Threefold Architecture Ltd.

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

47 Carrickmore Crs

47 Carrickmore Crs
Wanaka

Issued for Consent

2555

PROJECT OVERVIEW

Scope

New residential single storey dwelling with attached garage.

Address

Site Address	47 Carrickmore Crs
City	Wanaka
Lot #	493
DP #	600652

Site Conditions

Wind Zone	VH - Very High Wind Speed
Earthquake Zone	Zone 1
Exposure Zone	Zone B - Low
Snow Loading Zone	Zone N4

© Smartspec 2026

TABLE OF CONTENTS

Preliminaries & General 5
Establishment & Enabling 5
Siteworks 9
Site & Scope 9
Excavation & Siteworks 9
Concrete 11
Materials 11
Concrete 12
Blockwork 18
Concrete Blockwork 18
Waterproofing 23
ARDEX Liquid-Applied Waterproofing Membranes 23
Carpentry 28
Timber Framing 29
Deck 33
Futurebuild LVL Engineered Framing 33
GIB® Plasterboard Linings 34
GIB® EzyBrace® Systems 40
Rosenfeld Kidson & Co Cedarscreen Weatherboard Systems 44
Thermakraft Underlay, DPM, DPC & Tapes 48
James Hardie Eaves & Soffits 54
Workmanship & Materials 55
Roofing 62
Metalcraft Roofing Rainwater & Fascia Systems 62
Membrane Roofing 63
Metalcraft Longrun Roofing 65
Window & Door Joinery 70
APL Residential Aluminium Windows & Doors 70
VELUX Skylights and Roof Windows 75
Insulation 78
Pink Batts Insulation 78
EXPOL Concrete Slab Insulation 82
Tiling 84
Tiling 84
ARDEX Tiling Solutions 89
Floor Coverings 100
Carpet & Resilient Floor Coverings 100
Overlay Flooring 103
Plumbing 108
Workmanship 109
Materials 110
Systems 110
Elements 111
Rheem Domestic Electric Water Heaters 112
Aquatherm Flexi Pipe System 113
Drainlaying 115
Workmanship 115
Elements 116
Foul Water Drainage 116
Surface Water Drainage 123
Stormwater Drainage 126
Electrical 134
Workmanship 134
Systems 135
Materials & Control 135
Elements 136
Interconnected Smoke Alarms 137
HVAC 139
Escea Outdoor Wood Fires 139
Appendix 142
Thermakraft Corner Moulds Datasheet & Installation 142
James Hardie Eave & Soffit Installation Manual (Feb 2025) 142
BRANZ Appraisal No.238 - Pink® Batts® Insulation 142
BRANZ Appraisal No.767 - Pink® Batts® Skillion Roof Insulation 142
CodeMark Certificate of Conformity - Velux Skylights 142
CodeMark Certificate of Conformity - Velux Roof Windows 142
BRANZ Appraisal No. 969 - Velux Roof Windows 142
BRANZ Appraisal No. 968 - Velux Skylights 142
CodeMark 142
Kahu 142
BRANZ Appraisal No.708 - Aquatherm Flexi Pipe System 142
Cedarscreen 20mm Vertical v5 Oct 2020 142

© Smartspec 2026

Cedarscreen 20mm Vertical Installation Details - Rigid Underlay 142
Cedarscreen 20mm Vertical Installation Details - Flexible Underlay 142
BRANZ Appraisal No.473 - ARDEX Undertile External Liquid Membranes 142
BRANZ Appraisal No.472 - ARDEX Undertile Internal Liquid Membranes 142
Aluband Data Sheet 142
Aluband Install Guide 142
BRANZ Appraisal No.878 - Thermakraft Aluband Window Flashing Tape 142
OneSeal Data Sheet 142
OneSeal Install Guide 142
BRANZ Appraisal No.942 - ONESEAL MULTI-FIT PIPE AND CABLE PENETRATION SEALS 142
EXPOL ThermaSlab H Grade – Technical Data Sheet 142
EXPOL SLABX200 – Technical Data Sheet 142
BRANZ Appraisal No.928 - GIB EzyBrace Systems 142
BRANZ Appraisal No.695 - Watergate-Plus Wall Underlay 142
CodeMark Certificate of Conformity - Watergate Plus Wall Underlay 142
Watergate Plus Data Sheet 142
Watergate Plus Install Guide 142
Thermathene Black Install Guide 142
Thermathene Black Data Sheet 142
Thermakraft White GP Tape Data Sheet 142
BRANZ Appraisal No.329 - Supercourse 500 Damp-Proof Course & Concealed Flashing 142
Supercourse 500 DPC Data Sheet 142
Supercourse 500 DPC Install Guide 142
CodeMark Product Certificate - Thermakraft Covertek 407 Synthetic Roof and Wall Underlay 142
BRANZ Appraisal No.651 - Thermakraft Covertek 407 Roof and Wall Underlay 142
Covertek 407 Data Sheet 142
Covertek 407 Install Guide 142
Thermakraft Product Warranty Statement 142
EXPOL Expanded Polystyrene and XPS Technical Guide 142
Velux FS Product Data Sheet 142
Velux FS Installation Instructions 142
Velux VSE Installation Instructions 142
Velux VSE Product Technical Datasheet 142

© Smartspec 2026

1 PRELIMINARIES & GENERAL

1.1 Establishment & Enabling

1.1.1 Site Establishment

1.1.1.1 Safety

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

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

1.1.1.2 Site Boundaries

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

1.1.1.3 Regulatory Authorities

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

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

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

1.1.1.4 Network Utility Operators

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

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

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

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

1.1.1.5 Existing Services

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

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

1.1.1.6 Permitted Access & Work Hours

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

1.1.1.7 Permitted Work Zone

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

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

1.1.1.8 Temporary Buildings & Site Amenities

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

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

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

1.1.1.9 Temporary Roads & Surfaces

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

1.1.1.10 Hoardings, Gantries, Lighting

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

1.1.1.11 Project Sign Board

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

1.1.1.12 Setting Out

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

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

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

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

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

1.1.2 Temporary Works & Services

1.1.2.1 General

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

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

1.1.2.2 Site Perimeter Fencing

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

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

1.1.2.3 Site Cleaning & Waste Management

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

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

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

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

1.1.2.4 Site Security

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

1.1.2.5 Dust & Noise Control

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

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

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

1.1.2.6 Stormwater & Sediment Control

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

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

1.1.2.7 Concrete & Cement Wash-Water Control

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

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

1.1.2.8 Construction Vibration

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

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

Vibration monitoring shall be carried out at the property boundary. Additional monitoring inside the neighbouring property shall be carried out where the vibration limits at the boundary exceed the permitted level or when complaints are received. Where access is

granted such additional monitoring shall be carried out either outside the building but connected to the building foundation or inside the building.

1.1.3 Protection of Existing Features

1.1.3.1 Survey Marks

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

1.1.3.2 Adjacent Sites

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

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

1.1.3.3 Explosives

The use of explosives in the contract works is prohibited.

2 SITEWORKS

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.

2.3 Site & Scope

2.3.1 Site

Note that no claims will be recognised on the grounds of insufficient description of existing site conditions in the Contract Documents.

2.3.2 Waahi Tapu

During excavation, should a waahi tapu or other cultural site be unearthed, cease excavation operations immediately, and inform the Contract Administrator. Inform the local Iwi, and inform Heritage New Zealand Pouhere Taonga and apply for an appropriate authority if required. Take appropriate action, following discussions with Heritage NZ Pouhere Taonga and Territorial Authority, and runanga/runaka/iwi if Maori, to remedy any damage and/or to restore the site.

Note; in accordance with the Heritage New Zealand Pouhere Taonga Act 2014, where an archaeological site is present (or uncovered), an authority from Heritage New Zealand is required if the site is to be modified in any way. An archaeological site is defined in the Heritage New Zealand Pouhere Taonga Act 2014 as any place in New Zealand (including buildings, structures or shipwrecks) that was associated with pre-1900 human activity, where there is evidence relating to the history of New Zealand that can be investigated using archaeological methods.

2.4 Excavation & Siteworks

2.4.1 Excavation

Excavation work shall be carried out in accordance with the WorkSafe NZ Excavation Code of Practice. Co-ordinate with other trades as to set-out and timing to ensure that all cut faces are covered or finished etc. as soon as possible after the excavation is complete.

Plan the excavation carefully to ensure that stockpiles will not interfere with concrete construction, to stockpile just sufficient material for the filling, backfilling and reshaping required later, and to avoid overlaying areas outside the works area with material.

As the bulk scope of excavations works will have been carried out prior to commencing work on site, advise and co-ordinate with the separate contractor to ensure that the main building platform is consistent with what is expected. If any concerns are raised please immediately advise the Architect for direction.

Cease machine excavation above final levels and trim to the finish profiles by hand where appropriate. Any over excavation in critical foundation, etc. areas made up with 10MPa concrete unless otherwise approved. Trim slab benches exactly to the required level to allow for hardfill and blinding.

Noisy excavation equipment shall be used only during hours which will avoid undue nuisance to the occupants of adjacent properties.

Excavate accurately in position and true to line and minimum sizes and to levels and grades required for all slabs, footings and foundations, and over the rest of the areas shown for levels adjustment.

Excavations down to firm undisturbed ground, and footings and foundations 200mm minimum into solid, except where shown otherwise.

Below slabs on ground the general intent is to excavate to a stable undisturbed subgrade (of 300 kPa ultimate bearing capacity).

Trim slab benches as required to allow for hardfill and blinding.

Batter all excavation cuts at a stable slope.

From the excavated material select the most appropriate material for compacted filling and stockpile it in appropriate positions sufficient for filling and backfilling (but NOT for hardfilling).

Remove all surplus material from the site as soon as it is excavated, taking care to avoid damaging the footpath or streets or spilling material on to them.

Remove individual boulders from the excavated material and stockpile them where noted for future landscaping use by others.

Keep excavations free of water - remove foundation trench material which becomes water-softened.

Ensure that rainwater runoff from excavated surfaces does not carry material onto adjacent properties.

Report for instruction when any unexpected voids, made-up ground or similar are encountered.

Report the finding of antiquities or other items of value, and leave them undisturbed until approval (and instruction) is given for their removal - they remain the property of the Principal.

As soon as excavation and filling is complete foundation material will be inspected by the Architect, and any changes to foundation widths/details will be directed.

2.4.2 Filling

Filling with salvaged material (of appropriate moisture content) shall be compacted in 150mm layers with mechanical rammers, to 95% relative compaction. All work generally in accordance with the provisions of NZS 4431.

On completion clean up the stockpile areas and the site.

2.4.3 Hardfill & Blinding

Providing the excavation is carried out as specified there will be no need for hardfill beneath the slabs on grade, and if the subsoils are clean sand as anticipated there will be no need for blinding under the polythene DPC.

2.4.4 Sealing Retaining Walls

The exterior of concrete blockwork walls shall be waterproofed with all aspects of the surface preparation and application exactly in accordance with the manufacturers recommendations.

(manufacturer & product info here)

2.4.5 Field Drains

Install 80mm diameter Novaflo field drain wrapped in Bidum filter fabric surrounded with free draining no fines metal for full height of backfilling.

2.4.6 Backfilling

Backfill with hardfill as specified above (or with approved clean salvaged site material of appropriate moisture content) compacted in 150mm layers with mechanical rammers to 90% relative compaction. Avoid any damage or displacement of the drainage layer during backfilling and compaction.

3 C O N C R E T E

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:

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

3.3 Materials

3.3.1 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.

3.3.2 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.

Unless otherwise indicated on structural documents, 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.

3.3.3 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.

3.4 Concrete

3.4.1 Scope

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

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

3.4.2 Requirements

3.4.2.1 Safety

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

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

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

3.4.2.2 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.

3.4.2.3 Materials & Workmanship

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

3.4.2.4 Producer Statement

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

3.4.3 Reinforcement

Refer to separate section Reinforcing Steel.

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

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

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

3.4.4 Formwork

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

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

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

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

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

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

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

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

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

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

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

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

3.4.5 Finishes

3.4.5.1 NZS 3114

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

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

3.4.5.2 Slab Finishes

Refer to the Schedule of Surface Finishes below for the finishes required unless specified otherwise in the contract documents.

Arrange the pouring to allow adequate time for floating and finishing.

Floating and any subsequent finishing shall be at the correct time to obtain the quality of compaction and finish required. No finishing work shall be carried out on any area where there is free surface water. The application of dry cement or sand to absorb free water is not permitted.

All trowelling ridges shall be removed while soft, or by subsequent light grinding. Slabs not fulfilling the standard of finish required shall be ground smooth or otherwise treated to the satisfaction of the Contract Administrator. Care shall be taken to avoid ridges where a newly poured slab meets existing edges.

3.4.6 Concrete

3.4.6.1 Concrete Tests & Non-Compliant Concrete

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

In addition to the tests required by NZS 3104, allow to take test cylinders on site at random for each pour of concrete, in accordance with NZS 3112.2: Clause 3. Make four standard cylinders for the first 25m³ of concrete placed, or part thereof and test in an approved laboratory. Make four standard cylinders for each subsequent 100m³ of concrete placed, or part thereof and test in an approved laboratory. Test results for breaking one cylinder at 7 days and the remaining three cylinders at 28 days shall be forwarded to the Contract Administrator on completion of the test together with details of where the concrete was placed in the structure.

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

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

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

3.4.7 Concreting

3.4.7.1 Handling, Placing & Compaction

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

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

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

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

3.4.7.2 Curing & Protection

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

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

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

3.4.7.3 Unfavourable Conditions

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

3.4.8 Construction Joints

3.4.8.1 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.

3.4.9 Penetrations and Detailing

Form all penetrations, rebates, fillets, nibs, upstands, and other detailing as shown on the drawings. Sleeves, conduits, pipes, cores or other penetrations shall not be cast in concrete unless they are indicated on the drawings. If not indicated, they must be approved by the Contract Administrator. All penetrations and concrete detailing shall be accurately positioned and formed at the time of pouring the concrete (without movement or displacement).

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

3.4.10 Building In

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

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

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

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

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

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

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

3.4.11 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.

3.4.12 On-Ground Floor Slabs

3.4.12.1 Concrete Floor Slab-on-Grade

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

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

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

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

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

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

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

3.4.12.2 Damp-Proof Membrane

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

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

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

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

3.4.12.3 Under-Slab Insulation

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

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

3.4.12.4 Shrinkage-Control Joints - Saw Cutting

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

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

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

3.4.13 Repair & Cleaning of Concrete

3.4.13.1 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.

4 BLOCKWORK

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:

3103:1991(NZS)	Specification for sands for mortars and plasters
3104:2003(NZS)	Specification for concrete production
3112.1:1986(NZS)	Methods of test for concrete - Tests relating to fresh concrete
3121:2015(NZS)	Water and aggregate for concrete
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
CCANZ CP 01:2011	Code of Practice for Weathertight Concrete and Concrete Masonry Construction
NZBC E2/AS3	Concrete and concrete masonry buildings

4.3 Concrete Blockwork

4.3.1 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.

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

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

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

4.3.2.2 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.

4.3.2.3 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.

4.3.2.4 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.

4.3.2.5 Temporary Bracing

Provide and maintain temporary support to block walls until the walls have been filled, the grout filling has cured, and the walls are adequately built into the final structure. Any damage resulting from failure or neglect to provide adequate support to concrete block walls during construction shall be repaired at the Blocklayer's expense.

4.3.2.6 Co-operation

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

Coordinate with 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.

4.3.2.7 Producer Statement

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

4.3.3 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.

4.3.4 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.

4.3.5 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.

4.3.6 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.

4.3.7 Block Laying

4.3.7.1 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.

4.3.7.2 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.

4.3.7.3 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.

4.3.7.4 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.

4.3.7.5 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.

4.3.7.6 Seismic Movement Joints

Maintain clearances to columns and other structural elements as shown on the drawings. Fill joints with approved compressible fire proofing material and sealant as specified and shown on the drawings.

4.3.8 Grout Filling

4.3.8.1 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.

5 WATERPROOFING

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:

3740:2010(AS)	Waterproofing of domestic wet areas
4858:2004(AS/NZS)	Wet area membranes
NZBC E3/AS1	Internal Moisture

5.3 ARDEX Liquid-Applied Waterproofing Membranes

5.3.1 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.

The following is a list and/or general description of the extent of ARDEX Liquid-Applied Waterproofing Membranes works, which are more specifically defined in the contract documents, required for the completion of the contract works:

5.3.2 Requirements

5.3.2.1 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.

5.3.2.2 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.

5.3.2.3 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.

5.3.2.4 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.

5.3.2.5 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.

5.3.2.6 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.

5.3.2.7 Flood Testing

Make all necessary provisions for, and carry out all necessary flood testing of ARDEX waterproofing membranes in accordance with the requirements of the ARDEX Warranty. Carry out any additional works required as a result of the flood testing.

5.3.3 Performance

5.3.3.1 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.

5.3.3.2 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.

5.3.4 Interior Undertile Membrane

5.3.4.1 ARDEX WPM 002

Interior Undertile Waterproofing Membrane - ARDEX WPM 002. A 2-part, fast drying, cementitious-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. ARDEX WPM 002 waterproofing membrane is suitable for continuously immersed tiling applications - refer to ARDEX Terchnical Bulletin - TB088 for swimming pool applications.

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.
- On plywood - wet-area grade only - interior use only.
- On particleboard - wet-area grade only - interior use only.

Limitations:
- Do NOT use ARDEX WPM 002 on substrates subject to negative hydrostatic pressure or rising damp, unless treated with ARDEX WPM 300.
- Do NOT allow ARDEX WPM 002 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 002 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 002 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 002 to achieve the required total dry film thickness - Floors, 1.2mm; Walls, 0.8mm - in accordance with ARDEX requirements.
- Reinforce ARDEX WPM 002 membrane between coats as necessary using ARDEX Deckweb fabric in accordance with ARDEX requirements.

Application Data (at +23° and 50% RH):
- Mixing Ratio: Part A + B = 1:1 by weight.
- Application Temperature Range: from +10°C to +35°C (surface temperature).
- Recoat Time: 1-2 hours.
- Ready to Tile: 16-24 hours after application, depending on humidity, surface temperature and porosity of substrate.
- Fully Cured: 3 days after application.
- Flood Test Time: at least 48 hours after application, and before tiling commences.
- Colour: Grey/green.

Apply ARDEX WPM 002 undertile waterproofing membrane to properly prepared substrates in strict accordance with the manufacturer's requirements.

Installed Location:

5.3.5 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.

5.3.6 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.

5.3.7 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.

5.3.8 Preparation

5.3.8.1 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.

5.3.8.2 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.

5.3.8.3 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.

5.3.8.4 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.

5.3.8.5 Compressed Fibre Cement Sheet

Compressed Fibre Cement Sheet - check all aspects of preparatory works, including but not limited to:
- Ensure the compressed fibre cement sheets have been correctly installed in accordance with the manufacturer's requirements.
- Check that all fibre cement sheet joints are flush and even, and that all fixings are countersunk and filled with a compatible filler.
- 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.

5.3.8.6 Concrete Masonry Walls

Concrete Masonry Walls - check all aspects of preparatory works, including but not limited to:
- Old or soiled blockwork must be thoroughly cleaned and washed and allowed to dry.
- Check that mortar joints have been struck flush with the concrete blocks and tooled tight.
- 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.

5.3.8.7 Insitu Concrete Walls

Insitu Concrete Walls - check all aspects of preparatory works, including but not limited to:
- New concrete must be allowed to cure for at least 28 days prior to surface priming and membrane application.
- Old or 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.
- 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 aggregate, sharp protrusions, hollows, etc., prior to priming and membrane application.
- Carry out all necessary substrate priming in accordance with ARDEX requirements.

5.3.9 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.

6 CARPENTRY

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:

1170.0:2002(AS/NZS)	Structural design actions - Part 0: General principles
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
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
NASH Standard	Residential and Low-rise Steel Framing - Part 1: Design Criteria
NZBC B2/AS1	Durability
NZBC C/AS2-AS6	Protection from Fire
NZBC F2	Hazardous Building Materials
NZBC G6	Airborne and Impact Sound
SNZ HB 3604:2011	Timber-framed buildings - Selected extracts from NZS 3604:2011

6.3 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.

6.4 Timber Framing

6.4.1 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.

6.4.2 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.

6.4.3 Timber Framing

6.4.3.1 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.

6.4.3.2 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.

6.4.3.3 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.

6.4.3.4 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.

6.4.3.5 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.

6.4.3.6 Timber Re-treatment

All cut or drilled surfaces of H4 and H5 treated timber framing shall be flood coat re-treated, with a suitable product recommended by the original treatment plant, before installation.

6.4.3.7 Edge Notching and Centre Holes

The notching, checking, and boring of framing members shall be in strict accordance with the requirements of NZS 3604.
Avoided checking and cutting where possible and keep to such dimensions so as not to prejudice the purpose for which the member is used. Keep edge notching to a minimum and where possible use centrally bored holes instead.
Concealed services pipes and wiring shall not project beyond the framing face and where possible shall be beyond the lining's fixing reach.

6.4.3.8 Framing Protection

Protect timber framing as required during installation against damage and moisture, and against significant variation of moisture content until ready for lining. Avoid ponding of water around floor plates.

6.4.3.9 Built-up Framing Members

Except for jack studs, bottom plates and top plates, framing members may be substituted with built-up members in accordance with the limitations of NZS 3604 2.4.4.7 with the prior approval of the Architect/Designer only.

6.4.4 Steel Fixings

6.4.4.1 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.

6.4.4.2 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.

6.4.4.3 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.

6.4.5 Sub Floor Framing

Unless specified or shown otherwise, bearers for 1.5 kPa floors (dry service) shall be sized in accordance with NZS 3604 Table 6.4(a).
Bearers shall be continuous over two or more spans and jointed over the centre of an ordinary pile or jack stud in accordance with NZS 3604 6.12.7.
Bearers laid so that any crook will straighten under load. Bearers shall have a minimum support bearing of 90mm, or 45mm when butt jointed.
Built-up bearers formed to the requirements of NZS 3604 6.12.3.

Unless specified or shown otherwise, bearers for 2 kPa floors (wet service) shall be sized in accordance with NZS 3604 Table 6.4(b).
Bearers shall be continuous over two or more spans and jointed over the centre of an ordinary pile or jack stud in accordance with NZS 3604 6.12.7.
Bearers laid so that any crook will straighten under load.
Bearers shall have a minimum support bearing of 90mm, or 45mm when butt jointed.
Built-up bearers formed to the requirements of NZS 3604 6.12.3.

Unless specified or shown otherwise, bearers for 3 kPa floors (dry service) shall be sized in accordance with NZS 3604 Table 14.4.
Bearers shall be continuous over two or more spans and jointed over the centre of an ordinary pile or jack stud in accordance with NZS 3604 6.12.7. Bearers laid so that any crook will straighten under load. Bearers shall have a minimum support bearing of 90mm, or 45mm when butt jointed.
Built-up bearers formed to the requirements of NZS 3604 6.12.3.

Bearers shall be fixed to ordinary concrete piles in accordance with NZS 3604 6.5.2.

Cantilevered bearer projections shall not extend beyond the face of the support (pile/jack stud) more than stated in NZS 6.12.4.

Wall plates shall be as shown on the drawings and fixed to the foundation walls with cast-in M12 bolts with 50mm x 3mm square washers at maximum 1400mm centres, and within 300mm from the plate ends, embedded minimum 75mm into the foundation wall.

Unless specified or shown otherwise, stringers for 3 kPa floors shall be to the dimensions and maximum fixing spacings given in NZS 3604 Table 14.7. Fixings shall be M12 bolts set 100mm minimum into the wall. Proprietary bolt systems shall have a minimum capacity of 4.5kN vertically, and 7.3kN parallel to the stringer.

6.4.6 Floor Framing

Non-loadbearing walls, with a bracing element, parallel to floor joists and not supported by a floor joist, shall be supported by minimum 90mm x 45mm solid blocking on-edge at maximum 1.2m centres and at each side of door openings.

Unless specified or shown otherwise cantilevered floor joists for 1.5 kPa floors shall to the dimensions and spacings given in NZS 3604 Table 7.2, and shall be lapped over the outermost support and fixed to the adjacent joist as required by NZS 3604 7.1.5.3(b).

Unless specified or shown otherwise cantilevered floor joists for 2 kPa floors shall to the dimensions and spacings given in NZS 3604 Table 7.2, and shall be lapped over the outermost support and fixed to the adjacent joist as required by NZS 3604 7.1.5.3(b).

6.4.7 Wall Framing

6.4.7.1 Plates

Top and bottom plates shall be to the dimensions and layout shown on the drawings. Unless specified or shown otherwise, top and bottom plates shall be fixed in accordance with NZS 3604 7.5.12 and Tables 8.18 and 8.19, true to line and level or angle.
Joints in top plates shall be made over a stud or over blocking between studs, and all top plate connections shall be in accordance with NZS 3604 8.7.3. Form all holes and edge notches in top and bottom plates in accordance with NZS 3604 8.7.5.

6.4.7.2 Studs

Studs shall be to the dimensions and spacings shown on the drawings, and installed true to line and plumb in both directions between top and bottom plates.
Unless noted otherwise, non-load bearing wall studs shall be to the spacings given in NZS 3604 Table 8.4, stud width as shown on the drawings.
Form all holes and edge notches in studs in accordance with NZS 3604 8.5.1.5. Do not notch, check, cut, or bore holes in the middle third of any trimming stud.
Should the need arise, studs shall be straightened in accordance with NZS 3604 8.5.3 with prior approval from the Architect/Designer only.

Unless noted otherwise, studs in loadbearing walls for 3 kPa floor loads shall be in accordance with NZS 3604 Table 14.10.

6.4.7.3 Lintels

Lintels shall be to the dimensions and locations shown on the drawings, and installed true to line and level, and shall be supported by a 45mm thick doubling stud or jack stud fixed to a trimming stud, and secured against uplift in accordance with NZS 3604 8.6.1.8 as required.
The thickness of a lintel may be made from two or more members, where each member is the length of the lintel, in accordance with NZS 3604 2.4.4.7.

6.4.7.4 Sill & Head Trimmers

Unless specified or shown otherwise, sill and head trimmers to openings shall be the same width as the wall stud and to the thickness given in NZS 3604 Table 8.15, and installed at the required opening height true to line and level, and supported by a 45mm thick doubling stud or jack stud fixed to a trimming stud.

6.4.7.5 Dwangs

Dwangs shall be the same width and thickness as the wall stud, and installed at the centres noted on the drawings, and accurately cut and fixed in place true to line and level and flush with stud edges. Dwangs fixed in accordance with NZS 3604 Table 8.19.

6.4.7.6 Ribbon Boards

Ribbon boards shall be as dimensioned and located on the drawings, and installed on edge and checked 25mm into studs at the required height, true to line and level, and fixed in place in accordance with NZS 3604 Table 8.19.

6.4.8 Posts

Timber posts shall be to the sizes and locations shown on the drawings, and installed true to line and plumb each way, and supported at the base by steel post brackets as detailed.

6.4.9 Roof Framing

6.4.9.1 Rafters

All rafters (including hip, valley and jack rafters) shall be to the dimensions, spacings, pitch, and layout shown on the drawings.
Rafters shall be aligned and paired at the required spacings to ridge boards, ridge beams, hip rafters and valley rafters, and as shown on the drawings, and installed parallel, true to line, pitch and plane, and fixed in accordance with NZS 3604 Table 10.1.
Any required jointing of rafters shall be made over supports shown on the drawings only.
Unless shown otherwise, rafter seating to top plates, beams, and lintels shall have a minimum bearing of 32mm without reducing the rafter depth to less than 65mm, or 80%, at the birds mouth.
Extend rafter ends to form eaves as detailed on the drawings and in accordance with NZS 3604 10.2.1.14.
Fly rafters and outriggers installed to form gable verges as detailed on the drawings and in accordance with NZS 10.2.1.15.3

6.4.9.2 Ridge Beams

Ridge beams shall be to the dimensions and locations shown on the drawings, and installed true to line and level.
Unless specified or shown otherwise, ridge beam ends shall be secured by and fixed to wall framing in accordance with NZS 3604 Table 10.2.

6.4.9.3 Rafters Seated onto a Ridge Beam

Unless shown otherwise, rafters seated over a ridge beam shall each have a minimum horizontal seating of 32mm without reducing the rafter depth to less than 65mm, or 80%, at the birds mouth.

6.4.9.4 Verandah Beams

Verandah beams shall be to the dimensions and locations shown on the drawing and installed true to line and level. Unless shown otherwise, all verandah beam jointing and connections to timber posts shall be in accordance with NZS 3604 Table 9.2.

Tie bracket brand name & type:

6.4.9.5 Valley Boards

Valley boards shall be sized to the dimensions and installed to the supporting framing as detailed on the drawings.

6.4.9.6 Ceiling Joists

Unless specified or shown otherwise, ceiling joists shall be to the dimensions and spacings given in NZS 3604 Table 10.3.
Ceiling joists shall be installed parallel true to line and plane, and shall be joined directly over framing supports and lapped minimum 300mm, or butted and flitched, in accordance with NZS 3604 10.2.1.6.5.
Do not support ceiling joists from a strutting beam.

6.4.9.7 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.

6.4.9.8 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.

6.4.9.9 Roof Bracing

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

6.4.10 Ceiling Framing

Ceiling framing shall be to the dimensions, layout, spacings, and details shown on the drawings, and shall be installed true to line, level and plane, and securely fixed in accordance with NZS 3604 Table 13.3.

Unless specified or shown otherwise, timber ceiling battens shall be to the dimensions and spacings shown on the drawings and in accordance with NZS 3604: Table 13.1, and shall be installed true to line, level and plane, and fixed to the underside of floor joists, rafters, ceiling joists or truss chords in accordance with NZS 3604: Table 13.3.

Ceiling battens shall be of Merchantable grade or better timber complying with NZS 3631.

6.5 Deck

6.5.1 Preparation

Ensure that all bolts, nails, screws and structural brackets as noted for use in the deck construction are appropriate for the Exposure Zone, timber treatment etc. Ensure that all cut or drilled surfaces of H4 and H5 treated timbers are flood coat re-treated, with the product recommended by the original treatment plant, before installation. All foundations taken down to firm undisturbed ground, concrete 20MPa, and with all aspects as specified in Concretor. Bearers spaced off adjacent supporting walls and fixed as detailed, and sill junction to adjacent access doors drained, flashed, sealed and finished as detailed.

6.5.2 Installation

Accurately set up, temporarily brace, and fix as noted or detailed all timber posts, beams, joists, braces, etc. as shown on the drawings, with all joints neatly fitted to ensure close contact over the full surface of the joint. Bolt holes 1mm larger than the bolt, and bolts re-tightened just prior to completion to remove any slack consequent on timber shrinkage. Very slightly arris timber edges where appropriate to avoid splintering, and cut any required rebates, grooves, etc. before erection.

6.5.3 Decking

Decking set out and fixed as noted, with butt joins staggered, slightly undercut, and drilled for nailing.

Steps down to adjacent ground, timber handrails (fully complying with NZBC-D1) and deck edge bench seats where drawn, shall all be exactly as detailed.

Where deck timbers are scheduled to be left natural keep them clean and ensure timber treatment marks are on the ends rather than timber faces.

