.

Installed as ceiling thermal insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location:

10.4.5 Building Insulation Blanket (BIB)

10.4.5.1 Pink® Batts® BIB R1.2 Blanket

Pink® Batts® BIB R1.2 Blanket - product code 7250001. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-1.2. 50mm thick x 1.2m wide x 12m long rolls.

Pink® Batts® Building Insulation Blanket (BIB) is specifically designed for commercial roof and commercial wall applications. When used in residential applications, installation must be completed in line with NZS 4246.

BRANZ Appraised for use as a thermal insulating material for framed or part-framed walls, ceilings and roofs of domestic and commercial buildings according to the conditions and limitations of BRANZ Appraisal No.238. Refer to product data - https://www.pinkbatts.co.nz/assets/BIB/PB_BIB-ProductSheet_MARCH22_1080-RevD.pdf

Installed as thermal insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location:

10.4.6 Acoustic Insulation

10.4.6.1 Wall - Pink® Batts® Silencer® 100mm

Pink® Batts® Silencer® 100mm - product code 7317001. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. STC 43 (*with 10mm GIB® Standard plasterboard each side*), R-value R-2.4 (estimate only). 100mm thick x 560mm wide x 1140mm long segments. Suits 90mm thick framed internal walls.

Pink® Batts® Silencer® wall insulation is designed for use in internal walls only where both acoustic and thermal properties are desired. Do not use Pink® Batts® Silencer® insulation for external wall applications.

Refer to product data - https://www.pinkbatts.co.nz/assets/Acoustic-Silencer-Product-Sheet-FEB20-RevD.pdf

Installed as internal wall cavity acoustic insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location: between bathrooms and bedrooms, between bedrooms

10.4.6.2 Floor - Pink® Batts® Silencer® Midfloor

Pink® Batts® Silencer® Midfloor - product code 7310051. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. IIC Rating 43 (*construction: 200 x 50mm floor joist @450mm crs, 20mm particle board flooring, 10mm GIB standard plasterboard ceiling lining fixed to ceiling battens @ 400mm crs)*. R-value R-3.6 (estimate only). 150mm thick x 432mm wide x 1140mm long segments.

Pink® Batts® Silencer® Midfloor insulation is specifically designed to reduce noise transmission between floors.

Refer to product data - https://www.pinkbatts.co.nz/assets/Acoustic-Silencer-Product-Sheet-FEB20-RevD.pdf

Installed as inter-storey floor acoustic insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location: Refer to drawings

10.4.7 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with trades to install Pink® Batts® Insulation as required.

10.4.8 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

The building envelope must be fully enclosed and weatherproof, with construction materials framing at or below the required moisture content, before insulation installation commences.

All installation work shall be carried out by registered PinkFit® Installers, or by experienced and competent installers, familiar with the specified products and installation techniques, in accordance with the manufacturer's requirements, and to fully comply with all warranty requirements.

Carry out all necessary pre-installation and pre-line inspections of Pink® Batts® Insulation for each area of work in accordance with the requirements of industry best practice recommendations and the manufacturer's guidelines. Inspect all Pink® Batts® insulation work before it is closed off with linings or made inaccessible.

Insulation shoud be installed without leaving gaps or compresing the material. Always maintain full insulation thickness to ensure that the stated thermal and acoustic values are achieved. Do not install insulation into closed cavities with a cavity depth less than the insulation's stated thickness.

10.4.9 Delivery & Handling

Store the Pink® Batts® Insulation materials undercover, in a weatherproof environment, off the floor, on a flat, even surface in accordance with the manufacturer's requirements. Keep materials dry and protected from damage, moisture and contamination at all times.

Do not use damaged or defective materials.

Should a problem be encountered with any Pink® Batts® Insulation product, immediately contact Pink® Batts® on 0800 746 522. Do not continue to use the product that is not performing to specification or expectation. Keep the product in question and where possible, the bale package documentation with batch number and/or date of manufacture.

Handle Pink® Batts® Insulation products in accordance with the manufacturer's requirements and in a manner that prevents damage to and contamination of the product. Ensure installed Pink® Batts® Insulation remains dry at all times.

Installers shall be familiar with and comply with the manufacturer's https://www.pinkbatts.co.nz/assets/Products/April-2022-changes-/Pink-Batts-Insulation-SDS-v-1.6.pdfprecautions for use, and use recommended safety gear when handling materials.

Conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

10.4.10 Installation

10.4.10.1 General

Install Pink® Batts® Insulation in accordance with NZS 4246 and the manufacturer's requirements.

Each installation is unique, so prior to installation:
- check for all hazards that may cause injury; and
- carry out any required repair work before starting installation; and
- ensure there's adequate lighting to identify any hazards; and
- treat all electrical cables as live, being careful not to cut or expose cables and wires; and
- beware of other sharp objects (protruding nails, splinters etc.), pests (bees and wasps), loose boards and pipe work.

10.4.10.2 Pink® Batts® Wall

Pink® Batts® wall insulation segments shall be oversized by no more than 10mm than the wall framing spacings. If cutting is required, cut oversize by 5mm to ensure a good friction fit.

Friction fit the insulation segments between wall framing members ensuring there is no undue compression, gaps, creases, tucks or folds, and the insulation is finished flush with the framing edges.

Firmly butt all insulation segment joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum thermal performance.

Refer to installation instructions - https://www.pinkbatts.co.nz/assets/Products/April-2022-changes-/Wall-Installation-instructions_April22_1076RevH.pdf

Fit Pink® Batts® insulation tight and close around electrical cables and pipes. As necessary, partially cut and fit insulation around cables and pipes. Take extreme care when working around exposed electrical cables - treat all cables as live.

10.4.10.3 Pink® Batts® Ceiling - General Suspended Ceiling

Carefully lay Pink® Batts® ceiling insulation segments over the suspended ceiling lining and supports ensuring there is no undue compression, gaps, creases, tucks or folds in the insulation.

Butt insulation, without leaving gaps, against wall lining along suspended ceiling edges - where necessary, drape insulation into open wall cavities, trim around wall framing as necessary.

Firmly butt all insulation segment joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum thermal performance.

Ensure that the appropriate clearances are maintained for electrical equipment, heating and ventilation equipment, heated flues and pipes, etc. Where possible, place insulation beneath electrical wiring and plumbing. Take extreme care when working around exposed electrical cables - treat all cables as live.

10.4.10.4 Pink® Batts® Ceiling - Truss/Framed Roof

Pink® Batts® insulation segments shall be oversized by no more than 10mm wider than the ceiling framing spacings.

Lay the insulation segments over the ceiling, friction fitted between the ceiling joists/truss chords, ensuring there is no undue compression, gaps, creases, tucks or folds in the insulation.

Firmly butt all insulation segment joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum thermal performance.

Cover the entire ceiling, including the outer edge of the top plate of external walls - the insulation must cover at least 50% of external top plates.

Maintain a minimum 25mm clearance between the top of the ceiling insulation and any roofing material, including underlay. If required, trim the insulation or use a thinner product around the perimeter.

Refer to installation instructions - https://www.pinkbatts.co.nz/assets/Uploads/Downloads/Roof-Installation-Instructions-February-2023.pdf & https://www.pinkbatts.co.nz/assets/Uploads/Downloads/Pink-Superbatts-Installation-Instructions-April-2023-v2.pdf

Ensure that the appropriate clearances are maintained for electrical equipment, heating and ventilation equipment, heated flues and pipes, etc. Where possible, place insulation beneath electrical wiring and plumbing. Take extreme care when working around exposed electrical cables - treat all cables as live.

10.4.10.5 Pink® Batts® Skillion Roof

Pink® Batts® Skillion Roof insulation segments shall be oversized by no more than 10mm wider than the rafter spacings.

Friction fit insulation segments between rafters/top chords, behind ceiling battens where provided, ensuring there is no undue compression, gaps, creases, tucks or folds in the insulation.

Maintain a minimum 25mm clearance between the top of the insulation and any roofing material, including underlay.

Firmly butt all insulation segment joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum thermal performance.

Cover the entire area, including the outer edge of the top plate of external walls - the insulation must cover at least 50% of external top plates.

Refer to installation instructions - https://www.pinkbatts.co.nz/assets/Uploads/Downloads/Skillion-Roof-Installation-Instructions-February-2023.pdf

Ensure that the appropriate clearances are maintained for electrical equipment, heating and ventilation equipment, heated flues and pipes, etc. Where possible, place insulation beneath electrical wiring and plumbing. Take extreme care when working around exposed electrical cables - treat all cables as live.

10.4.10.6 Pink® Batts® BIB - Wall

Friction fit Pink® Batts® BIB insulation blanket between wall framing members, ensuring there is no undue compression, gaps, creases, tucks or folds.

Fill all framing voids and pockets. Firmly butt all blanket joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum thermal performance.

Refer to installation instructions - https://www.pinkbatts.co.nz/assets/BIB/BIB-Installation-instructions_-MARCH-22-RevD.pdf

Fit Pink® Batts® BIB behind electrical wiring and plumbing work. Where necessary, partially cut and fit insulation around cables and pipes. Take extreme care when working around exposed electrical cables - treat all cables as live.

10.4.10.7 Pink® Batts® BIB - General Suspended Ceiling

Carefully lay Pink® Batts® BIB insulation blanket over the suspended ceiling lining at right angles to the ceiling supports, ensuring there is no undue compression, gaps, creases, tucks or folds in the insulation.

Butt insulation, without leaving gaps, against wall lining along suspended ceiling edges - where necessary, drape insulation into open wall cavities, trim around wall framing as necessary.

Firmly butt all insulation blanket joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum thermal performance.

Ensure that the appropriate clearances are maintained for electrical equipment, heating and ventilation equipment, heated flues and pipes, etc. Where possible, place insulation beneath electrical wiring and plumbing. Take extreme care when working around exposed electrical cables - treat all cables as live.

10.4.10.8 Pink® Batts® Ceiling - Armstrong Suspended Ceiling

Carefully lay Pink® Batts® BIB insulation blanket over the Armstrong suspended ceiling lining at right angles to the ceiling supports, ensuring there is no undue compression, gaps, creases, tucks or folds in the insulation.

Limit BIB insulation to a maximum of 1.27 kg/m2 - R2.6 (maximum) with the grid supporting the weight of the insulation. Where a higher total R value is required provide additional insulation between or below the roof structure on mesh as required by the drawings.

Butt insulation, without leaving gaps, against wall lining along suspended ceiling edges - where necessary, drape insulation into open wall cavities, trim around wall framing as necessary.

Firmly butt all insulation blanket joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum thermal performance.

Ensure that the appropriate clearances are maintained for electrical equipment, heating and ventilation equipment, heated flues and pipes, etc. Where possible, place insulation beneath electrical wiring and plumbing. Take extreme care when working around exposed electrical cables - treat all cables as live.

10.4.10.9 Pink® Batts® BIB - Roof

As as detailed, lay Pink® Batts® BIB insulation blanket over the safety netting or sarking, between roof purlins or battens, ensuring there is no undue compression, gaps, creases, tucks or folds in the insulation.

Firmly butt all insulation joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum thermal performance.

Maintain a minimum 25mm clearance between the top of the insulation and any roofing material, including underlay.

Except where shown otherwise on the drawings, cover the entire roof area to the outer edge of external walls.

Refer to installation instructions - https://www.pinkbatts.co.nz/assets/BIB/BIB-Installation-instructions_-MARCH-22-RevD.pdf

Ensure that the appropriate clearances are maintained for electrical equipment, heating and ventilation equipment, heated flues and pipes, etc. Where possible, place insulation beneath electrical wiring and plumbing. Take extreme care when working around exposed electrical cables - treat all cables as live.

10.4.10.10 Pink® Batts® Silencer® Wall

Pink® Batts® Silencer® acoustic insulation segments shall be oversized by no more than 10mm than the wall framing spacings.

Friction fit the insulation segments between wall framing members ensuring there is no undue compression, gaps, creases, tucks or folds, and the insulation is finished flush with the framing edges.

Firmly butt all insulation segment joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum acoustic performance.

Refer to installation instructions - https://www.pinkbatts.co.nz/assets/Silencer-acoustic-Installation-instructions-2.pdf

Fit Pink® Batts® Silencer® insulation tight and close around electrical cables and pipes. As necessary, partially cut and fit insulation around cables and pipes. Take extreme care when working around exposed electrical cables - treat all cables as live.

10.4.10.11 Pink® Batts® Silencer® Midfloor

Install Pink® Batts® Silencer® Midfloor acoustic insulation as detailed on the drawings, ensuring there is no undue compression, gaps, creases, tucks or folds in the insulation.

Firmly butt all insulation joins together, ensuring there are no gaps, and maintain full thickness of the insulation to ensure maximum acoustic performance.

Ensure that the appropriate clearances are maintained for electrical equipment, heating and ventilation equipment, heated flues and pipes, etc. Where possible, fit acoustic insulation beneath electrical wiring and plumbing. Take extreme care when working around exposed electrical cables - treat all cables as live.

10.4.11 Completion

Check that all specified Pink® Batts® Insulation products have been installed correctly in accordance with the manufacturer's requirements.

Check for damage and defects - replace damaged and defective insulation as necessary to the required standard.

Ensure the installed insulation will be adequately protected for durability and performance in accordance with the manufacturer's warranty requirements.

Leave all of this work complete, and in the condition required for proper performance, including for the installation of subsequent linings, in accordance with the manufacturer's warranty requirements.

Leave adjacent surfaces and finished work clean and free of damage. Remove all associated rubbish and waste material from site.

Issue to the Owner a copy of the Pink® Batts® Lifetime Product Warranty for all Pink® Batts® Insulation products installed.

11 METALWORK & BALUSTRADES

11.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

11.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1163:2016(AS/NZS)	Cold-formed structural steel hollow sections
1252.1:2016(AS|NZS)	High-strength steel fastener assemblies for structural engineering - Bolts, nuts and washers - Part 1: Technical requirements
1387:1985(NZS/BS)	Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads
14341:2012(AS/NZS)	Welding consumables – Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels – Classifications
1554.1:2014(AS/NZS)	Structural steel welding - Part 1: Welding of steel structures
1554.6:2012(AS/NZS)	Structural steel welding - Part 6: Welding stainless steels for structural purposes
1554.7:2014(AS/NZS)	Structural steel welding - Part 7: Welding of sheet steel structures
1665:2004(AS/NZS)	Welding of aluminium structures
1734:1997(AS/NZS)	Aluminium and aluminium alloys - Flat sheets, coiled sheet and plate
1866:1997(AS/NZS)	Aluminium and aluminium alloys - Extruded rod, bar, solid and hollow shapes
1897:1976(AS)	Electroplated coatings on threaded components (metric coarse series)
3678:2016(AS/NZS)	Structural steel - Hot-rolled plates, floorplates and slabs
3679.1:2016(AS/NZS)	Structural steel - Part 1: Hot-rolled bars and sections
3679.2:2016(AS/NZS)	Structural steel - Part 2: Welded I sections
3750(AS/NZS):Parts 1-23	Paints for steel structures
4680:2006(AS/NZS)	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles

11.3 Metalwork

11.3.1 Scope

Manufacture and install the Metalwork elements, as specified and identified on the drawings and schedules, to the locations, layout and details shown on the drawings, complete with all components and accessories. All aspects of this work shall be carried out to comply with the requirements of the New Zealand Building Code, relevant Standards, and in accordance with

any specific manufacturer's requirements, other relevant product manufacturers' recommendations, and as noted and detailed on the drawings and schedules.

11.3.2 Requirements

11.3.2.1 Shop Drawings

Prepare and submit to the Architect/Designer for verification and approval Shop Drawings, issued For Fabrication & Installation, covering the following aspects:

- Fully dimensioned plans, elevations and sections of all elements; to the appropriate scale.
- Assembly jointing and fixing methods and details; to the appropriate scale.
- Jointing details and method of fixing between individual elements/components.
- Methods of installation construction, site assembly connections and all support systems for fixed elements.
- Where required - provision for thermal movement, wind load movement, and seismic movement.
- Installation sequence for large elements.
- Co-ordination requirements with other work and trades.
- A schedule of materials, finishes, fittings, fixings and fastenings, sealants and other accessories.

Shop Drawings are required for the following Metalwork items:

11.3.2.2 Samples

Submit clearly identified material samples of specified finishes requested for approval by the Architect/Designer. Do not commence fabrication until the samples have been approved.

11.3.3 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings prior to installation.
Co-ordinate with other trades as required to manufacture and install Metalwork elements and components to the required locations and tolerances.

11.3.4 Workmanship

All fabrication, assembly and installation work shall be carried out by qualified welders and trade related tradesmen, familiar with the specified products and fabrication and assembly techniques, to the best standard of workmanship under experienced factory supervision and control. All work shall be such as to leave a neat, efficient and robust assembly. Do not use damaged or defective products to fabricate steel metalwork elements and components.

11.3.5 Delivery & Handling

Store Metalwork elements, components and accessories undercover, off the floor and on a flat, level surface. Keep dry and protect from damage, moisture and contamination at all times.
Handle elements without scratching or damaging and in a manner that prevents distortion or

deformation and pre-finished and vulnerable surfaces from rubbing together. Do no install damaged or defective metalwork elements or accessories.

11.3.6 Fabricated Elements

11.3.6.1 Balustrades

Balustrades. Materials, finish, dimensions, assembly details and installation methods as specified, scheduled and shown on the drawings.

Materials: Aluminium
Finish: powdercoatyed
Location: Refer to drawings

11.3.6.2 Handrails

Handrails. Materials, finish, dimensions, assembly details and installation methods as specified, scheduled and shown on the drawings.

Materials:
Finish:
Location: Refer to drawings

11.3.6.3 Screens

Screens. Materials, finish, dimensions, assembly details and installation methods as specified, scheduled and shown on the drawings.

Materials: Aluminum
Finish: Powdercoated
Location: Refer to drawings

11.3.7 Steel Materials

11.3.7.1 Proprietary Balustrade System

Proprietary Tubular Balustrade System. Mild steel, pre-engineered balustrade system for commercial and industrial applications, complete with system stanchions, base plates, mounting brackets, rails, bends, gates, drop barriers, and fixing accessories. Galvanised steel or untreated black steel. Installed in accordance with the manufacturer's requirements to the locations layout and details identified on the drawings.

Manufacturer & brand: Opus Smartlock
Material & finish:
Location: Refer to drawings

11.3.8 Aluminium Materials

11.3.8.1 Proprietary Balustrade System

Aluminium Proprietary Balustrade System. Pre-engineered balustrade system, complete with system stanchions, base plates, mounting brackets, rails, bends, end caps, and fixing accessories. Finish as specified. Installed in accordance with the manufacturer's requirements to the locations layout and details identified on the drawings.

Manufacturer & brand: Opus SmartLock
Finish: Powdercoated
Location: Refer to drawings

11.3.9 Fastenings & Accessories

Bolts, Nuts & Washers. Selected to suit the mechanical properties and composition of the parent metal. Bolt type, size and finish shall be selected to suit the assembly and construction and the installed location and environment of the fabricated element.

Screws. Including self-tapping screws, self-tapping and machine screws. Selected to suit the mechanical properties and composition of the parent metal. Screw type, head, gauge and length and finish shall be selected to suit the assembly and construction and the installed location and environment of the fabricated element.

11.3.10 Fabrication & Assembly

11.3.10.1 General

Ensure that appropriate quality assurance measures are followed during fabrication and assembly of elements.
Check that all materials are free of defects and damage including warping, buckling and fractures prior to manufacture.

All cutting, folding, bending, drilling, welding, grinding and finishing of materials shall be carried out using suitable machinery, tools and equipment and fabrication and finishing techniques in a factory workshop to ensure the accurate fabrication and assembly of elements, without distortion, warp, buckling or fracture, to the dimensions and details shown on the approved contract drawings (shop or otherwise).

Take all measures to protect surfaces of the work that will be visible when complete from marking, scratching and other damage likely to affect the quality, finish and appearance of the element. Remove all burrs and sharp edges and form arrised edges.

Corner joints of identical sections shall be mitred unless shown or specified otherwise.

Mechanical joints shall be tight with no visible gaps. Unless shown or noted otherwise, use countersunk screws to mechanically connect cleats to frames. Mastic seal mechanical joints of externally installed metalwork elements, including all mating surfaces, cleats and other fixtures.

All moving parts shall move freely, without binding, to the required operation, functionality and tolerances when the element is fully assembled and installed.

Carrying out any necessary finishing and cleaning requirements and leave surfaces, edges and joints smooth and free of defects and contaminants to the required completion level and in preparation for any specified coating, treatment or finish.

Prior to dispatch and delivery and where necessary; trail assemble multiple components of a single element to the completed/installed arrangement to ensure proper site assembly, fitting and installation.

11.3.10.2 Welding - General

All welds shall be shop welds, unless specified as a field weld, and in accordance with the approved For Fabrication and Installation Shop Drawings.

All weld runs shall be as specified and without a concave surface. Welds shall have proper penetration, with all slag deposits removed as work proceeds and when runs are completed. Welds shall be continuous around joints to prevent the ingress of moisture.

All butt welds are to be full penetration unless specified otherwise on the shop drawings. Butt welds shall be ground flush.
Welding of hollow sections shall incorporate internal sections or backing plates as necessary to complete the specified weld.
Open ended hollow sections shall be capped using 3mm material and seal welded, unless shown otherwise on the approved shop drawings.

Properly prepare materials for welding; ensure that all edges to be welded are dry, clean and free of grease, dirt, rust and other contaminants. Grind off any residue or scale from cutting processes prior to welding.

Tack welds shall only be used for temporary attachment where jigging is impractical and only for permanent attachment where specified on the approved shop drawings as an integral component of the fabrication.

Protect surfaces of the work that will be visible when complete from weld splatter and other damage likely to affect the quality, finish and appearance of the element.

11.3.10.3 Aluminium Welding Requirements

Welding methods employed for the manufacture of aluminium metalwork shall be:

- arc welding to AS/NZS 1665
- projection welding to BS EN 28167:1992
- seam welding to BS EN ISO 16433:2007
- gas welding
- other methods subject to approval by the Architect/Designer.

11.3.10.4 Sheet Metalwork

Accurately mark out sheet work square and true to line and as dimensioned with correct allowance for all folds, bends and laps. Use marking methods that do not damage or cause defect to the materials

Cut sheets using mechanical equipment and methods appropriate for the material, leaving edges true, square, and smooth and free from burr.

Use mechanical equipment and methods to form and fold sheets square and true and which

leave faces free of deformation, warp and defect. Avoid over-bending and sharp bending of thick sheets - refer to the manufacturer's product specification and recommendations.

Isolate dissimilar materials in close proximity as necessary by painting the surfaces or fitting suitable separating/isolating membranes and gaskets. Place separating strips between metals and treated timber and cement-based materials.

11.3.11 Finish

Powder Coated Metalwork. Metalwork elements, components, and accessories specified on the drawings and schedules as being Powder Coated shall be polyester organic powder coat finished and properly prepared and treated prior to powder coating in accordance with the manufacturer's requirements.

Powder coating manufacturer & brand: To match aluminium joinery
Colour: Refer to drawings

11.3.12 Installation

Check that all necessary building and finishing works have been carried out and completed and that the metalwork elements can be installed.

