IDSGN Architecture

P R O J E C T S P E C I F I C A T I O N

Proposed New House - Bell Residence

45 Burdon Loop

Lake Hawea

Otago

Issued for Tender/Consent

26.069

PROJECT OVERVIEW

Scope

Construction of new 2 bedroom, single storey dwelling with attached single garage and attached one bedroom unit. Concrete block foundation with concrete slab floor. Timber wall framing with a mix of Colorstreel 5 Rib vertical metal and Abodo Vulcan vertical weatherboard claddings. Gable roof line with timber trusses and Colorsteel 5 Rib roofing.

Address

Site Address	45 Burdon Loop
Suburb	Lake Hawea
Region	Otago
Lot #	96
DP #	605685

Site Conditions

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

Related Parties

Architectural Designer

IDSGN Architecture, Lisa Southby, BP165977, lisa@idsgn.nz, 97 Church Street, Seaview, TIMARU, 7910, 021 911 425

Truss Designer

Placemakers Wanaka, Kim Wilson, Kim.Wilson@placemakers.co.nz, 8 Connell Terrace, WANAKA, 9305, 027 490 9871

Builder

Jack Gibson Building LTD, Jack Gibson, jgibsonbuilders.co.nz, 1 Glen Dene Crescent, WANAKA, 027 233 7229

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1 PRELIMINARIES & GENERAL

1.1 Project Overview

1.1.1 Contract Documents

The Contract Documents are complementary and comprise this Specification, the accompanying drawings, the Contract 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.

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.

1.1.2 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.

1.1.3 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.

1.1.4 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.

1.1.5 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.

1.1.6 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).

1.1.7 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.

1.1.8 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.

1.1.9 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. However, Practical Completion will NOT be certified until the CCC inspection has occurred and any additional works required by the local Building Consent Authority have been completed. To this end it is recommended that the Contractor 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.

1.1.10 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.

1.1.11 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.

1.1.12 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.

1.1.13 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).

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:

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
3604:2011(NZS)	Timber-framed buildings
4455.1:2008(AS/NZS)	Masonry units, pavers, flags and segmental retaining wall units - Masonry units

2.3 Materials

2.3.1 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.

2.3.2 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.

2.3.3 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.

2.4 Workmanship

2.4.1 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.

2.4.2 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.

Formwork suitable for required F3 finish to all exposed locations (for stopping only prior to painting).

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.

2.4.3 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.

Grout for concrete blockwork shall be in accordance with the requirements of Section 2.3 of NZS 4210, shall have a spread value 450 to 530mm when tested in accordance with Section 11 of NZS 3112: Part 1. The grout shall incorporate an appropriate expansive admixture, added in accordance with NZS 4210:2001 Section 3.2.3. The grout shall have a minimum compressive strength of 17.5 MPa for all durability zones, except for Seaspray (B2) where the minimum compressive strength shall be 25 MPa. 25 MPa grout shall be supplied by a concrete producer certified as having production compliance with NZS 3104.

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.

2.4.4 Surface Finishes

General floor slabs - U3 finish.

2.4.5 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.

2.5 Concrete

2.5.1 Scope

Supply and install Concrete 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, Concrete Systems are referred to as 'Concrete', and installation instructions and drawings, are collectively referred to as the 'technical literature'.

This specification 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.

- The supply and fixing of reinforcing for concrete is not covered by this specification.
- The supply and placing of blockwork grout is not covered by this specification.
- The supply and placing of below ground tanking systems are not covered by this specification.

Extent of work (including in-situ and Pre-cast concrete works):

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

2.5.2 Requirements

2.5.2.1 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, refer http://www.worksafe.govt.nz

Precast concrete shall be handled in accordance with the WorkSafe requirements, refer http://www.worksafe.govt.nz/search/SearchForm?Search=precast+concrete

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

2.5.2.2 Warranty:

Concrete Warranty - is to be provided in accordance with the actual Concrete suppliers specific warranty terms and conditions.

2.5.2.3 Producer Statement - PS3:

Furnish a fully completed Producer Statement - PS3 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.

2.5.2.4 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.

2.5.2.5 Quality Assurance:

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
- formwork quality
- construction tolerances
- reinforcing steel placement
- cast-in items
- 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. The quality assurance procedures for concrete construction shall comply with AS/NZS ISO 9001.

The Quality Assurance Plan (when required) should set out in detail how the quality control of all aspects for concrete construction shall be achieved. Submit the Quality Assurance Plan for review prior to commencing construction work.

The Quality Assurance Plan shall include, but not be limited to:

- objectives of the plan
- key personnel, their qualifications and responsibilities
- communication paths
- the management of documents, including receiving and recording of amended drawings
- the preparation and approval of any shop drawings, including review and coordination of Architectural, Structural and Building Services drawings
- testing facilities
- checking and recording procedures for elements of work, including subcontractor's work\
- reporting

The procedures of the Quality Assurance Plan shall be maintained by the Contractor. Ensure to follow the procedure set out in the plan at all times, and that all subcontractors and suppliers do.

Before pouring concrete, all aspects of the materials, formwork, and reinforcing shall be checked by the Contract Administrator. The following items, where applicable, shall be checked and signed-off by the person responsible, and records of these shall be kept on site:

- formwork set-out
- construction joints

- damp proof membrane (DPM)
- reinforcing requirements - size, location and cover
- cast-in items
- concrete mix requirements - strength and slump
- surface finish requirements
- proposed curing system
- a record of all Engineer/Designer and Building Consent Authority comments if applicable.

2.5.2.6 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.

2.5.2.7 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.

2.5.2.8 Materials & Workmanship:

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

2.5.3 Co-operation

2.5.3.1 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 concrete to the required layout, details and tolerances.

2.5.4 Finishes

2.5.4.1 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.

2.5.5 Concrete

2.5.5.1 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:

- Foundation pads and strip footings: *20 MPa*.

- Floor slab-on-grade: 20 *MPa*.
- Driveways, pavements, landscaping: *20 MPa*.

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

2.5.6 Concreting

2.5.6.1 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
- 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.

2.5.6.2 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.

2.5.6.3 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.

2.5.7 Construction Joints

2.5.7.1 Free Joints:

Free joints (not tied) shall be formed in concrete elements as shown on the drawings. Where a free joint is not specified or shown on the drawings, the location and detail of the joint must be approved before work commences. Free joints shall not be repositioned or eliminated from the locations shown on the drawings without prior approval.

2.5.7.2 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.

2.5.8 DPM

2.5.8.1 Polyethylene DPM - Concrete Slab-on-Ground:

Concrete Slab-on-Ground Damp Proof Membrane. Minimum 0.25mm (250µm) thick, tear resistant, polyethylene film sheet as per NZS 3604 7.5.6.

Installed as a moisture vapour barrier under concrete slabs on-ground (prior to concreting), over a properly prepared sub-base as required by NZS 3604: 7.5, by a Licensed Building Practitioner (LBP), in accordance with the manufacturer's requirements and as shown on the drawings.

All joins shall be lapped minimum 150mm and continuously sealed with a 48mm wide pressure sensitive PVC jointing tape. Tape-seal around DPM-penetrating pipes and sleeves. Take all reasonable measures to protect the DPM from damage during construction. Inspect DPM immediately before pouring concrete, and repair any perforations or damage in accordance with the manufacturer's instructions.

Installed Location:

2.5.8.2 Under-Slab DPM Installation:

Install under-slab damp proof membrane (DPM) in accordance with the manufacturer's requirements and as shown on the drawings.

Unless otherwise specified on the design drawings, under-slab DPM shall be laid in a single layer, over sand blinding, with all edges lapped minimum 150mm and sealed with minimum 50mm wide PVC sealing and joining tape, so as to achieve a continuous waterproof barrier over the entire area.

Seal all pipe, duct, and other services penetrations in the DPM using PVC sealing and joining tape.

Protect installed DPM as required during all stages of slab construction, and avoid puncturing or damaging. Tape-repair damaged DPM as soon as it occurs - tape over small punctures; patch large punctures and damaged areas with a DPM overlay section sealed all sides with PVC tape.

Inspect the DPM for damage just prior to concrete pouring and repair as necessary.

2.5.9 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.

2.5.10 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.

2.5.11 Waterstops

Supply and install waterstops of the types, sizes and sections indicated and in the positions shown on the drawings. Waterstops shall be accurately cut to length, jointed and installed in strict accordance with the manufacturer's requirements using factory-made prefabricated intersection pieces.

2.5.12 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.

2.5.13 On-Ground Floor Slabs

2.5.13.1 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/m^3, 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.

2.5.13.2 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.

2.5.13.3 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.

2.5.14 Workmanship

2.5.14.1 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.

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.

Installation of the concrete shall only be carried out 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 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 concrete components from damage and surface marking.

Make all necessary provisions to protect adjacent finished work and surfaces from damage during installation.

2.5.15 Completion, Repair & Cleaning of Concrete

2.5.15.1 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.

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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:

1554.3:2014(AS/NZS)	Structural steel welding - Part 3: Welding of reinforcing steel
3101.1&2:2006(NZS)	Concrete Structures Standard
3103:1991(NZS)	Specification for sands for mortars and plasters
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
3121:2015(NZS)	Water and aggregate for concrete
3404.1&2:1997(NZS)	Steel Structures Standard
4210:2001(NZS)	Masonry construction: Materials and workmanship
4229:2013(NZS)	Concrete masonry buildings not requiring specific engineering design
4230:2004(NZS)	Design of reinforced concrete masonry structures
4455.1:2008(AS/NZS)	Masonry units, pavers, flags and segmental retaining wall units - Masonry units
4455.3:2008(AS/NZS)	Masonry units, pavers, flags and segmental retaining wall units - Segmental retaining wall units
4672.1:2007(AS/NZS)	Steel prestressing materials - General requirements
4680:2006(AS/NZS)	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
CCANZ CP 01:2011	Code of Practice for Weathertight Concrete and Concrete Masonry Construction
NZBC E2/AS3	Concrete and concrete masonry buildings

3.3 Workmanship

3.3.1 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.

All work shall only be carried out by Licensed Building Practitioners - Bricklaying and Blocklaying. Submit evidence on request of experience, relevant qualifications, LBP Licence - Bricklaying & Blocklaying, New Zealand Masonry Trades Association (NZMTA) Member Registration.

All walls shall be true to line, level and plumb, and with perpends 'kept' (the mean alignment of all corners, edges and conspicuous lines shall be +/-3mm in 3 metres, without local irregularities). All concrete blockwork stretcher bond, with joints width 10mm +/- 2mm (blockwork with a number of joints exceeding this tolerance may be required to be demolished and rebuilt). Webs and ends to be fully buttered.

No retempering of partially set or dried mortar. Insitu concrete at the base of walls shall be scabbled to provide a key for mortar and grout. All part masonry units that are required shall be sawn cut to clean straight lines. Keep wall faces clean as the work proceeds and regularly inspect for mortar droppings etc.

Mortar joints shall be burnished smooth and pointed to a light concave to achieve full compaction of mortar to a depth not exceeding 6mm after the initial stiffening has occurred.

Coordinate with all trades to build in all required starters, anchors, bolts, fixings, sleeves, conduits, chases, or electrical or plumbing devices etc. (conduits vertical only unless otherwise is approved). Check that positions are correct before pouring. Coordinate with all trades to form all necessary holes, openings etc. with positions and sizes exactly as required.

During the progress of work every care must be taken to prevent moisture penetration of the blocks. No blocklaying shall proceed during wet weather. Turn back scaffold planks at night and during rain. Upon completion of each days work, exposed tops of block walls shall be protected from weather.

On completion thoroughly clean all surfaces affected by this work.

3.3.2 Concrete Blockwork

The bottom course of blocks shall be inverted open end bond beams to provide full length clean out duct. Clean out ports shall be formed by neatly sawing out a 100 wide x 200 high section of shell at each vertical rod. Sprinkle sand on the scabbled surface inside the first course to facilitate removal of mortar droppings.

Reinforcement shall be as specified on the drawings. Vertical rods tied to starter rods. Hook horizontal and vertical rods around the trimmer rods at openings, ends and tops of walls. Delay grouting until the mortar has sufficient strength. Thoroughly clean the grout space. Close ports only after inspection and approval; close by mortaring the face shell neatly in place, and brace them to prevent displacement during grouting.

For epoxy fixed starter bars drill holes to the depths indicated on the drawings and 6mm larger in diameter than the nominal size of the fixing. Thoroughly clean out the holes with a stiff brush and compressed air. Use an approved product, injected to completely fill the hole prior to inserting the fixing.

All lapped reinforcing steel shall be in contact and shall be tied. Starter bars which have not been cast in the correct location shall not be cranked into position - refer to Engineer for instruction.

3.3.3 Grouting of Cells & Cavities

The grout pump shall be squeeze type. Use a pencil vibrator, and have a standby unit on site. All blockwork cells filled solid, and all grout shall be thoroughly vibrated. Grouting is to be high-lift grouting with expansive additive as NZS 4210.

3.4 Reinforcing Steel

3.4.1 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.

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, including WorkSafe's General Risk and Workplace Management - Part 1 and Workplace and Facilities Requirements guidance.

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

3.4.2.2 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.

3.4.2.3 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.

3.4.3 Reinforcing Steel

3.4.3.1 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.

3.4.4 Prestressing Steel

3.4.4.1 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.

3.4.4.2 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.

3.4.4.3 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.

3.4.5 Bending of Bars

3.4.5.1 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.

3.4.5.2 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.

3.4.6 Laps, Cover & Tolerances

3.4.6.1 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.

3.4.6.2 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.

3.4.6.3 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.

3.4.7 Welding of Bars

3.4.7.1 Welding Procedures & Personnel

All welding procedures, consumables and personnel as a minimum shall be prequalified in accordance with AS/NZS 1554.3. If requested, supply a list of nominated welders and their welding certificates prior to any welding being carried out. No welder shall carry out work for which he/she is not certified.

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.

3.4.7.2 Welding of Bars

Welding of all reinforcing bars shall comply with the requirements AS/NZS 1554.3. No welding of reinforcing bars is permitted unless specifically detailed on the drawings, or where not specifically detailed, without the prior approval of the Contract Administrator. Approval will not be given for welding of reinforcement which does not comply with AS/NZS 4671.