6.6 Futurebuild LVL Engineered Framing

6.6.1 Scope

Supply and install the selected Futurebuild LVL products, complete with all accessories, to the floors, walls, roofs and other areas as identified on the drawings. All aspects of this work shall be in complete accordance with Futurebuild LVL's product installation guides, technical manuals software and specifications (check www.futurebuild.co.nz for the latest editions), and other relevant product manufacturer's recommendations, and as shown on the drawings.

No substitutions are permitted for Futurebuild LVL products.

6.6.2 Co-operation

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

6.6.3 Product

hySPAN, H1.2 treated.

6.6.4 Delivery & Handling

Check for damage upon delivery and reject damaged items. Handle and move Futurebuild LVL in accordance with the manufacturer's recommendations carefully using appropriate slings and strops to ensure safe handling and to prevent damage to the members. Store Futurebuild LVL under cover, away from damage, on level gluts, well clear of the ground. Keep dry and protect from damage until installation. Use personal protection equipment and tag lines as appropriate when handling at heights.

6.6.5 Workmanship

All installation work shall be carried out by experienced and competent tradesmen who are familiar with common building practice, NZS 3604 and the specified products and installation techniques.
Avoid damaging LVL products during installation, do not use damaged or faulty products and materials.

6.6.6 Treatment

Timber treatment shall be to the requirements of NZS 3602 and NZS 3604 as detailed in Acceptable Solution B2/AS1. Refer to the drawings for the locations of timber framing treatment classes.

6.6.7 Preparation

Check that all support framing is complete, true and plumb, is correctly fixed and secured, is to the design requirements, and as shown on the drawings. Make ready any temporary propping and bracing as required prior to installation.

6.6.8 Installation

Carefully lift into place without over stressing LVL members or connections. Fix members in place to the spacings, spans and seating details as shown on the drawings and to the manufacturer's design requirements. Accurately cut members for neat fitting, including appropriate tolerances, where Futurebuild LVL is to be cut to length. Do not cut truss chords without the manufacturer's specific approval. Where H1.2 treatment has been applied, resealing of Futurebuild LVL members is not required. Notching and holes in hyJOIST together with holes, ripping, chamfering and temporary support requirements of solid Futurebuild LVL sections shall be in strict accordance with the manufacturer's details or specific design requirements and associated project drawings. Ensure Futurebuild LVL members are installed true to line, plumb, evenly aligned and square. Complete all other integral and associated framing to the manufacturer's design requirements and as shown on the drawings for that section of work.

6.6.9 Protection

Reasonable effort should be made to protect Futurebuild LVL during construction in order to minimise swelling and distortion due to moisture uptake. Protection methods such as protecting edges and ends of Futurebuild LVL with strips of building paper can minimise uptake of moisture. Should Futurebuild LVL be exposed for long periods of time and take up external moisture, it is recommended that long spanning or heavily loaded members are temporarily propped until moisture content returns to below 15%. Alternatively designers can allow for higher creep deflections in their designs if there is reasonable potential for Futurebuild LVL to get wet during construction and propping is not an option.

6.6.10 Fixings

Check that all Futurebuild LVL items have been fixed correctly, that all seating and bearing supports have been completed correctly, and that all holes, notching and end cuts are in accordance with the manufacturer's requirements. Check members are true to line, plumb and aligned, and correct if necessary. Check that no damage has occurred to any member or fastening component and replace as necessary. Remove temporary propping at the scheduled time. Remove all waste from the site.

6.6.11 Completion

Check that all CHH Woodproducts LVL items have been fixed correctly, that all seating and bearing supports have been completed correctly, and that all holes, notching and end cuts are resealed to the manufacturer's requirements. Check members are true to line, plumb and aligned, and correct if necessary. Check that no damage has occurred to any member or fastening component and replace as necessary. Remove temporary propping at the scheduled time. Remove all waste from the site.

6.7 GIB® Plasterboard Linings

6.7.1 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.

6.7.2 Requirements

6.7.2.1 Safety

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

6.7.2.2 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.

6.7.2.3 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.

6.7.2.4 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.

6.7.2.5 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.

6.7.2.6 Producer Statement (other manufacturer's system)

Producer Statement PS1 - where required. Where GIB® Plasterboard Linings are installed as a component of another manufacturer's proprietary system, the system manufacturer shall furnish a completed Producer Statement PS1 (Design) as confirmation that the specified proprietary system as designed and documented complies with the relevant clauses of the New Zealand Building Code. The PS1 Producer Statement shall not serve as a product warranty or guarantee of compliance.

6.7.2.7 Substitution of GIB® Plasterboard Linings

GIB® plasterboard linings shall be as specified herein and as indicated on the approved drawings. The substitution of GIB® branded plasterboard linings and GIB® 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.

6.7.3 Performance

6.7.3.1 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.

6.7.4 GIB® Plasterboard Linings

6.7.4.1 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:

6.7.4.2 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:

6.7.4.3 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:

6.7.4.4 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:

6.7.5 Level of Finish

6.7.5.1 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.

6.7.5.2 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.

6.7.6 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.
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.

6.7.7 Workmanship

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

Installation 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.

6.7.8 Delivery & Handling

Store GIB® Plasterboard Linings indoors, in neat, flat stacks off the floor, in dry conditions and without any sagging or distortion, in accordance with the GIB® Site Guide. Keep plasterboard linings, compounds and accessories dry, out of direct sunlight, and protected from damage, moisture and contamination at all times.

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

Should a problem be encountered with any GIB® product during installation or delivery, immediately contact the GIB® Helpline on 0800 100 442. Do not continue to use the product that is not performing to specification or expectation. Keep samples of the product in question and where possible, document batch numbers and/or manufacturing dates.

Handle all products and materials in accordance with the manufacturer's requirements and relevant Product Data Sheets and GIB® Site Guide, and in a manner that prevents damage. Carry plasterboard sheets on edge, and avoid damage to sheet edges, ends, and surfaces.

Installers shall be familiar with and comply with the requirements of the GIB® Site Guide precautions for use, and use appropriate safety gear when handling materials.

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

6.7.9 Preparation

6.7.9.1 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.

6.7.9.2 Framing Check

Framing - check all aspects of preparatory works, including but not limited to:
- Check that the framing is straight and true to line, and is plumb/level and correctly aligned.
- Check that 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.

6.7.9.3 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.

6.7.10 Installation

6.7.10.1 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.

6.7.10.2 Standard Ceiling - Timber Ceiling Battens

GIB® Plasterboard Ceiling Linings - Standard Ceiling Fixing with Timber Ceiling Battens. Timber ceiling battens shall be 75 x 35mm thick and fixed in accordance with NZS 3604: Table 13.3. Refer to separate specification section Timber Framing.

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.

Timber ceiling batten spacings shall not exceed the spacings given in the GIB® Site Guide according to the specified plasterboard thickness - 600mm for 13mm or greater thickness, 450mm for 10mm thickness. Where a ceiling batten spacing given in NZS 3604: Table 13.1 is less than that stated in the GIB® Site Guide, the NZS 3604 spacing shall be achieved. Ceiling battens shall all run in the same direction within the ceiling area or between movement control joints. 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® High Thread 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.

6.7.10.3 Ceiling Diaphragms

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

6.7.10.4 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.

6.7.10.5 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.

6.7.11 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.

6.8 GIB® EzyBrace® Systems

6.8.1 Scope

Supply and install the specified GIB EzyBrace® Systems to the locations identified on the drawings, incorporating GIB® plasterboards and all system components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with the GIB EzyBrace® Systems publication, GIB EzyBrace® Bracing Software and the current GIB® Site Guide (check www.gib.co.nz, or call 0800 100 442 for the latest editions), BRANZ Appraisal No.928, other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for GIB EzyBrace® Systems, GIB® Plasterboard Linings, or GIB® System components and accessories.

This specification section must be read in conjunction with the GIB® Plasterboard Linings specification and relevant GIB® Systems specifications, and other specification sections, as they are interrelated.

6.8.2 Requirements

6.8.2.1 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.

6.8.2.2 Warranty

GIB® Product & System Warranty:
- 10 Years Warranty - for all GIB® Products and Systems installed, according to warranty conditions.
- Provide the GIB® Product & System Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of practical completion of the contract works.

Include with the warranty: a copy of the completed GIB® Installation Sign-Off sheet, and the GIB® Plasterboard Lining Systems Care and Maintenance bulletin.

6.8.2.3 Quality Assurance

Ensure that the installation and finishing of GIB EzyBrace® 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.

6.8.2.4 Inspection & Acceptance of GIB EzyBrace® Systems

Carry out all necessary pre-installation, installation and finishing inspections necessary for GIB EzyBrace® Systems for each area of work in accordance with the requirements of the GIB EzyBrace® Systems Manual, GIB® Site Guide, and BRANZ Appraisal No.928.

Complete the GIB® Site Guide Pre-Installation Checklist prior to installing GIB® plasterboard linings.

Complete the GIB® Interior Plasterer/Stopper Installation Sign-Off Certificate upon completion and before handover for subsequent decoration.

6.8.2.5 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 EzyBrace® System materials and/or work shall be repaired and/or replaced to the satisfaction of the Architect/Designer, without delay and at no additional cost to the Principal.

6.8.2.6 Producer Statement (other manufacturer's system)

Producer Statement PS1 - where required. Where GIB® plasterboard linings are installed as a component of another manufacturer's proprietary system, the system manufacturer shall furnish a completed Producer Statement PS1 (Design) as confirmation that the specified proprietary system as designed and documented complies with the relevant clauses of the New Zealand Building Code. The PS1 Producer Statement shall not serve as a product warranty or guarantee of compliance.

6.8.2.7 Substitution of GIB® Plasterboard Linings

GIB® plasterboard linings shall be as specified herein and as indicated on the approved drawings. The substitution of GIB® branded plasterboard linings and GIB EzyBrace® Systems components for alternative brands is not permitted under any circumstances.

The substitution of a specified GIB® plasterboard lining for an alternative GIB® plasterboard lining by the Contractor shall be in strict accordance with the requirements of the GIB EzyBrace® Systems Manual and GIB® Site Guide: 2.3 - Board Substitution Options. Such substitutions shall only be permitted with the Architect's/Designer's written authorisation, and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate alternative GIB® plasterboard linings to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

6.8.3 Performance

6.8.3.1 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.

GIB EzyBrace® Systems must NOT be used in showers or behind baths. GIB EzyBrace® Systems may be used in watersplash areas provided they are protected with an impervious finish in accordance with the requirements of NZBC E3/AS1, and the GIB Aqualine® Wet Area Systems publication.

6.8.3.2 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.

6.8.4 GIB EzyBrace® Systems - Timber Frame

6.8.4.1 GS1-N

GIB EzyBrace® System - GS1-N. A timber frame, external or internal wall bracing system incorporating one layer of any 10mm or 13mm GIB® Standard Plasterboard on one side. Refer to the GIB EzyBrace® Systems literature.

Installed Location:

6.8.4.2 GSP-H

GIB EzyBrace® System - GSP-H. A timber frame, external or internal wall bracing system incorporating one layer of any 10mm or 13mm GIB® Standard Plasterboard on one side, and one layer of minimum 7mm structural plywood on the other, and panel hold-down fixings with panel hold downs. Refer to the GIB EzyBrace® Systems literature.

Installed Location:

6.8.4.3 BL1-H

GIB EzyBrace® System - BL1-H. A timber frame, external or internal wall bracing system incorporating one layer of 10mm or 13mm GIB Braceline® on one side with panel hold downs. Refer to the GIB EzyBrace® Systems literature.

Installed Location:

6.8.5 Ceiling Diaphragms

6.8.5.1 Limitations

GIB® plasterboard ceiling diaphragms must be constructed in accordance with the requirements and within the limitations of the GIB EzyBrace® Systems Manual.

Openings are permitted within the middle third of the diaphragm's length and width. Opening dimensions (length or width) shall not exceed a third of the diaphragm width. Fix GIB® Plasterboard ceiling linings to opening trimmers at 150mm centres. Larger openings, or openings in other locations, require specific engineering design.

6.8.6 Components & Accessories

6.8.6.1 Components & Accessories

GIB EzyBrace® Systems components and accessories, including, but not limited to:
- GIB® Plasterboard Linings;
- GIB® Plasterboard Fasteners;
- Plywood Sheathing;
- GIB® HandiBrac® Panel Hold-down Bracket with Bowmac® Blue Head Screw Bolt;
- Galvanised Steel Strap Plate Connectors;
- Ceiling Diaphragm Ceiling Battens;
- GIB® Adhesives - GIBFix® One and/or GIBFix® All-Bond;
- GIB® Metal Trims & Paper Faced Trims;
- GIB® Plasterboard Control Joints;
- GIB® Joint and Finishing Compounds;
- GIB Soundseal® Acoustic Sealant;
- Fire Resistant Sealant.

Refer to the GIB EzyBrace® Systems literature and the GIB® Site Guide for further information.

6.8.7 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 EzyBrace® Systems to the required set-out and standard, and to ensure:
- appropriate tolerances and clearances allow for adjacent internal linings, fixtures, fittings, services, etc; and
- GIB® plasterboard linings correctly allow for proper door and window installation; and
- penetrations for building services are correctly handled to maintain sheet integrity and system performance.

6.8.8 Workmanship

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

Installation of GIB EzyBrace® Systems shall be carried out by experienced and competent tradespersons, who are familiar with the specified materials and installation techniques, in accordance with the manufacturer's installation requirements, and to fully comply with all warranty requirements. Submit evidence of experience on request, e.g. National Certificate of Interior Systems, or Certified Business Member of AWCINZ.

Carry out all necessary installation inspections in accordance with the GIB EzyBrace® Systems Manual and the GIB® Site Guide, and to fully comply with the manufacturer's warranty requirements as the works progress.

All cutting, jointing, fixing and sealing techniques shall be exactly as recommended by the manufacturer. All work shall be such as to leave a neat, efficient and robust installation, to the required standard, free from damage and defects.

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

On Completion:
- Check that GIB EzyBrace® Systems have been correctly installed and finished in accordance with the requirements of the GIB EzyBrace® Systems Manual and GIB® Site Guide, to the correct set-out, dimensions and details shown on the drawings.
- Check for any damage and defective work - repair or replace as necessary to the required standard.
- Ensure that inspection and assessment of the plasterboard Finish Level have been carried out, and that written agreement stating the completed jointing and finishing is acceptable for subsequent surface sealing and decoration has been provided.
- Ensure that the GIB® Installation Sign-Off Certificate has been completed and signed by the Interior Plasterer/Stopper.
- Leave all of this work complete and to the required standard in accordance with the manufacturer's warranty requirements, as shown on the drawings and the conditions of the Building Consent.
- Clean up thoroughly and leave the finished work and surrounding surfaces clean and free of contamination from compound splashes and sanding dust. Remove all associated rubbish and excess material from the site.
- Issue to the Owner a copy of the GIB® Plasterboard Lining Systems Care and Maintenance bulletin, and a copy of the GIB® Product and System Warranty.

6.8.9 Delivery & Handling

Store all GIB EzyBrace® Systems plasterboard linings and system components indoors, off the floor, on a flat, level surface in accordance with the manufacturer's requirements. Keep stored plasterboard linings and system accessories dry, out of direct sunlight, and protected from damage, moisture and contamination at all times.

Do not use damaged or defective materials and products, or products that are beyond the designated shelf life. Cracked or damaged GIB Aqualine® sheets must never be used.

Should a problem be encountered with any GIB® product during installation or delivery, immediately contact the GIB® Helpline on 0800 100 442. Do not continue to use the product that is not performing to specification or expectation. Keep samples of the product in question and where possible, document batch numbers and/or manufacturing dates.

Handle all materials in accordance with the manufacturer's requirements and relevant Product Data Sheets, and in a manner that prevents damage.

Installers shall be familiar with and comply with the manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials. Carry plasterboard sheets on edge, and avoid damage to sheet edges, ends, and surfaces.

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

6.8.10 Preparation

6.8.10.1 General

All framing shall be complete and ready for GIB® Ezybrace Systems and associated GIB® plasterboard linings installation.

Timber framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content 18% at the time of plasterboard lining installation.

Light structural steel framing shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. All light structural steel framing members shall satisfy the requirements of AS/NZS 1170. Comply with the steel framing fabricator's specifications and requirements for plasterboard installation.

Steel stud partitioning shall comply with AS 1397 and as specified and shown on the drawings. Comply with the manufacturer's specifications and requirements for plasterboard installation.

Concrete substrates shall comply with the CCANZ CP 01:2011 or with NZS 3109. New concrete must have aged for a minimum of 28 days. Ensure that concrete surfaces are within the tolerances specified.

Concrete masonry structures shall comply with NZS 4229, or with NZS 4230 and AS/NZS 1170 for specific design.

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.

6.8.10.2 Framing Check

Framing - check all aspects of preparatory works, including but not limited to:
- Check that the framing is straight and true to line, and is plumb/level and correctly aligned.
- Check that the framing is within the required deviation tolerances defined in AS/NZS 2589 according the specified Finish Level.
- Check that vertical and horizontal framing members are at the spacings shown on the drawings, and that any required battens or furring channels are installed to the required layout.
- Check that the framing has no projections due to structural and bracing bracketry, etc. Ensure that framing brackets, plates, braces, hold-downs, etc., are correctly installed.

6.9 Rosenfeld Kidson & Co Cedarscreen Weatherboard Systems

6.9.1 Scope

6.9.1.1 Cedarscreen Vertical Shiplap Weatherboard - 20mm Cavity

Supply and install the RK TIMBERS (Ex Rosenfeld Kidson) Cedarscreen Vertical Shiplap Weatherboard 20mm Cavity System, as specified herein, to the walls identified on the drawings, complete with all accessories and trim. All aspects of this work shall be in complete accordance with the Rosenfeld Kidson Cedarscreen product specifications and technical literature (check www.cedarscreen.co.nz for the latest editions), NZBC E2/AS1, other relevant product manufacturers' recommendations, and as shown on the drawings.

The Rosenfeld Kidson Cedarscreen Vertical Shiplap Weatherboard 20mm Cavity System is CodeMark assured: CodeMark Product Certificate No. CM70083, issued by Bureau Veritas Australia Pty Ltd.

No substitutions or deletions are permitted for the Rosenfeld Kidson Cedarscreen Vertical Shiplap Weatherboard 20mm Cavity System.

6.9.2 Timber Species

6.9.2.1 Western Red Cedar, Premium Clears No 1 – Vertical Shiplap Weatherboard

Rosenfeld Kidson Vertical Shiplap Weatherboard Premium Grade PC1 Clears shall be manufactured from sustainably sourced Canadian Western Red Cedar (*Thuja plicata)*. Producers carry SFI, CSA, FSC or PEFC Certifications.

Western Red Cedar used above ground complies with New Zealand Building Code Clause B2 Durability, Performance Requirement B2.3.1(b) and NZS 3602: Part 1:2003 Timber and Wood based products for use in Buildings.

6.9.3 Weatherboard Profile

6.9.3.1 RK55 Vertical Shiplap

RK55 Rosenfeld Kidson Vertical Shiplap Weatherboard: 110mm effective cover, 135mm wide x 18.5mm thick.

Installed Location:

6.9.4 Weatherboard Finish & Coating

6.9.4.1 Bandsawn Face - Dryden WoodOil Clear Finish - Western Red Cedar

Cedarscreen Western Red Cedar weatherboard profiles and timber mouldings shall be shall be manufactured with a Bandsawn Face (BSF) and supplied factory-coated with Dryden WoodOil applied to all faces and edges.

All site-cut ends, notches and holes in weatherboards and timber mouldings must be sealed with one coat of Dryden WoodOil

Following installation, Cedarscreen Western Red Cedar weatherboards and timber mouldings shall be coated with a finishing coat of Dryden WoodOil, applied to all exposed surfaces.

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

6.9.5 Cavity Battens

6.9.5.1 Timber Cavity Battens, 20mm Cavity - Vertical Weatherboard

Timber Cavity Battens (non-structural) to form a nominal 20mm deep drained cavity for vertical weatherboards.

Horizontal Battens: Rosenfeld Kidson CS-H 20x45mm, H3.1 treated Radiata pine, bevelled and castellated cavity battens, incorporating 25mm wide x 6mm deep rebates alternating at 75mm centres either side of the batten.

Installed horizontally, with batten edges sloping down and away from the framing, at maximum 400 - 480mm vertical centres, to the layout and details shown on the drawings and in accordance with Cedarscreen installation requirements.

NOTE:

- CS-H 20 Horizontal Cavity Battens require additional dwang support.

Vertical Battens: Rosenfeld Kidson CS-V 20x45mm & CS-V 20x75, H3.1 treated Radiata pine cavity battens.

Installed vertically to form a cavity at window jambs and at internal and external corners as per the layout and details shown on the drawings and in accordance with Cedarscreen installation requirements.

Fixing to Timber Framing:

- **CS-H 20**: Position castellated cavity battens to timber framing using 40 x 2.5mm hot-dip galvanised flat head nails. Final fixing of battens by cladding fixings through to wall framing.
- **CS-V 20:** Position cavity battens to timber framing with 40 x 2.5mm hot-dipped galvanised flat head nails. Final fixing of battens by cladding fixings through to wall framing.

6.9.6 Flashings

6.9.6.1 Flashings - Aluminium, 20mm Cavity, Mill Finish, Low-Very High Wind Zone

Flashings manufactured from Grade 5005 H32 aluminium, 0.70mm thick, and formed to suit the details indicated on the design drawings and in accordance with the Cedarscreen Installation Manual. Flashing materials shall comply with the requirements of NZBC E2/AS1 Tables 20, 21 and 22.

Mill Finish to allow for powder coating with Dulux Duratec Powder coating.

Colour & Location:

Standard concealed and exposed flashings include:

- RKFL-09 65mm x 65mm internal/external corner flashing

- RKFL-11 23.5mm J Mould

- RKFL-12 20mm Cavity Closure

- RKFL-17 33mm J Mould

- RKFL-31 18mm External Corner Flashing

- RKFL-34 28mm External Corner Flashing

- RKFL-35 18mm External Corner Flashing

- RKFL-36 28mm External Corner Flashing

- RKFL-40 Vertical Joint Flashing

6.9.7 Timber Mouldings

6.9.7.1 RK97 External Timber Moulding

Rosenfeld Kidson & Co Timber Moulding - RK97 : 45 x 45mm External Timber Moulding. Supplied by Rosenfeld Kidson & Co, and selected to match the specified cladding material. Installed to the locations and details shown on the approved drawings in accordance with the applicable Cedarscreen Weatherboard Cladding Manual(s)

6.9.8 Co-operation

6.9.8.1 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 Cedarscreen Weatherboard Cladding System technical manuals and approved construction drawings.

Refer www.cedarscreen.co.nz or contact Rosenfeld Kidson & Co on 09 573 0503 (North Island) or 03 349 3316 (South Island) for any technical assistance required, and ensure that current Cedarscreen technical literature is referenced and followed when installing Cedarscreen weatherboards.

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

6.9.9 Workmanship

6.9.9.1 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner (LBP). On completion of the installation, the installing LBP shall complete and sign a Restricted Building Work (RBW) memorandum, and shall issue a copy to the Building Consent Authority and 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 applicable Cedarscreen Weatherboard Cladding Manual(s) 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.

6.9.10 Delivery & Handling

6.9.10.1 Delivery and Handling

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

Store Cedarscreen weatherboards and accessories undercover, flat and true, clear of the ground by at least 100mm and supported on dry and clean timber in accordance with Rosenfeld Kidson & Co recommendations. Keep stored weatherboards and accessories dry and protected from damage and contamination.

Do not use damaged or defective weatherboards or accessories. Should a problem be encountered with any Rosenfeld Kidson & Co product, immediately contact Rosenfeld Kidson & Co on 09 573 0503 (North Island) or 03 349 3316 (South Island). 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 details.

Handle weatherboards in accordance with the manufacturer's recommendations and in a manner that prevents damage and 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 Best practice guidelines for working at height in NZ, and the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

6.9.11 Preparation

6.9.11.1 Cavity Fix over Flexible Underlay - 20mm Cavity, Vertical Weatherboard

Cedarscreen Shiplap Weatherboard Cladding - installed over bevelled and castellated Cavity Batten profiles with a Flexible Wall Underlay as required by E2/AS1 Table 23 over Timber framing - check all aspects of preparatory works, including, but not limited to:

- Check that the timber wall framing complies with NZS 3604, has studs at maximum 600mm centres and nogs/dwangs at maximum 480mm centres for vertical cladding, is plumb and in true alignment, includes all blocking required for cavity battens and fixing at openings, joints, corners, soffits, etc., and has a maximum moisture content of 18% at the time of cladding installation.
- Check that the flexible wall underlay, as specified, 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 to the wrap 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.

6.9.12 Installation

6.9.12.1 Cladding General

Install Cedarscreen Weatherboard Cladding, complete with all system components and accessories required for proper installation and performance, in accordance with the appropriate Cedarscreen Cladding System 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 Cedarscreen technical literature is readily available on site for reference during installation. Where there is any doubt, contact Rosenfeld Kidson & Co on 09 573 0503 (North Island), 03 349 3316 (South Island) or visit www.cedarscreen.co.nz

Ensure that all site-cuts to weatherboards and timber mouldings are properly sealed with Dryden WoodOil accordance with WoodOil application requirements

Refer to Fixing clause for fixing type and placement etc.

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

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 and Cedarscreen technical resources.

- Start the fixing process from either an internal or external corner.

- The layout of the vertical shiplap weatherboards should be configured against the prevailing wind.

- Establish an accurate measurement between the starting corner and finishing point, working out an even board set out taking into account all associated junctions, including window jambs.

- Ensure full width boards are allowed for trimming into window jamb to head Junctions.

- Jamb to head and sill junctions – ensure weatherboards are full width and continuous in length.

- Ensure vertical weatherboards are continuous in length between inter storey heights (maximum height 2 storey).

- Check weatherboard length spread and use appropriately to suit each cladding face.

6.9.13 Fixing

6.9.13.1 Fixing - Vertical Weatherboard, Stainless Steel

Fix Cedarscreen Weatherboards with Rose Head, Annular Grooved, Grade 316 Stainless Steel Nails in accordance with Cedarscreen fixing requirements and as shown on the design drawings. Nail fixings shall be hand-driven, and placed so as to be accurately aligned without deviation along vertical, plumb lines.

Fixing to Timber Framing over 20mm Packer Cavity Battens (non-structural):
- Flexible Underlay - Fix to timber framing using minimum 75 x 3.15mm nails.
- Rigid Underlay - Fix to timber framing using minimum 85 x 3.15mm nails

- The nail length must allow minimum 35mm penetration into into timber framing. Cavity Battens are fixed by the cladding fixings to wall framing members.

Fixing to 45mm Structural Cavity Battens:
- minimum 60 x 3.15mm nails
- The nail length must allow minimum 35mm penetration into the structural cavity batten.

All nail fixings shall be pre-drilled slightly smaller than the nail gauge. Do not brad weatherboards prior to face nailing.

Single fix rusticated weatherboards at every fixing point, located 35-40mm up from the bottom or lapped edge of the weatherboard, and no closer than 20mm from the end of the board.

Ensure the weatherboards are set-out with an overlap of 25mm, with a 2mm expansion gap between boards at the overlap.

Set rose head nails flush onto the board surface - not into or below the surface.

Fix Timber Mouldings using 40-50mm x 2.8mm, Grade 316 Stainless Steel, Annular Grooved, Rose Head Nails.

6.9.14 Completion

6.9.14.1 Completion

Check that the CedarscrenWeatherboard Cladding system has been correctly installed and fixed to the layout and details shown on the drawings and in accordance with the requirements of the applicable Cedarscreen Cladding Manual(s)
Check that all joints, associated trim and accessories are correct, that junctions with other materials and elements are sealed, and the weatherboard 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 Cedarscreen requirements and NZBC E2/AS1.

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 Cedarscreen Cladding System Quality Assurance Check List. Issue a copy of the RBW document to the Building Consent Authority and to the Main Contractor.

Issue to the Owner a copy of the Cedarscreen Cladding maintenance requirements.

6.10 Thermakraft Underlay, DPM, DPC & Tapes

6.10.1 Scope

Supply and install Thermakraft Underlays and Membranes, as specified herein, to the locations identified on the drawings, complete with all accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with Thermakraft Ltd technical information and installation requirements (check www.thermakraft.co.nz, or call 0800 806 595 for the latest editions), other relevant product manufacturers' recommendations, and as shown on the design drawings.

No substitutions are permitted for the specified products from Thermakraft Ltd.

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

6.10.2 Requirements

6.10.2.1 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.

6.10.2.2 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.

6.10.2.3 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.

6.10.3 Damp-Proof Membrane

Thermathene Black (250µm). A 250 micron thick (0.25mm), tear resistant, recycled polyethylene film sheet concrete underlay. Coloured black.

Installed over nominal 10mm (max. 25mm) thick compacted sand blinding layer, over a properly prepared base course, as a moisture vapour barrier under concrete slabs on-ground (prior to concreting), in accordance with the manufacturer's requirements and as shown on the drawings (Install Guide).

Thermathene Black must be laid in a continuous manner with all laps minimum 150mm, and penetrations to be taped with Thermakraft White General Purpose Tape. Tape-seal around penetrations. Inspect immediately before pouring concrete and repair any holes or other damage.

Installed Location:

6.10.4 Damp-Proof Course

Supercourse 500 DPC. A 0.75mm thick, high-impact, single-layer Polyethylene film, embossed on both sides. Available in 50mm 75mm, 90mm, 100mm, 150mm, 200mm, 250mm, 300mm, and 500mm roll widths. Supercourse 500 DPC is suitable for use as a separation barrier between most incompatible and dissimilar materials.

Used as a general damp proof course (DPC) for separating timber and wood-based products and metal from concrete, masonry, brick, and stone surfaces, and as a moisture barrier (Install Guide).

Also used as a concealed flashing behind brick veneer cladding in accordance with NZS 4229 and NZBC E2/AS1.

Installed in accordance with the manufacturer's requirements, BRANZ Appraisal No.329, and as shown on the drawings.

6.10.5 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:

6.10.6 Roof Underlay

Covertek 407. A self-supporting, fire-retardant, absorbent, breathable, synthetic non-woven polyolefin underlay.

Can only be used in lined applications. Section E2 of the NZBC defines a lining as "the rigid sheet covering for a wall, ceiling or other interior surface." Must not be used in unlined buildings such as unlined garages, sheds, soffits or canopies.

Covertek 407 is CodeMark assured with the NZ Building Code: CodeMark Certificate of Conformity No:CM30028-RevI, issued by Global-Mark Pty Ltd.

Installed as a roof underlay over timber or steel roof framing in accordance with the manufacturer's requirements and BRANZ Appraisal No.651.

Covertek 407 roof underlay can be used directly under direct-fixed roof claddings, or directly under roof cavity battens or tile battens in accordance with Thermakraft requirements.

Covertek 407 roof underlay must installed in a manner that prevents ponding of water. Refer to Covertek 407 Installation guide for underlay support requirements. Support requirements are dependent upon pitch, purlin spacing and installation direction of underlay.

Do not leave Covertek 407 exposed on roofs for more than a total of 7 days before covering.

