Figure & Ground

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

125 Harris Cresent

125 Harris Cresent

Papanui

Christchurch

Issued for Consent

25.1160

PROJECT OVERVIEW

Scope

New Multi residential dwellings.

Address

Site Address	125 Harris Cresent
Suburb	Papanui
City	Christchurch
Lot #	50
DP #	19712

Site Conditions

Wind Zone	L - Low Wind Speed
Earthquake Zone	Zone 2
Exposure Zone	Zone C - Medium
Snow Loading Zone	Zone N4

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1 PRELIMINARIES & GENERAL

1.1 Project Overview

1.1.1 Site

1.1.1.1 Site

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

1.1.2 Adjacent Owners

1.1.2.1 Adjacent Owners

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

1.1.3 Protection

1.1.3.1 Protection

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

Suspend operations during weather which would affect the quality of work in progress. Secure the works as soon as possible against adverse weather, dust and vandals. Avoid structural damage that is caused by overloading.

Adequately protect all finished work and maintain until the date of Practical Completion. Each trade shall protect the work of all other trades, and each trade is responsible for making good any damage they cause to finished works. Arrange special protection as required for windows and doors, finished timber work, plumbing fittings and hardware, cabinets and other joinery, and similar items.

1.1.4 Responsibility

1.1.4.1 Responsibility

The Contractor will be held responsible for the full period of their legal responsibility in connection with this Contract for ensuring that all work execution, materials, and fittings, are completely in accordance with Contract requirements.

The Contractor is responsible to the Principal for the appropriateness and fitness, in relation to a reasonable expectation or requirement, of all of the materials and workmanship incorporated into the works by themselves or their subcontractors; for this reason few specific guarantees are required

in these contract documents. The terms and conditions of any warranty or guarantee required or provided shall not in any way negate the minimum remedies available under common law as if no warranty or guarantee had been furnished.
No apparent expression of the Architect's/Designer's reasonable satisfaction shall be deemed to be acceptance of defective materials or workmanship within the terms of the Contract or to be an authority for any Variation except where such Variation is authorised as provided for in the Contract. Instructions that are given verbally are deemed to be instructions for proper execution of the works and do not involve extra charges.

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

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

The Contractor and all Subcontractors affected shall be jointly and severally responsible for completion of the whole of the works in a completely watertight condition and shall therefore examine all details to be satisfied that this condition can be achieved. If any detail is considered unsatisfactory the Architect/Designer shall be notified immediately and he/she will then either interpret the detail to the Contractor's satisfaction, or accept responsibility for watertightness at the points in question, always assuming reasonable workmanship.

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

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

1.1.5 Specification

1.1.5.1 Specification

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

1.1.6 Standards

1.1.6.1 Standards

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

1.1.7 Authorities and Charges

1.1.7.1 Authorities and Charges

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

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

1.1.8 Code Compliance Certificate

1.1.8.1 Code Compliance Certificate

The Principal will apply for the Code Compliance Certificate (CCC) and any other licenses or approvals for the building to be used. However, Practical Completion will NOT be certified until the CCC inspection has occurred and any additional works required by the local Building Consent Authority have been completed. To this end it is recommended that the Contractor obtains all required certificates, guarantees, Producer Statements, as-built drawings, etc., required for the CCC application as work proceeds, to facilitate application for the CCC as soon as the works are completed. For their part, the Principal hereby undertakes to apply for the CCC within one day of all required material being in hand. Likewise, the Contractor should have capacity available to attend as quickly as possible to any items identified by the Building Consent Authority as being required prior to the issue of the CCC.

1.1.9 Coordination of the Works

1.1.9.1 Coordination of the Works

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

1.1.10 Documents Interpretation

1.1.10.1 Documents Interpretation

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

1.1.11 Work Shown and Mentioned

1.1.11.1 Work Shown and Mentioned

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

1.1.12 Site Safety

1.1.12.1 Health & Safety

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

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

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

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

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

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

1.1.12.2 Primary Duty of Care

A PCBU's primary duty of care includes, but is not limited to, so far as is reasonably practicable:
- providing and maintaining a work environment that is without risks to health and safety;
- providing and maintaining safe plant and structures;
- providing and maintaining safe systems of work;
- ensuring the safe use, handling and storage of plant, structures and substances;
- providing adequate facilities for the welfare at work of workers in carrying out work for the business or undertaking, including ensuring access to those facilities;
- providing any information, training, instruction, or supervision that is necessary to protect all

persons from risks to their health and safety arising from work carried out as part of the conduct of the business or undertaking;
- monitoring the health of workers and the conditions at the workplace for the purpose of preventing injury or illness of workers arising from the conduct of the business or undertaking.

1.1.12.3 Health & Safety Plan

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

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

1.1.13 Cleaning and Completion

1.1.13.1 Cleaning and Completion

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

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

certified. Obtain all required certificates, guarantees, as-built drawings, etc., as work proceeds to enable the CCC application to be submitted as soon as construction is completed).

2 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.

Comply with all relevant provisions and recommendations of:

4402.4.1.1:1986(NZS)	Soil compaction tests - Determination of the dry density/water content relationship - Test 4.1.1 New Zealand standard compaction test
4431:1989(NZS)	Code of practice for earth fill for residential development
NZBC E1	Surface Water

2.3 Drives, Paths & Paving

2.3.1 Cars Area

2.3.1.1 Cars Area Construction

To the cars area identified on the setout plan, and soon after the excavation work is completed and approved, install an 80mm layer of no fines drainage chips or roading reject 20mm chips, and partly compact this layer into the sand subsoils. Finish the edge of the chips to reasonably smooth lines (where drawn), but without any permanent edging.

2.3.2 Driveway

2.3.2.1 Driveway Construction

Check that the excavated surface is accurately to the gradients and levels required and then install 100mm of standard basecourse M4 compacted to 95% relative compaction, and cover this with a 30mm depth of 20mm no-fines chips.

2.3.3 Insitu Concrete Paving

Check that the stormwater sump, Telecoms/Telstra, power, water and gas service lines are correctly in place and have been fully operationally tested.
Accurately setout the drive ensuring that all gradients are correct.

Reinforce with 665 grade 300 mesh, plus a D12 bar to all edges, and pour the Ordinary Grade (20MPa) concrete slab, with all aspects of the work to the requirements of the Concretor section of this specification.

Slab thickness:

Reinforce with 665 grade 500E mesh, as per AS/NZS 4671:2001, plus a grade 500E D12 bar to all edges, and pour the Ordinary Grade (20MPa) concrete slab, with all aspects of the work to the requirements of the Concretor section of this specification.

Slab thickness:

While still wet, steel trowel finish concrete to a true surface and carefully apply a broom finish laterally across the direction of the driveway/path before setting takes place. Broom finishes shall be left uniform with straight markings and be in accordance with NZS 3114:1987 Concrete Surface Finishes.
Unless noted or shown otherwise, crack control joints shall be at maximum 4.0m centres (maximum 16m2 area).
Cover finished concrete when set with plastic sheeting to prevent rapid drying and allow to fully cure. Protect from freezing conditions for minimum 3 days. Avoid pedestrian traffic for minimum 7 days after installation.

Steel trowel finish to a true surface and immediately spread an even layer of the finishing aggregate and press it into the surface. Lightly spray the top surface with a cure retarder and, when the cement has fully bound the aggregate, sweep and wash the top surface to expose it. Ensure the finishing aggregate is spread before the initial set of the concrete to obtain a good bond - to achieve this it may be necessary to finish the slab progressively.
A very well-bonded and well cleaned finished surface with clean straight edges is required. To this end the operative carrying out the exposed aggregate paving must be experienced in work of this nature – if so requested provide two or three location references where their earlier similar work may be inspected.

2.3.4 Asphalt

Check the setout, gradients, alignments and compaction of the hardfill. Sweep surplus fine hardfill material off the surface.

Apply approved long term weedkiller to the compacted hardfill surface, with the application exactly to the Manufacturers Recommendations. Apply a tack priming coat of bituminous emulsion at the rate of 1sq.m/litre onto the prepared hardfill - mask adjacent surfaces as required, and completely remove any accidental marks. Install Mix 5 hotmix asphaltic concrete, with minimum compacted thickness 40mm to the full area.

Workmanship shall be to Transit Specification P9. Spread and thoroughly roll to a smooth, even surface that is evenly graded with true alignments and smooth transitions and has no local pondings. Finish with clean lines. Clean up thoroughly on completion and competently make good any damage to adjacent surfaces.

2.3.5 Paving Preparation

To all hard landscaping areas check that all topsoil and soft material has been removed.

Check setout and gradients of landscaping profiling, and check kerbs etc. are accurate and properly cured.

Place and compact, to 95% relative compaction, 100mm minimum thickness of standard M4 basecourse.

Build the compacted hardfill up to 80mm below the required finished levels.

It is suggested that the hardfilling is carried out as soon as the excavation is completed, to avoid a quagmire during use by construction activities, and that hardfilling is made good (and up to full compaction required) as necessary just prior to finish paving.

Just prior to paver installation lay a 35mm thick damp sand base on top of the prepared basecourse compacted down to approximately 30mm finished thickness to the required falls with nominal 1:40 fall.

2.3.6 Paving Type

All paving shall be:

interlocking clay or concrete pavers to entrance walkways. slip resistance to comply with D1/As1

2.3.7 Paving Installation

Lay pavers to true even surfaces with smooth transitions, on a 30mm bed of properly graded sand, with 2 to 3mm joints between pavers. Sand bed to have a very heavy application of approved long-term weedkiller applied just ahead of blocks.

Laid square to the building axis.

Laid to the setout shown on the floor plans.

Compact the pavers down.

Edge pavers shall be set onto a wet 200x100 concrete perimeter footing on compacted hardfill.

Edge pavers mortared onto a 200x100 concrete footing reinforced with 1-D12 rod.

Sand over and compact as recommended, and finish clean and free of blemishes.

Unless otherwise shown install paving with a minimum fall of 1:40 away from buildings.

2.3.8 Vehicle Crossing

The contractor shall arrange for the construction of new 5m wide and a 3m wide vehicle crossings (complete with adjacent kerb and channel reinstatement and making good etc.) to replace the existing crossing, all in compliance with ACC rules.

The consent for and adjustment to the existing road edge planter kerbing will be arranged separately by the Principal.

2.4 Landscaping

2.4.1 Topsoil

Prepare substrate by turning soil to a depth of 300mm and mix with mulch to a ratio of 1:6 then supply top grade (but not sterilised) topsoil and spread to 150mm lightly compacted thickness over all outside areas shown as being finished with grass.

2.4.2 Grass

Check that all edges against building and landscaping elements have smooth lines and transitions, and are shaped to reasonably match the adjacent natural landforms. Break up the topsoil surface and work and rake until the top 20mm or so is fine particles. Sow grass seed, spread lawn fertilizer at the recommended rate, and water and keep watered and keep the birds away as required until a good strike is achieved.

2.5 Siteworks

2.5.1 Scope

This section sets out the general requirements for sitework necessary for the satisfactory completion of the contract works. All aspects of this work shall be carried out to comply with all statutory obligations and regulations of regulatory bodies controlling the execution of the contract works, and in accordance with the project design documentation.

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

2.5.2 Requirements

2.5.2.1 Safety

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

2.5.2.2 Explosives

The use of explosives is NOT permitted.

2.5.2.3 Compliance

Allow for all work associated with the safe and orderly execution of the siteworks, 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 works.

2.5.2.4 Existing Subsoil Conditions

Carry out all necessary inspections of existing subsoil conditions. Review and assess any factual geotechnical information available for the site or surrounding area included in the contract documents or from any other readily-available source (e.g. the Territorial Authority). Take full account of such information, and ensure that any proposed earthworks methodology and machinery is appropriate for the ground conditions.

2.5.2.5 Contaminated Ground

Comply with the conditions of the Resource Consent/Building Consent related to contaminated material, and with the approved Site Management Plan (SMP), prepared in accordance with Ministry for the Environment Contamination Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand and the NES Soil Regulations.

All material classified as sufficiently contaminated and requiring removal from site shall be stripped and transported to a suitable and approved disposal site. No material is however to be removed from the site without the prior approval of the contract administrator.

The Contractor's project-specific Health and Safety Plan shall complement the SMP and address all other health and safety requirements applicable to the works.

2.5.2.6 Definition of Good Ground

Good Ground means any soil or rock capable of permanently withstanding an ultimate bearing pressure of 300 kPa (i.e. an allowable bearing pressure of 100 kPa using a factor of safety of 3.0), but excludes:

- Potentially compressible ground such as topsoil, soft soils such as clay which can be moulded easily in the fingers, and uncompacted loose gravel which contains obvious voids;
- Expansive soils being those that have a liquid limit of more than 50% when tested in accordance with NZS 4402:Test 2.2, and a linear shrinkage of more than 15% when tested, from the liquid limit, in accordance with NZS 4402:Test 2.6, and
- Any ground which could foreseeably experience movement of 25mm or greater for any reason including one or a combination of: land instability, ground creep, subsidence, (liquefaction, lateral spread - for the *Canterbury earthquake region only)*, seasonal swelling and shrinking, frost heave, changing ground water level, erosion, dissolution of soil in water, and effects of tree roots.

Soil below concrete foundations, footings and slabs-on-ground: unless specified otherwise, the general intent is to excavate to a stable, undisturbed sub-grade of 300 kPa ultimate bearing capacity.

Unless specified otherwise, soils (except those excluded from the Good Ground definition) tested with a dynamic cone penetrometer in accordance with NZS 4402: Test 6.5.2, shall be acceptable as good ground for building foundations if penetration resistance is no less than:

- 5 blows per 100mm at depths down to twice the footing width;
- 3 blows per 100mm at depths greater than twice the footing width.

Depths shall be measured from the underside of the proposed footing.

2.5.2.7 Geotechnical Report

A geotechnical investigation of the site has been carried out - refer to the Geotechnical Report appended.

2.5.2.8 Stormwater & Sediment Control

Ensure the environmental protection of the site during the works. Carry out 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 in accordance with the requirements of the controlling Territorial Authority. Where required, detailed design of mitigation measures such as fences, cut off ditches, detention ponds, etc., shall be undertaken by a suitably qualified person employed by the Contractor.

Erosion and sediment control measures shall be maintained and remain in place until surface reinstatement has been established. If at any time the performance of the stormwater and sediment control measures, or ongoing review of them, indicates that they need to be extended or modified, the design modification and construction of these shall be undertaken by the Contractor at no extra cost to the Principal.

Basic management principles shall be implemented, in particular:
- areas being exposed at any one time shall be kept to a minimum;
- diversion ditches and catch drains or earth bunds to intercept and divert upslope stormwater runoff around areas of earthworks;
- waterborne silt captured by filter mesh fences, hay bales, vegetation buffer strips or settlement ponds/areas, in a way that manages adverse downstream effects;
- stockpiles of topsoil, excavated earth or other material shall not be positioned where they can be eroded or washed into any drain or watercourse.
- only pump water from trenches and detention areas using methods to prevent sediment entering any drain or watercourse.
- all soil-contaminated water shall be properly filtered before discharging into the stormwater drainage system.

2.5.2.9 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.

2.5.3 Clearing & Stripping

2.5.3.1 Clearing

Remove from the site all vegetation and obstructions within the area of the earthworks that are not designated as remaining in the contract documents.

Clearing shall be carried out as a separate operation before stripping and excavation. Clearing shall include complete removal from the site of lightweight structures, foundations, trees, tree stumps,

logs, roots, scrub, grass and other vegetation, paving materials, fences and rubbish, and the off-site disposal of such items.

The removal of surface grass and weeds shall be completed as part of the topsoil stripping operation.

All trees within the limits of the earthworks shall be removed unless designated as remaining by the Contract Administrator and contract documents.

Protect trees and other vegetation designated as remaining within the earthworks area, and trees and other vegetation beyond the limits of the earthworks, from damage by these operations.

Extraction of tree stumps (if any) shall include the removal of roots greater than 25mm diameter.

2.5.3.2 Disposal of Cleared Material

Unless specified or directed otherwise, all material cleared shall become the property of the Contractor, and shall be removed from the site and disposed of in a safe and legal manner, and in such a manner as to cause as little inconvenience as possible to adjacent properties and the public. Pay all required tipping and landfill fees.

2.5.3.3 Burning of Cleared Material - Not Permitted

The disposal of cleared materials by burning is NOT permitted on the site.

2.5.3.4 Burning of Cleared Material - Permitted

Only when authorised by the Territorial Authority and the Fire Service Authority and the Contract Administrator, the disposal of cleared material by way of burning on the site is permitted.

Obtain and comply with the necessary permits, and take all necessary precautions to prevent fire from spreading, and have available and ready for use suitable equipment and supplies for fighting fires, all in accordance with the requirements of the authorities. Fires must be completely extinguished before the hours of darkness (night-time) unless full time attendance has been authorised by the authorities.

2.5.3.5 Stripping

Stripping shall be carried out as a separate operation after clearing and before excavation. All turf and organic topsoil shall be stripped from the areas subject to excavation before any excavation operations commence in these areas.

Except where limited by boundaries and existing structures or other limiting features, stripping shall extend no more than 500mm beyond the limits of areas subject to earthworks or construction, and to such depth as to avoid unnecessary over-excavation.

Topsoil to be kept, shall be stockpiled separately, away from other materials and as approved or directed by the Contract Administrator, for later re-spreading and use. Maintain and manage topsoil stockpiles to minimise contamination and erosion and to allow maximum reuse on the site.

2.5.4 Excavation

2.5.4.1 Excavation General

Excavate out all ground material above the finished levels or contours indicated on the design drawings, making due allowance for the construction of foundations, ground slabs, retaining walls, hard paving, underground utilities, landscaping and reinstatement of topsoil. The manner of excavations is the responsibility of the Contractor.

Excavation, as a minimum, shall include stripping of the site to remove all rubbish, noxious material and organic material, including topsoil, covering the area where the buildings, paving and other work is to be placed.

Excavations shall be undertaken in accordance with the 'Excavation Safety - Good Practice Guidelines'.

As necessary, cross reference and coordinate excavation work with the design drawings - Architectural, Structural, Building Services, Civil.

As necessary, coordinate excavation work with other trades as to set-out and timing to ensure that all cut faces are covered or finished etc. as soon as practicable after the excavation is complete.

If, in the opinion of the Contract Administrator, weather conditions or the excavation methods employed are such as to result in undue disturbance of adjacent ground or ground below final trimming level, suspend the work and complete the excavation in accordance with the Contract Administrator's instructions.