Welding of Grade 500E reinforcement not manufactured by Pacific Steel is prohibited. Welding of Grade 500E reinforcement will require a welding procedure test to be conducted using a portion of the reinforcement to be welded.

The acceptance level for welds shall be in accordance with the requirements of AS/NZS 1554.3. Site welding shall only be undertaken using hydrogen controlled electrodes. Site welding is not permitted in winds exceeding 10m/s, or in rain, and shall only be undertaken with proper protection.

Welds to reinforcing bars shall not be made less than 3 x bar diameter distance from the commencement of bends or to any part of a bar that has been bent and re-straightened.

3.4.7.3 Welding Testing & Inspection

Welds shall be subject to inspection and testing in accordance with NZS 3404 and AS/NZS 1554.1. Test inspections shall be carried out by a CBIP Certified Welding Inspector (CWI). The cost of testing shall be borne by the Contractor.

Give the Contract Administrator at least one working day's notice of any welding that will subsequently be covered by concreting or construction procedure that will prevent its inspection afterwards.

3.4.8 Placing & Fixing

3.4.8.1 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.

3.4.8.2 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.

3.5 Concrete Blockwork

3.5.1 Scope

Supply and construct all concrete blockwork elements, including laying block, placing reinforcement and grout filling, to the locations and details shown on the approved drawings. 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.

3.5.2 Requirements

3.5.2.1 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, including WorkSafe's General Risk and Workplalce Management - Part 1 and Workplace and Facilities Requirements guidance.

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

3.5.2.2 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 only be carried out by Licensed Building Practitioners - Bricklaying and Blocklaying. Submit evidence on request of experience, relevant qualifications, LBP Licence - Bricklaying & Blocklaying, New Zealand Masonry Trades Association (NZMTA) Member Registration.

Blockwork materials and workmanship shall comply with the requirements of NZS 4210.

All work shall be by or under the direct supervision of a Registered Structural Mason, registered with NZ Masonry Trades Registration Board, and carried out by competent, experienced tradespersons who are fully conversant with the detailed provisions of NZS 4210.

Tolerances of blockwork construction shall conform to NZS 4210: Table 2.2, except where specified otherwise on the drawings.

3.5.2.3 Observation Types

Blockwork shall be constructed and supervised in accordance with NZS 4230: Table 3.1 in respect to the observation type applied to the blockwork. The observation type(s) of all blockwork elements shall be as specified on the drawings.

Type C Observation:
- Observation Requirement: May be built without construction observation by a design engineer or a nominated representative thereof.
- Admissible Use: Elastic and nominally ductile structures. Face loaded walls designed for limited ductility.
- Maximum Specified Compressive Strength: 4 MPa.

Type B Observation:
- Observation Requirement: Shall be inspected by a design engineer or by a nominated representative thereof, who may be a mason deemed to comply with the competency requirements of NZS 4210. Such inspection shall establish that the design is being interpreted correctly and that the work is being carried out generally as specified.
- Admissible Use: Elastic, nominally ductile, limited ductile or ductile structures.
- Maximum Specified Compressive Strength: 12 MPa.

Type A Observation:
- Observation Requirements: In addition to the inspection required of Type B, Type A observation of masonry shall require construction supervision at all critical stages by a person approved by a design engineer, having appropriate knowledge/experience of correct masonry trade practices and reporting to a design engineer, such as to ensure that the standards of materials and workmanship applying on the job are of a consistently high quality commensurate with the achievement of superior strengths. Masonry shall be constructed using a mason deemed to comply with the competency requirements of NZS 4210.
- Admissible Use: Elastic, nominally ductile, limited ductile or ductile structures.
- Maximum Specified Compressive Strength: ≥12 MPa.

3.5.2.4 Inspections

Blockwork construction shall be inspected in accordance with NZS 4210: Clause 1.4, as appropriate for the specified type of masonry (observation type).

Before grouting of any section of blockwork, give at least 24 hour's notice for the inspection of the blockwork. Any instructions issued shall be carried out before grouting any blockwork.

3.5.2.5 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 all trades to accurately position and build in all required starters, anchors, bolts, fixings, sleeves, conduits, chases, electrical and/or plumbing fixtures and fittings, etc. (conduits shall be vertical only unless approved otherwise). Coordinate with all trades to form all necessary holes, openings, etc., with positions and sizes exactly as required.

Remove all rubbish and waste material from the site as the work progresses. On completion of the work, leave the site clear of all associated rubbish, waste and excess material.

3.5.2.6 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 blockwork completed under this section of the specification - Concrete Blockwork.

3.5.3 Blocks

All concrete blocks shall be of hollow type masonry units from an approved manufacturer, in accordance with AS/NZS 4455. Blocks shall be of an approved standard grey colour, properly cured, square and true to shape and size. Blocks shall be manufactured from standard aggregates to NZS 3121. Lightweight aggregate blocks shall NOT be used.

Suppliers of masonry units shall provide the following information:
- Unconfined compressive strength as determined by AS/NZS 4456: Part 4.
- Work size tolerances as determined by AS/NZS 4456: Part 3.

Excessively damaged or otherwise irregular blocks will NOT be accepted. Where block types are shown on the drawings, the blocks used shall be such as to achieve the joint patterns shown on the drawings and be capable of being placed to suit reinforcing steelwork already in place.

Blocks shall be cut as necessary, to fit dimensions or to suit reinforcing. Cutting shall be done by means of a special hydraulic block cutting machine or carborundum saw, and exposed edges shall be clean, square and even.

3.5.4 Mortar

Mortar shall conform with the requirements of NZS 4210: Section 2.2.

The minimum 28 day compressive strength of mortar shall be 12.5 MPa. Allow to test mortar in accordance with Appendix 2.A of NZS 4210. A test sample of at least three cylindrical specimens shall be taken for every 200m² of wall, and the test results submitted for review.

Sand for mortar shall comply with NZS 3103, and water for mortar shall comply with NZS 3121. Sands used for mortar exposed to the weather shall not have a chloride content in excess of 0.04 % by mass.

Chemical admixtures shall comply with NZS 3113 or AS 1478, and used in accordance with the manufacturer's requirements. Calcium chloride based accelerators shall not be used in any mortar exposed to weather.

3.5.5 Grout

Grout shall be coarse grout in accordance with NZS 4210: Section 2.3. Grout shall be mixed at an approved ready mix plant in accordance with NZS 3104. Site mixing will only be permitted with the express and prior approval of the Contract Administrator.

The minimum 28 day compressive strength of the grout shall be 17.5 MPa for all durability zones except Seaspray (B2), where the minimum compressive strength shall be 25 MPa. Allow to test grout in accordance with Appendix 2.A of NZS 4210. A test sample of at least three cylindrical specimens shall be taken for every 200m² of wall filled, and the test results submitted for review.

3.5.6 Reinforcement

Refer to separate section Reinforcing Steel for specification of reinforcement.

Reinforcing steel for blockwork shall comply with the requirements of NZS 4210, be bent and installed as detailed on the drawings, and fixed by the Blocklayer.

Vertical reinforcing shall be positioned in advance of laying, and horizontal reinforcing positioned when the appropriate block course is laid. Vertical steel, including starters shall be central, unless noted otherwise on the drawings. Vertical reinforcement shall be fixed to starter bars before block laying commences.

Ensure correct location of reinforcing starter bars according to the required block layout. Starter bars cast out of position shall NOT be bent over into the correct position. In the event of starter bars being out of position, the Contract Administrator shall be notified and instruct any remedial work required.

Lap lengths shall be a minimum of 450mm long and not less than that specified below, unless specified otherwise on the drawings:
- Grade300E reinforcing: 40 bar diameters;
- Grade500E reinforcing: 70 bar diameters.

Lapping bars shall be tied to each other. The position of laps other than those detailed shall be as approved by the Contract Administrator before placing reinforcing steel.

3.5.7 Block Laying

3.5.7.1 Block Laying

Block laying shall comply with NZS 4210, Section 2.7. Except where shown otherwise on the drawings, all blocks shall be laid running bond (stretcher bond) pattern.

The base shall be scored, scabbled or otherwise mechanically roughened to a minimum amplitude of 1.5mm prior to laying of blocks. It shall be clean and free from all laitance, loose mortar or any other material which would prevent the mortar bonding to it.

Unless otherwise indicated on the drawings, all blockwork shall be laid in running (stretcher) bond throughout and all panels shall be carefully set out so as to avoid use of cut blocks wherever possible.

No blocks shall be laid during inclement weather. No blocks shall be laid on a partially built wall which has been exposed to rain until the wall has dried out. Alternatively, provide adequate cover to the top of block walls under construction during inclement weather.

To facilitate cleaning out of mortar droppings and other debris, the first course of each lift shall be laid using inverted knock-in bond beam blocks. Sand shall NOT be sprinkled at the bottom of the grout space.

Build blockwork to vertical reinforcing with open-end type blocks and end closers. Provide bond beam and open ended bond beam type blocks and end closures for horizontal reinforcement. Where

blockwork is not course-bonded at wall junctions, cut blocks at all levels to allow horizontal reinforcing and grout to pass through. Blockwork shall be constructed so that filling grout is fully contained within the grout spaces and does not leak from these.

All newly laid concrete blockwork shall be protected from drying winds and from sunshine. The top surface of the grout shall be protected from premature drying for a minimum of 24 hours by covering with moist hessian or by other approved means.

3.5.7.2 Building In

The Blocklayer shall coordinate as necessary with other trades and make all necessary provisions for built-in items.

Refer to and coordinate with the Architectural Drawings to ensure all blocks around openings, etc., are correctly laid with sills, reveals and rebates as necessary.

As work proceeds, allow to drill and cut out neat rectangular holes in the concrete blocks for flush boxes for cable services outlets, switches and controls, etc., as shown on the Architectural and/or Building Services drawings. Holes shall be accurately positioned and carefully cut to exact sizes.

As the work proceeds, build into blockwork all necessary bolts, steelwork and metalwork items and other fittings and fixings as shown on the drawings or otherwise required for the work.

3.5.7.3 Cleaning Out

All walls shall have clean-out ports at the bottom with inverted open ended blocks for the length of the wall. Clean-out ports shall be spaced to match all wall starter locations and at no greater than 800mm centres.

Cleaning out of grout spaces shall include the removal of any mortar from ties and reinforcing bars, the removal of any mortar protruding into cells or cavities at joints, and the removal of all mortar droppings and other loose material.

Clean-out openings shall be left open for the inspection of tied laps in the reinforcement.

Clean-out openings shall be closed after inspection and prior to grouting by boxing with timber on concealed surfaces and by mortaring-in face shells at visible surfaces. Clean-out boxing shall be braced, and supports shall be provided to closure units at ends of walls and at openings as required to resist grout pressure.

3.5.7.4 Pointing & Finishing

As the work proceeds, blockwork joints shall be neatly and expertly pointed with joints of mortar as specified on the drawings in accordance with NZS 4210: Section 2.7.7.

Concave tooled to a depth not exceeding 6 mm and burnished after the initial stiffening has occurred.

Raked out pointed and tooled to a depth not exceeding 6 mm after the initial stiffening has occurred

Blockwork to be covered or plastered in the finished work shall have joints compacted by tooling and left flush with the block surface. Add additional mortar before tooling to ensure joints are completely full.

On completion of walls, clean down and remove all mortar projections and irregularities. Patch and make good around all pipes, conduits, etc., penetrating the blockwalls. Make good any defects in the pointing.

3.5.7.5 Control Joints

Construct vertical control joints where shown on the drawings and at not more than 8m spacing along all walls where not specifically shown. Confirm in advance the location of all control joints when they are not shown on the drawings.

Control joints shall be continuous vertical joints. Reinforcement and filling grout shall be continuous through the joint unless shown otherwise.

Mortar on internal wall faces in a control joint shall be laid and painted after all shrinkage has taken place and at least 14 days after grouting the wall. Seal control joints on external wall faces with Sikaflex AT-Façade sealant or approved equivalent high-performance movement joint sealant.

3.5.8 Grout Filling

3.5.8.1 General

Grouting shall not commence until the mortar joints have attained sufficient strength to resist blow-outs and grout spaces have been cleaned out. The height of individual lifts in any pour should be limited so as to prevent blow-outs.

All block cells shall be filled, unless specified otherwise on the drawings. Cells that are not to be filled shall be covered to prevent the entry of grout, provided that this shall be done in such a manner that the mortar bond between courses is not impaired.

Grout in each lift shall be thoroughly compacted in order to fill all voids and ensure bond between grout and masonry or construction joints.

Ensure all face shells, supports, forms, etc., are adequate to prevent bursting of the wall during filling. Do not pour grout until spaces to be filled have been checked for debris and restrictions.

During grout filling around reinforcement ensure that the position of reinforcing is correctly maintained. Prevent any movement of projecting reinforcement while the grout is setting.

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
NZBC E3/AS1	Internal Moisture

4.3 ARDEX Liquid-Applied Waterproofing Membranes

4.3.1 Scope

Supply and install the specified ARDEX Liquid-Applied Waterproofing Membranes to the locations indicated on the 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 the manufacturer's requirements and technical literature (check www.ardex.co.nz, or call 0800 227 339 for the latest editions), other relevant product manufacturers' recommendations, and BRANZ Appraisal No.472 and No. 473, and as shown on the drawings.

No substitutions are permitted for any specified ARDEX Liquid-Applied Waterproofing Membranes, or ARDEX products, or ARDEX system components or accessories.

This specification should be read in conjunction with other relevant specification sections as they may be interrelated.

4.3.2 Requirements

4.3.2.1 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.

4.3.2.2 Warranty

ARDEX NZ Ltd warrant this work under normal use and environmental conditions, against failure of materials and application, according to the warranty conditions.

- 15 Years' Warranty Materials and Workmanship - for all ARDEX Liquid-Applied Waterproofing

Membranes.
- Provide the aarranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of practical completion.