Install fixed metalwork elements plumb, level and true to line, and to the required tolerances to the locations, layout and details shown on the drawings. Provide all necessary temporary supports, all fixings and fastenings as specified and as required, and apply any required bedding compounds and sealants in accordance with the drawings. Ensure that fixed elements are secure and properly supported. Do not mark or scratch pre-finished metalwork surfaces.

11.3.13 Completion

Check that the metalwork elements have been fabricated and assembled and finished and installed to the required layout and tolerances as specified and shown on the drawings. Check that fixed elements are secure and correctly fastened. Check that all moving parts move freely and without binding to the required operation, functionality. Check for damage and defects and replace/repair as necessary.
Leave the completed works clean and tidy, and remove all rubbish and excess material from site.

Issue to the Owner a copy of any specific maintenance requirements and any manufacturer specific Product Warranty and Installer Warranty for the installed metalwork elements.

Where necessary, provide all Producer Statements.

12 INTERNAL DOORS & JOINERY

12.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

12.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1491:1996(AS/NZS)	Finger jointed structural timber
1859.1:2017(AS|NZS)	Reconstituted wood-based panels - Specifications - Part 1: Particleboard
2208:1996(AS/NZS)	Safety glazing materials in buildings
2924.1:1998(AS/NZS)	High pressure decorative laminates - Sheets made from thermosetting resins - Classification and specifications
3601:1987(NZS/BS)	Specification for carbon steel pipes and tubes with specified room temperature properties for pressure purposes
3602:2003(NZS)	Timber and wood-based products for use in building
3610:1979(NZS)	Specification for profiles of mouldings and joinery
3619:1979(NZS)	Specification for timber windows
3631:1988(NZS)	New Zealand timber grading rules
4121:2001(NZS)	Design for access and mobility: Buildings and associated facilities
4211:2008(NZS)	Specification for performance of windows
4223.1:2008(NZS)	Code of practice for glazing in buildings - Glass selection and glazing
4223.2:2016(NZS)	Glazing in buildings - Part 2: Insulating glass units
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4223.4:2008(NZS)	Glazing in buildings - Part 4: Wind, dead, snow, and live actions
4666:2012(AS/NZS)	Insulating glass units
4667:2000(AS/NZS)	Quality requirements for cut-to-size and processed glass
NZBC D1	Access Routes

12.3 Workmanship

12.3.1 Workmanship

All work shall be carried out by or under the direct supervision of competent and experienced joiners in accordance with recognised good trade practice, and shall be carried out in a properly established workshop complete with all mechanical equipment appropriate for the work. All work shall be in strict accordance with the drawings.

Confer with the Main Contractor to check openings sizes, fittings limiting dimensions and available access dimensions (and make provision for site assembly if appropriate). Additional dimensions will be supplied by the Architect/Designer if required.

All items assembled by appropriate joints customarily employed in good quality work. Joints shall be accurately cut, fitted and full surface glued and shall be tongued, mortice and tenon, doweled or housed in preference to scarfed or mitred. Use screws in preference to nails or brads. Install glue blocks in appropriate locations. Unavoidable screw pockets matching buttoned in clear finished work.

Fine machine sand all visible surfaces and handsand finish to a clean, even surface all clear finished cabinets. Lightly sand arris all projecting edges.

All veneers shall be A grade, completely free of bark pockets, checks, gum streaks, resin pockets, stains, knots (of any size), or pith. Adjacent veneers and boards in clear finished work shall be carefully selected to provide good continuity of colour and grain pattern; this particularly applies to clashing strips on veneered MDF which shall be 2mm thickness solids.

The following are unacceptable defects and will most likely result in rejection of cabinets specified for clear finishing:
a) Scratches, bruises, machine or hammer marks on exposed surfaces;
b) Glue stains on clear finish specified work;
c) Iron-on veneers;
d) Corrugated fasteners and machine staples;
e) Baseboard showing through veneers through excessive sanding (to remove marks presumably).

12.3.2 Delivery

Brace and / or crate all items as required to prevent distortion or disfigurement during transit. Arrange for delivery to site, not during inclement weather. Attend upon the carpenter to identify items and instruct in assembly procedures.

12.4 Timber Windows & Doors

12.4.1 Scope

Supply, install and commission Timber Windows and/or Doors, as specified and identified on the drawings and schedules, to the locations, layout and details shown on the drawings, complete with all components and accessories for proper installation, operation and performance. All aspects of this work shall be carried out to comply with the requirements of the New Zealand Building Code, relevant Standards, and in accordance with any specific manufacturer's requirements, other relevant product manufacturers' recommendations, and as noted and detailed on the drawings.

12.4.2 Interior Doors & Frames

12.4.2.1 Solid Timber Interior Doors

Solid Timber Interior Doors. Manufactured from solid timber, with style, rail and bar profiles in accordance with NZS 3610 or as shown on the drawings. Paint (factory pre-primed) or stain

quality - to suit the specified finish and in accordance with AS/NZS 2311. Manufactured to the dimensions and details shown on the drawings and door schedule.
Timber sections shall be to exact sizes, with mortise and tenon joints, and with profiles rebated, throated, grooved, sunk etc. as drawn, or as required, to suit glazing and panelling requirements.
Installed complete with door frame, hardware, acoustic seals, furniture and fittings, and any glazing, to the required handing and operation and locations shown on the drawings.

Manufacturer & style: T.B.C
Location: Refer to drawings

12.4.3 Interior Cavity Sliding Door Units

12.4.3.1 Solid Timber Door

Interior Cavity Sliding Doors shall be manufactured from solid timber with style, rail and bar profiles in accordance with NZS 3610 or as shown on the drawings. Paint (factory pre-primed) or stain quality - to suit the specified finish and in accordance with AS/NZS 2311.
Manufactured and pre-assembled to the dimensions and details shown on the drawings and door schedule.
Timber sections shall be to exact sizes, with mortise and tenon joints, and with profiles rebated, throated, grooved, sunk etc. as drawn, or as required, to suit glazing and panelling requirements.
Interior cavity sliding door units installed and commissioned to the required operation and performance in accordance with the manufacturer's requirements to the location and details shown on the drawings, complete with installation frame, sliding track, hardware, acoustic seals, furniture and fittings, and any glazing.

Cavity sliding door unit manufacturer and model:
Wall cavity/frame thickness:
Maximum kg load per door leaf:
Location:

12.4.4 Timber Quality

Timber for all solid timber windows and doors shall be in accordance with the requirements NZS 3602 and NZS 3631 and be equal to or better than Premium Grade and/or Select A Grade. Heart quality timbers shall comprise 100% heartwood. Items fabricated from timber which in the opinion of the Architect/Designer is deemed substandard shall be removed from the site and replaced.
Exterior timber shall be seasoned to a stable moisture content of 14-18%. Interior timber shall be seasoned to the stable moisture content (8-12% for air-conditioned or centrally heated, or 10-14% for heated, or 12-16% for unheated buildings) suitable for its location in the finished work.
If the use of inadequately seasoned timber results in winding, warping, twisting or shrinkage opening of joints in the finished work the item shall be replaced by the manufacturer.
Installation of interior doors is permitted only when the building is closed-in and weathertight.

12.4.5 Timber Species

Solid Timber Interior Doors manufactured from Radiata Pine (*Pinus radiata*), Select A Grade, Premium Clears timber, kiln dried.

12.4.6 Finish

Solid Timber Interior Doors to be Paint Finished; refer to Painting for specification requirements, materials, products and coatings. Any factory priming undertaken by the timber door manufacturer shall be carried out in strict accordance with the requirements of Painting specification.

12.4.7 Hardware

Use only fixings and fastenings that are compatible with the materials involved, and that are appropriate for the assembly and installation of the components and suitable for the installed location and environment. Unless noted otherwise on the drawings and schedules, fixings and fastenings shall be Grade 316 stainless steel where they are exposed to weather, and hot dip galvanized steel where they are not exposed to weather. Unless noted otherwise; punch nail fixings and countersink screw fixings below the timber surface for filling and finish application.

12.4.8 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-ordinate with other trades as required to install Timber Windows and Doors and accessories and hardware to the required operating performance and functionality and tolerances.
Where required, complete and submit for fabrication the manufacturer's Site Measure document confirming all window and/or door opening site-measurements, fixing types, and other necessary information prior to manufacture.

12.4.9 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All installation and commissioning work shall be carried out by experienced and competent installers, familiar with the specified products and installation techniques, in accordance with the manufacturer's installation requirements and as shown on the drawings. All work shall be such as to leave a neat, efficient and robust installation. Do not install damaged or defective products, components and accessories.

Electrical wiring (by others) shall be carried out by a qualified electrician in accordance with the electrical standards and regulations. The Electrician shall connect the power supply, set the limits and commission the door. The Door Installer shall verify the operation of the door.

12.4.10 Delivery & Handling

Arrange for delivery of windows and doors to the site only when a suitable storage situation is available for them. Store timber windows, doors, frames and accessories undercover on a flat, level surface off the floor on bearers at the appropriate spacings. Keep door and window

elements dry and protect from damage, moisture and contamination while stored. Retain any factory-applied protective coverings while stored.
Handle window and door joinery in a manner that prevents any marking, distortion, glass breakage or other damage.

12.4.11 Preparation

Timber Framed Walls, ensure that all preparatory work has been completed before installing joinery elements. Check all aspects of preparatory works to window and door openings, including but not limited to:
Check that the timber wall framing complies with NZS 3604, or is in accordance with NZS 3603 and AS/NZS 1170 for specific design, and with the drawings.
Check that all framed internal and external window openings and door openings are correctly sized for fitting tolerances, are square and correctly aligned, and that trimming members are plumb and level and true to line and plane.
Check that the specified building underlay and/or rigid air barriers have been installed in accordance with NZBC requirements and the manufacturer’s recommendations, and all finishing tapes, flashings etc. at window and door openings.
Check that flexible sill tape at window openings is installed over the wall underlay, is flush with the inside of the framing and dressed up each end of the opening minimum 100mm, and that the front edge of the tape is folded and lapped minimum 50mm over the outside face of the framing and underlay.
Check that flexible flashing tape has been installed to the corners of window and door heads minimum 100mm each way from the corner junction, is flush with the inside line of the framing and is folded minimum 50mm over the outside face of the framing and wall overlay.
Check that all preparatory materials are lapped such that any water will run down to the exterior.
Check that any rigid air barrier to unlined gables and external garage walls is installed with an absorbent flexible underlay in accordance with E2/AS1 Table 23 and the manufacturer's recommendations.
Check window and door openings adjoining other building elements to ensure that all necessary works have been completed that will enable the windows and/or doors and accessories to be installed correctly.
Check that concrete slabs are correctly rebated to accommodate exterior timber door sills and any floor mounted timber window frames as detailed on the drawings, and that any required waterproofing membrane has been applied to the rebates.

12.4.12 Installation

Install the specified interior cavity sliding door units in accordance with the manufacturer's requirements and as shown on the drawings.

Install all window and door hardware and furniture as scheduled and shown on the drawings to the required operation and functionality. Hardware will be fixed true to line and position, and adjusted and oiled as required for correct operation.

Commission opening window sashes, doors, sliding carriage assemblies, and moving components to the required operation, performance and tolerances, and ensure that all hardware is in full working order. Provide safety indication of the glass for the balance of adjacent works.

12.4.13 Completion

Check that the timber windows and doors have been installed correctly and that all opening window sashes, doors, sliding carriage assemblies, and moving components are functioning to the required operation, performance and tolerances, and that all hardware is in full working order.
Check for defects, damage and glass breakage and repair/replace as necessary.
Leave the completed installation weathertight. Remove all rubbish and excess material from site.

Issue to the Owner a copy of any manufacturer specific maintenance requirements and any manufacturer specific Product Warranty and Installer Warranty for the installed timber windows and doors, components and accessories.

Where necessary, provide all Producer Statements.

12.5 Other

12.5.1 Stairs

Carpet quality, all radiata (no MDF), fully housed, rebated, wedged etc. to best trade practice, and all fully glued and fixed to avoid any squeaks etc.

12.5.2 Miscellaneous

All items listed below shall be as detailed, and all constructed in accordance with the appropriate sections of the specification above:

- Walk-in-wardrobe shelves, laundry cupboards shelves, Guest Bedroom cupboard shelves,
- Passage cupboard shelves.
- Bedrooms 2 and 3 wardrobes.
- Main Bedroom bookcase.
- Ensuite store cupboard.
- Wineroom racks (in-situ assembly may be necessary).
- Study desk and drawers unit under.
- Front door (timber framed and tg&v infilled).
- Doors to the firewood hoist at two levels.
- Gates and door to Walled Garden.
- Doors to Gas tanks space
- Corian bench (by licensed fabricator).
- Mantlepiece.
- Wine rack.
- Wardrobe doors, frames, panels and shelves complete.
- Laylight for Toilet skylight.
- Cistern access panels

12.6 Materials

12.6.1 Timber

All timber true to NZS 3631 and equal or better than dressing A for all joinery work. Items fabricated from timber which in the opinion of the Architect/Designer is substandard shall be removed from the site.

All timber shall be seasoned to the stable moisture content (approximately 12% for most joinery applications) suitable for its location in the finished work; if the use of inadequately seasoned timber results in winding, warping, twisting or shrinkage opening of joints in the finished work the item shall be replaced (by the Joiner, excepting where the damage has resulted from excessive heating, placing in direct sun or other improper handling). Installation of cabinets shall be delayed until the building is watertight and has dried sufficiently to allow for the maximum settling of substrates.

All timber shall be to nominal sizes shown or specified subject only to normal cutting and dressing tolerances. All non-heart timber used, including cores to doors, etc. shall be treated, and shall be re-seasoned to the correct moisture content after treatment. Joinery timber shall have all machine marks, stains and roughness removed and shall all be sanded smooth.

Ensure that all enclosed surfaces of exterior joinery frames are fully primed before fixing. (If this trade carries out the priming it shall be to the standards required of the Painter).

Unless noted otherwise timbers as follows (use of alternate grades and varieties to those specified is subject to approval in each specific case):

H3.2 Finishing Radiata - Exterior joinery frames, Exterior glazed doors
H1.2 Finishing Radiata - Interior door frames painted
H1.2 Radiata clears - Cabinets specified painted
D.A. Rimu - Interior door frames varnished
D.A. Ht. Rimu and Ht. Rimu veneered board - Cabinets clear finished
D.A. Victorian Ash - Interior doors and stair balustrade capping, varnished.

12.6.2 Hardware

Nails and screws for construction shall be of appropriate gauge, thread design, corrosion resistance, length, material, and finish. Screws to hardware of material and finish to match the hardware item.

Unless otherwise noted interior doors hung on three stainless steel 100mm butts or four off 80x40 stainless steel hinges for 25mm thick doors.

Unless otherwise noted hang cabinet doors on Grass, Blum, Hafele, or Hettich where face fixed.

12.6.3 Hardware Finish

Unless specified or noted otherwise, architectural hardware and furniture shall be finished Brushed Stainless Steel.

13 FLOOR COVERINGS

13.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

13.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1884:2013(NZS AS)	Floor coverings - Resilient sheet and tiles - Installation practices
2358:1990(AS)	Adhesives - For fixing ceramic tiles
2455.2:2007(AS/NZS)	Textile floor coverings - Installation practice - Carpet tiles
3103:1991(NZS)	Specification for sands for mortars and plasters
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
3661.2:1994(AS/NZS)	Slip resistance of pedestrian surfaces - Part 2: Guide to the reduction of slip hazards
3740:2010(AS)	Waterproofing of domestic wet areas
4586:2004(AS/NZS)	Slip resistance classification of new pedestrian surface materials
4858:2004(AS/NZS)	Wet area membranes
BRANZ Good Practice Guide	Tiling
NZBC B2/AS1	Durability
NZBC D1	Access Routes
NZBC D1/AS1	Access Routes
NZBC E3/AS1	Internal Moisture

13.3 Carpet & Resilient Floor Coverings

13.3.1 Scope

Supply and install the specified Floor Coverings and flooring products to the areas and surfaces, layouts and details shown on the drawings, complete with all accessories. All aspects of this work shall be in accordance with the specified floor covering manufacturers' technical literature and installation requirements, relevant Standards and Code requirements, other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for the specified Floor Coverings and flooring products.

13.3.2 Floor Coverings

13.3.2.1 Carpet

Carpet flooring; to the specified product, pile style and content, and colour and pattern. Installed in accordance with the manufacturer's requirements and AS/NZS 2455.1 to the locations and layout shown on the drawings.

Carpet and underlay to be confirmed by interior designer

13.3.3 Adhesives

Floor covering adhesives shall be as recommended by the floor covering manufacturer, and be suitable and compatible with the specified flooring product, substrate type and environment, and the flooring product's end use; and shall be applied in accordance with the adhesive manufacturer's instructions. Seal or prime porous substrates exactly as recommended by the adhesive manufacturer.

13.3.4 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-ordinate with other trades as required to install the specified floor coverings and accessories.

13.3.5 Workmanship

All installation work shall be carried out by experienced and competent floor layers, familiar with the products specified and installation techniques, under the direct supervision of a Registered National Flooring Association (NFA) Member, in accordance with the manufacturer's installation requirements, NZS/AS 1884, AS/NZS 2455.1, AS/NZS 2455.2 and AS/NZS 4586 as relevant, and as noted and detailed on the drawings.
Use only approved adhesives that are compatible with the specified floor covering product and the substrate as recommended by the floor covering manufacturer.
The building must be fully enclosed and weathertight with all doors and necessary fittings and trim installed prior to laying floor coverings.

13.3.6 Delivery & Handling

Store and handle all floor covering products and accessories in accordance with the manufacturer's recommendations. Store products and accessories under cover and out of direct sunlight on a flat and level surface; keep dry and protect from damage and contamination at all times.
Do not use damaged or defective flooring products or accessories, or products that are beyond their designated shelf life. Do not damage or mark or distort flooring products and accessories during handling.
Allow floor coverings and accessories to properly condition for a minimum of 24 hours, or as recommended by the manufacturer, prior to laying in accordance with the manufacturer's requirements. Unless recommended otherwise by the manufacturer, do not lay floor coverings below 15ºC room temperature.

13.3.7 Substrate Preparation

13.3.7.1 General

Ensure the substrate surface is free of oil, grease and other contaminants, then sweep or vacuum as required to ensure it is absolutely clean. Ensure that any expansion or crack control joints are appropriately trimmed - do not install floor coverings over them.
The commencement of work on each section of floor shall be deemed to indicate a full acceptance by the relevant Flooring Subcontractor that all preparatory works by other trades are appropriate to achieve the required finished results.

13.3.7.2 New Concrete Floors

New concrete substrates must be compliant with NZS 3114 'U3 Surface Finish' and with the floor covering manufacturer's requirements and must have aged for a minimum of 28 days prior to laying the floor coverings. Check for moisture content by hygrometer reading to BRANZ BU330 - do not commence laying floor coverings until the substrate is surface-dry and the moisture readings are less than 75% relative humidity over the entire surface.
Grind off any high spots on the concrete slab, and using the specified proprietary levelling compound repair flush with feathered edges any low spots or damaged areas then grind smooth.
Lightly grind or shot blast any surface that is glazed to the extent that may compromise the adhesive bond. Leave the surface clean and free of dust and contaminants etc.

Location:

13.3.7.3 New Particle Board Floors

Check that the particle board sheets have been laid with staggered joints, with joints gapped 1mm - 2mm and supported on all edges on framing members or unsupported T&G jointed long-edges, and is fixed exactly to the particle board manufacturer's recommendations.
Using the specified proprietary levelling compound, repair flush with feathered edges any damaged areas of the particle board floor. Mechanically sand to remove all surface irregularities and contaminants likely to effect the floor covering adhesion. Vacuum clean leaving the surface clean and free of dust and contaminants etc.
Check that all particle board sheet joints are flush and even, and that all fixings are countersunk and filled with a compatible filler.
Check to ensure the particle board moisture content is below 12% for air-conditioned spaces, 14% for intermittently heated spaces, and 16% for unheated spaces - do not commence laying floor coverings until the particle board is surface-dry and the moisture readings are less than the required moisture level over the entire area.

Location:

13.3.8 Installation

13.3.8.1 Carpet Floor Coverings - Conventional Stretch-in

Install by conventional stretch-in method carpet floor coverings, and accessories, including all jointing, in accordance with the manufacturers' recommendations, procedures and techniques, AS/NZS 2455.1, and as shown on the drawings.

Allow the carpet underlay and carpet floor coverings to properly condition in accordance with the manufacturers' recommendations prior to laying. Turn underfloor heating systems off 48 hours prior to installation and leave off during installation and for a minimum of 48 hours after completion. Thoroughly clean each area before commencing work. Seal or prime as necessary any porous surface receiving floor covering adhesive, and apply adhesive exactly to the manufacturer's recommendations.

Confirm the location of all carpet joints and seams prior to laying. Install carpet rolls in consecutive sequence and in the same direction. Do not install carpet underlay and carpet floor coverings over expansion joints - use only the specified expansion joint cover strip and neatly finish the underlay and carpet flooring in accordance with the cover strip manufacturer's requirements.

Install edge grippers and lay the carpet underlay at right angles to the direction of the carpet floor covering with joints no less than 300mm from any seam in the carpet. Staple or adhesive fix underlay to substrates in accordance with the manufacturer's recommendations.

Carpet flooring installed flat and taut and evenly tensioned both ways by power stretching sequence. All seams and cross joins to be close-fitting and fused together with hot melt tape. Cut and properly prepare cross joins to ensure accurate pattern alignment.
Accurately install stair tread nosings and lay pre-cut carpet pieces to each stair tread and riser and finish neatly into or under the nosing edge as necessary.
Install any required carpet skirting, capping and edge trim, transition strips and naplock bars, as noted and detailed on the drawings; all finished straight and level and true to line.

Keep the working area cordoned off and protected during installation and protect completed installation work from damage and contamination until hand over of the works as programmed/scheduled.

13.3.9 Completion

Ensure that the specified floor coverings have been installed correctly, and that all seams, joints and accessories have been and completed correctly. Check for damage and defects and repair or replace as necessary.
Thoroughly clean the installed floor coverings in accordance with the manufacturers' recommended techniques and procedures.
Carry out any product specific finishing/polishing applications as recommended only by the floor covering manufacturer.
Leave the works area clean and remove all rubbish and waste material from the site.

Protect the completed works from damage, trafficable dirt and grime, and stains as necessary while other works are in progress.

Issue to the Owner a copy of the Manufacturers' maintenance requirements and a copy of the Manufacturers' Materials Warranties and the Applicators' Installation Warranties for all of the installed floor coverings.

13.4 Overlay Flooring

13.4.1 Scope

Supply and install the specified Overlay Floorings to the locations, layouts and details shown on the drawings, complete with all accessories. All aspects of this work shall be in accordance with the manufacturers' technical literature and installation requirements, relevant Standards and Code requirements, other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for the specified Overlay Floorings.

13.4.2 Overlay Flooring

13.4.2.1 Engineered Timber Overlay Flooring - Floating

Engineered Timber Interlocking Overlay Flooring: prefinished, engineered timber interlocking plank flooring, to the specified product, and surface layer wood species and finish, and size. Installed as a floating overlay floor covering in accordance with the manufacturer's requirements, and as specified, to the locations, layout and details shown on the drawings.