Installed Location:

6.10.7 Window Flashing Tape

6.10.7.1 Aluband Bituminous Adhesive Flexible Window Flashing Tape

Aluband Window Flashing Tape. A polymeric faced, bituminous modified, self-adhesive tape with a release backing paper. Must be used in conjunction with the Thermakraft Corner Moulds, and when used with the declared Kingspan Thermakraft flexible underlays is part of the Thermakraft OneWrap System.

Aluband Window Flashing Tape is part of the Thermakraft ONE WRAP System - a total building wrap solution.

Aluband Window Flashing Tape is suitable for use on timber or steel framed buildings, in conjunction with a compatible flexible underlay, around framed joinery openings as a secondary weather barrier, in NZS 3604 Wind Zones up to and including 'Extra High'.

Aluband Window Flashing Tape can be used on the sill and lintel of framed joinery openings, and to seal flashing upstands to a flexible underlay.

Physical Properties:
- Thickness: 0.65mm.
- Installation temperature range: minimum 5°C; maximum 30°C.
- Maximum UV exposure: 42 days.
- Tape width: Available in 75mm, 150mm, and 200mm wide rolls.

The width of Aluband Window Flashing Tapes used shall be selected to suit the depth of framed openings and Thermakraft installation requirements.

Installed in accordance with the requirements of the Thermakraft Aluband Application & Installation Guide and BRANZ Appraisal No.878, to the locations and details shown on the drawings.

Compatible with all Thermakraft building underlays. Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in well ventilated area. Recommended minimum 7 days.

Thermakraft Corner Moulds MUST be used at flashing corners (see installation guide).

Do not leave Aluband Window Flashing Tape exposed to weather and UV light for more than 42 days after installation.

Flashing Tape Size:
Installed Location:

6.10.8 Underlay Penetration Seals

6.10.8.1 OneSeal - Multi-fit pipe and cable penetration seals

Thermakraft OneSeal, multi-fit pipe and cable penetration seals. A range of pipe and service penetration seals consisting of soft, flexible EPDM membrane with a self-adhesive flange.

OneSeal multi-fit pipe and cable penetration seals are part of the Thermakraft ONE WRAP System - a total building wrap solution, and are a patented airtight solution for round or rectangular pipes, cables or conduits when passing through underlay barriers.

Pipe Seals
Four pre-notched rings for pipes sized from 15mm to 110mm diameter.

Cable Seals
1 x conduit – 55mm to 80mm diameter;
OR
2 x cables – 10mm to 22mm diameter; and
4 x cables – 7mm to 10mm diameter.
Installed in accordance with the manufacturer's requirements and BRANZ Appraisal No.942, with stand-alone flexible wall underlay over timber or steel wall framed walls on buildings situated in NZS 3604 Wind Zones up to and including 'Very High'.

Installed in accordance with the manufacturer's requirements and BRANZ Appraisal No.942, with flexible wall underlay used over a rigid wall underlay on buildings situated in NZS 3604 Wind Zones up to and including 'Extra High'.

6.10.9 Co-operation

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

Coordinate with other trades to install Thermakraft Underlays, DPMs, and DPCs as required.

6.10.10 Workmanship

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

All installation work shall be carried out by experienced and competent tradespersons, familiar with the specified products and installation techniques, in accordance with the manufacturer's requirements, and to fully comply with all warranty requirements.

All cutting, joining, and fixing techniques shall be exactly as recommended by the manufacturer, and carried out with the use of suitable tools and equipment appropriate for the application. All work shall be such as to leave a neat, efficient, and weathertight installation.

6.10.11 Delivery & Handling

Store underlay rolls on end, undercover, on a flat, clean and dry surface. Keep stored materials dry, out of direct sunlight, and protected from damage and contamination at all times.

Handle materials in accordance with the manufacturer's requirements and in a manner that prevents damage to or deterioration of the product.

Do not used damaged or defective materials, or products that are beyond their designated shelf life.

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

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry, as well as the Best practice guidelines for working on roofs for roofing installations.

6.10.12 Preparation

6.10.12.1 General

Prior to installation, carry out all necessary inspections and preparatory work required, and ensure that all preliminary works by other trades has been completed to specification and as shown on the approved drawings.

Do not commence installation until all necessary preliminary works by others is complete and to the required standard. The commencement of work shall be deemed to indicate full acceptance by the installer that all preliminary works by other trades is complete.

Supporting timber framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content of 20% at the time of cladding installation. Allow LOSP treated timber to sufficiently flash-off before installing Thermakraft building underlays and foils.

Supporting light structural steel framing shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. Comply with the light structural steel framing fabricator's specifications and requirements for fixing cladding and roofing components.

Supporting heavy steel structures shall comply with NZS 3404.

6.10.12.2 Under-Slab Basecourse

Under-Slab Basecourse - prior to laying under-slab DPM, check all aspects of preparatory works, including but not limited to:
- Check that the under-slab basecourse has been correctly laid and compacted as specified.
- Check that the surface has been properly prepared and compacted to the required standard, and is smooth and flat.
- Ensure any sand blinding is free of aggregate, sharp protrusions.
- Ensure the final surface is free of hollows and ponded water prior to laying the DPM.

6.10.12.3 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.

6.10.12.4 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.

6.10.13 Installation - Wall Underlay

6.10.13.1 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.

6.10.13.2 Aluband Window Flashing Tape

Install Aluband Window Flashing Tape in accordance with the manufacturer's requirements, to the locations and details shown on the approved drawings.

Window Sills:
- Fit Thermakraft Corner Moulded Piece to the bottom corners of the opening.
- Cut Aluband Window Flashing Tape to the length of the sill trimmer plus an additional 400mm.
- Apply the tape over the underlay along the sill trimmer, with the back edge flush with the inside edge of the framing, and returned minimum 200mm up both trimming studs.
- Fold the tape minimum 50mm over the face of the underlay on the outside of the opening.
- Press the tape firmly in place over the underlay to ensure a continuous weathertight seal is maintained.

Window & Door Lintels:
- Install Aluband Window Flashing Tape to the top corners of framed window and door openings, over the underlay and 200mm along the lintel and 200mm down the trimming stud, with the back edge flush with the inside edge of the framing.
- Fold the tape minimum 50mm over the face of the underlay on the outside of the opening.
- Press firmly in place over the underlay to ensure a weathertight seal.
- Apply a 100mm strip of Aluband Window Flashing Tape at 45° over the taped outside face of each corner.

Avoid joining Aluband Window Flashing Tape. Where necessary, form joins with minimum 100mm overlap, keep any required joining to an absolute minimum.

Do not over-stretch tape during installation, and ensure adequate adhesion and weathertightness is maintained against the underlay.

Do not leave Aluband Window Flashing Tape exposed to weather and UV light for more than 42 days after installation - replace with new window flashing tape if 42 day's exposure is exceeded.

6.10.14 Installation - Roof Underlay

6.10.14.1 Covertek 407 - synthetic roof underlay

Covertek 407 synthetic roof underlay shall be installed without support on roofs with slopes 10° or greater (unless specified otherwise), run horizontally across the roof slope and over the purlins, starting from the gutter/lowest point up to the ridge/highest point, extending maximum 20mm into gutters, with minimum 150mm side and end laps, lapped such that any water will be shed to the outside of the underlay, and sufficiently tensioned without sagging.

Fix at maximum 300mm centres to purlins, with 8-12mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary grippers.

For tiled roofs, lay Covertek 407 underlay over the anti-ponding board and rafters/trusses, and fix at maximum 300mm centres to the rafters/trusses before the tile battens are installed.

Can only be used in lined applications

Finish Covertek 407 underlay along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Carefully cut underlay at roof openings at 45º angle away from each corner and lap-tape closed to framed up-stands, ducts and other services penetrating the underlay in accordance with Thermakraft requirements and as detailed. Leave underlay minimum 50mm distance clear of the outer liner of flue stacks.

6.10.15 Completion

Check that all underlays have been installed correctly and are properly supported, and that all underlay edges, joins and ends are correctly finished prior to closing off with claddings - all in accordance with Thermakraft installation requirements.

Check installed membranes and underlays for defective work and damage - replace and/or repair as necessary to the required standard.

Leave all of this work complete, and free of defects, and to the required standard in accordance with the manufacturer's warranty requirements.

Issue to the Owner a copy of the Thermakraft maintenance requirements and the Thermakraft product warranties for the installed products.

6.11 James Hardie Eaves & Soffits

6.11.1 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.

6.11.2 Eaves & Soffit Lining

Hardie™ Flex Sheet 6mm. 6mm 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.

6.11.3 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.

6.11.4 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.

6.11.5 Flexible Sealant

Flexible silicone sealant to be SIKA AT Facade. 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.

6.11.6 Adhesive Sealant

Polyurethane adhesive sealant to be SIKA Sikaflex 11FC. Use to adhere the sheets to the framing in accordance with the sealant manufacturer’s recommendations and to James Hardie requirements. Ensure sealant compatibility with jointing and texture finishes.

6.11.7 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.

6.11.8 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.

6.11.9 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.

Hardie™ Flex Sheet joints to be formed as express joints with backing strip.

6.11.10 Fixings

Fix Hardie™ Flex Sheet 6mm sheets with Grade 304 stainless steel screws in accordance with James Hardie requirements.

6.11.11 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, 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.

6.12 Workmanship & Materials

6.12.1 Workmanship

6.12.1.1 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.

6.12.1.2 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.

6.12.1.3 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.

6.12.1.4 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.

6.12.1.5 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.

6.12.1.6 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.

6.12.2 Timber

6.12.2.1 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.

6.12.2.2 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.

6.12.2.3 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.

6.12.3 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.

6.12.4 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.

6.12.5 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.

6.12.6 Fixings

6.12.6.1 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.

6.12.6.2 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.

6.12.6.3 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.

6.12.6.4 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.

6.12.6.5 Powder Fastening Systems

Powder powered fasteners are not permitted for fastening structural timber framing unless specifically noted on the drawings. All applications are subject to specific approval.

6.12.6.6 Adhesives

Aliphatic PVA for dry timber applications - all other adhesives for timber jointing are subject to specific approval or as specified.
Check surfaces are in appropriate condition to receive adhesive, and that adhesives are used strictly in accordance with the manufacturer's instructions. Clamp adhesive-jointed timber connections and check alignment of members before the adhesive has set.

6.12.7 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.

6.12.8 Sealants

6.12.8.1 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.

6.12.9 Exterior Finishing Trim

Fascias and barges ex.150x40mm, painted radiata. All exterior trim handled as for interior trim.

6.12.10 Garage Door

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

6.12.11 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:

Wardrobe, laundry, linen cupboards, passage cupboards, wineroom, boxroom, drying room and stores, shelves cupboards and other fit-out items as shown and noted on the drawings.

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 built-in, domestic solid fuel firebox, as specified, to the location and details shown on the drawings, complete with flue system and all necessary incidentals and accessories for proper installation. Installation shall be exactly in accordance with manufacturer's recommendations, AS/NZS 2918, and as shown on the drawings.

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.

Supply and install proprietary skylights and or daylighting systems, as specified and/or scheduled, to the locations and details shown on the drawings. Installation shall be exactly in accordance with the manufacturer's requirements and as shown on the drawings.
Skylight penetrations in the roof shall be carefully formed, accurately sized and trimmed, with the roof underlay neatly cut, folded and dressed, and the roof cladding fully supported, fixed and correctly flashed around the skylight in accordance with the roof cladding manufacturer's requirements.
Form any required upstand to the dimensions as detailed, and finish and flash the roof cladding and underlay around the upstand to the details shown on the drawings.
Form and trim ceiling openings, and line and finish the skylight void sides to the required opening size and as detailed. Reinstate any roof/ceiling insulation around the installed opening without voids or gaps.

Take delivery of the following Principal Supplied Items, install them in complete accordance with their manufacturer's instructions to the locations shown on the drawings, and protect them from damage and contamination until Practical Completion:

7 ROOFING

7.1 Preliminary

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

7.2 Compliance

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

Comply with all relevant provisions and recommendations of:

1170.0:2002 SUPP1(AS/NZS)	Structural design actions - General principles - Commentary
1170.2:2011(AS/NZS)	Structural design actions - Wind actions
2295:2006(NZS)	Pliable, permeable building underlays
2728:2013(AS|NZS)	Prefinished/prepainted sheet metal products for interior/exterior building applications - Performance requirements
3604:2011(NZS)	Timber-framed buildings
4200.1:2017(AS|NZS)	Pliable building membranes and underlays - Part 1: Materials
NZBC F2	Hazardous Building Materials
NZBC G12	Water Supplies
NZMRM Code of Practice	NZ Metal Roof and Wall Cladding Code of Practice - Version 3.0

7.3 Metalcraft Roofing Rainwater & Fascia Systems

7.3.1 Scope

Supply and install the selected Metalcraft Rainwater & Fascia Systems to the roofs identified on the drawings complete with all accessories. All aspects of this work shall be in complete accordance with Metalcraft Rainwater & Fascia Systems guides and technical manuals, (check 0800 766 369 for the latest editions), and other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for Metalcraft Rainwater & Fascia Systems products.

7.3.2 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works, including membranes, wraps, framing, claddings and trims, and any other related works, are completed to specification and as shown on the drawings.
Coordinate with trades the locations of pipes, outlets, cables, meter boards and other fittings installed by others.

7.3.3 Material

Steel - 0.55mm BMT.

7.3.4 Product

Colorsteel Endura.

7.3.5 Spouting Profile

Box Gutter 125mm.

7.3.6 Fascia Profile

Metalline Fascia 185.

7.3.7 Downpipe Profile

Round Downpipe. Round downpipe diameters shall be to the Metalcraft range as noted on the drawings, and manufactured from the material specified.

7.3.8 Preparation

Check all aspects of preparatory works, including but not limited to:-

Check that the timber framing complies with NZS 3604, is in true alignment and includes all blocking required for joints, corners and soffits etc., and has a maximum moisture content of 24% at the time of Metalcraft Rainwater & Fascia Systems installation.

Check that all preparatory materials are lapped such that any water will run down to the exterior.

7.3.9 Installation

7.3.9.1 Workmanship

All installation work shall be carried out by experienced and competent tradesmen who are familiar with the techniques and materials specified. All handling and fixing techniques, and all jointing and sealing materials and techniques, shall be exactly as recommended by Metalcraft Roofing.
Handle spouting and fascia without scratching, distorting or damaging.

Protect the coated surface from damage at all times; replace the whole section where a significant depth of the coating has been damaged. Completely clean off all drill and power saw swarf as the work proceeds.

Screw fixings shall be in accordance with Metalcraft Roofing requirements and as noted on the drawings, and of a compatible material and finish with the fascia, spouting, and spouting brackets. Exposed screws should be factory prepainted for an accurate colour match. Support brackets fixed in accordance with Metalcraft Roofing recommendations.

7.3.9.2 Fascia

Install Metalline Fascia 185 panels, complete with joints and corners, in accordance with Metalcraft recommendations and as noted and detailed on the drawings.

7.3.9.3 Spouting

Screw fix spouting brackets, true to line, at maximum 900mm centres and to falls as shown on the drawings. Form spouting joints and downpipe droppers in strict accordance with Metalcraft recommendations. Locate downpipe droppers to the set-out shown on the drawings.

7.3.9.4 Downpipes

Downpipes and spreaders setout and installed complete with bends as shown on the drawings. All joints lapped and sealed to Metalcraft recommendations. Screw fix down pipes plumb to walls with matching support brackets. Direct downpipes into stormwater system as noted on the drawings.

7.3.9.5 Completion

Clean up thoroughly and remove debris and unused material from site.
Issue to the Main Contractor a copy of the Metalcraft Roofing Rainwater Systems maintenance requirements together with the Metalcraft Roofing Rainwater Systems Warranty for the completed works.

7.4 Membrane Roofing

7.4.1 Scope

Supply and install the specified Waterproof Membrane Roofing System, complete with all components and accessories, to the locations shown on the drawings. All aspects of this work shall be in strict accordance with the manufacturer's technical guidelines, installation specifications and details, other relevant product manufacturers' recommendations, and as shown on the drawings.

The following is a list and a general description of the extent of Membrane Roofing work, which are more specifically defined in the contract documents, required for the completion of the contract works.

7.4.2 Membrane Roofing System

7.4.2.1 Butyl Rubber Membrane Roofing System

Single layer flexible synthetic rubber waterproofing membrane, installed (adhesive fixed) as a waterproof membrane roofing system on properly prepared substrates in accordance with the manufacturer's requirements and as shown on the drawings.

Manufacturer, brand name & type: 1.5mm Viking Enviroclad
Colour: Grey
Location: Refer roof plan

7.4.3 Co-operation

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

7.4.4 Workmanship

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

All installation work shall be carried out by experienced contractors, authorised by the manufacturer, familiar with the specified products and installation techniques, to fully comply with all of the manufacturer's warranty requirements in accordance with the manufacturer's installation requirements and as noted and detailed on the drawings.

7.4.5 Delivery & Handling

Store products off the ground on a flat surface undercover, keep materials dry and out of direct sunlight, and protect from damage. Do not use damaged or faulty products, or products beyond the designated shelf life. Handle materials and products in accordance with the manufacturer's recommendations.

7.4.6 Preparation

Ensure that the roof substrates have a minimum fall of 1:30 (and any internal gutters 1:100, preferably 1:60, including allowing for possible deflection and/or settlement), that overflows are provided where the roof drains to an internal gutter, and that penetration flashings and edge upstands are carried above the overflow level (to allow for a drainage blockage). Check that crack control and movement joints are incorporated at the locations shown on the drawings and are constructed as recommended by the membrane manufacturer. Ensure the substrates are clean and free of oil grease etc., and are smooth (with any defects filled to an even surface).

Check that the plywood has been laid with staggered joints, and is supported on framing at maximum 400mm centres, that the plywood is 17mm minimum thickness, is CD grade (C face up), is H3 CCA treated (LOSP treated plywood must NOT be used), is installed and fixed exactly to the Ply manufacturer's and Nuralite recommendations, and complies with E2/AS1 8.5.3 and 8.5.5.
20 x 20 mm H3 fillet deck/wall junctions, and 5mm radius chamfer external edges at turn-downs. Ensure the maximum moisture content is 20%, and that the plywood is surface dry at the time of membrane application.

7.4.7 Batten Detail

Tapered Profiled Roof Battens.
Ex 100 x 50mm with tapered edges as detailed, H3.2 treated timber roof battens, installed to the layout and centres shown on the drawings, fixed with hot-dip galvanized countersunk self-drilling screws in accordance with the system requirements.
Ensure that the roofing membranes are correctly dressed and layered over the battens and that any required membrane saddle flashing is installed.

7.4.8 Primer

Apply the membrane roofing primer to properly prepared substrates for optimum membrane adhesion in accordance with the manufacturer's requirements. Limit priming to no more than can be covered by the membrane in one working day or as recommended by the manufacturer, and allow the primer to properly dry before installing the membrane. Protect the primed surface from contamination until membrane installation.

Manufacturer, brand name & type:

7.4.9 Adhesive

Apply the membrane roofing adhesive to the primed substrate at the recommended application rate to achieve proper membrane bonding, and to membrane joints and folds as necessary, in accordance with the manufacturer's requirements.

Manufacturer, brand name & type:

7.4.10 Ventilators

Install the roof space ventilators as specified to the locations shown on the drawings in accordance with the manufacturer's requirements and as detailed. Ensure the ventilators are correctly flashed when installing the roofing membrane system.

Manufacturer, brand name & type:
Size/dimensions:

7.4.11 Installation

7.4.11.1 Butyl Rubber Membrane System

Install the butyl rubber membrane roofing system, including all surface priming, membrane application, jointing, flashing and sealing, etc., and all system supplied fillets and metal edge trims, roof vents and gutter outlets etc., in strict accordance with the manufacturer's installation requirements and details, and as shown on the drawings.

Prepare all substrate sheet joints with a system approved pressure sensitive tape.
Unroll the membrane on to the substrate and allow it to relax for at least 20 minutes prior to installation. Do not lay membrane sheets under tension.
Commence membrane installation at sumps and proceed through gutters to the main roof installing the membrane up the roof slope from the lowest edge. Sheets generally laid in two stages along the sheet length.
Apply adhesive to the substrate and to the underside of the first half of the membrane sheet, leave to tack dry, then fold the sheet along its length over the adhesive, thoroughly roll to remove entrapped air and to achieve full bonding, repeat the process to fix the other half of the sheet along its length. Joints overlapped 50mm and adhesive sealed watertight, or pre-primed and sealed watertight with proprietary lap tape, in accordance with the manufacturer's requirements. Joints neatly finished straight and parallel.
Use neatly cut strips of membrane for gutters and upstands etc., and install system supplied preformed corners, metal edge trims, flanged drains, outlets, and vents etc., as required and/or specified to complete the installation.
Finish any control joints located on the drawings to the manufacturer's requirements.
Consult the manufacturer regarding any detail where a standard system detail does not exist.
Protect installed membrane as required, avoid puncturing or damaging the membrane during installation; repair or replace as necessary.

7.4.12 Completion

Check that the membrane roofing system has been installed correctly, and that all system accessories are correctly installed and finished. Check for damage and repair or replace as necessary.
If reasonably possible, flood test box gutters and low-fall decks with a minimum 40mm water depth for 24 hours, carry out any additional works necessary as a result of the testing.
Leave the completed membrane roofing system leak free and watertight. Completely clean the works area and remove all rubbish and waste material from the site.

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

7.5 Metalcraft Longrun Roofing

7.5.1 Scope

Supply and install Metalcraft Longrun Roofing, as specified herein, to the locations and details shown on the design drawings, complete with all necessary components and accessories required for proper installation and performance. All aspects of this work shall comply with the NZ Building Code, related Metalcraft Longrun Roofing technical literature and publications (check http://www.metalcraftgroup.co.nz or call (0800) 766 369 for the latest editions), and other relevant product manufacturers' recommendations.

No substitutions are permitted for Metalcraft Longrun Roofing.

For the purpose of this specification, Metalcraft Longrun Roofing is referred to as 'Longrun Roofing', and all 'Metalcraft' associated technical literature and publications, including the 'Metalcraft Product Technical Statement', installation instructions and drawings, are collectively referred to as the 'technical literature'.

Extent of work:

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

7.5.2 Requirements

7.5.2.1 Rainwater Run-off used as Potable Water:

Roofing for collecting potable water will be to the requirements of NZBC G12/AS1.

7.5.2.2 Safety:

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

7.5.2.3 Warranty:

Warranty for Manufacturer or Supplier:

- 15 years minimum for coatings

Commence the warranty from the date of installation.

Warranty - Installer/ Applicator:

Warrant this work under normal environmental and use conditions against weatherproofing failure.

Workmanship – Refer to Supplier.

7.5.2.4 Substitutions:

The Metalcraft Longrun Roofing shall be as specified herein and on the design drawings. The substitution of the Metalcraft Longrun Roofing for an alternative brand is not permitted under any circumstances.

The substitution of the specified Metalcraft Longrun roofing or ancillary component for an alternative Metalcraft Longrun Roofing system or ancillary component by the Contractor shall only be permitted with the Contract Administrator's written authorisation and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate an alternative Metalcraft Longrun Roofing or ancillary component to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

7.5.2.5 Samples:

As required, provide samples of the specified Metalcraft Longrun Roofing for verification by the Contract Administrator.

7.5.2.6 Producer statement (PS3):

The Metalcraft Longrun Roofing installer shall furnish a fully completed PS3 Producer Statement (Construction) at time of application for Code Compliance Certificate. The Producer Statement shall accurately reflect the scope of the installation of the Metalcraft Longrun Roofing in accordance with the consented drawings and specifications.

7.5.2.7 Inspections & reporting:

Inspections shall take place at each of the stages as scheduled in the building consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

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

Complete all necessary pre-installation checklists prior to installation, and all necessary installation checklists.

Complete all necessary final checklists and installation sign-off certificates before handing over completed work.

7.5.2.8 Quality assurance:

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

7.5.2.9 Defective materials & workmanship:

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected Metalcraft Longrun Roofing materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator without delay and at no additional cost to the Principal.

7.5.3 Profile

Metalcraft - Metrib 760 roof sheet - symmetrical, trapezodial profile, 32mm rib height and 875mm effective cover based on the selected BMT.

Material type - Refer to ‘Roof Sheet Material’ clause.
Thickness - 0.40mm BMT (G550), 0.55mm BMT (G550)
Windload – Refer to 'technical literature'
Mass (KG/M2)- Refer to ‘Metalcraft’
Minimum pitch - 3 degrees. Check product literature for max runs, 2 degrees if over 40m

- Sheets shall be continuous from ridge to gutter, or where a step is designed into the roof, sheets shall be continuous from ridge to step and step to gutter.
- Sheet ends must be stop-ended under flashings.

Installed in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

7.5.4 Roof Sheet Material

Galvsteel® to selected BMT. Hot-dipped coated steel coil manufactured to ISO 5660 Part 1 and Part 2.

7.5.5 Roof Ancillary Components & Accessories

Fit and lap roofing underlay over the netting/mesh or use a self-supporting underlay. Lay underlay horizontally or vertically with a 150mm side lap, over-sailing the spouting and/or gutters by 10mm, in accordance with 'technical literature'.

Non self-supporting underlay must be supported by hexagonal wire mesh, safety mesh or alternative support, as specified and/or as shown on the approved drawings, in accordance with the roofing underlay manufacturer's recommendations.

Underlay shall be installed in a manner so that it is sufficiently tensioned without sagging, overhangs fascia boards 20mm - 25mm, and finished along roof edges, ridges, valley gutters, roof/wall junctions and at penetrations to the details shown on the drawings.

Underlayment for fully-supported roofing shall be in accordance with NZMRM Code of Practice.

Separate roof underlay from chimneys and flues in accordance with the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 7.5.9.

Cladding screw fastener type and durability shall comply with AS 3566 Class 4 or Class 5, as appropriate, and be no less than the durability of the material being fixed. Fastener type and placement (frequency) shall be appropriate for the environmental conditions and the specified cladding profile and material and the supporting structure material; all in accordance with the NZMRM Code of Practice and E2 External Moisture.

COLORSTEEL Altimate® must be installed with CL 4% screw with 30mm minimum embedment. Screws must be installed through a clearance hole. All fasteners to be fitted with a bonded sealing washer.

Metal Flashings. Profiled metal cladding flashings shall be fabricated from material with the same coating as the cladding material, to maintain durability and compatibility requirements. Flashings shall be 0.55BMT G300 steel or H34 Aluminium coated to the same standards as the profiled cladding sheets, and notched/scribed when installed across the cladding profile or provided with a soft edge – in accordance with selected roof sheet material and NZMRM Code of Practice requirements.

Flashings, flashing fastenings and fastening frequency shall be in accordance with the NZMRM Code of Practice.

Do not construct flashing joints and flashing junctions in a manner that relies entirely on sealant to maintain weathertightness.

Rivet Fastenings. Rivets shall be sealed aluminium minimum 4mm diameter.

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

Proprietary Collar Flashings. EDPM or silicone-polymer proprietary flexible collar flashings for weatherproofing cladding-penetrating pipes/flues/ducts. Sized to suit the applicable pipe/flue/duct and installed in strict accordance with the manufacturer's requirements and the NZMRM Code of Practice.

Profiled Foam Closure Strip. Non-bituminous, compressible, closed-cell foam strips profiled to fit the specified cladding profile. Installed to the details shown on the drawings and in accordance with selected roof sheet material and NZMRM Code of Practice recommendations.

7.5.6 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 with other trades, as required, on the assembly and installation of the Metalcraft Longrun Roofing to the required layout, details and tolerances.

7.5.7 Qualifications & Workmanship

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

All installation work shall be carried out by experienced and competent tradespersons, familiar with the specified products and installation techniques and suitably qualified to install Metalcraft Longrun Roofing, to fully comply with all warranty requirements in accordance with the manufacturer's requirements.

Installers of COLORSTEEL Maxam® shall be supervised by an accredited COLORSTEEL Maxam® installer.

All cutting, fixing and installation techniques, fastenings and sealants shall be exactly as recommended by and in accordance with the NZMRM Code of Practice, and carried out with the use of suitable tools and equipment appropriate for the application.

Always maintain isolation of dissimilar materials in accordance with the NZMRM Code of Practice Section 4.10. Isolate dissimilar materials (metal and non-metal) in close proximity as necessary by fitting separator strips. Place isolators between metals and treated timber or cement-based materials. Do not allow unpainted lead-sheet or copper materials to come in contact with, or allow water run-off from these onto Zincalume or galvanised materials.

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

7.5.8 Delivery & Handling

Store Metalcraft Longrun Roofing, flashings and accessories clear of level ground, on bearers at evenly spaced centres as recommended by the NZMRM Code of Practice. Keep stored materials and accessories dry and protected from damage and contamination at all times.

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

Handle materials in accordance with the manufacturer's requirements and in a manner that prevents damage to or deterioration of the material, including surface marking.

7.5.9 Preparation

Prior to installation, carry out all necessary inspections and preparatory work required, and ensure that all preliminary works by other trades have been completed to specification and as shown on the approved drawings.

Do not commence installation until all necessary preliminary works by others are complete and to the required standard. The commencement of work shall be deemed to indicate full acceptance by the installer that all preliminary works by other trades are complete.

Supporting timber structures shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content in accordance with the requirements of NZS 3602 at the time of installation.

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

Supporting heavy steel structures shall comply with NZS 3404 and the NZ Building Code.

Roof Structure - check all aspects of preparatory works, including but not limited to:

- Check that the purlins are installed to the required set-out and spacings, are straight and true to line and plane, and are securely fixed.
- Check that all barge and fascia boards have been installed to the correct line and plane with all edge blocking complete and secure.
- Check that valley gutter and hidden gutter framing is to the required dimensions with solid backing supports securely fixed, true to line and plane.
- Check that internal gutter membrane linings are properly dressed back and adhered to a solid substrate along the roof edge as shown on the design drawings.
- Check that all trimming for roof penetrations, all roof/wall junction blocking, and all necessary work by other trades are complete.
- Check that solid backing required for fully supported roofing is complete and securely fixed in accordance with the design drawings.

7.5.10 Installation

Installers shall be familiar with and comply with the manufacturer's safe handling requirements and precautions for use and shall use appropriate safety gear when handling materials. Installers shall conform with all relevant WorkSafe NZ Guidelines Working at Heights.

Prevent contact with, or run-off from, incompatible materials in accordance with the recommendations in the NZMRM Code of Practice.

Protect the finished surface from damage at all times; replace the whole sheet where a significant depth of the finish has been damaged (including flashings).

Accurately set-out the planned cladding layout prior to fixing to ensure true and accurate cladding lines and incorporate correct relationships with other design features shown on the drawings; maintain this accurate set-out throughout installation.

Keep cladding lines consistent and true along the roof; with side-laps of sheets to be straight, true and accurately aligned up and down. Check for and eliminate any creep and/or spread of sheets during installation.

Cut metal cladding and flashings by shear only - do not use abrasive cutting tools. Do not use black lead pencils for marking pre-finished metal cladding and flashings.

All cladding jointing techniques and sealants shall be in accordance with the NZMRM Code of Practice and shall be compatible with the cladding material and finish. Joints shall be sealed with an approved neutral-cure sealant or approved closed-cell lap tape.