4.3.2.3 Substitutions

ARDEX Liquid-Applied Waterproofing Membranes shall be as specified herein and as indicated on the approved drawings. The substitution of ARDEX branded products for alternative brands is not permitted under any circumstances.

The substitution of a specified ARDEX waterproofing product for an alternative ARDEX branded product by the Applicator shall only be permitted with the Contract Administrator's 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 ARDEX branded products to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Applicator.

4.3.2.4 Quality Assurance

Maintain and comply with industry-recognised quality control and assurance procedures to ensure that all stages of ARDEX Liquid-Applied Waterproofing Membranes work are carried out to the highest standard.

4.3.2.5 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/application and installation/application inspections for each area of waterproofing work in accordance with the requirements of industry best practice recommendations and guidelines.

Complete all necessary Pre-Installation Checklists prior to installation/application, and all relevant Installation Checklists.

Complete all necessary Installation Sign-Off Certificates before undertaking subsequent work or before handing over completed work.

4.3.2.6 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 ARDEX Liquid-Applied Waterproofing Membranes 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.

Should a problem be encountered with any ARDEX waterproofing product during use or delivery, immediately contact the ARDEX Technical Hotline on 0800 227 339. 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 dates.

4.3.3 Performance

4.3.3.1 Durability

The durability requirements of ARDEX Liquid-Applied Waterproofing Membranes shall meet the requirements of NZBC B2/AS1: Table 1, according to Building Element, Component, Situation/Function, and Duration.

4.3.3.2 Interior Wet-Area Waterproofing Membranes

Interior Wet-Area Waterproofing Membranes. The performance of interior wet-area waterproofing membranes shall comply with the requirements of NZBC E3/AS1, in accordance with the 'Code of Practice for Internal Wet Area Membranes' prepared by the Waterproofing Association (NZ) Inc.

4.3.4 Interior Undertile Membrane

4.3.4.1 ARDEX WPM 001

Interior Undertile Waterproofing Membrane - ARDEX WPM 001. A 1-part, read-to-use, fast drying, polymer-based, fibre-reinforced waterproofing membrane designed for use under tiles. Suitable for use on interior and exterior walls and floors, in wet areas, and on decks, balconies, and other areas that will be tiled or otherwise protected from regular foot traffic.

Features:
- BRANZ Appraised - refer to BRANZ Appraisal No.472.
- Conforms to the requirements of AS/NZS 4858 - meets class 3 classification (high extensibility).
- Designed for tiling applications - fully compatible with ARDEX tiling adhesive systems.
- Fibre reinforced - excellent strength, eliminates the need for a reinforcing mat.
- Low VOC.

Where to Use:
- On concrete structures; on new and existing concrete.
- On cement/sand screeds and renders.
- On fibre cement sheet - wet-area grade only; and compressed fibre cement sheet.
- On plasterboard wall lining - wet-area grade only - interior use only.
- On plywood - wet-area grade only - interior use only.
- On particleboard - wet-area grade only - interior use only.

Limitations:
- Do NOT use ARDEX WPM 001 for continuously immersed waterproofing applications.
- Do NOT use ARDEX WPM 001 on substrates subject to negative hydrostatic pressure or rising damp, unless treated with Ardex WPM 300.
- Do NOT allow ARDEX WPM 001 waterproofing membrane to be left exposed and subject to regular foot traffic.
- All floor areas must have adequate built-in drainage falls prior to the application of ARDEX WPM 001 waterproofing membrane.

Primer & Sealer:
- Seal damp substrates and set concrete less than 28 days' old using ARDEX WPM 300 in accordance

with ARDEX requirements.
- Seal set renders and screeds less than 7 days' old using ARDEX WPM 300 in accordance with ARDEX requirements.
- Prime all substrates receiving ARDEX WPM 001 waterproofing membrane using ARDEX WPM 265 in accordance with ARDEX requirements.

Application:
- Seal corner junctions and junctions where movement will occur with a neutral cure silicone sealant in accordance with ARDEX requirements.
- Treat movement control joints, waste outlets and penetrations in accordance with ARDEX requirements.
- Apply a minimum of two coats of ARDEX WPM 001 to achieve the required total dry film thickness - Floors, 1.0mm; Walls, 0.5mm - in accordance with ARDEX requirements.
- Reinforce ARDEX WPM 001 membrane between coats as necessary using ARDEX Deckweb fabric in accordance with ARDEX requirements.

Application Data (at +23° and 50% RH):
- Application Temperature Range: from +10°C to +35°C (surface temperature).
- Recoat Time: 1-2 hours.
- Complete Dry Time: 48-72 hours after application, depending on humidity, surface temperature and porosity of substrate.
- Fully Cured: 3 days after application.
- Flood Test Time: at least 72 hours after application, and before tiling commences.
- Colour: Blue.

Apply ARDEX WPM 001 undertile waterproofing membrane to properly prepared substrates in strict accordance with the manufacturer's requirements.

Installed Location:

4.3.5 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 install ARDEX Liquid-Applied Waterproofing Membrane systems and products as required.

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 preparation and installation work shall be carried out by ARDEX Approved Applicators, familiar with the specified products and installation techniques, to fully comply with all ARDEX NZ Ltd warranty requirements and in accordance with the manufacturer's installation requirements, relevant ARDEX 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.

Use only ARDEX-approved primers compatible with the specified membranes and substrates, and according to the membrane's application/use.

Do not install membranes in wet weather conditions, or when temperatures and humidity are outside the manufacturer's permissible range.

Make all necessary provisions to protect adjacent finished work and surfaces from damage and contamination during installation.

As necessary, protect installed membranes from damage and contamination during subsequent construction activities until permanently covered/enclosed.

4.3.7 Delivery & Handling

Store ARDEX waterproofing products inside, in a weatherproof environment, clear of the floor, on a flat, even and level surface. Keep stored products dry, out of direct sunlight and protected from damage, moisture and contamination.

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

Should a problem be encountered with any ARDEX product, immediately contact the ARDEX Technical Hotline on 0800 227 339. 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 ARDEX waterproofing 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 and does not reduce 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.

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.

4.3.8 Preparation

4.3.8.1 General

Substrates shall be structurally sound and dimensionally stable, 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 cause damage to the waterproofing membrane or affect its bonding and performance.

Carry out all necessary inspections and preparatory work to all substrates in accordance with the manufacturer's product Technical Data Sheet prior to application of ARDEX surface primers and waterproofing membranes.

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 all movement control joints prior to commencement of the works, and ensure that they are appropriately treated. Do not cover or bridge control joints without the use of the manufacturer's recommended bond breaker tapes, flexible waterproofing bands, corners, sleeves, sealants etc, appropriate for the application and the ARDEX waterproofing membrane.

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 ARDEX Approved Applicator that all preparatory works by other trades are appropriate to achieve the required finished results.

Carry out all necessary substrate priming in accordance with ARDEX requirements.

4.3.8.2 Concrete Tidy Slabs

Concrete Tidy Slabs - check all aspects of preparatory works, including but not limited to:
- Where ARDEX waterproofing membranes are laid on a concrete tidy slab on grade (and overlaid with a structural slab) the tidy slab shall be at least 75mm thick.
- Soiled concrete must be thoroughly cleaned and washed and allowed to dry.
- Check the surface for damage and defects - have any surface damage and defects appropriately remedied.
- Ensure the substrate is dry and free of all loose material, sharp protrusions, hollows, etc., prior to priming and membrane application.
- Carry out all necessary substrate priming in accordance with ARDEX requirements.

4.3.8.3 Concrete Slabs

Reinforced Concrete Slabs - check all aspects of preparatory works, including but not limited to:
- 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 ARDEX waterproofing membranes.
- Old or soiled concrete must be thoroughly cleaned and washed and allowed to dry prior to application of waterproof membranes.
- Check the surface for damage and defects - have any surface damage and defects appropriately remedied.
- Check junctions with adjacent substrates and elements, ensuring that all necessary works have been completed as detailed.

- Ensure the substrate is dry and free of all loose material, sharp protrusions, hollows, etc., prior to priming and membrane application.
- Carry out all necessary substrate priming in accordance with ARDEX requirements.

4.3.8.4 Cement Screeds & Render

Cement Screeds & Render - check all aspects of preparatory works, including but not limited to:
- New screeds/render should be finished a wooden float and left to cure for at least 24 hours for every 25mm of thickness.
- Old or soiled screeds/render must be thoroughly cleaned and washed and allowed to dry.
- Check the surface for damage and defects - have any surface damage and defects appropriately remedied.
- Check junctions with adjacent substrates and elements, ensuring that all necessary works have been completed as detailed.
- Ensure the substrate is dry and free of all loose material, sharp protrusions, hollows, etc., prior to priming and membrane application.
- Carry out all necessary substrate priming in accordance with ARDEX requirements.

4.3.8.5 Fibre Cement Sheet Wet-Area Lining/Tile Underlay

Fibre Cement Sheet Wet-Area Lining/Tile Underlay - 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 sheet joints and fastening heads have been finished to the required standard.
- Check the surface for damage and defects - have any surface damage and defects appropriately remedied.
- 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.
- Carry out all necessary substrate priming in accordance with ARDEX requirements.

4.3.8.6 Plasterboard Wet-Area Lining

Water-Resistant Plasterboard Wet-Area Lining - 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 have been finished to the required standard.
- Check the surface for damage and defects - have any surface damage and defects appropriately remedied.
- 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.
- Carry out all necessary substrate priming in accordance with ARDEX requirements.

4.3.9 Completion

Check that ARDEX liquid-applied waterproofing membranes have been applied and installed correctly, with all edges, penetrations, outlets, movement control joints and other detailing correctly finished.

Check waterproofing membranes for defects, surface damage and punctures - carry out any repairs in strict accordance with the manufacturer's instructions before permanently covering. Replace damaged membranes when beyond repair.

As necessary, flood test waterproofing membranes in accordance the manufacturer's requirements and time frames - carry out any additional works necessary as a result of the testing.

Ensure waterproofing membranes are adequately protected from damage and contamination until permanently covered or enclosed.

Leave this work complete, watertight and leak-free, and to the required standard in accordance with ARDEX NZ Ltd requirements.

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

Issue to the Owner a copy of the manufacturer's maintenance requirements (if applicable), and a copy of the ARDEX NZ Ltd Warranty.

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:

1170.2:2011(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
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
AS/NZS 1080.1:2012	Timber - Methods of test - Method 1: Moisture content

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 C/AS2-AS6	Protection from Fire
NZBC G6	Airborne and Impact Sound
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 Workmanship & Materials

5.4.1 Workmanship

5.4.1.1 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.

5.4.1.2 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.

5.4.1.3 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.

5.4.1.4 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.

5.4.1.5 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.

5.4.1.6 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.

5.4.2 Timber

5.4.2.1 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.

5.4.2.2 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.

5.4.2.3 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.

5.4.2.4 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.

5.4.3 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.

5.4.4 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.

5.4.5 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.

5.4.6 Fixings

5.4.6.1 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.

5.4.6.2 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.

5.4.6.3 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.

5.4.6.4 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.

5.4.6.5 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.

5.4.7 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.

5.4.8 Sealants

5.4.8.1 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.

5.4.9 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.

No scotia (all square stopped).

Architraves 60mm x 18mm, finger jointed finishing Radiata, square profile, sand arrissed to wet areas, 65mm x 18mm square profile MDF elsewhere.

Skirtings 135mm x 18mm, square dressed, high moisture resistance MDF.

5.4.10 Garage Door

Garage door(s) as shown and noted on the drawings, installed complete.

5.4.11 Sundry Items

Supply and install, complete with all normal incidentals, and in total compliance with the item manufacturer's recommendations and instructions and with all of the appropriate preceding clauses:

Supply and install the toughened glass shower screens to the shower room and/or bathroom, all as detailed and noted on the drawings.

Carry out all necessary trimming out, etc. flashing and finishing required for installation of the kitchen, bathroom, shower room and laundry air exhaust fans.

Supply and install the free standing, domestic solid fuel woodburner, as specified, to the location and details shown on the drawings, complete with flue, flue-pipe casing, flue-mounted heat shield, ceiling plate and all other necessary incidentals and accessories for proper installation. Installation shall be exactly in accordance with the manufacturer's requirements, AS/NZS 2918, and as shown on the drawings; including flue bracing and support, and with the penetration through the roofing fully flashed and weathertight.

Supply and install the proprietary ceiling access hatch, as specified or scheduled, to the location and details shown on the drawings in accordance with the manufacturer's requirements.

5.5 Timber Framing

5.5.1 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.

5.5.2 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.

5.5.3 Timber Framing

5.5.3.1 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.

5.5.3.2 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.

5.5.3.3 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.

5.5.3.4 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.

5.5.3.5 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.

5.5.3.6 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.

5.5.3.7 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.

5.5.3.8 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.

5.5.4 Steel Fixings

5.5.4.1 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.

5.5.4.2 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.

5.5.4.3 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.

5.5.5 Wall Framing

5.5.5.1 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.

5.5.5.2 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.

5.5.5.3 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.

5.5.5.4 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.

5.5.5.5 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.

5.5.6 Roof Framing

5.5.6.1 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.

5.5.6.2 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.

5.5.6.3 Roof Bracing

Roof bracing shall be as shown on the drawings and in accordance with NZS 3604 10.3 and 10.4 as necessary.

5.6 James Hardie Eaves & Soffits

5.6.1 Scope

Supply and install the specified James Hardie products as a fibre-cement sheet lining material to the eaves and soffits identified on the drawings, complete with all accessories. All aspects of this work shall be in complete accordance with James Hardie Eaves And Soffits Installation Manual (check www.jameshardie.co.nz, or call 0800 808 868 for the latest edition) and other relevant product manufacturers' recommendations.

5.6.2 Eaves & Soffit Lining

Hardie™ Flex Eaves Lining - 4.5mm. 4.5mm thick fibre-cement sheet lining with an un-sanded surface finish. The sheets are to be finished with a paint system. Installed in accordance with the James Hardie Eaves And Soffits Installation Manual to the locations shown on the drawings.

5.6.3 Co-operation

Co-ordinate with other trades to ensure that the panels correctly allow for fascia and wall cladding installation and associated flashings etc., and that services penetrations are correctly handled to maintain full weathertightness and sheet integrity.