Timber flooring to be confirmed by interior designer

13.4.3 Substrate Type

13.4.3.1 Concrete Floor - Engineered Timber Overlay Flooring (floating)

The specified floating Engineered Timber Overlay Flooring is to be installed over a concrete floor.

13.4.3.2 Particle Board Floor - Engineered Timber Overlay Flooring (floating)

The specified floating Engineered Timber Overlay Flooring is to be installed over a particle board floor.

13.4.4 Vapour Barrier & Underlays

13.4.4.1 Acoustic Underlay

Acoustic underlay; to the specified product, and material and thickness and weight. Installed as an acoustic underlay to the required Impact Insulation Class (IIC) in accordance with the manufacturer's requirements and to the locations and details shown on the drawings.

To be confirmed once flooring confirmed

13.4.5 Trim & Accessories

13.4.5.1 Stair Nosing

Stair nosing for overlay timber & woodbased flooring, to the specified product, material, finish and colour, and size. Installed as stair nosing to overlay timber or wood-based sheet covered stairs in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

To be confirmed when floorfing confirmed

13.4.6 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-ordinate with trades the locations of pipes, cables, outlets, and other fittings installed by others, and to install the specified Overlay Flooring as required.

13.4.7 Workmanship

All installation work shall be carried out by experienced and competent installers, familiar with the products specified and installation techniques, in accordance with the manufacturer's installation requirements, AS/NZS 4586, and as noted and detailed on the drawings.
Use only approved adhesives that are compatible with the specified overlay flooring product and the substrate as recommended by the overlay flooring manufacturer.
The building must be fully enclosed and weathertight with all doors and necessary fittings and trim installed prior to laying overlay floorings.

13.4.8 Delivery & Handling

Store and handle overlay flooring products and accessories in accordance with the manufacturer's recommendations. Store products and accessories under cover and out of direct sunlight on a flat and level surface; keep dry and protect from damage and contamination at all times.
Do not use damaged or defective overlay floorings or accessories, or products that are beyond their designated shelf life. Do not damage or mark or distort overlay flooring and accessories during handling.
Allow overlay floorings and accessories to properly condition prior to laying in accordance with the manufacturer's requirements. Refer to the manufacturer's installation recommendations for minimum and maximum floor and ambient temperatures.

13.4.9 Substrate Preparation

13.4.9.1 General

Ensure the substrate surface is free of oil, grease and other contaminants, then sweep or vacuum as required to ensure it is absolutely clean. Ensure that any expansion or crack control joints are appropriately trimmed - do not install overlay flooring over them.
The commencement of work on each section of floor shall be deemed to indicate a full acceptance by the relevant Flooring Subcontractor that all preparatory works by other trades are appropriate to achieve the required finished results.

13.4.9.2 New Concrete Floors

New concrete substrates must be allowed to properly dry out and be compliant with NZS 3114 'U3 Surface Finish' and with the overlay flooring manufacturer's requirements and must have aged for a minimum of 28 days prior to laying the overlay floor coverings.
Check for moisture content by hygrometer reading to BRANZ BU330 - do not commence laying overlay flooring until the substrate is surface-dry and the moisture readings are less than 70% relative humidity over the entire surface.
Substrate surfaces must not deviate more than 3mm over 3000mm in any direction and have no abrupt variation greater than 1mm over 250mm.
Grind off any high spots on the concrete slab, and using the specified proprietary levelling compound repair flush with feathered edges any low spots or damaged areas then grind

smooth.
Lightly grind or shot blast any surface that is glazed to the extent that may compromise the adhesion of the vapour barrier and/or acoustic underlay. Leave the surface clean and free of dust and contaminants etc.

Location:

13.4.9.3 New Particle Board Floors

Check that the particle board sheets have been laid with staggered joints, with joints gapped 1mm - 2mm and supported on all edges on framing members or unsupported T&G jointed long-edges, and is fixed exactly to the particle board manufacturer's recommendations.
Substrate surfaces must not deviate more than 3mm over 3000mm in any direction and have no abrupt variation greater than 1mm over 250mm.
Using the specified proprietary levelling compound, repair flush with feathered edges any damaged areas of the particle board floor. Mechanically sand to remove all surface irregularities and contaminants likely to effect the overlay flooring adhesion. Vacuum clean leaving the surface clean and free of dust and contaminants etc.
Check that all particle board sheet joints are flush and even, and that all fixings are countersunk and filled with a compatible filler.
Check to ensure the particle board moisture content is below 12% - do not commence laying overlay flooring until the particle board is surface-dry and the moisture reading is less than that required over the entire area.

Location:

13.4.10 Installation

13.4.10.1 Acoustic Underlay

Glue-fix the specified acoustic underlay to properly prepared substrates in accordance with the manufacturer's installation instructions.

13.4.10.2 Engineered Timber Overlay Flooring - Floating

Install the specified engineered timber overlay flooring and accessories in accordance with the manufacturer's recommendations, procedures and techniques, and as shown on the drawings.

Allow engineered timber overlay flooring to properly condition in accordance with the manufacturer's recommendations prior to laying.

Confirm the overlay flooring layout pattern and direction prior to laying. Do not install overlay floor coverings over expansion joints - use only the specified expansion joint and neatly finish overlay flooring in accordance with the manufacturer's requirements.

Engineered timber overlay flooring accurately laid, fitted and jointed without cupping or surface deviation. Leave expansion gap at all fixed objects, walls and flooring transitions and junctions.
Accurately install stair tread nosings and adhesive fix pre-cut timber overlay pieces to each stair tread and riser and neatly finish to the nosing edge as detailed.

Install any required engineered timber skirting, capping and edge trim, transition strips and bars, as noted and detailed on the drawings; all finished straight and level and true to line.

Keep the working area cordoned off and protected during installation and protect completed installation work from damage and contamination until hand over of the works as programmed/scheduled.

13.4.11 Completion

Ensure that the specified Overlay Floorings have been installed correctly, and that all joins and accessories have been and completed correctly. Check for damage and defects and repair or replace as necessary.
Thoroughly clean the installed overlay flooring in accordance with the manufacturers' recommended techniques and procedures.
Carry out any product specific finishing/polishing applications as recommended only by the floor covering manufacturer.
Leave the works area clean and remove all rubbish and waste material from the site.

Protect the completed works from damage, trafficable dirt and grime, and stains as necessary while other works are in progress.

Issue to the Owner a copy of the Manufacturer's maintenance requirements and a copy of the Manufacturer's Material Warranty and the Applicator's Installation Warranty for the installed overlay flooring.

13.5 Tiling

13.5.1 Scope

Supply, install and finish all Tiling works, complete with all necessary components and accessories required for proper installation and performance, as specified herein and to the locations, layouts and details shown on the approved drawings. All aspects of this work shall be carried out to comply with the New Zealand Building Code and relevant standards, and in accordance with the approved project design documentation, and with any relevant product manufacturers' technical literature.

The following is a list and a general description of the extent of Tiling work, which are more specifically defined in the contract documents, required for the completion of the contract works:

13.5.2 Requirements

13.5.2.1 Quality Assurance

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of Tiling work are carried out to the highest standard.

13.5.2.2 Inspection & Acceptance of Tiling Work

Carry out all necessary pre-installation, installation and finishing inspections of Tiling for each area of work in accordance with the requirements of industry best practice recommendations and code of practice guidelines.

Complete all necessary Pre-Installation/Application Checklists prior to installing proprietary under-tile waterproofing systems and heating systems and floor levelling systems, and relevant Installation/Application Checklists.

Complete all necessary Installation/Application Sign-Off Certificates and before undertaking subsequent work or handing over.

13.5.2.3 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected Tiling materials and work shall be repaired and/or replaced to the satisfaction of the Architect/Designer, without delay and at no additional cost to the Principal.

13.5.2.4 Evidence of Slip Resistance

If requested, provide certified evidence of the slip resistance classification for each floor tile specified.

13.5.2.5 Tile Samples

Submit a clearly identified full-size sample of each tile specified, including colour/pattern, for signed approval by the Architect/Designer - do not proceed until the samples have been approved.

13.5.2.6 Tiled Sample Section

Allow to install a finished tiled sample section for inspection by the Architect/Designer. Do not commence installation until the sample section has been approved. Subject to confirmation in writing, the insitu sample section may form part of the completed installation.

Sample Size:
Installed Location:

13.5.2.7 Provision for Spare Tiles

Provision for Spare Tiles - refer to Reserve Material clause.

13.5.3 Performance

13.5.3.1 Slip-Resistance Performance of Access Routes

Slip-Resistance Performance of Access Routes. The slip-resistance performance of tiled access routes, ramps and stairs shall comply with the requirements of NZBC D1/VM1 and NZBC D1/AS1.

13.5.3.2 Interior Wet Area Performance

Interior Wet Area Performance. The performance of tiled interior wet areas shall comply with the requirements of NZBC E3/AS1.

13.5.4 Interior Dry Area Tiles

13.5.4.1 Floor Tile - Selection 1

Interior Dry Area Tiles - Floor Tile, Selection 1 - as specified below. Tiles shall be true to shape; free of warp; accurate in dimensions to facilitate laying with minimum joint width; free

of imperfections; and true to samples. Tiles shall be from the same batch where possible, and delivered with the original packaging and labeling intact.

Installed in accordance with AS 3958.1, as an interior dry area floor tile, to the locations, layout and details shown on the drawings.

Tiles to be selected by interior designer

13.5.5 Interior Wet Area Tiles

13.5.5.1 Floor Tile - Selection 1

Interior Wet Area Tiles - Floor Tile, Selection 1 - as specified below. Tiles shall be true to shape; free of warp; accurate in dimensions to facilitate laying with minimum joint width; free of imperfections; and true to samples. Tiles shall be from the same batch where possible, and delivered with the original packaging and labeling intact.

Installed in accordance with AS 3958.1, as an interior wet area floor tile, to the locations, layout and details shown on the drawings.

Tiles to be selected by interior designer

13.5.5.2 Wall Tile - Selection 1

Interior Wet Area Tiles - Wall Tile, Selection 1 - as specified below. Tiles shall be true to shape; free of warp; accurate in dimensions to facilitate laying with minimum joint width; free of imperfections; and true to samples. Tiles shall be from the same batch where possible, and delivered with the original packaging and labeling intact.

Installed in accordance with AS 3958.1, as an interior wet area wall tile, to the locations, layout and details shown on the drawings.

Tiles to be selected by interior designer

13.5.6 Undertile Waterproofing

13.5.6.1 Interior Wet Area Tiles - 1-Part Liquid-Applied Membrane

Interior Wet Area Tiles - Undertile Waterproofing System: 1-Part Liquid-Applied Undertile Waterproofing Membrane - as specified below. A proprietary, 1-part, flexible liquid-applied waterproofing membrane system suitable for interior wet area tiling applications - including showers. Complete with all system components and accessories required for proper installation and performance. Applied to properly prepared substrates in strict accordance with the manufacturer's instructions to the locations and details shown on the approved drawings.

Refer to Waterproofing section of specification

13.5.7 Undertile Heating

13.5.7.1 Interior Floor Tiles

Undertile Heating System - Interior Floor Tiles - as specified below. A low temperature radiant, electric floor surface warming and space heating system, incorporating an electric element heating cable embedded into tile adhesive or levelling screed, complete with all necessary system controls, components and accessories required for proper installation and performance.

When installed in an interior wet area, an undertile waterproof membrane must be used.

Installed in accordance with the manufacturer's requirements, complete with all necessary components and accessories, to the locations and details shown on the approved drawings.

Confirm with owner if underfloor heating matts required

13.5.8 Tile Adhesive

13.5.8.1 Interior Dry Area Tiles - Floor Tile

Interior Dry Area Tiles - Floor Tile Adhesive - as specified below. A proprietary, high strength, flexible tile adhesive for bonding most types of floor tiles, including large-format and heavy tiles; and approved for use with the specified floor tiles (type), tiling application and substrate type. Suitable for interior dry area floor tiling applications; on new and existing substrates. Used in strict accordance with the manufacturer's instructions and recommendations.

Brand & Product: As recommended by tile installer

13.5.8.2 Interior Wet Area Tiles - Floor Tile

Interior Wet Area Tiles - Floor Tile Adhesive - as specified below. A proprietary, high strength, flexible tile adhesive for bonding most types of floor tiles, including large-format and heavy tiles; and approved for use with the specified floor tiles (type), tiling application and substrate type. Suitable for interior wet area floor tiling applications; on new and existing substrates. Used in strict accordance with the manufacturer's instructions and recommendations.

Brand & Product: As recommended by tile installer and as per Waterproofing membrane specifications

13.5.9 Tile Grout

13.5.9.1 Interior Dry Area Tiles - Floor Tile

Interior Dry Area Tiles - Floor Tile Grout - as specified below. A proprietary, high performance, coloured tile grout. Suitable for interior dry area floor tiling applications, and approved for the tiling application. Used in strict accordance with the manufacturer's instructions and recommendations.

Brand & Product:
Colour:

13.5.9.2 Interior Wet Area Tiles - Floor Tile

Interior Wet Area Tiles - Floor Tile Grout - as specified below. A proprietary, high performance, flexible, water-repellent, coloured tile grout with anti-fungal agent. Suitable for interior wet area floor tiling applications, and approved for the tiling application. Used in strict accordance with the manufacturer's instructions and recommendations.

Brand & Product:
Colour:

13.5.9.3 Interior Wet Area Tiles - Wall Tile

Interior Wet Area Tiles - Wall Tile Grout - as specified below. A proprietary, high performance, flexible, water-repellent, coloured tile grout with anti-fungal agent. Suitable for interior wet area wall tiling applications, and approved for the tiling application. Used in strict accordance with the manufacturer's instructions and recommendations.

Brand & Product:
Colour:

13.5.10 Flexible Sealant

13.5.10.1 Interior Dry Area Tiles - Floor Tile

Interior Dry Area Tiles - Floor Tile Flexible Sealant - as specified below. Acetic-curing, UV-resistant, mildew-resistant, waterproof silicone sealant. Suitable for interior and exterior tiling applications, including general sealing, movement control joints, internal corner junctions, worktops and benches, sanitary installations. Applied in accordance with the sealant manufacturer's instructions, and neatly finished with the tiled surface.

Sealant joints shall be in accordance with the sealant manufacturer's joint design width-to-depth ratio. When sealing movement control joints, the sealant shall be applied over a suitably sized PEF backing rod inserted into the joint to the required depth.

Brand & Product:
Colour:

13.5.10.2 Interior Wet Area Tiles - Floor Tile

Interior Wet Area Tiles - Floor Tile Flexible Sealant - as specified below. Acetic-curing, UV-resistant, mildew-resistant, waterproof silicone sealant. Suitable for interior and exterior tiling applications, including wet areas, showers, sanitary installations, kitchen worktops and benches, movement control joints, internal corner joints, general sealing, etc. Applied in accordance with the sealant manufacturer's instructions, and neatly finished with the tiled surface.

Sealant joints shall be in accordance with the sealant manufacturer's joint design width-to-depth ratio. When sealing movement control joints, the sealant shall be applied over a suitably sized PEF backing rod inserted into the joint to the required depth.

Brand & Product:
Colour:

13.5.10.3 Interior Wet Area Tiles - Wall Tile

Interior Wet Area Tiles - Wall Tile Flexible Sealant - as specified below. Acetic-curing, UV-resistant, mildew-resistant, waterproof silicone sealant. Suitable for interior and exterior tiling applications, including wet areas, showers, sanitary installations, kitchen worktops and benches, movement control joints, internal corner joints, general sealing, etc. Applied in accordance with the sealant manufacturer's instructions, and neatly finished with the tiled surface.

Sealant joints shall be in accordance with the sealant manufacturer's joint design width-to-depth ratio. When sealing movement control joints, the sealant shall be applied over a suitably sized PEF backing rod inserted into the joint to the required depth.

Brand & Product:
Colour:

13.5.11 Aluminium Trim

13.5.11.1 Aluminium Square-Edge Tile Trim

Aluminium Square-Edge Tile Trim. Square profiled extruded aluminium edge trim for tiling. Sized to suit the thickness of the tiling installation. Finish and colour as specified. Installed to the locations and details shown on the drawings.

Finish & Colour: T.b.C

13.5.12 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to install tiling as required, and to ensure that:
- appropriate tolerances and clearances allow for adjacent finishes, fixtures and fittings, etc; and
- penetrations for piped and cabled services are correctly located to maintain tile integrity and tiling performance.

13.5.13 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All Tiling work shall be carried out to best trade practice by qualified and experienced tradespersons, familiar with the specified materials and installation and finishing techniques, in accordance with AS 3958.1 and relevant product manufacturers' technical literature, to the layout and details shown on the approved drawings, and to fully comply with all warranty requirements.

Submit evidence of experience on request, e.g. National Certificate in Floor and Wall Tiling, or certified member of Master Plasterers and Tilers Association.

All substrate preparation, tile laying and tiling accessories application and finishing techniques shall be exactly as recommended by the specified product manufacturer. All work shall be such as to leave a neat, efficient and robust installation.

Interior wet-area tiling shall be waterproof and installed over a waterproof membrane as shown on the drawings.
Exterior floor tiling shall be waterproof and weathertight, and where necessary installed over a waterproof membrane as shown on the drawings.

As recommended by the tile manufacturer, use only an approved adhesive that is compatible with the specified tile, its substrate and its application/use.

Where necessary, delay tiling to allow maximum curing and settling and initial creep of the substrates, particularly to load bearing structural elements.

Do not cover or bridge movement control joints with tiles and tile underlay.

Tiling shall not be undertaken when the ambient and surface temperatures are outside the specified product manufacturer's permissible temperature range.

Where necessary, mask off and protect from contamination adjacent surfaces, joinery, fixtures and finished work before commencing.

Exterior tiling shall not be undertaken during inclement weather. As necessary and in accordance with the manufacturer's requirements, protect exterior tiling from rain, hot dry winds and direct sunlight to aid proper drying and curing.

Leave all tiled surfaces clean, sound, and free from blemishes of any kind.

13.5.14 Delivery & Handling

Upon delivery to site, inspect the tile packs and reject those items that are found to be damaged, defective or contaminated. Contact the supplier for replacement of rejected items at time of delivery to site.

Do not use damaged, defective or contaminated materials, or products that are beyond their designated shelf life.

Store all tiling materials undercover, in a weatherproof environment, off the floor, on a flat, even and level surface in accordance with the manufacturer's requirements. Keep products and materials dry, out of direct sunlight and protected from damage, moisture and contamination at all times.

Handle tiling materials in accordance with the manufacturer's requirements and in a manner that prevents damage to and contamination of the materials and works.

Installers shall be familiar with and comply with all associated product Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

13.5.15 Preparation

13.5.15.1 General

All substrates to be tiled shall be structurally sound, even and smooth, clean, dry, and free from dirt, dust, grease, oil, wax, paint residue, loose plaster and laitance, curing compounds and other materials and contaminants likely to affect the bonding and performance of the specified tile adhesive and grout.

Carry out all necessary moisture readings of substrates. Do not commence installation until the moisture readings for the whole area are below the required level.

Carry out all necessary substrate inspections and preparatory work in accordance with the relevant product manufacturer's recommendations prior to application.

Check that the substrate is free of voids and depressions, and is in correct alignment - true to line, level and/or plumb, and to the falls indicated on the drawings.

Check that all fixtures, fittings and embedded items are correctly installed, and that all substrate edges are completed as detailed.

Confirm the location of any movement control or crack control joints prior to commencement of the works, and ensure that they are appropriately trimmed. Do not cover or bridge movement control joints with tiles, adhesive and grout.

Allow self-levelling underlayments and mortar screeds to properly cure in accordance with the manufacturer's recommendations before commencing tiling.

Allow new concrete substrates to cure for at least four weeks prior to tiling.

Ensure that the back of each tile is clean and free from dust or other contaminants prior to laying.

The commencement of work on each section/area shall be deemed to indicate full acceptance by the Tiler that all preparatory works by other trades are appropriate to achieve the required finished results.

13.5.15.2 New Concrete Floor

New Concrete Floor - check all aspects of preparatory works, including but not limited to:
- Check that the concrete slab has been formed and finished to the levels and falls indicated on the drawings, including any tanking or waterproofing requirements.
- New concrete floors must have aged for a minimum of 28 days, and have dried over the entire area to a relative humidity of 75% or less.
- Grind off any high spots, and using a proprietary levelling compound repair flush with feathered edges any low spots or damaged areas, then grind smooth.
- Mechanically grind or acid etch very dense concrete surfaces and any surface that is glazed

to the extent that may compromise adhesion.
- Leave the surface clean, free of dust and surface contaminants.
- Check that any protruding or exposed bare metal has been treated with a suitable corrosion-inhibiting primer.

13.5.15.3 New Particle Board Floor

New Particle Board Floor - check all aspects of preparatory works, including but not limited to:
- Check that the sheets have been installed, jointed and fixed in accordance with the manufacturer's requirements and indicated on the drawings, and that all sheet edges are fully supported.
- Check that the sheet joints are flush and even, and that all fixings are countersunk and filled with a compatible filler.
- Using a proprietary levelling compound, repair flush with smooth, feathered edges any damaged areas in the floor surface.
- Mechanically sand to remove all surface irregularities and contaminants likely to affect adhesion.
- Leave the surface completely clean and free of dust and contaminants, then fully prime the substrate with an appropriate primer in accordance with the particle board manufacturer's recommendations.

13.5.15.4 Fibre Cement Sheet Wall Lining

Fibre Cement Sheet Wall Lining - check all aspects of preparatory works, including but not limited to:
- Check that the fibre cement sheets have been installed, jointed and fixed in accordance with the manufacturer's requirements and as indicated on the drawings, and that all sheet edges are fully supported.
- Check junctions with all other substrates and elements, ensuring that all necessary works have been completed as detailed.
- Check that all apertures, openings, edges and expansion and movement control joints are completed as detailed.

13.5.15.5 Plasterboard Wall Lining

Plasterboard Lining - check all aspects of preparatory works, including but not limited to:
- Check that the plasterboard sheets have been installed in accordance with the manufacturer's requirements, are supported on all edges on framing, are securely fastened, and that all joints and junctions have been stopped flush with reinforcing tape embedded in the jointing compound.
- Check junctions with all other substrates and elements, ensuring that all necessary works have been completed as detailed.
- Check that all apertures, openings, edges and expansion and movement control joints are completed as detailed.

13.5.16 Installation

13.5.16.1 Undertile Waterproofing System - Interior Wet Area

Undertile Waterproofing System - Interior Wet Area. Install the specified undertile, liquid-applied waterproofing membrane in accordance with the manufacturer's instructions, to

properly prepared, clean, dry substrates, and at the specified coverage rate and to the required dry film thickness.

Where required by the membrane manufacturer, prime substrates with a manufacturer-approved primer/sealer in accordance with the primer manufacturer's instructions.

Reinforce all junctions of the waterproofing membrane in accordance with the manufacturer's instructions, including floor/wall junctions, internal and external corner junctions, movement control joints, floor waste and drain outlets, pipe penetrations, etc.

Eliminate any pin holes, surface imperfections and defects as the work proceeds. Apply the required number of coats, with each successive coat at right angles to the previous coat.