Install fasteners in a straight line with a consistent fastening pattern on each sheet in accordance with 'technical literature' requirements. Fasteners are to be set using a snug fitting socket and a setting tool that does not unduly damage the finish coating of the screw. Depth of setting is to be sufficient to achieve slight compression of the sealing washer without distorting the profile or the sealing washer itself.

Aluminium rivets are to be sealed type minimum 4mm diameter. Clip-fastened sheets shall be fixed with concealed proprietary fastening clips appropriate for the cladding profile and material, substrate/structure and the environment in accordance with the NZMRM Code of Practice recommendations.

Install flashings as detailed on the drawings and in accordance with the Zealand Metal Roofing Code of Practice. All flashings shall be neatly formed and finished, securely fastened to the structure, weatherproof, and lapped such that any water will run down to the exterior. For highly visible flashings, plan each flashing joint and/or junction with specific regard to aesthetic requirements. Penetration flashings shall be as per the design details and shall not rely solely on silicone sealant to achieve weathertightness of the flashing.

Handle sheets carefully to avoid scratching and denting. Do not walk on cladding sheets prior to installation. Remove strippable film, if applied, immediately after installation of roof cladding to avoid resin staining. Ensure sealant is trapped between joint surfaces and not exposed to the visual surface.

7.5.11 Compatibility

Ensure material is isolated from incompatible materials. It must not be in contact with, or receive run off from, less noble metals such as copper, brass and lead. It should not be in wet contact with stainless steel. Sustained wet contact with timber, either treated or untreated, must be avoided.

7.5.12 Completion

Check that the Metalcraft Longrun Roofing and associated components and flashings have been installed and finished correctly. Check for defective work, damage and surface marking - replace and/or repair as necessary. Ensure that the work of other trades does not reduce the clearances of the cladding to ground, deck or roof that are required by the NZ Building Code.

Leave all work complete and weathertight and to the required standard in accordance with the New Zealand Metal Roofing Code of Practice.

Leave the completed works and surrounding surfaces clean and free of debris and rubbish. Remove all rubbish and excess material from the site.

Maintenance should be carried out in accordance with Metalcraft maintenance requirements.

8 WINDOW & DOOR JOINERY

8.1 Preliminary

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

8.2 Compliance

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

Comply with all relevant provisions and recommendations of:

1170.2:2011(AS/NZS)	Structural design actions - Wind actions
1734:1997(AS/NZS)	Aluminium and aluminium alloys - Flat sheets, coiled sheet and plate
1866:1997(AS/NZS)	Aluminium and aluminium alloys - Extruded rod, bar, solid and hollow shapes
3604:2011(NZS)	Timber-framed buildings
4211:2008(NZS)	Specification for performance of windows
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4303:1990(NZS)	Ventilation for acceptable indoor air quality
4680:2006(AS/NZS)	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
NZBC B1	Guidance on Barrier Design
NZBC B1/VM1	Structure
NZBC B2/AS1	Durability
NZBC E2/VM1	External Moisture
NZBC F2	Hazardous Building Materials
NZBC F4	Safety from Falling
NZBC G4/AS1	Ventilation
NZBC H1	Energy Efficiency

8.3 APL Residential Aluminium Windows & Doors

8.3.1 Scope

8.3.1.1 APL Aluminium Window & Door Systems

APL Aluminium Window & Door Systems
Supply and install the specified Aluminium Windows and Doors from APL- Window Solutions to the locations and details shown on the drawings; complete with all components (flashings, support mechanisms, brackets, etc) where required, for proper installation and operation; and commissioned to the required performance and functionality. All aspects of this work shall be in strict accordance with the manufacturer's technical literature and installation requirements (check www.aplnz.co.nz, call 07 849 8888, or email techinfo@aplnz.co.nz for the latest editions), other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for the specified Aluminium Windows and Doors from APL - Window Solutions

8.3.2 Warranty

Warranty APL - Window Solutions Materials & Workmanship Warranty:
- 12 Years Warranty on Materials – AGP® Insulated glass units (Warrant glass under normal environmental and use conditions against failure of materials).
- 5 Years Warranty on Materials and Workmanship - for all APL window and door products.
- 2 Years Warranty on Materials and Workmanship – for all mirror glass and hardware.
- Provide the Materials & Workmanship Warranty on the Manufacturer's Standard Warranty Form.
- Commence the warranty from the date of practical completion of the contract works.

View the "Care and Maintenance for Windows and Doors". Terms and Conditions are here www.AGPL.co.nz

8.3.3 Requirements

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

Shop Drawings
Prepare and submit to the Main Contractor for verification and approval prior to the commencement of works, Shop Drawings describing the general arrangement and connection to the building envelope of the specified window & door systems.

These shall include, but not be limited to:
- Design calculations - where required;
- Dimensioned elevations of all aluminium joinery elements (typical scale = 1:50; minimum scale = 1:100);
- Complete details of the installation construction, connections and all support systems (typical scale = 1:2; minimum scale = 1:5);
- Sealant types and backing rods, etc;
- Provision for movement, thermal, wind load and/or seismic - where required;
- Coordination requirements/issues with other works and trades - where applicable;
- A schedule of materials, finishes, componentry, fittings, fixings and fastenings - where required.

Producer Statement PS1
If required, as a component of the consent process APL can provide a "Letter of Intended Design" outlining the evidence used in the selection of the specified window and door systems. Upon request, the successful tenderer/manufacturer shall furnish a completed Producer Statement PS1 (Design) as confirmation that the specified window and door systems complies with the relevant clauses of the New Zealand Building Code. To ensure accuracy, the PS1 Producer Statement will be prepared as a part of the shop drawing process but will not serve as a product warranty or guarantee of compliance.

8.3.4 Performance Criteria - Wind Zone - Durability

General Performance - Wind Zone: High
The specified APL Aluminium Window and Door Systems shall comply with the requirements of NZS 4211 for all relevant clauses.

Wind Load - Non-Specific Design Wind Zone Classification. The specified APL Aluminium Window and Door Systems joinery installation is located in a NZS 3604 Wind Zone: H - High; with a maximum pressure of 0.97kPa SLS and 1.36kPa ULS.

Durability - Exposure Zone B: Low
Durability. The specified APL Aluminium Window and Door Systems joinery installation is located in a NZS 3604 Exposure Zone B: Low - within an inland area with little risk from wind-blown sea-spray salt deposits.

ISO 9223 Category: C2 Low: Characterised by no obvious marine influences. Typically, more than 1000 metres from the exposed coasts or more than 500 metres from industrial emissions.

All aspects of the specified APL Aluminium Window and Door System, including surface finishing and hardware, shall meet the durability requirements for the given Exposure Zone in accordance with NZBC B2.

8.3.5 APL Aluminium Joinery Range

Residential Series ThermalHEART
'Residential Series ThermalHEART' Windows and Doors, fully glazed, finished, and complete with hardware and other specified components - all as specified in the following clauses. Manufactured and installed in accordance with the manufacturer's requirements to the locations, configurations and details shown on the drawings and schedules.

Metro Series ThermalHEART
'Metro Series ThermalHEART' Windows and Doors, fully glazed, finished, and complete with hardware and other specified components - all as specified in the following clauses. Manufactured and installed in accordance with the manufacturer's requirements to the locations, configurations and details shown on the drawings and schedules.

APL Architectural Series ThermalHEART®
APL Architectural Series ThermalHEART® Suitable for window and doors in large formats and exposed locations, including Extra High and SED applications. Frames designed with 114mm & 171mm option. Flush sill sliding door and window options. Dual colour availability. Windows and Doors, fully glazed, finished, and complete with hardware and other specified components - all as specified in the following clauses. Manufactured and installed in accordance with the manufacturer's requirements to the locations, configurations and details shown on the drawings and schedules.

8.3.6 Roof Windows

Overhead Glazing System - Sloped Overhead Glazing Bar System
Sloped overhead glazing shall be manufactured from APL-branded Sloped Overhead Glazing Bar System components with rafter bars/mullions fixed to the supporting structure. Sloped glazing bar systems shall be fixed, static assemblies.
Specification:
- Commercial Series
-Maximum Glass Thickness: 15mm Single Glazed 24mm Double Glazed
- Rafter Bars, Mullions, Ridge Sections, Angles, Brackets, Rails: with guidance from APL Span Tables, shall be selected by the manufacturer for compliance.

- Glass: Single glazed or double glazed; complying with NZS 4223.1, NZS4223.3 & NZS4223.4 Refer to Glazing and Glass clauses.
- Finish: Refer to Aluminium Finish clause.
- Thermal Values: Consult APL Technical Department
- Performance: Consult APL Technical Department

Refer to the Window & Door Schedule drawings for specific requirements of individual elements.
Manufactured and installed in accordance with the manufacturer's requirements to the locations, configurations and details shown on the drawings and schedules.

8.3.7 Entrance Door

Plasma Entrance Door Range
Entrance doors shall be from the APL 'Plasma' Entrance Door range. Refer to Entrance Door Style clause for the Plasma Entrance Door model/configuration number(s) and details. Installed in accordance with the manufacturer's requirements to the locations, configurations and details shown on the drawings and schedules.
Dimensions:
Sheet and glass clad panels 3600mm x 1500mm wide, depending on wind load - Pivots essential over 960mm wide
Maximum Glass Thickness: 22mm double glazing as standard

8.3.8 Jamb Liner

Paint-Quality Timber - 25mm thick, Architrave - H3.1 Treated
Paint-quality Timber Jamb Liners - for Planted Architraves. Manufactured from 25mm thick, dressing-grade, finger-jointed or clear Radiata pine complying with NZS 3602, H3.1 treated. Mitred corner joints; factory pre-primed on all faces.
Jamb liners shall be straight and true and free of warp or distortion. The depth of the jamb liners shall be sized to suit the wall construction thickness as shown on the drawings. Edges shall be square dressed, without a lining groove, to suit planted architraves. Except where indicated otherwise on the drawings and schedules, jamb liners shall be fitted to the head, jambs and sill of each aluminium joinery element.

8.3.9 Flashings & Support Bars

Aluminium Head Flashings
Aluminium Head Flashings shall be selected from the APL range of extruded aluminium flashings, suitably sized to suit the claddings and construction types in accordance with NZBC E2/AS1 and shown on the drawings; and finished and colour-matched with the aluminium windows and doors. All aluminium joinery flashings shall be supplied and installed by the APL aluminium joinery manufacturer.

Aluminium Sill Support Bar - Cavity Construction
Aluminium Sill Support Bar for Installations in Drained Cavity Construction. Extruded aluminium sill support bar, with built-in drainage and ventilation, for continuous support to the window or door unit. Mill finish aluminium. Sill support bars shall be used and installed in accordance with the requirements of NZBC E2/AS1, and comply with BRANZ Evaluation Method EM6, and be sized to suit the cladding thickness and weight of the window or door.

Support Angles
Support Angles. Where required support angles shall be provided. Either extruded aluminium or galvanised mild steel, used to support window and door frames. Support angle sizes, fixing and installation requirements as shown on the drawings.

Custom Flashings
Supply and install custom flashings as required and as shown and described on the approved drawings and herein. Special flashings shall be formed to suit the details shown and the application.

Special Flashings (except where otherwise specified on the drawings):
- Material & thickness:
- Finish:

8.3.10 Hardware Range

Urbo™ Hardware
APL aluminium window and door hardware and furniture shall be selected from the Urbo™ Hardware range. Manufactured from die-cast zinc and powder coated to the specified colour. Supplied and installed by the APL aluminium joinery manufacturer to the windows and doors as indicated on the drawings and schedules.
Powder coat colour:

8.3.11 Co-operation Workmanship & Delivery

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

Coordinate with other trades to establish exact sizes for all aluminium window and door frames; and to ensure that each element correctly allows for the installation and finishing of exterior claddings and interior linings and any specific detailing shown on the drawings; and generally, to install all APL aluminium windows, doors and accessories as required.

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

Aluminium window and door joinery fabrication, assembly and installation work shall be carried out by experienced and competent tradespersons, authorised to manufacture and install APL - Window Solutions aluminium windows and doors, under controlled supervision and procedures, to fully comply with all warranty requirements and in accordance with the manufacturer's requirements.

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

All fabrication and assembly processes and techniques, materials and accessories shall be exactly as recommended by the manufacturer and shall be carried out using suitable machinery, tools and equipment, in a factory workshop.

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

Leave aluminium joinery and glazing clean and free from damage and defects of any kind.

Delivery & Handling
Aluminium joinery frames shall be braced and restrained as necessary for transportation and delivery to site. All surfaces, including glass, shall be appropriately protected from marking and damage during manufacture, delivery and installation.

Inspect all aluminium joinery units upon delivery and reject any damaged or defective items. Contact the manufacturer for replacement of rejected items at time of delivery to site. Do not use or install damaged or defective materials, products and joinery elements.

Store aluminium windows, doors and accessories undercover, off the floor, on a flat, even and level surface as recommended by the manufacturer and in a manner that prevents any frame distortion and surface damage and deterioration. Keep stored aluminium joinery dry and protected from damage, moisture and contamination at all times.

Handle aluminium joinery units and accessories in accordance with the manufacturer's requirements and in a manner that prevents distortion to joinery frames and any damage to the elements - including surface marking. Retain manufacturer's protective coverings for as long as possible, and remove them upon completion.

Installers shall be familiar with and comply with the manufacturer's safe handling requirements and precautions for use, and shall use appropriate safety gear and equipment during all stages of manufacture and installation.

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the Best practice guidelines for working at height in NZ, and the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

8.3.12 Preparation

General
Prior to installation, carry out all necessary inspections and preparatory work required, and ensure that all preliminary works by other trades has been completed to specification and as shown on the drawings.
Do not commence installation until all necessary preliminary works by others is complete and to the required standard. The commencement of work shall be deemed to indicate full acceptance by the installer that all preliminary works by other trades is complete.
Check that all window openings and door openings are correctly sized for fitting tolerances, are square and correctly aligned, with all sides plumb, level and true to line and plane.
Check window and door openings adjoining other building elements to ensure that all necessary works have been completed that will enable the windows and/or doors to be installed correctly and as shown on the drawings.
Supporting concrete structures shall be within the scope of NZBC E2/AS3, and comply with NZS 3109. New concrete must have aged for a minimum of 28 days prior to installation.
Supporting concrete masonry structures shall be within the scope of NZBC E2/AS3, and shall comply with NZS 4229, or with NZS 4230 and AS/NZS 1170 for specific design, and NZS 4210.
Supporting timber structures shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content in accordance with the requirements of NZS 3602 at the time of installation.
Supporting lightweight steel framed structures shall comply with NZ NASH 3405, or the NZBC for specific design.
Supporting steel structures shall comply with NZS 3404.

Concrete Slab Rebates
Concrete Slab Rebates: check that concrete slabs have been correctly rebated to accommodate door sills and floor-mounted window frames as detailed on the drawings, and that any required waterproofing membrane has been applied to the rebates.

Timber Framed Walls - Rigid Underlay
Timber Framed Walls (within the scope of NZBC E2/AS1) - check all aspects of preparatory works to window and door openings, including but not limited to:
- Check that the timber framing is complete at window and door openings, and is in accordance with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design.
- Check that the timber framing has a maximum moisture content of 20% at the time of joinery installation.
- Check that the rigid wall underlay has been correctly finished around framed window and door openings in accordance with E2/AS1 and the manufacturer's requirements.
- Where flexible wall underlay is installed over the rigid underlay, check that the flexible underlay has been correctly finished around framed window and door openings in accordance with E2/AS1 and the manufacturer's requirements.
- Check that flexible flashing tape has been correctly applied and finished to window and door openings in accordance with E2/AS1 and the manufacturer's requirements.

8.3.13 Fabrication

Fabrication
Do not commence production and fabrication of the joinery elements until the 'For Fabrication and Installation' shop drawings have been verified and approved by the Architect/Designer.
Fabricate and install aluminium window and door joinery in accordance with the approved shop drawings, design calculations, and the project documentation.

Unless noted otherwise on the approved shop drawings, joinery fabrication shall include the installation of all glazing, hinges, stays, running gear, and other hardware items scheduled on the approved shop drawings.

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

Window and door hardware shall be fixed true to line and position, and adjusted and oiled as required for correct operation. The aluminium joinery manufacturer shall notify the Architect/Designer if any scheduled hardware item or fixing position appears incorrect. Account for all keys and deliver separately to the site manager.

Factory-fit safety stays as scheduled to all opening windows, and to opening windows where safety stays are required to comply with the requirements of NZBC F4/AS1.
Factory-fit all required and scheduled passive ventilation systems to NZBC G4/AS1, 1.3.9 - Trickle ventilators, NZS 4303, and the manufacturer's requirements.

As necessary, provide protection and temporary bracing required for the transportation and general handling of the joinery elements. Ensure that all opening doors and windows are temporarily secured for transportation and general handling.

8.3.14 Installation

Flashings - Framed Openings
Install metal flashings to window and door openings, accurately level and plumb, and to the required tolerances as detailed - with the head flashing weathering jamb flashings, jamb flashings weathering sill flashing, and sill flashings open (draining) to the exterior. Overlap and the top edge of head flashings with flexible flashing tape, or a section of additional flexible wall underlay, along the top edge to ensure water drains to the exterior.
Except where windows and doors are recessed, and where detailed otherwise, all head flashings shall extend minimum 30mm beyond the edge of the window/door frame.

Aluminium Joinery
Installation of aluminium window and door joinery shall be to the requirements of the approved shop drawings and installation details, including fixings and fasteners, flashings, bedding compounds, pointing sealants, weathering sealants, and other components and accessories required for proper installation.
Use only fasteners compatible with the materials involved, as recommended by the window manufacturer and to comply with durability and performance requirements. Fixings and fasteners exposed to weather shall be aluminium or Grade 316 stainless steel. Fixings and fasteners not exposed to weather may be galvanised in accordance with AS/NZS 4680.
Set proprietary plastic packers, sized to the required installation tolerances, to the formed opening at the appropriate fixing spacings for secure installation and allowance for wind loading for windows.
Install aluminium windows and doors exactly square, true to line, plumb and level for proper operation of opening sashes and door leaves, and with fixings fastened through jamb liners and packers.
Door installation shall allow for a minimum clearance gap of 5mm above the specified floor covering in the space that the door opens into.

Form a continuous air-tight seal between the window/door frames and the adjacent structure with a proprietary expanding foam, or appropriate sealant, to a depth of 15mm - 20mm over PEF backing rod at head, jambs and sill.
Commission opening windows and doors, sliding carriage assemblies, and all moving components to the required operation, performance and tolerances, and ensure that all hardware is in full working order.

Weather Sealing
Weather-seal frame jambs etc. to adjacent surfaces (or to each other) as detailed or as required by the window manufacturer, to achieve a fully weathertight installation.
Sealants shall be BRANZ approved for the application and be compatible with all surfaces and any applied finish.
Insert closed cell PEF backing rods or a polyethylene bond breaker tape slip where required and as shown on the drawings.
Ensure substrates are clean and dry; mask off adjacent surfaces; prime substrates and apply sealant in accordance with the sealant manufacturer's requirements and tool finish to a smooth, even surface.
Where required and as shown on the drawings, install aluminium wind deflection or pressure relief angles, over the head and jambs of frames installed within a recessed opening, prior to weather-sealing frames.

Temporary Safety Indicators
As necessary, provide temporary safety indicators to clear glass until completion of adjacent work. Do not use masking tape or materials incompatible with the glass for this purpose.

8.3.15 Completion

Defective Materials & Work
Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected APL Aluminium Windows & Doors work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional cost to the Principal.

Completion
Check that APL aluminium window and door joinery and accessories have been installed, glazed and finished correctly and fully tested for weathertightness.
Check that all opening window sashes, doors, sliding carriage assemblies and all moving components have been commissioned to the required operating performance and functionality.
Check that all hardware, locks, latches and handles are firmly fixed in place without restricting the operation of their moving parts, and that latches and locks fully engage with strikes and keepers and are free of slack when engaged.
Check all aluminium joinery elements for damage, defects, faults and weathertightness - carry out repairs and/or replace elements as necessary in accordance with the manufacturer's instructions to the required standard.
Remove applied safety indicators and protective coverings, and clean all joinery surfaces inside and out and leave perfectly clean.
Leave this work complete, weathertight and leak-free, and in full working order to the required operating performance and functionality in accordance with the manufacturer's warranty requirements. Leave all locking keys with the Contractor.
Leave the surrounding work area clean and free of rubbish. Remove rubbish and waste material from the site.

Complete the manufacturer's warranty and maintenance requirements, online process **FOUND HERE**. APL Product and Installation Warranty for the installed aluminium windows and doors can be **FOUND HERE**.

Provide all necessary Producer Statements.

8.4 VELUX Skylights and Roof Windows

8.4.1 Scope

8.4.1.1 Scope

This specification outlines the requirements for the supply, installation, and inspection of Velux Skylights and Roof Windows. All installations must ensure compliance with the relevant New Zealand Building Code (NZBC) clauses and associated standards. Skylights must be installed according to Velux's installation instructions and according to the conditions and limitations of the Building Code and relevant New Zealand Standards. For technical guidance and advice, phone Velux technical advice on 0800 650 445 or email info@velux.co.nz.

8.4.2 Requirements

8.4.2.1 Safety

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

8.4.2.2 Warranty - Manufacturer/Supplier

Provide a material manufacturer/supplier warranty:

- 10 Years' Warranty – for Velux Skylights, roof windows, insulated glazing units and flashings.
- 1 Years' Warranty – for Velux accessories (motorised units, controls, rods, blinds, insect screens).

Provide this warranty on the manufacturer/supplier standard form.

Commence the warranty from the date of practical completion of the contract works.

8.4.2.3 Warranty - Installer/Applicator

Provide an installer/applicator warranty prior to installation/application.

Commence the warranty from the date of practical completion of the contract works.

8.4.3 Performance Criteria

8.4.3.1 General Performance - Wind Zone: Very High

In a Very High Wind Zone (VH), the Velux Skylight systems must comply with all relevant New Zealand Building Code (NZBC) clauses. The installation falls under a Non-Specific Design Wind Zone, with the skylight joinery installation subjected to maximum pressures of 1.25 kPa for SLS and 1.76 kPa for ULS. Consultation with Velux is recommended to address specific site conditions.

8.4.3.2 Durability - Exposure Zone B: Low

For installations located in a Low Exposure Zone (B) as defined by NZS 3604, the Velux Skylight systems must meet the durability requirements of NZBC Clause B2. This zone is typically characterized by an inland coastal area with medium risk from wind-blown sea-spray salt deposits (ISO 9223 Category: C2 Low)

8.4.4 VELUX System Selection

8.4.4.1 Velux FS Fixed Skylight for roof pitches 15° to 90°

The Velux FS Fixed Skylight is to be supplied and installed in accordance with the architectural drawings and specifications. This skylight features a ponderosa pine frame, treated and finished with white enamel, and is equipped with laminated double glazing featuring the NEAT™ coating. The sizes available range from 550x700 mm to 1140x1180 mm, and the skylight provides an R-value between 0 .356 and 0.43 as verified by BRANZ. Installation must adhere to a pitch between 15° and 90°, as specified in NZBC Acceptable Solution E2/AS1. VELUX EDL or EDW or custom made flashing s, such as, in accordance with the latest version of the Roofing Code of Practice should be used depending on the roof type . This skylight meets the requirements of NZBC clauses B1 (Structure), B2 (Durability), E2 (External Moisture), F2 (Hazardous Building Materials), G4 (Ventilation), G7 (Natural Light), and H1 (Energy Efficiency).

8.4.4.2 Velux VSE electric-opening Skylight for roof pitches 15° to 90°

The Velux VSE Electric Skylight should be supplied and installed in accordance with the details provided in the architectural specifications. This product is constructed with a quality frame made from Ponderosa pine, which is factory treated with wood preservative and coated with two layers of white enamel paint for a clean interior finish. The skylight is available in seven sizes, ranging from 550x980 mm to 1140x1180 mm, with R-values between 0.382 and 0.441, as verified by BRANZ. The installation pitch must be between 15° and 60°, in accordance with the New Zealand Building Code (NZBC) Acceptable Solution E2/AS1. This skylight meets the requirements of NZBC clauses B1, B2, E2, F2, G4, G7, and H1.

8.4.5 Glazing

8.4.5.1 Velux Glazing

All Velux skylights and roof windows are equipped with Argon gass fill and low-E3 coating to enhance thermal performance and safety. The glazing units are treated with the NEAT™ coating to minimize cleaning and maintain clarity. The glazing complies with

NZS 4223.4:2016 for dead, wind, and snow loading, ensuring resistance to the environmental conditions expected in New Zealand. Additionally, the glazing meets the safety glass requirements as outlined in NZBC Clause F2 (Hazardous Building Materials), and the safety glazing materials in buildings outlined in AS/NZS 2208:1996.

8.4.6 Delivery and Handling

8.4.6.1 Delivery and Handling Requirements

All Velux skylights and roof windows should be delivered and handled with care to prevent damage. Store products in a dry, secure location, protected from weather and impacts. Handling must follow the manufacturer's recommendations, ensuring that the frames and glazing are not subjected to undue stress. Installers should comply with all relevant WorkSafe NZ guidelines, including those for working at heights and safe manual handling, to ensure safety during installation.

8.4.7 Installation

8.4.7.1 WorkSafe NZ Guidelines

Installers must adhere to WorkSafe NZ guidelines throughout the installation process, particularly concerning working at heights and manual handling. Proper safety gear and practices must be employed to prevent accidents and injuries. Compliance with these guidelines is mandatory to ensure a safe working environment and to meet legal obligations under New Zealand health and safety regulations.

8.4.7.2 Workmanship Requirements

All installation work must be performed by experienced tradesmen who are familiar with the specified products and the necessary techniques. Quality assurance processes must be followed to ensure that the installation complies with Velux warranty requirements and the relevant NZBC clauses. The installation should be carried out to the highest standards, ensuring the durability and performance of the skylights or roof windows.

8.4.8 Completion

8.4.8.1 Final Inspection and Testing

Upon completion of the installation, all skylights should be thoroughly inspected to confirm that they have been installed according to the specified requirements. Any necessary testing should be performed to ensure compliance with the applicable standards. Once the installation has been verified, a copy of the Product and Installation Warranties should be issued to the client, confirming that the skylights or roof windows meet all required standards and specifications.

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:

3101.1&2:2006(NZS)	Concrete Structures Standard
3104:2003(NZS)	Specification for concrete production
3109:1997(NZS)	Concrete construction
3112.1:1986(NZS)	Methods of test for concrete - Tests relating to fresh concrete
3112.2:1986(NZS)	Methods of test for concrete - Tests relating to the determination of strength of concrete
3114:1987(NZS)	Specification for concrete surface finishes
3121:2015(NZS)	Water and aggregate for concrete
3604:2011(NZS)	Timber-framed buildings
4218:2009(NZS)	Thermal insulation - Housing and small buildings
4220:1982(NZS)	Code of practice for energy conservation in non-residential buildings
4243.1:2007(NZS)	Energy efficiency - Large buildings - Building thermal envelope
4246:2016(NZS)	Energy efficiency - Installing bulk thermal insulation in residential buildings
4671:2019(AS|NZS)	Steel for the reinforcement of concrete
4859.1:2018(AS|NZS)	Thermal insulation materials for buildings - Part 1: General criteria and technical provisions
4859.2:2018(AS|NZS)	Thermal insulation materials for buildings - Part 2: Design
NZBC B1/VM1	Structure
NZBC F2	Hazardous Building Materials

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. All aspects of this work shall be in complete accordance with Tasman Insulation technical information and installation requirements (check pinkbatts.co.nz, call 0800 746 522, or email customer@pinkbatts.co.nz for the latest editions), other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for Pink® Batts® Insulation.

Pink® Batts® insulation is certified under the GREENGUARD Certification Program (UL 2818). Being certified for indoor air quality gives an assurance that products meet strict chemical emissions limits (including minimal levels of VOCs and formaldehyde), to help create healthier indoor environments.

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

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.

9.3.2.4 Inspections

Carry out all necessary pre-installation and pre-line inspections of Pink® Batts® Insulation for each area of work in accordance with the requirements of industry best practice recommendations and manufacturer guidelines.

Complete a Pre-Installation Checklist prior to installation, and a Pre-Line Checklist before handing over for subsequent work.

Note: Pink® Batts® checklist applies only to Pinkfit.

9.3.3 Wall Thermal Insulation

9.3.3.1 Pink® Batts® Ultra® R4.0 140mm Wall

Pink® Batts® Ultra® R4.0 140mm Wall - product code 7127140. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-4.0. 140mm thick x 560mm wide x 1140mm long segments.

BRANZ Appraised for use as a thermal insulating material for framed or part-framed walls, ceilings and roofs of domestic and commercial buildings according to the conditions and limitations of BRANZ Appraisal No.238. Refer to product data - https://www.pinkbatts.co.nz/assets/Products/April-2022-changes-/Wall-Product-Sheet_April22_1075-RevF.pdf

Pink® Batts® Ultra® R4.0 140mm Wall is licenced with Environmental Choice New Zealand: Thermal Building Insulants Licence No.2504017.

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

Installed Location:

9.3.3.2 Pink® Batts® Ultra® R4.0 140mm Narrow Wall

Pink® Batts® Ultra® R4.0 140mm Narrow Wall - product code 7160242. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-4.0. 140mm thick x 380mm wide x 1140mm long segments.

BRANZ Appraised for use as a thermal insulating material for framed or part-framed walls, ceilings and roofs of domestic and commercial buildings according to the conditions and limitations of BRANZ Appraisal No.238. Refer to product data - https://www.pinkbatts.co.nz/assets/Products/April-2022-changes-/Wall-Product-Sheet_April22_1075-RevF.pdf

Pink® Batts® Ultra® R4.0 140mm Narrow 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® Classic R3.2 Ceiling

Pink® Batts® Classic R3.2 Ceiling - product code 7110132. 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. 170mm thick x 432mm wide x 1220mm long segments.

Pink® Batts® ceiling insulation is a lightweight flexible glasswool insulation products designed to:
- thermally insulate ceilings in new homes, be retrofitted into existing homes without insulation, or over existing insulation for better performance;
- fit easily into standard ceiling constructions, or be easily cut to fit non-standard constructions;
- meet the requirements of the New Zealand Building Code for different designs and environments.

Pink® Batts® Classic R3.2 Ceiling is BRANZ Appraised - refer to BRANZ Appraisal No.238. Refer to data - https://www.pinkbatts.co.nz/assets/Uploads/Downloads/Roof-and-RTA-Data-Sheet-February-2023.pdf

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

Installed Location:

9.3.4.2 Pink® Batts® Superbatts® R6.0 Ceiling

Pink® Batts Superbatts® R6.0 Ceiling - product code 7113160. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-6.0 - 245mm thick x 460mm wide x 1220mm long segments.

Pink® Batts® ceiling insulation is a lightweight flexible glasswool insulation product designed to:

- thermally insulate ceilings in new homes, be retrofitted into existing homes without insulation, or over existing insulation for better performance;
- fit easily into standard ceiling constructions, or be easily cut to fit non-standard constructions;
- meet the requirements of the New Zealand Building Code for different designs and environments.

Pink® Batts® Ultra® R6.0 Ceiling is BRANZ Appraised - refer to BRANZ Appraisal No.238.