2.5.4.2 Excavation Inspections for Foundations

Give at least 48 hours' notice prior to commencement of each stage of excavation work. Where required, the proposed methods of completing each phase of the work shall be discussed and agreed with the Contract Administrator prior to starting.

Give at least 12 hours' notice of when a foundation inspection is required. Backfill, basecourse, site concrete, reinforcing, etc., shall not be placed in foundations until the Contract Administrator has been given adequate opportunity to inspect the relevant area.

2.5.4.3 Unearthing of Waahi Tapu & Cultural Sites

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.

2.5.4.4 Excavation of Treasure

Notify the Contract Administrator of the remains of fossils and articles of value or antiquity discovered during excavation, and leave them undisturbed and protected until written instruction from the Contract Administrator is given for their removal. Such items shall remain the property of the Principal unless advised otherwise by the Contract Administrator or appropriate Statutory Authority.

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.

2.5.4.5 Excavation of Unforeseen Obstructions & Ground Conditions

Notify the Contract Administrator immediately in the event that any of the following conditions are encountered during excavation:

- unexpected underground obstructions or voids;
- unforeseen variations in ground material types or properties;
- observations of buried vegetation, groundwater flows or seepages.

2.5.4.6 Excavation of Hazardous and/or Contaminated Materials

Should material encountered during excavation appear to be hazardous and/or contaminated in any way such that it would not be accepted at a conventional landfill site, immediately cease all such work likely to spread the hazardous material or worsen the contamination, and notify the Contract Administrator and seek instruction as to how the work should proceed.

2.5.4.7 Excavation of Boulders to be Retained on Site

Remove individual boulders of the specified size from the excavated material, and stockpile them on site as directed by the Contract Administrator for future landscaping use by others.

Boulder size:

2.5.4.8 Excavations in Existing Paved Surfaces

Take all necessary precautions and make appropriate provisions to prevent damage to or contamination of existing paved surfaces that are to be retained and remain intact while the contract works are being carried out.

Prior to excavation, the paving shall be accurately cut to neat, straight lines parallel to the line of the excavation (unless shown otherwise on the drawings) with a nominal 100mm trimming allowance either side of the excavation width.

Paved surfaces shall be reinstated as specified and as shown on the drawings - refer to Reinstatement of Surfaces.

2.5.4.9 Excavation for Foundations

Foundation excavations shall be accurately cut true to line, level and angle, to minimum sizes and to the levels and grades required for all slabs, footings and foundations, and over the rest of the areas shown for levels adjustment. Foundation excavations shall extend down to firm undisturbed ground to the required depth. Refer to the foundation layout and details shown on the drawings.

2.5.4.10 Excavation for Slab Benches

Excavate and trim benches for slabs-on-ground level and true, allowing for all below-slab items such as granular hardfill base, blinding, insulation, etc., to the layout and details shown on the drawings.

2.5.4.11 Excavation for Services

Excavate trenches for all services, including drainage, plumbing, electrical, gas, telecommunications as indicated on the drawings. Cross reference and coordinate all excavations with the Architectural, Structural and Building Services drawings.

2.5.4.12 Inadequate Soil Bearing Capacity

If the soil bearing capacity is not to the determination required by NZS 3604:Section 3.1.3, the foundation shall be excavated further and backfilled as follows and/or to the BCA's requirements:

Below Footings: Mass concrete having a minimum strength of 10 MPa at 28 days.
Below Slabs on Ground: Hardfill, placed and tightly compacted in layers of 150mm maximum thickness.
Service Trenches: Hardfill, placed and tightly compacted in layers of 150mm maximum thickness.

2.5.4.13 Excavations Too Deep

Where an excavation is cut to a greater depth than called for by the drawings or the Contract Administrator's written instructions, fill to the required level in accordance with the Contract Administrator's instructions without additional cost. This may involve filling with site concrete.

2.5.4.14 Existing Soft Spots and Previously Filled Areas

Excavate and remove from site all material from soft spots and previously filled areas as directed by the Contract Administrator. The Contract Administrator shall advise in writing the area, extent and depth of excavation required, and the backfilling requirements.

2.5.4.15 Stockpile Excavation Spoil

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

Excavation spoil shall be stockpiled in such a manner as not to jeopardise the stability of any trench, bank, batter, etc.; or to obstruct any road, crossing or driveway without authorised consent.

On completion, remove from site and dispose of all surplus stockpiled material, unless directed otherwise by the Contract Administrator. Leave the stockpile areas clean and free of spoil to the required standard.

2.5.4.16 Surplus Material

Remove from site and dispose of in a safe and legal manner all surplus material as it is excavated. Fouling of the site or adjoining public or private property and roads by spilled material is not permitted. Pay all tipping and landfill fees required.

2.5.4.17 Maintain Excavations

Secure and maintain excavations free from slips, erosion, water and other fluids or fallen materials. Provide and maintain stable battered slopes, pile liners, shoring, strutting, sheet piling, planking, pumps and other materials or plant necessary for carrying out and maintaining excavations. Remove these when no longer necessary.

Allow to protect exposed faces of temporary batters and slopes as necessary using an approved protection method, to prevent slumping and collapse.

2.5.4.18 Excavation Dewatering and Stormwater Control

Keep excavations free from ponding stormwater, and provide all pumps, drainage pipes and other equipment necessary for dewatering operations.

As necessary, dig suitable temporary sumps/pits outside the line of foundations to receive dewatering pumps.

If water enters concrete foundation excavations, the water shall be pumped out, and any soft materials not suitable for receiving concrete shall be removed and replaced with clean compacted hardfill or site concrete to the required levels.

Comply with the conditions of the Resource Consent/Building Consent related to stormwater and sediment control during construction, and employ suitable methods for minimising the runoff of sediment laden water from the site in accordance with accepted practices and guidelines. Refer to Requirements - Stormwater & Sediment Control.

Do not permit any flooding of property, footpaths or roadways as a result of excavation operations or dewatering measures, including the use of pumping equipment.

Provide channels, pipes or other approved means for effectively conveying groundwater to the nearest adequate and approved discharge point.

The discharge of groundwater to piped or open drains or channels shall only be permitted when prior approval from the controlling Territorial Authority has been obtained.

2.5.5 Earth Fill

2.5.5.1 Compliance & Testing

Earth fill works shall be carried out in accordance with NZS 4431 and the conditions of the Resource Consent/Building Consent. The Contractor is responsible for all associated earth fill testing and compliance.

2.5.5.2 Site-Won Earth Fill

Except for materials removed during clearing and stripping of topsoil or material designated as unsuitable for fill, site-won soils obtained from excavation may be used for general filling. Use only suitable material obtained from cut areas within the site. Site-won fill material shall be consistent, well graded non-organic, clean, uncontaminated soil material that is sourced on the site and approved suitable for filling by having grading and moisture content properties that will allow re-compaction to 95% of maximum density.

2.5.5.3 Imported Earth Fill

Imported earth fill material shall be consistent, well graded non-organic, clean, uncontaminated soil material that is approved suitable for filling by having grading and moisture content properties that will allow re-compaction to 95% of maximum density. Do not use material which is organic or highly plastic. Obtain the required permissions and permits, and pay all associated costs and fees for imported earth fill.

2.5.5.4 Surface Preparation

Clear and strip the areas on which earth fill material is to be placed - refer to Clearing and Stripping. Before filling commences in any area of the site, the cleared and stripped surface shall be inspected and approved by the Contract Administrator.

Any soft or compressible areas discovered shall be excavated and refilled with suitable compacted material in accordance with the Contract Administrator's instructions. The exposed surfaces shall be compacted so as to achieve relative compaction at least equal to that specified for the fill to a depth of 150mm. Where necessary the ground shall be bladed until it is uniform, free of large clods and brought to suitable water content prior to compaction.

2.5.5.5 Fill Placing

Earth fill material shall be placed and spread in a systematic manner, in near-horizontal layers of uniform thickness no greater than 230mm before compaction, progressively across the fill area. Any lumps or rocks exceeding 100mm in any direction shall be either broken down to less than 100mm or removed.

Do not place, spread or compact earth fill during or immediately after wet weather or when the ground is frozen. Except for essential work to maintain safety or drainage or prevent damage to work, no equipment shall be moved on or over the earthworks area during or immediately after wet weather.

2.5.5.6 Fill Compaction

After each layer of earth fill has been placed and spread evenly and brought to a suitable moisture content, it shall be compacted to at least 95% of NZS 4402:Test 4.1.1, unless directed otherwise. Each layer shall be compacted as a separate operation before any subsequent filling.

Compaction shall only be carried out with approved, special-purpose compaction equipment. Compaction equipment shall follow systematic patterns of travel and make sufficient passes to ensure that the required compaction has been uniformly obtained everywhere.

Compact fill-formed batter faces as a separate operation, either by overfilling and cutting back, or by rolling with compacting plant working up and down the slope.

2.5.5.7 Finished Surfaces

Finished earth-fill surfaces shall conform to the levels, lines, grades and contours shown on the drawings or as directed by the Contract Administrator, within the tolerances specified.

Finished earth-fill surfaces for the construction of structures, concrete work, etc., shall be completed to the detailed dimensions. Where earth fill abuts undisturbed ground, the ground shall be trimmed and finished either side to gradually conform to the shape of the adjacent ground for a regular appearance.

2.5.5.8 Backfilling

The backfilling of earth fill around structures, and where required to bring undercut areas to finished levels and form, shall consist of selected earth fill material, evenly spread and compacted in uniform layers, with the use of suitable plant and equipment to achieve the specified relative compaction.

Do not, under any circumstances, substitute any specified hardfill backfill with earth backfill without prior written instruction from the Contract Administrator.

2.5.6 Hardfill & Blinding

2.5.6.1 Material

Hardfill material shall be good quality low fines crushed aggregate metal of approved origin, well graded and free of deleterious and organic material, and able to be compacted to a dense uniform layer. Hardfill material with obvious clumps of plastic content will not be accepted.
Except where specified otherwise, the maximum aggregate size shall not exceed 65mm and shall conform to the following:

Test Sieve Aperture	**% Passing by Mass**
63mm	100%
19mm	30-70%
4.75mm	10-40%
75 micron	10% maximum

2.5.6.2 Testing & Verification of Hardfill

The Contractor remains solely responsible for compliance of all hardfill materials used. Where a material appears to fall outside the recommended parameters, the Contractor shall employ an independent testing agency to confirm that the supplied material is within the specifications. All costs associated with non-complying hardfill material, including initial and subsequent testing, shall be at the Contractor's expense.

2.5.6.3 Backfilling with Hardfill

Backfill with hardfill around the sides of foundations and retaining walls, except where specified otherwise, with approved hardfill material as specified.

Hardfill material shall be good quality low fines crushed aggregate metal of approved origin, well graded, free of deleterious and organic material, and able to be compacted to a dense uniform layer.

Ensure that all timber, rubbish and other debris and other loose material is removed before backfilling. Avoid contaminating hardfill with excavated material during placement and compaction.

Place hardfill to bring levels up to the underside of the basecourse, site concrete, capillary break material or sand blinding as appropriate, with at least 150mm hardfill under ground beams, foundation pads and pits.

Spread loose hardfill in layers no more than 150mm thick, and compact with a vibrating roller, plate compactor or other suitable equipment to achieve not less than 95% of maximum dry density determined at optimum water content in accordance with NZS 4402:Test 4.1.1.

Compaction equipment shall follow systematic patterns of travel and make sufficient passes to ensure that the required compaction has been uniformly obtained everywhere for each layer. Care should be taken not to overwork the subgrade or to cause weaving during hardfill compaction. Any soft patches evident after compacting hardfill must be brought to the attention of the Contract Administrator for consideration.

2.5.6.4 NZS 3604 Granular Base to Underside of Slab-on-Grade

Granular hardfill base used as a capillary break to the underside of concrete slabs on grade shall consist of granular fill material conforming to NZS 3604: Section 7.5.3, and be systematically placed and compacted in horizontal layers no thicker than 150mm over the entire area beneath the proposed ground slab. Each layer shall be placed and compacted as a separate operation to subsequent layers.

The total thickness of the granular base shall be as indicated on the drawings, and no less than 75mm and no more than 600mm unless specified otherwise.

Compact each layer until the material is tightly bound together and does not visibly deform under the weight of a pressed adult heel. Compaction shall only be carried out with approved, special-purpose compaction equipment appropriate for the application. Compaction equipment shall follow systematic patterns of travel, and make sufficient passes to ensure that the required compaction has

been uniformly obtained everywhere for each layer. Care should be taken not to overwork the subgrade or to cause weaving during hardfill compaction.

Blind the basecourse with a uniform layer of clean sand between 5mm and 25mm thick over all areas where a damp-proof membrane (DPM) is to be overlaid. Ensure the sand blinding layer is sufficiently compacted and smoothed before laying the DPM. Do not leave sand blinding exposed to the elements any longer than necessary, and install the DPM immediately or as soon as possible.

2.5.6.5 AP40 Hardfill Base to Underside of Slab-on-Grade

Granular hardfill base for capillary break to the underside of concrete slabs on grade shall consist of AP40 crushed rock, free of clay and organic matter, systematically placed and compacted in horizontal layers no thicker than 150mm, over the area beneath the proposed ground slab. Each layer shall be placed and compacted as a separate operation to subsequent layers.

The total thickness of the granular base shall be as shown on the drawings, and no less than 75mm and no more than 600mm unless specified otherwise.

Compact each layer to not less than 95% of maximum dry density determined at optimum water content in accordance with NZS 4402: Test 4.1.1. Compaction shall only be carried out with approved, special-purpose compaction equipment appropriate for the application. Compaction equipment shall follow systematic patterns of travel and make sufficient passes to ensure that the required compaction has been uniformly obtained everywhere for each layer. Care should be taken not to overwork the subgrade or to cause weaving during hardfill compaction.

Blind the basecourse with a uniform layer of clean sand between 5mm and 25mm thick over all areas where a subsequent damp-proof membrane (DPM) is to be laid. Ensure the sand blinding layer is sufficiently compacted and smoothed to protect the DPM from any damage. Do not leave sand blinding exposed to the elements any longer than necessary, and install the DPM immediately or as soon as possible.

2.5.6.6 AP40/AP65 Hardfill Base to Underside of Slab-on-Grade

Granular hardfill base for capillary break to the underside of concrete slabs on grade shall consist of a 100mm thick layer of AP40 over a minimum 200mm thick layer of AP65 sub-base, systematically placed and compacted over the area beneath the proposed ground slab. Each layer shall be placed and compacted as a separate operation to subsequent layers. The sub-base AP65 material shall be placed in horizontal layers no thicker than 200mm.

The total thickness of the granular base shall be as shown on the drawings, and no less than 300mm and no more than 900mm unless specified otherwise.

Compact each layer to no less than 95% of maximum dry density determined at optimum water content in accordance with NZS 4402: Test 4.1.1. Compaction shall only be carried out with approved, special-purpose compaction equipment appropriate for the application. Compaction equipment shall follow systematic patterns of travel and make sufficient passes to ensure that the required compaction has been uniformly obtained everywhere for each layer. Care should be taken not to overwork the subgrade or to cause weaving during hardfill compaction.

Blind the basecourse with a uniform layer of clean sand between 5mm and 25mm thick over all areas where a subsequent damp-proof membrane (DPM) is to be laid. Ensure the sand blinding layer is sufficiently compacted and smoothed before laying the DPM. Do not leave sand blinding exposed to the elements any longer than necessary, and install the DPM immediately or as soon as possible.

2.5.6.7 Hardfill Basecourse for Concrete & Asphalt Paving

Unless specified otherwise, granular hardfill base for insitu concrete paving or asphalt paving shall comply with current TNZ M/4 'Specification for Basecourse Aggregate', Grading AP40 and AP20.

The basecourse material shall be placed and compacted in layers with an uncompacted thickness between 50mm and 100mm thick. Each layer shall be compacted by multiple passes of approved, special-purpose compaction equipment appropriate for the application, to not less than 100% of maximum dry density determined at optimum water content in accordance with NZS 4402:Test 4.1.1.

Compaction of the basecourse shall take place at a water content appropriate to the plant being used. If water is required to be added, a fine mist spray shall be used and excess water shall be prevented from damaging the subgrade or sub-base. The uppermost layer shall be compacted and the finished surface proof rolled using a smooth steel wheeled roller of appropriate size

2.5.6.8 Site Concrete

Only as directed by the Contract Administrator and following approval of the excavation by the Contract Administrator, concrete footings to be cast on original ground may be covered for the full width of the excavated trench with site concrete to the specified thickness.

2.5.7 Insitu Concrete Paving

2.5.7.1 General

Insitu concrete paving, including driveways and parking areas, courtyards, footpaths, kerbs, channels and vehicle crossings, shall be accurately constructed to the locations, layout, dimensions, levels, crossfalls and gradients shown on the drawings without any abrupt deviations, irregularities or depressions which would allow water to pond.

Where it is necessary to match into existing work of a different shape, the change of shape shall be made gradually to present a regular appearance.

Before commencing, check that stormwater sumps, telecommunications, power, water and gas service pits, manholes and lines are correctly in place and have been fully operationally tested.

Where the pavement is to be constructed adjacent to buildings and structures, ensure that the level of the paving does not negatively impact on or reduce the minimum clearances required by the NZ Building Code, between the pavement, the base of cladding and finished floor level.

2.5.7.2 Subgrade Preparation

The subgrade shall be trimmed to the appropriate levels and compacted to the required standard. Except where work is to be constructed on pavement materials already placed, the subgrade shall be

excavated 100mm below the required level and brought up to grade with compacted TNZ M/4 basecourse aggregate AP40 or AP20.

Surface openings to underground services shall be adjusted as necessary so that their tops will be flush with the finished pavement surface.

2.5.7.3 Formwork

Formwork shall be dressed timber (or steel) of sound quality suitable for providing a high quality smooth finish free from blemishes, distortions or misalignment. Formwork shall be secured accurately in position to maintain lines and/or shape during concrete placement, and set to the correct levels so as to provide guide for the finished surface levels and tolerances. Formwork should be pegged so that it is rigid enough to take the load of the concrete during placing and finishing without distortion.

2.5.7.4 Polyethylene Sheet

Install 0.25mm thick polyethylene sheeting, with all joints lapped 150mm and tape sealed, over the subgrade.

2.5.7.5 Reinforcement

Insitu concrete paving shall be reinforced according to the reinforcing steel layout and details shown on the drawings. Refer to separate specification section - Concrete - Reinforcement.

2.5.7.6 Concrete

Refer to separate specification section - Concrete.