Complete the installation to the required standard and leave waterproof and leak free. Allow the finished membrane to dry as recommended by the membrane manufacturer before flood testing and/or tiling.

Unless indicated otherwise on the drawings, interior wet-area undertile waterproofing membranes shall be installed to cover the following minimum dimensions:
For an Unenclosed Shower:
- Walls: extending to 1800mm above the floor, and 300mm above the shower rose, and horizontally 1500mm from the shower rose.
- Floor: extending to a 1500mm horizontal radius from the shower rose.

For a Bath with a Shower over and no Shower Screen:
- Walls: extending to 1800mm height above base of the bath, and horizontally 1500mm from the shower rose.
- Floor: extending to a 1500mm horizontal radius from the shower rose.

For a Bath with a Shower over and a Shower Screen:
- Walls: extending to 1800mm height above the base of the bath along its sides.

For a Bath:
- Walls: extending to 150mm height above the sides of the bath, and 150mm horizontally along walls.

For a vanity Splashback:
- Wall: to 300mm height above the vanity top behind the vanity.
- Floor: extending to twice the width (front-to-back) of the vanity, and to 500mm beyond the ends of the vanity.

13.5.16.2 Undertile Heating System

Undertile Heating System. Install the specified undertile heating system in strict accordance with the manufacturer's installation requirements.

Lay the heating element cable to the required design configuration in accordance with the manufacturer's installation requirements. Temporarily tack the cable in place with tape as it is laid. Do not cut the heating element cable.

Terminate cable tail ends at the required position according to the design requirements, and make all necessary connections to the system controls.

Apply protective self-levelling compound over the entire heated floor area to the required thickness. Allow to cure before tiling over.

13.5.16.3 Floor Tiles

Floor Tiles. Install floor tiles by direct-stick method to clean, dry and properly prepared substrates in accordance with AS 3958.1 and the adhesive manufacturer's instructions. Accurately set-out and lay tiles to the layout and details shown on the drawings. Confirm the floor tile layout and pattern requirements prior to installation.

As required by the adhesive manufacturer, seal or prime porous substrates or substrates where dusting or powdering exists. The use and application of adhesive shall be exactly to the adhesive manufacturer's instructions.

All tile cutting, boring and shaping shall be carried out using appropriate tools and equipment and methods suitable for the tile type and in accordance with the tile manufacturer's recommendations. Only install cut tiles that have smooth, uniform cut edges - do not use tiles with jagged or flaked edges.

Mechanically mix powdered adhesive at the recommended ratio with clean potable water to a smooth, lump-free paste in accordance with the manufacturer's requirements. Do not mix more than can be used within the specified open time.

Apply tile adhesive evenly using a suitably notched trowel to properly prepared substrates in accordance with the manufacturer's instruction.
- Do not apply more adhesive than can be covered within the specified open time.
- Do not over spread the adhesive, and avoid surface skinning - particularly when used in unfavourable conditions such as direct sunlight, wind and/or high temperatures.
- Ensue to follow the adhesive manufacturer's recommended setting and curing periods.

Lay floor tiles into adhesive to achieve maximum contact and bonding before skinning occurs. Re-trowel any adhesive that has skinned - do not apply water to skinned adhesive. Where necessary, back-butter tiles with adhesive to ensure maximum contact and bonding - do not spot-fix floor tiles.

Floor tiles shall be laid so that the finished surface and edges are true and even, level and/or to the falls shown on the drawings, and finished flush with adjoining finished work as appropriate or as detailed.

Tile joints shall be to the required layout, uniform, accurately aligned, straight and true to line, and set even and parallel to the specified joint width.

Where indicated on the drawings, return floor tiles along walls, upstands, toe spaces, etc., to the height and details shown on the drawings.

Remove excess adhesive from tile joints as each tile is laid to ensure full depth grouting can be achieved, and leave the tile surface completely clean.

13.5.16.4 Wall Tiles

Wall Tiles: Install wall tiles by direct-stick method to clean, dry and properly prepared substrates in accordance with AS 3958.1 and the adhesive manufacturer's instructions. Accurately set-out and lay tiles to the layout and details shown on the drawings. Confirm the wall tile layout and pattern requirements prior to installation.

As required by the adhesive manufacturer, seal or prime porous substrates or substrates where dusting or powdering exists. The use and application of adhesive shall be exactly to the adhesive manufacturer's instructions.

All tile cutting, boring and shaping shall be carried out using appropriate tools and equipment and methods suitable for the tile type and in accordance with the tile manufacturer's recommendations. Only install cut tiles that have smooth, uniform cut edges - do not use tiles with jagged or flaked edges.

Mechanically mix powdered adhesive at the recommended ratio with clean potable water to a smooth, lump-free paste in accordance with the manufacturer's requirements. Do not mix more than can be used within the specified open time.

Apply tile adhesive evenly using a suitably notched trowel to properly prepared substrates in accordance with the manufacturer's instruction.
- Do not apply more adhesive than can be covered within the specified open time.
- Do not over spread the adhesive, and avoid surface skinning - particularly when used in unfavourable conditions such as direct sunlight, wind and/or high temperatures.
- Ensue to follow the adhesive manufacturer's recommended setting and curing periods.

Press wall tiles into adhesive to achieve maximum contact and bonding before skinning occurs. Re-trowel any adhesive that has skinned - do not apply water to skinned adhesive. Where necessary, back-butter tiles with adhesive to ensure maximum contact and bonding - do not spot-fix wall tiles.

Wall tiles shall be installed so that the finished surface and edges are true and even, level, and finished flush with adjoining work as appropriate or as detailed.

Tile joints shall be to the required layout, uniform, accurately aligned, straight and true to line, level and plumb, and set even and parallel to the specified joint width. Use proprietary tile spacers, sized for the specified joint width, to ensure accurate jointing.

Form internal and external wall corner junctions true and plumb and with tile joints continued around corners level and true.

Remove excess adhesive from tile joints as each tile is laid to ensure full depth grouting can be achieved, and leave the tile surface completely clean.

13.5.16.5 Edge Trim

Edge Trim. As required and indicated on the drawings, install all necessary tiling edge trim - including edge cappings, corner mouldings, transition strips, etc., - all neatly finished, accurately aligned and true, to the required layout and as detailed on the drawings.

13.5.16.6 Stairs & Steps

Stairs & Steps. Accurately lay tiles to steps and stair treads, risers and landings as detailed on the drawings. Finish tiles neatly along tread/riser junctions and against trim. Ensure that the tile joints on treads and risers are aligned, straight and true along each stair flight. As indicated on the drawings, install nosing tiles or proprietary stair-nosings to treads.

13.5.16.7 Movement Control Joints

Movement Control Joints. Form movement control joints in tiling to the locations and details shown on the drawings and in accordance with AS 3958.1.

Movement control joints in tiling shall coincide with control joints in the substrate and structure, and at junctions between dissimilar substrates and other surface finish materials in the same plane.

Ensure to carry movement control joints through tiling from the substrate. Do not bridge movement control joints with underlayment, membranes, adhesive or tiles.

Seal movement control joints after grouting with the specified flexible sealant in accordance with the sealant manufacturer's instructions and as detailed.

Proprietary movement control joints shall be installed in strict accordance with the manufacturer's instructions and to the layout and details shown on the drawings. Finish tiling against proprietary movement control joints as detailed.

13.5.16.8 Grouting

Grouting. Grouting shall be in accordance with the grout manufacturer's requirements and recommendations. Coloured grout shall be to the colour specified.

Prior to grouting, ensure that the tile adhesive has completely set, and that the tile joints are clean, dry and free from excess adhesive and any foreign material. Rake out any excess adhesive from joints to ensure a maximum, uniform grout joint is achieved. Tile spacers must be removed prior to grouting.

Mechanically mix powdered tile grout with clean water at the required ratio to a smooth, lump-free paste in accordance with the manufacturer's requirements. Do not mix more than can be used within the manufacturer's specified open time. Ensue to follow the manufacturer's recommended drying and curing periods.

Apply tile grout evenly with a rubber squeegee or grouting float, ensuring that the tile joints are completely filled and smoothed to a dense, uniform surface. Do not spread more grout than can be cleaned within the specified open time. Remove excess grout immediately. In hot or windy conditions, dampen the joints to prevent the grout from drying out too quickly.

Clean the tiles with a damp sponge when the grout joints have firmed, making sure not to wash-out the joints. Finish grout joints to a smooth, uniform effect and leave grout free of pin holes and blemishes.

Allow grout joints to dry before cleaning with a clean, dry, soft cloth, to completely remove any grout haze and residue from the surface of the tiles.

13.5.16.9 Protection

Protection. Take all necessary measures to protect exterior tiling from the extremes of weather and climate during the fixing and grouting operation and for as long as possible thereafter.

Keep the working area cordoned off during the whole tiling installation. Protect completed tiling from excessive loads, damage and contamination until hand-over or as directed.

Restrict foot traffic from completed floor tiling in accordance with the tile manufacturer's time frames for 'set-to-light-foot-traffic' and 'ready-for-service-use'.

Where necessary, cover completed floor tiling with a heavy-duty temporary floor protection such as Ovaboard, Ram Board, Buffalo Board; laid in accordance with the manufacturer's requirements.

Protect exterior tiling, immediately after laying and grouting, from rain and moisture for at least 24 hours, and from frost and strong sunlight after laying in accordance with the tile adhesive and grout technical specifications.

13.5.17 Completion

Check that all Tiling work has been correctly installed to the required layout, and that all tile joints, edge-trimming and other detailing is correctly finished, grouted and sealed.

Check all Tiling installations for damage, marks and defects - repair or replace as necessary. Carry out any repairs to the required standard.

Thoroughly clean tiled surfaces in accordance with the manufacturer's recommended procedures and techniques. Lightly buff where appropriate.

Leave this work complete and to the required standard, and in accordance with the associated warranty requirements.

Clean up thoroughly, and leave adjacent surfaces and finished work clean and free of damage and contamination. Remove all associated rubbish from site.

Protect the completed installation from damage, trafficable dirt and grime, and stains as necessary until hand-over as scheduled or directed.

Issue to the Owner a copy of all relevant product manufacturers' maintenance requirements, and a copy of relevant manufacturer Product Warranties and the installer/applicator Installation Warranty for the installed products and completed works.

14 PLUMBING

14.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

14.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1221:1997(AS/NZS)	Fire hose reels
1254:2010(AS/NZS)	PVC-U pipes and fittings for stormwater and surface water applications
1260:2017(AS|NZS)	PVC-U pipes and fittings for drain, waste and vent applications
1477:2017(AS|NZS)	PVC pipes and fittings for pressure applications
1546.1:2008(AS/NZS)	On-site domestic wastewater treatment units - Septic tanks
1596:2014(AS/NZS)	The storage and handling of LP Gas
2032:2006(AS/NZS)	Installation of PVC pipe systems
2033:2008(AS/NZS)	Installation of polyethylene pipe systems
2492:2007(AS/NZS)	Cross-linked polyethylene (PE-X) pipes for pressure applications
2537.1:2011(AS/NZS)	Mechanical jointing fittings for use with crosslinked polyethylene (PE-X) for pressure applications - Part 1: Plastics piping systems for hot and cold water installations - Crosslinked polyethylene (PE-X) - General
2642.2:2008(AS/NZS)	Polybutylene pipe systems - Polybutylene (PB) pipe for hot and cold water applications
2712:2007(AS/NZS)	Solar and heat pump water heaters - Design and construction
3500.1:2015(AS|NZS)	Plumbing and drainage - Part 1: Water services
3500.1:2018(AS|NZS)	Plumbing and drainage Part 1: Water services
3500.1:2021(AS/NZS)	Plumbing and drainage, Part 1: Water services
3500.2:2015(AS|NZS)	Plumbing and drainage - Part 2: Sanitary plumbing and drainage
3500.2:2018(AS|NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.2:2021 (AS|NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.2:2021(AS|NZS)	Plumbing and drainage, Part 2: Sanitary plumbing and drainage
3500.3:2018(AS|NZS)	Plumbing and drainage Part 3: Stormwater drainage
3500.3:2021(AS|NZS)	Plumbing and drainage, Part 3: Stormwater drainage
3500.4:2015(AS|NZS)	Plumbing and drainage - Part 4: Heated water services
3500.4:2018(AS|NZS)	Plumbing and drainage Part 4: Heated water services
3500.4:2021(AS|NZS)	Plumbing and drainage, Part 4: Heated water services

3500.5:2012(AS/NZS)	Plumbing and drainage - Part 5: Housing Installations
3501:1976(NZS)	Specification for copper tubes for water, gas, and sanitation
4020:2018(AS|NZS)	Testing of products for use in contact with drinking water
4121:2001(NZS)	Design for access and mobility: Buildings and associated facilities
4517:2010(NZS)	Fire sprinkler systems for houses
4602:1988(NZS)	Low pressure copper thermal storage electric water heaters
4603:1985(NZS)	Installation of low pressure thermal storage electric water heaters with copper cylinders (open-vented systems)
4606.1:1989(NZS)	Storage water heaters - General requirements
4607:1989(NZS)	Installation of thermal storage electric water heaters: valve-vented systems
4613:1986(NZS)	Domestic solar water heaters
4614:1986(NZS)	Installation of domestic solar water heating systems
4617:1989(NZS)	Tempering (3-port mixing) valves
4692.1:2005(AS/NZS)	Electric water heaters - Energy consumption, performance and general requirements
5601.1:2013(AS|NZS)	Gas installations - Part 1: General installations
7602:1977(NZS)	Specification for polyethylene pipe (Type 5) for cold water services
7643:1979(NZS)	Code of practice for the installation of unplasticized PVC pipe systems
7646:1978(NZS)	Specification for polyethylene pipes and fittings for gas reticulation
AS/NZS 3500.5:2012	Plumbing and drainage - Part 5: Housing installations
NZBC B2/AS1	Durability
NZBC G11	Gas as an Energy Source
NZBC G12	Water Supplies
NZBC G13/AS1	Sanitary Plumbing

14.3 General

Carry out all works necessary to leave the water, waste, vent and soil systems serving the sanitary fittings and the plumbing hardware shown on the drawings or specified below in correct working order complete with all ancillary systems (safetrays, floor drains, overflows, relief valves, etc.) required, and with all normal incidentals customarily installed by this trade.

Comply with the Building Code, Territorial Authority By-laws and statutory authority Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange for all tests and pay all fees and customary charges in connection with the required works.

14.4 Materials

14.4.1 Materials

Materials shall be delivered with packaging and labeling intact. Incidentals (jointing compounds, PTFE tape, seals, washers, silfos, solvent cements, etc.) shall be completely

appropriate for the application involved. The use of imperfect items or items damaged in any way is always subject to approval.

14.4.2 Alternatives

The materials and elements specified indicate the required standards for these works. Alternatives which are equal to or superior to these materials and elements may be tendered for approval.

14.4.3 Materials Separation

Separate dissimilar metals in any circumstances which could produce contact or electrolytic action by a water film, with thick plastic tape, bituminous felt or other inert material. Pipes in contact with or built into concrete or masonry shall be fully spiral wrapped in Denso tape or equal.

14.5 Plumbing Elements

14.5.1 Sanitary Fittings

Supply and fix all of the sanitary fittings as scheduled on the drawings. All fittings checked on delivery for 'perfect' condition, and all fittings plain white. Supply and fix all normal accessories that are not usually supplied with the fitting.
The Plumber is responsible for fittings from delivery until Practical Completion of the contract.

14.5.2 Plumbing Hardware

There is no prime cost sum allowance. All plumbing finishing hardware is specified on the drawings.

14.5.3 Flashings

Ridges, hips, barges, valleys, aprons etc. flashings all supplied and installed by the Roofer. Metal windows flashings (those installed during windows installation ONLY) will be supplied by the windows subcontractor and installed by the Carpenter. All other flashings including wall penetration flashings, soakers, etc. that are required to leave the building completely water and weathertight are the Plumber's responsibility.

All flashings shall be machine folded to profiles as shown or required, incorporating capillary breaks where appropriate, shall be formed in one piece where possible, and lead or other soft edged where required. Stop ends, external angles, junctions etc. soldered or sealed and blind riveted as appropriate.

All flashings 1mm powder coated aluminium unless otherwise noted. Supply the flashings to appropriate trades for building in as work proceeds, with all flashings neatly dressed to substrates.

All flashings shall be either 0.55mm Colorsteel VP or 1mm powder coated aluminium as and where identified on the drawings, refer to the Architect for direction where unclear.

14.5.4 Appliances

All appliances are exactly identified on the drawings notes. Main Contractor will establish, in consultation with the Plumber and Electrician, which of them will be supplied by each of these trades.

14.6 Systems

14.6.1 Wastes & Vents

All traps sized to AS 3500.2. Wastes and vents all uPVC. Wastes shall be to AS 3500.2 falls as a minimum. Vents shall be generally as indicated, but avoid where permissible in compliance with AS 3500.2, or shall be combined above the flood level of the fittings.

Fit bird proof domes to all vents.

14.6.2 Cold Water System

14.6.2.1 Supply From Existing Toby

All cold water supply pipework shall be medium/high-density polyethylene (MDPE/HDPE), arranged and fixed so that all joints are in a fully ‘relaxed' condition, without any stress or tension.
Lay on a 20mm main from the existing toby along the route shown on the Site Plan to the connection position noted on the Floor Plan (pipe depth, protection, backfilling, signal strip etc. to comply with all Supply Authority requirements). At the connection position take a branch feed off for the hosecocks (and reticulate to the positions shown and install angle hosecocks) and toilet cisterns and then take the main feed through an accessibly positioned cleanable in-line sediment and dirt filter.
Primary distribution from the water filter shall be in 20mm piping, reducing to 15mm for the final feed to individual items. Install conveniently located isolating valves to turn off each group of fittings, and install a small isolating valve alongside each toilet cistern not integrally fitted with one. (Note that these isolating valves and the hosecocks are not covered by the Plumbing Hardware Prime Cost Sum).

14.6.3 Hot Water System

14.6.3.1 Electric Storage, High Pressure Hot Water Cylinder

Supply the electric storage high pressure hot water cylinder noted on the drawings and install it where shown. Where appropriate install the cylinder on a safetray, with its drain discharging in a visible location.
Install temperature and pressure relief valves, cold water expansion valves, flow control valves, line strainers, pressure limit valves, and non-return/isolating valves as required to leave the hot water system in full design operational order. Install a tempering valve for each cylinder to control the hot water temperature at any sanitary fixture used for personal hygiene at not more than 50°C.
Check that the water pressure is suitable for the cylinders operation, and install PRV's if excessive.
Pressure relief discharges shall be copper and to the exterior in approved positions.

Flush all pipework before making the final connections. Lag the main distribution pipes full length with wall pipe insulation.
Showers shall have priority feeds, without 'tees', and the pipework layout shall ensure that the showers temperature and pressure remain as even as possible.
Irrespective of whether a mixing device is installed, the storage water heater control thermostat shall be set at a temperature of not less than 60°C to prevent the growth of Legionella bacteria.

14.6.3.2 Gas Instant Hot Water Device

Supply the gas instant hot water device complete with a wall recess box as noted on the drawings and install it where shown on the plan and elevation.
Install pressure relief valves, cold water expansion valves, flow control valves, pressure limit valves, and non-return/isolating valves as required to leave the hot water systems in full design operational order.
Install a tempering valve to control the hot water temperature at any sanitary fixture used for personal hygiene at not more than 50°C.
Flush all pipework before making the final connections. Lag the main distribution pipes full length with wall pipe insulation.
Showers shall have priority feeds, without 'tees', and the pipework layout shall ensure that the showers temperature and pressure remain as even as possible.

14.6.4 Gas Fitting

Is included in the Plumbing trade, although all work must be carried by Registered Gasfitters, and be in complete accordance with all relevant Regulations and standards and be in full accordance with best trade practice.

Obtain all necessary permits and pay all fees. If necessary obtain a Dangerous Goods Licence for the storage installation in the name of the Owner; and if the Owner's signature is required forward all relevant papers to the Architect/Designer.

Test the full systems to all relevant requirements; if any faults are discovered rectify them and then re-test the full system.

Check that all necessary flues comply in all respects with the regulations and the item manufacturer’s requirements.

14.7 Workmanship

14.7.1 Co-operation

Co-operate with all other trades. Attend upon Concretor, Drainlayer and Carpenter to set out the exact positions of pipe runs before adjacent work is put in hand, and to ensure that all pipes, sleeves, fixings, flashings etc. are correctly incorporated into the structure as construction proceeds.

14.7.2 Workmanship

All plumbing work shall be carried out by, or under the direct control of, properly qualified tradesmen, and shall be to recognised high standards.

Observe best local trade practice to avoid problems which arise from freezing winter conditions.

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials only to approval. Install seismic restraints to storage tanks and HWCs.

Weatherseal wherever pipes, screws, bolts or other fastenings penetrate an external surface, and particularly roofing; seal with gaskets, flashings (and overflashings if necessary) or mastic as appropriate - any damage that results from failure of such seals will be made good at the Plumber's expense.

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Plumber's expense.

14.7.3 Pipework

Joints between pipes of different materials shall always be to the approval of the TA Plumbing Inspector.

Pipework set-out neatly with a minimum number of bends, and more or less parallel to and at right angles to structural elements - avoid diagonal piping.

All internal pipework shall be concealed except where otherwise is either shown or approved. Exposed pipework shall be accurately and neatly run. Arrange all pipework (and particularly traps) in a manner which will allow maximum future accessibility for repairs or maintenance. Arrange for access panels to any primary maintenance positions, and install conveniently located isolating valves for each group of fittings. Wingbacks securely and squarely fixed. Crox unions usually acceptable only at the final connection to fittings. Install white plastic flanges where pipes penetrate linings in visible locations.

Where pipes are covered with nail fixed linings and trim ensure that their positions are marked on the linings to minimise the risk of subsequent nailings penetrating the pipe. Any such damage shall be rectified immediately, with all consequential damage made good.

Set pipework out in straight runs to even gradients. Fix all pipes to the structure sufficiently to fully support and to prevent sagging or vibration. Clips and saddles shall be the same material as the pipe. Exterior pipes on stand-off brackets. Fixings to the exterior or damp locations shall all be hot dip galvanized unless otherwise noted. Sleeves for pipes or drains penetrating concrete or masonry shall be uPVC, 20mm minimum larger internal diameter than the external diameter of the pipe, finished flush with concrete or masonry, and packed and mastic sealed.

Close open ends of the systems during construction to prevent the entry of foreign matter.

14.7.4 Temperature Movement

All work shall respect in full all probable thermal movements - layouts, fixings and jointings shall be arranged to allow thermal movement without risk of prejudice to watertight conditions,

or risk of damage from straining of the pipes which will generate failures.
In particular, observe best local trade practice to avoid problems arising from freezing conditions.

14.7.5 Excavation

Allow to carry out all excavation that is required to suit the services installed by this trade. Check for other services before excavation. Trenches true to line and level, base of trenches clear of loose material, and shore trenches as required to suit the ground conditions. Backfilling shall be carried out by this trade, and be to the requirements specified in Siteworks.