Ensure that other trades are aware of the James Hardie Safe Working Practices.

5.6.4 Preparation

Check that the timber framing elements are in accordance with NZS 3604, or in accordance with NZS 3603 and AS/NZS 1170 for specific design, and in accordance with James Hardie requirements. The fascia and framing shall be in true alignment, complete and suitable for the sheets, and maximum moisture content as per NZS 3602. Ensure that the framing is true in line with no projections due to structural and bracing bracketry etc. Ensure that any hold-downs from the roof framing to the wall framing are correctly installed.

Check that the building underlay or rigid air barrier to the wall framing has been installed in full accordance with the manufacturer’s requirements and the drawings. Check junctions to all other building elements and ensure that all necessary works have been completed eg. flashings etc that will enable the sheets and all accessories to be installed.

5.6.5 Flexible Sealant

Flexible silicone sealant to be SIKA Silaflex MS. Use to seal the sheets and accessories in accordance with the sealant manufacturer’s recommendations and to James Hardie requirements. Ensure sealant compatibility with selected finish.

5.6.6 Workmanship

All installation work shall be carried out by an LBP, or supervised by an LBP, in accordance with James Hardie Eaves And Soffits Installation Manual and other relevant product manufacturers' recommendations.

5.6.7 Delivery & Handling

Carry all sheets on edge. Stack sheets flat on a level platform off the ground ie. use the supplied delivery pallet on level ground (if no pallet then evenly spaced bearers on level ground at 600mm crs maximum). Keep sheets and accessories dry at all times. Avoid damage to sheet edges, ends, and surfaces. Keep uPVC flashings etc. out of direct sunlight, and store all accessories on flat and avoid damage. All installers to be familiar with and comply with the James Hardie Safe Working Practices in the Installation Manual, to use appropriate safety gear, and in particular to be aware to avoid breathing silica dust. Do not use any damaged or blemished sheets or accessories.

5.6.8 Installation

Install the sheets to the framing in accordance with the Installation Manual, complete with all accessories eg. mouldings, sealant, underflashings, etc.

Ensure that all cut edges of panels are primed prior to installation with Dulux 1 Step Prep, Resene Quick Dry, or similar. Ensure that the bottom edge of the fascia forms a drip edge of 15mm minimum to the sheet. Seal around services penetrations to maintain weathertightness and air pressure resistance.

5.6.9 Fixings

Hardie™ Flex Sheet 4.5mm sheets with galvanised nails in accordance with James Hardie requirements.

5.6.10 Completion

Ensure that the sheets have been fixed correctly, that all joints and accessories have been completed correctly, and that all penetrations have been taped correctly. Check that no damage has occurred to any installed sheet element or associated component, and replace as necessary. Ensure that the sheets are painted within 90 days of the sheet installation, complete with all accessories and flashings. Hand over a copy of the latest edition of the **James Hardie Hardie™ Flex Eaves Lining** Product Warranty to the client. Hand over a copy of the latest James Hardie Eaves and Soffits Installation Manual to the client for their maintenance information.

5.7 Residential Garage Doors

5.7.1 Scope

Supply, install and commission residential garage doors, as specified herein, to the locations identified on the drawings and schedules, complete with all accessories for proper installation and functionality. All aspects of this work shall be in complete accordance with the manufacturer's technical literature and installation guidelines, other relevant product manufacturers' recommendations, and as shown on the drawings.

5.7.2 Requirements

5.7.2.1 Wind Performance

All residential garage doors shall comply with the wind performance requirements of AS/NZS 4505 according to the applicable NZS 3604 Wind Zone. Residential garage door components shall be

designed, constructed and installed to resist pressures corresponding to the ultimate wind pressure rating.

5.7.3 Sectional Garage Doors

5.7.3.1 Insulated Sectional Overhead Door

Insulated Sectional Overhead Garage Door - as specified herein and/or door schedule. The door shall be made of two or more insulated horizontal sections hinged together so as to provide a door large enough to close the entire opening, which is guided in vertical and horizontal tracks by rollers situated at the ends of each panel. Classified according to AS/NZS 4505: Table 5.1; and according to the ultimate wind pressure rating given in AS/NZS 4505: Table 5.3.

General Specification:
- Construction & Performance Criteria: In accordance with the requirements and limitations of AS/NZS 4505.
- Door Panel Material: Refer to Material, Finish & Colour clause.
- Panel Insulation: Expanded polystyrene (EPS) panels.
- Door Guides: 2-piece roll-formed track guides; nylon wheels with ball bearings.
- Hinges: Full sized hinges spanning the panel length.
- Weather Seal: Neoprene base weather strip, attached to the bottom closing surface of the door.
- Mounting: Face mounted - fixed to the interior face of the wall opening.
- Opening Operation: Refer to Door Opening Operation clause.
- Durability Requirements: Not less than 15 years in accordance with NZBC B2/AS1.

Manufactured and installed in accordance with AS/NZS 4505 and the manufacturer's requirements, to the locations and details shown on the drawings, complete with all necessary components and accessories required for proper installation, performance and functionality. Refer to the approved Door Schedule and drawings.

Manufacturer & Model:
Minimum Headroom Clearance:
Minimum Sideroom Clearance:
Scheduled Door Numbers:

5.7.4 Door Material & Finish

5.7.4.1 Pre-Painted Steel (COLORSTEEL) - Insulated Sectional Overhead Door

Insulated Sectional Overhead Garage Door panels shall be manufactured from COLORSTEEL® or approved equivalent pre-painted hot-dipped galvanised zinc coated steel coil conforming with AS/NZS 2728. Panel colour and surface texture (smooth or woodgrain) as specified below.

Panel Colour:
Surface Texture:

5.7.5 Door Opening Operation

5.7.5.1 Automatic Door Opener - Insulated Sectional Overhead Door

Insulated Sectional Overhead Garage Door - Automatic Door Opener - as specified below. The insulated sectional overhead garage doors scheduled below shall be operated by the automatic door opener as recommended by the garage door manufacturer - to suit the door size, loads, and application. Installed as a component of the insulated sectional garage door(s), complete with accessories, and commissioned to the required operating functionality.

Opener Brand & Model:
Maximum Door Size:
Maximum Door Area (m^2):
Maximum Lifting Force (kg):
Input Voltage:
Scheduled Door Numbers:

5.7.6 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 to establish exact sizes for garage doors, to install garage doors and accessories to the required installation details and tolerances, and door operation. Confirm garage door opening site-measurements, fixing types, and other necessary information prior to manufacture.

5.7.7 Workmanship

Where required by the NZ Building Amendment Act 2012 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 of residential garage doors shall be carried out by experienced and competent installers, familiar with the selected products and installation techniques, to fully comply with all warranty requirements and in accordance with the manufacturer's requirements.

All work shall be such as to leave a neat, efficient, robust and fully operable installation.

Electrical wiring (by others) shall be carried out by a qualified Electrician in accordance with the Electrical Standards and Regulations. The Electrician shall provide the power supply; the Door Installer shall commission and verify the operation of the door.

Leave installed garage doors clean and free from damage and defects, and operating to the required functionality.

Issue to the Owner a copy of the manufacturer's maintenance requirements, and a copy of the manufacturer's product and installation warranty when commissioning is complete.

5.7.8 Delivery & Handling

All surfaces, including and glass, shall be appropriately protected from marking and damage during manufacture, delivery and installation.

Inspect components and accessories upon delivery to site 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 use or install damaged or defective components or accessories.

Store components 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 distortion and damage. Keep stored garage doors and accessories dry and protected from damage, moisture and contamination at all times.

Handle components and accessories in accordance with the manufacturer's requirements and in a manner that prevents distortion to joinery frames and any damage - including surface marking.

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 Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

5.7.9 Preparation

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.

Supporting timber framed 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 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. Comply with the light structural steel framing fabricator's specifications and requirements for fixing cladding and roofing components.

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 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 heavy steel structures shall comply with NZS 3404.

Check all aspects of preparatory works, including but not limited to:
- Check that garage 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 threshold rebates are correctly size and formed to suit the door operation.
- Check door installation clearances for headroom, sideroom and backspace.

5.7.10 Installation

Install and commission garage doors to the required operation and functionality in accordance with the manufacturer's installation requirements and as indicated on the drawings and door schedule, complete with sliding carriage assemblies, operating controls and other accessories necessary for proper operation.

Installation tolerances shall not exceed the manufacturer's recommendations. Garage door carriage tracks and guides shall be accurately aligned and fixed plumb and parallel, and the door head true to level.

Fastener and fixing types and spacings shall be appropriate for the door size and operation, with allowance for imposed wind loads, in accordance with the manufacturer's design and installation requirements. Except where specified otherwise on the drawings, fixings shall be hot-dip galvanised.

5.7.11 Completion

Check that the garage doors have been installed correctly, and that all moving and locking assemblies and components, and operating controls have been commissioned to the required functionality and tolerances. Check that all mechanical and electronic hardware is in full working order.

Check installed garage doors for damage, defects, faults and weathertightness - carry out repairs and/or replace elements as necessary in accordance with the manufacturer's instructions and to the required standard.

Leave this work complete 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.

Issue to the Owner a copy of the manufacturer's maintenance requirements and a copy of the manufacturer's product and installation warranty for the completed work.

5.8 Thermakraft Underlay, DPM, DPC & Tapes

5.8.1 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.

5.8.2 Requirements

5.8.2.1 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, particularly those for construction and building maintenance.

5.8.2.2 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.

5.8.2.3 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.

5.8.3 Wall Underlay

Watergate Plus. A fire-retardant, absorbent, breathable, composite non-woven polyolefin synthetic underlay.

Watergate Plus is part of the Thermakraft ONE WRAP System - a total building wrap solution.

Can only be used in lined applications. Section E2 of the NZBC defines lining at " the rigid sheet covering for a wall, celing or other interior surface".

Thermakraft Watergate Plus Wall Underlay is CodeMark assured to comply with the NZ Building Code subject to specific conditions and limitations - refer to CodeMark Certificate of Conformity No: BRANZ-CM-1002-Rev 4, issued by BRANZ Ltd.

Installed as a standalone flexible underlay over timber or steel wall framing in accordance with the manufacturer's requirements and BRANZ Appraisal No.695, in NZS 3604 Wind Zones up to and including 'Very High'.

Installed as a flexible underlay over a rigid air barrier in accordance with NZBC E2/AS1 9.1.7.2 to the manufacturer's requirements and BRANZ Appraisal No.695, in NZS 3604 Wind Zones up to and including 'Extra High'.

Watergate Plus can be used with absorbent and non-absorbent direct-fixed wall claddings, and absorbent and non-absorbent wall claddings over a 20mm drained cavity, and masonry veneer cladding over a drained cavity in accordance with NZBC E2/AS1 and BRANZ Appraisal No.695.

(See Install Guide attached)

Do not leave Watergate Plus exposed on walls for more than a total of 90 days before covering.

Installed Location:

5.8.4 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:

5.8.5 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 install Thermakraft Underlays, DPMs, and DPCs as required.

5.8.6 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 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.

5.8.7 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 General risk and workplace management - part 1.

5.8.8 Preparation

5.8.8.1 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.

5.8.8.2 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.

5.8.8.3 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.

5.8.9 Installation - Wall Underlay

5.8.9.1 Watergate Plus Wall Underlay

Watergate Plus 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 Watergate Plus 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 Watergate Plus 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.

5.8.10 Installation - Roof Underlay

5.8.10.1 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.

5.8.11 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.

5.9 GIB® Rondo® Metal Batten Systems

5.9.1 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'..

5.9.2 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

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.

5.9.3 GIB® Rondo® Metal Batten Systems

5.9.3.1 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:

5.9.4 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 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.

5.9.5 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.

5.9.6 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 General risk and workplace management - part 1.

5.9.7 Preparation

5.9.7.1 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.

5.9.8 Installation

5.9.8.1 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.

5.9.9 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.

5.10 GIB® Plasterboard Linings

5.10.1 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

5.10.2 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:

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.

5.10.2.3 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.

5.10.2.4 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.

5.10.2.5 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® 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.

5.10.2.6 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.

5.10.3 Performance

5.10.3.1 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.

5.10.3.2 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.

5.10.3.3 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.

5.10.4 GIB® Plasterboard Linings

5.10.4.1 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:

5.10.4.2 GIB® Standard Plasterboard, 13mm

GIB® Standard Plasterboard, 13mm. A 13mm thick standard plasterboard interior lining. Suitable for use in residential and commercial applications on walls and ceilings. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location:

5.10.4.3 GIB Wideline®, 10mm

GIB Wideline®, 10mm. A 10mm thick x 1350mm wide 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:

5.10.4.4 GIB Wideline®, 13mm

GIB Wideline®, 13mm. A 13mm thick x 1350mm wide standard plasterboard interior lining. Suitable for use in residential and commercial applications on walls and ceilings. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location:

5.10.4.5 GIB Braceline® & GIB Noiseline®, 10mm

GIB Braceline® & GIB Noiseline®, 10mm. A 10mm 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:

5.10.4.6 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:

5.10.4.7 GIB Aqualine®, 13mm

GIB Aqualine®, 13mm. A 13mm 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:

5.10.4.8 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:

5.10.5 Components & Accessories

5.10.5.1 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.

5.10.5.2 GIBFix® Framing System

GIBFix® Framing System - incorporating GIBFix® Angle and GIB® Grabber® Dual Thread Drywall Screws. Refer to the GIB® Site Guide, and to separate specification GIBFix® Framing System.

5.10.5.3 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.

5.10.5.4 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.

5.10.5.5 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.

5.10.5.6 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.

5.10.5.7 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.

5.10.5.8 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.

5.10.5.9 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.

5.10.5.10 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:

5.10.5.11 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.

5.10.6 Level of Finish

5.10.6.1 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.

5.10.6.2 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.

5.10.7 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.

5.10.8 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.

5.10.9 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.

5.10.10 Preparation

5.10.10.1 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.

5.10.10.2 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.

5.10.10.3 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.

5.10.11 Installation

5.10.11.1 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.