Concrete for driveways, vehicle parking, footpaths, kerbs and channels and light-duty crossings shall be Grade 20 MPa concrete.
Concrete for heavy-duty crossings and paving shall be Grade 30 MPa concrete.

2.5.7.7 Finish - U2 Wood Float Finish

Insitu concrete paving shall be finished to a U2 wood float finish in accordance with NZS 3114. Refer to separate specification section - Concrete - Finishes.

2.5.7.8 Finish - U5 Broom Finish

Insitu concrete paving shall be finished to a U5 broom finish as per the approved sample. Bristle markings shall be applied laterally across the direction of the pavement before setting takes place. The finish shall be uniform with straight markings in accordance with NZS 3114. Refer to separate specification section - Concrete - Finishes.

2.5.7.9 Finish - Exposed Aggregate Finish

Insitu concrete paving shall be finished to a U2E exposed aggregate finish as per the approved sample. Refer to separate specification section - Concrete - Finishes.

2.5.7.10 Finish - Acid Etch/Wash Finish

Insitu concrete paving shall be acid etch finished or an acid wash finished as per the approved sample. Acid etching shall happen not less than two weeks and not more than one month following laying of

the concrete. Acid etching shall be achieved with three passes of sulphuric acid and all spent acid shall be collected and disposed of off site. Refer to separate specification section - Concrete - Finishes.

2.5.7.11 Finish - Custom Finish

Insitu concrete paving shall be finished to a custom finish as per the approved sample. Refer to separate specification section - Concrete - Finishes.

2.5.7.12 Finish - Kerb & Channel

Concrete kerbs and channels shall be finished to a U3 steel trowel finish in accordance with NZS 3114. Refer to separate specification section - Concrete - Finishes.

2.5.7.13 Kerb Extrusion Machines

Kerb extrusion machines may be used subject to approval. The grade line for the kerb shall be indicated by an offset guideline. Concrete used shall be of such consistency that after extrusion it will maintain the kerb shape without support. The extrusion machine shall be operated to produce a well compacted mass of concrete free from surface pitting. Except where required or specified otherwise, contraction joints shall be formed at maximum 20m intervals.

2.5.7.14 Joints in Insitu Concrete Paving

Joints in insitu concrete paving (isolation joints, free movement joints, shrinkage control joints) shall be formed at the locations and layout shown on the drawings.

Isolation Joints:
Isolation joints shall be formed against abutting structures and other pavements, crossings, around utility access holes, etc., with 10mm thick compressible filler material such as expanded polystyrene for the full depth of the pavement. The top 10mm of the joint shall be sealed with a suitable silicon or polyurethane sealant to prevent ingress of dirt.

Free Joints:
Form free movement joints in the paving at maximum 15.0m intervals or as shown otherwise on the drawings by saw-cutting, with a temporary insert strip or by tooling. Joint depth shall be between 0.25 - 0.33 of the slab thickness. Terminate reinforcing steel 50mm either side of the joint - do not bridge the joint with reinforcing.

Shrinkage Control Joints:
- Form shrinkage control joints in the paving at maximum 3m intervals (maximum 15m² area) or as shown otherwise on the drawings by saw-cutting, with a temporary insert strip or by tooling. Joints shall be 5-10mm wide x 25mm deep. Saw cutting shall be carried out prior to shrinkage cracking occurring - within 12-18 hours of concrete placing, depending on ambient temperature and conditions. Seal control joints with a BRANZ-approved sealant or as specified on the drawings, after the concrete has cured.
- Shrinkage control joints in kerb and channel shall be formed at not more than 20m intervals.
- Where control joints are not indicated on the drawings, the joints should be set-out to a length-to-width ratio not exceeding 1.7:1. For decorative work, the joints should be located to suit the proposed decoration pattern or finish.

Construction Joints:
- Should any unplanned breaks occur in the concrete placement, provide properly formed construction joints to allow adequate compaction and finishing of the concrete along the edge.
- Allow for any reinforcement to be continuous across the joint.
- When hardened, ensure that the formed edge is sufficiently roughened to provide aggregate interlock along the length of the joint.

2.5.7.15 Final Surface Tolerances

The final surface of the insitu concrete paving shall be within ±10mm of the design levels provided that the surface level is at least 5mm above drainage channels or gully entries and continuously graded towards them. The surface shall not pond water. The deviation from a 3m straightedge or template shall not exceed 5mm anywhere on the pavement, including on slopes. The maximum abrupt deviation anywhere on the surface shall be 5mm.

2.5.7.16 Surface Sealer

Surface sealers shall be used and applied in strict accordance with the sealer manufacturer's requirements. Mask off and adequately protect adjacent finished work, fixtures, fittings and surfaces from contamination during application. Do not allow the sealer to enter or contaminate the stormwater drainage system.

Sealer coatings must not reduce the slip resistance of an access route's walking surface in wet conditions any less than required by NZBC D1/AS1.

Coating Brand:

2.5.7.17 Completion

After removal of formwork, any backfill required shall be placed by hand tamping or approved mechanical means, without damage to the concrete.

On completion clean down the paved surfaces and remove all dirt and stains. Remove all rubbish, surplus concrete and spoil, and the leave the finished paving and surrounding site left clean and tidy.

As necessary, protect insitu concrete paving to prevent rapid drying and from freezing conditions, and allow to fully cure. Avoid pedestrian traffic for minimum 7 days after installation.

Ensure that other activities on the site are carried out without damage to the insitu concrete paving, and that is fully protected from damage until handover.

2.5.8 Asphalt Paving

2.5.8.1 General

This section sets out the requirements for the construction of footpaths, driveways and other pavement surfaced with hot mix asphaltic concrete.

Asphalt paving shall be accurately laid to the locations, layout, dimensions, levels, crossfalls and gradients shown on the drawings, without any abrupt deviations, irregularities or depressions which would allow water to pond.

Before commencing, check that stormwater sumps, service pits, manholes, etc., are correctly in place and the utility service has been fully tested.

Where the pavement is to be constructed adjacent to buildings and structures, ensure that the level of the paving does not negatively impact on or reduce the minimum clearances required by the NZ Building Code, between the pavement, the base of cladding and finished floor level.

Programme asphalt paving work to suit forecast weather conditions. Asphalting should only be carried out at a time when at least 2 days' fine warm weather following paving can be expected.

Do not place asphalt when the pavement surface temperature is less that +10°C without prior agreement from the Contract Administrator.

2.5.8.2 Materials

Basecourse material used shall comply with TNZ M/4 Specification for Basecourse Aggregate AP40 and AP20 - refer to Hard Fill & Blinding.

Pavement surfacing material shall be hot-laid asphaltic concrete consisting of coarse aggregate, fine aggregate, filler and asphaltic bitumen binder conforming to the requirements of TNZ M/10 Specification.

2.5.8.3 Subgrade Preparation

The subgrade shall be properly prepared by trimming and compaction to the correct levels including the removal and replacement of any areas of soft material, allowance for basecourse and paving thickness, crossfalls and the levels of adjacent construction (e.g. kerbs, sumps, etc.).

Surface openings to underground services shall be adjusted as necessary so that their tops will be flush with the finished pavement surface.

2.5.8.4 Weed Control

Prior to the laying of any asphalt surfacing on basecourse that has been in place for more than two weeks or on any pit-sourced basecourse, the prepared basecourse shall be sprayed with an approved brand of knockdown and sterilant weed killer, at a rate and in accordance with the manufacturer's recommendation.

Accept all responsibility for the use of weed killers. Confirm weed killer product suitability for the intended application, and product acceptance by the appropriate authorities as being safe and approved for use in the particular environment.

2.5.8.5 Pavement Edges

Where edges of asphalt paving are to be retained by concrete kerbs, these shall be constructed prior to the completion of the subgrade preparation.

Where no concrete edging is specified, footpath edges shall be retained using strips of 150 x 25mm, H4 treated timber, securely fixed in place to the correct line and gradient to H4 treated timber pegs. The tops of the timber strips and pegs shall lie flush with the finished surface of asphalt paving.

2.5.8.6 Basecourse

The basecourse shall be formed by placing base material, and grading and compacting it with suitable vibrating compacting plant (roller, plate). Compact the basecourse until no further impression is made on the surface. The compacted basecourse must be smooth and swept clean before any surfacing is placed.

Unless specified otherwise on the drawings, the minimum thickness of basecourse shall be:
- Pedestrian only paving (non-vehicular): 100mm.
- Residential driveway: 125mm.
- Light vehicular traffic: 125mm.
- Heavy vehicular traffic: 150mm.

2.5.8.7 Tack Coat

Apply a tack coat of bituminous emulsion by spray at a rate of not less than 0.3 litres/m² over the whole of the prepared basecourse area, and leave for sufficient time for the emulsion to break (set). The tack coat must be fully broken, free of surface water and intact before the commencement of asphalt spreading.

Take all necessary precautions to protect adjacent surfaces from contamination of tack coat spray. Completely remove any accidental overspray and marks.

2.5.8.8 Surfacing

The surface on which the asphalt is to be placed must be dry. Asphaltic concrete shall be placed and spread to achieve a minimum depth after compaction of 25mm, or as indicated otherwise, over the entire area.

Compact asphalt using suitable vibrating compacting plant (plate, roller), with sufficient passes to ensure no further impression is made on the surface (between 94-97% of maximum theoretical density).

Asphalt paving surfaces shall be finished to a neat and smooth appearance that is evenly graded to the lines, gradients and crossfalls indicated on the drawings, with flush, even transitions, and without any surface irregularities, localised depressions and pondings or abrupt deviations.

The location of joints shall be planned before work commences, and the number of joints shall be minimised in accordance with good asphalt paving practice. Cold asphalt joints between stages in the work shall be saw-cut to provide a vertical face and straight joint. Cold joints shall be flush and even between adjoining runs/layers, and shall not deviate in height more than 2mm at any point along the joint.

Joints shall be coated with a 100mm wide emulsion and sand bandage - extending not less than 50mm either side of the joint. Use either plastering sand or a coarse sand, and apply sand so as to completely cover the emulsion.

2.5.9 Reinstatement of Surfaces

2.5.9.1 General

This section covers the reinstatement of all surfaces disturbed by excavations and construction work. Reinstate all such disturbed surfaces and features, including grass surfaces, gardens and pavements to the standards specified on the drawings or herein. Reinstatement shall generally achieve a standard equal to or better than the pre-existing situation - in no case will a lower standard be accepted.

2.5.9.2 Grassed Areas & Gardens

The surfaces of excavation carried out in grassed areas and gardens shall be reinstated by placing 200mm of topsoil or turf, levelled and sown with approved grass seed to the satisfaction of the Contract Administrator. Topsoil or turf shall be either saved from the original stripping or obtained elsewhere.

Hedges, fences and other items to be retained that have been damaged or removed during the work shall be reinstated to the satisfaction of the Contract Administrator.

2.5.9.3 Private Driveways & Paths

Reinstatement of paved private driveways and paths shall match the existing surface but the following minimum standards apply.

- Concrete: A minimum of 100mm thick Grade 20 MPa concrete, over 100mm thick compacted TNZ M4 basecourse.
- Asphalt: A minimum of 25mm thick asphalt, over 100mm thick compacted TNZ M4 basecourse.

2.5.9.4 Public Property

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 (Territorial Authority or NZTA) for their standards for excavation and reinstatement.

Reinstatement of surfaces to public property shall comply with the requirements of the relevant controlling authority.

Arrange and pay for any reinstatement inspections of public property required by the controlling authority.

3 B L O C K W O R K

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:

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

3.3 Concrete Blockwork

3.3.1 Scope

3.3.1.1 Scope

Supply and construct all concrete blockwork elements, including laying block, placing reinforcement and grout filling, to the locations and details shown on the approved drawings. All aspects of this work shall be carried out to comply with the requirements of the New Zealand Building Code and relevant Standards, and in accordance with the approved project design documentation, and with any relevant product manufacturers' recommendations.

3.3.2 Requirements

3.3.2.1 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.

3.3.2.2 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.

3.3.2.3 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.

3.3.2.4 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.

3.3.2.5 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.

3.3.2.6 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.

3.3.2.7 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.

3.3.3 Blocks

3.3.3.1 Blocks

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

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

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

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

3.3.4 Mortar

3.3.4.1 Mortar

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

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

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

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

3.3.5 Grout

3.3.5.1 Grout

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

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

3.3.6 Reinforcement

Refer to Structural Engineers specification & details for Reinforcing Steel.

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

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

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

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

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

3.3.7 Block Laying

3.3.7.1 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.

3.3.7.2 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.

3.3.7.3 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.

3.3.7.4 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.

3.3.7.5 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.

3.3.7.6 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.

3.3.8 Grout Filling

3.3.8.1 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.

3.3.8.2 High Lift Grouting with Expansive Admixture Method

Grouting shall be by the High Lift Grouting with Expansive Admixture Method in accordance with NZS 4210: Section 2.12. Expansive admixtures shall be used in accordance with the manufacturer's requirements.

Walls may be filled in a semi-continuous pour of up to 3.6m lift height with continuous compaction using a pencil vibrator or by rodding with 16mm minimum diameter rod. After expansion has taken place, the top of each pour must be re-compacted by trowelling.

3.3.8.3 High Lift Grouting without Expansive Admixture Method

Grouting shall be by the High Lift Grouting without Expansive Admixture Method in accordance with NZS 4210: Section 2.13.

Walls may be filled in a semi-continuous pour of up to 3.6m lift height with continuous compaction using a pencil vibrator, in a series of lifts not exceeding 1.2m per lift and with a waiting period of 15-60 minutes between each lift.

3.3.8.4 High Lift Grouting Method with Reduced Compaction

Grouting shall be by the High Lift Grouting Method (without expansive admixture) with Reduced Compaction in accordance with NZS 4210: Section 2.15.

Walls may be filled in a single continuous pour of up to 2.4m lift height with continuous vibration using a pencil vibrator. Wait for a period of 15 to 60 minutes to allow blockwork to absorb moisture, then re-vibrate and top up the wall with grout as required.

4 BRICKWORK

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:

2295:2006(NZS)	Pliable, permeable building underlays
2699.1:2000(AS/NZS)	Built-in components for masonry construction - Wall ties
2904:1995(AS/NZS)	Damp-proof courses and flashings
3103:1991(NZS)	Specification for sands for mortars and plasters
3604:2011(NZS)	Timber-framed buildings
4200.1:2017(AS|NZS)	Pliable building membranes and underlays - Part 1: Materials
4200.2:1994(AS/NZS)	Pliable building membranes and underlays - Installation requirements
4210:2001(NZS)	Masonry construction: Materials and workmanship
4236:2002(SNZHB)	Masonry veneer wall cladding

4.3 Masons NZ Ltd Membranes, Wraps & Flashing Tape

4.3.1 Scope

4.3.1.1 Scope

Supply and install the specified Membranes, Wraps and Flashing Tape from Masons NZ Ltd 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 Masons NZ Ltd technical information and installation requirements (check mpb.co.nz, or call 0800 522 533 for the latest editions), other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for the specified Membranes, Wraps and Flashing Tape from Masons NZ Ltd.

4.3.2 Damp-Proof Course (DPC)

Masons DRY-FIX™ DPC. A 0.75mm thick, high-impact, single-layer Polyethylene film, embossed on both sides, complying with AS/NZS 2904. Available in 50, 75, 90, 100, 150, 200, 250, 300, and 400mm roll widths.

Applications:
- DRY-FIX™ DPC is approved for use for separating timber and wood-based products and metal from concrete, masonry or brick.
- DRY-FIX™ DPC can be used as a moisture barrier and flashing in masonry veneer constructed in accordance with NZBC E2/AS1 and NZS 4229.
- DRY-FIX™ DPC is approved for use as a concealed flashing at jambs and sills of aluminium window and door joinery in masonry veneers walls constructed in accordance with NZBC E2/AS1.

DRY-FIX™ installed as a general Damp-Proof Course:
- The substrate must be flat and free from sharp ridges likely to puncture the DPC.
- The DPC must fully cover the width of material in contact with concrete or masonry.
- Where a bolt or fixing will penetrate the DPC, make a small cut with a sharp knife.

DRY-FIX™ installed as a Flashing:
- Fix to framing members at maximum 300mm centres with small hot-dip galvanised clouts.
- Avoid joining DRY-FIX™ flashings. Where necessary, form joins with minimum 75mm overlap, lapped such that any water will be shed to the outside. Keep any required joining to an absolute minimum.

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

Installed Location:

4.3.3 Wall Underlay

4.3.3.1 UNI Flexible Air Barrier

UNI Flexible Air Barrier. A non-woven, water resistant, breathable synthetic flexible air barrier, designed to provide temporary protection from weather conditions and UV exposure to timber framing without the installation of the cladding, which allows for the continuation of internal work on the house for 90 days after installation. Nominal weight 230g/m².

UNI Flexible Air Barrier is CodeMark assured with the NZ Building Code: CodeMark Certificate of Conformity No: CM70116, issued by CertMark International Pty Ltd.

To achieve temporary weather protection, UNI Flexible Air Barrier must be used in conjunction with Masons 40 Below Flashing Tape and be installed in accordance with the current UNI Flexible Air Barrier Installation Guide.

UNI Flexible Air Barrier 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 E2/AS1 and the CodeMark Certificate of Conformity.

UNI Flexible Air Barrier can be installed in NZS 3604 Wind Zones up to and including 'Very High' as a flexible air barrier over timber or steel wall framing in accordance with the manufacturer's requirements and CodeMark Certificate of Conformity.

UNI Flexible Air Barrier can be installed in NZS 3604 Wind Zones up to and including 'Extra High' as a flexible air barrier over a rigid wall underlay in accordance with NZBC E2/AS1 9.1.7.2 to the manufacturer's requirements and CodeMark Certificate of Conformity.

UNI Flexible Air Barrier can be installed in NZS3604 windzone Extra High using a specific fixing method. See the current UNI FLEXIBLE AIR BARRIER INSTALLATION GUIDE. N.B. this is an alternative solution and fall outside the scope of the Codemark Certificate.

Do not leave UNI Flexible Air Barrier exposed on walls for more than a total of 90 days before covering.

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

Installed Location:

4.3.4 Window Flashing Tape

4.3.4.1 Hydro™ Flashing Tape

Masons Hydro™ Flashing Tape. Masons Hydro Flashing Tape is a self adhesive, bituminous, flexible, foil-backed tape that is extremely strong and will adhere to most surfaces, and is designed to be used in conjunction with Masons Corner Guard and branded building wraps.

Masons Hydro™ Flashing Tape is CodeMark assured with the NZ Building Code: CodeMark Certificate of Conformity No:CMA-CM70075, issued by CertMark Australasia Pty Ltd.