14.7.6 Testing

All plumbing services shall be completed in stages which will allow for proper testing under normal working pressures prior to the application of insulation, concealment or other enclosure. Testing of piped water services shall be by hydrostatic testing in accordance with AS/NZS 3500.1 and shall not show any leakage when subjected to a hydrostatic pressure of 1500kPa for a period of not less than 30 minutes. All leaks remedied and retested. On completion the whole of the plumbing services to be subjected to full operational tests in the presence of the plumbing inspector, with any defects revealed in these tests properly remedied.

14.7.7 Warranties

Warranty cards and manufacturer's guarantees for all items supplied and installed by this trade shall be correctly filled in and handed over at Practical Completion.

15 GAS

15.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

15.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1596:2014(AS/NZS)	The storage and handling of LP Gas
5601.1:2013(AS|NZS)	Gas installations - Part 1: General installations
Gas Regulations	Gas (Safety and Measurement) Regulations 2010
LPG Association of New Zealand	LPGA CoP No 2 - Installation and maintenance of twin 45kg LPG cylinder systems
NZBC G10	Piped Services
NZBC G11	Gas as an Energy Source

15.3 Gas System - LPG Cylinders (LPGA CoP No.2)

15.3.1 Scope

Supply, install, test and commission the Gas System LPG Cylinders to the locations and layout shown on the drawings, complete with all system components and accessories required for proper performance and functionality, and compliance. Carry out the works to comply with the requirements of the LPGA CoP No.2: 'Installation and maintenance of twin 45kg LPG cylinder systems', AS/NZS 5601.1 and the NZ Building Code, and with all relevant Regulations and Acts, and the requirements of the controlling Regulatory Authorities.

For the purpose of this specification, the following definitions apply:
- EPA: Meaning the ‘Environmental Protection Authority’.
- Excess Flow Valve: A normally open valve that closes automatically when a predetermined flow rate in a particular direction has been exceeded.
- HSNO: Hazardous Substances and New Organisms Act 1996.
- LAB Number: The number allocated by EPA when a cylinder is approved.
- LPGA: LPG Association of New Zealand Inc.
- POL Fitting (Prest-O-Lite): The common name given for a standard union with left hand thread, used for connection to a 45kg cylinder.
- Pigtail: A short length of flexible tube or copper pipe completed with end couplings. Use for connecting the cylinder to the manifold or the changeover valve.
- Twin Cylinder Installation: A cylinder installation where the cylinders are connected separately to the system. Each cylinder is connected to a change over valve that can be operated manually or automatically, to change over the cylinder which is supplying LPG to the installation. Connection may be made using flexible rubber or copper pigtails, or pipe fittings.

15.3.2 Requirements

15.3.2.1 Compliance

Installation of the LPG service shall comply with the Gas Act 1992, the Gas (Safety & Measurement) Regulations 2010, and the NZ Building Code. Obtain all necessary permits, pay all fees and give all notices, and complete the works to the approval of the Territorial Authority.

15.3.2.2 Gas Compliance Certificates

In accordance with the Gas (Safety and Measurement) Regulations 2010, complete and issue to the relevant parties the following documents for the LPG service installation:
- Gasfitting Certificate of Compliance (CoC).
- Gas Safety Certificate (GSC).

15.3.2.3 Record Keeping

Maintain a complete and up-to-date record of the location of the LPG service, and of the equipment and materials used in its assembly and installation. The record shall include, but be limited to:
- A dimensioned, scaled plan of the location of LPG cylinders, and the installed layout of the LPG piping and system components.
- Details of the pipe diameters and pipe types used.
- The locations and types of mechanical joints used, with the locations clearly marked on the plan.
- Full details and exact location of valves fitted to the distribution system, giving the number of turns required to operate the valve and the direction of rotation.
- Full details of the LPG service operation and maintenance requirements.

15.3.2.4 As-Built Documents

Provide all required As-Built documentation and records. Prepare and submit As-Built drawings of the LPG service installation, based on the approved contract drawings, that accurately record the location of LPG cylinders, gas pipe runs, pipe sizes, and the locations and types of componentry and fittings.

15.3.2.5 Corrosion Control

Take all reasonable attempts to limit corrosion of the LPG service installation. Separate dissimilar metals by a 5mm air gap or by an appropriate 2mm thick isolating material. As necessary provide suitable protection from other materials with corrosion resistant coatings, by insulating joints or by sleeving. Use proprietary pipe clamps, clips, brackets and hanger supports, and fastenings and anchors appropriate for the installation and support of the piped gas system components and equipment and suitable for the environmental conditions.

15.3.2.6 Openings & Penetrations

Form openings and penetrations through walls, floors and structural elements, as required and as shown on the drawings. Provide pipe sleeves for LPG pipe penetrations through concrete foundation walls, floor slabs and concrete and/or masonry walls.

Provide proprietary intumescent fire collars around pipes that pass through a fire separation element (fire-rated wall, floor, duct or riser, or other as shown on the drawings) in accordance with the fire collar manufacturer's requirements and as shown on the drawings.

15.3.2.7 Support & Seismic Restraint

Supply and install all necessary pipe support clamps, clips, brackets, hangers, etc., required to properly support and anchor surface-mounted and suspended pipework.

Components shall be adequately fastened and restrained for both normal loadings and earthquake loadings (NZS 4219).

15.3.2.8 LPG Pipe Identification

In-ground LPG pipes shall have warning tape placed in the trench directly above the gas pipe and between 150mm and 300mm below the finished surface level.

Above-ground LPG pipes shall be identified by colours and letters within 1m of every valve and in every space/area that the pipe is run, at maximum 6m intervals. Coloured marker bands shall be minimum 50mm wide, and identifying letters shall be minimum 25mm high.

Where required, LPG pipes shall have indicating arrows, minimum 100mm long, showing the direction of flow. Colours, letters, arrows and tags shall be plainly visible from the direction the pipes are most likely to be viewed from.

Where LPG pipes are to be painted, the final coat shall be the appropriate identification colour in accordance with NZS 5807.

Identify all valves with a numbered brass label showing the normal valve position; number as shown on the drawings.

15.3.2.9 Enclosed Pipework

Where pipework is installed in an enclosed space, the enclosed space shall be ventilated in accordance with NZBC E2/AS1. Pipework installed under floor spaces shall be suspended clear of the ground by a minimum of 100mm. Pipework installed in unventilated and/or inaccessible spaces shall be installed without joints - where joints are unavoidable in unventilated and/or enclosed spaces, each joint shall be inspected, tested and proved sound before the pipework is concealed. Do not install pipework in lift wells, air ducts, plenum ceilings, air handling plena, laundry/clothes chutes, rubbish chutes, ventilating ducts, fire hydrant cupboards or fire isolated stairways.

15.3.3 LPG Cylinders

15.3.3.1 Exchange Cylinders

Exchange LPG cylinders. The number of cylinders supplied shall meet the design capacity of the LPG service. Cylinders shall be full 45kg (nominal 108 litre) cylinders supplied by the LPG supplier.

LPG cylinders shall comply with the Hazardous Substances (Compressed Gases) Regulations and the Environmental Protection Authority (EPA) Guide to Gas Cylinders. Cylinders shall be stamped with a LAB number and a current test date.

Exchange cylinders shall be located and installed such that the delivery of gas can be made safely by one person without excessive manual handling or risk of damage to property.

LPG Supplier:

15.3.3.2 Location of Cylinders

Except where permitted by AS/NZS 1596, all LPG cylinders and associated equipment shall be installed to the exterior of the building in accordance with the requirements AS/NZS 5601.1: Section J3.

Where the LPG storage capacity does not exceed 100 kg, the minimum clearance and separation distances around the cylinder installation shall be in strict accordance with AS/NZS 5601.1: Section J5 (for New Zealand).

Where the LPG storage capacity is between 100kg to 300kg, the cylinder installation shall comply with the Environmental Protection Authority Approved Code of Practice HSNOCOP 50.

Install LPG cylinders to the specified location indicated on the approved drawings. Should a conflict arise between the specified location and the requirements of AS/NZS 5601.1: Section J3, seek advice from the Architect/Designer before proceeding.

Installed Location:

15.3.3.3 Base Support

Cylinders shall not be supported by other cylinders. Cylinders shall be installed on a supporting base that is firm, level, of non-combustible material, and with a finished surface that is drained and at least 50mm above the surrounding surface. Cylinders shall not rest on soil.

15.3.3.4 Seismic Restraint

LPG cylinders shall be restrained against seismic activity by hot-dip galvanised steel or Grade 316 stainless steel chains, brackets and fasteners. The brackets shall be fastened to a wall or similar structural support. Fasteners used to secure chains and brackets shall be capable of withstanding applied loads at least four times the weight of the filled cylinder.

15.3.3.5 Cylinder Connection

Cylinders shall be connected directly to the changeover valve assembly by copper or flexible rubber pigtails.

An excess flow valve shall be fitted immediately upstream of the piping or hose assembly (the excess flow valve may be an integral part of the POL fitting).

Pigtails connecting cylinders to changeover valves or manifolds should not exceed 1.0m in length.

A non-return valve must be fitted in the supply between each cylinder and the changeover valve, or in a manifold system , between each cylinder and its manifold connection.

15.3.3.6 Test Points

A pressure test point should be installed immediately downstream of each second-stage regulator. The test point may be an integral part of the regulator.

15.3.4 Changeover Valves

15.3.4.1 Automatic Changeover Valve

Changeover valves shall be to the requirements of AS/NZS 5601.1 and comply with the requirements of HSNO. Changeover valves may be comprised of a first and second stage regulator system in a single body, or as a combination of separate component items.

Supply and install automatic changeover valves with a non-return valve on each pigtail connection, complete with all necessary components required for the proper operation of the LPG cylinder system, including pigtails, regulators, condensation trap, over pressure shut off, excess flow valves.

15.3.5 Copper Piping

15.3.5.1 Copper Piping

Copper tube shall be in accordance with NZS 3501 or AS 1432.

Copper and copper alloy capillary fittings shall be in accordance with AS 3688. Copper alloy compression fittings shall be in accordance with AS 3688 or AS D26.

The use of copper tube and fittings shall be in accordance with the conditions and limitations of AS/NZS 5601.1: Section 4 - in particular Table 4.1.

Copper tube shall be free of burrs, scale, damage and defects. Clean thoroughly with a solvent to remove oil and dirt prior to installation.

Pipework shall follow wall lines, and be straight and true to line, plumb and level, parallel with adjacent pipes, and have the minimum number of bends. Avoid diagonal pipe runs. Arrange pipework for easy dismantling of plant components and valves. Minimise pipe cross-overs. Grade all pipework as necessary to ensure proper venting and drainage. Install tailpipes in accordance with AS/NZS 5601.1.

Support pipework in accordance with AS/NZS 5601.1. Ensure pipework in under floor spaces is supported clear of the ground by as minimum of 100mm. Support pipe risers with suitable fixings and attachments that are capable of supporting the total weight of the riser and allow for differential expansion.

Provide pipe sleeves where pipes pass through walls, floors and ceilings to accommodate movement of the pipes. Do not joint pipes at sleeved locations. Unless shown otherwise, finish pipe sleeves flush with the finished surface. In plant rooms and wet areas, provide steel sleeves that extend above the floor level. Avoid concealed pipe joints; where essential, weld each joint and test hydraulically before embedding or covering the pipe.

Allow for movement due to expansion and contraction, either by loops, deviations in the pipework, or by fitting expansion joints as shown on the drawings. Arrange pipe supports so that the expansion is taken up by the provisions of the expansion design.

Ensure pipes are separated by a minimum of 25mm from any metallic electrical conduit, or metal armoured or metal sheathed electrical wire.

Plug open pipe ends as the works progress to ensure the pipe bore is kept clean and free of contamination.

15.3.6 Polyethylene Piping

15.3.6.1 Polyethylene Piping

Polyethylene (PE) pipe shall comply with AS/NZS 4130; Series 2 Pipes - Gas, or AS/NZS 4130 Series 3 Pipes - Gas. Polyethylene pipe is permitted for in-ground use only, and is not permitted for use beneath a building. Jointing shall be by electrofusion, butt-fusion or mechanical joints complying with AS/NZS 4645.3.

The use of polyethylene pipe and fittings shall be in accordance with the conditions and limitations of AS/NZS 5601.1: Section 4 - in particular Table 4.1.

Inspect polyethylene pipes and fittings for damage, cuts and deep scratches prior to use, and discard if deemed defective.

Pipework shall follow wall lines, and be straight and true to line, plumb and level, parallel with adjacent pipes, and have the minimum number of bends. Avoid diagonal pipe runs. Arrange pipework for easy dismantling of plant components and valves. Minimise pipe cross-overs. Grade all pipework as necessary to ensure proper venting and drainage. Install tailpipes in accordance with AS/NZS 5601.1.

Support pipework in accordance with AS/NZS 5601.1. Ensure pipework in under floor spaces is supported clear of the ground by as minimum of 100mm. Support pipe risers with suitable fixings and attachments that are capable of supporting the total weight of the riser and allow for differential expansion.

Provide pipe sleeves where pipes pass through walls, floors and ceilings to accommodate movement of the pipes. Do not joint pipes at sleeved locations. Unless shown otherwise, finish pipe sleeves flush with the finished surface. In plant rooms and wet areas, provide steel sleeves that extend above the floor level. Avoid concealed pipe joints; where essential, weld each joint and test hydraulically before embedding or covering the pipe.

Allow for movement due to expansion and contraction, either by loops, deviations in the pipework, or by fitting expansion joints. Arrange pipe supports so that the expansion is taken up by the provisions of the expansion design.

Ensure pipes are separated by a minimum of 25mm from any metallic electrical conduit, or metal armoured or metal sheathed electrical wire.

Plug open pipe ends as the works progress to ensure the pipe bore is kept clean and free of contamination.

15.3.7 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings prior to installation.

Co-ordinate with other trades as necessary to install the LPG service to the required locations and layouts, tolerances and standards - in particular with electrical installations to ensure that minimum clearances are maintained.

The LPG service layout drawings and schematics are indicative only, and indicate the main routes and positions for the LPG service installation and equipment in relation to the building and other services.

Should an alternative LPG pipe route to that shown on the drawings be proposed, submit all necessary details to the Architect/Designer for review and approval before proceeding. Alternative routes for pipework are not permitted without written instruction from the Architect/Designer.

15.3.8 Workmanship

Installation work shall be carried out by qualified and experienced tradesmen, under the direct supervision of a NZ certified Registered Gasfitter authorised to undertake the work under the Plumbers, Gasfitters, and Drainlayers Act 2006, to the requirements of AS/NZS 5601.1, NZBC G10 and NZBC G11, and with all regulatory requirements.

All pipe cutting, jointing, and supporting techniques shall be exactly as recommended by the manufacturer. Pipes, fittings and accessories shall be handled and installed in such a manner that prevents any damage, deterioration or contamination to the product.

All work shall be such as to leave a neat, efficient, robust and gastight installation.□□

Carry out all necessary inspections during installation, and complete all necessary commissioning tests and reports. Complete checklists for Gas Safety Certificate (GSC) and for Certificate of Compliance (CoC) - Gas.

15.3.9 Delivery & Handling

Store materials undercover, off the ground on a flat, level surface in accordance with the manufacturer's requirements. Keep materials and equipment dry, and protect from damage and contamination while stored and as necessary during installation.

Do not use damaged, defective or contaminated pipes, fittings and accessories.

Handle materials in accordance with the manufacturer's requirements.

Installers shall be familiar with and comply with the manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

15.3.10 Commission

15.3.10.1 Commission

Carry out final inspections and testing. Carry out pressure testing of pipework and LPG installation for gastightness (leakage) to the requirements of AS/NZS 5601.1. Remedy any leaks and defects found in the LPG service installation to the specified standard.

Ensure that the Gasfitting Certificate of Compliance and the Gas Safety Certificate have been completed.

15.3.11 Completion

Check that the LPG service installation has been installed correctly in accordance with AS/NZS 5601.1 in compliance with the Gas (Measurement and Safety) Regulations, and that the installation has been purged, tested and commissioned in accordance with the required procedures.

Check for faults and defective work - repair/replace as necessary to the required standard.

Leave this work complete and in full working order, gastight and leak-free, to the required standard and operation.

Leave the surrounding surfaces clean and free of rubbish and debris. Remove all rubbish and excess material from the site.

Issue to the Owner a copy of the operation and maintenance requirements, and a copy of the associated warranties for the LPG installation, components and appliances.

Issue all required As-Built Documentation, the Gasfitting Certificate of Compliance, and the Gas Safety Certificate to the relevant parties.

16 DRAINAGE

16.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

16.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1254:2010(AS/NZS)	PVC-U pipes and fittings for stormwater and surface water applications
1260:2017(AS|NZS)	PVC-U pipes and fittings for drain, waste and vent applications
1546.1:2008(AS/NZS)	On-site domestic wastewater treatment units - Septic tanks
1547:2012(AS/NZS)	On-site domestic wastewater management
2032:2006(AS/NZS)	Installation of PVC pipe systems
2439.1:2007(AS)	Perforated plastics drainage and effluent pipe and fittings Part 1: Perforated drainage pipe and associated fittings
2566.1:1998(AS/NZS)	Buried flexible pipelines - Structural design
2566.2:2002(AS/NZS)	Buried flexible pipelines - Installation
3500.0:2003(AS/NZS)	Plumbing and drainage - Glossary of terms
3500.2:2018(AS|NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.2:2021 (AS|NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.3:2018(AS|NZS)	Plumbing and drainage Part 3: Stormwater drainage
7643:1979(NZS)	Code of practice for the installation of unplasticized PVC pipe systems
NZBC E1/AS1	Surface Water
NZBC G13/AS2	Foul Water Drainage

16.3 General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals.

Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.

16.4 Drainlaying Elements

16.4.1 Drainlaying

Commence drainlaying at the low end of even fall sections of drains and proceed in a continuous sequence to the fittings connections.

Sumps, gullies, etc. solidly bedded. Lay 110mm uPVC drains to connect gullies, sumps, stacks, and downpipes through to the street edge connections.

Every junction and bend shall be an inspection position. Temporarily seal the open ends of incomplete drains to prevent entry of foreign matter. Make appropriate provision for any anticipated differential settlement. Place signal strip above all drains.

Ensure that stormwater drains are very accurately positioned so that downpipes can drop directly into them, without offsets.

16.4.2 Testing

The sewer and stormwater systems shall both be fully tested to the approval of the Territorial Authority Inspector before being covered in. If any defects show rectify and then fully retest.

16.4.3 As Built Drawings

During drainlaying plot the location of all bends and changes in direction and all cleaning access positions. Locate each item by two diagonal measures from structure corners, etc. and record on a blank plan copy (supplied by Architect/Designer when requested).

Note that Practical Completion of the contract will not be certified until this as-built drawing has been produced (made available to the Contractor in time for the Code Compliance Certificate application.

16.5 Foul Water Drainage

16.5.1 Scope

Supply, install, test and commission new, gravity-flow foul water drains on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for satisfactory completion and performance of the foul water drainage system. All aspects of this works shall comply with the requirements of the NZ Building Code, related compliance Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the approved drawings and schedules. Ancillary work and/or services not specifically mentioned but necessary to complete the work to specified levels of performance shall be deemed included.

Install foul water drains in natural ground, beneath and external to the building, for the distances indicated on the drawings. Allow for all ventilation requirements, inspection openings, bends, branches, manholes, inspection chambers, overflow gully traps, etc., as required and indicated on the drawings. Unless shown otherwise, the foul water drains shall be connected to the building's sanitary drainage system, and discharge to the foul water network.

The foul water drainage plans are diagrammatic only. Allow for all necessary vents, inspection fittings, cleaning eyes, traps and venting in accordance with AS/NZS 3500.2 and to comply with the New Zealand Building Code, and as required by the Territorial Authority. Refer to the drawings for the dimensioned locations of sanitary waste pipes and outlets.

The following is a list and a general description of the extent of Foul Water Drainage works, which are more specifically defined in the contract documents, required for the completion of the contract works:

16.5.2 Requirements

16.5.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, in particular the 'Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry', and the 'Excavation Safety - Good Practice Guidelines'

Carry out all construction operations in accordance with the Contractor's project-specific Health and Safety Plan.

16.5.2.2 Compliance

Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the foul water drainage works.

The Drain Layer shall be deemed to have allowed for all work associated with the safe and orderly execution of the foul water drainage work, including complying with all Territorial Authority requirements, Building Consent, Building Act, Health and Safety requirements, and all other acts, laws, by-laws and regulations that may affect the execution of the work.

16.5.2.3 Work on Public Property

Excavation and reinstatement of public property shall comply with the requirements of the relevant controlling authorities.

Obtain all necessary approvals and permits from the controlling authorities before commencing work on public property.

Arrange and pay for any excavation and reinstatement inspections of public property required by the controlling authorities.

Before commencing any excavation in or reinstatement work to public footpaths, driveway crossings, roads or other public property, make all necessary enquiries to the relevant controlling authority for their standards for excavation and reinstatement.

Provide at all times, adequate safeguards to the public in respect of temporary fences, signals, signs and lights. Where traffic signs are necessary, these shall be provided and operated in accordance with the Regulatory Authority or NZ Transport Agency (NZTA) guidelines, as applicable, but erected only with the prior written approval of the Regulatory Authority or NZTA and the Contract Administrator.

Where a Traffic Management Plan (TMP) is required, prepare, operate and update this plan as necessary throughout the duration of the works. The TMP shall conform to the requirements of the Regulatory Authority or NZTA, as applicable. Obtain TMP prior-approvals, and maintain the TMP for the entire construction duration.

Remove dirt and contamination deposited on public property to the satisfaction of the controlling authorities.

16.5.2.4 Notifiable Work

Notify WorkSafe NZ of work that is notifiable (particular hazardous work) under the Health and Safety in Employment Regulations 1995, 24 hours before starting the work.

16.5.2.5 Explosives

The use of explosives is NOT permitted.

16.5.2.6 Inspections

Inspections of foul water drainage works shall take place at each of the stages as scheduled in the Building Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

16.5.2.7 Testing

Carry out all necessary testing of the foul water drainage installations, and demonstrate to the Contract Administrator and the controlling Territorial Authority that the installations are watertight and comply with the requirements of the New Zealand Building Code, related compliance Standards, and the design documents.

16.5.2.8 CCTV Inspection

Where required by the Territorial Authority and in addition to pressure testing, CCTV acceptance inspection of new drains shall be carried out in accordance with the New Zealand Pipe Inspection Manual.

All defects identified by the CCTV inspection shall be rectified to the required standard, without cost to the Principal, and the relevant section of pipeline tested and/or inspected again.

16.5.2.9 Redundant Drains

Where an existing foul water drain or part thereof is no longer required, it shall be disconnected from the service at the junction of the live drain or at the property boundary, and be appropriately sealed-off watertight in accordance with AS/NZS 3500.2. Advise the controlling Territorial Authority of the final sealing treatment.

16.5.2.10 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades as necessary to install foul water drains to the required locations and layouts.

16.5.2.11 Workmanship

Foul water drainage work shall be carried out by qualified and experienced tradespersons, familiar with the required installation requirements, under the direct supervision of a NZ certified Registered Drainlayer, in accordance with AS/NZS 3500.2 in compliance with the New Zealand Building Code, and all local codes and regulatory authority requirements, and the conditions of the Building Consent.