5.10.11.2 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.

5.10.11.3 Ceiling Diaphragms

Ceiling Diaphragms - refer to separate specification GIB® Ezybrace Systems, and to the GIB EzyBrace® Systems publication.

5.10.11.4 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.

5.10.11.5 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.

5.10.12 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.

6 CLADDING

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.

Comply with all relevant provisions and recommendations of:

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

6.3 ABODO Vulcan Cladding - Vertical Grain

6.3.1 Scope

Supply and install ABODO Vulcan Cladding - Vertical Grain, as specified herein, to the locations identified on the 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 ABODO product literature (check abodo.co.nz, or email info@abodo.co.nz, or call 09 249 0100 for the latest editions), and other relevant product manufacturers' recommendations. For the purpose of this specification, the Abodo CodeMark Weatherboard Cladding System Manual (2020) publication is referred to as the 'ABODO Cladding Manual'.

ABODO Vulcan Cladding is CodeMark assured to comply with the New Zealand Building Code:CodeMark Certificate of Conformity No.CM70046 Rev1, issued by Bureau Veritas New Zealand. ABODO Vulcan Cladding must be applied within the conditions and limitations of the Abodo Weatherboard Cladding CodeMark Certificate of Conformity

No substitutions are permitted for ABODO Weatherboard Cladding.

The following is a list and a general description of the extent of the ABODO Vulcan Cladding - Vertical Grain (which include the specified Architectural, Standard and Nexus series profiles), which are more specifically defined in the contract documents, required for the completion of the contract works:

6.3.2 Requirements

6.3.2.1 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 ABODO Vulcan Cladding - Vertical Grain - Series 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 ABODO Vulcan Cladding - Vertical Grain - Series during use or delivery, immediately contact ABODO Wood on 09 2490 100. Do not continue to use the product that is not performing to specification or expectation. Keep the product in question, the order number and where possible packet numbers of the timber.

The quality of the ABODO Vulcan Cladding - Vertical Grain - Series timber needs to be assesed against the Abodo timber grading rules:

Architectural Series / C1 grade

https://www.abodo.co.nz/uploads/resource/Appearance-Grades-Timber-Grading-Rules-Abodo-Wood.pdf

Standard Series / C2 grade

https://www.abodo.co.nz/uploads/resource/Abodo-Guidelines-for-Vulcan-Cladding-Standard-Series-Clear-2-Laminated-Grade.pdf

6.3.2.2 Substitutions:

ABODO Vulcan Cladding - Vertical Grain shall be as specified herein and as indicated on the approved drawings. The substitution of ABODO Vulcan Cladding - Vertical Grain for alternative brands is not permitted under any circumstances.

The substitution of a specified ABODO wood product for an alternative ABODO wood branded product by the Contractor 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 ABODO wood branded products to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

6.3.2.3 Warranty:

ABODO Wood Ltd 'Built-to-Last Warranty':

- 25 Year Warranty (pro rata) - for all ABODO Vulcan Cladding materials installed, according to the warranty conditions:

http://www.abodo.co.nz/uploads/resource/Vulcan-25-Year-Warranty.pdf

- Provide the ABODO Wood Ltd 'Built-to-Last Warranty' on the manufacturer's standard warranty form.
- Commence the warranty from the date of permanent installation.

6.3.2.4 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.

6.3.3 ABODO Vulcan Cladding - Selection

6.3.3.1 Vulcan Cladding - Vertical Grain - Architectural Series

ABODO Weatherboard Cladding, including weatherboards and timber mouldings, shall be manufactured from Vulcan Cladding - Vertical Grain -Architectural Series thermally modified Radiata pine (*Pinus radiata*), engineered with a vertical grain orientation.

Quality:

- Select Grade: C1LAMVG Grade- Front face and edges have a good appearance which is virtually free of defects but with one edge knot and one small face defect allowed per piece in 20% of boards only. Reverse side with some defects allowed according to standard Grade. The reverse face may also skip dress present and one under thickness lamina up to 4mm depth, provided the function of the product is not compromised.

Substrate Colour:

- Chocolate brown (timber will weather to grey unless pigmented coating is applied and maintained).

Face Finish:

- Fine bandsawn face or brushed face.

Durability:

- Tested and approved for uses described in NZS 3602:2003 Table 2A 'Requirements for wood -based building to achieve a 15-year durability performance. Members exposed to exterior weather conditions and dampness'. Class 2 above ground (AS5604). Durability Class 1 (EN 350-1).

Moisture Content:

- Approximately 7% MC (+/-2%) at time of despatch.

Construction:

- Laminated wood with vertical grain orientation.
- New generation polyurethane adhesive - VOC, solvent and formaldehyde free. Exterior Type 1 - AS/NZS 4364. Approved for Service Class 3 (exposed exterior applications).

Coatings:
- Vulcan Cladding will take most stains, penetrating oils and paints well, though uptake of coating is generally higher than normal.
- At least one coat must be applied all sides, including back face and ends, and at least two coats to the front face and edges with Abodo Protector Water Borne or other approved proprietary wood stain.
- Vulcan Cladding is available factory pre-coated with 1 or 2 coats.
- Refer to Coating clause.

Vulcan Weatherboard Profile: Refer to specific Weatherboard Profile clause

For optimal coating performance on bandsawn finish apply a further coat of oil after 12 months of weathering.

For brushed finish a third coat is required between 1-12 months after installation.

Available coatings:

Abodo Protector pigmented stain

Sioo: x coating

Iron Vitirol coating

6.3.4 Architectural Series - Weatherboard Profile & Orientation

6.3.4.1 Vertical - WB18 180x18 (160mm cover)

Vulcan Cladding Profile - WB18 180x18 (160mm cover). A 180mm wide x 18mm thick, secret-fixed, interlocking weatherboard, band sawn face or optionally with brushed face. Installed vertically to the locations and details shown on the approved drawings in accordance with the Abodo Cladding Manual.

Installed Location:

6.3.5 Timber Mouldings

6.3.5.1 AW41 - Internal Corner Mould:

ABODO Wood Internal Corner Mould - AW41: 20 x 20mm and/or 40 x 40mm D4S (as detailed on the approved drawings). Supplied by ABODO, and selected to match the specified cladding material. Installed to the locations and details shown on the approved drawings in accordance with the ABODO Cladding Manual.

6.3.5.2 AW12 - Scriber:

ABODO Wood Scribers - AW12 (as detailed on the approved drawings). Supplied by ABODO, and selected to match the specified cladding material. Installed to the locations and details shown on the approved drawings in accordance with the ABODO Cladding Manual.

6.3.5.3 AW32 - Eaves Mould:

ABODO Wood Eaves Mould - AW32. Supplied by ABODO, and selected to match the specified cladding material. Installed to the locations and details shown on the approved drawings in accordance with the ABODO Cladding Manual.

6.3.6 Coating

6.3.6.1 Abodo Protector

ABODO Protector, to the colour specified. Refer to specification section Painting & Decorating.

ABODO Vulcan Cladding weatherboards and timber mouldings can be supplied factory-coated with at least one coat of ABODO Protector applied to all faces and edges. Alternatively one coat on all four sides must be applied on site prior to installing the board.

All site-cut ends, notches and holes in ABODO Vulcan weatherboards and timber mouldings must be sealed with one coat of ABODO Protector End Seal.

Following installation, the ABODO Vulcan Cladding shall be coated with at least 1 additional coat of ABODO Protector, applied to all exposed surfaces. A third coat is required with a brushed finish and recommeded in certain situations for bandsaw finish. Refer to the relevant Technical Data Sheet.

The use and application of ABODO Protector shall be carried out in strict accordance with the manufacturer's requirements.

ABODO Protector Colour:

6.3.7 Accessories

6.3.7.1 Adhesive Sealant:

Adhesive sealant shall be SIKA Sikaflex® 11FC or equivalent polyurethane-based joint sealant and adhesive. Use to seal and adhere ABODO weatherboards and accessories in accordance with the sealant manufacturer’s recommendations and the ABODO Cladding Manual.

6.3.8 Flashings

6.3.8.1 Flashings - uPVC:

Flashings used in conjunction with the ABODO weatherboard cladding system shall be manufactured from UPVC plastic, and suit the details indicated on the approved drawings in accordance the ABODO Weatherboard Cladding Manual. Flashing materials shall comply with the requirements of NZBC E2/AS1 Tables 20, 21 and 22.

6.3.8.2 Flashings - Colorsteel® Maxx:

Flashings used in conjunction with the ABODO weatherboard cladding system shall be manufactured from Colorsteel® Maxx, 0.55mm thick, and formed to suit the details indicated on the approved drawings in accordance the ABODO Weatherboard Cladding Manual. Flashing materials shall comply with the requirements of NZBC E2/AS1 Tables 20, 21 and 22.

Standard concealed metal corner (internal/external) back flashings for ABODO weatherboard cladding systems include:

- Hemmed Internal 90° Corner Flashing: 50mm, 70mm, 90mm.
- Hemmed External 90° Corner Flashing: 50mm, 90mm.
- Hemmed W Internal 90° Corner Flashing: 70mm.
- Hemmed Internal 135° Corner Flashing: 50mm.
- Hemmed External 135° Corner Flashing: 50mm.
- Unhemmed 90° Corner Flashings: 100mm, 120mm.
- Unhemmed W Internal 90° Corner Flashing: 100mm.

Unhemmed metal corner back flashings may be used with flat profile weatherboards (Hector, Rusticated) provided minimum 75mm cover is obtained the behind weatherboards.

For Extra High Wind Zones and higher, corner back-flashings require minimum 75mm cover and folded hems.

6.3.9 Cavity Battens

6.3.9.1 Timber Cavity Battens, 20mm Cavity - Vertical Weatherboards:

Timber Cavity Battens (non-structural) - to form a nominal 20mm deep drained cavity for vertical weatherboards - ABODO CB-H-20x45 Castellated Cavity Battens. 45 wide x 20mm thick, H3.1 treated Radiata pine, bevelled and castellated cavity battens, incorporating 25mm wide x 6mm deep rebates alternating at 100mm centres either side of the batten.

Proprietary cavity battens complying with NZBC C/AS1, such as Cavibat or DriSpace, can be used.

Fixing to Timber Framing:
- Fix castellated cavity battens to timber framing using 40 x 2.5mm hot-dip galvanised flat head nails.

Fixing to Lightweight Steel Framing (painted weatherboards only):
- Fix castellated cavity battens to lightweight steel framing Refer to NASH Building Envelope Solutions document for further information on fixings and material compatibility with steel framing http://nashnz.org.nz/knowledge_hub/nash-building-envelope-solutions-2019

Installed horizontally, with batten edges sloping down and away from the framing, at maximum 480mm vertical centres, to the layout and details shown on the drawings and in accordance with the ABODO Cladding Manual.

6.3.10 Cavity Base Closer

6.3.10.1 uPVC:

uPVC Cavity Base Closer. Punched with 3-5mm holes or slots complying with NZBC E2/AS1 Paragraph 9.1.8.3. Fitted to the base of the drained cavity, above window and door heads, and inter-storey junctions. Installed in accordance with the ABODO Weatherboard Cladding Manual to the locations and details shown on the drawings.

6.3.11 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works, including membranes, flexible underlays, rigid air barriers, and trims and any other related works are completed in accordance with the ABODO Vulcan Cladding Manual.

Coordinate with trades the locations of pipes, outlets, cables, meter boards and other fittings installed by others, and to install ABODO Weatherboard Cladding as required.

6.3.12 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 to the Main Contractor (as applicable).

Installation work shall be carried out by suitably qualified and experienced tradespersons, familiar with the specified products and the required construction and installation techniques, in accordance with ABODO Vulcan Cladding Manual and to fully comply with all warranty requirements.

All work shall be such as to leave a neat, efficient, robust and weathertight installation, to the required standard, free from damage and defects, including surface marking.

Make all necessary provisions to protect adjacent finished work and surfaces from damage during installation.

6.3.13 Delivery & Handling

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

Store ABODO Vulcan Cladding and accessories undercover, flat and true, clear of the ground by at least 100mm and supported on dry and clean timber bearers spaced at maximum 900mm centres in accordance with Abodo recommendations. Keep stored ABODO Cladding and accessories dry and protected from damage and contamination.

Do not use damaged or defective cladding or accessories. Should a problem be encountered with any ABODO cladding product, immediately contact ABODO on 09 249 0100 with affected timber packet number and order number. Do not continue to use the product that is not performing to specification or expectation. Keep samples and take photos of the product in question.

Handle weatherboards in accordance with the manufacturer's recommendations and in a manner that prevents damage and surface marking. Abodo requires the use of gloves when handling raw timber or factory finish timber to prevent the transfer of dirt/oil.

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 Best practice Guidelines for working at height in NZ Best practice guidelines for working at height in NZ, and the General risk and workplace management - part 1 from Worksafe

6.3.14 Substrate Preparation

6.3.14.1 Vertical Cladding - Timber Frame, Flexible Underlay

Vertical Vulcan Cladding - installed over a drained cavity, on timber framed walls with a flexible wall underlay; check all aspects of preparatory works, 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 in accordance with the requirements of the ABODO Cladding Manual.
- Check that the framing has studs at maximum 600mm centres, nogs/dwangs at maximum 480mm centres, is plumb and in true alignment, includes all blocking required for cavity battens and fixing at openings, joints, corners and soffits etc., and has a maximum moisture content of 20% at the time of cladding installation.
- Check that the flexible wall underlay 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 all preparatory materials are lapped such that any water will run down to the exterior.
- Where the stud spacings are greater than 450mm centres, ensure that appropriate additional restraint is installed over the underlay to prevent bulk insulation pushing the underlay into the drained cavity.
- 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 be remain clear of the cladding by at least 100mm at all times in accordance with E2/AS1.

6.3.15 Installation

6.3.15.1 Cladding General:

Install ABODO Vulcan Cladding, complete with all system components and accessories required for proper installation and performance, in accordance with the ABODO Cladding Manual and as shown on the approved construction drawings.

Confirm the layout and location of movement control joints, the layout of cavity battens, and any specific cladding detailing requirements prior to installation.