Masons Hydro™ Flashing Tape is suitable for use on timber or steel framed buildings, in conjunction with a compatible flexible wall underlay or rigid wall underlay, in NZS 3604 Wind Zones up to and including 'Very High'.

Masons Hydro™ 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: 1.2mm.
- Minimum installation temperature: +5°C.
- Maximum UV exposure: 30 days.
- Tape width: Available in 75mm, 100mm, 150mm, and 200mm wide rolls.

Masons Hydro™ Flashing Tape should not be applied directly or indirectly (over flexible underlay) to timber that has been freshly LOSP treated. Always allow LOSP solvent to fully flash off before covering with underlay and applying Masons Hydro™ Flashing Tape.

Installed in accordance with the requirements of the manufacturer's requirements, and CodeMark certification, to the locations and details shown on the approved drawings.

Frame Depth:
Installed Location:

4.3.5 Co-operation

4.3.5.1 Co-operation

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

Coordinate with other trades to install the specified membranes, wraps and flashing tape as required.

4.3.6 Workmanship

4.3.6.1 Workmanship

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

All 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.

4.3.7 Delivery & Handling

4.3.7.1 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 materia.

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 Best practice guidelines for working on roofs and the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

4.3.8 Preparation

4.3.8.1 General

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

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

Supporting timber 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 NASH 3405, or the NZBC for specific design.

Supporting steel structures shall comply with NZS 3404.

4.3.8.2 Under-Slab Basecourse

Masons HT Green installed over an Under-Slab Basecourse. Prior to laying Masons HT Green 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 Masons HT Green DPM.

4.3.9 Installation

4.3.9.1 UNI Flexible Air Barrier

Install UNI Flexible Air Barrier in accordance with the manufacturer's installation instructions, to the locations and details shown on the approved drawings.

UNI Flexible Air Barrier must 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 50mm or as detailed below slab bottom plates or framed floor structure, and sufficiently tensioned to prevent sagging or bulging.

Lap UNI Flexible Air Barrier such that any water will be shed to the outside of the underlay. Horizontal side-laps must be no less than 75mm wide and sealed with Masons 40 Below Flashing Tape. Vertical end-laps must be no less than 150mm wide, made over solid framing and sealed with Masons 40 Below Flashing Tape.

Fix UNI Flexible Air Barrier to timber framing with Masons UNI Fasteners at maximum 600mm centres using a hammer or gun. Fix UNI Flexible Air Barrier to steel framing at maximum 600mm centres with

Masons UNI Washers and self-drilling metal screws. The underlay must be pulled taut over the framing before fixing.

Framed openings should be left covered with UNI Flexible Air Barrier until window and door joinery is ready to be installed Carefully cut UNI Flexible Air Barrier at 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.

For drained cavity wall construction where studs are spaced more than 450mm apart, install Masons WrapStrap™ 19mm/25mm wide polythene embossed strap - horizontally at 300mm centres, or vertically mid-way between battens/studs - as additional restraint to prevent bulk insulation from pushing the underlay into the cavity space.

Install Masons 40 Below Flashing Tape to window and door openings in accordance with Masons requirements.

UNI Flexible Air Barrier can be added as a second layer over the upstand of head flashings and inter-storey flashings, in lieu of flexible flashing tape, when extended up to and lapped under the nearest underlay lap above.

Install all necessary flexible flashing tapes required to seal the underlay at openings, around pipes, ducts and other services penetrating the underlay, at parapet and balustrade junctions, along head flashings and inter-storey flashings, as shown on the drawings.

Do not leave UNI Flexible Air Barrier exposed to weather and UV light for more than 90 days after installation - replace with new underlay if 90 days' exposure is exceeded.

4.3.9.2 Hydro™ Flashing Tape

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

Window Sills:
- Fit Masons Corner Guard to the bottom corners of the opening, over the underlay. Alternatively, apply triangular pieces of Masons Hydro™ Flashing Tape to bottom corners in accordance with Masons instructions.
- Cut Masons Hydro™ 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 Masons Hydro™ 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 75mm wide x 150mm long strip of Masons Hydro™ Flashing Tape at 45° over the taped outside face of each corner.

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

Do not stretch Masons Hydro™ Flashing Tape during installation, and ensure adequate adhesion and weathertightness is maintained against the underlay.

Do not leave Masons Hydro™ Flashing Tape exposed to weather and UV light for more than 30 days after installation - replace with new window flashing tape if 30 days' exposure is exceeded.

4.3.10 Completion

4.3.10.1 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 the manufacturer's installation requirements.

Check installed underlays and flashing tapes for defective work and damage before covering - 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 Masons Plastabrick Ltd Product Warranty for all Masons products installed.

4.4 Brickwork

4.4.1 Scope

Supply and lay the selected bricks to form the brick elements as shown on the drawings. All aspects of this work shall be in accordance with the related compliance documents and as shown on the drawings.

4.4.2 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 only be carried out by Licensed Building Practitioners - Bricklaying and Blocklaying, and conform to the requirements of NZS 4210.

Submit evidence on request of experience, relevant qualifications, LBP Licence - Bricklaying & Blocklaying, New Zealand Masonry Trades Association (NZMTA) Member Registration.

Co-operate with the concretor and carpenter in the setting out of the works.
Co-operate with other trades to ensure that all preliminary and preparatory works, including all framing, membranes, wraps, rigid air barriers, and flashings, all relevant clearances, and any other related works, are completed to specification and as shown on the drawings.
Co-ordinate with trades the locations of pipes, outlets, cables, meter boards and other fittings installed by others.

All brick veneer walls shall be true to line, level and plumb, and within the tolerances tabled in NZS 4210 and SNZ HB4236. All brickwork laid to stretcher bond pattern, with joints width 10mm +/- 3mm.

4.4.3 Installation

Install all brickwork related damp proof courses in accordance with the requirements of NZBC E2/AS1 and to the details shown on the drawings.

Mortar shall have a minimum compressive strength of 12.5 MPa, and be manufactured from cement, sand, lime, and admixtures, and be accurately measured and mixed in accordance with NZS 4210. Mineral oxide pigment dosages shall be to NZS 4210.

Form all necessary openings, reveals, sills, weepholes, separation and control joints, and cavities to the locations and details shown on the drawings, and in accordance with the requirements of NZBC E2/AS1 and NZS 4210. Install necessary vermin stops. Weatherproof all separation joints to the details shown on the drawings.

Wall tie type, durability, spacing, fixing and installation shall be as defined in NZBC E2/AS1 Tables 18A, 18B, 18C, and NZS 4210.

Install steel angle lintels to openings as required by NZBC E2/AS1 Table 18E and as noted on the drawings.

Install all necessary flashings to openings, and other locations as required, to the details shown on the drawings and in accordance with NZBC E2/AS1 requirements.

During the progress of work every care must be taken to prevent moisture penetration of the bricks. No bricklaying shall proceed during wet weather. Upon completion of each days work, exposed tops of brick veneers shall be protected from inclement weather.
Comply with NZS 4210 Cold Weather Construction and Hot Weather Construction requirements.

On completion or the works leave brickwork clean and free of marks and staining. All brickwork cleaning shall be done to the brick manufacturer's recommendations.
Thoroughly clean all other surfaces affected by the brickworks.

4.4.4 Mortar Pointing

Mortar joints shall be concave, tooled to a depth not exceeding 6mm and burnished after the initial stiffening has occurred.

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

5.3.1.1 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.

5.3.1.2 Extent of Work

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 001

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

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

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

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

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

Primer & Sealer:
- Seal damp substrates and set concrete less than 28 days' old using ARDEX WPM 300 in accordance with ARDEX requirements.
- Seal set renders and screeds less than 7 days' old using ARDEX WPM 300 in accordance with ARDEX requirements.
- Prime all substrates receiving ARDEX WPM 001 waterproofing membrane using ARDEX WPM 265 in accordance with ARDEX requirements.

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

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

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

Installed Location:

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 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.

5.3.8.3 Plywood Sheet

Plywood Sheet - check all aspects of preparatory works, including but not limited to:
- Check that the plywood is CD grade (C face up), and is to the specified treatment. Do not apply ARDEX membranes over LOSP treated plywood.
- Ensure the plywood sheets have been correctly installed in accordance with the manufacturer's requirements.
- Check that all plywood 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.

5.3.8.4 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.

5.3.8.5 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.

5.3.8.6 Plasterboard Wet-Area Lining

Water-Resistant Plasterboard Wet-Area Lining - check all aspects of preparatory works, including but not limited to:
- Check that the plasterboard sheets have been correctly installed in accordance with the manufacturer's requirements, and that all sheet edges are fully supported.
- Check that all sheet joints and fastening heads have been finished to the required standard.
- Check the surface for damage and defects - have any surface damage and defects appropriately remedied.
- Check junctions with all other substrates and elements, ensuring that all necessary works have been completed as detailed.
- Check that all apertures, openings, edges and expansion and movement control joints are completed as detailed.
- Carry out all necessary substrate priming in accordance with ARDEX requirements.

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:

1170.2:2011(AS/NZS)	Structural design actions - Wind actions
1170.5:2004(NZS)	Structural design actions - Earthquake actions - New Zealand
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
3622:2004(NZS)	Verification of timber properties
3631:1988(NZS)	New Zealand timber grading rules
3640:2003(NZS)	Chemical preservation of round and sawn timber
4200.1:2017(AS|NZS)	Pliable building membranes and underlays - Part 1: Materials
4200.2:1994(AS/NZS)	Pliable building membranes and underlays - Installation requirements
4219:2009(NZS)	Seismic performance of engineering systems in buildings
AS/NZS 1080.1:2012	Timber - Methods of test - Method 1: Moisture content
AWCI Code of Practice	For Design, Installation and Seismic Restraint of Suspended Ceilings
NASH Standard	Residential and Low-rise Steel Framing - Part 1: Design Criteria
NZBC C/AS2-AS6	Protection from Fire
NZBC G6	Airborne and Impact Sound

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

6.4.1.1 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

6.4.2.1 Workmanship

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

All work shall be carried out to 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.

6.4.2.2 Co-operation

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

6.4.5.1 Floor Joists - 1.5 kPa & 2 kPa Floors

Unless specified or shown otherwise, timber floor joists shall be to the dimensions and spacings given in NZS 3604 Table 7.1.
Floor joists shall be laid on edge true to line and level, have a minimum support bearing of 32mm (except when cantilevered), and so that any crook will straighten under load.
Floor joists shall be jointed over supports (except when cantilevered beyond the support) in accordance with NZS 3604 7.1.1.7.

6.4.5.2 Boundary Joist - Lateral Edge Support

Unless specified or shown otherwise, boundary joists shall be continuous 25mm thick x joist depth as lateral support, and fixed to each end of the floor joists in accordance with NZS 3604 Table 7.5.

Boundary joist size:

6.4.5.3 Solid Blocking - Lateral Edge Support

Unless specified or shown otherwise, solid blocking shall be 45mm thick x joist depth and installed between joist ends at maximum 1.8m centre spacings as lateral edge support, and fixed in accordance with NZS 3604 Table 7.5. Floor joists supported by by a foundation wall shall have solid blocking over a distance of minimum 1.8m at joist ends.

6.4.5.4 Solid Blocking - Mid Span

Floor joists with a span of 2.5m or greater and a depth of at least 4 times the joist thickness shall have 45mm thick continuous solid blocking at mid span, fixed in accordance with NZS 3604 Table 7.5.

6.4.5.5 Support for Loadbearing Walls

Loadbearing walls run parallel to the line of joists shall be supported directly over double joists located at no more than 200mm centre-to-centre from a pile row.

Loadbearing walls run at right angles to the line of joists shall be located at no more than 200mm centre-to-centre from a bearer or subfloor loadbearing wall (running parallel to the loadbearing wall).

6.4.5.6 Support for Non-Loadbearing Walls without Bracing Elements

Non-loadbearing walls, without a bracing element, within 150mm and parallel to a floor joist, shall be supported by minimum 90mm x 45mm solid blocking on-edge at maximum 1.2m centres and at each side of door openings.

6.4.5.7 Cantilevered Joists - 1.5 kPa Floors, Continuous

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 continuous over the outermost support as required by NZS 3604 7.1.5.3(a).

6.4.5.8 Cantilevered Joists - 2 kPa Floors, Continuous

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

6.4.6 Wall Framing

6.4.6.1 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.

6.4.6.2 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.

6.4.6.3 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.

6.4.6.4 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.

6.4.6.5 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.

6.4.6.6 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.

6.4.7 Posts

6.4.7.1 Timber 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.

Base bracket brand name & type:

6.4.8 Roof Framing

6.4.8.1 Rafters

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

6.4.8.2 Dummy Rafters

Dummy rafters shall be to the dimensions and spacings shown on the drawings, and installed over roof sarking directly over rafters as detailed, and fixed in accordance with NZS 3604 Table 10.13.

6.4.8.3 Ridge Boards

Ridge boards shall be to the dimensions and locations shown on the drawings, and installed true to line and level.

6.4.8.4 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.

6.4.8.5 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.

6.4.8.6 Rafters Housed into a Ridge Beam

Unless shown otherwise, rafters set into a ridge beam shall fully housed 15mm into the ridge beam. The rafter shall be cut to the housing angle for full end bearing.

6.4.8.7 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:

6.4.8.8 Valley Boards

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

6.4.8.9 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.

6.4.8.10 Ceiling Runners

Unless specified or shown otherwise, ceiling runners shall be to the dimensions and spacings given in NZS 3604 Table 10.4. Ceiling joists shall be supported by ceiling runners with proprietary steel hangers or 50mm x 50mm timber hangers in accordance with NZS 3604 10.2.1.7.6.

Proprietary hanger brand name & type:

6.4.8.11 Underpurlins & struts

Underpurlins and underpurlin struts shall be to the dimension and location shown on the drawings, and fixed in accordance with NZS 3604 Table 10.5. Underpurlin struts shall have a maximum length in accordance with NZS 3604 Table 10.6, and be directly supported by framing in accordance with NZS 3604 10.2.1.10.3.

6.4.8.12 Strutting Beams

Strutting beams shall be to the dimensions and locations shown on the drawings and fixed in accordance with NZS 3604 Table 10.7. Strutting beams shall have a minimum clearance of 25mm above the ceiling lining or ceiling joists (depending on the beam orientation), and shall have a minimum support bearing of 65mm in accordance with NZS 3604 10.2.1.11.5. Do not support ceiling joists from strutting beams.

6.4.8.13 Collar Ties & Cleats

Collar ties and rafter cleats shall be to the dimensions shown on the drawings, at 1.8m centres or at every third pair of rafters (which ever is the closer), and fixed in accordance with NZS 3604 Table 10.18. Rafter cleats shall be located directly beneath the ridge board.

6.4.8.14 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.

6.4.8.15 Purlins over Sheet Sarking

Purilins laid on edge directly over sheet sarking, or ceiling lining, shall be fixed and installed in accordance with NZS 3604 Table 10.13 and as detailed.

6.4.8.16 Tile Battens

Tile battens shall be to the dimensions and spacings shown on the drawings and to suit the roofing tiles, and fixed to rafters and/or trusses in accordance with NZS 3604 Table 10.12. Tile battens shall be continuous over a minimum of two spans.
Tile battens laid directly over sheet sarking, or ceiling lining, shall be fixed and installed as shown on the drawings.

6.4.8.17 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.

6.4.8.18 Roof Bracing

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

6.5 GIB® Rondo® Metal Batten Systems

6.5.1 Scope

6.5.1.1 Scope

Supply and install the specified GIB® Rondo® Metal Batten Systems to the locations identified on the drawings, incorporating all system components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with the GIB® Rondo® Metal Batten Systems - System and Installation Manual publication and the current GIB® Site Guide (check www.gib.co.nz, or call 0800 100 442 for the latest editions), other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for GIB® Rondo® Metal Batten Systems.

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

For the purpose of this specification, the GIB® Rondo® Metal Batten Systems - System and Installation Manual publication is referred to as the 'GIB® Rondo® Metal Batten Systems Manual'.

6.5.2 Requirements

6.5.2.1 Safety

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

6.5.2.2 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.

6.5.2.3 Producer Statement PS1 - GIB® Rondo® 308 Ceiling Suspension System

Producer Statement PS1 - GIB® Rondo® 308 Ceiling Suspension System. Furnish a fully completed Producer Statement PS1 (Design) as confirmation that the GIB® Rondo® 308 Ceiling Suspension System as designed and documented complies with the relevant clauses of the New Zealand Building Code. The PS1 Producer Statement shall not serve as a product warranty or guarantee of compliance.

6.5.3 Co-operation

6.5.3.1 Co-operation

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

Coordinate with other trades to ensure that the GIB® Rondo® Metal Batten System correctly allows for ceiling lining installation, and for the locations of recessed lights and other fittings installed by others, and to install GIB® Rondo® Metal Batten Systems as required.

6.5.4 Workmanship

6.5.4.1 Workmanship

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

Installation of GIB® Rondo® Metal Batten Systems shall be carried out by experienced and competent tradespersons, who are familiar with the specified systems and installation techniques, in accordance with the GIB® Rondo® Metal Batten Systems - System and Installation Manual, to fully comply with all warranty requirements, and relevant requirements of AS/NZS 2785 (suspended systems). Submit evidence of experience on request, e.g. National Certificate of Interior Systems, or Certified Business Member of AWCINZ.

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

6.5.5 Delivery & Handling

6.5.5.1 Delivery & Handling

Store all materials and accessories indoors, off the floor, on a flat, level surface in accordance with the manufacturer's requirements. Keep materials and accessories dry and protected from damage, distortion, moisture and contamination at all times.

Do not use damaged or defective materials and products.

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

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

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

6.5.6 Preparation

6.5.6.1 General

The building must be fully enclosed, weathertight and suitably dry before installation commences.

Check that all preliminary and preparatory building works have been completed to specification and as shown on the drawings.

Check that any required building services installations, including electrical, plumbing, mechanical, fire, or other service located behind the ceiling line and/or wall line, have been completed.

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

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

Supporting steel stud partitioning shall comply with AS 1397 and as specified and shown on the drawings.

Supporting steel structures shall comply with NZS 3404.

Supporting concrete structures shall comply with the CCANZ CP 01:2011 or with NZS 3109. New concrete must have aged for a minimum of 28 days.

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

Carry out all necessary substrate inspections and preparatory work in accordance with the GIB® Rondo® Metal Batten System Manual and the GIB® Site Guide prior to installation.

Confirm the location and details of movement control joints, as indicated on the drawings, prior to installation.

The commencement of work on each section/area shall be deemed to indicate full acceptance by the installer that all preparatory works by other trades is complete.