All pipe cutting, jointing, and supporting techniques shall be exactly as recommended by the pipe manufacturer. Pipes, fittings and accessories shall be handled and installed in such a manner that prevents any damage to the component.

All work shall be such as to leave a neat, efficient, robust and watertight installation.

Carry out all necessary inspections and tests during installation to ensure compliance with the design specifications and regulatory requirements. Provide test result sheets to the Contract Administrator to show compliance has been achieved.

Take all necessary measures during installation to protect the foul water drainage system from damage, and to prevent the entry of:
- extraneous water;
- soil, sand, or rock,
- the contents of any septic tank; or
- any other substance, the discharge or which could impede the operation of the foul water drainage network.

Ensure that any installed drain is adequately protected from any damage and excessive loading during the remaining construction period.

Protect adjacent finished work and surfaces from damage and contamination during installation. Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Drain Layer's expense.

Any associated electrical wiring and prescribed electrical work (by others) shall be carried out by a qualified electrician in accordance with the electrical standards and regulations and the Electrical specification.

16.5.2.12 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected foul water drainage materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional expense to the Principal.

16.5.2.13 Delivery & Handling

Store foul water drain pipes and accessories undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance

with the manufacturer's requirements. Keep pipes and accessories out of direct sunlight and protected from damage and contamination at all times.

Where possible, store pre-packed PVC pipes in the original delivery crate.
Store loose PVC pipes on evenly spaced bearers at maximum 1.0m centres, with pipe sockets alternated so the the sockets do not bear on each other, and with side supports if pipes are stacked more than two layers high. When loose PVC pipes are stacked in a pyramid, the maximum stack height shall be 1.0m and the bottom pipes shall be chocked.

Do not used damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

Installers shall be familiar with and comply with manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

Conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - in particular the 'OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry' and the 'Excavation Safety - Good Practice Guidelines'.

16.5.2.14 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare As-Built Drawings of the foul water drainage system, that accurately record the new and/or modified foul water drainage installation.

Information shall include, but not limited to, type, class and size of all pipes, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, manholes, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

16.5.2.15 Warranties

On completion and before Practical Completion, provide all relevant manufacturer/supplier warranties in favour of the Principal, covering materials, equipment, proprietary products, etc., supplied and installed.

16.5.3 Materials

16.5.3.1 General

Supply and deliver to the site all pipes, fittings, precast manholes, granular bedding material and other materials required for incorporation in the drainlaying work. All drainlaying materials shall be fit for purpose and intended use, new, of good quality and free from defects, and as specified herein and on the approved drawings and schedules.

16.5.3.2 PVC-U Pipes & Fittings

PVC-U foul water drain pipes and fittings for non-pressure applications shall comply with AS/NZS 1260: 'PVC-U pipes and fittings for drain, waste and vent application'. Installed in accordance with AS/NZS 3500.2, and AS/NZS 2032 or AS/NZS 2566.2.

Pipe Classification:
Class SN4-SN6 - Rubber Ring Joint or Solvent Welded Joint. For domestic and residential applications, and low load areas.
Class SN8-SN10 - Rubber Ring Joint or Solvent Welded Joint. For commercial and industrial applications, and medium load areas.
Class SN16 - Rubber Ring Joint or Solvent Welded Joint. For heavy traffic load areas.

16.5.3.3 Gullies

Gully traps shall be of an approved type and installed in accordance with AS/NZS 3500.2 and the requirements of the Territorial Authority.

Gully traps shall be PVC construction, including dish and lid.

The overflow level of gully dishes shall be set no less than 25mm above paved surfaces, and no less than 100mm above unpaved surfaces.

Provide adequate support to gully riser and dish with compacted bedding or concrete.

Where subject to damage, protect gully traps with a smooth-finished concrete surround, or with 2:1 sand/cement mortar, surrounding the entire gully and separated from the building foundation, in accordance with AS/NZS 3500.2 and as shown on the drawings.

16.5.3.4 Insitu Concrete

Cast insitu concrete used for foul water drainage installation shall be 20 MPa Normal Concrete complying with NZS 3104. Where specified, used as bedding, capping and surround concrete, and for any cast-insitu concrete elements (to NZS 3104 unless specified otherwise).

16.5.3.5 Reinforcing Steel

Steel reinforcing materials for cast-insitu concrete elements shall comply with AS/NZS 4671. Unless specified otherwise on the drawings, bars shall be Grade 300 deformed.

16.5.3.6 Cement Mortar

Cement mortar shall consist of one part cement and two parts of fine aggregate measured by volume, properly mixed with the minimum amount of clean water necessary to render the mix workable. Do not use cement mortar that has been mixed and left standing for more than one hour.

16.5.3.7 Bedding & Surround Material

Except where specified otherwise on the drawings, bedding (underlay, side support, overlay) material shall be compacted clean granular non-cohesive material - crushed rock or gravel screenings - of nominal particle size range of 7-10mm with a maximum particle size of 20mm, that is free from organic material and clay, and have a moisture content appropriate to the

degree of compaction required. If the bedding material is contaminated or an excessive amount of oversized particles are present, the bedding material shall be rejected and not used.

16.5.3.8 Backfill Material

Except where specified otherwise, backfill material above the pipe embedment layer (150mm above the top of pipe) shall be selected excavated material that is free from any builder's waste, any organic material, any rocks or hard matter larger than 20mm, and any soil lumps larger than 75mm.

Except where specified otherwise, pipes beneath private roadways and where subject to vehicular traffic - all backfill from the top of the embedment layer (150mm above top of pipe) to the underside of the pavement layer shall be GAP 65 - General All Passing 65mm.

Mechanically compact backfill material in layers not exceeding 300mm to a relative compaction no less than 95% of the NZ Standard Compaction.

Trenches in public footpaths and roads shall be backfilled in accordance with the requirements of the controlling authority.

16.5.3.9 Marking Tape

Marking tape shall be located just above the top of the pipe embedment zone, and centred over the pipe.

Non-Detectable Marking Tape:
- Non-detectable marking tape shall comply with AS/NZS 2648.1.
- Tape width shall be 100mm minimum.
- Height of message letters shall be 40mm minimum.

Detectable Marking Tape:
- Detectable marking tape shall comply with AS/NZS 2648.1.
- Tape width shall be 100mm minimum.
- Tracer wire shall be stainless steel grade 316 or copper alloy designation 122.
- Tracer wire shall allow at least 25% elongation of the plastic tape before breakage of the wire.
- Height of message letters shall be 40mm minimum.

16.5.4 Trench Excavation

16.5.4.1 Clearing of Surfaces

Where trenches are to be excavated in a grassed area, garden or a berm, the topsoil shall be stripped from the area of the excavation and stockpiled separately adjacent to the trench for use in reinstating the surface.

Where trenches are to be excavated in existing concrete or asphalt paved areas, the paving shall be cut to neat, straight lines, parallel to the trench prior to excavation, with a nominal 100mm trimming allowance either side of the excavation width. The excavation shall be carried out with minimal damage to the existing paved surface.

Where trenches are to be excavated in existing segmental paved areas, the pavers shall be removed by hand, cleaned and set aside for later reinstatement.

Subsequent trench backfill shall be adequately compacted to avoid subsidence of reinstated surfaces.

16.5.4.2 Excavation

Locate all existing buried services before commencing excavation work in any area.

Excavations for trenches and pits shall be properly executed and supported in accordance with the requirements of AS/NZS 3500.2.

Carry out excavation work to comply with all relevant health and safety regulations and guidelines, including the 'Excavation Safety - Good Practice Guidelines' where appropriate.

Unless specified otherwise, the excavation of trenches shall be taken out by open cut to the levels and grades shown or implied on the drawings. Excavate trenches to the depths which will provide for the appropriate type of bedding.

Trench excavations shall be of sufficient width to allow all operations necessary for the jointing of pipes and placing of the specified backfill. The bottom width of the trenches shall at least the combined measurement of the outside diameter of the pipe plus 200mm - with a minimum clearance of 100mm on each side of the drain barrel. The trench width at the top of the pipe shall not exceed the outside diameter of the pipe plus 600mm unless the pipe in the trench is covered with concrete. The trench above the top of the pipe may be cut wider, either by excavating a wider bench or by battering the trench wall.

16.5.4.3 Shoring

Make all necessary provisions for shoring trench walls to comply with all regulations and for health and safety measures.

Trench shoring materials and equipment must be suitable for the purpose for which they are to be used, of sound quality, and adequate in strength for the particular use.

Shoring shall be placed by experienced operators under competent supervision, and shall not be altered, dismantled, or interfered with except on the instruction of the authorised supervisor.

Ensure no voids are left in the backfill when shoring is removed, and the required compaction density of the backfill is achieved.

16.5.4.4 Dewatering

Take all necessary precautions to keep trenches and pits free from water. Provide all necessary pumps, drainage pipes and other equipments required for dewatering. Install all necessary filtering and detention measures required by the Territorial Authority.

If the bottom of the trench is likely to be adversely affected by rain, remove the final 80mm of excavation as a separate operation immediately before placing the bedding material.

16.5.5 Pipe Laying

16.5.5.1 Bedding Pipes

Provide a minimum 75mm thick underlay layer of well compacted bedding material for all pipes. A chase shall be excavated in the bedding to accommodate any jointing socket or fitting in the drain. The pipe embedment material shall be laid and compacted so that the pipe is evenly and continuously supported along its length on either side of the pipe, and with an overlay layer minimum 150mm thick.

When trench support systems are used, the bedding material shall be placed and compacted in a manner so that no loss of compaction results from removal of the trench side support systems. The trench support shall be removed in such a way as to ensure that the placing and compaction of the bedding material occurs below the trench supports and directly against the undisturbed ground of the trench walls.

After completion of the jointing and inspection of drain pipes, place and compact the bedding surround material around the pipe to the required depth over the pipe. The material shall be carefully placed around and over the pipe using hand tamping and in a manner that ensures the pipe is uniformly supported all round its perimeter and without voids. Take care during placement and compaction to ensure the pipe is not displaced or damaged.

16.5.5.2 Laying Pipes

Install foul water drains in accordance with AS/NZS 3500.2 to the layout, levels and grades shown on the drawings Drain pipes shall be laid to provide maximum falls, in straight lines and at an even grade, without obstruction to flow, and with full allowance for bedding.

Before installing the pipes, check the bore of each pipe is free from foreign matter and that the pipe exterior and the socket have not been damaged in handling or storage. All pipelines shall be kept clean and free of dirt and debris at all times during installation, testing and commissioning.

PVC-U foul water drain pipes shall be properly jointed (rubber ring joint or solvent welded joint) to produce a watertight seal in accordance with the manufacturer's instructions.

Start laying main drains at the point of outfall and insert junctions for branch drains as the work proceeds. Pipes shall be laid with the least number of bends, in the centre of the trench, in straight lines between bends, and to the grades and locations shown on the drawings.

Install all necessary fittings, including vents, inspection openings and access points, bends and junctions, to the locations shown on the drawings and in accordance with the manufacturer's instructions. Where not specified on the drawings or schedules, fittings for inspection openings, bends, junctions, etc., shall be selected from the PVC pipe system range of products and installed in accordance with the manufacturer's instructions.

Other than precautions against damage by displacement or floating pipes, no bedding surround material or backfill shall be placed until the laying of the drain has been inspected by the Territorial Authority.

16.5.5.3 Steep Gradients

Where the gradient of a foul water drain pipe exceeds 1:5 (20%), anchor blocks shall be installed at the bend or junction at the top and bottom of the inclined drain, and at intervals not exceeding 3m. Anchor blocks shall be constructed in accordance with AS/NZS 3500.2: Section 3.4.4.

16.5.5.4 Underground Drains Near & Under Buildings

Protect underground drains near and under buildings against damage in accordance with AS/NZ 3500.2 where the minimum cover specified cannot be provided.

16.5.5.5 Concrete Support

Concrete pads used to support foul water drains, gully traps, risers, etc., shall be minimum 100mm thick and in accordance with AS/NZS 3500.2: Section 5.3.

16.5.5.6 Jointing - Rubber Ring Joints

PVC-U drain pipes shall be jointed using rubber ring seals in preference to the solvent welded method - which shall be used where rubber ring jointed fittings are not manufactured. Only use seals and lubricants recommended by the pipe or fitting manufacturer. The marking of pipes by scoring is not permitted. All joints shall be watertight and prevent the infiltration of groundwater and the intrusion of tree roots.

Rubber ring joints shall be assembled in accordance with the pipe manufacturer's instructions and generally as follows:
- Ensure that all components are clean and free of dirt and debris during all stages of the jointing process;
- Ensure the pipe spigot is correctly chamfered and has a clearly visible witness mark to the correct insertion length;
- Clean and generously lubricate with jointing lubricant, especially the chamfer. Do not lubricate the ring groove;
- Where elastomeric seals are required to be fitted, clean and fit the seal, and check the elastomeric seal sits evenly in the housing;
- Apply the manufacturer’s specified lubricant to the end of the spigot and chamfer of the pipe;
- Keep the elastomeric seal and its housing free of lubricant, unless otherwise recommended by the manufacturer;
- Align the pipes so there is no deflection at the joint, then insert the spigot in the socket and push home to the witness mark;
- Hold the socket end firmly during the jointing to prevent previously assembled joints from moving;
- If excessive force is required and/or the jointing process does not comply with the manufacturer's instructions, disassemble and remake the joint.

Field cutting pipes:
- cut the spigot end square and remove all burrs;
- chamfer the cut end of the pipe with a taper of 15° to approx. half the wall thickness, or as specified by the pipe manufacturer;
- as appropriate, witness mark the pipe at the specified insert by the manufacturer.

16.5.5.7 Pipe Cover

Unless specified otherwise on the drawings, the minimum pipe cover (finished surface to top of pipe) shall be:
- where not subject to vehicular loading: 300mm.
- where subject to vehicular loading - not in roadways: 500mm.
- where subject to vehicular loading - in sealed roadways: 500mm.
- where subject to vehicular loading - in unsealed roadways: 500mm.
- pipes in embankment conditions or subject to loading from heavy construction equipment: 750mm.

16.5.5.8 Marking Tape

Install marking tape on top of the pipe embedment zone and centred over the pipe before commencing backfilling.

16.5.6 Connection

16.5.6.1 Public Network - Boundary Connection

Connect to discharge the foul water drainage line directly to the public mains street-edge/boundary connection in accordance with the requirements of the Territorial Authority and as shown on the drawings.

16.5.7 Testing

16.5.7.1 Foul Water Drains

Test the foul water drainage installation, including all drains, connections and system components, for water tightness in accordance with the requirements of the Territorial Authority (TA).

Where required by the Territorial Authority, the testing shall be undertaken in the presence of a representative of the TA. Demonstrate to the Contract Administrator and the Territorial Authority that the installation complies with the requirements of the contract documents, related standards and regulatory bodies. Lodge all certificates of approval with the Contract Administrator.

Unless specified otherwise by the Territorial Authority, the test method shall be the Water Test procedure for non-pressure pipelines as defined in AS/NZS 2302. Where appropriate, the procedures in NZBC E1/VM1 may be used as an alternative. The acceptability of other test methods are be subject to the approval of the Territorial Authority and the Contract Administrator.

Provide all necessary plant, equipment and instruments required for the specified testing procedure. All testing and commissioning shall be undertaken by suitably skilled and experienced technicians.

Pressure testing shall be carried out after the pipes have been laid and the bedding material has been placed over the pipes as specified.

Prior to testing ensure that all pipe junctions and inspection eyes are exposed, and pipelines have been flushed and all residual debris cleaned out.

Foul water manholes shall be tested for watertightness by plugging all pipes and filling with water. After absorption has taken place the water level shall remain constant for thirty minutes.

Test results shall be recorded clearly on properly formatted Test Result sheets, and submitted to the Contract Administrator within 48 hours of completion of testing.

Repair or replace any materials or workmanship found to be defective or faulty during testing, and repeat the test until a satisfactory test result is achieved.

Leave the installation watertight and free of defects, and operating to the required performance standard.

The work shall be deemed incomplete unless all required testing and commissioning has been carried out and has passed the requirements of the testing specification and the Territorial Authority.

16.5.7.2 Water Test Procedure - to AS/NZS 2302

Water test procedure of foul water drains (non-pressure) - to AS/NZS 2302: Section 7.3.2.
- The pipeline shall be filled with water to a height of not less than 1m above the natural ground level at the highest point of the section being tested, or to the flood level of the lowest sanitary fixture, but not exceeding 5m at the lowest point of the test section.
- The pressure shall be maintained without leakage for at least 15 minutes.
- The source of any leaks shall then be ascertained and any defects repaired.
- The pipeline shall then be retested.

Note: Testing should not be carried out if groundwater is present above the pipeline. If groundwater is present, the test pressure should be increased to compensate for the depth of groundwater at a rate of 10 kPa for every 1m of groundwater depth.

16.5.8 Backfilling

16.5.8.1 Backfilling

Trenches shall be backfilled as soon as possible after the laying, inspecting and testing of the pipeline.

Where required, lay marker tape along the length of the drain, just above the top of the pipe embedment zone, before backfilling.

Trench backfill materials shall be placed over the pipe embedment, and compacted to restore the trench as near as practicable to the normal surrounding ground surface level and reduce the likelihood of subsidence. Backfill material shall be placed in uncompacted layers not exceed 300mm, then mechanically compacted to the required density.

Temporary trench support systems shall be lifted progressively above each layer of backfill to ensure each layer is compacted against undisturbed ground.

Any deficiencies of trench filling exposed by settlement shall be corrected to the required standard.

16.5.9 Reinstatement of Surfaces

16.5.9.1 Reinstatement of Surfaces

Refer to separate specification section - Siteworks - Reinstatement of Surfaces.

Ground and paved surfaces above excavated foul water drainage trenches shall be reinstated to the standard specified. Reinstatement shall generally achieve a standard equal to or better than the pre-existing situation - in no case will a lower standard be accepted.

Hedges, fences and other features to be retained that have been damaged or removed during the work shall be reinstated to the satisfaction of the Contract Administrator.

16.5.9.2 Public Property

Reinstatement of surfaces to public property shall comply with the requirements of the relevant controlling authorities.

16.6 Groundwater Drainage

16.6.1 Scope

Supply, install and commission new gravity groundwater subsoil drains on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for the satisfactory completion and performance of the groundwater drainage system. All aspects of this works shall comply with the requirements of the NZ Building Code, relevant Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the approved drawings and schedules.

The following is a list and a general description of the extent of the Groundwater Drainage works, which are more specifically defined in the contract documents, required for the completion of the contract works:

16.6.2 Requirements

16.6.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, in particular the 'Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry'.

Carry out all construction operations in accordance with the Contractor's project-specific Health and Safety Plan.

16.6.2.2 Compliance

Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the drainlaying works.

The Drain Layer shall be deemed to have allowed for all work associated with the safe and orderly execution of the drainlaying work, including complying with all Territorial Authority

requirements, Building Consent, Building Act, Health and Safety requirements, and all other acts, laws, by-laws and regulations that may affect the execution of the work.

16.6.2.3 Subsoil Drains

Construct subsoil drains in natural ground, in accordance with AS/NZS 3500.3 or as otherwise specified herein, to the locations, layout and details shown on the drawings. As shown on the approved drawings, outlets from subsoil drains shall be connected (downstream) to the stormwater system or constructed to discharge clear of embankments.

The groundwater drainage plans are diagrammatic only. Allow for all necessary pits and connections indicated on the drawings and as required by the controlling Territorial Authority. Refer to the drawings for the dimensioned locations of pits etc.

As necessary, check on site before excavation of trenches commences to ensure the required minimum gradient and cover are achieved.

The groundwater subsoil drains are intended as a permanent feature of the contract works, and not construction purposes. The use of permanent groundwater subsoil drains for construction purposes during the construction period is not permitted.

16.6.2.4 Inspections

Inspection of the groundwater drainage work shall take place at each of the stages as scheduled in the Building/Resource Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

16.6.2.5 Records & Testing

Maintain records of the type, size, and location and levels of subsoil drains laid for documenting subsequent As-Built drawings.

On completion, demonstrate by flow-testing to the satisfaction of the Contract Administrator that a clear waterway has been provided and the subsoil drains perform the required standard. Any deficiencies in the performance of subsoil drains during the Contract Period or Maintenance Period shall be remedied by the Drain Layer, at no additional expense to the Principal.

16.6.2.6 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades as necessary to install groundwater subsoil drains to the required locations, tolerances and standards.

16.6.2.7 Workmanship

All drainlaying work shall be carried out by qualified and experienced tradespersons, familiar with the specified system design requirements and installation techniques, under the direct

supervision of a NZ certified Registered Drainlayer, in accordance with the manufacturer's installation requirements, AS/NZS 3500.3 in compliance with the New Zealand Building Code, and with all local codes and regulatory authority requirements, and as shown on the drawings. Comply with the requirements of the Building Consent.

All pipe cutting, jointing, and supporting techniques shall be exactly as recommended by the pipe manufacturer. Pipes, fittings and accessories shall be handled and installed in such a manner that prevents any damage to the component.

All work shall be such as to leave a neat, efficient and robust installation.

Carry out all necessary inspections and tests during installation to ensure compliance with the design documents and the specification is achieved. Submit test result sheets to show compliance with the design drawings and specification.

Ensure that any installed drain is adequately protected from any damage and excessive loading during the remaining construction period.

Protect adjacent finished work and surfaces from damage and contamination during installation. Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Drain Layer's expense.

16.6.2.8 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected groundwater drainage materials and/or work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional expense to the Principal.

16.6.2.9 Delivery & Handling

Store ground water darainagel pipes and accessories undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep pipes and accessories out of direct sunlight and protected from damage and contamination at all times.

Do not used damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC/uPVC materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

Installers shall be familiar with and comply with the manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Approved Codes of Practice - in particular the Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

16.6.2.10 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare and submit scaled 'As-Built' drawings of the new groundwater subsoil drainage system that accurately record the new and/or modified groundwater drainage installation

Information shall include, but not limited to, subsoil drain pipe type and size, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

16.6.3 Materials

16.6.3.1 Pipe

Perforated corrugated plastic pipes used in subsoil drains shall comply with AS 2439.1.

Pipe Schedule:
- Subsoil Drains NOT Subject to Traffic Loading: Iplex Novaflo or approved-equivalent pre-perforated single-wall corrugated high-density polyethylene (HDPE) subsoil drainage pipe; pre-fitted with a full-length polypropylene or polyester filter sock.
- Subsoil Drains Subject to Traffic Loading: Iplex Nexus Hi-Way or approved-equivalent heavy-duty pre-perforated double-wall corrugated high-density polyethylene (HDPE) roadworthy subsoil drainage pipe; pre-fitted with a full-length polypropylene or polyester filter sock.

Pipe diameters shall be as indicated on the drawings. Pipes shall be installed only with the use of proprietary components recommended by the pipe manufacturer for all joints, bend fittings, couplers, end caps, etc., and in accordance with the manufacturer's requirements to the locations, layout and details shown on the drawings.

Do not allow pipes and fittings to be exposed to direct sunlight for extended periods of time - refer to the manufacturer's technical literature.