Ensure that all associated preliminary and preparatory works are completed to the required standard and specification, and as shown on the drawings.

Ensure that the current, up-to-date ABODO technical literature is readily available on site for reference during installation. Where there is any doubt, contact Abodo Wood on 09 249 0100 or email info@abodo.co.nz.

ABODO Vulcan cladding and timber mouldings must be sealed with at least one coat all four sides prior to fixing. Ensure that all site-cuts to weatherboards and timber mouldings are properly sealed with an approved coating in accordance with ABODO requirements.

Refer to Fixing clause for fixing type and placement etc.

All internal and external cladding corner junctions, inter-storey junctions, and weatherboard trim and accessories, shall be constructed and installed to the details shown on the drawings.

Always keep Vulcan cladding lines consistent and true along walls and around corners.

All flashings around windows, doors and other openings, at corner junctions, inter-storey junctions, soffit junctions, and pipe penetrations, shall be carefully constructed, fixed and finished to the details shown on the drawings.

6.3.15.2 WB12/WB18 - Vertical Cladding:

Over the flexible wall underlay, install and fix the specified cavity battens and cavity closure to wall framing according to the layout and details shown on the drawings.

Back-flash all internal and external corners with corner flashings as detailed on the drawings and in accordance with the ABODO Cladding Manual.

Carefully set-out and secret-fix Vulcan WB12 Cladding to the wall framing through the cavity battens, vertically to straight plumb lines, with side-laps directed away from prevailing weather, and with ends level along the baseline, minimum 50mm, or as detailed, below the bottom plate or floor structure.

From each leading corner, interlock and fix vertical Vulcan WB12 Cladding in accordance with the ABODO Cladding Manual and as detailed on the drawings, keeping cladding lines plumb, straight and true.

Always use full length weatherboards where possible. Where joints are unavoidable, joints shall be formed over a nog/dwang line and cavity batten, and with 50mm wide PVC flashing tape applied to the back face of the boards along the joint. Weatherboard joints shall be scarfed at 35º, centred over the double dwangs/nogs, and fixed with a single fixing located minimum 12mm from the end (front edge) of each board. The scarf joint shall have adhesive sealant applied before fixing. Only if specified and shown on the drawings, the joint shall be covered with a flat soaker - as specified. Joints shall be located so as to avoid clustering, and shall be offset by at least 480mm from joints in boards either side of the joint. The use of end-matched joints made off nog/dwang fixing lines is subject to the Architect's/Designer's express approval only.

Internal and external corners, eaves junctions, windows, doors and other openings in the weatherboard cladding shall be constructed and made weathertight as detailed on the drawings in accordance with the ABODO Cladding Manual.

6.3.16 Fixing

6.3.16.1 Fixing into Timber - Secret Fix Cladding WB12, WB18:

Fix ABODO Secret Fix Cladding (WB12, WB18) with Grade 316 Stainless Steel Nails with ABODO fixing requirements and as shown on the drawings.

Fixings for WB18/12 secret fix stain and paint finished weatherboards shall be:

- self countersinking head, self drilling screw (recommened)
- Or Flat Round head Annular grooved/ ring shank nail
- Stainless steel
- Allow for minimum 30mm penetration in the framing (when using a packer cavity batten) or into the cavity batten when using structural cavity batten.
- For powerdriven nails a protective rubber attachement (e.g. Paslode No Mar Tip) must be used on the nail gun tip to prevent damage to the timber.
- fixing must be driven so head is flush with timber surface.

Single fix cladding at every fixing point, with nails located along the positioning groove 12mm from the edge of the tongue, and no closer than 12mm from the end of the board.

Do not allow cladding fixings to penetrate through flashings under any circumstances.

Set round flat head nails flush with the timber surface.

Fix ABODO Timber Mouldings using 40-50mm x 2.8mm Hot-Dip Galvanised Steel Jolt Head Nails. Punch jolt head nails 2mm below the surface. Ensure all nail holes are primed and flush-filled before painting.

6.3.17 Completion

Check that the ABODO Vulcan Cladding - Vertical Grain - System has been correctly installed and fixed to the layout and details shown on the drawings and in accordance with the requirements of the ABODO Cladding Manual.

Check that all joints, associated trim and accessories are correct, that junctions with other materials and elements are sealed, and the cladding system is weathertight.

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 weathertight and to the required standard in accordance with the ABODO Wood Ltd 'Built-to-Last Warranty'.

Leave all of this work complete and weathertight and to the required standard in accordance with the ABODO Vulcan standard warranty conditions.

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, and the ABODO Wood Weatherboard Cladding System Quality Assurance Checklist. Issue a copy of the RBW document to the Building Consent Authority and to the Main Contractor (as applicable).

Issue to the Owner a copy of the ABODO Vulcan Cladding maintenance requirements, and a copy of ABODO Wood Ltd 'Built-to-Last Warranty'.

7 EXTERNAL WINDOW & DOOR JOINERY

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:

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
2208:1996(AS/NZS)	Safety glazing materials in buildings
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
4667:2000(AS/NZS)	Quality requirements for cut-to-size and processed glass
4668:2000 (AS/NZS)	Glossary of terms used in the glass and glazing industry
AS/NZS 4666:2012	Insulating glass units

7.3 Aluminium Windows & Doors

7.3.1 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.

Thermal performance (NZBC H1/AS1) must be as required to meet the Designer's Thermal Evaluation.

7.3.2 Installation Type

7.3.2.1 Timber Frame Installation - Cavity Construction

All windows (and aluminium frame external doors) installation work shall be exactly in accordance with NZBC E2/AS1, the Windows Association's Windows Installation System (WANZ:WIS), and details on the drawings or supplied by the windows manufacturer.
Check framing alignment, and that window openings are square and the correct size for fitting tolerances.
Prepare framing openings by neatly cutting the building wrap at 45º into the corners, turning wrap through the frame depth and fixing to the inside face, flashing the bottom corners with moulded

plastic and over-flashing the full sill and 200mm up the jambs with the specified flexible flashing tape, stapled to hold the stretched external corners. At head corners install flashing tape 200mm each way from the corners.

Install the WANZ extruded aluminium support bar with built in drainage and ventilation to NZBC E2, to provide continuous support to the window unit. Install the head cavity closer, positioned to provide a 15mm drip edge to the cladding.

Set shims or pack as necessary and install the frames exactly true and square, blocked-up off the support bar as required. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim etc.

Install the head flashing, extending 35mm up behind the cladding (and in turn over-flashed with an additional piece of wrap cover extended up under the wrap or flashing or eaves above), sloping at 15º down to the exterior, and turning down to cover the top of the aluminium frame by at least 10mm, before finishing with a 5mm 45º 'kick out'. Upstand the head flashing ends as detailed. Install jamb flashings/ sealant or scribers as detailed.
After frames installation install closed cell backing rods as required and expanding foam air-seal the gap between framing and liners.

7.3.3 Interior Finish

Architraved.

7.3.4 Reveal

Timber reveals for paint finish with all sides primed.

7.3.5 Glass Platform

Double Glazed.

7.3.6 Finish

7.3.6.1 Powder Coated Aluminium - Matt

Polyester powder coating in accordance with WANZ Powder Coating Quality Assurance System and AAMA 2603-98 performance is required.

7.3.7 Hardware

Hardware colour matched to Aluminium Joinery.

Hinges, stays, catches, fasteners, latches, locks and furniture as offered by the window and door manufacturer. Key alike all lockable window hardware able to be keyed alike.

Account for all keys and deliver separately to the site manager. Factory fit all required and scheduled hardware.

7.3.8 Workmanship

These windows will be manufacturerd in workshops containing all mechanical equipment appropriate for the work, and by experienced and competent tradesmen who are familiar with the techniques and materials specified.

The manufacturer will co-ordinate with other trades to establish the exact sizes for all frames before fabrication. Frames and sashes will be fabricated true, square, rigid, and 'out of wind', with all joints strongly mechanically fixed, and with mitres tight and fully sealed. Potential thermal, wind and seismic movements will be accommodated within the construction. All cavities will drain to the exterior, and all drilling swarf etc. will be removed during fabrication.

Stays, hinges, running gear and glazing will be installed as scheduled (the Designer will be notified if any scheduled hardware of fixing position appears to be inappropriate for this project).

Hardware will be fixed true to line and position, and adjusted and oiled as required for correct operation.

Glass will be cut true and square, sized to provide correct edge clearances, blocked into place as required, and all units will be delivered either pressure fit, pocket glaze, or beaded/wedged, unless site glazing is required. Glazing gaskets will be compatible with all adjacent materials, and cut 1% over-length to absolutely avoid stretching during installation. Frames will be braced etc. as necessary for transportation to the site.

Flashings as detailed will be supplied. Flashing materials will be compatible with the windows.

7.3.9 Delivery and Installation

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

Arrange for delivery of windows to the site only when a suitable storage situation is available for them, handle the windows in accordance with the manufacturers requirements, avoid any frame distortion, avoid rubbing damage, avoid contact with concrete, plaster, mud etc. and keep them dry. Retain protective coverings for as long as possible, and remove them at completion.

Experienced and competent tradesmen who are familiar with the techniques and materials specified shall carry out all installation work. Fix in accordance with the manufacturer's instructions. Take utmost care to avoid damage to anodized or powder coated surfaces - correction of any such disfigurement requires written authority - replace any badly damaged items.

Use fixings compatible with the materials involved, as recommended by the windows manufacturer and to comply with the DWP requirements, basically aluminium or Type 316 stainless steel where exposed externally; galvanized to AS/NZS 4680, 610g/m2, may be used where not exposed.

Thoroughly check all preparatory work to openings prior to installation, including underlay, corner seal tapes, adjacent cladding, pre-installed flashings, waterproofing systems etc. as appropriate. Use

inert barriers or coatings to prevent contact between dissimilar metals or between aluminium and concrete.

Install flashings as detailed and supplied by the windows manufacturer, installed tightly and neatly with absolute minimum tolerances, with head weathering jamb, jamb weathering sill, and sill open (draining) to exterior. Except where the window is recessed all head flashings shall extend 30mm minimum beyond the frame.

Air-seal all frame perimeters to adjacent structure to a depth of 15 - 20mm with expanding foam or appropriate sealant including a PEF rod at head, sill and jambs to retard the spread of sealant.

Weather-seal frame jambs etc. to adjacent surfaces (or to each other) as detailed or as required by the windows manufacturer, to achieve a fully watertight installation. In preparation for sealant the joints shall be clean, dry, and primed if necessary. Insert closed cell polyethylene backer rods or a polyethylene tape slip layer if required. Mask adjacent surfaces if appropriate, install the sealant fully in accordance with the sealant manufacturer's recommendations, and finish to even smooth surfaces.

Remove trade debris progressively, appropriately clean any affected adjacent surfaces, thoroughly clean the windows, check that all hardware is in full working order, and provide safety indication of the glass for the balance of adjacent works.

8 GLAZING

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:

1170.0:2002(AS/NZS)	Structural design actions - Part 0: General principles
2208:1996(AS/NZS)	Safety glazing materials in buildings
3604:2011(NZS)	Timber-framed buildings
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
4232.2:1988(NZS)	Performance criteria for fire resisting enclosures - Part 2: Fire resisting glazing systems
4667:2000(AS/NZS)	Quality requirements for cut-to-size and processed glass
4668:2000 (AS/NZS)	Glossary of terms used in the glass and glazing industry
AS/NZS 4666:2012	Insulating glass units

8.3 Non-Structural Glazing

8.3.1 Scope

Supply and install the selected glass products to the windows, doors, curtain wall systems, roofs and canopies, balustrades and barriers, partitions and screens, and other non-structural glazing elements, as noted and shown on the drawings. All aspects of this work shall be in accordance with the glass manufacturer's installation requirements and recommendations, other relevant product manufacturers' recommendations, and as shown on the drawings.

8.3.2 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 for all necessary holes and cut-outs, etc., for glass-mounted hardware, fittings and fixtures, and to install all glass and glazed elements as required.

8.3.3 Workmanship

All installation work shall be carried out by experienced and competent tradesmen familiar with the products specified and installation techniques, to the manufacturer's requirements and recommendations, and the requirements of the relevant Glazing Standards, and to the layout and details shown on the drawings.
Handle and store glass in accordance with the manufacturer's recommendations.
Provide temporary safety markings to all glass panes as the installation work progresses.
Finish all external glazing wind and watertight.
Do not use damaged, marked or faulty materials.

8.3.4 Glass Type

8.3.4.1 Low-E Glass

Low Emissivity Glass. Heat-reflective coated surface, annealed float glass, complying with AS/NZS 4667 and in accordance with NZS 4223.1. Installed to the locations identified on the drawings and schedules.

Manufacturer, brand name & type: TBC

8.3.4.2 Obscure & Patterned Glass

Obscure and Patterned Glass. Surface patterned glass and/or obscure glass, complying with AS/NZS 4667 and in accordance with NZS 4223.1. Installed to the locations identified on the drawings and schedules.

8.3.4.3 Toughened Safety Glass

Toughened Safety Glass. Toughened Grade 'A' Safety Glass, complying with AS/NZS 2208 and AS/NZS 4667 and in accordance NZS 4223.1. Installed to the locations identified on the drawings and schedules. All cutting and drilling and other processing requirements must be done prior to toughening.

8.3.5 Insulating Glass Units

8.3.5.1 Special Double Glazing

Special Double Glazing. Air or gas-filled, sealed insulating glass units (IGUs), complying with NZS 4223.2. Glass type as specified and in accordance with NZS 4223.1 and NZS 4223.3. Double glazed IGUs shall be manufactured and installed in accordance with AS/NZS 4666. Factory-fitted to the windows and doors identified as 'double glazed' on the drawings and schedules.

8.3.6 Components & Accessories

8.3.6.1 Aluminium Framed Glazing

Provide all necessary glazing components and accessories including glazing tape, setting and distance blocks, sealants, gaskets, etc., to complete aluminium framed glazing as required.

8.3.7 Installation

8.3.7.1 Aluminium, Double Glazed (IGU's)

Install Insulated Glass Units into aluminium frames in accordance with the glazing manufacturer's recommendations and NZS 4223.1, and as detailed.