Pink® Batts® Ultra® R6.0 Ceiling is licenced with Environmental Choice New Zealand: Thermal

Building Insulants Licence No.2504017. Refer to data - https://www.pinkbatts.co.nz/assets/Uploads/Downloads/Roof-and-RTA-Data-Sheet-February-2023.pdf

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

Installed Location:

9.3.4.3 Pink® Superbatts® Skillion Roof R5.0

Pink® Superbatts® Skillion Roof R5.0 - product code 7113250. A non-combustible, resin bonded fibrous glasswool insulation manufactured from recycled and virgin glass and cured urea extended phenolic resin. R-value R-5.0. 180mm Max. thickness x 560mm wide x 1220mm long segments.

Pink® Superbatts® Skillion Roof insulation products are specifically designed for skillion roofs, and provide high levels of thermal performance while ensuring the maximum thickness the segments can achieve.

Pink® Superbatts® Skillion Roof insulation has been BRANZ Appraised for use as a thermal insulating material for timber framed skillion roofs of domestic and commercial buildings - refer to BRANZ Appraisal No.767.

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

Installed Location:

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

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

The building envelope must be fully enclosed and weatherproof, with construction materials framing at or below the required moisture content, before insulation installation commences.

All installation work shall be carried out by registered PinkFit® Installers, or by experienced and competent installers, familiar with the specified products and installation techniques, in accordance with the manufacturer's requirements, and to fully comply with all warranty requirements.

Carry out all necessary pre-installation and pre-line inspections of Pink® Batts® Insulation for each area of work in accordance with the requirements of industry best practice recommendations and the manufacturer's guidelines. Inspect all Pink® Batts® insulation work before it is closed off with linings or made inaccessible.

Insulation shoud be installed without leaving gaps or compresing the material. Always maintain full insulation thickness to ensure that the stated thermal and acoustic values are achieved. Do not install insulation into closed cavities with a cavity depth less than the insulation's stated thickness.

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.

Do not use damaged or defective materials.

Should a problem be encountered with any Pink® Batts® Insulation product, immediately contact Pink® Batts® on 0800 746 522. Do not continue to use the product that is not performing to specification or expectation. Keep the product in question and where possible, the bale package documentation with batch number and/or date of manufacture.

Handle Pink® Batts® Insulation products in accordance with the manufacturer's requirements and in a manner that prevents damage to and contamination of the product. Ensure installed Pink® Batts® Insulation remains dry at all times.

Installers shall be familiar with and comply with the manufacturer's https://www.pinkbatts.co.nz/assets/Products/April-2022-changes-/Pink-Batts-Insulation-SDS-v-1.6.pdfprecautions for use, and use recommended safety gear when handling materials.

Conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - including the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

9.3.8 Installation

9.3.8.1 General

Install Pink® Batts® Insulation in accordance with NZS 4246 and the manufacturer's requirements.

Each installation is unique, so prior to installation:
- check for all hazards that may cause injury; and
- carry out any required repair work before starting installation; and
- ensure there’s adequate lighting to identify any hazards; and
- treat all electrical cables as live, being careful not to cut or expose cables and wires; and
- beware of other sharp objects (protruding nails, splinters etc.), pests (bees and wasps), loose boards and pipe work.

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.

9.4 EXPOL Concrete Slab Insulation

9.4.1 Scope

Supply and install the selected EXPOL concrete slab insulation, complete with all accessories, reinforcing, and construct the concrete slab to the layout and details shown on the drawings. All aspects of this work shall be in accordance with the EXPOL concrete slab insulation specification and guidelines (check www.expol.co.nz or call 0800 86 33 73 for the latest editions), other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for EXPOL concrete slab insulation products.

9.4.2 Requirements

9.4.2.1 Requirements

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

Extent of Work
The following is a list and a general description of the extent of the EXPOL Concrete Slab Insulation works, which are more specifically defined in the contract documents, required for the completion of the contract works:

Defective Materials & Work
Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected EXPOL materials and work shall be repaired and/or replaced to the satisfaction of the Architect/Designer, without delay and at no additional cost to the principal.

Should a problem be encountered with any EXPOL product during use or delivery, immediately contact EXPOL on 0800 86 33 73 or email tech@expol.co.nz. Contact EXPOL within 48 hours of finding the defective product. Do not continue to use the product that is not performing to specification or expectation. Keep the product in question, and where possible, the document batch numbers and/or manufacturing details.

Transportation
When transporting, storing or installing, ensure the EXPOL EPS Sheet is not exposed to:
Petroleum based solvents, or
Fire, or
Sustained direct sunlight.

9.4.3 Co-operation

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

Coordinate with trades, the locations of penetrations, services, drainage fittings and shower set-downs, installed by others, to install the EXPOL Concrete Slab Insulation to the required layout and standard.

9.4.4 Substrate

The soil or fill beneath the foundation is to be prepared to the structural / civil engineer’s requirements and to comply with the requirements of NZBC B2. Ensure that the required fill and its compaction meets the requirements of NZS 4431. Ensure that the foundation DPM, laps and details are completed as shown in the contract documents.

9.4.5 Workmanship

All installation work, including preparatory blinding, DPM, formwork, reinforcing, concreting and finishing techniques, shall be carried out by experienced tradesmen under the direct supervision of a LBP, familiar with the specified products and installation techniques, in accordance with the manufacturer's installation requirements, NZS 3109 and NZS 3114, and as noted and detailed on the drawings.
Store and handle all materials and products in accordance with the manufacturer's recommendations.
Notify the BCA for inspection of the excavation and of the slab ready for pouring, keep all records and test results they may require.

9.4.6 EXPOL Concrete Slab Insulation

EXPOL ThermaSlab (EPS – Expanded Polystyrene Sheet) is a lightweight polystyrene board that does not compromise on insulation performance
Size: 2400x1200mm
Total raft slab thickness:
Slab thickness above EXPOL:
Concrete Strength:
Concrete Finish: U3, F5
DPM: 0.25mm thick polythene
Install as per EXPOL guidance and engineering contract documents. If in doubt, contact EXPOL for more information.

EXPOL SLABX200 specifically designed for insulating concrete slabs. It delivers an uncompromised compressive strength of 200kPa @ 10% deformation and exceptional Insulation Values. Specifically engineered for residential and commercial projects
Size: 2400x1200mm
Total raft slab thickness:
Slab thickness above EXPOL:
Concrete Strength:
Concrete Finish: U3, F5
DPM: 0.25mm thick polythene
Install as per EXPOL guidance and engineering contract documents. If in doubt, contact EXPOL for more information.

9.4.7 Installation

Refer to EXPOL Building Product Information Sheet (Class 1). See Attached or visit www.expol.co.nz or email tech@expol.co.nz.
Installation shall only be undertaken by suitably qualified and experienced tradespeople.
Ensure that the site has been scraped of organics and topsoil and prepared as directed by the geotechnical engineer or structural engineer, to ‘good ground’ with the required bearing capacity, or as instructed.
If hardfill is required, ensure it is compacted as shown in the contract documents, to the required depth and in a layer depth as specified. Ensure the observing engineer has approved the preparatory works and fill compaction before carrying on further. Ensure the base is level and finished with 50mm of fine material, such as river blinding or crusher dust.
Before laying all EXPOL products, please observe the followin
• Site ground works must be complete
• Site must be completely level
• 50mm of crusher dust or manufactured sand must be laid on the entire site
• All plumbing is installed and inspected
All electrical cables should not be allowed direct contact with EXPOL EPS Sheet and require PVC sheathing.The boxing can be put in place following the site prep, with the specified DPM installed following this. Ensure all laps are taped and penetrations fully sealed. Care should be taken to ensure the DPM is installed as per manufacturer’s instructions and is not damaged during installation of the EXPOL or reinforcing.
The EXPOL shall be installed as shown in the contract drawings, to the locations, direction of installation, details, methods and EXPOL Building Product Information Sheet (Class 1). EXPOL shall be installed in accordance with the installation instructions and if maintained according to relevant Standards including NZS-4246. All penetrations shall be cut in EXPOL as per instructions.

Reinforce as specified, and as noted and detailed on the drawings. All reinforcing bars, stirrups, links, mesh etc., accurately positioned and firmly secured to the required cover. Install proprietary control joints to the manufacturer's details and as shown on the drawings. Install plumbing waste pipes etc. as required and install the reinforcing mesh over the top of the EXPOL, seated on mesh chairs, install shrinkage control bars across internal corners as noted. Install starters as detailed for any subsequent masonry walls, ensuring accurate positioning (as bending to masonry core positions is not acceptable).

Pour the specified concrete, vibrate, screed, cure and finish as specified or as per notes.

9.4.8 Completion

Check that the concrete slab has been correctly formed and finished, that all cast-in items are correctly installed and positioned and that the DPM has been lapped up as detailed. Check for damage and faults and repair as necessary. Leave the slab and surrounding area clear of rubbish and any EXPOL off-cuts, remove from site.

Complete the EXPOL “XPS 15 YEAR PRODUCT WARRANTY” at EXPOL XPS Warranty. Or EXPOL “EPS 20 YEAR PRODUCT WARRANTY” at EXPOL EPS Warranty.

10 TILING

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:

2358:1990(AS)	Adhesives - For fixing ceramic tiles
3103:1991(NZS)	Specification for sands for mortars and plasters
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
3661.2:1994(AS/NZS)	Slip resistance of pedestrian surfaces - Part 2: Guide to the reduction of slip hazards
3740:2010(AS)	Waterproofing of domestic wet areas
4586:2004(AS/NZS)	Slip resistance classification of new pedestrian surface materials
4858:2004(AS/NZS)	Wet area membranes
BRANZ Good Practice Guide	Tiling
NZBC B2/AS1	Durability
NZBC D1/AS1	Access Routes
NZBC E3/AS1	Internal Moisture

10.3 Tiling

10.3.1 Scope

Supply, install and finish all Tiling works, complete with all necessary components and accessories required for proper installation and performance, as specified herein and to the locations, layouts and details shown on the approved drawings. All aspects of this work shall be carried out to comply with the New Zealand Building Code and relevant standards, and in accordance with the approved project design documentation, and with any relevant product manufacturers' technical literature.

10.3.2 Requirements

10.3.2.1 Quality Assurance

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

10.3.2.2 Inspection & Acceptance of Tiling Work

Carry out all necessary pre-installation, installation and finishing inspections of Tiling for each area of work in accordance with the requirements of industry best practice recommendations and code of practice guidelines.

Complete all necessary Pre-Installation/Application Checklists prior to installing proprietary under-tile waterproofing systems and heating systems and floor levelling systems, and relevant Installation/Application Checklists.

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

10.3.2.3 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected Tiling materials and work shall be repaired and/or replaced to the satisfaction of the Architect/Designer, without delay and at no additional cost to the Principal.

10.3.2.4 Evidence of Slip Resistance

If requested, provide certified evidence of the slip resistance classification for each floor tile specified.

10.3.3 Performance

10.3.3.1 Interior Wet Area Performance

Interior Wet Area Performance. The performance of tiled interior wet areas shall comply with the requirements of NZBC E3/AS1.

10.3.4 Co-operation

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

Coordinate with other trades to install tiling as required, and to ensure that:
- appropriate tolerances and clearances allow for adjacent finishes, fixtures and fittings, etc; and
- penetrations for piped and cabled services are correctly located to maintain tile integrity and tiling performance.

10.3.5 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.

All Tiling work shall be carried out to best trade practice by qualified and experienced tradespersons, familiar with the specified materials and installation and finishing techniques, in accordance with AS 3958.1 and relevant product manufacturers' technical literature, to the layout and details shown on the approved drawings, and to fully comply with all warranty requirements.

Submit evidence of experience on request, e.g. National Certificate in Floor and Wall Tiling, or certified member of Master Plasterers and Tilers Association.

All substrate preparation, tile laying and tiling accessories application and finishing techniques shall be exactly as recommended by the specified product manufacturer. All work shall be such as to leave a neat, efficient and robust installation.

Interior wet-area tiling shall be waterproof and installed over a waterproof membrane as shown on the drawings.
Exterior floor tiling shall be waterproof and weathertight, and where necessary installed over a waterproof membrane as shown on the drawings.

As recommended by the tile manufacturer, use only an approved adhesive that is compatible with the specified tile, its substrate and its application/use.

Where necessary, delay tiling to allow maximum curing and settling and initial creep of the substrates, particularly to load bearing structural elements.

Do not cover or bridge movement control joints with tiles and tile underlay.

Tiling shall not be undertaken when the ambient and surface temperatures are outside the specified product manufacturer's permissible temperature range.

Where necessary, mask off and protect from contamination adjacent surfaces, joinery, fixtures and finished work before commencing.

Exterior tiling shall not be undertaken during inclement weather. As necessary and in accordance with the manufacturer's requirements, protect exterior tiling from rain, hot dry winds and direct sunlight to aid proper drying and curing.

Leave all tiled surfaces clean, sound, and free from blemishes of any kind.

10.3.6 Delivery & Handling

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

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

Store all tiling materials undercover, in a weatherproof environment, off the floor, on a flat, even and level surface in accordance with the manufacturer's requirements. Keep products and materials dry, out of direct sunlight and protected from damage, moisture and contamination at all times.

Handle tiling materials in accordance with the manufacturer's requirements and in a manner that prevents damage to and contamination of the materials and works.

Installers shall be familiar with and comply with all associated product Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

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

10.3.7 Preparation

10.3.7.1 Plasterboard Wall Lining

Plasterboard Lining - check all aspects of preparatory works, including but not limited to:
- Check that the plasterboard sheets have been installed in accordance with the manufacturer's requirements, are supported on all edges on framing, are securely fastened, and that all joints and junctions have been stopped flush with reinforcing tape embedded in the jointing compound.
- Check junctions with all other substrates and elements, ensuring that all necessary works have been completed as detailed.
- Check that all apertures, openings, edges and expansion and movement control joints are completed as detailed.

10.3.7.2 General

All substrates to be tiled shall be structurally sound, even and smooth, clean, dry, and free from dirt, dust, grease, oil, wax, paint residue, loose plaster and laitance, curing compounds and other materials and contaminants likely to affect the bonding and performance of the specified tile adhesive and grout.

Carry out all necessary moisture readings of substrates. Do not commence installation until the moisture readings for the whole area are below the required level.

Carry out all necessary substrate inspections and preparatory work in accordance with the relevant product manufacturer's recommendations prior to application.

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

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

Confirm the location of any movement control or crack control joints prior to commencement of the works, and ensure that they are appropriately trimmed. Do not cover or bridge movement control joints with tiles, adhesive and grout.

Allow self-levelling underlayments and mortar screeds to properly cure in accordance with the manufacturer's recommendations before commencing tiling.

Allow new concrete substrates to cure for at least four weeks prior to tiling.

Ensure that the back of each tile is clean and free from dust or other contaminants prior to laying.

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

10.3.7.3 Under-floor Heating Systems

Turn off working in-slab under-floor heating systems at least 48 hours prior to installation. Underfloor heating must remain off during installation and for at least 48 hours, or in accordance with the adhesive manufacturer's requirements, after installation.

10.3.7.4 New Concrete Floor

New Concrete Floor - check all aspects of preparatory works, including but not limited to:
- Check that the concrete slab has been formed and finished to the levels and falls indicated on the drawings, including any tanking or waterproofing requirements.
- New concrete floors must have aged for a minimum of 28 days, and have dried over the entire area to a relative humidity of 75% or less.
- Grind off any high spots, and using a proprietary levelling compound repair flush with feathered edges any low spots or damaged areas, then grind smooth.
- Mechanically grind or acid etch very dense concrete surfaces and any surface that is glazed to the extent that may compromise adhesion.
- Leave the surface clean, free of dust and surface contaminants.
- Check that any protruding or exposed bare metal has been treated with a suitable corrosion-inhibiting primer.

10.3.8 Installation

10.3.8.1 Floor Tiles

Floor Tiles. Install floor tiles by direct-stick method to clean, dry and properly prepared substrates in accordance with AS 3958.1 and the adhesive manufacturer's instructions. Accurately set-out and lay tiles to the layout and details shown on the drawings. Confirm the floor tile layout and pattern requirements prior to installation.

As required by the adhesive manufacturer, seal or prime porous substrates or substrates where dusting or powdering exists. The use and application of adhesive shall be exactly to the adhesive manufacturer's instructions.

All tile cutting, boring and shaping shall be carried out using appropriate tools and equipment and methods suitable for the tile type and in accordance with the tile manufacturer's recommendations. Only install cut tiles that have smooth, uniform cut edges - do not use tiles with jagged or flaked edges.

Mechanically mix powdered adhesive at the recommended ratio with clean potable water to a smooth, lump-free paste in accordance with the manufacturer's requirements. Do not mix more than can be used within the specified open time.

Apply tile adhesive evenly using a suitably notched trowel to properly prepared substrates in accordance with the manufacturer's instruction.
- Do not apply more adhesive than can be covered within the specified open time.
- Do not over spread the adhesive, and avoid surface skinning - particularly when used in unfavourable conditions such as direct sunlight, wind and/or high temperatures.
- Ensue to follow the adhesive manufacturer's recommended setting and curing periods.

Lay floor tiles into adhesive to achieve maximum contact and bonding before skinning occurs. Re-trowel any adhesive that has skinned - do not apply water to skinned adhesive. Where necessary, back-butter tiles with adhesive to ensure maximum contact and bonding - do not spot-fix floor tiles.

Floor tiles shall be laid so that the finished surface and edges are true and even, level and/or to the falls shown on the drawings, and finished flush with adjoining finished work as appropriate or as detailed.

Tile joints shall be to the required layout, uniform, accurately aligned, straight and true to line, and set even and parallel to the specified joint width.

Where indicated on the drawings, return floor tiles along walls, upstands, toe spaces, etc., to the height and details shown on the drawings.

Remove excess adhesive from tile joints as each tile is laid to ensure full depth grouting can be achieved, and leave the tile surface completely clean.

10.3.8.2 Wall Tiles

Wall Tiles: Install wall tiles by direct-stick method to clean, dry and properly prepared substrates in accordance with AS 3958.1 and the adhesive manufacturer's instructions. Accurately set-out and lay tiles to the layout and details shown on the drawings. Confirm the wall tile layout and pattern requirements prior to installation.

As required by the adhesive manufacturer, seal or prime porous substrates or substrates where dusting or powdering exists. The use and application of adhesive shall be exactly to the adhesive manufacturer's instructions.

All tile cutting, boring and shaping shall be carried out using appropriate tools and equipment and methods suitable for the tile type and in accordance with the tile manufacturer's recommendations. Only install cut tiles that have smooth, uniform cut edges - do not use tiles with jagged or flaked edges.

Mechanically mix powdered adhesive at the recommended ratio with clean potable water to a smooth, lump-free paste in accordance with the manufacturer's requirements. Do not mix more than can be used within the specified open time.

Apply tile adhesive evenly using a suitably notched trowel to properly prepared substrates in accordance with the manufacturer's instruction.
- Do not apply more adhesive than can be covered within the specified open time.
- Do not over spread the adhesive, and avoid surface skinning - particularly when used in unfavourable conditions such as direct sunlight, wind and/or high temperatures.
- Ensue to follow the adhesive manufacturer's recommended setting and curing periods.

Press wall tiles into adhesive to achieve maximum contact and bonding before skinning occurs. Re-trowel any adhesive that has skinned - do not apply water to skinned adhesive. Where necessary, back-butter tiles with adhesive to ensure maximum contact and bonding - do not spot-fix wall tiles.

Wall tiles shall be installed so that the finished surface and edges are true and even, level, and finished flush with adjoining work as appropriate or as detailed.

Tile joints shall be to the required layout, uniform, accurately aligned, straight and true to line, level and plumb, and set even and parallel to the specified joint width. Use proprietary tile spacers, sized for the specified joint width, to ensure accurate jointing.

Form internal and external wall corner junctions true and plumb and with tile joints continued around corners level and true.

Remove excess adhesive from tile joints as each tile is laid to ensure full depth grouting can be achieved, and leave the tile surface completely clean.

10.3.8.3 Edge Trim

Edge Trim. As required and indicated on the drawings, install all necessary tiling edge trim - including edge cappings, corner mouldings, transition strips, etc., - all neatly finished, accurately aligned and true, to the required layout and as detailed on the drawings.

10.3.8.4 Movement Control Joints

Movement Control Joints. Form movement control joints in tiling to the locations and details shown on the drawings and in accordance with AS 3958.1.

Movement control joints in tiling shall coincide with control joints in the substrate and structure, and at junctions between dissimilar substrates and other surface finish materials in the same plane.

Ensure to carry movement control joints through tiling from the substrate. Do not bridge movement control joints with underlayment, membranes, adhesive or tiles.

Seal movement control joints after grouting with the specified flexible sealant in accordance with the sealant manufacturer's instructions and as detailed.

Proprietary movement control joints shall be installed in strict accordance with the manufacturer's instructions and to the layout and details shown on the drawings. Finish tiling against proprietary movement control joints as detailed.

10.3.8.5 Grouting

Grouting. Grouting shall be in accordance with the grout manufacturer's requirements and recommendations. Coloured grout shall be to the colour specified.

Prior to grouting, ensure that the tile adhesive has completely set, and that the tile joints are clean, dry and free from excess adhesive and any foreign material. Rake out any excess adhesive from joints to ensure a maximum, uniform grout joint is achieved. Tile spacers must be removed prior to grouting.

Mechanically mix powdered tile grout with clean water at the required ratio to a smooth, lump-free paste in accordance with the manufacturer's requirements. Do not mix more than can be used within the manufacturer's specified open time. Ensue to follow the manufacturer's recommended drying and curing periods.

Apply tile grout evenly with a rubber squeegee or grouting float, ensuring that the tile joints are completely filled and smoothed to a dense, uniform surface. Do not spread more grout than can be cleaned within the specified open time. Remove excess grout immediately. In hot or windy conditions, dampen the joints to prevent the grout from drying out too quickly.

Clean the tiles with a damp sponge when the grout joints have firmed, making sure not to wash-out the joints. Finish grout joints to a smooth, uniform effect and leave grout free of pin holes and blemishes.

Allow grout joints to dry before cleaning with a clean, dry, soft cloth, to completely remove any grout haze and residue from the surface of the tiles.

10.3.8.6 Protection

Protection. Take all necessary measures to protect exterior tiling from the extremes of weather and climate during the fixing and grouting operation and for as long as possible thereafter.

Keep the working area cordoned off during the whole tiling installation. Protect completed tiling from excessive loads, damage and contamination until hand-over or as directed.

Restrict foot traffic from completed floor tiling in accordance with the tile manufacturer's time frames for 'set-to-light-foot-traffic' and 'ready-for-service-use'.

Where necessary, cover completed floor tiling with a heavy-duty temporary floor protection such as Ovaboard, Ram Board, Buffalo Board; laid in accordance with the manufacturer's requirements.

Protect exterior tiling, immediately after laying and grouting, from rain and moisture for at least 24 hours, and from frost and strong sunlight after laying in accordance with the tile adhesive and grout technical specifications.

10.3.9 Completion

Check that all Tiling work has been correctly installed to the required layout, and that all tile joints, edge-trimming and other detailing is correctly finished, grouted and sealed.

Check all Tiling installations for damage, marks and defects - repair or replace as necessary. Carry out any repairs to the required standard.

Thoroughly clean tiled surfaces in accordance with the manufacturer's recommended procedures and techniques. Lightly buff where appropriate.

Leave this work complete and to the required standard, and in accordance with the associated warranty requirements.

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

Protect the completed installation from damage, trafficable dirt and grime, and stains as necessary until hand-over as scheduled or directed.

Issue to the Owner a copy of all relevant product manufacturers' maintenance requirements, and a copy of relevant manufacturer Product Warranties and the installer/applicator Installation Warranty for the installed products and completed works.

10.4 ARDEX Tiling Solutions

10.4.1 Scope

Supply and install ARDEX Tiling Solutions products and systems as components and accessories of the Tiling works identified on the drawings. 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 as shown on the drawings.

No substitutions are permitted for any specified ARDEX Tiling Solutions products, systems, components or accessories.

As necessary, this specification should be read in conjunction with other relevant ARDEX specifications, as referenced herein, as they may be interrelated.

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

10.4.2 Requirements

10.4.2.1 Safety

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

10.4.2.2 Warranty

ARDEX NZ Ltd Warranty. Warrant this work under normal use and environmental conditions, against failure of materials and application, according to the warranty conditions.
- 10 Years' Warranty Materials and Workmanship - for all tiling applications other than interior wet-area tiling.
- 15 Years' Warranty Materials and Workmanship - for all interior wet-area tiling applications.

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

10.4.2.3 Substitutions

ARDEX tiling products 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 tiling product for an alternative ARDEX branded product by the Tiler 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 Tiler.

10.4.2.4 Quality Assurance

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

10.4.2.5 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, installation and finishing inspections of Tiling for each area of work in accordance with the requirements of industry best practice recommendations and code of practice guidelines.

Complete all necessary Pre-Installation Checklists prior to installing proprietary under-tile waterproofing systems and heating systems and floor levelling compound systems, and all relevant Installation Checklists.

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

10.4.2.6 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 Tiling 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 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.

10.4.2.7 Spare Tiles

Upon completion of the Tiling works, supply and deliver to the Principal the specified quantity of unopened packs of each tile specified.

Quantity:

10.4.3 Performance

10.4.3.1 Interior Wet Area Performance

Interior Wet Area Performance. The performance of tiled interior wet areas shall comply with the requirements of NZBC E3/AS1.

10.4.3.2 Slip-Resistance Performance of Access Routes

Slip-Resistance Performance of Access Routes. The slip-resistance performance of tiled access routes, ramps and stairs shall comply with the requirements of NZBC D1/VM1 and NZBC D1/AS1.

10.4.4 Undertile Sheet Underlayment

10.4.4.1 Fibre Cement Sheet Underlay

Interior Floor Tile Underlayment - Fibre Cement Sheet Underlay. 6mm thick fibre cement underlay sheet with pre-marked nailing pattern on the face. Suitable for tiling applications. Installed as an underlay over new or existing solid timber strip flooring or wood-based sheet flooring, for subsequent interior floor tiles, in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

Installed Location:

10.4.5 Substrate Primer

10.4.5.1 ARDEX P 9

Substrate Primer - ARDEX P 9. A single-part, water-based primer used for improving the adhesion of ARDEX products - including tile adhesives, floor levelling compounds and undertile waterproofing membranes (non fully immersed) - to smooth, dense or non-porous substrates. Suitable for interior and exterior applications; on new and existing substrates.

Suitable Substrates:
- Concrete, renders, screeds;
- Blockwork;
- Fibre cement sheet, compressed fibre cement sheet;
- Plasterboard jointing compound;
- Autoclaved aerated concrete (AAC);
- Interior plywood, particleboard, OSB;
- For use with other substrates, contact the ARDEX Technical Hot Line on 0800 227 339.

Use ARDEX P9 in strict accordance with the manufacturer's requirements.

10.4.6 Acoustic & Decoupling Underlayment

10.4.6.1 Acoustic Underlayment - ARDEX DS 70

Acoustic Underlayment - ARDEX DS 70 Recycled Rubber Impact Insulation Mat. Suitable for use under hard flooring surfaces such as ceramic and stone tiles, in both dry and wet areas in commercial and domestic locations.

Features:
- High performance soundproofing matting for insulating against footfall and impact sound.
- Isolates the floor finish from substrate movement and cracking.
- Suitable for use with underfloor heating systems.
- Rated to 19dB as per ASTM E2179.
- 5mm thick.

System Components (excluding Tiles):
- Levelling & Repair Compound (optional): Use the appropriate ARDEX levelling and repair compounds. Refer to Levelling Underlayment clause.
- Substrate Primer (where required): ARDEX P51 diluted 1:3 with cold, clean water - for sealing porous substrates.
- ARDEX Perimeter Isolation Strip: To provide an acoustic break between perimeter walls, columns etc.
- Acoustic Mat Adhesive: ARDEX AF 145, ARDEX AF 180 MS, ARDEX AF 275, or ARDEX 2365.
- ARDEX DS 70 recycled Rubber Impact Insulation Mat: 1.2m wide x 9.1m long x 5mm thick resilient rubber flooring underlayment roll. Manufactured from 92% recycled, wear and water esistant rubber grannules. 4.1 kg/m² approx. Coloured Black.
- Floating Screed (wet areas, where required): ARDEX A48 - to produce falls to the floor waste outlet. Refer to Levelling Underlayment clause.
- Waterproofing Membrane (wet areas): ARDEX WPM 155 Rapid or ARDEX WPM 002 liquid-applied waterproofing membrane - applied over installed ARDEX DS 70 acoustic mat. Refer to Undertile Waterproofing clause.
- Tile Adhesive: Depending on the tile type, size, weight and application, use ARDEX X 18, ARDEX X 52, ARDEX X 56 or ARDEX X 77 in accordance with ARDEX requirements.

Suitable Substrates:
- Concrete, screeds;
- Heated screeds;
- Dry screed systems;
- Timber strip flooring, wood-based sheet flooring;
- Existing floor tiles.

Install ARDEX DS 70 Recycled Rubber Impact Insulation Mat to properly prepared substrates in strict accordance with the manufacturer's requirements, and to the layout and details shown on the approved drawings.

Installed Location:

10.4.7 Undertile Waterproofing

10.4.7.1 Interior Wet-Area Tiling - ARDEX WPM 002

Interior Wet-Area Tiling - ARDEX WPM 002. Refer to separate specification section Waterproofing: ARDEX Liquid-Applied Waterproofing Membranes.

10.4.7.2 Interior Wet-Area Tiling - ARDEX WPM 750

Interior Wet-Area Tiling - ARDEX WPM 750. Refer to separate specification section Waterproofing: Ardex Sheet Waterproofing Membranes.

10.4.8 Undertile Heating

Undertile Heating System - Interior Floor Tiling - as specified below. A low temperature radiant, electric floor surface warming and space heating system, incorporating an electric element heating cable embedded into tile adhesive or levelling screed, complete with all necessary system controls, components and accessories required for proper installation and performance.

When installed in interior wet areas, an undertile waterproof membrane must be used.

Installed in accordance with the manufacturer's requirements, complete with all necessary components and accessories, to the locations and details shown on the approved drawings.

Brand & Product:
Installed Location:

10.4.9 Interior Wet-Area Floor Tile Adhesive

10.4.9.1 ARDEX X 77

Interior Wet-Area Floor Tile Adhesive - ARDEX X 77. A high performance, flexible, fibre reinforced, polymer modified, cement-based tile adhesive. Suitable for interior, exterior and continuously-immersed tiling applications; on new and existing substrates.

Classification (EN 12004):
- C2 T(T)E(E) S1 (S2 with ARDEX E 90).

Features:
- Microtec Technology for improved adhesion strength.
- Water and frost resistant.
- Efflorescence free.
- Can be used over early age concrete/screeds and render.
- Low VOC content.

For Fixing (tile types):
- Suitable for fixing fully vitrified and ceramic tiles, porcelain, natural stones (excludiing moisture sensitive), glass and porcelain mosaics.

Suitable Substrates:
- Concrete, renders, screeds;
- ARDEX liquid-applied undertile waterproofing membranes;
- Medium density fibre cement sheet on walls;
- Plasterboard;
- Autoclave aerated concrete (AAC);
- Compressed fibre cement sheet on floors;
- ARDEX DS 40 Acoustic Mat;
- Existing ceramic tiles.