16.6.3.2 Drainage Aggregate

Unless specified otherwise on the drawings, filter and bedding material shall be drainage 40/20 open coarse graded clean (preferably washed) durable aggregate.

16.6.3.3 Geotextile

Unless specified otherwise on the drawings, geotextile fabric shall be Strength Class B, Filtration Classes 1-4, non-woven needle-punched continuous filament polyester geotextile. Installed in accordance with the manufacturer's requirements and as shown on the drawings.

Pins for securing the geotextile shall be of steel, a minimum of 5mm in diameter, and at least 400 mm in length. Other equivalent securing devices may be substituted if recommended by the geotextile manufacturer.

The geotextile shall not be left exposed for more than two weeks without being covered by backfill. Geotextile that becomes torn or otherwise damaged through any cause shall be removed and replaced with undamaged geotextile with a minimum 500mm overlap requirement in all directions.

16.6.4 Trench Excavation

16.6.4.1 Clearing of Surfaces

Where trenches are to be excavated in a grassed area, garden or a berm, the topsoil shall be stripped from the area of the excavation and stockpiled separately adjacent to the trench for use in reinstating the surface.

Where trenches are to be excavated in existing concrete or asphalt paved areas, the paving shall be cut to neat, straight lines, parallel to the trench prior to excavation, with a nominal 100mm trimming allowance either side of the excavation width. The excavation shall be carried out with minimal damage to the existing paved surface.

Where trenches are to be excavated in existing segmental paved areas, the pavers shall be removed by hand, cleaned and set aside for later reinstatement.

Subsequent trench backfill shall be adequately compacted to avoid subsidence of reinstated surfaces.

16.6.4.2 Excavation

Unless specified otherwise, the excavation for trenches shall be taken out by open cut to the depths shown or implied on the drawings. Excavate trenches to the depths which will provide for the appropriate bedding depth.

Trenches shall be cut in such a manner as will ensure that the geotextile wrapped aggregate subsoil drains, and pipes if included, will be laid true to the depths, grades and lines shown on the drawings.

Unless otherwise specified trenches shall have: a minimum gradient of 1:100; vertical sides; and a minimum depth that will ensure that the invert level shall be not less than 1 metre below finished subgrade level; and a minimum depth of cover over the flexible pipes.

Where a trench has been excavated deeper than necessary, the excess depth shall be filled either with embedment material compacted to achieve a density as near to the original soil density as possible.

Excavated material shall be stacked at least the excavated depth away from the edge of the excavation and the size of the spoil bank shall be limited to avoid any danger to stability of the trench or adjacent buried services.

All spoil shall be managed so as to avoid contamination of the clean drainage aggregate.

Surplus excavated material shall be disposed of as detailed in the Siteworks specification.

Trenches shall be graded to obtain smooth side and bottom surfaces so that the geotextile will not bridge cavities in the soil or be damaged by projecting rock.

16.6.4.3 Dewatering

Take all necessary precautions to keep trenches and pits free from water. Provide all necessary pumps, drainage pipes and other equipments required for dewatering. Install all necessary filtering and detention measures required by the Territorial Authority.

If the bottom of the trench is likely to be adversely affected by rain, remove the final 80mm of excavation as a separate operation immediately before placing the bedding material.

16.6.5 Laying Subsoil Drains

16.6.5.1 Perforated Corrugated Plastic Pipe Subsoil Drain

Perforated corrugated plastic pipe subsoil drains shall be installed with a geotextile fabric filter to the trench perimeter, and generally as follows:
- Following trench excavation the geotextile filter fabric shall be placed in the trench so as to conform loosely to the shape of the trench. The geotextile shall be laid flat, but not stretched on the soil, and shall be anchored with securing pins.
- Use single full width fabric sections only cut to suit the required trench width, drainage height and fabric overlap. Longitudinal joints in the fabric are not permitted.
- Geotextile fabric end-joints (transverse) shall be overlapped minimum 500mm and shall be anchored with securing pins to ensure this required overlap is maintained.
- Geotextile fabric sides shall be cut to size to provide a minimum longitudinal lap of 300mm on the top of the drainage aggregate when placed to the specified depth.
- Place a 100mm thick bedding layer of drainage aggregate in the base of the fabric lined trench.
- Lay pipe straight and true along the centre of the trench.
- Back fill with drainage aggregate at least 150mm above the pipe - to the depth specified.
- Wrap the sides of the fabric over the top of the drainage aggregate, longitudinally overlapped 300mm minimum.
- Backfill above the geotextile fabric shall be as specified on the drawings.
- Backfill shall be compacted to provide support of not less than that of the adjacent soil.
- As shown on the approved drawings, outlets from subsoil drains shall be connected to the stormwater system or constructed to discharge clear of embankments.

16.6.6 Reinstatement of Surfaces

16.6.6.1 Reinstatement of Surfaces

Refer to separate specification section - Siteworks - Reinstatement of Surfaces. Ground and paved surfaces above excavated groundwater drainage trenches shall be reinstated to the standard specified. Reinstatement shall generally achieve a standard equal to or better than the pre-existing situation - in no case will a lower standard be accepted.

Hedges, fences and other items to be retained that have been damaged or removed during the work shall be reinstated to the satisfaction of the Contract Administrator.

16.7 Stormwater Drainage

16.7.1 Scope

Supply, install, test and commission new, gravity-flow stormwater drains on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for the satisfactory completion and performance of the stormwater system. All aspects of this works shall comply with the requirements of the NZ Building Code, related compliance Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the design drawings and schedules. Ancillary work and/or services not specifically mentioned but necessary to complete the installation shall be deemed included.

Install stormwater drains in natural ground, beneath and/or external to the building, for the distances indicated on the drawings. Allow for all inspection openings, bends, branches, manholes, inspection chambers, etc., as required and indicated on the drawings. Unless shown otherwise on the drawings, the stormwater drains shall be connected to the roof and surface stormwater installations, and discharge to the stormwater network.

The stormwater drainage plans are diagrammatic only. Allow for all necessary inspection fittings, cleaning eyes, and traps in accordance with AS/NZS 3500.3 and to comply with the New Zealand Building Code, and as required by the Territorial Authority. Refer to the drawings for the dimensioned locations of roof drainage system rainwater pipes and outlets, and surface drainage outlets, etc.

The following is a list and a general description of the extent of Stormwater Drainage works, which are more specifically defined in the contract documents, required for the completion of the contract works:

16.7.2 Requirements

16.7.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, in particular the 'Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry', and the 'Excavation Safety - Good Practice Guidelines'

Carry out all construction operations in accordance with the Contractor's project-specific Health and Safety Plan.

16.7.2.2 Compliance

Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the stormwater drainage works.

The Drain Layer shall be deemed to have allowed for all work associated with the safe and orderly execution of the stormwater drainage work, including complying with all Territorial Authority requirements, Building Consent, Building Act, Health and Safety requirements, and all other acts, laws, by-laws and regulations that may affect the execution of the work.

16.7.2.3 Work on Public Property

Excavation and reinstatement of public property shall comply with the requirements of the relevant controlling authorities.

Obtain all necessary approvals and permits from the controlling authorities before commencing work on public property.

Arrange and pay for any excavation and reinstatement inspections of public property required by the controlling authorities.

Before commencing any excavation in or reinstatement work to public footpaths, driveway crossings, roads or other public property, make all necessary enquiries to the relevant controlling authority for their standards for excavation and reinstatement.

Provide at all times, adequate safeguards to the public in respect of temporary fences, signals, signs and lights. Where traffic signs are necessary, these shall be provided and operated in accordance with the Regulatory Authority or NZ Transport Agency (NZTA) guidelines, as applicable, but erected only with the prior written approval of the Regulatory Authority or NZTA and the Contract Administrator.

Where a Traffic Management Plan (TMP) is required, prepare, operate and update this plan as necessary throughout the duration of the works. The TMP shall conform to the requirements of the Regulatory Authority or NZTA, as applicable. Obtain TMP prior-approvals, and maintain the TMP for the entire construction duration.

Remove dirt and contamination deposited on public property to the satisfaction of the controlling authorities.

16.7.2.4 Notifiable Work

Notify WorkSafe NZ of work that is notifiable (particular hazardous work) under the Health and Safety in Employment Regulations 1995, 24 hours before starting the work.

16.7.2.5 Explosives

The use of explosives is NOT permitted.

16.7.2.6 Inspections

Inspections of stormwater drainage works shall take place at each of the stages as scheduled in the Building Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

16.7.2.7 Testing

Carry out all necessary testing of the stormwater drainage installations, and demonstrate to the Contract Administrator and the Territorial Authority that the installations are watertight and comply with the requirements of the New Zealand Building Code, related compliance Standards, and the design documents.

16.7.2.8 CCTV Inspection

Where required by the Territorial Authority and in addition to pressure testing, CCTV acceptance inspection of new drains shall be carried out in accordance with the New Zealand Pipe Inspection Manual.

All defects identified by the CCTV inspection shall be rectified to the required standard, without cost to the Principal, and the relevant section of pipeline tested and/or inspected again.

16.7.2.9 Redundant Drains

Where an existing drain or part thereof is no longer required, it shall be disconnected from the service at the junction of the live drain or at the property boundary, and be appropriately sealed-off watertight in accordance with AS/NZS 3500.3. Advise the controlling Territorial Authority of the final sealing treatment.

16.7.2.10 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades as necessary to install stormwater drains to the required locations and layout.

16.7.2.11 Workmanship

Stormwater drainage work shall be carried out by qualified and experienced tradespersons, familiar with all required installation requirements, under the direct supervision of a NZ certified Registered Drain Layer, in accordance with AS/NZS 3500.3 and to comply with the New Zealand Building Code, and all local codes and regulatory authority requirements, and the conditions of the Building Consent.

All pipe cutting, jointing, and supporting techniques shall be exactly as recommended by the pipe manufacturer. Pipes, fittings and accessories shall be handled and installed in such a manner that prevents any damage to the component.

All work shall be such as to leave a neat, efficient, robust and watertight installation.

Carry out all necessary inspections and tests during installation to ensure compliance with the design specifications and regulatory requirements. Provide test result sheets to the Contract Administrator to show compliance has been achieved.

Take all necessary precautions during installation to protect the stormwater drainage system from damage, and to prevent the entry of:
- soil, sand, or rock;
- sewage, including the contents of any septic tank, or trade waste; or
- any other substance that could damage or impede the operation of the stormwater drainage network.

Ensure that any installed drain is adequately protected from any damage and excessive loading during the remaining construction period.

Protect adjacent finished work and surfaces from damage and contamination during installation. Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Drain Layer's expense.

Any associated electrical wiring and prescribed electrical work (by others) shall be carried out by a qualified electrician in accordance with the electrical standards and regulations and the Electrical specification.

16.7.2.12 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected stormwater drainage materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional expense to the Principal.

16.7.2.13 Delivery & Handling

Store stormwater drain pipes and accessories undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep pipes and accessories out of direct sunlight and protected from damage and contamination at all times.

Store loose PVC-U pipes on evenly spaced bearers at maximum 1.0m centres, with pipe sockets alternated so the the sockets do not bear on each other, and with side supports if pipes are stacked more than two layers high. When loose PVC-U pipes are stacked in a pyramid, the maximum stack height shall be 1.0m and the bottom pipes shall be chocked.

Do not used damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC-U materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

Installers shall be familiar with and comply with manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

Conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - in particular the 'Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry' and the 'Excavation Safety - Good Practice Guidelines'.

16.7.2.14 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare As-Built Drawings of the stormwater drainage system, that accurately record the new and/or modified stormwater drainage installation.

Information shall include, but not limited to, type, class and size of all pipes, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, manholes, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

16.7.2.15 Warranties

On completion and before Practical Completion, provide all relevant manufacturer/supplier warranties in favour of the Principal, covering materials, equipment, proprietary products, etc., supplied and installed.

16.7.3 Materials

16.7.3.1 General

Supply and deliver to the site all pipes, junctions, precast manholes, granular bedding material and other materials required for the satisfactory completion of the stormwater drainage works. All drainlaying materials shall be fit for purpose, new and free from damage and defects.

16.7.3.2 PVC-U Pipes & Fittings

PVC-U stormwater drain pipes and fittings for non-pressure applications shall comply with AS/NZS 1254: 'PVC-U pipes and fittings for stormwater and surface water applications'. Installed in accordance with AS/NZS 3500.3 and AS/NZS 2032 or AS/NZS 2566.2

Pipe Classification:
Class SN4-SN6 - Rubber Ring Joint or Solvent Welded Joint. For domestic and residential applications, and low load areas.
Class SN8-SN10 - Rubber Ring Joint or Solvent Welded Joint. For commercial and industrial applications, and medium load areas.
Class SN16 - Rubber Ring Joint or Solvent Welded Joint. For heavy traffic load areas.

16.7.3.3 Concrete

Cast insitu concrete used for stormwater drainage installation shall be 20 MPa Normal Concrete complying with NZS 3104. Where specified, used as bedding, capping and surround concrete, and for any cast-insitu concrete elements (to NZS 3104 unless specified otherwise).

16.7.3.4 Reinforcing Steel

Steel reinforcing materials for cast-insitu concrete elements shall comply with AS/NZS 4671. Unless specified otherwise on the drawings, bars shall be Grade 300 deformed.

16.7.3.5 Cement Mortar

Cement mortar shall consist of one part cement and two parts of fine aggregate measured by volume, properly mixed with the minimum amount of clean water necessary to render the mix workable. Do not use cement mortar that has been mixed and left standing for more than one hour.

16.7.3.6 Bedding & Surround Material

Except where specified otherwise, bedding (underlay, side support, overlay) material for PVC-U pipes shall be GAP 7 - General All Passing 7mm - clean, granular, non-cohesive crushed rock or gravel screenings, that is free from organic material and clay, with a moisture content

appropriate to the degree of compaction required. If the bedding material is contaminated or an excessive amount of oversized particles are present, the bedding material shall be rejected and not used.

16.7.3.7 Backfill Material

Except where specified otherwise, backfill material above the pipe embedment layer (150mm above the top of pipe) shall be selected ordinary excavated material that is free from any builder's waste, any organic material, any rocks or hard matter larger than 20mm, and any soil lumps larger than 75mm.

Except where specified otherwise, pipes beneath private roadways and where subject to vehicular traffic - all backfill from the top of the embedment layer (150mm above top of pipe) to the underside of the pavement layer shall be GAP 65 - General All Passing 65mm.

Mechanically compact backfill material in layers not exceeding 300mm to a relative compaction no less than 95% of the NZ Standard Compaction.

Trenches in public footpaths and roads shall be backfilled in accordance with the requirements of the controlling authority.

16.7.4 Trench Excavation

16.7.4.1 Clearing of Surfaces

Where trenches are to be excavated in a grassed area, garden or a berm, the topsoil shall be stripped from the area of the excavation and stockpiled separately adjacent to the trench for use in reinstating the surface.

Where trenches are to be excavated in existing concrete or asphalt paved areas, the paving shall be cut to neat, straight lines, parallel to the trench prior to excavation, with a nominal 100mm trimming allowance either side of the excavation width. The excavation shall be carried out with minimal damage to the existing paved surface.

Where trenches are to be excavated in existing segmental paved areas, the pavers shall be removed by hand, cleaned and set aside for later reinstatement.

Subsequent trench backfill shall be adequately compacted to avoid subsidence of reinstated surfaces.

16.7.4.2 Excavation

Locate all existing buried services before commencing excavation work in any area.

Excavations for trenches and pits shall be properly executed and supported in accordance with the requirements of AS/NZS 3500.3.

Carry out excavation work to comply with all relevant health and safety regulations and guidelines, including the 'Excavation Safety - Good Practice Guidelines'.

Unless specified otherwise, the excavation of trenches shall be taken out by open cut to the levels and grades shown or implied on the drawings. Excavate trenches to the depths which will provide for the appropriate type of bedding.

Trench excavations shall be of sufficient width to allow all operations necessary for the jointing of pipes and placing of the specified backfill. The bottom width of the trenches shall at least the combined measurement of the outside diameter of the pipe plus 200mm - with a minimum clearance of 100mm on each side of the drain barrel. The trench width at the top of the pipe shall not exceed the outside diameter of the pipe plus 600mm unless the pipe in the trench is covered with concrete. The trench above the top of the pipe may be cut wider, either by excavating a wider bench or by battering the trench wall.

Where a trench has been excavated deeper than required without authorisation, the excess depth shall be filled either with bedding material compacted to achieve a density as near to the original soil density as possible, or with concrete.

16.7.4.3 Shoring

Make all necessary provisions for shoring trench walls to comply with all regulations and for health and safety measures.

Trench shoring materials and equipment must be suitable for the purpose for which they are to be used, of sound quality, and adequate in strength for the particular use.

Shoring shall be placed by experienced operators under competent supervision, and shall not be altered, dismantled, or interfered with except on the instruction of the authorised supervisor.

Ensure no voids are left in the backfill when shoring is removed, and the required compaction density of the backfill is achieved.

16.7.4.4 Dewatering

Take all necessary precautions to keep trenches and pits free from water. Provide all necessary pumps, drainage pipes and other equipments required for dewatering. Install all necessary filtering and detention measures required by the Territorial Authority.

If the bottom of the trench is likely to be adversely affected by rain, remove the final 80mm of excavation as a separate operation immediately before placing the bedding material.

16.7.5 Pipe Laying

16.7.5.1 Bedding Pipes

Provide a minimum 75mm thick underlay layer of well compacted bedding material for all pipes. A chase shall be excavated in the bedding to accommodate any jointing socket or fitting in the drain. The pipe embedment material shall be laid and compacted so that the pipe is evenly and continuously supported along its length on either side of the pipe, and with an overlay layer minimum 150mm thick.

When trench support systems are used, the bedding material shall be placed and compacted in a manner so that no loss of compaction results from removal of the trench side support

systems. The trench support shall be removed in such a way as to ensure that the placing and compaction of the bedding material occurs below the trench supports and directly against the undisturbed ground of the trench walls.

After completion of the jointing and inspection of drain pipes, place and compact the bedding surround material around the pipe to the required depth over the pipe. The material shall be carefully placed around and over the pipe using hand tamping and in a manner that ensures the pipe is uniformly supported all round its perimeter and without voids. Take care during placement and compaction to ensure the pipe is not displaced or damaged.

16.7.5.2 Laying Pipes

Install stormwater drains in accordance with AS/NZS 3500.3 to the layout, levels and grades shown on the drawings. Drain pipes shall be laid to provide maximum falls, in straight lines and at an even grade, without obstruction to flow, and with full allowance for bedding.

Before installing the pipes, check the bore of each pipe is free from foreign matter and that the pipe exterior and the socket have not been damaged in handling or storage. All pipelines shall be kept clean and free of dirt and debris at all times during installation, testing and commissioning.

PVC-U stormwater drain pipes shall be properly jointed (rubber ring joint or solvent welded joint) to produce a watertight seal in accordance with the manufacturer's instructions.

Start laying main drains at the point of outfall and insert junctions for branch drains as the work proceeds. Pipes shall be laid with the least number of bends, in the centre of the trench, in straight lines between bends, and to the grades and locations shown on the drawings.

Install all necessary fittings, including inspection openings, bends and junctions, to the locations shown on the drawings and in accordance with the manufacturer's instructions. Where not specified on the drawings or schedules, fittings for inspection openings, bends, and junctions shall be selected from the PVC-U pipe system range of products and installed in accordance with the manufacturer's instructions.

Other than precautions against damage by displacement or floating pipes, no bedding surround material or backfill shall be placed until the laying of the drain has been inspected by the Territorial Authority.

16.7.5.3 Steep Gradients

Where the gradient of a stormwater drain pipe exceeds 1:5 (20%), anchor blocks shall be installed at the bend or junction at the top and bottom of the inclined drain, and at intervals not exceeding 3m. Anchor blocks shall be constructed in accordance with AS/NZS 3500.3: Section 7.9.

16.7.5.4 Underground Drains Near & Under Buildings

Protect underground drains near and under buildings against damage in accordance with AS/NZS 3500.3 where the minimum cover specified cannot be provided.

16.7.5.5 Jointing - Rubber Ring Joints

PVC-U drain pipes shall be jointed using rubber ring seals in preference to the solvent welded method - which shall be used where rubber ring jointed fittings are not manufactured. Only use seals and lubricants recommended by the pipe or fitting manufacturer. The marking of pipes by scoring is not permitted. All joints shall be watertight and prevent the infiltration of groundwater and the intrusion of tree roots.

Rubber ring joints shall be assembled in accordance with the pipe manufacturer's instructions and generally as follows:
- Ensure that all components are clean and free of dirt and debris during all stages of the jointing process;
- Ensure the pipe spigot is correctly chamfered and has a clearly visible witness mark to the correct insertion length;
- Clean and generously lubricate with jointing lubricant, especially the chamfer. Do not lubricate the ring groove;
- Where elastomeric seals are required to be fitted, clean and fit the seal, and check the elastomeric seal sits evenly in the housing;
- Apply the manufacturer’s specified lubricant to the end of the spigot and chamfer of the pipe;
- Keep the elastomeric seal and its housing free of lubricant, unless otherwise recommended by the manufacturer;
- Align the pipes so there is no deflection at the joint, then insert the spigot in the socket and push home to the witness mark;
- Hold the socket end firmly during the jointing to prevent previously assembled joints from moving;
- If excessive force is required and/or the jointing process does not comply with the manufacturer's instructions, disassemble and remake the joint.

Field cutting pipes:
- cut the spigot end square and remove all burrs;
- chamfer the cut end of the pipe with a taper of 15° to approx. half the wall thickness, or as specified by the pipe manufacturer;
- as appropriate, witness mark the pipe at the specified insert by the manufacturer.

16.7.5.6 Pipe Cover

Unless specified otherwise on the drawings, the minimum pipe cover (finished surface to top of pipe) shall be:
- where not subject to vehicular loading: 300mm.
- where subject to vehicular loading - not in roadways: 450mm.
- where subject to vehicular loading - in sealed roadways: 600mm.
- where subject to vehicular loading - in unsealed roadways: 750mm.
- pipes in embankment conditions or subject to loading from heavy construction equipment: 750mm.

16.7.6 Manholes

16.7.6.1 Manholes

Construct stormwater manholes to the locations, dimensions, levels and details shown on the drawings, and make all necessary connections to the private stormwater drainage system.

Manholes shall be circular precast concrete manholes, constructed to NZS 4404 and the requirements of the Territorial Authority, and to the dimensions and details shown on the drawings.
- Concrete precast manhole risers: manufactured to the requirements of AS/NZS 4058.
- Concrete precast manhole flanged bases and lids: manufactured to NZS 3109, with a surface finish to NZS 3114.
- Manhole covers and cover frames: cast iron or steel construction conforming to AS 3996 and the requirements of the Territorial Authority.

Connect stormwater drains to concrete precast manholes using purpose-made manhole connectors and pipe stubs/shorts in accordance with the requirements of the Territorial Authority and as shown on the drawings.

16.7.7 Connection

16.7.7.1 Public Network - Street Mains Connection

Connect to discharge the stormwater drainage line directly to the public stormwater mains in accordance with the requirements of the Territorial Authority and as shown on the drawings.

16.7.7.2 On Site - to Detention/Retention Tanks

Connect to discharge the new stormwater drainage line to detention tanks on-site in accordance with the requirements of the Territorial Authority and as shown on the drawings.