6.5.7 Completion

6.5.7.1 Completion

Carry out a final inspection immediately after installation. Check that the GIB Rondo Metal Batten System has been installed correctly in accordance with the GIB® Rondo® Metal Batten Systems Manual and installation tolerances, to the correct set-out and details shown on the drawings, and that the installations are accurately aligned true to line, level (and/or plumb) and plane.

Check that the installed layout allows for the correct positioning and installation of all penetrations and services fixtures and fittings as indicated on the drawings.

Check for any damage and defective work - repair or replace as necessary to the required standard.

Leave all of this work complete and to the required standard in accordance with the manufacturer's warranty requirements, as shown on the drawings.

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

Issue to the Owner a copy of the a copy of the GIB® Product and System Warranty.

Provide all necessary Producer Statements.

6.6 Masons NZ Ltd Membranes, Wraps & Flashing Tape

6.6.1 Scope

6.6.1.1 Scope

Supply and install the specified Membranes, Wraps and Flashing Tape from Masons NZ Ltd 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 Masons NZ Ltd technical information and installation requirements (check mpb.co.nz, or call 0800 522 533 for the latest editions), other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for the specified Membranes, Wraps and Flashing Tape from Masons NZ Ltd.

6.6.2 Damp-Proof Course (DPC)

6.6.2.1 DRY-FIX™ Damp-Proof Course

Masons DRY-FIX™ DPC. A 0.75mm thick, high-impact, single-layer Polyethylene film, embossed on both sides, complying with AS/NZS 2904. Available in 50, 75, 90, 100, 150, 200, 250, 300, and 400mm roll widths.

Applications:
- DRY-FIX™ DPC is approved for use for separating timber and wood-based products and metal from concrete, masonry or brick.
- DRY-FIX™ DPC can be used as a moisture barrier and flashing in masonry veneer constructed in accordance with NZBC E2/AS1 and NZS 4229.
- DRY-FIX™ DPC is approved for use as a concealed flashing at jambs and sills of aluminium window and door joinery in masonry veneers walls constructed in accordance with NZBC E2/AS1.

DRY-FIX™ installed as a general Damp-Proof Course:
- The substrate must be flat and free from sharp ridges likely to puncture the DPC.
- The DPC must fully cover the width of material in contact with concrete or masonry.
- Where a bolt or fixing will penetrate the DPC, make a small cut with a sharp knife.

DRY-FIX™ installed as a Flashing:
- Fix to framing members at maximum 300mm centres with small hot-dip galvanised clouts.
- Avoid joining DRY-FIX™ flashings. Where necessary, form joins with minimum 75mm overlap, lapped such that any water will be shed to the outside. Keep any required joining to an absolute minimum.

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

Installed Location:

6.6.3 Wall Underlay

6.6.3.1 UNI Flexible Air Barrier

UNI Flexible Air Barrier. A non-woven, water resistant, breathable synthetic flexible air barrier, designed to provide temporary protection from weather conditions and UV exposure to timber framing without the installation of the cladding, which allows for the continuation of internal work on the house for 90 days after installation. Nominal weight 230g/m².

UNI Flexible Air Barrier is CodeMark assured with the NZ Building Code: CodeMark Certificate of Conformity No: CM70116, issued by CertMark International Pty Ltd.

To achieve temporary weather protection, UNI Flexible Air Barrier must be used in conjunction with Masons 40 Below Flashing Tape and be installed in accordance with the current UNI Flexible Air Barrier Installation Guide.

UNI Flexible Air Barrier 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 E2/AS1 and the CodeMark Certificate of Conformity.

UNI Flexible Air Barrier can be installed in NZS 3604 Wind Zones up to and including 'Very High' as a flexible air barrier over timber or steel wall framing in accordance with the manufacturer's requirements and CodeMark Certificate of Conformity.

UNI Flexible Air Barrier can be installed in NZS 3604 Wind Zones up to and including 'Extra High' as a flexible air barrier over a rigid wall underlay in accordance with NZBC E2/AS1 9.1.7.2 to the manufacturer's requirements and CodeMark Certificate of Conformity.

UNI Flexible Air Barrier can be installed in NZS3604 windzone Extra High using a specific fixing method. See the current UNI FLEXIBLE AIR BARRIER INSTALLATION GUIDE. N.B. this is an alternative solution and fall outside the scope of the Codemark Certificate.

Do not leave UNI Flexible Air Barrier exposed on walls for more than a total of 90 days before covering.

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

Installed Location:

6.6.4 Window Flashing Tape

6.6.4.1 Hydro™ Flashing Tape

Masons Hydro™ Flashing Tape. Masons Hydro Flashing Tape is a self adhesive, bituminous, flexible, foil-backed tape that is extremely strong and will adhere to most surfaces, and is designed to be used in conjunction with Masons Corner Guard and branded building wraps.

Masons Hydro™ Flashing Tape is CodeMark assured with the NZ Building Code: CodeMark Certificate of Conformity No:CMA-CM70075, issued by CertMark Australasia Pty Ltd.

Masons Hydro™ Flashing Tape is suitable for use on timber or steel framed buildings, in conjunction with a compatible flexible wall underlay or rigid wall underlay, in NZS 3604 Wind Zones up to and including 'Very High'.

Masons Hydro™ 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: 1.2mm.
- Minimum installation temperature: +5°C.
- Maximum UV exposure: 30 days.
- Tape width: Available in 75mm, 100mm, 150mm, and 200mm wide rolls.

Masons Hydro™ Flashing Tape should not be applied directly or indirectly (over flexible underlay) to timber that has been freshly LOSP treated. Always allow LOSP solvent to fully flash off before covering with underlay and applying Masons Hydro™ Flashing Tape.

Installed in accordance with the requirements of the manufacturer's requirements, and CodeMark certification, to the locations and details shown on the approved drawings.

Frame Depth:
Installed Location:

6.6.5 Co-operation

6.6.5.1 Co-operation

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

Coordinate with other trades to install the specified membranes, wraps and flashing tape as required.

6.6.6 Workmanship

6.6.6.1 Workmanship

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

All 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.

6.6.7 Delivery & Handling

6.6.7.1 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 materia.

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 Best practice guidelines for working on roofs and the OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

6.6.8 Preparation

6.6.8.1 General

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

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

Supporting timber 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 NASH 3405, or the NZBC for specific design.

Supporting steel structures shall comply with NZS 3404.

6.6.8.2 Under-Slab Basecourse

Masons HT Green installed over an Under-Slab Basecourse. Prior to laying Masons HT Green 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 Masons HT Green DPM.

6.6.9 Installation

6.6.9.1 UNI Flexible Air Barrier

Install UNI Flexible Air Barrier in accordance with the manufacturer's installation instructions, to the locations and details shown on the approved drawings.

UNI Flexible Air Barrier must 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 50mm or as detailed below slab bottom plates or framed floor structure, and sufficiently tensioned to prevent sagging or bulging.

Lap UNI Flexible Air Barrier such that any water will be shed to the outside of the underlay. Horizontal side-laps must be no less than 75mm wide and sealed with Masons 40 Below Flashing

Tape. Vertical end-laps must be no less than 150mm wide, made over solid framing and sealed with Masons 40 Below Flashing Tape.

Fix UNI Flexible Air Barrier to timber framing with Masons UNI Fasteners at maximum 600mm centres using a hammer or gun. Fix UNI Flexible Air Barrier to steel framing at maximum 600mm centres with Masons UNI Washers and self-drilling metal screws. The underlay must be pulled taut over the framing before fixing.

Framed openings should be left covered with UNI Flexible Air Barrier until window and door joinery is ready to be installed Carefully cut UNI Flexible Air Barrier at 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.

For drained cavity wall construction where studs are spaced more than 450mm apart, install Masons WrapStrap™ 19mm/25mm wide polythene embossed strap - horizontally at 300mm centres, or vertically mid-way between battens/studs - as additional restraint to prevent bulk insulation from pushing the underlay into the cavity space.

Install Masons 40 Below Flashing Tape to window and door openings in accordance with Masons requirements.

UNI Flexible Air Barrier can be added as a second layer over the upstand of head flashings and inter-storey flashings, in lieu of flexible flashing tape, when extended up to and lapped under the nearest underlay lap above.

Install all necessary flexible flashing tapes required to seal the underlay at openings, around pipes, ducts and other services penetrating the underlay, at parapet and balustrade junctions, along head flashings and inter-storey flashings, as shown on the drawings.

Do not leave UNI Flexible Air Barrier exposed to weather and UV light for more than 90 days after installation - replace with new underlay if 90 days' exposure is exceeded.

6.6.9.2 Hydro™ Flashing Tape

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

Window Sills:
- Fit Masons Corner Guard to the bottom corners of the opening, over the underlay. Alternatively, apply triangular pieces of Masons Hydro™ Flashing Tape to bottom corners in accordance with Masons instructions.
- Cut Masons Hydro™ 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 Masons Hydro™ 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 75mm wide x 150mm long strip of Masons Hydro™ Flashing Tape at 45° over the taped outside face of each corner.

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

Do not stretch Masons Hydro™ Flashing Tape during installation, and ensure adequate adhesion and weathertightness is maintained against the underlay.

Do not leave Masons Hydro™ Flashing Tape exposed to weather and UV light for more than 30 days after installation - replace with new window flashing tape if 30 days' exposure is exceeded.

6.6.10 Completion

6.6.10.1 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 the manufacturer's installation requirements.

Check installed underlays and flashing tapes for defective work and damage before covering - 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 Masons Plastabrick Ltd Product Warranty for all Masons products installed.

6.7 GIB® Plasterboard Linings

6.7.1 Scope

6.7.1.1 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 AWCI Membership

Installation of GIB® Plasterboard Linings and associated GIB® Systems shall be carried out by a registered member of the Association of Wall and Ceiling Industries of New Zealand Inc. (AWCI). If not already provided and if requested, submit evidence of AWCI membership and relevant experience.

6.7.2.4 Quality Assurance

Ensure that the installation and finishing of GIB® Plasterboard Linings and associated GIB® Systems comply in all respects with the approved design drawings and specifications, and Building Consent.

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

6.7.2.5 Inspection & Acceptance of GIB® Plasterboard Linings

Carry out all necessary pre-installation, installation and finishing inspections of GIB® Plasterboard Linings for each area of work in accordance with the requirements of the GIB® Site Guide and associated industry Code of Practice (AWCI) recommendations.

Complete the GIB® Site Guide Pre-Installation Checklist prior to installing GIB® plasterboard linings, and relevant GIB® Performance Systems Installation Checklists.

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

6.7.2.6 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. 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.

6.7.2.7 Producer Statement (other manufacturer's system)

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

6.7.2.8 Substitution of GIB® Plasterboard Linings

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

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

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.

6.7.3.2 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.

6.7.3.3 Wet Areas

Wet Area Plasterboard Linings - GIB Aqualine® Wet Area Systems. To the areas noted as 'Wet Area' on the drawings, additionally comply with all relevant aspects of the GIB Aqualine® Wet Area Systems publication, BRANZ Appraisal No.427 (2021), and other relevant product manufacturers' recommendations. Refer to separate specification GIB Aqualine® Wet Area Systems.

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 Braceline® & GIB Noiseline®, 10mm

GIB Braceline® & GIB Noiseline®, 10mm. A 10mm thick dual purpose plasterboard interior lining, with a high-density core for extra bracing and noise control performance. Suitable for use in residential and commercial applications on walls and ceilings where increased bracing and noise control performance is required. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location:

6.7.4.4 GIB Braceline® & GIB Noiseline®, 13mm

GIB Braceline® & GIB Noiseline®, 13mm. A 13mm thick dual purpose plasterboard interior lining, with a high-density core for extra bracing and noise control performance. Suitable for use in residential and commercial applications on walls and ceilings where increased bracing and noise control

performance is required. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location:

6.7.4.5 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:

6.7.4.6 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 Components & Accessories

6.7.5.1 Metal Ceiling Battens

Metal Ceiling Battens - GIB® Rondo® Metal Batten Systems. Installed in accordance with the manufacturer's requirements to the layout and details shown on the approved drawings. Refer to the GIB® Site Guide, and to separate specification GIB® Rondo® Metal Batten Systems.

6.7.5.2 Plasterboard Fasteners

GIB® Plasterboard Fasteners. Fasteners for fixing GIB® Plasterboard Linings shall be selected and used according to best fixing practices and the GIB® Site Guide and relevant GIB® Systems literature. Fastener heads shall be set slightly below the plasterboard sheet surface without breaking the paper facing.

Screw Fixing to Timber Framing:
- GIB® Grabber® High Thread Drywall Screws: A coarse high-thread screw for fixing into timber with superior holding power and ease of penetration.
- GIB® Grabber® Self Tapping Drywall Screws: A fine self-tapping thread, needle point screw, suitable for fixing to timber and light gauge steel framing.
- GIB® Grabber® Dual Thread Drywall Screws: A dual coarse/fine threaded, needle point screw, as a component of the GIBFix® Framing System and for fixing to timber framing.

Nail Fixing to Timber Framing:
- GIB Nail: Passivated coated, annular grooved, bugle head drywall nails with chequer-keyed head.

Screw Fixing to Light Steel Framing:
- GIB® Grabber® Self Tapping Drywall Screws: A fine self-tapping thread needle point screw, suitable for fixing to light gauge (0.45-0.95mm) steel framing.
- GIB® Grabber® Dual Thread Drywall Screws: A dual coarse/fine threaded, needle point screw, suitable for fixing to light gauge (0.45-0.95mm) steel framing.

6.7.5.3 Adhesives

GIB® Adhesives. In addition to GIB® plasterboard fasteners, fix GIB® Plasterboard Linings using GIB® adhesives in accordance with the requirements of the GIB® Site Guide and GIB® System literature.

GIB® Adhesives:
- GIBFix® One: An acrylic based plasterboard adhesive with ultra low VOC, suitable for use on timber and metal substrates, including all treated timber. Minimum application temperature - 10°C.
- GIBFix® All-Bond: A solvent based plasterboard adhesive, suitable for use on timber and metal substrates, including all treated timber. Do not use on polystyrene surfaces.

6.7.5.4 Paper Faced Metal Trims

GIB® Goldline® Paper Faced Metal Trims. Paper-faced metal corner beads and edge trim made with a patented, high quality paper laminated to galvanised steel forms. Paper faced metal trims shall be embedded in jointing compound - do not mechanically fasten paper faced trims. Installed in accordance with the requirements of the GIB® Site Guide and GIB® Systems literature.

GIB® Goldline® Profiles:
- External 90° Corner Trim (G1-W): profile available in 2.4/2.7/3.0m lengths.
- External 135° Corner Trim (G1-O): profile available in 2.4m lengths.
- Internal 90° Corner Trim (G2): profile available in 2.4/2.7/3.0m lengths.
- Internal 135° Corner Trim (G2-O): profile available in 2.4m lengths.
- Bullnose External 90° Corner Trim (G1-B): profile available in 2.4/2.7/3.0m lengths.
- Reveals (GR): profiles available for 10mm thick and 13mm thick plasterboard.
- L-Trims (G4): profiles available for 10mm thick and 13mm thick plasterboard.

6.7.5.5 Proprietary Control Joints

GIB® Plasterboard Control Joints. Form movement control joints in plasterboard lined walls and ceilings to the locations and details shown on the approved drawings. Where not indicated on the drawings, movement joints shall be positioned in accordance with the requirements and recommendations given in the GIB® Site Guide and relevant GIB® Systems literature.

When not specified on the drawings, select the most suitable GIB® Plasterboard Control Joint according to location, application, durability, and finish detail required.

GIB® Plasterboard Control Joints:
- Metal Control Joint: GIB® Rondo® P35 Control Joint, with perforated metal flanges. 18mm wide. Available in 3.0m lengths.
- Plastic Smooth Control Joint: GIB® Plastic Smooth Control Joint, with flush face. 10mm wide. Available in 3.0m lengths.

- Plastic W-Profile Control Joint: GIB® Plastic W-Profile Control Joint, with tear-away beads. 14mm wide. Available in 3.0m lengths.

6.7.5.6 Joint & Finishing Compounds

GIB® Compounds. Use the most suitable GIB® Compounds to joint and finish GIB® Plasterboard Linings according to the plasterboard type, location, application, durability, and quality of finish required. GIB® Compounds shall be applied and finished in accordance with the manufacturer's requirements to the specified finish level, and used in conjunction with GIB® Paper Joint Tape and GIB® Plasterboard Trims.

GIB® Compounds:
- GIB TradeSet®: Setting type compound. Suitable for Tape Coat, 2nd Coat. Easy to scrape. 20/45/90/150 minute working/set times.
- GIB MaxSet®: Setting type compound. Suitable for Tape Coat, 2nd Coat. Scrape while 'green'. 90 minute working/set time.
- GIB Lite Blue®: Setting type compound. Suitable for 2nd Coat. Easy sanding. 90 minute working/set time.
- GIB Trade Finish® Heavy Weight: Air drying ready-mix type compound. Suitable for Finishing Coat. Moderate sanding.
- GIB Trade Finish® Multi: Air drying ready-mix type compound. Suitable for Tape Coat, 2nd Coat; Finishing Coat. Easy sanding.
- GIB Trade Finish® Lite: Air drying ready-mix type compound. Suitable for Finishing Coat. Very easy sanding.
- GIB Promix® Lite: Air drying ready-mix type compound. Suitable for Finishing Coat. Very easy sanding.
- GIB® U-Mix: Air drying powder-mix type compound. Suitable for Finishing Coat. Easy Sanding.
- GIB Plus 4®: Air drying ready-mix type compound. Suitable for Tape Coat, 2nd Coat, Finishing Coat. Very easy sanding.
- GIB Promix® All Purpose: Air drying ready-mix type compound. Suitable for Tape Coat, 2nd Coat, Finishing Coat. Moderate sanding.
- GIB-Cove® Bond: Setting type compound. Suitable for bonding GIB-Cove® cornice, back-blocking plasterboard linings, and direct-bonding plasterboard to concrete and masonry walls. Hard to scrape. 45/90 minute working/set times.
- GIB X-Block® Jointing Compound: Used in conjunction with GIB X-Block® plasterboard wall and ceiling linings in accordance with the GIB X-Block® Radiation Shielding publication.

6.7.5.7 Joint Tape

GIB® Paper Joint Tape. A 50mm wide, spark perforated paper joint tape used to strengthen joints between plasterboard sheets. Centre-creased for internal and external corner applications. Recommended for jointing GIB® plasterboard wall and ceiling linings in accordance with the GIB® Site Guide and GIB Systems literature.