Application Data (at +23°C and 50% RH):
- Mixing Ratio: Floors - 6.5-6.75L water/15kg ARDEX X 77 powder.
- Application Temperature Range: from +5°C to +35°C.
- Pot Life: 3 hours.
- Open Time: 60 minutes.
- Adjustment Time: 15-30 minutes.
- Ready for Grouting: 8 hours.
- Colour: Off-white.
- Suitable for use with underfloor heating.

Apply ARDEX X 77 tile adhesive to properly prepared substrates in strict accordance with the manufacturer's requirements.

10.4.10 Interior Wet-Area Floor Tile Grout

10.4.10.1 ARDEX FS-DD

Interior Dry-Area Floor Tile Grout - ARDEX FS-DD. A flexible, non-sanded, cement-based tile grout - to the colour specified herein. Suitable for interior and exterior tiling applications; for tile joints from 1mm to 5mm wide.

Classification (AS 4992.3):
- C G1.

Features:
- Water repellent and dirt resistant
- Contains ARDEX Grout Shield to combat mould growth
- Water wash up.
- Extremely low VOC.

For Grouting (tile types):
- All ceramic and porcelain tiles, terrazzo, slate, quarry tiles, glass, natural stones (excluding moisture sensitive).

Application Data (at +23°C and 50% RH):
- Mixing Ratio: 6L water/20kg ARDEX FS-DD powder. Use ARDEX FS-DD with ARDEX Grout Booster in accordance with the manufacturer's requirements.
- Application Temperature Range: from +5°C to +35°C.
- Pot Life: 2.5 hours.
- Set Time: 5 hours.
- Full Cure Time: 7 days.
- Colours: 10 colours available.
- Suitable for use with underfloor heating.

Use ARDEX FS-DD tile grout in strict accordance with the manufacturer's requirements.

Colour:

10.4.11 Interior Wet-Area Wall Tile Adhesive

10.4.11.1 ARDEX X 77

Interior Wet-Area Wall Tile Adhesive - ARDEX X 77. A high performance, flexible, fibre reinforced, polymer modified, cement-based tile adhesive. Suitable for interior, exterior and continuously-immersed tiling applications; on new and existing substrates.

Classification (EN 12004):
- C2 T(T)E(E) S1 (S2 with ARDEX E 90).

Features:
- Microtec Technology for improved adhesion strength.
- Water and frost resistant.
- Efflorescence free.
- Can be used over early age concrete/screeds and render.
- Low VOC content.

For Fixing (tile types):
- Suitable for fixing fully vitrified and ceramic tiles, porcelain, natural stone (excluding moisture sensitive), glass and porcelain mosaics.

Suitable Substrates:
- Concrete, renders, screeds;
- ARDEX liquid-applied undertile waterproofing membranes;
- Medium density fibre cement sheet on walls;
- Plasterboard;
- Autoclave aerated concrete (AAC);
- Compressed fibre cement sheet on floors;
- ARDEX DS 40 Acoustic Mat;
- Existing ceramic tiles.

Application Data (at +23°C and 50% RH):
- Mixing Ratio: Floors - 6.5-6.75L water/15kg ARDEX X 77 powder.
- Application Temperature Range: from +5°C to +35°C.
- Pot Life: 3 hours.
- Open Time: 60 minutes.
- Adjustment Time: 15-30 minutes.
- Ready for Grouting: 8 hours.
- Colour: Off-white.

Apply ARDEX X 77 tile adhesive to properly prepared substrates in strict accordance with the manufacturer's requirements.

10.4.12 Interior Wet-Area Wall Tile Grout

10.4.12.1 ARDEX FS-DD

Interior Dry-Area Floor Tile Grout - ARDEX FS-DD. A flexible, non-sanded, cement-based tile grout - to the colour specified herein. Suitable for interior and exterior tiling applications; for tile joints from 1mm to 5mm wide.

Classification (AS 4992.3):
- C G1.

Features:
- Water repellent and dirt resistant
- Contains ARDEX Grout Shield to combat mould growth
- Water wash up.
- Extremely low VOC.

For Grouting (tile types):
- All ceramic and porcelain tiles, terrazzo, slate, quarry tiles, glass, natural stones (excluding moisture sensitive).

Application Data (at +23°C and 50% RH):
- Mixing Ratio: 6L water/20kg ARDEX FS-DD powder. Use ARDEX FS-DD with ARDEX Grout Booster in accordance with the manufacturer's requirements.
- Application Temperature Range: from +5°C to +35°C.
- Pot Life: 2.5 hours.
- Set Time: 5 hours.
- Full Cure Time: 7 days.
- Colours: 10 colours available.
- Suitable for use with underfloor heating.

Use ARDEX FS-DD tile grout in strict accordance with the manufacturer's requirements.

Colour:

10.4.13 Flexible Sealant

10.4.13.1 ARDEX SE

Flexible Sealant - ARDEX SE. A coloured, acetic cure silicone sealant - to the colour specified herein. Suitable for interior and exterior floor and wall tiling applications. Not suitable for continuously immersed tiling applications.

Features:
- Waterproof and UV resistant.
- Contains fungicides to combat mould growth.
- Withstands up to 25% total movement of original joint width.
- Low VOC.

Application Data (at +23°C and 50% RH):
- Application Temperature Range: from +5°C to +40°C.
- Joint Width: Up to 30mm. Sealant joints shall be in accordance with the manufacturer's joint design width-to-depth ratio.
- Skin Forming Time: 10-12 minutes.
- Curing Time (approx.): 2mm per day; 7mm per week.
- Colours: 12 colours available from the ARDEX colour range.
- Suitable for use with underfloor heating.

Use ARDEX SE silicone sealant to seal tiling work in strict accordance with the manufacturer's requirements.

Colour:

10.4.14 Co-operation

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

Coordinate with other trades to install tiling as required, and to ensure that:
- appropriate tolerances and clearances allow for adjacent finishes, fixtures and fittings, etc; and
- penetrations for piped and cabled services are correctly located to maintain tile integrity and tiling performance.

10.4.15 Workmanship

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

All Tiling work shall be carried out to best trade practice by qualified and experienced tradespersons, familiar with the specified materials and installation and finishing techniques, in accordance with AS 3958.1 and relevant product manufacturers' technical literature, to the layout and details shown on the approved drawings, and to fully comply with all warranty requirements.

Submit evidence of experience on request, e.g. National Certificate in Floor and Wall Tiling, or certified member of Master Plasterers and Tilers Association.

All substrate preparation, tile laying and tiling accessories application and finishing techniques shall be exactly as recommended by the specified product manufacturer. All work shall be such as to leave a neat, efficient and robust installation.

Interior wet-area tiling shall be waterproof and installed over a waterproof membrane as shown on the drawings.
Exterior floor tiling shall be waterproof and weathertight, and where necessary installed over a waterproof membrane as shown on the drawings.

As recommended by the tile manufacturer, use only an approved adhesive that is compatible with the specified tile, its substrate and its application/use.

Where necessary, delay tiling to allow maximum curing and settling and initial creep of the substrates, particularly to load bearing structural elements.

Do not cover or bridge movement control joints with tiles and tile underlay.

Tiling shall not be undertaken when the ambient and surface temperatures are outside the specified product manufacturer's permissible temperature range.

Where necessary, mask off and protect from contamination adjacent surfaces, joinery, fixtures and finished work before commencing.

Exterior tiling shall not be undertaken during inclement weather. As necessary and in accordance with the manufacturer's requirements, protect exterior tiling from rain, hot dry winds and direct sunlight to aid proper drying and curing.

Leave all tiled surfaces clean, sound, and free from blemishes of any kind.

10.4.16 Delivery & Handling

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

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

Should a problem be encountered with any ARDEX tiling product at time of delivery or during use, immediately contact the ARDEX Technical Hot Line on 0800 227 339. Do not continue to use the product if it is not performing to specification or expectation. Keep the product in question, and where possible, the product batch numbers and/or manufacturing dates.

Store all tiling materials undercover, in a weatherproof environment, off the floor, on a flat, even and level surface in accordance with the manufacturer's requirements. Keep products and materials dry, out of direct sunlight and protected from damage, moisture and contamination at all times.

Handle all tiling materials in accordance with the manufacturer's requirements.

Installers shall be familiar with and comply with all associated product Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

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

10.4.17 Preparation

10.4.17.1 General

Before commencing tiling, prepare and prime substrates according to the requirements of the ARDEX tile adhesive technical literature. If there is any uncertainty, contact the ARDEX Technical Hot Line on 0800 227 339 to confirm preparatory requirements.

All substrates to be tiled shall be structurally sound, even and smooth, clean, dry, and free from dirt, dust, grease, oil, wax, paint residue, loose plaster and laitance, curing compounds and other materials and contaminants likely to affect the bonding and performance of the specified tile adhesive and grout.

Carry out all necessary moisture readings of substrates. Do not commence installation until the moisture readings for the whole area are below the required level.

Carry out all necessary substrate inspections and preparatory work in accordance with ARDEX recommendations prior to application.

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

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

Confirm the location of any movement control or crack control joints prior to commencement of the works, and ensure that they are appropriately trimmed. Do not cover or bridge movement control joints with tiles, adhesive and grout.

Allow self-levelling underlayments and mortar screeds to properly cure in accordance with the manufacturer's recommendations before commencing tiling.

Allow new concrete substrates to cure for at least four weeks prior to tiling.

Prime porous substrates using ARDEX primers in accordance with the requirements of the respective ARDEX tile adhesive.

Ensure that the back of each tile is clean and free from dust or other contaminants prior to laying.

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

10.4.17.2 Underfloor Heating Systems

Turn off working in-slab under-floor heating systems at least 48 hours prior to installation. Underfloor heating must remain off during installation and for at least 48 hours, or in accordance with ARDEX requirements, after tiling installation.

10.4.17.3 New Concrete Floor

New Concrete Floor - check all aspects of preparatory works, including but not limited to:
- Check that the concrete slab has been formed and finished to the levels and falls indicated on the drawings, including any tanking or waterproofing requirements.
- New concrete floors must have aged for a minimum of 28 days, and have dried over the entire area to a relative humidity of 75% or less.
- Grind off any high spots, and using a proprietary levelling compound repair flush with feathered edges any low spots or damaged areas, then grind smooth.
- Mechanically grind or acid etch very dense concrete surfaces and any surface that is glazed to the extent that may compromise adhesion.
- Leave the surface clean, free of dust and surface contaminants before commencing tiling.
- Check that any protruding or exposed bare metal has been treated with a suitable corrosion-inhibiting primer.

10.4.17.4 New Compressed Fibre Cement Sheet Floor

New Compressed Fibre Cement Sheet Floor - check all aspects of preparatory works, including but not limited to:
- Check that the sheets have been installed, jointed and fixed in accordance with the manufacturer's requirements and indicated on the drawings, and that all sheet edges are fully supported.
- Check that the sheet joints are flush and even, and that all fixings are countersunk and filled with a compatible filler.
- Using a proprietary levelling compound, repair flush with smooth, feathered edges any damaged areas in the floor surface.
- Mechanically sand to remove all surface irregularities and contaminants likely to affect adhesion.
- Leave the surface completely clean and free of dust and contaminants before commencing tiling.

10.4.18 Installation

10.4.18.1 Undertile Liquid-Applied Waterproofing Membranes

Undertile Liquid-Applied Waterproofing Membranes. Install ARDEX liquid-applied waterproofing membranes in strict accordance with the manufacturer's requirements. Refer to separate specification section Waterproofing: ARDEX Liquid-Applied Waterproofing Membranes.

10.4.18.2 Aluminium Trims

Aluminium Trims. As required and indicated on the drawings, install all necessary aluminium tiling trims - including edge cappings, corner mouldings, transition strips, etc., - all neatly finished, accurately aligned and true, according to the tile layout and as detailed on the drawings.

10.4.18.3 Movement Control Joints

Movement Control Joints. Form movement control joints in tiling to the locations and details shown on the drawings and in accordance with AS 3958.1.

Movement control joints in tiling shall coincide with control joints in the substrate and structure, and at junctions between dissimilar substrates and other surface finish materials in the same plane.

Ensure to carry movement control joints through tiling from the substrate. Do not bridge movement control joints with underlayment, membranes, adhesive or tiles.

Seal movement control joints after grouting with the specified flexible sealant in accordance with the sealant manufacturer's instructions and as detailed.

Proprietary movement control joints shall be installed in strict accordance with the manufacturer's instructions and to the layout and details shown on the drawings. Finish tiling against proprietary movement control joints as detailed.

10.4.18.4 Floor Tiles

Floor Tiles. Install floor tiles by direct-stick method to clean, dry and properly prepared substrates in accordance with AS 3958.1 and the respective ARDEX tile adhesive instructions. Accurately set-out and lay tiles to the layout and details shown on the drawings. Confirm the floor tile layout and pattern requirements prior to installation.

Seal or prime porous substrates or substrates where dusting or powdering exists, in accordance with the requirements of the ARDEX tile adhesive.

The use and application of ARDEX tile adhesive shall be exactly to the manufacturer's technical literature.

All tile cutting, boring and shaping shall be carried out using appropriate tools and equipment and methods suitable for the tile type and in accordance with the tile manufacturer's recommendations. Only install cut tiles that have smooth, uniform cut edges - do not use tiles with jagged or flaked edges.

Mechanically mix powdered adhesive at the recommended ratio with clean potable water to a smooth, lump-free paste in accordance with the manufacturer's requirements. Do not mix more than can be used within the specified open time.

Apply ARDEX tile adhesive evenly using a suitably notched trowel to properly prepared substrates in accordance with the manufacturer's instruction.
- Do not apply more adhesive than can be covered within the specified open time.
- Do not over spread the adhesive, and avoid surface skinning - particularly when used in unfavourable conditions such as direct sunlight, wind and/or high temperatures.
- Ensue to follow the adhesive manufacturer's recommended setting and curing periods.

Lay floor tiles into adhesive to achieve maximum contact and bonding before skinning occurs. Re-trowel any adhesive that has skinned - do not apply water to skinned adhesive. Where necessary, back-butter tiles with adhesive to ensure maximum contact and bonding - do not spot-fix floor tiles.

Floor tiles shall be laid so that the finished surface and edges are true and even, level and/or to the falls shown on the drawings, and finished flush with adjoining finished work as appropriate or as detailed.

Tile joints shall be to the required layout, uniform, accurately aligned, straight and true to line, and set even and parallel to the specified joint width.

Where indicated on the drawings, return floor tiles along walls, upstands, toe spaces, etc., to the height and details shown on the drawings.

Remove excess adhesive from tile joints as each tile is laid to ensure full depth grouting can be achieved, and leave the tile surface completely clean.

10.4.18.5 Wall Tiles

Wall Tiles: Install wall tiles by direct-stick method to clean, dry and properly prepared substrates in accordance with AS 3958.1 and the respective ARDEX tile adhesive instructions. Accurately set-out and lay tiles to the layout and details shown on the drawings. Confirm the wall tile layout and pattern requirements prior to installation.

Seal or prime porous substrates or substrates where dusting or powdering exists, in accordance with the requirements of the ARDEX tile adhesive.

The use and application of ARDEX tile adhesive shall be exactly to the manufacturer's technical literature.

All tile cutting, boring and shaping shall be carried out using appropriate tools and equipment and methods suitable for the tile type and in accordance with the tile manufacturer's recommendations. Only install cut tiles that have smooth, uniform cut edges - do not use tiles with jagged or flaked edges.

Mechanically mix powdered adhesive at the recommended ratio with clean potable water to a smooth, lump-free paste in accordance with the manufacturer's requirements. Do not mix more than can be used within the specified open time.

Apply ARDEX tile adhesive evenly using a suitably notched trowel to properly prepared substrates in accordance with the manufacturer's instruction.
- Do not apply more adhesive than can be covered within the specified open time.
- Do not over spread the adhesive, and avoid surface skinning - particularly when used in unfavourable conditions such as direct sunlight, wind and/or high temperatures.
- Ensue to follow the adhesive manufacturer's recommended setting and curing periods.

Press wall tiles into adhesive to achieve maximum contact and bonding before skinning occurs. Re-trowel any adhesive that has skinned - do not apply water to skinned adhesive. Where necessary, back-butter tiles with adhesive to ensure maximum contact and bonding - do not spot-fix wall tiles.

Wall tiles shall be installed so that the finished surface and edges are true and even, level, and finished flush with adjoining work as appropriate or as detailed.

Tile joints shall be to the required layout, uniform, accurately aligned, straight and true to line, level and plumb, and set even and parallel to the specified joint width. Use proprietary tile spacers, sized for the specified joint width, to ensure accurate jointing.

Form internal and external wall corner junctions true and plumb and with tile joints continued around corners level and true.

Remove excess adhesive from tile joints as each tile is laid to ensure full depth grouting can be achieved, and leave the tile surface completely clean.

10.4.18.6 Grouting

Grouting. Tile grouting shall be in accordance with AS 3958.1 and the respective ARDEX tile grout instructions. Coloured grout shall be to the colour specified.

Prior to grouting, ensure that the tile adhesive has set firmly, and that the tile joints are clean, dry and free from excess adhesive and any foreign material. Rake out any excess adhesive from joints to ensure a maximum, uniform grout joint is achieved. Tile spacers must be removed prior to grouting.

Mechanically mix powdered tile grout with clean water at the required ratio to a smooth, lump-free paste in accordance with the manufacturer's requirements. Do not mix more than can be used within the manufacturer's specified open time. Ensue to follow the manufacturer's recommended drying and curing periods.

Apply ARDEX tile grout evenly with a rubber squeegee or grouting float, ensuring that the tile joints are completely filled and smoothed to a dense, uniform surface. Do not spread more grout than can be cleaned within the specified open time. Remove excess grout immediately.

Clean the tiles with a damp sponge when the grout joints have firmed, making sure not to wash-out the joints. Finish grout joints to a smooth, uniform effect and leave grout free of pin holes and blemishes.

Allow grout joints to dry before cleaning with a clean, dry, soft cloth, to completely remove any grout haze and residue from the surface of the tiles.

10.4.18.7 Protection

Protection. Take all necessary measures to protect exterior tiling from the extremes of weather and climate during the fixing and grouting operation and for as long as possible thereafter.

Keep the working area cordoned off during the whole tiling installation. Protect completed tiling from excessive loads, damage and contamination until hand-over or as directed.

Restrict foot traffic from completed floor tiling in accordance with ARDEX time frames for 'set-to-light-foot-traffic' and 'ready-for-service-use'.

Where necessary, cover completed floor tiling with a heavy-duty temporary floor protection such as Ovaboard, Ram Board, Buffalo Board; laid in accordance with the manufacturer's requirements.

Protect exterior tiling, immediately after laying and grouting, from rain and moisture for at least 24 hours, and from frost and strong sunlight after laying in accordance with ARDEX tile adhesive and grout technical specifications.

10.4.19 Completion

Check that the Tiling work has been correctly installed to the required layout, and that all tile joints, edge-trimming and other detailing is correctly finished, grouted and sealed.

Check all tiling work for damage, marks and defects - repair or replace as necessary. Carry out any repairs to the required standard.

Thoroughly clean tiled surfaces in accordance with the manufacturer's recommended procedures and techniques. Lightly buff where appropriate.

Leave all of this work complete and to the required standard, completely clean and without blemish.

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

Protect the completed installation from damage and contamination as necessary until hand-over as scheduled or directed.

Issue to the Owner a copy of all relevant product manufacturers' maintenance requirements, and a copy of the ARDEX NZ Ltd Warranty.

11 FLOOR COVERINGS

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:

1884:2013(NZS AS)	Floor coverings - Resilient sheet and tiles - Installation practices
2455.2:2007(AS/NZS)	Textile floor coverings - Installation practice - Carpet tiles
3661.2:1994(AS/NZS)	Slip resistance of pedestrian surfaces - Part 2: Guide to the reduction of slip hazards
4586:2004(AS/NZS)	Slip resistance classification of new pedestrian surface materials
NZBC D1	Access Routes

11.3 Carpet & Resilient Floor Coverings

11.3.1 Scope

Supply and install the specified Floor Coverings and flooring products to the areas and surfaces, layouts and details shown on the drawings, complete with all accessories. All aspects of this work shall be in accordance with the specified floor covering manufacturers' technical literature and installation requirements, relevant Standards and Code requirements, other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for the specified Floor Coverings and flooring products.

11.3.2 Floor Coverings

11.3.2.1 Carpet

Carpet flooring; to the specified product, pile style and content, and colour and pattern. Installed in accordance with the manufacturer's requirements and AS/NZS 2455.1 to the locations and layout shown on the drawings.

Refer to architectural drawings for selection, if no selection has been specified, please confirm with owner before ordering.

11.3.3 Trim & Accessories

11.3.3.1 Stair Nosing for Carpet Floor Coverings

Stair nosing for carpet floor coverings, to the specified product, material, finish and colour, and size. Installed as stair nosing to carpet covered stairs in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

Manufacturer, brand name & type:
Material:
Finish & colour:
Safety insert colour:
Size:
Floor covering:
Location:

11.3.3.2 Carpet Transition Strip

Carpet to vinyl/thin resilient flooring transition strip; to the specified product, material, finish and colour, and size. Installed as a transition strip between carpet and thin resilient floor coverings in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

Manufacturer, brand name:
Material:
Finish & colour:
Size:
Floor coverings:
Location:

11.3.3.3 Height Transition Strip

Height transition strip; to the specified product, material, and finish and colour, and size. Installed as a height transition strip between floor coverings with variation in thickness in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

Manufacturer, brand name:
Material:
Finish & colour:
Size:
Floor coverings:
Location:

11.3.3.4 Expansion Joint Cover Strip

Expansion joint cover strip; to the specified product, material, finish and colour, and size. Installed in conjunction with vinyl sheet/tile floor coverings as a flexible cover strip over expansion and control joints in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

Manufacturer, brand name:
Material:
Finish & colour:
Size:
Floor covering:
Location:

11.3.4 Floor Levelling Compound

Floor levelling compound, as specified. Applied as a surface preparation to uneven floor substrates for subsequent floor covering laying in accordance with the manufacturer's requirements.

Manufacturer, brand name & type:
Substrate:
Floor covering:
Location:

11.3.5 Underlays

11.3.5.1 Carpet Underlay - Double Bonded Carpet Applications

Double bonded application carpet underlay; to the specified product, material, thickness, weight, and grade. Installed as an underlay for double bonded carpet applications in accordance with the manufacturer's requirements and to the locations and details shown on the drawings.

Manufacturer, brand name: Dunlop, EXCELLAY 7
Thickness & weight kg/m2: 120

11.3.6 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-ordinate with other trades as required to install the specified floor coverings and accessories.

11.3.7 Workmanship

All installation work shall be carried out by experienced and competent floor layers, familiar with the products specified and installation techniques, under the direct supervision of a Registered National Flooring Association (NFA) Member, in accordance with the manufacturer's installation requirements, NZS/AS 1884, AS/NZS 2455.1, AS/NZS 2455.2 and AS/NZS 4586 as relevant, and as noted and detailed on the drawings.
Use only approved adhesives that are compatible with the specified floor covering product and the substrate as recommended by the floor covering manufacturer.
The building must be fully enclosed and weathertight with all doors and necessary fittings and trim installed prior to laying floor coverings.

11.3.8 Delivery & Handling

Store and handle all floor covering products and accessories in accordance with the manufacturer's recommendations. Store products and accessories under cover and out of direct sunlight on a flat and level surface; keep dry and protect from damage and contamination at all times.
Do not use damaged or defective flooring products or accessories, or products that are beyond their designated shelf life. Do not damage or mark or distort flooring products and accessories during handling.

Allow floor coverings and accessories to properly condition for a minimum of 24 hours, or as recommended by the manufacturer, prior to laying in accordance with the manufacturer's requirements. Unless recommended otherwise by the manufacturer, do not lay floor coverings below 15ºC room temperature.

11.3.9 Substrate Preparation

11.3.9.1 General

Ensure the substrate surface is free of oil, grease and other contaminants, then sweep or vacuum as required to ensure it is absolutely clean. Ensure that any expansion or crack control joints are appropriately trimmed - do not install floor coverings over them. The commencement of work on each section of floor shall be deemed to indicate a full acceptance by the relevant Flooring Subcontractor that all preparatory works by other trades are appropriate to achieve the required finished results.

11.3.9.2 New Concrete Floors

New concrete substrates must be compliant with NZS 3114 'U3 Surface Finish' and with the floor covering manufacturer's requirements and must have aged for a minimum of 28 days prior to laying the floor coverings. Check for moisture content by hygrometer reading to BRANZ BU330 - do not commence laying floor coverings until the substrate is surface-dry and the moisture readings are less than 75% relative humidity over the entire surface.
Grind off any high spots on the concrete slab, and using the specified proprietary levelling compound repair flush with feathered edges any low spots or damaged areas then grind smooth.
Lightly grind or shot blast any surface that is glazed to the extent that may compromise the adhesive bond. Leave the surface clean and free of dust and contaminants etc.

Location:

11.3.9.3 New Plywood Floors

Check that the plywood sheets have been laid with staggered joints, with joints gapped 1mm - 2mm and supported on all edges on framing members or unsupported T&G jointed long-edges. Check that the plywood is CD grade (C face up), and is H3.2 CCA treated, and is fixed exactly to the plywood manufacturer's recommendations.
Using the specified proprietary levelling compound, repair flush with feathered edges any damaged areas of the plywood floor.
Mechanically sand to remove all surface irregularities and contaminants likely to effect the floor covering adhesion. Vacuum clean leaving the surface clean and free of dust and contaminants etc.
Check that all plywood sheet joints are flush and even, and that all fixings are countersunk and filled with a compatible filler.
Check to ensure the plywood moisture content is below 12% for air-conditioned spaces, 14% for intermittently heated spaces, and 16% for unheated spaces - do not commence laying floor coverings until the plywood is surface-dry and the moisture readings are less than the required moisture level over the entire area.

Location:

11.3.10 Installation

11.3.10.1 Carpet Floor Coverings - Double Bonded

Install by double bonded method carpet floor coverings, and accessories, including all jointing, in accordance with the manufacturers' recommendations, procedures and techniques, AS/NZS 2455.1, and as shown on the drawings.

Allow the double bonded carpet underlay and carpet floor coverings to properly condition in accordance with the manufacturers' recommendations prior to laying. Turn underfloor heating systems off 48 hours prior to installation and leave off during installation and for a minimum of 48 hours after completion. Thoroughly clean each area before commencing work. Seal or prime as necessary any porous surface receiving floor covering adhesive, and apply adhesive exactly to the manufacturer's recommendations.

Confirm the location of all carpet joints and seams prior to laying. Install carpet rolls in consecutive sequence and in the same direction. Do not install double bonded underlay and carpet floor coverings over expansion joints - use only the specified expansion joint cover strip and neatly finish carpet flooring in accordance with the cover strip manufacturer's requirements.

Lay the double bonded carpet underlay at right angles to the direction of the carpet floor covering and with joints no less than 300mm from any seam in the carpet. Fully bond the underlay to the substrate with the manufacturer's recommended adhesive and roll with a suitably weighted roller to ensure maximum adhesion.

Carpet flooring accurately laid, fitted and jointed and fully bonded to the underlay. All seams and cross joins to be close-fitting and fused together with a low profile heat bond tape. Cut and properly prepare cross joins to ensure accurate pattern alignment. Roll carpet flooring with a suitably weighted roller as recommended by the manufacturer to ensure maximum adhesion to the double bonded underlay.
Accurately install stair tread nosings and lay pre-cut carpet pieces to each stair tread and riser and finish neatly into or under the nosing edge as necessary.
Install any required carpet skirting, capping and edge trim, transition strips and naplock bars, as noted and detailed on the drawings; all finished straight and level and true to line.

Keep the working area cordoned off and protected during installation and protect completed installation work from damage and contamination until hand over of the works as programmed/scheduled.

11.3.11 Completion

Ensure that the specified floor coverings have been installed correctly, and that all seams, joints and accessories have been and completed correctly. Check for damage and defects and repair or replace as necessary.
Thoroughly clean the installed floor coverings in accordance with the manufacturers' recommended techniques and procedures.
Carry out any product specific finishing/polishing applications as recommended only by the floor covering manufacturer.
Leave the works area clean and remove all rubbish and waste material from the site.

Protect the completed works from damage, trafficable dirt and grime, and stains as necessary while other works are in progress.

Issue to the Owner a copy of the Manufacturers' maintenance requirements and a copy of the Manufacturers' Materials Warranties and the Applicators' Installation Warranties for all of the installed floor coverings.

11.4 Overlay Flooring

11.4.1 Scope

Supply and install the specified Overlay Floorings to the locations, layouts and details shown on the drawings, complete with all accessories. All aspects of this work shall be in accordance with the manufacturers' technical literature and installation requirements, relevant Standards and Code requirements, other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for the specified Overlay Floorings.

11.4.2 Overlay Flooring

11.4.2.1 Engineered Timber Overlay Flooring - Floating

Engineered Timber Interlocking Overlay Flooring: prefinished, engineered timber interlocking plank flooring, to the specified product, and surface layer wood species and finish, and size. Installed as a floating overlay floor covering in accordance with the manufacturer's requirements, and as specified, to the locations, layout and details shown on the drawings.

11.4.2.2 Manufactured Laminate Overlay Flooring - Fixed

Laminate Strip Overlay Flooring: prefinished, manufactured laminate interlocking plank flooring, to the specified product, and species and finish, and size. Installed as a fixed overlay floor covering in accordance with the manufacturer's requirements, and as specified, to the locations, layout and details shown on the drawings.

Manufacturer & brand name:
Species/colour code:
Board size:
Location:

11.4.3 Substrate Type

11.4.3.1 Concrete Floor with In-slab Heating - Engineered Timber Overlay Flooring (floating)

The specified floating Engineered Timber Overlay Flooring is to be installed over a concrete floor with an in-slab/screed underfloor heating system.

11.4.3.2 Concrete Floor with In-slab Heating - Manufactured Laminate Overlay Flooring (fixed)

The specified fixed Manufactured Laminate Overlay Flooring is to be installed over a concrete floor with an in-slab/screed underfloor heating system.

11.4.4 Vapour Barrier & Underlays

11.4.4.1 Vapour Barrier - Sheet Membrane

Vapour barrier sheet membrane as specified. Applied to properly prepared concrete floors/screeds for the prevention of moisture vapour transmission, fully adhered to the substrate with all edges and joins overlapped and tape-sealed in accordance with the manufacturer's recommendations. Tape repair any damaged vapour barrier sheet membrane as soon as it occurs.

Manufacturer, brand name & type:
Substrate:
Overlay flooring:
Location:

11.4.4.2 Acoustic Underlay

Acoustic underlay; to the specified product, and material and thickness and weight. Installed as an acoustic underlay to the required Impact Insulation Class (IIC) in accordance with the manufacturer's requirements and to the locations and details shown on the drawings.

Manufacturer, brand name:
Material:
Thickness & weight g/m2:
Required IIC:
Substrate:
Location:

11.4.4.3 Foam Underlay

Foam underlay; to the specified product, and material and thickness and weight. Installed as an underlay over properly prepared substrates to in accordance with the manufacturer's requirements and to the locations and details shown on the drawings. Overlap edges and joins and tape over with a suitable moisture resistant tape. Dress foam underlay up walls to the required level/height.