16.7.8 Testing

16.7.8.1 Stormwater Drains

Test the stormwater installation, including all drains, connections and system components, for water tightness in accordance with the requirements of the Territorial Authority (TA).

Where required by the Territorial Authority, the testing shall be undertaken in the presence of the representative of the TA. Demonstrate to the Contract Administrator and the Territorial Authority that the installation complies with the requirements of the contract documents, related standards and regulatory bodies. Lodge all certificates of approval with the Contract Administrator.

Unless specified otherwise by the Territorial Authority, the testing procedure shall be the Water Test procedure as defined in AS/NZS 3500.3: Section 9. Where appropriate, the procedures in NZBC E1/VM1 may be used as an alternative. The acceptability of other test methods are be subject to the approval of the Territorial Authority and the Contract Administrator.

Provide all necessary plant, equipment and instruments required for the specified testing procedure. All testing and commissioning shall be undertaken by suitably skilled and experienced technicians.

Pressure testing shall be carried out after the pipes have been laid and the bedding material has been placed over the pipes as specified.

Prior to testing ensure that all pipe junctions and inspection eyes are exposed, and pipelines have been flushed and all residual debris cleaned out.

Stormwater manholes shall be free of visible faults, or permeable zones, and jointing or penetration repairs shall be to best trade practice and standards.

Test results shall be recorded clearly on properly formatted test result sheets, and submitted to the Contract Administrator within 48 hours of completion of testing.

Repair or replace any materials or workmanship found to be defective or faulty during testing, and repeat the test until a satisfactory test result is achieved.

Leave the installation watertight and free of defects, and operating to the required performance standard.

The work shall be deemed incomplete unless all required testing and commissioning has been carried out and has passed the requirements of the testing specification and the Territorial Authority.

16.7.8.2 Water Test Procedure - to AS/NZS 3500.3

Water test procedure of stormwater drains (non-pressure) - to AS/NZS 3500.3: Section 9.4: The head of water on any section of drain shall not exceed 3m.

The procedure shall be as follows:
- Seal all openings except the top of the section of the below-ground drain to be tested.
- Fill the below-ground drain with water to the highest level in that section.
- 10 minutes for vitrified clay drains; or
- 5 minutes for drains of any other material.

The drain shall be deemed to have passed the test if no make-up water is required.

16.7.9 Backfilling

16.7.9.1 Backfilling

Trenches shall be backfilled as soon as possible after the laying, inspecting and testing of the pipeline.

Where required, lay marker tape along the length of the drain, just above the top of the pipe embedment zone, before backfilling.

Trench backfill materials shall be placed on the pipe embedment, and compacted to restore the trench as near as practicable to the normal surrounding ground surface level and reduce

the likelihood of subsidence. Backfill material shall be placed in uncompacted layers not exceed 300mm, then mechanically compacted to the required density.

Temporary trench support systems shall be lifted progressively above each layer of backfill to ensure each layer is compacted against undisturbed ground.

Any deficiencies of trench filling exposed by settlement shall be corrected to the required standard.

16.7.10 Reinstatement of Surfaces

16.7.10.1 Reinstatement of Surfaces

Refer to separate specification section - Siteworks - Reinstatement of Surfaces. Ground and paved surfaces above excavated stormwater drainage trenches shall be reinstated to the standard specified. Reinstatement shall generally achieve a standard equal to or better than the pre-existing situation - in no case will a lower standard be accepted.

Hedges, fences and other features to be retained that have been damaged or removed during the work shall be reinstated to the satisfaction of the Contract Administrator.

16.7.10.2 Public Property

Reinstatement of surfaces to public property shall comply with the requirements of the relevant controlling authorities.

16.8 Surface Water Drainage

16.8.1 Scope

Supply, install and commission new, gravity-flow exterior surface water drainage on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for the satisfactory completion and performance of the surface water and stormwater systems. All aspects of this works shall comply with the requirements of the NZ Building Code, related compliance Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the design drawings and schedules. Ancillary work and/or services not specifically mentioned but necessary to complete the installation shall be deemed included.

This specification should be read in conjunction with other relevant specification sections, in particular Stormwater Drainage and Site Works, as they are interrelated.

The following is a list and a general description of the extent of Surface Water Drainage works, which are more specifically defined in the contract documents, required for the completion of the contract works:

16.8.2 Requirements

16.8.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand

(WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, in particular the 'Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry', and the 'Excavation Safety - Good Practice Guidelines'

Carry out all construction operations in accordance with the Contractor's project-specific Health and Safety Plan.

16.8.2.2 Compliance

Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the drainage works.

16.8.2.3 Inspections

Inspections of drainage works shall take place at each of the stages as scheduled in the Building Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

16.8.2.4 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades as necessary to install surface water drainage facilities at the required locations and layout.

16.8.2.5 Workmanship

Surface water drainage work shall be carried out by qualified and experienced tradespersons, familiar with all required installation requirements, under the direct supervision of a NZ certified Registered Drain Layer, to comply with the New Zealand Building Code, and all local codes and regulatory authority requirements, and the conditions of the Building Consent.

All work shall be such as to leave a neat, efficient, robust and watertight installation.

Carry out all necessary inspections during installation to ensure compliance with the design specifications and regulatory requirements.

Take all necessary precautions during installation to protect the drainage system from damage and contamination from substances that could damage or impede the operation of the drainage system.

Ensure installed components are adequately protected from any damage and excessive loading during the remaining construction period.

Protect adjacent finished work and surfaces from damage and contamination during installation. Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Drain Layer's expense.

Any associated electrical wiring and prescribed electrical work (by others) shall be carried out by a qualified electrician in accordance with the electrical standards and regulations and the Electrical specification.

16.8.2.6 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected surface water drainage materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional expense to the Principal.

16.8.2.7 Delivery & Handling

Store manufactured materials undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep PVC-U and PE components out of direct sunlight and protected from damage and contamination at all times.

Store loose PVC-U pipes on evenly spaced bearers at maximum 1.0m centres, with pipe sockets alternated so the the sockets do not bear on each other, and with side supports if pipes are stacked more than two layers high. When loose PVC-U pipes are stacked in a pyramid, the maximum stack height shall be 1.0m and the bottom pipes shall be chocked.

Do not used damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC-U or PE materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

Installers shall be familiar with and comply with manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

Conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - in particular the 'Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry', and where relevant, the 'Excavation Safety - Good Practice Guidelines'.

16.8.2.8 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare As-Built Drawings of surface water drainage associated with the stormwater drainage system, that accurately record the new and/or modified stormwater drainage installation.

Information shall include, but not limited to, type, class and size of all pipes, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, manholes, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

16.8.2.9 Stormwater Drains

Stormwater Drains. Refer to separate specification section - Stormwater Drainage.

16.8.2.10 Paved Surfaces

Paved Surfaces. Refer to separate specification section - Siteworks.

16.8.3 Materials

16.8.3.1 PVC-U Pipes & Fittings

PVC-U Pipes & Fittings. PVC-U stormwater drain pipes and fittings for non-pressure applications shall comply with AS/NZS 1254: 'PVC-U pipes and fittings for stormwater and surface water applications'. Installed in accordance with AS/NZS 3500.3 and AS/NZS 2032 or AS/NZS 2566.2

Pipe Classification:
Class SN4-SN6 - Rubber Ring Joint or Solvent Welded Joint. For domestic and residential applications, and low load areas.
Class SN8-SN10 - Rubber Ring Joint or Solvent Welded Joint. For commercial and industrial applications, and medium load areas.
Class SN16 - Rubber Ring Joint or Solvent Welded Joint. For heavy traffic load areas.

16.8.3.2 Catchpits - Moulded Plastic

Moulded Plastic Catchpits/Sumps. Proprietary moulded polypropylene stormwater catchpits (sumps) complete with grate, as specified, installed to the locations, dimensions, levels and details shown on the drawings.

Connect installed catchpits to the stormwater drainage system in accordance with the requirements of the manufacturer's requirements and as shown on the drawings.

Brand/Series:
Dimensions:
Capacity:
Grate Material, Load Class:

16.8.3.3 Modular Channel & Grate Drain - Vehicular Traffic, Light Duty

Modular Channel & Grate Drain - Vehicle Traffic, Light Duty. A proprietary, modular channel and grate surface drainage system, as specified, installed to the locations, dimensions, levels and details shown on the drawings in accordance with the manufacturer's requirements, complete with all necessary components and accessories required for satisfactory installation and performance.

Connect installed channel and grate surface drainage system to the stormwater drainage system in accordance with the requirements of the Territorial Authority and as shown on the drawings.

Brand/Series: Marley or similar
Installed Location: Refer to site plan

16.8.3.4 Reinforcing Steel

Steel reinforcing materials for cast-insitu concrete elements shall comply with AS/NZS 4671. Except where specified otherwise on the drawings, bars shall be Grade 300 deformed.

16.8.3.5 Bedding & Surround Material

Granular Material:
- Except where specified otherwise on the drawings, granular bedding and surround material shall be GAP 7 - General All Passing 7mm - clean, granular, non-cohesive crushed rock or gravel screenings, that is free from organic material and clay, with a moisture content appropriate to the degree of compaction required.
- If the bedding material is contaminated or an excessive amount of oversized particles are present, the bedding material shall be rejected and not used.

Concrete - non-load-bearing applications:
- Except where specified otherwise, concrete bedding and surround material used for non-load-bearing applications shall be 10 MPa ordinary grade concrete complying with NZS 3104.

Concrete - load-bearing applications:
- Except where specified otherwise, concrete bedding and surround material used for load-bearing applications shall be 25 MPa ordinary grade concrete complying with NZS 3104.

16.8.4 Excavation

16.8.4.1 Excavation

Locate all existing buried services before commencing excavation work in any area.

Excavations shall be of sufficient depth and width for proper installation of catchpits and surface water drains (channel, slot), and their connections to in-ground stormwater drains, according to the layout and levels shown or implied on the drawings. Excavate to accommodate all required bedding and encasement. Finish excavations with a flat bottom, relative to the grades and levels of finished paved surfaces.

16.8.4.2 Dewatering

Take all necessary precautions to keep trenches and pits free from water. Provide all necessary pumps, drainage pipes and other equipments required for dewatering. Install all necessary filtering and detention measures required by the Territorial Authority.

If the bottom of the trench is likely to be adversely affected by rain, remove the final 80mm of excavation as a separate operation immediately before placing the bedding material.

16.8.5 Connection

16.8.5.1 On-Site - to New Stormwater Drainage System

Connect to discharge surface water drainage lines directly to the new on-site stormwater drainage system in accordance with the requirements of the Territorial Authority and as shown on the drawings.

16.9 Workmanship

16.9.1 General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals. Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.

16.9.2 Co-operation

Cooperate with all trades and attend upon the Concretor and Plumber to set out exact pipe runs before any adjacent work is put in hand and ensure that all sleeves etc. are correctly incorporated as work proceeds.

16.9.3 Materials

All pipes and other materials shall comply with the appropriate Standards, and shall be protected from damage of any kind until installation is complete. All incidentals appropriate for the applications involved. Concrete shall be 17.5MPa and as specified under Concretor, Mortar shall be as specified in Blocklayer.

16.9.4 Workmanship

All drainlaying shall be carried out by, or under direct control of, properly qualified tradesmen, and shall be to recognised high standards. Ensure cast-in items are installed when required so that no delay is caused by this trade. Adequately protect all adjacent surfaces - clean down to remove dirt etc., and any damage shall be made good by the appropriate trade at the Drainlayer's expense.

On completion of drainlaying clean up full area affected by this trade to the condition it was in before drainlaying commenced.

Site is to be returned as close as possible to its present condition on completion of the contract.

16.9.5 Excavation

As required for sewer and stormwater. Check for other service lines before excavation - the Drainlayer is responsible for making good any damage. Trenches true to line and with even gradients between gullies, soil stack terminations or downpipes, etc.

Keep the bottom of trenches clear of loose material. All pipes shall be laid in appropriate bedding material, compacted as required. Shore trenches if required to suit ground conditions. Backfilling shall be by this trade, to the standards required in Siteworks.

17 ELECTRICAL

17.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

17.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

2053.1:2001(AS/NZS)	Conduits and fittings for electrical installations - General requirements
2201.1:2007(AS/NZS)	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
2293.2:2019(AS|NZS)	Emergency lighting and exit signs for buildings - Part 2: Routine service and maintenance
3000:2018(AS|NZS)	Electrical installations - Known as the Australian/New Zealand Wiring Rules
3100:2009(AS/NZS)	Approval and test specification - General requirements for electrical equipment
3112:2011(AS/NZS)	Approval and test specification - Plugs and socket-outlets
4512:2010(NZS)	Fire detection and alarm systems in buildings
4514:2009(NZS)	Interconnected smoke alarms for houses
4514:2021(NZS)	Interconnected smoke alarms for houses
5000.1:2005(AS/NZS)	Electric cables - Polymeric insulated - For working voltages up to and including 0.6/1 (1.2) kV
60335.2.30:2015(AS|NZS)	Household and similar electrical appliances - Safety - Part 2.30: Particular requirements for room heaters
60335.2.30:2015(AS|NZS)INCIEC	Household and similar electrical appliances - Safety - Part 2.30: Particular requirements for room heaters
60335.2.35:2013(AS/NZS)	Household and similar electrical appliances - Safety - Part 2.35: Particular requirements for instantaneous water heaters
60598.2.2:2016(AS|NZS)	Luminaires - Part 2.2: Particular requirements - Recessed luminaires
6104:1981(NZS)	Specification for emergency electricity supply in buildings

17.3 Electrical Elements

17.3.1 Appliances

All appliances are exactly identified on the drawings notes. Main Contractor will establish, in consultation with the Plumber and Electrician, which of them will be supplied by each of these trades.

The Electrician shall supply appliances that are their responsibility, install them exactly in accordance with their manufacturer’s instructions, and protect them until completion.

17.3.2 Light Fittings

Allow the Net Sum of $25,000 for the supply only of selected lights. Take delivery, install in accordance with any directions supplied, and protect until Practical Completion.

17.3.3 Tele Communications

Workmanship shall be recognised best trade practice, and in accordance with the manufacturers' recommendations. All work shall be by competent and experienced operatives.

17.3.4 Other Wired Services

Co-operate with all other trades to ensure that the following services are installed complete and in accordance with their manufacturer’s recommendations with all normal or necessary incidentals and with all wiring concealed.

-SKY TV.
-Stereo Unit.
-Central Vacuum System.
-Garage door operating mechanisms.
-Gas hot water supply unit installed complete by the Plumber - supply electrical feed and connect.
-Wall mounted fan heaters.
-Front door bell as noted - supply and install.
-Kitchen, laundry and wet areas air exhaust fans and ducting as noted - supply and install.
-Cupboard heaters - supply and install.
-Infrared / movement / daylight sensor switches as noted.
-Under-tile electric heating to the bathroom and shower room complete with thermostat control installed where shown. Supply and install (immediately prior to tiles installation) exactly to the suppliers recommendations.
-Heated towel rails to bathroom and shower room.
-Spa pool equipment will be installed complete by the Plumber. Supply power through weather proof connection, with an isolating switch.
-Hot water cylinders installed complete by the Plumber. Supply and connect.
-The lap pool electrical equipment will be installed complete and wired from the splitter box (by a Registered Electrician) by the Pool Installer. Main contract Electrician shall verify that all aspects of this work comply with all relevant main contract requirements.
-Septic tank pumps feed in conduit from an isolating switch.
-Heat pump
-Supply a Heavy Duty TV Aerial (suitable for TV1, 2, and 3, Sky, and all local and community TV stations) and install on the roof ridges where directed, stayed against wind, and with all connections compatible with the roofing and waterproof. Feed to the outlets shown with the complete system exactly to aerial suppliers recommendations.
-Heating.
-Install ceiling fans with variable speed controllers supplied by owner.

17.4 Interconnected Smoke Alarms

17.4.1 Scope

Supply, install, and commission Interconnected Smoke Alarms to the locations and layout shown on the drawings, complete with accessories. All aspects of this work shall be in accordance with the smoke alarm manufacturer's product specification and installation requirements, other product manufacturers' recommendations, the electrical specification, and as shown on the drawings.

17.4.2 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-ordinate with other trades to install Interconnected Smoke Alarms as required.

17.4.3 Workmanship

All work shall be carried out by experienced and competent tradesmen in accordance with the manufacturer's requirements, the electrical specification and drawings, and the related standards, electrical regulations and code requirements.
All work shall be such as to leave a neat, efficient and robust installation.

17.4.4 Power Supply

Interconnected smoke alarms shall be powered from a permanently energised 230 v a.c. mains power supplied from the unswitched side of a commonly used circuit, and shall include either a long-life battery backup or long life (10yr minimum) built-in rechargeable energy storage device.

17.4.5 Alarm Type

Install interconnected Multi-sensor type smoke alarms.

Manufacturer, brand name & type: To be confirmed

17.4.6 Installation

Install the interconnected smoke alarms on ceilings, or as shown otherwise, to the layout shown on the drawings in strict accordance with the manufacturer's instructions. Do not install smoke alarms in dead air spaces or obstructions where dead air spaces may be created.

Install smoke alarms to sloping ceilings at the high end of the ceiling slope.

Do not install smoke alarms to exposed bulkheads, beams, joists or purlins greater than 300mm deep.

Do not install smoke alarms closer than 400mm to any forced-air supply opening or to any blade of a ceiling fan.

17.4.7 Completion

Check that the smoke alarms have been correctly installed and wired.
Commission smoke alarms to the required operation in accordance with the manufacturer's

instructions. Test alarms to ensure that the warning signal is heard in all bedrooms when all doors between the alarm and bedrooms are closed.
Check for faults and damage, repair/replace as necessary.

Issue to the Owner a copy of the manufacturer's testing and maintenance requirements and product warranty.

17.5 Materials & Control

17.5.1 Materials

All materials delivered with packaging and labeling intact. All required incidentals (insulating tape, seals, fixings, etc.) shall be completely appropriate for the application involved. The use of items damaged in any way is subject to approval in each instance.

17.5.2 Switchboard

The switchboard shall be an appropriate size standard PDL DBF series board installed fully recessed where shown and at 2m to the top of the board. Install appropriate sized MCB's for all circuits, including a minimum of two power and one lighting RCDs as required to cover all outlets.

The main switchboard and the subboard(s) shall be appropriate sized standard PDL DBF series boards installed fully recessed where shown and at 2m to the top of the boards. Install appropriate sized MCB's for all circuits, including a minimum of two power and one lighting RCDs as required to cover all outlets to each board. Submain(s) from the main switchboard to the subboard(s) shall be neutral screened 16mm or 2 x 16mm as appropriate, run along the routes indicated / as approved. Pay particular attention to spreading the distribution of the various probable loadings evenly across the phases to obtain an optimum balance of the system.

17.6 Systems

17.6.1 Earth

Provide a driven main earth suitable for the full installation, close to the meterboard, complying fully with all appropriate regulations and to the complete approval of a certified inspector. Bond all exposed metals, including light fittings and piped services and provide earth conductors for the entire system. Sheathing to any neutral screened cables may be used for earthing.

17.6.2 Mains

Install a neutral screened 16mm main cable underground (depth, cover/protection, backfilling, signal strip etc. to comply with all relevant regulations) from the grid connection position noted on the Site Plan along the route indicated to the meterboard, positioned where shown on the Floor Plan, and make appropriate arrangements for the grid connection. Install pilot as required. The meterboard shall be metalclad with a meter reading window, recessed maximum depth into the wall and at 2m to the top of the board, with the meters and water heater controllers by the supply company nominated by the Principal. Install all switches and

fuses that are necessary. From the meterboard run (route to approval) a neutral screened 16mm main plus controllers etc. to the switchboard.

17.7 Workmanship

17.7.1 General

Supply and install all materials, including all necessary minor and incidental items, for proper completion of all of the electrical services specified or shown on the drawings. The contract will not be deemed to be complete until the Electrician has provided an Electrical Certificate of Compliance (made available to the Contractor in time for the Code Compliance Certificate application).

Obtain all necessary permits and consents, serve all notices and pay all fees in and customary charges connection with the works.

The position of switches, light and power outlets and other fittings, although shown specifically in some instances, are in general only shown diagrammatically. The exact location of each of these items will be as directed on site by the Architect/Designer; the Electrician shall give reasonable notice of when this information is required. Items positioned in contravention of this shall be repositioned if directed, including rewiring if necessary, all at the Electrician's expense.

Unless drawn (on 1:20 wall elevations) or specified otherwise the mounting height to the centreline of the following items above the floor shall be:

-1000mm for lighting switches;
-2000mm for wall mounted lights;
-2100mm for the bayonet of pendant lights;
-300mm for power points, except at benches.

(Notify the Architect/Designer if either the actual fitting or mounting position seem to make the mounting height noted above inappropriate).

Warranty cards and manufacturers guarantees for items supplied and installed by this trade shall be filled in correctly and handed over at Practical Completion. Arrange all circuits to obtain an optimum balance of the system, and check and reconnect where necessary to achieve this on completion. Leave the works clean and tidy and in full operational order.

17.7.2 Co-operation

Co-operate with all other trades and attend upon the Concretor and Carpenter to set out all required penetrations and to ensure that all wiring and fittings are correctly incorporated as work proceeds. The Carpenter will provide and fix all necessary dwangs and timber supports in locations determined by the Electrician.

17.7.3 Workmanship

All electrical work shall be carried out by, or under the direct control of, registered tradesmen, and shall be to recognized high standards. All work shall be such as to leave a neat, efficient and robust installation. Neatly label switchboards to identify each circuit.

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604: 2011 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials shall be only to approval.

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Electrician's expense.

17.7.4 Wiring

Joints within cable runs will not normally be accepted. TPS cable shall be adequately supported, and clipped at regular intervals. At terminations all strands of conductors shall be fully secured in a terminal block or clamped under a screw head washer; do not cut away any strands. Wiring which terminates in enclosed fittings and/or where subject to heat liable to cause deterioration, shall be high temperature type, with the tails made off with heat resisting sleeves, to protect the permanent wiring.

Wire lights in 1.5mm 3 core - 7.5 amps loading max per circuit (allow for 100w to all light fittings unless identified otherwise).
Wire power outlets in 2.5mm 3 core - 7 maximum GPO singles or doubles per circuit. Assess power outlets for specific equipment and allow accordingly.

Conceal all wiring except as noted on drawings or below. All wiring cast into concrete shall be run in conduit pipes. All cables shall be stranded (single core is unacceptable).

Wire more or less parallel to and at right angles to the structural elements - avoid any diagonal wiring. Layout of the principal distribution wiring shall be to approval. Position all wires to minimise the risk of damage from subsequent nailing of linings etc.

Generally, do not run TPS horizontally within timber walls except in the area up to 300mm above floor. Wire in the ceiling framing and drop vertically to outlets and switches.

Do not run TPS horizontally within partitions except in the area up to 300mm above floor. Wire in the ceiling void and drop vertically to outlets and switches. Principal wiring in the ceiling void shall be supported on adequate catenaries.

Wire exterior lighting in screened cable.

Where cables pass through fire rated walls or floors use a fire barrier or fire rated sealing compound to seal the space after installation of the cables.