6.7.5.8 Wet Area Sealant

Wet Area Sealant. A mould resistant, flexible, neutral curing silicone sealant with strong adhesion, suitable for wet area applications and where there is high humidity, including bathrooms, toilets, showers, wash-down areas, kitchens, laundries.

Applied in accordance with the sealant manufacturer's instructions, as required by the GIB® Site Guide and GIB® System literature. Sealant joints shall be in accordance with the sealant manufacturer's joint design width-to-depth ratio.

Manufacturer & Brand:

6.7.5.9 Gap Filler

GIB® Gapfiller. A general purpose, gun applied, one-part water based, paintable acrylic gap filler. Provides excellent adhesion for gaps and cracks and other low movement joints. Used in strict in accordance with the manufacturer's requirements. Refer to the GIB® Site Guide.

6.7.6 Level of Finish

6.7.6.1 Level of Finish

To the areas noted as a specific Level of Finish (3-5) on the drawings, additionally comply with all relevant aspects of the GIB® Site Guide and AS/NZS 2589, complete with all system accessories, and other relevant product manufacturers' recommendations.

NOTE: Unless stated otherwise, Level 4 is the default Level of Finish.

6.7.6.2 Acceptance of Levels of Finish

Carry out all necessary inspections and assessments of completed plasterboard jointing and finishing prior to hand-over for subsequent decoration.

Do not apply surface sealers and decorative treatments until written agreement between the Contractor and Painter/Decorator is given confirming the specified Finish Levels have been achieved and the plasterboard linings are ready for subsequent sealing and decoration.

6.7.7 Co-operation

6.7.7.1 Co-operation

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

6.7.8 Workmanship

6.7.8.1 Workmanship

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

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.

6.7.9 Delivery & Handling

6.7.9.1 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.

6.7.10 Preparation

6.7.10.1 General

All framing and substrates shall be complete and ready for GIB® Plasterboard Lining installation.

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

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

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

Concrete substrates shall comply with the CCANZ CP 01:2011 or with NZS 3109. New concrete must have aged for a minimum of 28 days. Ensure that concrete surfaces are within the tolerances specified. For of direct bonded plasterboard linings, concrete substrates must below 75% relative humidity prior to installation.

Concrete masonry substrates shall comply with NZS 4229, or with NZS 4230 and AS/NZS 1170 for specific design. For of direct bonded plasterboard linings, concrete masonry substrates must below 75% relative humidity prior to installation.

Carry out all necessary moisture readings. Do not commence installation until the moisture readings are below the required level.

Carry out all necessary substrate inspections and preparatory work in accordance with the manufacturer's recommendations and the GIB® Site Guide prior to installation. Complete and sign the GIB® Site Guide Pre-Installation Checklist.

Check that the building envelope has been finished at all penetrations including doors, windows, services, etc., and the building is weathertight.

Check junctions to all other building elements and ensure that all necessary works have been completed, including cavity insulation.

Check that all fixtures, fittings and built-in items are correctly installed, and that all framing and substrate edges are completed as detailed.

Confirm the location and details of movement control joints, as indicated on the drawings, prior to installation.

Ensure all pre-wiring and service piping is installed and complete.

Check that any required cavity insulation has been installed correctly and its bulk thickness does not exceed the framing thickness.

Remove all debris and rubbish from framing voids prior to installing linings.

The commencement of work on each section/area shall be deemed to indicate full acceptance by the installer that all preparatory works by other trades is complete.

6.7.10.2 Framing Check

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

6.7.10.3 Work above Ceilings

Check that all building work, mechanical, plumbing, electrical, fire protection and other services installed above the ceiling are completed and independently supported by the building structure - not by the ceiling system.

6.7.11 Installation

6.7.11.1 General

Install GIB® Plasterboard Linings and accessories in accordance with the requirements of the GIB® Site Guide and product technical literature and associated fixing schedules, to the locations and details shown on the drawings. For GIB® Performance Systems, refer to the relevant GIB® system specification.

Prior to installation, confirm:
- The locations and construction details of all movement control joints;
- The locations and installation details of all building services items within framed structures;
- The specified GIB® plasterboard installation and fixing requirements;
- The specified Finish Level(s) for the plasterboard linings.
- Subsequent surface treatments and finishes applied to GIB® plasterboard.

6.7.11.2 Standard Ceiling Fixing - Metal Ceiling Battens

GIB® Plasterboard Ceiling Linings - Standard Ceiling Fixing with Metal Ceiling Battens. Metal ceiling battens shall be from the GIB® Rondo® Metal Batten Systems - refer to separate specification GIB® Rondo® Metal Batten Systems.

Unless independently supported, uniformly distributed loads (fixtures and fittings and/or overlaid insulation) supported by GIB® plasterboard ceiling linings shall not exceed 3.0 kg/m².

Metal ceiling batten spacings shall be shall be as given in the GIB® Site Guide according to the specified plasterboard thickness - 600mm for 13mm or greater thickness, 450mm for 10mm thickness. Ceiling battens shall all run in the same direction within the ceiling area. In no case shall ceiling battens be continuous over movement control joints in the structure.

Install GIB® Plasterboard sheets right angles to ceiling battens, with sheet end-joints staggered minimum 600mm and located off battens and back-blocked. Fully support sheets during positioning and fixing - for ceiling installations, the use of a mechanical lifting machine is recommended.

Plasterboard sheets shall be fixed to ceiling battens in conjunction with GIBFix® adhesive applied at maximum at 200mm centres. Do not apply adhesive at sheet edges or within 200mm of fasteners. Firmly press the plasterboard where adhesive has been applied to ensure full contact.

Fix sheets to timber ceiling battens with GIB® Grabber® Self Tapping Screws in accordance with GIB® Site Guide fastener schedule according to the plasterboard thickness. Position fasteners no closer than 12mm from a tapered edge or 18mm from a cut sheet edge.

Install all necessary paper-faced metal beads, casing beads, shadow and reveal beads and other edge trims to plasterboard corners and edges as necessary and as detailed on the drawings.

Form movement control joints to the locations and details shown on the approved drawings. Where not indicated on the drawings, movement joints shall be positioned at maximum 12m intervals in both directions on any single ceiling, and where there is a change in ceiling lining material, and shall coincide with the junctions between adjoining spaces.

Accommodate recessed light fittings, heating and ventilating diffusers and grilles and other utility fixtures and fittings that penetrate the ceiling lining.

6.7.11.3 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.

6.7.11.4 Ceiling Diaphragms

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

6.7.11.5 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.

6.7.11.6 Wall Linings - Vertically Fixed - Timber Frame

GIB® Plasterboard Wall Linings Vertically-Fixed to Timber Framing. Install GIB® plasterboard sheets vertically, parallel with studs, with any end-joints staggered, and with the bottom edge of the lower sheet gapped 5–10mm off finished floor level.

All joints between sheets shall be touch fitted. Eliminate or minimise the butting of sheet end-joints by using full-length or long-length sheets. Give careful consideration to the placement of sheet joints. Where possible, place joints in situations where they are less likely to be affected by critical lighting.

Form sheet edge joints on studs. Short vertical edge joints (400mm or less) such as above windows and door can be made off stud and back blocked.

Sheet joints at openings, such as window and door openings, shall not coincide with the vertical edges of the opening - sheets shall be fitted so that the vertical end joint falls minimum 200mm inside the edge of the opening.

Plasterboard sheets shall be fixed to timber framing in conjunction with GIBFix® adhesive applied at maximum at 300mm centres to intermediate studs. Do not apply adhesive at sheet edges or within 200mm of fasteners. Firmly press the plasterboard where adhesive has been applied to ensure full contact.

Fix sheets to timber framing with GIB® Grabber® High Thread Screws or GIB® Nails in accordance with GIB® Site Guide fastener schedule. Place fasteners at 300mm centres around the perimeter of each sheet, no closer than 12mm from sheet edges. It is recommended that fasteners at wall corners are placed 50mm in from the corner in each direction (horizontal/vertical).

Install all necessary paper-faced and metal beads, casing beads, shadow and reveal beads and other edge trims to plasterboard corners and edges as necessary and as detailed on the drawings.

Form movement control joints to the locations and details shown on the approved drawings. Where not indicated on the drawings, movement joints shall be positioned at maximum 12m intervals in both directions (horizontally/vertically), and shall coincide with movement joints in the primary structure, and where there is a change in wall lining material.

Accommodate piped and cabled services and other building services fixtures and fittings that penetrate the wall lining.

6.7.11.7 Wall Linings - Horizontally Fixed - Steel Frame

GIB® Plasterboard Wall Linings Horizontally-Fixed to Lightweight Steel 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 light steel 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 light steel framing with GIB® Grabber® Self Tapping Screws in accordance with GIB® Site Guide fastener schedule. Place fasteners at 300mm centres to top and bottom channels 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.

6.7.11.8 Wall Linings - Vertically Fixed - Steel Frame

GIB® Plasterboard Wall Linings Vertically-Fixed to Lightweight Steel Framing. Install GIB® plasterboard sheets vertically, parallel with studs, with any end-joints staggered, and with the bottom edge of the lower sheet gapped 5–10mm off finished floor level.

All joints between sheets shall be touch fitted. Eliminate or minimise the butting of sheet end-joints by using full-length or long-length sheets. Give careful consideration to the placement of sheet joints. Where possible, place joints in situations where they are less likely to be affected by critical lighting.

Form sheet edge joints on studs. Short vertical edge joints (400mm or less) such as above windows and door can be made off stud and back blocked. Where plasterboard linings are fixed both sides of lightweight steel framing, the sheet joints shall be staggered from the joints on the other side of the frame - maximum 600mm offset to intermediate studs.

Sheet joints at openings, such as window and door openings, shall not coincide with the vertical edges of the opening - sheets shall be fitted so that the vertical end joint falls minimum 200mm inside the edge of the opening.

Always commence sheet installation and fixing sequence from the open side of the steel studs - not the closed side.

Plasterboard sheets shall be fixed to lightweight steel 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 lightweight steel framing with GIB® Grabber® Self Tapping Screws in accordance with GIB® Site Guide fastener schedule. Place fasteners at 300mm centres around the perimeter of each sheet, no closer than 12mm from sheet edges. It is recommended that fasteners at wall corners are placed 50mm in from the corner in each direction (horizontal/vertical).

Install all necessary paper-faced and metal beads, casing beads, shadow and reveal beads and other edge trims to plasterboard corners and edges as necessary and as detailed on the drawings.

Form movement control joints to the locations and details shown on the approved drawings. Where not indicated on the drawings, movement joints shall be positioned at maximum 12m intervals in both directions (horizontally/vertically), and shall coincide with movement joints in the primary structure, and where there is a change in wall lining material.

Accommodate piped and cabled services and other building services fixtures and fittings that penetrate the wall lining.

6.7.11.9 Wall Linings - Direct Bonded to Concrete/Masonry (above ground level)

GIB® Plasterboard Wall Linings Direct Bonded to Concrete and Masonry Substrates (above ground level). Install GIB® plasterboard sheets horizontally, with any end-joints staggered, and with the bottom edge of the lower sheet gapped 5–10mm off finished floor level.

All joints between sheets shall be touch fitted. Eliminate or minimise the butting of sheet end-joints by using full-length or long-length sheets. Give careful consideration to the placement of sheet joints. Where possible, place joints in situations where they are less likely to be affected by critical lighting.

Sheet end joints at openings, such as window and door openings, shall not coincide with the vertical edges of the opening - sheets shall be fitted so that the vertical end joint falls minimum 200mm either side of the edge of the opening.

Plasterboard sheets shall be direct bonded to concrete and masonry walls with GIB-Cove® Bond applied in daubs approximately 50mm diameter x 12mm thick, at 300-400mm centres vertically and 500-600mm centres horizontally, and no closer than 25mm from the sheet edges. Position the sheet and press into place. Ensure each sheet achieves proper contact with GIB-Cove® Bond, and is in true alignment over the surface of the sheet before setting.

Install all necessary paper-faced and metal beads, casing beads, shadow and reveal beads and other edge trims to plasterboard corners and edges as necessary and as detailed on the drawings.

Form movement control joints to the locations and details shown on the approved drawings. Where not indicated on the drawings, movement joints shall coincide with movement joints in the primary structure, and where there is a change in wall lining material.

Accommodate piped and cabled services and other building services fixtures and fittings that penetrate the wall lining.

6.7.11.10 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.

6.7.12 Completion

6.7.12.1 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.

6.7.12.2 Subsequent Painting

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.

6.7.12.3 Subsequent Tiling

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® Wet Area Systems

6.8.1 Scope

6.8.1.1 Scope

Supply and install the specified GIB Aqualine® Wet Area Systems to the locations identified on the drawings, incorporating GIB® plasterboards and all system components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with the GIB Aqualine® Wet Area Systems publication and the current GIB® Site Guide (check www.gib.co.nz, or call 0800 100 442 for the latest editions), BRANZ Appraisal No.427, other relevant product manufacturers' recommendations, and as shown on the drawings.

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

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

For the purpose of this specification, the GIB Aqualine® Wet Area Systems publication is referred to as the GIB® Wet Area Systems Manual.

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 Aqualine® Wet Area Systems comply in all respects with the approved design drawings and specifications, and Building Consent.

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

6.8.2.4 Inspection & Acceptance of GIB® Wet Area Systems

Carry out all necessary pre-installation, installation and finishing inspections necessary for GIB Aqualine® Wet Area Systems for each area of work in accordance with the requirements of the GIB® Wet Area Systems Manual, GIB® Site Guide, and BRANZ Appraisal No.427.

Complete the GIB® Wet Area Systems Manual and GIB® Site Guide Pre-Installation Checklists prior to installing GIB® plasterboard linings.

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

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 Aqualine® Wet Area System materials and/or work shall be repaired

and/or replaced to the satisfaction of the Architect/Designer, without delay and at no additional cost to the Principal.

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 Aqualine® Wet Area Systems components for alternative brands is not permitted under any circumstances.

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

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.

In addition to the limitations above, GIB Aqualine® plasterboard must NOT be:
- used for bracing purposes in shower cubicles or above baths; or
- applied directly to solid plaster (gypsum or cement), wood based sheet linings or similar materials, masonry or concrete; or
- installed over a vapour barrier or a wall acting as a vapour barrier.

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 (2016), and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

6.8.3.3 Bracing Performance - Steel Framing

Bracing Performance - GIB EzyBrace® Systems - Steel Framing. To the steel framed elements noted as 'Bracing' on the drawings, additionally comply with all relevant aspects of the latest GIB Ezybrace® For Light Steel Frame Systems publication and GIB Ezybrace® Bracing Software according to the specified bracing unit rating, and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

6.8.3.4 Fire Rating Performance

Fire Rating Performance - GIB® Fire Rated Systems. To the areas noted as 'Fire-rated' on the drawings, additionally comply with all relevant aspects of the GIB® Fire Rated Systems (2018) publication according to the specified fire resistance rating (FRR), BRANZ Appraisal No.289 (2018), and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Fire Rated Systems.

6.8.3.5 Sound Insulation Performance

Sound Insulation Performance - GIB® Noise Control Systems. To the areas noted as 'Sound-rated' on the drawings, additionally comply with all relevant aspects of the GIB® Noise Control Systems (2017) publication according to the specified sound transmission class (STC) rating, BRANZ Appraisal No.394, and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Noise Control Systems.

6.8.4 GIB Aqualine® Non-Tiled Wall Systems

6.8.4.1 Non-Tiled Walls - Timber Frame

GIB Aqualine® Wet Area Systems - Non-Tiled Walls - Timber Framing. A timber frame, wet area lining system for non-tiled walls incorporating one layer of 10mm or 13mm GIB Aqualine® on the wet area side. Refer to the GIB® Aqualine® Systems literature.

6.8.5 GIB Aqualine® Tiled Wall Systems

6.8.5.1 Tiled Walls (tile weight - max. 26kg/m²) - Timber Frame

GIB Aqualine® Wet Area Systems - Tiled Walls - Timber Frame. A timber frame, wet area lining system for tiled walls with a maximum tile weight of 26kg/m², incorporating one layer of 10mm GIB Aqualine® on the wet area side. Refer to the GIB® Wet Area Systems literature.

6.8.5.2 Tiled Walls (tile weight - max 40kg/m²) - Timber Frame

GIB® Wet Area Systems - Tiled Walls - Timber Frame. A timber frame, wet area lining system for tiled walls with a maximum tile weight of 40kg/m², incorporating one layer of 13mm GIB Aqualine® on the wet area side. Refer to the GIB® Wet Area Systems literature.

6.8.6 GIB Aqualine® Ceiling Systems

6.8.6.1 Metal Ceiling Battens

GIB Aqualine® Wet Area Systems - Ceilings - Metal Ceiling Battens. A wet area drywall ceiling lining system over metal ceiling battens incorporating one layer of 10mm or 13mm GIB Aqualine®. Refer to the GIB® Wet Area Systems literature.

6.8.7 Components & Accessories

6.8.7.1 Components & Accessories

GIB Aqualine® Wet Area Systems components and accessories, including, but not limited to:
- GIB® Plasterboard Linings;
- GIB® Plasterboard Fasteners;
- GIB® Adhesives - GIBFix® One and/or GIBFix® All-Bond;
- GIB® Rondo® NZ18 Perimeter Angle: shower corner reinforcing, 32 x 32 x 0.55mm thick galvanised steel angle.
- GIB® Metal Trims & Paper Faced Trims;
- GIB® Plasterboard Control Joints;
- GIB® Joint and Finishing Compounds;
- Wet Area Sealant.

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

6.8.8 Co-operation

6.8.8.1 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.
Co-operate with the Decorator to ensure that the specified Finish Levels for plasterboard jointing and finishing is achieved before decorating commences.

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

6.8.9 Workmanship

6.8.9.1 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.

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

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

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

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

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

6.8.10 Delivery & Handling

6.8.10.1 Delivery & Handling

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

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

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

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

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

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

6.8.11 Preparation

6.8.11.1 General

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

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

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

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

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

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

Carry out all necessary moisture readings. Do not commence installation until the moisture readings are below the required level.

Carry out all necessary substrate inspections and preparatory work in accordance with the manufacturer's recommendations and the GIB® Site Guide prior to installation. Complete and sign the GIB® Site Guide Pre-Installation Checklist.

Check that the building envelope has been finished at all penetrations including doors, windows, services, etc., and the building is weathertight.

Check junctions to all other building elements and ensure that all necessary works have been completed, including cavity insulation.

Check that all fixtures, fittings and built-in items are correctly installed, and that all framing and substrate edges are completed as detailed.