Manufacturer, brand name:
Material:
Thickness & weight g/m2:
Substrate:
Location:

11.4.5 Floor Levelling Compound

Floor levelling compound, as specified. Applied as a surface preparation to uneven floor substrates for subsequent installation of overlay flooring in accordance with the manufacturer's requirements.

Manufacturer, brand name & type:
Substrate:
Overlay flooring:
Location:

11.4.6 Adhesives

Overlay flooring adhesives shall be as recommended by the overlay flooring manufacturer, and be suitable and compatible with the specified overlay flooring product, substrate type and environment.

Adhesive for fixed manufactured laminate overlay flooring, as specified. Applied in accordance with the manufacturer's instructions and requirements for open time, substrate porosity, ambient temperature, and relative humidity.

Manufacturer & brand name:
Substrate:

11.4.7 Trim & Accessories

11.4.7.1 Edge Trim

Edge trim; Suitable product and material and size. Installed as an edge trim in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

11.4.7.2 Edge Reducing Strip

Edge reducing strip; suitable product, material, and finish. Colour and size TBC by client. Installed as an edge and height transition strip between the overlay flooring and other floor finishes in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

11.4.7.3 Threshold Strip

Threshold strip; suitable product, material, and finish. Colour and size TBC by client. Installed as a threshold strip between the overlay flooring and other floor finishes at door openings in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

11.4.7.4 Expansion Joint Strip

Expansion joint strip; to the specified product, material, finish and colour, and size. Installed in conjunction with the overlay flooring as an expansion strip over expansion and control joints in accordance with the manufacturer's requirements to the locations and details shown on the drawings.

Manufacturer, brand name:
Material:
Finish & colour:
Size:
Overlay flooring:
Location:

11.4.8 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-ordinate with trades the locations of pipes, cables, outlets, and other fittings installed by others, and to install the specified Overlay Flooring as required.

11.4.9 Workmanship

All installation work shall be carried out by experienced and competent installers, familiar with the products specified and installation techniques, in accordance with the manufacturer's installation requirements, AS/NZS 4586, and as noted and detailed on the drawings.
Use only approved adhesives that are compatible with the specified overlay flooring product and the substrate as recommended by the overlay flooring manufacturer.
The building must be fully enclosed and weathertight with all doors and necessary fittings and trim installed prior to laying overlay floorings.

11.4.10 Delivery & Handling

Store and handle overlay flooring products and accessories in accordance with the manufacturer's recommendations. Store products and accessories under cover and out of direct sunlight on a flat and level surface; keep dry and protect from damage and contamination at all times.
Do not use damaged or defective overlay floorings or accessories, or products that are beyond their designated shelf life. Do not damage or mark or distort overlay flooring and accessories during handling.
Allow overlay floorings and accessories to properly condition prior to laying in accordance with the manufacturer's requirements.
Refer to the manufacturer's installation recommendations for minimum and maximum floor and ambient temperatures.

11.4.11 Substrate Preparation

11.4.11.1 In-slab Underfloor Heating

Turn in-slab underfloor heating systems off 48 hours prior to installation and leave off during installation and for a minimum of 48 hours after completion. When turning underfloor heating back on; caution should be taken to initially set the thermostat at maximum 5°C and to daily increase the temperature by maximum 5°C until the required temperature is reached - maximum 27°C or as recommended by the overlay flooring manufacturer.

11.4.11.2 General

Ensure the substrate surface is free of oil, grease and other contaminants, then sweep or vacuum as required to ensure it is absolutely clean. Ensure that any expansion or crack control joints are appropriately trimmed - do not install overlay flooring over them.
The commencement of work on each section of floor shall be deemed to indicate a full acceptance by the relevant Flooring Subcontractor that all preparatory works by other trades are appropriate to achieve the required finished results.

11.4.11.3 New Concrete Floors

New concrete substrates must be allowed to properly dry out and be compliant with NZS 3114 'U3 Surface Finish' and with the overlay flooring manufacturer's requirements and must have aged for a minimum of 28 days prior to laying the overlay floor coverings.
Check for moisture content by hygrometer reading to BRANZ BU330 - do not commence laying overlay flooring until the substrate is surface-dry and the moisture readings are less than 70% relative humidity over the entire surface.
Substrate surfaces must not deviate more than 3mm over 3000mm in any direction and have no abrupt variation greater than 1mm over 250mm.
Grind off any high spots on the concrete slab, and using the specified proprietary levelling compound repair flush with feathered edges any low spots or damaged areas then grind smooth.
Lightly grind or shot blast any surface that is glazed to the extent that may compromise the adhesion of the vapour barrier and/or acoustic underlay. Leave the surface clean and free of dust and contaminants etc.

Location:

11.4.12 Installation

11.4.12.1 Vapour Barrier - Sheet Membrane

Install the specified sheet membrane vapour barrier over the entire area of the prepared concrete substrate, with all edges and joins overlapped and tape-sealed, in accordance with the manufacturer's installation requirements. Tape repair any damaged vapour barrier sheet membrane as soon as it occurs.

11.4.12.2 Acoustic Underlay

Glue-fix the specified acoustic underlay to properly prepared substrates in accordance with the manufacturer's installation instructions.

11.4.12.3 Foam Underlay

Install the specified foam underlay over the entire area in accordance with the manufacturer's installation requirements and with edges and joins overlapped and taped closed with a 48mm wide moisture resistant tape. Dress foam underlay up walls to the required level/height.

11.4.12.4 Engineered Timber Overlay Flooring - Floating

Install the specified engineered timber overlay flooring and accessories in accordance with the manufacturer's recommendations, procedures and techniques, and as shown on the drawings.

Allow engineered timber overlay flooring to properly condition in accordance with the manufacturer's recommendations prior to laying.

Confirm the overlay flooring layout pattern and direction prior to laying. Do not install overlay floor coverings over expansion joints - use only the specified expansion joint and neatly finish overlay flooring in accordance with the manufacturer's requirements.

Engineered timber overlay flooring accurately laid, fitted and jointed without cupping or surface deviation. Leave expansion gap at all fixed objects, walls and flooring transitions and junctions.
Accurately install stair tread nosings and adhesive fix pre-cut timber overlay pieces to each stair tread and riser and neatly finish to the nosing edge as detailed.
Install any required engineered timber skirting, capping and edge trim, transition strips and bars, as noted and detailed on the drawings; all finished straight and level and true to line.

Keep the working area cordoned off and protected during installation and protect completed installation work from damage and contamination until hand over of the works as programmed/scheduled.

11.4.12.5 Manufactured Laminate Overlay Flooring - Fixed

Install the specified manufactured laminate overlay flooring and accessories in accordance with the manufacturer's recommendations, procedures and techniques, and as shown on the drawings.

Allow manufactured laminate overlay flooring to properly condition in accordance with the manufacturer's recommendations prior to laying.

Confirm the overlay flooring layout pattern and direction prior to laying. Do not install overlay floor coverings over expansion joints - use only the specified expansion joint and neatly finish overlay flooring in accordance with the manufacturer's requirements.

Manufactured laminate overlay flooring accurately laid, fitted and jointed, and fully bonded to the substrate without cupping or surface deviation. Leave expansion gap at all fixed objects, walls and flooring transitions and junctions. Remove excess adhesive as the work proceeds.
Accurately install stair tread nosings and adhesive fix pre-cut manufactured laminate overlay pieces to each stair tread and riser and neatly finish to the nosing edge as detailed.
Install any required manufactured laminate skirting, capping and edge trim, transition strips and bars, as noted and detailed on the drawings; all finished straight and level and true to line.

Keep the working area cordoned off and protected during installation and protect completed installation work from damage and contamination until hand over of the works as programmed/scheduled.

11.4.13 Completion

Ensure that the specified Overlay Floorings have been installed correctly, and that all joins and accessories have been and completed correctly. Check for damage and defects and repair or replace as necessary.
Thoroughly clean the installed overlay flooring in accordance with the manufacturers' recommended techniques and procedures.
Carry out any product specific finishing/polishing applications as recommended only by the floor covering manufacturer.
Leave the works area clean and remove all rubbish and waste material from the site.

Protect the completed works from damage, trafficable dirt and grime, and stains as necessary while other works are in progress.

Issue to the Owner a copy of the Manufacturer's maintenance requirements and a copy of the Manufacturer's Material Warranty and the Applicator's Installation Warranty for the installed overlay flooring.

1 2 P L U M B I N G

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:

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
3000:2018(AS|NZS)	Electrical installations - Known as the Australian/New Zealand Wiring Rules
3500.1:2015(AS|NZS)	Plumbing and drainage - Part 1: Water services
3500.1:2018(AS|NZS)	Plumbing and drainage Part 1: Water services
3500.1:2021(AS/NZS)	Plumbing and drainage, Part 1: Water services
3500.2:2015(AS|NZS)	Plumbing and drainage - Part 2: Sanitary plumbing and drainage
3500.2:2018(AS|NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.2:2021 (AS|NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.2:2021(AS|NZS)	Plumbing and drainage, Part 2: Sanitary plumbing and drainage
3500.3:2018(AS|NZS)	Plumbing and drainage Part 3: Stormwater drainage
3500.3:2021(AS|NZS)	Plumbing and drainage, Part 3: Stormwater drainage
3500.4:2015(AS|NZS)	Plumbing and drainage - Part 4: Heated water services
3500.4:2018(AS|NZS)	Plumbing and drainage Part 4: Heated water services
3500.4:2021(AS|NZS)	Plumbing and drainage, Part 4: Heated water services
3500.5:2012(AS/NZS)	Plumbing and drainage - Part 5: Housing Installations
3501:1976(NZS)	Specification for copper tubes for water, gas, and sanitation
4020:2018(AS|NZS)	Testing of products for use in contact with drinking water
4121:2001(NZS)	Design for access and mobility: Buildings and associated facilities
4517:2010(NZS)	Fire sprinkler systems for houses
4602:1988(NZS)	Low pressure copper thermal storage electric water heaters
4603:1985(NZS)	Installation of low pressure thermal storage electric water heaters with copper cylinders (open-vented systems)
4606.1:1989(NZS)	Storage water heaters - General requirements
4607:1989(NZS)	Installation of thermal storage electric water heaters: valve-vented systems
4613:1986(NZS)	Domestic solar water heaters
4614:1986(NZS)	Installation of domestic solar water heating systems
4617:1989(NZS)	Tempering (3-port mixing) valves
4692.1:2005(AS/NZS)	Electric water heaters - Energy consumption, performance and general requirements
5601.1:2013(AS|NZS)	Gas installations - Part 1: General installations
7602:1977(NZS)	Specification for polyethylene pipe (Type 5) for cold water services
7643:1979(NZS)	Code of practice for the installation of unplasticized PVC pipe systems

7646:1978(NZS)	Specification for polyethylene pipes and fittings for gas reticulation
AS/NZS 3500.5:2012	Plumbing and drainage - Part 5: Housing installations
NZBC B2/AS1	Durability
NZBC G11	Gas as an Energy Source
NZBC G12	Water Supplies
NZBC G13/AS1	Sanitary Plumbing

12.3 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.

12.4 Workmanship

12.4.1 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.

12.4.2 Workmanship

All plumbing work shall be carried out by, or under the direct control of, properly qualified tradesmen, and shall be to recognised high standards.

Observe best local trade practice to avoid problems which arise from freezing winter conditions.

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials only to approval. Install seismic restraints to storage tanks and HWCs.

Weatherseal wherever pipes, screws, bolts or other fastenings penetrate an external surface, and particularly roofing; seal with gaskets, flashings (and overflashings if necessary) or mastic as appropriate - any damage that results from failure of such seals will be made good at the Plumber's expense.

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

12.4.3 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.

12.4.4 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.

12.4.5 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.

12.4.6 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.

12.4.7 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.

12.5 Materials

12.5.1 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.

12.5.2 Alternatives

The materials and elements specified indicate the required standards for these works. Alternatives which are equal to or superior to these materials and elements may be tendered for approval.

12.5.3 Materials Separation

Separate dissimilar metals in any circumstances which could produce contact or electrolytic action by a water film, with thick plastic tape, bituminous felt or other inert material. Pipes in contact with or built into concrete or masonry shall be fully spiral wrapped in Denso tape or equal.

12.6 Systems

12.6.1 Wastes & Vents

All traps sized to AS 3500.2. Wastes and vents all uPVC. Wastes shall be to AS 3500.2 falls as a minimum. Vents shall be generally as indicated, but avoid where permissible in compliance with AS 3500.2, or shall be combined above the flood level of the fittings.

Fit bird proof domes to all vents.

12.6.2 Cold Water System

12.6.2.1 Supply From New Connection to Reticulated Supply

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.
Make complete arrangements for the installation of a new connection to the reticulated supply in the street and the main feed and toby in the position shown. Lay on a 20mm main from the 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).

12.6.3 Hot Water System

12.6.3.1 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.

12.6.4 Central Heating

Supply and install all materials, including all minor and incidental items necessary for proper completion of the central heating system specified and shown on the drawings.

Is included in the Plumbing trade, although all work must be carried by experienced tradesmen, be in complete accordance with relevant Regulations and standards, and be in accordance with the best trade practice. Obtain all necessary permits and pay all fees.

Cooperate with other trades to set out required penetrations and ensure that ducts and fittings are correctly incorporated as work proceeds. No account will be taken of abortive works which could have been avoided if full co-ordination had been carried out.

All work shall be such as to leave a neat, efficient, easily maintained and robust installation. Materials, fittings and equipment shall be installed exactly in accordance with the manufacturer's recommendations. Adequately protect all surfaces. Any damage to fittings or surfaces shall be made good by the appropriate trade.

All materials shall be delivered with packaging and labelling intact, shall be the latest appropriate technology but sufficiently service proven, shall be suitable for the intended purpose, and shall be supported by NZ available parts and servicing. Incidentals (tapes, fixings, seals, etc.) shall be appropriate for the application involved.

Leave the works clean and tidy with all discarded material removed, and in full operational order.

Any suggested modifications to improve the efficiency of the systems will be considered for approval, but it remains the Subcontractors responsibility to install neat, efficient, easily maintained and robust installations.

12.7 Elements

12.7.1 Sanitary Fittings

Supply and fix all of the sanitary fittings as scheduled on the drawings. All fittings checked on delivery for 'perfect' condition, and all fittings plain white. Supply and fix all normal accessories that are not usually supplied with the fitting.
The Plumber is responsible for fittings from delivery until Practical Completion of the contract.

12.7.2 Flashings

Ridges, hips, barges, valleys, aprons etc. flashings all supplied and installed by the Roofer. Metal windows flashings (those installed during windows installation ONLY) will be supplied by the windows subcontractor and installed by the Carpenter. All other flashings including wall penetration flashings, soakers, etc. that are required to leave the building completely water and weathertight are the Plumber's responsibility.

All flashings shall be machine folded to profiles as shown or required, incorporating capillary breaks where appropriate, shall be formed in one piece where possible, and lead or other soft edged where required. Stop ends, external angles, junctions etc. soldered or sealed and blind riveted as appropriate.

All flashings 1mm powder coated aluminium unless otherwise noted. Supply the flashings to appropriate trades for building in as work proceeds, with all flashings neatly dressed to substrates.

12.7.3 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.

12.8 Rheem Domestic Electric Water Heaters

12.8.1 Scope

Supply, install and commission the selected Rheem Domestic Electric Water Heaters to the locations shown on the drawings, complete with all necessary fittings and accessories for proper operation and functionality. All aspects of this work shall be in strict accordance with Rheem technical literature and installation requirements (check www.rheem.co.nz, or call 0800 657 336 for the latest editions), other relevant product manufacturers' recommendations, with all relevant Standards, Regulations and Acts, and the Plumbing specification, and as shown on the drawings.

No substitutions are permitted for Rheem Domestic Electric Water Heaters.

12.8.2 Mains Pressure Electric Water Heaters

Rheem 325300 Stainless Steel Mains Pressure Electric Water Heater. 295 litre storage capacity, mains pressure supply, single electric heating element (optional top element). Colorbond casing - suitable for indoor and outdoor installations, 580mm diameter x 1846mm high, solar/heat pump compatible connections.
Maximum 70°C, minimum 60°C thermostat settings. 1000kPa maximum working pressure.
240V/50Hz electrical connection, 3.0kW maximum load.
61kg approximate weight when empty.

Location:

12.8.3 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings prior to installation.
Co-ordinate with all trades to install Rheem Domestic Electric Water Heaters and accessories as required.

12.8.4 Workmanship

Rheem Domestic Electric Water Heater installation shall be carried out by experienced tradesmen, familiar with the specified products and installation techniques, under the direct supervision of a NZ certified Registered Plumber, in accordance with the manufacturer's instructions and with the requirements of AS/NZS 3500.4, AS/NZS 3000, NZBC G12, and with all local codes and regulatory authority requirements.

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.

Adequately protect all surrounding work surfaces during installation. Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Plumber's expense.

12.8.5 Delivery & Handling

Store Rheem Domestic Electric Water Heaters and accessories under cover on a flat surface in accordance with the manufacturer's recommendations. Keep products clean and dry, and protect from damage and contamination. Do not use damaged or defective products. Handle Rheem products in accordance with the manufacturer's recommendations.

12.8.6 Installation

Install the selected Rheem Domestic Electric Water Heaters, complete with accessories, to the locations shown on the drawings in accordance with the Rheem Installation Instructions and complying with the New Zealand Building Code.

Ensure that the required clearances are provided for the servicing and removal of the water heater and accessories, and that the water heater information label / rating plate and thermostat can be viewed and read when installed.
Ensure that the pipework is correctly sized and that a non-return valve is installed on the cold water line to the water heater. Provide a 50mm minimum clear opening around pipes and fittings connected to the water heater that pass through the support platform or floor.
Where required, install a safe tray below the water heater to prevent water damage to the building or property in the event of a leak.
Install a suitable moisture barrier under indoor water heaters installed on a concrete surface that is not fully cured or prone to dampness.
Ensure that the water heater sacrificial anode, if fitted, is the correct anode type.
Seismically restrain water heaters in accordance with NZBC G12/AS1 6.11.4, or Section 203 of NZS 4603, or with the specific design shown on the drawings.

Connect Rheem water heaters to the mains pressure hot and cold water system, with all necessary safety devices, valves, fittings and accessories, to achieve the required operation performance and functionality.
Install relief valve drains to expansion control valves and pressure relief valves in accordance with NZBC G12/AS1 or AS/NZS 3500.4, and follow all requirements when water heaters are located where freezing is likely.

Electrical connections to water heaters must be made in complete accordance with AS/NZS 3000 and the Rheem Installation Instructions. A 20mm flexible conduit is required for the electrical cable to the water heater. The power supply to the water heater must not be switched on until the water heater is filled and a satisfactory megger reading is obtained.

Commission Rheem Domestic Electric Water Heaters in accordance with the manufacturer's instructions.

12.8.7 Completion

Check that the Rheem Domestic Electric Water Heaters have been installed correctly and have been commissioned and are operating at the required performance and functionality. Check that pipework connections are leak free. Check that the water heaters are properly restrained against earthquake forces.
Check for damage, defects, faults and leaks and replace/repair as necessary.
Leave the works area clean and free of rubbish. Remove rubbish and waste material from the site.

Issue to the Owner a copy of the Rheem Domestic Electric Water Heater maintenance requirements and a copy of the Rheem Warranty for the installed water heaters.

Issue all As-Built Documentation required to the relevant parties.

12.9 Aquatherm Flexi Pipe System

12.9.1 Scope

Supply and install aquatherm Flexi Pipe System, complete with pipes, system components, fittings and accessories, as piped hot and cold potable water systems to the layout shown on the drawings. All aspects of this work shall be in strict accordance with aquatherm Flexi Pipe System technical literature and installation requirements and recommendations (check www.aquatherm.co.nz, or call 09 570 7204 for the latest editions), BRANZ Appraisal No.708, other relevant product manufacturers' recommendations, and with all relevant Standards, Regulations and Acts.

No substitutions are permitted for aquatherm Flexi Pipe System products.

12.9.2 Pipe

16mm diameter aquatherm Flexi polyethylene - raised temperature (PE-RT) type 2, black coloured pipe. For Hot & Cold potable water pipework. To the layout shown on the drawings. Supported at maximum 600mm spacings with aquatherm Flexi proprietary pipe clips. Includes aquatherm Flexi 16mm brass couplings, adaptors, junctions and bends, plastic pipe clips, H & C pipe indicators and other associated system accessories.

20mm diameter aquatherm Flexi Pipe polyethylene - raised temperature (PE-RT) type 2, black coloured pipe. For Hot & Cold potable water pipework. To the layout shown on the drawings. Supported at maximum 700mm spacings with aquatherm Flexi proprietary pipe clips.
Includes aquatherm Flexi 20mm brass couplings, adaptors, junctions and bends, plastic pipe clips, H & C pipe indicators and other associated system accessories.

12.9.3 Co-operation

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

Coordinate with all trades to install aquatherm Flexi Pipe System hot and cold water system components and accessories to the required locations, routes and clearances shown on the drawings.

12.9.4 Workmanship

All aquatherm Flexi Pipe System installation shall be carried out by aquatherm certified trained installers, familiar with the specified products and installation techniques, under the direct supervision of a NZ certified Registered Plumber, in accordance with the requirements of NZBC G12/AS1 - in particular Section 7.

Store aquatherm Flexi components and accessories under cover on a flat surface in accordance with the manufacturer's recommendations. Keep products clean and dry, and protect from damage and contamination, and out of direct sunlight. Do not use damaged or defective products.
Handle aquatherm Flexi components and accessories in accordance with the manufacturer's recommendations.

Adequately protect all surrounding work surfaces during installation. Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Plumber's expense.

12.9.5 Installation

All aquatherm Flexi RT Type 2 hot & cold water pipework and accessories and other necessary fittings and fixtures shall be sized and installed in strict accordance with the manufacturer's requirements and relevant Standards and Acts, to the layout, details and schedules shown on the drawings.

All pipework installation requirements and techniques, including but not limited to; cutting, joining and support, shall be in accordance with aquatherm Flexi Pipe technical manual and as detailed or noted on the drawings. In-ground pipes shall be installed to AS/NZS 3500 requirements. All cutting, checking and boring of timber framing for pipework shall be in accordance with NZS 3604, holes shall be correctly sized to allow pipework to expand and contract. Pipework shall be installed and supported in such a manner as to eliminate hammer and flow noise.

Set-out pipework neatly, and firmly support with proprietary pipe clamps at the required spacings. Make allowance for all probable thermal movement and linear expansion to the pipework as necessary.
Pipework shall be run straight and true to line, parallel with and at right angles to structural elements, and with a minimum number of bends - avoid diagonal piping. Neatly align support brackets, fittings and components to multiple pipe runs.
Protect aquatherm Flexi pipework with aquatherm Corrugated pipe, correctly sized, for UV and mechanical protection in accordance aquatherm requirements.
Install exterior sleeved pipes on stand-off brackets. Fixings to the exterior or damp locations shall be hot dip galvanized unless otherwise noted.
Sleeves for pipes penetrating concrete or masonry shall be uPVC, 20mm minimum larger internal diameter than the external diameter of the pipe, set at right angles to the surface, finished flush, packed and mastic sealed.
Install all other necessary system components, fittings and fixtures to complete the hot and cold water system as shown on the drawings.

Weather-seal wherever pipes and fastenings penetrate an external surface; seal with gaskets, flashings (and over-flashings if necessary) or mastic as appropriate.
Fire-protect all pipework that penetrate fire-rated floors and walls with intumescent foaming sealant for joints up to 10mm, and with intumescent stopping putty for gaps over 10mm. Where required fit approved intumescent type fire collars to pipes located such that the fire rating of the wall or ceiling is maintained.
Pipework insulation: preformed hollow sections to the pipe diameters with a minimum wall thickness as recommended by aquatherm Flex Pipe, and installed to the insulation manufacturer's recommendations.

Connect pipework to the main supply and to all hot & cold water fittings & outlets as necessary in preparation for system testing.

12.9.6 Completion

Check that all aquatherm Flexi pipework has been installed correctly in accordance with the manufacturer's recommendations and as shown on the drawings.
Check for damage and faults and repair as necessary. Charge the system and flush out pipework free of trapped air and foreign matter with clean, fresh water, and leave filters clean and free of contaminants.
Fully pressure test the completed system to aquatherm Flex Pipe requirements and leave leak-free.
Leave the works area clean and free of rubbish, remove rubbish and waste material from the site.

Issue to the Owner a copy of the aquatherm Flex Pipe maintenance requirements and a copy of the aquatherm Flex Pipe Warranty for the installed system.

Issue all As-Built Documentation required to the relevant parties.

1 3 D R A I N L A Y I N G

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:

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 E1/AS1	Surface Water
NZBC G13/AS2	Foul Water Drainage

13.3 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.

13.4 Workmanship

13.4.1 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.

13.4.2 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.

13.4.3 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.

13.4.4 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.

13.4.5 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.

13.5 Elements

13.5.1 Drainlaying

Commence drainlaying at the low end of even fall sections of drains and proceed in a continuous sequence to the fittings connections.

Sumps, gullies, etc. solidly bedded. Lay 110mm uPVC drains to connect gullies, sumps, stacks, and downpipes through to the street edge connections.

Every junction and bend shall be an inspection position. Temporarily seal the open ends of incomplete drains to prevent entry of foreign matter. Make appropriate provision for any anticipated differential settlement. Place signal strip above all drains.

Ensure that stormwater drains are very accurately positioned so that downpipes can drop directly into them, without offsets.

13.5.2 Testing

The sewer and stormwater systems shall both be fully tested to the approval of the Territorial Authority Inspector before being covered in. If any defects show rectify and then fully retest.

13.5.3 As Built Drawings

During drainlaying plot the location of all bends and changes in direction and all cleaning access positions. Locate each item by two diagonal measures from structure corners, etc. and record on a blank plan copy (supplied by Architect/Designer when requested).

Note that Practical Completion of the contract will not be certified until this as-built drawing has been produced (made available to the Contractor in time for the Code Compliance Certificate application.

13.6 Foul Water Drainage

13.6.1 Scope

Supply, install, test and commission new, gravity-flow foul water drains on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for satisfactory completion and performance of the foul water drainage system. All aspects of this works shall comply with the requirements of the NZ Building Code, related compliance Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the approved drawings and schedules. Ancillary work and/or services not specifically mentioned but necessary to complete the work to specified levels of performance shall be deemed included.

Install foul water drains in natural ground, beneath and external to the building, for the distances indicated on the drawings. Allow for all ventilation requirements, inspection openings, bends, branches, manholes, inspection chambers, overflow gully traps, etc., as required and indicated on the drawings. Unless shown otherwise, the foul water drains shall be connected to the building's sanitary drainage system, and discharge to the foul water network.

The foul water drainage plans are diagrammatic only. Allow for all necessary vents, inspection fittings, cleaning eyes, traps and venting in accordance with AS/NZS 3500.2 and to comply with the New Zealand Building Code, and as required by the Territorial Authority. Refer to the drawings for the dimensioned locations of sanitary waste pipes and outlets.

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

13.6.2 Requirements

13.6.2.1 Safety

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

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

13.6.2.2 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 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.

13.6.2.3 Work on Public Property

Excavation and reinstatement of public property shall comply with the requirements of the relevant controlling authorities.

Obtain all necessary approvals and permits from the controlling authorities before commencing work on public property.

Arrange and pay for any excavation and reinstatement inspections of public property required by the controlling authorities.

Before commencing any excavation in or reinstatement work to public footpaths, driveway crossings, roads or other public property, make all necessary enquiries to the relevant controlling authority for their standards for excavation and reinstatement.

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

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

Remove dirt and contamination deposited on public property to the satisfaction of the controlling authorities.

13.6.2.4 Notifiable Work

Notify WorkSafe NZ of work that is notifiable (particular hazardous work) under the Health and Safety in Employment Regulations 1995, 24 hours before starting the work.

13.6.2.5 Explosives

The use of explosives is NOT permitted.

13.6.2.6 Inspections

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

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

13.6.2.7 Testing

Carry out all necessary testing of the foul water drainage installations, and demonstrate to the Contract Administrator and the controlling Territorial Authority that the installations are watertight and comply with the requirements of the New Zealand Building Code, related compliance Standards, and the design documents.

13.6.2.8 Co-operation

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

Coordinate with other trades as necessary to install foul water drains to the required locations and layouts.

13.6.2.9 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.

13.6.2.10 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.

13.6.2.11 Delivery & Handling

Store foul water drain pipes and accessories undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep pipes and accessories out of direct sunlight and protected from damage and contamination at all times.

Where possible, store pre-packed PVC pipes in the original delivery crate.
Store loose PVC pipes on evenly spaced bearers at maximum 1.0m centres, with pipe sockets alternated so the the sockets do not bear on each other, and with side supports if pipes are stacked more than two layers high. When loose PVC pipes are stacked in a pyramid, the maximum stack height shall be 1.0m and the bottom pipes shall be chocked.

Do not used damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

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

Conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - in particular the 'OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry' and the 'Excavation Safety - Good Practice Guidelines'.

13.6.2.12 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.

13.6.2.13 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.

13.6.3 Materials

13.6.3.1 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.

13.6.3.2 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.

13.6.3.3 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.

13.6.3.4 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).

13.6.3.5 Cement Mortar

Cement mortar shall consist of one part cement and two parts of fine aggregate measured by volume, properly mixed with the minimum amount of clean water necessary to render the mix workable. Do not use cement mortar that has been mixed and left standing for more than one hour.

13.6.3.6 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.

13.6.3.7 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.

13.6.3.8 Marking Tape

Marking tape shall be located just above the top of the pipe embedment zone, and centred over the pipe.

Non-Detectable Marking Tape:
- Non-detectable marking tape shall comply with AS/NZS 2648.1.
- Tape width shall be 100mm minimum.
- Height of message letters shall be 40mm minimum.

Detectable Marking Tape:
- Detectable marking tape shall comply with AS/NZS 2648.1.
- Tape width shall be 100mm minimum.
- Tracer wire shall be stainless steel grade 316 or copper alloy designation 122.
- Tracer wire shall allow at least 25% elongation of the plastic tape before breakage of the wire.
- Height of message letters shall be 40mm minimum.

13.6.4 Trench Excavation

13.6.4.1 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.

13.6.4.2 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 3500.2.

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.

13.6.5 Pipe Laying

13.6.5.1 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.

13.6.5.2 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.

13.6.5.3 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.

13.6.5.4 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.

13.6.5.5 Jointing - Solvent Cement Welded Joints

Solvent welded joints shall only be used for jointing PVC-U pipes and fittings where rubber-ring jointed fittings are not manufactured. Use only cleaner primers and solvent cements specified by the manufacturer for the application and socket type. Only sockets complying with the relevant Standard shall be installed. Do not use cleaner primers or solvent cements if the 'use by' date has expired. 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.