8.3.8 Frameless Doors & Screens

Frameless glass doors and screens shall be safety glass in accordance with NZS 4223.3.

Frameless glass doors and screen panels cut to the dimensions shown on the drawings, and factory pre-drilled and cut as required for all necessary fixings, brackets, cleats, hinges, locks, latches, closers and other hardware or fixtures, and edge finished as specified, prior to installation.

Install frameless glass doors and screen panels to the layout and details shown on the drawings and in accordance with any proprietary fixing manufacturer's requirements.

Glass screen panels set straight, true to line and plumb. Panel joints plumb and parallel as detailed.

Fixings, clamps, brackets, and hardware etc. neatly set-out and aligned as detailed.

Note: where relevant, new structural glass barriers shall comply with NZBC B1/AS1 (Amendment 13) and must have an interlinking rail, unless the barrier is laminated safety glass and has features to retain panes of glass or prevent collapse, in the event of breakage. The interlinking rail shall be designed to resist serviceability limit state (SLS) loads, specified in AS/NZS 1170 and B1/VM1, in the event that a glass pane of the barrier breaks.

8.3.9 Edge Finishing

Flat and polished exposed edges to all frameless glass doors and screens, and where noted on the drawings.

8.3.10 Completion

Check that all glass has been installed correctly to the required standard and as shown on the drawings. Check for damage and surface marking and replace as necessary. Clean off and remove all temporary safety markings, as programmed and when instructed, and leave glass trade clean.
Remove all rubbish and waste material from site.
Issue to the Owner a copy of the Glass Manufacturer's maintenance requirements and all necessary Manufacturer Warranties.

9 INSULATION

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:

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
4859.1:2018(AS|NZS)	Thermal insulation materials for buildings - Part 1: General criteria and technical provisions

9.3 Pink Batts Insulation

9.3.1 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. No substitutions are permitted for Pink® Batts® Insulation. All aspects of this work shall be in complete accordance with Pink® Batts® technical information and installation requirements and as shown on the drawings:
https://www.pinkbatts.co.nz/resources/downloads/product-data-sheets

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 - 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.

9.3.2.3 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.

9.3.3 Wall Thermal Insulation

9.3.3.1 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:

9.3.3.2 Pink® Batts® Ultra® R3.2 140mm Wall

Pink® Batts® Ultra® R3.2 140mm Wall - product code 7127132. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-3.2. 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® R3.2 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:

9.3.4 Ceiling Thermal Insulation

9.3.4.1 Pink® Batts® Superbatts® R6.0 Ceiling

Pink® Batts® Superbatts® R6.0 Ceiling - product code 7113160.

Glasswool insulation manufactured from over 80% recycled New Zealand glass.

Product is BRANZ Appraised, and supported by an EPD and Eco Choice certification.

245mm thick x 460mm wide x 1220mm long segments.

Installed as ceiling thermal insulation to the locations shown on the drawings in accordance with the manufacturer's requirements.

Installed Location:

9.3.5 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 trades to install Pink® Batts® Insulation as required.

9.3.6 Workmanship

All installation work shall be carried out by registered PinkFit® installers; the preferred Pink® Batts® 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. For more information on best practice Pink® Batts® installation refer to: https://www.pinkbatts.co.nz/resources/downloads/product-data-sheets

9.3.7 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.

For best practice, refer to Pink Batts Product and Installation Guides.
Further assistance contact 0800 746 522

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.

Conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the Workplace and facilities requirements

9.3.8 Installation

9.3.8.1 General

Install Pink® Batts® Insulation in accordance with NZS 4246.
All installation work shall be carried out 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. For more information on best practice Pink® Batts® installation refer to:
https://www.pinkbatts.co.nz/resources/downloads/product-data-sheets

9.3.9 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.

10 ROOFING

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:

1170.2:2011(AS/NZS)	Structural design actions - Wind actions
1397:2001(AS)	Steel sheet and strip - Hot-dip zinc-coated or aluminium/zinc-coated
1562.2:1999(AS/NZS)	Design and installation of sheet roof and wall cladding - Corrugated fibre-reinforced cement
1562.3:1996(AS/NZS)	Design and installation of sheet roof and wall cladding - Plastic
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
4200.2:1994(AS/NZS)	Pliable building membranes and underlays - Installation requirements
4389:2015(AS/NZS)	Roof safety mesh
4534:2006(AS/NZS)	Zinc and zinc/aluminium-alloy coatings on steel wire
NZMRM Code of Practice	NZ Metal Roof and Wall Cladding Code of Practice - Version 3.0

10.3 Workmanship

10.3.1 Guarantees

The whole of the roof covering work shall be complete in all respects and absolutely watertight. Commencement of roofing works by any Subcontractor indicates their full agreement to and acceptance of an unwritten guarantee to maintain the whole of their work in a satisfactory and watertight condition, and to arrange and pay for any damage consequential upon the failure of their materials or workmanship, for the periods stated below, irrespective of the 90 day general maintenance period.

- Butyl roofer - ten years from completion.
- Galvanised steel roofer - two years after completion.
- Aluminium roofer - ten years after completion.
- Acrylic/f.glass roofer - ten years after completion.

10.3.2 Co-operation

Co-operate with other trades to ensure that framed roofing substrates have appropriate spacings, alignments and fixings, and to ensure that sheet roofing substrates have the correct edge and central fixings, appropriate alignments and gradients, edge priming if necessary, and are completely clean.

Ensure that each section is waterproofed as soon as possible after preparatory work is complete; allow to carry out the works in several operations if necessary to comply with this condition.

10.3.3 Alternatives

Tenderers are invited to submit a price variation for similar roofing products. Consideration of finished roofs in the alternative product and the extent that drawings will need to be modified to incorporate it will be the main items in the decision on the alternative proposed.

10.4 Profiled Metal Wall Cladding

10.4.1 Scope

Supply and install Profiled Metal Wall Cladding, as specified herein, to the locations identified on the drawings complete with all components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with the roofing manufacturer's technical literature and installation requirements, the NZ Metal Roof and Wall Cladding Code of Practice, other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for the specified Profiled Metal Wall Cladding.

10.4.2 Cladding Profile

Trapezoidal profiled metal wall cladding. Trapezoidal profile depth, crest pitch, crest width and pan width as specified below.
Manufactured from the material type, thickness and finish as specified below.
Installed as vertically-orientated and/or horizontally-orientated profiled metal wall cladding in accordance with the NZMRM Code of Practice and the manufacturer's requirements to the locations and details shown on the drawings.

10.4.3 Material Type, Thickness & Finish

Trapezoidal-profiled metal wall cladding shall be manufactured from COLORSTEEL® Endura - 0.4mm BMT. Pre-painted hot-dipped galvanised zinc coated steel coil conforming with AS/NZS 2728.

Colour: TBC

10.4.4 Components & Accessories

Cavity Battens. Refer to the Cavity Battens clause.

Cavity Closure Strip. Refer to the Cavity Closure Strip clause.

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. Class 5 or non-ferrous screw fasteners are recommended for Severe or Very Severe environments.
Screw fastener type and placement (frequency) shall be appropriate for wind or other design loads and the material into which the screw is being fastened; all in accordance with the NZMRM Code of Practice and the roofing manufacturer's requirements.

Rivets shall be sealed aluminium, 4.8mm diameter.

Metal Flashings. Metal flashings shall be in accordance with the details shown on the drawings and to the requirements of the NZMRM Code of Practice, and shall include all folded metal sections required to make the specified profiled metal wall cladding weathertight at:
- the building periphery,
- roof and wall junctions,
- changes of direction,
- intersections with other buildings,
- any wall penetration,
- junctions with other materials.

Metal flashings shall be fabricated from ductile grade metal of same material and coating as the cladding material, to maintain durability and compatibility requirements.
Metal flashings shall be designed for lateral strength by folding, stiffening or ribbing on external edges, and have a maximum un-stiffened width of 300mm.

The minimum thickness for metal flashings shall be:
- Coated steel: 0.55mm
- Aluminium: 0.9mm
- Copper: 0.6mm
- Zinc: 0.7mm
- Stainless steel: 0.45mm.

Flashing fastenings and fastening frequency shall be in accordance with the NZMRM Code of Practice.
Do not fix flashings to timber with a moisture content greater than 18%.
Do not construct flashing joints and flashing junctions in a manner that rely entirely on sealant to maintain weathertightness.

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.

Compressible Foam Sealing Tape. Self-adhering, compressible foam sealing tape for sealing metal flashings and generally as required in accordance with the NZMRM Code of Practice recommendations and as shown on the drawings.

Sealant. Use only neutral-curing silicone 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 recommendations.
All sealed joints must be mechanically fastened, and excess sealant neatly removed to prevent unnecessary dirt buildup.
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. Use only high-temperature silicone (not EDPM) collar flashings for heated flues and pipes with temperature range between 60°C - 200°C.

10.4.5 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.
Co-ordinate with other trades to ensure that the specified Profiled Metal Wall Cladding correctly allows for joinery installation, the location of pipes, outlets, meter boards and other fixtures and fittings installed by others, and to install the specified Profiled Metal Wall Cladding as required.

10.4.6 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 and competent tradespersons, familiar with the specified products and installation techniques, to fully comply with all warranty requirements in accordance with the roofing manufacturer's requirements. All work shall be such as to leave a neat, efficient, robust and weathertight installation.

All cutting, fixing and installation techniques, fastenings and sealants shall be exactly as recommended by the roofing manufacturer in accordance with the NZMRM Code of Practice and 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. Isolate dissimilar materials (metal and non-metal) in close proximity as necessary by painting the surfaces or fitting separator strips. Place isolators between metals and treated timber or cement-based materials. Do not use unpainted lead-sheet or copper materials to come in contact with, or allow water run-off from these onto, galvanised or Zincalume® materials.

10.4.7 Delivery & Handling

Store profiled metal wall cladding, flashings and accessories undercover, clear of level ground, on bearers at evenly spaced centres as recommended by the roofing manufacturer. Keep stored materials and accessories dry and protected from damage and contamination at all times.
Do not used 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.

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 Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

10.4.8 Preparation

Vertically-Orientated Profiled Metal Wall Cladding - installed over a 20mm drained cavity and fixed to timber framing - check all aspects of preparatory works, 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 in accordance with the cladding manufacturer's requirements.
Check that the framing has studs at maximum 600mm centres and nogs/dwangs at maximum 480mm centres, is plumb and in true alignment, includes all blocking required for cavity battens and fixing at openings, joints, corners and soffits etc., and has a maximum moisture content of 20% at the time of cladding installation.
Check that the specified absorbent breather type 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. Where the studs are at greater than 450mm centres, check that appropriate additional restraint is correctly installed over the underlay to keep bulk insulation from pushing the underlay into the cavity space.
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 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 be remain clear of the cladding by at least 100mm at all times in accordance with E2/AS1.

10.4.9 Cavity Battens

Timber Cavity Battens for Vertically-Orientated Profiled Metal Wall Cladding installed over Timber Framing. Ex 50 x 25mm, H3.1 treated Radiata, angle castellated cavity battens. Installed horizontally over the wall underlay and directly over nog/dwang lines 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 spaced at maximum 800mm centres. Ensure that LOSP solvents in the cavity battens have flashed-off before installing the cladding. 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.

10.4.10 Cavity Closure Strip

PVC Cavity Closure Strip. Installed to the details shown on the drawings.

10.4.11 Installation

Install Profiled Metal Wall Cladding in accordance with the NZMRM Code of Practice and the cladding manufacturer's requirements and as shown on the drawings.
As shown on the 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.

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.

Carefully set-out and fix the specified cavity battens and cavity closure strip to the framing, level along the base-line - 50mm minimum or as detailed - below the bottom plate or floor structure. Back-flash all internal and external corners to the details shown on the drawings prior to installing cladding sheets.

Cut Profiled Metal Wall 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.

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).

Screw-fixed sheets shall be fixed with fasteners appropriate for the cladding profile and material, substrate/structure and the environment in accordance with the cladding manufacturer's requirements and the NZMRM Code of Practice (minimum Class 4).
Screw fastening placement and spacings shall be strictly in accordance with the cladding manufacturer's requirements and the NZMRM Code of Practice to fully comply with the Wind Zone requirements, support frame spacings etc. Ensure the fastener layout is balanced to other architectural features.
Screw fastenings for pre-painted metal must be pre-painted prior to installation for an accurate colour match.
Use fixing systems that will accommodate due allowance for dynamic local wind pressures on the building and thermal movement in the sheet.

Clip-fastened sheets shall be fixed with concealed fastening clips appropriate for the cladding profile and material, substrate/structure and the environment in accordance with the cladding manufacturer's requirements.

All cladding jointing techniques and sealants shall be in accordance with the cladding manufacturer's recommendations and 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.
Metal flashings generally, shall be in accordance with the NZMRM Code of Practice and as shown on the drawings.

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 cladding manufacturer's requirements and the NZMRM 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.
Penetrations in the cladding that are greater than 150mm in any direction must have support framing installed around the perimeter of the penetration. Penetration flashings shall not rely solely on silicone sealant to achieve weathertightness of the flashing.
Flash pipes penetrating the roofing with a proprietary pipe collar flashing.

Completely clean off any swarf as the work proceeds.

10.4.12 Fixing

Pan-fix Trapezoidal profiled metal wall cladding - manufactured from COLORSTEEL® Endura and fixed to timber framing - with minimum AS 3566 Corrosion Class 4, Hex. Head-with-seal Self-drilling Screws in accordance with the NZMRM Code of Practice and cladding manufacturer's requirements.
Primary screw fastener embedment into timber framing must be a minimum of 35mm and greater than 6 times the screw thread diameter. Where a rigid underlay/sheet bracing is installed over the support framing, increase the screw length by the thickness of the rigid underlay/sheet bracing accordingly.
Pre-painted screws shall be factory pre-painted for an accurate colour match with the cladding.

10.4.13 Completion

Check that the Profiled Metal Wall Cladding and associated flashings and accessories 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 cladding to ground, deck or roof clearances that are required by the NZ Building Code.