Confirm the location and details of movement control joints, as indicated on the drawings, prior to installation.

Ensure all pre-wiring and service piping is installed and complete.

Check that any required cavity insulation has been installed correctly and its bulk thickness does not exceed the framing thickness.

Remove all debris and rubbish from framing voids prior to installing linings.

The commencement of work on each section/area shall be deemed to indicate full acceptance by the installer that all preparatory works by other trades is complete.

6.8.11.2 Framing Check

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

6.9 James Hardie Eaves & Soffits

6.9.1 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.

6.9.2 Eaves & Soffit Lining

Villaboard Lining 6mm. 6mm thick fibre-cement sheet lining with a 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.

6.9.3 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.

6.9.4 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.

6.9.5 Flexible Sealant

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

6.9.6 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.

6.9.7 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.

6.9.8 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.

6.9.9 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.

Install James Hardie mould accessories as shown on the drawings.

Villaboard™ Lining joints to be formed as flush joints with jointing compound and accessories, to Level 4 Finish. Seal sheet edges with Multiplast resin prior to flush stopping.

6.9.10 Fixings

Fix Villaboard™ Lining sheets with galvanised nails in accordance with James Hardie requirements.

6.9.11 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 Villaboard™ Soffit 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.

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:

1170.2:2011(AS/NZS)	Structural design actions - Wind actions
1397:2001(AS)	Steel sheet and strip - Hot-dip zinc-coated or aluminium/zinc-coated
1562.3:1996(AS/NZS)	Design and installation of sheet roof and wall cladding - Plastic
2295:2006(NZS)	Pliable, permeable building underlays
3604:2011(NZS)	Timber-framed buildings
4200.1:2017(AS|NZS)	Pliable building membranes and underlays - Part 1: Materials
4200.2:1994(AS/NZS)	Pliable building membranes and underlays - Installation requirements
4389:2015(AS/NZS)	Roof safety mesh
4534:2006(AS/NZS)	Zinc and zinc/aluminium-alloy coatings on steel wire
NASH 3405	An alternative solution for steel framed buildings
NZBC B2/AS1	Durability
NZBC F2	Hazardous Building Materials
NZMRM Code of Practice	NZ Metal Roof and Wall Cladding Code of Practice - Version 3.0

7.3 Rainwater Goods

7.3.1 Prefinished Steel Rainwater Goods

7.3.1.1 Prefinished Steel Rainwater Goods

Standard 'half round' (or equal) profile longrun prefinished steel spouting as for the roofing with flanged downpipe droppers siliconed into the gutter to take 65mm dia. PVC downpipes. Standard external spouting brackets at approximately 600mm centres.

7.3.1.2 Downpipes to Stormwater Drains

The downpipes shall drop directly into the stormwater drains - ensure the drains are accurately positioned.

(Any offsets and bends required in a downpipe shall be verified with the Architect/Designer before fabrication - ugly items fabricated in contravention of this must be replaced). Close off joints between

downpipes and stormwater pipes with a upvc transition piece. Fix bird proof plastic 'wire' balloons to the top inlet of all downpipes.

7.4 Profiled Metal Roofing

7.4.1 Scope

7.4.1.1 Coastal Moderate (ISO 9223 Category: C3)

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

7.4.2 Requirements

7.4.2.1 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.

7.4.2.2 Warranty - Roofing Material

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

7.4.2.3 Warranty - Installation

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

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

7.4.3 Roofing Profile

Corrugated Profiled Metal Roofing. Standard corrugated profile; 18mm nominal crest height; 76mm nominal crest pitch. Manufactured from the material type, thickness and finish specified.

Minimum roof pitch: 8° (1:7).

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

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

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

Installed Location:

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

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

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

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

Installed in accordance with the requirements of the roofing manufacturer and the NZMRM Code of Practice, to the locations and details shown on the drawings.

Profile Dimensions:
Installed Location:

Trough Profiled Metal Roofing. Double pan and crest trough profile with vertical ribs at a minimum height of 38mm, and flat or lightly profiled pans of 210mm maximum between crests. Profile depth and crest pitch dimensions as specified below or as shown on the drawings. Manufactured from the material type, thickness and finish as specified below.

Minimum roof pitch: 3° (1:20).

Trough metal roofing shall be fixed with concealed proprietary fastening clips in accordance with the roofing manufacturer's requirements.

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

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

Profile Dimensions:
Installed Location:

7.4.4 Roofing Material

7.4.4.1 COLORSTEEL® Endura - 0.4mm - Trapezoidal Profile

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

Colour:

7.4.4.2 COLORSTEEL® Endura - 0.55mm - Trough Profile

Trough profiled metal roofing shall be manufactured from COLORSTEEL® Endura - 0.55mm BMT. Pre-painted, hot-dipped zinc/aluminium alloy coated steel coil conforming with AS/NZS 2728. G550 steel - 550 MPa minimum yield strength. 150gms/m² coating weight. Atmospheric Classifications C1-C4.

Colour:

7.4.5 Components & Accessories

7.4.5.1 Polypropylene Strap Underlay Support

Polypropylene Strap Underlay Support. 19mm wide x 0.4mm thick polypropylene embossed strap. Installed at right angles to the purlins at maximum 300mm centres, and suitably tensioned to avoid any sagging and to keep the roof underlay in a flat plane.

7.4.5.2 Galvanised Netting Underlay Support

Galvanised Netting Underlay Support. Woven flat hexagonal roof netting, manufactured from galvanised mild steel wire, with reinforcing wires at 113mm centres. 1.0mm diameter wire with 2 x 1.2mm reinforcing wires twisted together. 380-550 kPa tensile strength. Galvanised in accordance with AS/NZS 4534, Class W02.

Installed in accordance with the manufacturer's requirements and as shown on the drawings. Do not use galvanised netting with aluminium roofing materials.

7.4.5.3 Roof Insulation

Roof Insulation. Refer to separate specification section - Insulation.

7.4.5.4 Roof Underlay

Roof Underlay. Refer to separate specification section.

7.4.5.5 Screw Fasteners - Corrugated/Trapezoidal Profiles

Screw Fasteners - Corrugated and Trapezoidal Profiles. Screw fasteners shall be self-drilling screws complying with AS 3566 Class 4 or Class 5, as appropriate, and be no less than the durability of the roofing material being fixed.

Fastener type and placement (frequency) shall be appropriate for the environmental conditions, and the specified roofing profile and material, and the supporting structure material; all in accordance with the NZMRM Code of Practice.

Screw fasteners for pre-painted roofing must be pre-painted prior to installation for an accurate colour match.

7.4.5.6 Clip Fixings - Trough Profile

Clip Fixings - Trough Profile. Proprietary fixing clips shall be minimum 0.9mm thick, at least 30mm wide, and be made of a material compatible with the roofing and the material being fixed to. Clips shall be fixed with a minimum of two wafer head screws - minimum Class 3 to AS/NZS 3566.

7.4.5.7 Coated Steel Flashings

Coated Steel Flashings. Metal roof flashings shall comply with the lap, cover, expansion and compatibility provisions of the NZMRM Code of Practice. Flashings shall be formed to suit the details shown on the drawings, and shall include all folded metal sections required to make the profiled metal roofing weathertight at:

- the building periphery,
- roof and wall junctions,
- changes of direction in the roof,
- intersections with other buildings,
- any wall penetration,
- junctions with other materials.

Coated steel flashings shall be fabricated from ductile grade metal of same material and coating as the roofing material - to maintain durability and compatibility requirements. Flashings shall be designed for lateral strength by folding, stiffening or ribbing on external edges, and have a maximum un-stiffened width of 300mm. The minimum thickness for coated steel flashings shall be 0.55mm.

Flashing fasteners and fastening frequency shall be in accordance with the NZMRM Code of Practice. Do not fix flashings to timber with a moisture content greater than 18%.

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

Where a flashing is hidden, or is otherwise difficult to access or replace, it shall have a durability of the life of the building or not less than 50 years.

7.4.5.8 Profiled Foam Closure Strip

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

7.4.5.9 Sealant

Sealant. Use only neutral-curing silicone sealant that is compatible with the specified metal roofing and flashing materials and finishes, and suitable for the required application and use, in accordance

with the sealant manufacturer's instructions and to the NZMRM Code of Practice recommendations. All sealed joints must be mechanically fastened, and excess sealant neatly removed to prevent unnecessary dirt buildup. Sealant shall only be used to seal between two metal surfaces, do not fill holes or gaps with sealant.

7.4.5.10 Proprietary Collar Flashings

Proprietary Collar Flashings. EPDM or silicone-polymer proprietary flexible collar flashings for weatherproofing roof-penetrating pipes/flues/ducts. Sized to suit the applicable pipe/flue/duct and installed in strict accordance with the manufacturer's requirements and the NZMRM Code of Practice. Use only high-temperature silicone (not EPDM) collar flashings for heated flues and pipes with temperature range between 60°C - 200°C.

7.4.6 Co-operation

7.4.6.1 Co-operation

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

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

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

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

7.4.7 Workmanship

7.4.7.1 Workmanship

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

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

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

Always maintain isolation of dissimilar materials in accordance with the NZMRM Code of Practice. Isolate dissimilar materials (metal and nonmetal) in close proximity as necessary by painting the surfaces or fitting separator strips. Place isolators between metals and treated timber or cement-

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

7.4.8 Delivery & Handling

7.4.8.1 Delivery & Handling

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

Store profiled metal roofing, flashings and accessories undercover, clear of level ground, on bearers at evenly spaced centres as recommended by the roofing manufacturer. Keep stored materials and accessories dry and protected from damage and contamination at all times.

Handle materials in accordance with the manufacturer's requirements and in a manner that prevents damage to or deterioration of the material, including surface marking. Do not used damaged or defective materials or products, or products that are beyond their designated shelf life.

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

Installers shall conform with all relevant WorkSafe NZ Guidelines and Codes of Practice - in particular the Best practice guidelines for working on roofs and the Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry.

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

7.4.9 Preparation

7.4.9.1 General

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

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

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

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

Supporting steel structures shall comply with NZS 3404.

7.4.9.2 Roof Structure Check

Roof Structure - check all aspects of preparatory works, including but not limited to:
- Check that the purlins are set-out to the required set-out and spacings, are straight and true to line and plane, and are securely fixed.
- Check that barge and fascia boards have been installed to the correct line and plane, with all edge blocking complete and secure.
- Check that valley gutter and hidden gutter framing is to the required dimensions, with solid backing supports securely fixed, true to line and plane.
- Check that internal gutter membrane linings are properly dressed back and adhered to a solid substrate along the roof edge as shown on the drawings.
- Check that trimming for roof penetrations, and roof/wall junction blocking, and all necessary work by other trades is complete.
- Check that solid backing required for fully supported roofing is complete and securely fixed in accordance with the approved drawings.

7.4.10 Installation

7.4.10.1 Roof Underlay

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

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

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

Underlayment for fully-supported roofing shall be in accordance with NZMRM Code of Practice - Sections 4.3.11 Separation, 11.4.2 Substrate, and 11.5.1 Ventilation.

7.4.10.2 Insulation

Insulation. Refer to separate specification section - Insulation.

7.4.10.3 Roofing - Corrugated/Trapezoidal Profile

Install profiled metal roofing in accordance with the NZMRM Code of Practice and as shown on the drawings, and to fully comply with all warranty requirements. As shown on the drawings, confirm any specific roofing detailing requirements prior to installation.

Accurately set-out roofing sheets exactly square to the building axis and with sheets lapped away from the prevailing wind; maintain this accurate set-out throughout installation. Check for and eliminate any creep and/or spread of sheets during installation.

Cut metal roofing and flashings by shear only – do not use abrasive cutting tools on or near the roof. Do not use black lead pencils for marking pre-finished roofing and flashings.

Prevent contact with, or run-off from, incompatible materials in accordance with the recommendations in the NZMRM Code of Practice. Observe the roofing material manufacturer's recommendations where flues discharge above roofs, and for the installation of solar heating panels. Protect roofing surfaces from damage at all times; replace the whole sheet where a significant depth of the material or coating has been damaged (including flashings).

Screw-fixed sheets shall be fixed with fasteners appropriate for the roofing profile and material, substrate/structure and the environment in accordance with the Roofing Industries Profile Technical Summary and the NZMRM Code of Practice recommendations (minimum Class 4).

Screw fastening placement and spacings shall be strictly in accordance with the roofing manufacturer's requirements and the NZMRM Code of Practice, to fully comply with the Wind Zone requirements, purlins spacings, etc.

Use fixing systems that will accommodate thermal expansion for long lengths and/or dark colours.

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

Ridges, hips, barges and flashings generally, shall be in accordance with the NZMRM Code of Practice and the roofing manufacturer's requirements.

7.4.10.4 Roofing - Trough Profile

Install profiled metal roofing in accordance with the NZMRM Code of Practice and as shown on the drawings, and to fully comply with all warranty requirements. As shown on the drawings, confirm any specific roofing detailing requirements prior to installation.

Accurately set-out roofing sheets exactly square to the building axis and with sheets lapped away from the prevailing wind; maintain this accurate set-out throughout installation. Check for and eliminate any creep and/or spread of sheets during installation.

Cut metal roofing and flashings by shear only – do not use abrasive cutting tools on or near the roof. Do not use black lead pencils for marking pre-finished roofing and flashings.

Prevent contact with, or run-off from, incompatible materials in accordance with the recommendations in the NZMRM Code of Practice. Observe the roofing material manufacturer's recommendations where flues discharge above roofs, and for the installation of solar heating panels. Protect roofing surfaces from damage at all times; replace the whole sheet where a significant depth of the material or coating has been damaged (including flashings).

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

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

Ridges, hips, barges and flashings generally, shall be in accordance with the NZMRM Code of Practice and the roofing manufacturer's requirements.

7.4.10.5 Flashings

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

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

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

7.4.10.6 Penetrations

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

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

7.4.10.7 Cleaning

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

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

7.4.11 Fixing

7.4.11.1 Trapezoidal Profile - Steel material, fixed to Timber

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

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

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

7.4.11.2 Trough Profile - Clip fixed to Timber

Trough Profile Roofing: Clip-fasten roofing using nylon-coated (or other compatible non-corrosive coating) proprietary concealed clips, fixed to timber framing with minimum AS 3566 Corrosion Class 3, Wafer Head, Self-drilling Screws, in accordance with the roofing manufacturer's requirements.

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

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

7.4.12 Completion

7.4.12.1 Completion

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

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

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

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

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

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

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

7.5 Masons NZ Ltd Roof Underlay System

7.5.1 Scope

Scope
Masons Roof Underlays are certified for use as a roof underlay and air barrier.
On buildings situated in wind zones up to and including Extra High (as set out in NZS3604) with a minimum roof pitch of 3°,
Under masonry or metal tile and profiled metal roof claddings, in all locations including where it is exposed to view.
Masons Roof Underlay shall be:
installed in accordance with the manufacturers Roof Underlay Installation Instructions, version 3.0 Feb 2024,
Installed run vertically or horizontally with or without support for roof pitches greater than 10°, run horizontally with or without support or run vertically with support for roof pitches less than 10°,

provided that support is provided where the span is greater than 1200mm, and protected from direct sunlight within 21 days of installation.

7.5.2 Masons Roofing Underlay

VHP Strong Roof Underlay
VHP Strong Roof Underlay is a 140 gsm premium roofing underlay. It is fire retardant, high performance and highly breathable.
VHP Strong underlay is a tri-laminate sheet consisting of a white non-woven top layer with black printing, a white non-woven back layer and a dark grey synthetic membrane centre layer. Both sides of the underlay sheet have an embossed pattern. The roll is 1.25m or 1.45m wide and is labelled VHP Strong Roof Underlay.
Masons Roof Underlays are certified for use as a roof underlay and air barrier:
a) on buildings situated in wind zones up to and including Extra High (as set out in NZS3604) with a minimum roof pitch of 3°,
b) under masonry or metal tile and profiled metal roof cladding,
c) in all locations including where it is not covered by an internal lining
Masons Roof Underlay shall be:
a) installed in accordance with Masons Roof Underlay Installation Instructions version attached or found in the link below, and
b) installed run vertically or horizontally with or without support for roof pitches greater than 10°, run horizontally with or without support or run vertically with support for roof pitches less than 10°, provided that support is provided where the span is greater than 1200mm, and
c) protected from sunlight within 21 days of installation
The installation of roof underlay must be considered as part of the overlaying cladding system, not in isolation.
Further details regarding the use of the product can be found in Masons Roof Underlay Installation Instructions.

7.5.3 Accessories

Sealing Tape - Synthetic Underlay
Sealing Tape - for Synthetic Underlay. Minimum 50mm wide, pressure-sensitive, self-adhesive, multi-purpose weathertightness sealing tape as recommended by the underlay manufacturer. Used for sealing synthetic underlay joints against air and water penetration in accordance with the underlay manufacturer's requirements.

Roof Boot Flashings - EPDM
For roof boots fixed directly to the roof cladding where the roof boot fits cross the entire pan of the profile the lowest permissible roof pitch is 8° for corrugated iron and 10° for low rib trapezoidal profiles. Where possible avoid fitting roof boots over a lap. If this cannot be avoided the lap must be fully sealed. *The installer must take actions needed to prevent the possibility of leaks through capillary action*. Directly fitted roof boots should be fitted with their edge's diagonal to the fall of the water. If this is not practical, they may be fitted square at pitches 10° and above.

Roof Underlay Support - Polypropylene Strap
Roof Underlay Support - Polypropylene Strap. 19-25mm wide x 0.4mm thick polypropylene

embossed strap. Installed at right angles to roof purlins, at maximum 300mm centres, and suitably tensioned to avoid any sagging and to keep the roof underlay in a flat plane.

Roof Underlay Support - Galvanised Wire Netting
Roof Underlay Support - Galvanised Wire Netting. 50mm or 75mm hexagonal, galvanised, mild steel wire netting. 1.0mm diameter wire, 150g/m² galvanised coating, 380-550 kPa tensile strength. Galvanised in accordance with AS/NZS 4534, Class W10. Installed in accordance with the manufacturer's requirements.

7.5.4 Requirements

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.

Masons Product Warranty:
- 15 Years Warranty - for all Masons warranted products installed, according to the warranty conditions.
- Provide the Masons NZ Ltd Product Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of permanent installation.