Solvent welded joints shall be assembled in accordance with the manufacturer's instructions and generally as follows:
- Solvent welding shall only be carried out in dry conditions above 5°C.
- Ensure the components are dry, clean and free of dust, dirt, grease and surface contaminants during all stages of the jointing process.
- Prior to welding, the components shall be assembled dry and checked for position and alignment to ensure accurate re-assembly in the correct position.
- Mark the spigot with a witness mark (pencil, not scored) at a distance equivalent to the internal depth of the socket.
- Dry the spigot end, up to the witness mark, and the socket interior, then clean and degrease with a clean cloth moistened with the pipe or fitting manufacturer’s specified priming fluid.
- Apply an even coating of solvent cement to the internal surface of the socket for the full engagement length, and to the external section of the spigot up to the witness mark.
- Only use the minimum amount of solvent cement in the socket necessary for a fully solvent-welded joint.
- Insert the spigot close to, but not beyond, the witness mark. Do not use excessive force. Firmly restrain the joint for the minimum period recommended by the pipe manufacturer.
- Wipe off excess solvent cement from the outside of the joint, and where possible from the inside.
- Adhere to the manufacturer's specified procedures and time frames for filling and testing pipework.
- Allow all solvent welded joints to fully cure before subjecting pipework to any imposed load or testing.

13.6.5.6 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.

13.6.5.7 Marking Tape

Install marking tape on top of the pipe embedment zone and centred over the pipe before commencing backfilling.

13.6.6 Connection

13.6.6.1 Public Network - Boundary Connection

Connect to discharge the foul water drainage line directly to the public mains street-edge/boundary connection in accordance with the requirements of the Territorial Authority and as shown on the drawings.

13.6.7 Testing

13.6.7.1 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.

13.6.8 Backfilling

13.6.8.1 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 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.

13.6.9 Reinstatement of Surfaces

13.6.9.1 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.

13.6.9.2 Public Property

Reinstatement of surfaces to public property shall comply with the requirements of the relevant controlling authorities.

13.7 Surface Water Drainage

13.7.1 Scope

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

Supply, install and commission new, gravity-flow exterior surface water drainage on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for the satisfactory completion and performance of the surface water and stormwater systems. All aspects of this works shall comply with the requirements of the NZ Building Code, related compliance Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the design drawings and schedules. Ancillary work and/or services not specifically mentioned but necessary to complete the installation shall be deemed included.

This specification should be read in conjunction with other relevant specification sections, in particular Stormwater Drainage and Site Works, as they are interrelated.

13.7.2 Requirements

13.7.2.1 Safety

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

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

13.7.2.2 Compliance

Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the drainage works.

13.7.2.3 Inspections

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

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

13.7.2.4 Co-operation

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

Coordinate with other trades as necessary to install surface water drainage facilities at the required locations and layout.

13.7.2.5 Workmanship

Surface water drainage work shall be carried out by qualified and experienced tradespersons, familiar with all required installation requirements, under the direct supervision of a NZ certified Registered Drain Layer, to comply with the New Zealand Building Code, and all local codes and regulatory authority requirements, and the conditions of the Building Consent.

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

Carry out all necessary inspections during installation to ensure compliance with the design specifications and regulatory requirements.

Take all necessary precautions during installation to protect the drainage system from damage and contamination from substances that could damage or impede the operation of the drainage system.

Ensure installed components are adequately protected from any damage and excessive loading during the remaining construction period.

Protect adjacent finished work and surfaces from damage and contamination during installation. Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Drain Layer's expense.

Any associated electrical wiring and prescribed electrical work (by others) shall be carried out by a qualified electrician in accordance with the electrical standards and regulations and the Electrical specification.

13.7.2.6 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected surface water drainage materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional expense to the Principal.

13.7.2.7 Delivery & Handling

Store manufactured materials undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep PVC-U and PE components out of direct sunlight and protected from damage and contamination at all times.

Store loose PVC-U pipes on evenly spaced bearers at maximum 1.0m centres, with pipe sockets alternated so the the sockets do not bear on each other, and with side supports if pipes are stacked more than two layers high. When loose PVC-U pipes are stacked in a pyramid, the maximum stack height shall be 1.0m and the bottom pipes shall be chocked.

Do not used damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC-U or PE materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

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

Conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - in particular the 'Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry', and where relevant, the 'Excavation Safety - Good Practice Guidelines'.

13.7.2.8 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare As-Built Drawings of surface water drainage associated with the stormwater drainage system, that accurately record the new and/or modified stormwater drainage installation.

Information shall include, but not limited to, type, class and size of all pipes, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, manholes, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

13.7.2.9 Stormwater Drains

Stormwater Drains. Refer to separate specification section - Stormwater Drainage.

13.7.2.10 Paved Surfaces

Paved Surfaces. Refer to separate specification section - Siteworks.

13.7.3 Materials

13.7.3.1 General

Supply and deliver to the site all materials and components required for the satisfactory completion of the surface water drainage works. All manufactured materials shall be fit for purpose, new and free from damage and defects.

13.7.3.2 PVC-U Pipes & Fittings

PVC-U Pipes & Fittings. PVC-U stormwater drain pipes and fittings for non-pressure applications shall comply with AS/NZS 1254: 'PVC-U pipes and fittings for stormwater and surface water applications'. Installed in accordance with AS/NZS 3500.3 and AS/NZS 2032 or AS/NZS 2566.2

Pipe Classification:
Class SN4-SN6 - Rubber Ring Joint or Solvent Welded Joint. For domestic and residential applications, and low load areas.
Class SN8-SN10 - Rubber Ring Joint or Solvent Welded Joint. For commercial and industrial applications, and medium load areas.
Class SN16 - Rubber Ring Joint or Solvent Welded Joint. For heavy traffic load areas.

13.7.3.3 Catchpits - Moulded Plastic

Moulded Plastic Catchpits/Sumps. Proprietary moulded polypropylene stormwater catchpits (sumps) complete with grate, as specified, installed to the locations, dimensions, levels and details shown on the drawings.

Connect installed catchpits to the stormwater drainage system in accordance with the requirements of the manufacturer's requirements and as shown on the drawings.

Brand/Series:
Dimensions:
Capacity:
Grate Material, Load Class:

13.7.3.4 Concrete

Except where specified otherwise on the drawings, cast insitu concrete used for surface water drainage installations shall be 20 MPa Normal Concrete complying with NZS 3104.

13.7.3.5 Reinforcing Steel

Steel reinforcing materials for cast-insitu concrete elements shall comply with AS/NZS 4671. Except where specified otherwise on the drawings, bars shall be Grade 300 deformed.

13.7.3.6 Cement Mortar

Cement mortar shall consist of one part cement and two parts of fine aggregate measured by volume, properly mixed with the minimum amount of clean water necessary to render the mix workable. Do not use cement mortar that has been mixed and left standing for more than one hour.

13.7.3.7 Bedding & Surround Material

Granular Material:
- Except where specified otherwise on the drawings, granular bedding and surround material shall be GAP 7 - General All Passing 7mm - clean, granular, non-cohesive crushed rock or gravel screenings, that is free from organic material and clay, with a moisture content appropriate to the degree of compaction required.
- If the bedding material is contaminated or an excessive amount of oversized particles are present, the bedding material shall be rejected and not used.

Concrete - non-load-bearing applications:
- Except where specified otherwise, concrete bedding and surround material used for non-load-bearing applications shall be 10 MPa ordinary grade concrete complying with NZS 3104.

Concrete - load-bearing applications:
- Except where specified otherwise, concrete bedding and surround material used for load-bearing applications shall be 25 MPa ordinary grade concrete complying with NZS 3104.

13.7.4 Excavation

13.7.4.1 Existing Paved Surfaces

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.

13.7.4.2 Excavation

Locate all existing buried services before commencing excavation work in any area.

Excavations shall be of sufficient depth and width for proper installation of catchpits and surface water drains (channel, slot), and their connections to in-ground stormwater drains, according to the layout and levels shown or implied on the drawings. Excavate to accommodate all required bedding and encasement. Finish excavations with a flat bottom, relative to the grades and levels of finished paved surfaces.

13.7.4.3 Dewatering

Take all necessary precautions to keep trenches and pits free from water. Provide all necessary pumps, drainage pipes and other equipments required for dewatering. Install all necessary filtering and detention measures required by the Territorial Authority.

If the bottom of the trench is likely to be adversely affected by rain, remove the final 80mm of excavation as a separate operation immediately before placing the bedding material.

13.7.5 Connection

13.7.5.1 On-Site - to Soak Pit

Connect to discharge surface water drainage lines directly to the on-site stormwater soak pit in accordance with the requirements of the Territorial Authority and as shown on the drawings.

13.8 Stormwater Drainage

13.8.1 Scope

Supply, install, test and commission new, gravity-flow stormwater drains on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for the satisfactory completion and performance of the stormwater system. All aspects of this works shall comply with the requirements of the NZ Building Code, related compliance Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the design drawings and schedules. Ancillary work and/or services not specifically mentioned but necessary to complete the installation shall be deemed included.

Install stormwater drains in natural ground, beneath and/or external to the building, for the distances indicated on the drawings. Allow for all inspection openings, bends, branches, manholes, inspection chambers, etc., as required and indicated on the drawings. Unless shown otherwise on the drawings, the stormwater drains shall be connected to the roof and surface stormwater installations, and discharge to the stormwater network.

The stormwater drainage plans are diagrammatic only. Allow for all necessary inspection fittings, cleaning eyes, and traps in accordance with AS/NZS 3500.3 and to comply with the New Zealand Building Code, and as required by the Territorial Authority. Refer to the drawings for the dimensioned locations of roof drainage system rainwater pipes and outlets, and surface drainage outlets, etc.

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

13.8.2 Requirements

13.8.2.1 Safety

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

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

13.8.2.2 Compliance

Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the 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.

13.8.2.3 Work on Public Property

Excavation and reinstatement of public property shall comply with the requirements of the relevant controlling authorities.

Obtain all necessary approvals and permits from the controlling authorities before commencing work on public property.

Arrange and pay for any excavation and reinstatement inspections of public property required by the controlling authorities.

Before commencing any excavation in or reinstatement work to public footpaths, driveway crossings, roads or other public property, make all necessary enquiries to the relevant controlling authority for their standards for excavation and reinstatement.

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

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

Remove dirt and contamination deposited on public property to the satisfaction of the controlling authorities.

13.8.2.4 Notifiable Work

Notify WorkSafe NZ of work that is notifiable (particular hazardous work) under the Health and Safety in Employment Regulations 1995, 24 hours before starting the work.

13.8.2.5 Explosives

The use of explosives is NOT permitted.

13.8.2.6 Inspections

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

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

13.8.2.7 Testing

Carry out all necessary testing of the stormwater drainage installations, and demonstrate to the Contract Administrator and the Territorial Authority that the installations are watertight and comply with the requirements of the New Zealand Building Code, related compliance Standards, and the design documents.

13.8.2.8 CCTV Inspection

Where required by the Territorial Authority and in addition to pressure testing, CCTV acceptance inspection of new drains shall be carried out in accordance with the New Zealand Pipe Inspection Manual.

All defects identified by the CCTV inspection shall be rectified to the required standard, without cost to the Principal, and the relevant section of pipeline tested and/or inspected again.

13.8.2.9 Redundant Drains

Where an existing drain or part thereof is no longer required, it shall be disconnected from the service at the junction of the live drain or at the property boundary, and be appropriately sealed-off watertight in accordance with AS/NZS 3500.3. Advise the controlling Territorial Authority of the final sealing treatment.

13.8.2.10 Co-operation

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

Coordinate with other trades as necessary to install stormwater drains to the required locations and layout.

13.8.2.11 Workmanship

Stormwater drainage work shall be carried out by qualified and experienced tradespersons, familiar with all required installation requirements, under the direct supervision of a NZ certified Registered Drain Layer, in accordance with AS/NZS 3500.3 and to comply with the New Zealand Building Code, and all local codes and regulatory authority requirements, and the conditions of the Building Consent.

All pipe cutting, jointing, and supporting techniques shall be exactly as recommended by the pipe manufacturer. Pipes, fittings and accessories shall be handled and installed in such a manner that prevents any damage to the component.

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

Carry out all necessary inspections and tests during installation to ensure compliance with the design specifications and regulatory requirements. Provide test result sheets to the Contract Administrator to show compliance has been achieved.

Take all necessary precautions during installation to protect the stormwater drainage system from damage, and to prevent the entry of:
- soil, sand, or rock;
- sewage, including the contents of any septic tank, or trade waste; or
- any other substance that could damage or impede the operation of the stormwater drainage network.

Ensure that any installed drain is adequately protected from any damage and excessive loading during the remaining construction period.

Protect adjacent finished work and surfaces from damage and contamination during installation. Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Drain Layer's expense.

Any associated electrical wiring and prescribed electrical work (by others) shall be carried out by a qualified electrician in accordance with the electrical standards and regulations and the Electrical specification.

13.8.2.12 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected stormwater drainage materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional expense to the Principal.

13.8.2.13 Delivery & Handling

Store stormwater drain pipes and accessories undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep pipes and accessories out of direct sunlight and protected from damage and contamination at all times.

Store loose PVC-U pipes on evenly spaced bearers at maximum 1.0m centres, with pipe sockets alternated so the the sockets do not bear on each other, and with side supports if pipes are stacked more than two layers high. When loose PVC-U pipes are stacked in a pyramid, the maximum stack height shall be 1.0m and the bottom pipes shall be chocked.

Do not used damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC-U materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

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

Conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - in particular the 'Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry' and the 'Excavation Safety - Good Practice Guidelines'.

13.8.2.14 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare As-Built Drawings of the stormwater drainage system, that accurately record the new and/or modified stormwater drainage installation.

Information shall include, but not limited to, type, class and size of all pipes, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, manholes, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

13.8.2.15 Warranties

On completion and before Practical Completion, provide all relevant manufacturer/supplier warranties in favour of the Principal, covering materials, equipment, proprietary products, etc., supplied and installed.

13.8.3 Materials

13.8.3.1 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.

13.8.3.2 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.

13.8.3.3 Concrete

Cast insitu concrete used for stormwater drainage installation shall be 20 MPa Normal Concrete complying with NZS 3104. Where specified, used as bedding, capping and surround concrete, and for any cast-insitu concrete elements (to NZS 3104 unless specified otherwise).

13.8.3.4 Reinforcing Steel

Steel reinforcing materials for cast-insitu concrete elements shall comply with AS/NZS 4671. Unless specified otherwise on the drawings, bars shall be Grade 300 deformed.

13.8.3.5 Cement Mortar

Cement mortar shall consist of one part cement and two parts of fine aggregate measured by volume, properly mixed with the minimum amount of clean water necessary to render the mix workable. Do not use cement mortar that has been mixed and left standing for more than one hour.

13.8.3.6 Bedding & Surround Material

Except where specified otherwise, bedding (underlay, side support, overlay) material for PVC-U pipes shall be GAP 7 - General All Passing 7mm - clean, granular, non-cohesive crushed rock or gravel screenings, that is free from organic material and clay, with a moisture content appropriate to the degree of compaction required. If the bedding material is contaminated or an excessive amount of oversized particles are present, the bedding material shall be rejected and not used.

13.8.3.7 Backfill Material

Except where specified otherwise, backfill material above the pipe embedment layer (150mm above the top of pipe) shall be selected ordinary excavated material that is free from any builder's waste, any organic material, any rocks or hard matter larger than 20mm, and any soil lumps larger than 75mm.

Except where specified otherwise, pipes beneath private roadways and where subject to vehicular traffic - all backfill from the top of the embedment layer (150mm above top of pipe) to the underside of the pavement layer shall be GAP 65 - General All Passing 65mm.

Mechanically compact backfill material in layers not exceeding 300mm to a relative compaction no less than 95% of the NZ Standard Compaction.

Trenches in public footpaths and roads shall be backfilled in accordance with the requirements of the controlling authority.

13.8.4 Trench Excavation

13.8.4.1 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.

13.8.4.2 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.

13.8.4.3 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.

13.8.4.4 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.

13.8.5 Pipe Laying

13.8.5.1 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.

13.8.5.2 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.

13.8.5.3 Steep Gradients

Where the gradient of a stormwater drain pipe exceeds 1:5 (20%), anchor blocks shall be installed at the bend or junction at the top and bottom of the inclined drain, and at intervals not exceeding 3m. Anchor blocks shall be constructed in accordance with AS/NZS 3500.3: Section 7.9.

13.8.5.4 Underground Drains Near & Under Buildings

Protect underground drains near and under buildings against damage in accordance with AS/NZS 3500.3 where the minimum cover specified cannot be provided.

13.8.5.5 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.

13.8.5.6 Jointing - Solvent Welded Joints

Solvent welded joints shall be used for jointing PVC-U pipes and fittings where rubber-ring jointed fittings are not manufactured. Use only cleaner primers and solvent cements specified by the manufacturer for the application and socket type. Only sockets complying with the relevant Standard shall be installed. Do not use cleaner primers or solvent cements if the 'use by' date has expired. 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.

Solvent welded joints shall be assembled in accordance with the manufacturer's instructions and generally as follows:
- Solvent welding shall only be carried out in dry conditions above 5°C.
- Ensure the components are dry, clean and free of dust, dirt, grease and surface contaminants during all stages of the jointing process.
- Prior to welding, the components shall be assembled dry and checked for position and alignment to ensure accurate re-assembly in the correct position.
- Mark the spigot with a witness mark (pencil, not scored) at a distance equivalent to the internal depth of the socket.
- Dry the spigot end, up to the witness mark, and the socket interior, then clean and degrease with a clean cloth moistened with the pipe or fitting manufacturer’s specified priming fluid.
- Apply an even coating of solvent cement to the internal surface of the socket for the full engagement length, and to the external section of the spigot up to the witness mark.
- Only use the minimum amount of solvent cement in the socket necessary for a fully solvent-welded joint.
- Insert the spigot close to, but not beyond, the witness mark. Do not use excessive force. Firmly restrain the joint for the minimum period recommended by the pipe manufacturer.
- Wipe off excess solvent cement from the outside of the joint, and where possible from the inside.
- Adhere to the manufacturer's specified procedures and time frames for filling and testing pipework.
- Allow all solvent welded joints to fully cure before subjecting pipework to any imposed load or testing.

13.8.5.7 Pipe Cover

Unless specified otherwise on the drawings, the minimum pipe cover (finished surface to top of pipe) shall be:
- where not subject to vehicular loading: 300mm.
- where subject to vehicular loading - not in roadways: 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.

13.8.6 Connection

13.8.6.1 On-Site - to Soak Pit

Connect to discharge the stormwater drainage line directly to the on-site stormwater soak pit in accordance with the requirements of the Territorial Authority and as shown on the drawings.

13.8.7 Testing

13.8.7.1 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.

13.8.7.2 Water Test Procedure - to AS/NZS 3500.3

Water test procedure of stormwater drains (non-pressure) - to AS/NZS 3500.3: Section 9.4: The head of water on any section of drain shall not exceed 3m.

The procedure shall be as follows:
- Seal all openings except the top of the section of the below-ground drain to be tested.
- Fill the below-ground drain with water to the highest level in that section.
- 10 minutes for vitrified clay drains; or
- 5 minutes for drains of any other material.

The drain shall be deemed to have passed the test if no make-up water is required.

13.8.8 Backfilling

13.8.8.1 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.

13.8.9 Reinstatement of Surfaces

13.8.9.1 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.

14 ELECTRICAL

14.1 Preliminary

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

14.2 Compliance

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

Comply with all relevant provisions and recommendations of:

2053.1:2001(AS/NZS)	Conduits and fittings for electrical installations - General requirements
2201.1:2007(AS/NZS)	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
2293.2:2019(AS|NZS)	Emergency lighting and exit signs for buildings - Part 2: Routine service and maintenance
3000:2018(AS|NZS)	Electrical installations - Known as the Australian/New Zealand Wiring Rules
3100:2009(AS/NZS)	Approval and test specification - General requirements for electrical equipment
3112:2011(AS/NZS)	Approval and test specification - Plugs and socket-outlets
4512:2010(NZS)	Fire detection and alarm systems in buildings
4514:2009(NZS)	Interconnected smoke alarms for houses
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

14.3 Workmanship

14.3.1 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 interior wall elevations) or specified otherwise in the electrical notes in the architectural drawings, the mounting height to the centreline of the following items above the floor shall be:

-1000mm for lighting switches;
-2000mm for wall mounted lights;
-400mm for power points, except at benches.

(Notify the Architect ural 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.

14.3.2 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.

14.3.3 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.

14.3.4 Wiring

Joints within cable runs will not normally be accepted. TPS cable shall be adequately supported, and clipped at regular intervals. At terminations all strands of conductors shall be fully secured in a terminal block or clamped under a screw head washer; do not cut away any strands. Wiring which terminates in enclosed fittings and/or where subject to heat liable to cause deterioration, shall be high temperature type, with the tails made off with heat resisting sleeves, to protect the permanent wiring.

Wire lights in 1.5mm 3 core - 7.5 amps loading max per circuit (allow for 100w to all light fittings unless identified otherwise).
Wire power outlets in 2.5mm 3 core - 7 maximum GPO singles or doubles per circuit. Assess power outlets for specific equipment and allow accordingly.

Conceal all wiring except as noted on drawings or below. All wiring cast into concrete shall be run in conduit pipes. All cables shall be stranded (single core is unacceptable).

Wire more or less parallel to and at right angles to the structural elements - avoid any diagonal wiring. Layout of the principal distribution wiring shall be to approval. Position all wires to minimise the risk of damage from subsequent nailing of linings etc.

Generally, do not run TPS horizontally within timber walls except in the area up to 300mm above floor. Wire in the ceiling framing and drop vertically to outlets and switches.

Do not run TPS horizontally within partitions except in the area up to 300mm above floor. Wire in the ceiling void and drop vertically to outlets and switches. Principal wiring in the ceiling void shall be supported on adequate catenaries.

Wire exterior lighting in screened cable.

14.4 Systems

14.4.1 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.

14.4.2 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 the type and location as shown in the architectural drawings. 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.

14.5 Materials & Control

14.5.1 Materials

All materials delivered with packaging and labeling intact. All required incidentals (insulating tape, seals, fixings, etc.) shall be completely appropriate for the application involved. The use of items damaged in any way is subject to approval in each instance.

14.5.2 Switchboard

The main switchboard and the subboard(s) shall be appropriate sized standard PDL DBF series boards installed fully recessed where shown and at 2m to the top of the boards. Install appropriate sized MCB's for all circuits, including a minimum of two power and one lighting RCDs as required to cover all outlets to each board. Submain(s) from the main switchboard to the subboard(s) shall be neutral screened 16mm or 2 x 16mm as appropriate, run along the routes indicated / as approved. Pay particular attention to spreading the distribution of the various probable loadings evenly across the phases to obtain an optimum balance of the system.

14.6 Elements

14.6.1 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.

14.6.2 Light Fittings

All light fittings are identified as to type on the drawing, and will be supplied by the Principal. Take delivery, install in accordance with any directions supplied and protect until Practical Completion.

14.6.3 Tele Communications

Workmanship shall be recognised best trade practice, and in accordance with the manufacturers' recommendations. All work shall be by competent and experienced operatives.

14.6.4 Other Wired Services

Co-operate with all other trades to ensure that the following services are installed complete and in accordance with their manufacturer’s recommendations with all normal or necessary incidentals and with all wiring concealed.

-SKY TV.
-Stereo Unit.
-Central Vacuum System.
-Garage door operating mechanisms.
-Gas hot water supply unit installed complete by the Plumber - supply electrical feed and connect.
-Wall mounted fan heaters.
-Front door bell as noted - supply and install.
-Kitchen, laundry and wet areas air exhaust fans and ducting as noted - supply and install.
-Cupboard heaters - supply and install.
-Infrared / movement / daylight sensor switches as noted.
-Under-tile electric heating to the bathroom and shower room complete with thermostat control installed where shown. Supply and install (immediately prior to tiles installation) exactly to the suppliers recommendations.
-Heated towel rails to bathroom and shower room.
-Spa pool equipment will be installed complete by the Plumber. Supply power through weather proof connection, with an isolating switch.
-Hot water cylinders installed complete by the Plumber. Supply and connect.
-The lap pool electrical equipment will be installed complete and wired from the splitter box (by a Registered Electrician) by the Pool Installer. Main contract Electrician shall verify that all aspects of this work comply with all relevant main contract requirements.
-Septic tank pumps feed in conduit from an isolating switch.
-Heat pump
-Supply a Heavy Duty TV Aerial (suitable for TV1, 2, and 3, Sky, and all local and community TV stations) and install on the roof ridges where directed, stayed against wind, and with all connections compatible with the roofing and waterproof. Feed to the outlets shown with the complete system exactly to aerial suppliers recommendations.
-Heating.

- Roof solar power.

-Install ceiling fans with variable speed controllers supplied by owner.

14.6.5 Electronic Security System

Specified here, although all aspects of this work shall be carried out by a separate contractor. The system shall include in-built anti-tamper devices, and shall comprise:

-Smoke Detectors.
-Passive infra-red detectors.

-Motion detector activated cameras.
-Primary digital pad indicating activated zone and for passcode changing, testing, checking and other control functions.
-Digital pads for access.
-Control box for zone system and incorporating a back-up battery, etc. Connect to the telephone distribution system for silent monitoring.
-110db piezo sirens.
-Polycarbonate satellite siren/strobe.
-Main bedroom panic button.
-A proposal for a Testing Contract for regular maintenance complying with NZS 4301.
-Digital video recorder, Dedicated Micron or equal, also located in the foyer cupboard, complete with a 30 cm flat panel monitor.

14.7 Interconnected Smoke Alarms

14.7.1 Scope

Supply, install, and commission Interconnected Smoke Alarms to the locations and layout shown on the drawings, complete with accessories. All aspects of this work shall be in accordance with the smoke alarm manufacturer's product specification and installation requirements, other product manufacturers' recommendations, the electrical specification, and as shown on the drawings.

14.7.2 Co-operation

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

14.7.3 Workmanship

All work shall be carried out by experienced and competent tradesmen in accordance with the manufacturer's requirements, the electrical specification and drawings, and the related standards, electrical regulations and code requirements.
All work shall be such as to leave a neat, efficient and robust installation.

14.7.4 Power Supply

Interconnected smoke alarms shall be powered from a permanently energised 230 v a.c. mains power supplied from the unswitched side of a commonly used circuit, and shall include either a long-life battery backup or long life (10yr minimum) built-in rechargeable energy storage device.

14.7.5 Alarm Type

Install interconnected Photoelectric type smoke alarms.

Manufacturer, brand name & type: As noted on architectural drawings.

14.7.6 Heat Alarms & Heat Detectors

In addition to installing interconnected smoke alarms; install heat alarms or heat detectors, interconnected to the smoke alarms, to the locations shown on the drawings.

Manufacturer, brand name & type: As noted on architectural drawings (if any).

14.7.7 Installation

Install the interconnected smoke alarms on ceilings, or as shown otherwise, to the layout shown on the drawings in strict accordance with the manufacturer's instructions. Do not install smoke alarms in dead air spaces or obstructions where dead air spaces may be created.

Install smoke alarms to sloping ceilings at the high end of the ceiling slope.

Do not install smoke alarms to exposed bulkheads, beams, joists or purlins greater than 300mm deep.

Do not install smoke alarms closer than 400mm to any forced-air supply opening or to any blade of a ceiling fan.

14.7.8 Completion

Check that the smoke alarms have been correctly installed and wired.
Commission smoke alarms to the required operation in accordance with the manufacturer's instructions. Test alarms to ensure that the warning signal is heard in all bedrooms when all doors between the alarm and bedrooms are closed.
Check for faults and damage, repair/replace as necessary.

Issue to the Owner a copy of the manufacturer's testing and maintenance requirements and product warranty.

15 HVAC

15.1 Preliminary

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

15.2 Compliance

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

Comply with all relevant provisions and recommendations of:

2918:2018(AS|NZS)	Domestic solid fuel burning appliances - Installation

15.3 Escea Outdoor Wood Fires

15.3.1 Scope

Supply and install Escea Outdoor Wood Fires, as specified herein and indicated on the design drawings, complete with all necessary components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with the manufacturer's technical literature (check www.escea.com, or email info@escea.co.nz, or call 0800 173 000 for the latest editions), and the requirements of the Building Consent.

No substitutions are permitted for Escea Outdoor Wood Fires.

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

15.3.2 Requirements

15.3.2.1 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.

15.3.2.2 Warranty - Product

Escea Warranty - according to warranty terms and conditions.
- 5 Year Fire Box Warranty.
- 2 Year Total Warranty.
- Provide the warranty on the Escea standard warranty form.
- Commence the warranty from the date of purchase.

15.3.2.3 Warranty - Installation

Installer Installation Warranty - according to warranty terms and conditions.
- 2 Years Workmanship Warranty for Escea Outdoor Wood Fires installed.
- Provide the Installation Warranty on the Installer standard warranty form.
- Commence the warranty from the date of practical completion of the contract works.

15.3.2.4 Substitutions

Escea Outdoor Wood Fires shall be as specified herein and on the design drawings. The substitution of an Escea Outdoor Wood Fire for an alternative brand or type is not permitted under any circumstances.

The substitution of a specified Escea wood fire for an alternative Escea fire by the Contractor shall only be permitted with the Contract Administrator's written authorisation and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate an alternative Escea fire to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

15.3.2.5 Quality Assurance

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

15.3.2.6 Inspections & Reporting

BCA inspections of the 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.

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

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

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

15.3.3 Outdoor Wood Fires

15.3.3.1 TFS650 Log Burner

Refer manufacturer's documents.

15.3.4 Co-operation

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

Coordinate with other trades to install Escea Outdoor Wood Fires as required. Confer with the site supervisor to check on-site the required installation location and arrangement, dimensions, clearances and other installation requirements. Resolve any discrepancies and conflicts before proceeding.

15.3.5 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 work shall be carried out by suitably qualified and experienced tradespersons, familiar with the specified products and their installation techniques, in accordance with Escea installation requirements, and to fully comply with all warranty requirements.

All work shall be such as to leave a neat, efficient, and robust installation, to the required standard.

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

15.3.6 Delivery & Handling

Inspect Escea appliances, components and accessories for damage upon delivery; reject any damaged or defective appliances, and immediately contact the supplier for replacement.

Store Escea appliances in the delivery packaging, in a secure, weatherproof, dry and well-ventilated space in accordance with the manufacturer's recommendations. At all times, keep stored appliances dry and protected from damage, moisture and contamination.

Do not install damaged or defective appliances, or products that are beyond their use by date.

Should a problem be encountered with any Escea appliance or product during delivery or installation, immediately contact Escea on 0800 173 000. Do not continue to use the item that is not performing to specification or expectation. Keep the item in question and where possible, the packaging, document numbers and manufacturer details.

Handle Escea appliances and products in accordance with the manufacturer's requirements and user guidelines.

Installers shall be familiar with and comply with the manufacturer's safety guidelines precautions for use, and use appropriate safety gear during handling.

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

15.3.7 Installation

15.3.7.1 Commissioning

Carry out a final inspection and any required testing and commissioning procedures in accordance with AS/NZS 2918.

15.3.8 Completion

Check that the Escea outdoor wood fire installation has been installed correctly in accordance with the manufacturer's requirements and the design drawings and the Building Consent.

Check for damage, faults and defective work - repair/replace as necessary to the required standard.

Leave this work complete and in full working order, to the required standard.

Leave the surrounding surfaces clean and free of rubbish and debris. Remove all rubbish and excess material from the site.

Issue to the Owner a copy of the manufacturer's operation and maintenance requirements, and a copy of the manufacturer's product warranty.