Leave all of this work complete and weathertight and to the required standard in accordance with the NZMRM 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.

Issue to the Owner a copy of the cladding manufacturer's maintenance requirements upon completion of the contract works.

Provide the cladding material manufacturer's/supplier's 'Product Warranty' for the installed metal cladding product on the cladding manufacturer's Standard Warranty Form. Warrant this work under normal conditions and use against failure of coating and for weatherproofing by material penetration. Commence the warranty from the date of practical completion of the contract works. Factory applied coatings; the warranty period is determined by the specified product and the site location and environment - contact the cladding manufacturer to evaluate the warranty conditions.

Provide the installer's 'Installation Warranty' on the installer's Standard Warranty Form. Warrant this work under normal environmental conditions and use against weatherproofing failure. Commence the warranty from the date of practical completion of the contract works.

10.5 Profiled Metal Roofing

10.5.1 Scope

10.5.1.1 Inland Moderate (ISO 9223 Category: C2)

Supply and install profiled metal rigid-sheet roofing, 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 the roofing manufacturer's technical literature and installation requirements, the NZ Metal Roof and Wall Cladding Code of Practice, other relevant product manufacturers' recommendations, and as shown on the drawings.

10.5.2 Requirements

10.5.2.1 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, particularly those for construction and building maintenance.

10.5.2.2 Warranty - Roofing Material

Roofing Material Product Warranty. Warrant this work against failure of materials under normal use and environmental conditions:
- 15 Years for Perforation: according to the roofing material manufacturer/supplier warranty conditions.
- 15 Years for Coatings: according to the roofing material manufacturer's warranty conditions.
- Provide the Product Warranty on the roofing manufacturer's Standard Warranty Form.
- Commence the warranty from the date of practical completion of the contract works.

10.5.2.3 Warranty - Installation

Installation Warranty. Warrant this work under normal environmental conditions and use against waterproofing failure:
- 15 Years for Workmanship.
- Provide the Installation Warranty on the roofing installer's Standard Warranty Form.
- Commence the warranty from the date of practical completion of the contract works.

Include a copy of the roofing manufacturer's maintenance requirements with the Installation Warranty.

10.5.2.4 Wind Performance - High Wind Zone

Profiled Metal Roofing Wind Performance - Non-Specific Design Wind Zone Classification:
- NZS 3604 Wind Zone: H = High.
- Wind Speed: <44m/s.
- Ultimate Limit State: 1.16kPa.

Refer to the roofing manufacturer's technical literature for wind load design parameters.

10.5.3 Roofing Profile

Trapezoidal Profiled Metal Roofing. Symmetrical or asymmetrical trapezoidal profile, with a minimum crest height of 19mm. Asymmetrical profiles shall have a flat or lightly profiled pan width of 210mm maximum between crests. Profile depth, crest pitch, crest width and pan width as specified below or as shown on the drawings. Manufactured from the material type, thickness and finish specified.

Minimum roof pitch: 4° (1:14) where the crest height is less than 27mm, or 3° (1:20) where the crest height is 27mm or higher.

Trapezoidal metal roofing shall be fixed with self-drilling screws through the profile crest in accordance with the requirements of the NZMRM Code of practice.

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 requirements of the roofing manufacturer's technical literature and the NZMRM Code of Practice, to the locations and details shown on the drawings.

Profile Dimensions:
Installed Location:

10.5.4 Roofing Material

10.5.4.1 COLORSTEEL® Endura - 0.4mm - Trapezoidal Profile

Trapezoidal profiled metal roofing shall be manufactured from COLORSTEEL® Endura - 0.4mm BMT. Pre-painted, hot-dipped zinc/aluminium alloy coated steel coil conforming with AS/NZS 2728. 550 MPa minimum yield strength. 150gms/m² coating weight. Atmospheric Classifications C1-C4.

Colour:

10.5.5 Components & Accessories

10.5.5.1 Roof Underlay

Roof Underlay. Refer to separate specification section.

10.5.5.2 Sealant

Sealant. Use only neutral-curing silicone sealant that is compatible with the specified metal roofing and flashing materials and finishes, and suitable for the required application and use, in accordance with the sealant manufacturer's instructions and to the NZMRM Code of Practice recommendations. All sealed joints must be mechanically fastened, and excess sealant neatly removed to prevent unnecessary dirt buildup. Sealant shall only be used to seal between two metal surfaces, do not fill holes or gaps with sealant.

10.5.5.3 Proprietary Collar Flashings

Proprietary Collar Flashings. EPDM or silicone-polymer proprietary flexible collar flashings for weatherproofing roof-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. Use only high-temperature silicone (not EPDM) collar flashings for heated flues and pipes with temperature range between 60°C - 200°C.

10.5.6 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 to ensure that all roof members required for ridges, hips, valleys, barges, penetrations, junctions with vertical faces, etc. are correctly installed.

Coordinate with the roof drainage system, and generally with other trades as required, to install the specified profiled metal roofing.

Ensure that each section of roof is waterproofed as soon as possible after preparatory work is complete; allow to carry out the works in several operations if necessary to comply with this condition.

10.5.7 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.

All installation work shall be carried out by experienced and competent tradespersons, familiar with the specified products and installation techniques, in accordance with the requirements of the NZMRM Code of Practice, and to fully comply with all warranty requirements. All work shall be such as to leave a neat, efficient, robust and weathertight installation.

All cutting, fixing and installation techniques, fasteners and sealants shall be exactly as recommended by the roofing manufacturer in accordance with the NZMRM Code of Practice, and 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. Isolate dissimilar materials (metal and nonmetal) in close proximity as necessary by painting the surfaces or fitting separator strips. Place isolators between metals and treated timber or cement-

based materials. Do not use unpainted lead-sheet or copper materials to come in contact, or allow runoff from these, with galvanised or Zincalume® materials.

10.5.8 Delivery & Handling

Upon delivery to site, inspect roofing materials and reject those items that are found to be damaged, defective or contaminated. Contact the manufacturer/supplier for replacement of rejected items at time of delivery to site.

Store profiled metal roofing, flashings and accessories undercover, clear of level ground, on bearers at evenly spaced centres as recommended by the roofing manufacturer. Keep stored materials and accessories dry 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 material, including surface marking. Do not used damaged or defective materials or products, 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 Best practice guidelines for working on roofs and the General risk and workplace management - part 1.

For all work undertaken on the roof, installers shall always wear soft, clean footwear with a light-coloured sole. Do not walk on translucent/natural lighting sheet.

10.5.9 Preparation

10.5.9.1 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 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 3603 at the time of installation.

Supporting lightweight steel framed structures shall meet the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria.

Supporting steel structures shall comply with NZS 3404.

10.5.9.2 Roof Structure Check

Roof Structure - check all aspects of preparatory works, including but not limited to:
- Check that the purlins are set-out to the required set-out and spacings, are straight and true to line and plane, and are securely fixed.
- Check that 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 drawings.
- Check that trimming for roof penetrations, and roof/wall junction blocking, and all necessary work by other trades is complete.
- Check that solid backing required for fully supported roofing is complete and securely fixed in accordance with the approved drawings.

10.5.10 Installation

10.5.10.1 Roof Underlay

Install roof underlay in accordance with the underlay manufacturer's requirements with minimum 150mm side and end laps, and lapped such that any water will be shed to the outside of the underlay.

Non self-supporting underlay must be supported by hexagonal galvanised wire mesh, safety mesh or alternative support, as specified and/or shown on the drawings, in accordance with the 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 - Sections 4.3.11 Separation, 11.4.2 Substrate, and 11.5.1 Ventilation.

10.5.10.2 Flashings

Install flashings to roof edges, ridges, roof/wall junctions, parapets and roof penetrations as detailed on the drawings and in accordance with the NZMRM Code of Practice and the roofing manufacturer's requirements.

All flashings shall be neatly formed and finished, securely fastened to the structure, weatherproof and have falls set to avoid water ponding.

For highly visible flashings, plan each flashing joint and/or junction with specific regard to aesthetic requirements.

10.5.10.3 Penetrations

Penetrations greater than 150mm in any direction must have support framing installed around the perimeter of the penetration. Penetration flashings shall not rely solely on silicone sealant to achieve weathertightness of the flashing.

Flash pipes penetrating the roofing with a proprietary pipe collar flashing.

10.5.10.4 Cleaning

Completely clean off all drill and other swarf and pop-rivet shanks as the work proceeds (at least daily), and keep them and other rubbish out of the spoutings.

Remove associated trade debris from the roof and from the site progressively, and on completion leave the roof and rainwater system completely clean.

10.5.11 Fixing

10.5.11.1 Trapezoidal Profile - Steel material, fixed to Timber

Trapezoidal Profile Roofing - manufactured from steel-based material: Crest-fix roofing to timber framing using minimum AS 3566 Corrosion Class 4, 12g-11, Type 17, Hex. Head-with-Seal, Self-drilling Screws, in accordance with the NZMRM Code of Practice and the roofing manufacturer's requirements.

Primary screw fastener embedment into timber framing shall be a minimum of 35mm and greater than 6 times the screw thread diameter.

Where battens, sarking or insulation is installed over the structure being fixed to, increase the screw length by the thickness of such material.

10.5.12 Completion

Check that the profiled metal roofing and associated components and flashings have been installed and finished correctly.

Check for defective work and materials - replace and/or repair as necessary.

Sweep down the completed roof and clean out spouting, gutters and rainwater pipes.

Leave all of this work complete and weathertight in accordance with the roofing manufacturer's requirements and the NZMRM Code of Practice, and to fully comply with all 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.

Issue to the Owner a copy of the roofing manufacturer's maintenance requirements on completion.

Issue to the Owner the roofing material manufacturer/supplier 'Product Warranty', and a copy of the installer's 'Installation Warranty'

11 PLUMBING

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:

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
3500.2:2021 (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
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

11.3 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.

11.4 Materials

11.4.1 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.

11.4.2 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.

11.5 Workmanship

11.5.1 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.

11.5.2 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.

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Plumber's expense.

11.5.3 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.

11.5.4 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.

11.5.5 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.

11.5.6 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.

11.5.7 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.

11.6 Systems

11.6.1 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.

11.6.2 Cold Water System

11.6.2.1 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).

11.6.3 Hot Water System

11.6.3.1 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.

12 DRAINAGE

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:

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
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 G13/AS2	Foul Water Drainage

12.3 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.

12.4 Workmanship

12.4.1 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.

12.4.2 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.

12.4.3 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.

12.4.4 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.

12.4.5 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.

12.5 Foul Water Drainage

12.5.1 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.

12.5.2 Requirements

12.5.2.1 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, including WorkSafe's General Risk and Workplace Management - Part 1 and Workplace and Facilities Requirements guidance.

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

12.5.2.2 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.

12.5.2.3 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.

12.5.2.4 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.

12.5.2.5 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 necessary to install foul water drains to the required locations and layouts.

12.5.2.6 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.

12.5.2.7 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. 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.

12.5.2.8 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.

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, including WorkSafe's General Risk and Workplace Management - Part 1 and Workplace and Facilities Requirements guidance.

12.5.2.9 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.

12.5.2.10 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.

12.5.3 Materials

12.5.3.1 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.

12.5.3.2 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.

12.5.3.3 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.

12.5.3.4 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).

12.5.3.5 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.

12.5.3.6 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.

12.5.4 Trench Excavation

12.5.4.1 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.

12.5.4.2 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.

12.5.4.3 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.

12.5.4.4 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.

12.5.5 Pipe Laying

12.5.5.1 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.

12.5.5.2 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.

12.5.5.3 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.

12.5.5.4 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.

12.5.5.5 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.

12.5.5.6 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: 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.

12.5.6 Connection

12.5.6.1 On-Site - to Existing Foul Water Drain

Connect to discharge the new foul water drainage line to the existing, operational foul water drainage line on-site in accordance with the requirements of the Territorial Authority and as shown on the drawings.

12.5.7 Testing

12.5.7.1 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.

12.5.8 Backfilling

12.5.8.1 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.

12.5.9 Reinstatement of Surfaces

12.5.9.1 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.

12.6 Stormwater Drainage

12.6.1 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.

12.6.2 Requirements

12.6.2.1 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, including WorkSafe's General Risk and Workplace Management - Part 1 and Workplace and Facilities Requirements guidance.

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

12.6.2.2 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 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.

12.6.2.3 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.

12.6.2.4 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.

12.6.2.5 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 necessary to install stormwater drains to the required locations and layout.

12.6.2.6 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.

12.6.2.7 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. 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.

12.6.2.8 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.

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, including WorkSafe's General Risk and Workplace Management - Part 1 and Workplace and Facilities Requirements guidance.

12.6.2.9 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.

12.6.2.10 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.

12.6.3 Materials

12.6.3.1 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.

12.6.3.2 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.

12.6.3.3 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.

12.6.3.4 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.

12.6.4 Trench Excavation

12.6.4.1 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.

12.6.4.2 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.

12.6.4.3 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.

12.6.4.4 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.

12.6.5 Pipe Laying

12.6.5.1 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.

12.6.5.2 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.

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12.6.5.3 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.

12.6.5.4 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.

12.6.5.5 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.

12.6.6 Connection

12.6.6.1 Onsite - to Existing Stormwater Drain

Connect to discharge the new stormwater drainage line to the existing, operational stormwater drainage line on-site in accordance with the requirements of the Territorial Authority and as shown on the drawings.

12.6.7 Testing

12.6.7.1 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.

12.6.8 Backfilling

12.6.8.1 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 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.

12.6.9 Reinstatement of Surfaces

12.6.9.1 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.

13 ELECTRICAL

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:

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
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

13.3 Elements

13.3.1 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.

13.3.2 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.

13.3.3 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.

-Garage door operating mechanisms.
-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.
-Infrared / movement / daylight sensor switches as noted.
-Heated towel rails to bathroom and shower room.
-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.

13.4 Workmanship

13.4.1 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.

13.4.2 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.

13.4.3 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.

13.4.4 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.

Wire exterior lighting in screened cable.

13.5 Systems

13.5.1 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.

13.5.2 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.

13.6 Materials & Control

13.6.1 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.

13.6.2 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.