Substitutions
Masons NZ Ltd products shall be as specified herein and as indicated on the approved drawings. The substitution of Masons branded products for alternative brands is not permitted under any circumstances.
Substitutions of Masons NZ Ltd brands.
The substitution of a specified Masons NZ Ltd product for an alternative Masons 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 Masons branded products to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

7.5.5 Installation

Residential Long-Run Metal Roofing / Vertical Or Horizontal Installation Method - Wooden Construction
Masons recommends that underlay be laid horizontally. However, it may be laid vertically where roof pitches are 8° or greater. Horizontal underlay must be laid from the bottom up, so the upper layers overlap the lower layers. E2/AS1 requires 150mm minimum laps in all situations.
NOTE: All cladding to be fixed per profiled metal cladding manufactures recommendations.
-Fix underlay using stainless steel 8-12mm staples or 20mm flat head clouts or appropriate proprietary fastenings at 300mm maximum centres.
-Between 3° and 5° pitched roofs suitable safety mesh 300mm x 150m or similar or hexagonal netting 50mm or 75mm, and/or Masons Insulation Strapping or Wrap Strap. Fix horizontally at 300mm centres.
If required to achieve a lap seal (refer to NZ Metal Roofing Code of Practice 4.3.8 and 4.3.9), use

Masons UNI Seam Tape or 40Below Platinum Flashing Tape.
-Masons Roof Underlay maybe unwound to the full length from the gutter to the ridge. However, when ventilation at the ridge is required, the underlay should be finished at the ridge purlin to allow a free air movement.
-Masons Roof Underlay must be free of rips and holes fit tightly and be lap taped around all penetrations, (except flue penetrations) to assist with drainage and moisture.
- **Maximum drape 25mm**.
-Flue penetrations must have a minimum distance of 50mm from the underlay See NZ Metal Roof and Wall Cladding Code of Practice 4.3.8.

Masons VHP Roof Underlay Support Required

Roof Pitch	Span	Horizontally Installed	Vertically Installed
>= 10˚	> 1200mm	Yes	Yes
>= 10˚	<= 1200mm	No	No
< 10˚ (Min 3˚)	> 1200mm	Yes	Yes
< 10˚ (Min 3˚)	<= 1200mm	No	Yes

7.5.6 Completion

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 Masons 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 Masons maintenance requirements and the Masons product warranties for the installed products.

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:

1734:1997(AS/NZS)	Aluminium and aluminium alloys - Flat sheets, coiled sheet and plate
1866:1997(AS/NZS)	Aluminium and aluminium alloys - Extruded rod, bar, solid and hollow shapes
2208:1996(AS/NZS)	Safety glazing materials in buildings
4211:2008(NZS)	Specification for performance of windows
4223.1:2008(NZS)	Code of practice for glazing in buildings - Glass selection and glazing
4223.2:2016(NZS)	Glazing in buildings - Part 2: Insulating glass units
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4223.4:2008(NZS)	Glazing in buildings - Part 4: Wind, dead, snow, and live actions
4667:2000(AS/NZS)	Quality requirements for cut-to-size and processed glass
4668:2000 (AS/NZS)	Glossary of terms used in the glass and glazing industry
AS/NZS 4666:2012	Insulating glass units

8.3 Aluminium Windows & Doors

8.3.1 Alternatives

No specific supplier is nominated, although a list of acceptable brands is given below. The Contractor shall state with their tender which brand they is using.

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

APL Brands:
-Altherm
-First
-Vantage
-Smartwood
-Metro Series
-Thermal Heart
-Architectural Series
-Commercial

ASL Brands:
-Elite
-Fairview
-Residential
-Evolution
-Architectural
-Commercial

Fletcher Aluminium Brands:
-Pacific Residential
-Pacific Thermal
-Pacific Architectural
-Atlantic High Performance
-ALTI
-Nubulite
-Rylock

Nalco Brands:
-Nulook
-Bradnams

8.3.2 Installation Type

8.3.2.1 Timber Frame Installation - Cavity Construction

All windows (and aluminium frame external doors) installation work shall be exactly in accordance with NZBC E2/AS1, the Windows Association's Windows Installation System (WANZ:WIS), and details on the drawings or supplied by the windows manufacturer.
Check framing alignment, and that window openings are square and the correct size for fitting tolerances.
Prepare framing openings by neatly cutting the building wrap at 45º into the corners, turning wrap through the frame depth and fixing to the inside face, flashing the bottom corners with moulded plastic and over-flashing the full sill and 200mm up the jambs with the specified flexible flashing tape, stapled to hold the stretched external corners. At head corners install flashing tape 200mm each way from the corners.

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

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

Install the head flashing, extending 35mm up behind the cladding (and in turn over-flashed with an additional piece of wrap cover extended up under the wrap or flashing or eaves above), sloping at 15º down to the exterior, and turning down to cover the top of the aluminium frame by at least 10mm,

before finishing with a 5mm 45º 'kick out'. Upstand the head flashing ends as detailed. Install jamb flashings/ sealant or scribers as detailed.
After frames installation install closed cell backing rods as required and expanding foam air-seal the gap between framing and liners.

8.3.3 Interior Finish

8.3.3.1 GIB Groove

GIB Groove.

8.3.4 Reveal

Timber reveals for paint finish with all sides primed.

8.3.5 Glass Platform

Double Glazed.

8.3.6 Finish

8.3.6.1 Powder Coated Aluminium - Matt

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

8.3.7 Hardware

Black Hardware.

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

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

8.3.8 Workmanship

8.3.8.1 Workmanship

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

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

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

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

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

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

8.3.9 Delivery and Installation

8.3.9.1 Delivery and Installation

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

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

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

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

Thoroughly check all preparatory work to openings prior to installation, including underlay, corner seal tapes, adjacent cladding, pre-installed flashings, waterproofing systems etc. as appropriate. Use inert barriers or coatings to prevent contact between dissimilar metals or between aluminium and concrete.

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

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

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

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

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 Thermal Insulation

9.3.1 Scope

Supply and install the selected products as thermal insulation to the specified R-values, complete with all accessories, to the floors, walls, ceilings, roofs, and other thermally insulated building elements, as noted and shown on the drawings. All aspects of this work shall be in accordance with the product manufacturer's technical literature and installation requirements, other relevant product manufacturers' recommendations, and as shown on the drawings.

9.3.2 Co-operation

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

9.3.3 Workmanship

All installation work shall be carried out by experienced and competent tradesmen, familiar with the specified products and installation techniques, in accordance with the manufacturer's installation requirements, and as noted and detailed on the drawings.
Store and handle products in accordance with the manufacturer's recommendations, keep dry and protect from damage. Do not compress fibre insulation bales. Do not use damaged or defective insulation products and accessories.
The building must be completely enclosed and water tight before installation commences with the exception of roof insulation when installed with roofing. Ensure the moisture content of timber framing is no greater than 18% prior to installing insulation to timber framed elements. Always maintain the full insulation thickness to ensure the required thermal values are achieved. Do not install insulation pads or blankets into closed cavities that are less than the stated insulation nominal thickness.

9.3.4 Product

9.3.4.1 Glass Fibre Pads

Glass fibre thermal insulating pads.

Manufacturer, brand name & type: Earthwool, Glasswool Skillion Batt
Thickness & R-Value: 265mm, R7.4
Location: 40 degreee roof

Manufacturer, brand name & type: Earthwool, Glasswool mid floor acoustic batt
Thickness & R-Value: 175mm, R3.6
Location: mid floor

9.3.4.2 Rigid PIR Foam Sheet, Foil Faced

Rigid Polyisocyanurate (PIR) foam thermal insulating sheets, foil faced both sides.

Manufacturer, brand name & type: CNZ PIR Rigid insulation
Thickness & R-Value: 150mm, R7.32
Location: 3 degree roof

Manufacturer, brand name & type: Rockcote Duratherm Gold Internal slab edge insulation
Thickness & R-Value: 22mm, R1.0
Location: Slab Edge

9.3.5 Installation

9.3.5.1 Wall Insulation - Glass Fibre Pads

Install glass fibre insulation pads, complete with accessories, friction fitted between wall studs and dwangs etc. and held in place in accordance with the manufacturer's installation recommendations. Completely fill the framing voids, leave no gaps at the edges or at penetrations etc, and maintain full insulation pad thickness. Support external wall insulation with vertical strapping tape at 400mm centres to the outside face, stainless steel stapled to the framing.

9.3.5.2 Ceiling Insulation, Suspended Ceiling - Glass Fibre Pad

Install glass fibre insulation pads, complete with accessories, over the suspended ceiling lining and frame in accordance with the manufacturer's installation recommendations. Leave no gaps along the insulation pad edges and joints, and at the ceiling perimeter/wall junction.

For recessed luminaires LEDs & Control-gear, rated IC, IC-F & IC-4 to cover, follow manufactures instruction on insulation in line with NZS4246.

For all other separate ceiling insulation 200mm from recessed light fittings and other recessed electrical fittings; refer to the drawings for containment requirements around recessed electrical fittings.

9.3.5.3 Ceiling Insulation, Truss/Framed Roof - Glass Fibre Pad

Install glass fibre insulation pads, complete with accessories, friction fitted between the ceiling joists, over the ceiling lining in accordance with the manufacturer's installation recommendations. Leave no gaps along the insulation pad edges and joints, and at the ceiling perimeter/wall junction.

For recessed luminaires LEDs & Control-gear, rated IC, IC-F & IC-4 to cover, follow manufactures instruction on insulation in line with NZS4246.

For all other separate ceiling insulation 200mm from recessed light fittings and other recessed electrical fittings; refer to the drawings for containment requirements around recessed electrical fittings.

9.3.5.4 Rigid PIR Insulation Sheet - Direct Fix, Full Cover

Rigid PIR insulation sheets installed, complete with all accessories, directly to the framing and/or concrete substrate walls in strict accordance with the manufacturer's specifications and as shown on the drawings.

9.3.6 Completion

Check that all insulation has been installed correctly and is correctly supported and that all edges, joins and ends are fully closed without gaps. Check for damage and faults and repair or replace as necessary. Collect and remove from site all rubbish and waste material.
Issue to the Owner a copy of any product maintenance requirements and a copy of the Thermal Insulation Product and Installation Warranties for the completed works.

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.

9.4.2.2 Engineering Design

All works are to be constructed as per the architectural and engineering drawings, details, documents and specifications. Work is to be undertaken by experienced and suitably qualified persons to best industry practice and to the NZBC / relevant NZ standards. The contractor shall specifically ensure

that works adhere to the information presented in the architectural and engineering design for: site preparation, foundation substrate preparation, grades and details of reinforcing steel, the EXPOL placement and the local authority inspection regime.

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 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 System Components

EXPOL PODSTICK - use to align EXPOL, forming a system to provide support for steel mesh.
Made from: Recycled plastic

EXPOL Clip on Spacer - clips onto the centre spacer for edge beams and internal thickenings.
Made from: Recycled plastic

EXPOL Centre Spacer - for internal and external use throughout the Pod floor.
Made from: Recycled plastic

UNIMAX Spacer - sits on the ground between the pods. Clips together to form any size spacing required. Used in conjunction with any other spacer type.

EXPOL 100mm Spacer - to align the Tuff Pods, and PODSTICKS for mesh support, for internal ribs.
Made from: Recycled plastic

EXPOL 300mm Spacer
EXPOL 300mm Spacer - to align the Tuff Pods, and PODSTICKS for mesh support, for slab edge beam and thickenings.
Made from: Recycled plastic

Gorilla Grip 1 Hour Cure Construction Adhesive is a one-component ready to use, translucent polyurethane based construction adhesive.

Styro–Fix is an advanced single component polyurethane-based construction adhesive

9.4.8 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.

9.4.9 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.

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

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.

10.3.2.5 Tile Samples

Submit a clearly identified full-size sample of each tile specified, including colour/pattern, for signed approval by the Architect/Designer - do not proceed until the samples have been approved.

10.3.2.6 Tiled Sample Section

Allow to install a finished tiled sample section for inspection by the Architect/Designer. Do not commence installation until the sample section has been approved. Subject to confirmation in writing, the insitu sample section may form part of the completed installation.

Sample Size:
Installed Location:

10.3.2.7 Provision for Spare Tiles

Provision for Spare Tiles - refer to Reserve Material clause.

10.3.3 Performance

10.3.3.1 Slip-Resistance Performance of Access Routes

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

10.3.3.2 Interior Wet Area Performance

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

10.3.4 Aluminium Trim

10.3.4.1 Aluminium Square-Edge Tile Trim

Aluminium Square-Edge Tile Trim. Square profiled extruded aluminium edge trim for tiling. Sized to suit the thickness of the tiling installation. Finish and colour as specified. Installed to the locations and details shown on the drawings.

Finish & Colour:

10.3.5 Co-operation

10.3.5.1 Co-operation

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

Coordinate with other trades 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.

10.3.6 Workmanship

10.3.6.1 Workmanship

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

All 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.

10.3.7 Delivery & Handling

10.3.7.1 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.

10.3.8 Preparation

10.3.8.1 General

All substrates to be tiled shall be structurally sound, even and smooth, clean, dry, and free from dirt, dust, grease, oil, wax, paint residue, loose plaster and laitance, curing compounds and other materials

and contaminants likely to affect the bonding and performance of the specified tile adhesive and grout.

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

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

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

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

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

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

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

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

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

10.3.8.2 New Concrete Floor

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

10.3.8.3 New Plywood Floor

New Plywood Floor - check all aspects of preparatory works, including but not limited to:
- Check that the plywood is CD grade (C face up), and the sheets have been installed, jointed and fixed in accordance with the manufacturer's requirements and indicated on the drawings, and that all sheet edges are fully supported.
- Check that the sheet joints are flush and even, and that all fixings are countersunk and filled with a compatible filler.
- Using a proprietary levelling compound, repair flush with smooth, feathered edges any damaged areas in the floor surface.
- Mechanically sand to remove all surface irregularities and contaminants likely to affect adhesion.
- Leave the surface completely clean and free of dust and contaminants, then fully prime the substrate with an appropriate primer in accordance with the plywood manufacturer's recommendations.

10.3.8.4 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.

10.3.9 Installation

10.3.9.1 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.

10.3.9.2 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.

10.3.9.3 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.

10.3.9.4 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.

10.3.9.5 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.

10.3.10 Completion

10.3.10.1 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.

11 PAINTING & DECORATING

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:

2310:2002(AS/NZS)	Glossary of paint and painting terms
2311:2017(AS/NZS)	Guide to the painting of buildings
3750.0:2008(AS/NZS)	Paints for steel structures - Introduction and list of Standards

11.3 General

11.3.1 Alternatives

The materials specified in this section or on the drawings indicate the required standards for these works. Alternatives which are considered equal to or superior to these may be tendered for approval (in writing, and they must NOT be used unless they are approved in writing).

11.3.2 Co-operation

11.3.2.1 Co-operation

Co-operate with all trades and attend upon Concretor, Joiner, Carpenter, etc. to ensure that the surfaces provided by these trades are completely suitable for the Painter works that are required.

11.3.3 Preparation

11.3.3.1 Preparation

No painting or varnishing or other surface coating work shall be undertaken unless the surfaces to be coated are in a correct and proper condition to ensure first class results.

Inspect the works of other trades on which Painter work is scheduled and report to the Main Contractor and the Architect/Designer any defects or irregularities that would affect the permanency or finish of the painting work, and do not proceed until the defects or irregularities have been completely rectified. Failure to examine and report will be construed as an acceptance that all preparatory works are completely satisfactory.

This clause does not relieve the Painter of any of the usual preparatory work to surfaces customarily performed by this trade.

Clean down all surfaces with sugar soap, strippers, mould killers, etching agents, etc. as required. Sand or rub all sharp edges off exterior timbers and other materials as appropriate before painting. Finish rub down ALL surfaces. Ensure that the moisture content of all substrates is appropriate. Remove locks, fastenings, and similar hardware before painting and refix on completion. Remove all electrical switch and power plates before painting and refix them on completion. Mask adjacent surfaces as required to a true line and remove the masking on completion. Dust and wipe down all surfaces for Painter work and completely remove all dust, rubbish, dirt etc. from areas involved immediately prior to commencement. To each area of the works complete all surface preparation before applying paint to any surface.

11.3.4 Protection

11.3.4.1 Protection

Take adequate precautions to prevent paint spots falling on prefinished or similar surfaces, and extreme care to keep absorbent materials (e.g. cedar, sawn framing, decking, paving) completely clean during all adjacent painting work. Correction of any such disfigurement shall be to the Architect/Designer's approval.

11.3.5 Qualifications

11.3.5.1 Qualifications - Option 1

The Painting Subcontractor must be a member of the Master Painters Association. All work shall be of the highest reasonable standard, and executed by experienced and competent tradesmen to the Architect/Designer's approval.

11.3.6 Workmanship

11.3.6.1 Workmanship

Strictly adhere to all Manufacturers' instructions.

Strictly observe Manufacturers' requirements with regard to surface and air temperatures for painting. No work shall be carried out on surfaces that are not completely dry, and no external work shall be carried out during damp or wet conditions.

In all finishes any irregularities or brushmarks or dust etc. in each preceding coat shall be rubbed down to provide a smooth clean surface for the following coat. Each coat shall be finished over all surfaces before a further coat is applied, and each coat shall be completely dry before subsequent coats. Finish broad areas before painting trim, paint ceilings before walls and walls before joinery, trim and other items.

Each coat and the full completed system shall be of uniform finish, colour, texture and sheen, shall have proper covering of thin edges, corners, end grain etc. and shall be free of blemishes such as runs, sags, fat edges, entrained hairs, brush marks, starved patches etc.

11.3.7 Wallpapers & Lining Papers

11.3.7.1 Wallpapers & Lining Papers

Wallpapers and lining papers, where scheduled, shall be hung plumb, true and square, and with precise butts. Patterns shall be accurately matched at each join. All rolls used in any one area shall be from the same batch. Use a fungicide incorporated adhesive that is recommended by the supplier. Edges neatly and precisely cut to the adjacent element. Finish free of air bubbles, wrinkles, gaps or stains.

11.3.8 General

11.3.8.1 General

The schedules indicate the general extent of the works to be carried out but are in no way exhaustive in their description of the actual items for painter work. Complete all work necessary for the proper and entire completion of the works. All items and portions of items reasonably inferable but not specifically mentioned are deemed included, i.e. cupboard interiors, the top and bottom of doors, unseen cabinetry tops, etc. All doors shall have equal painter work on ALL surfaces.

Where timber work is specified for priming before fixing the priming shall be thoroughly brushed in to all surfaces, and all exterior timber work for paint finishing shall be fully primed within one week of fixing. Should more than one month elapse between priming and undercoating the timber shall be fully reprimed.

Stopping up work shall be carried out immediately the priming or sealing coat is dry, and shall be solidly placed to finish clean and dry. Stopping tinted to match the timber for clear finished work.

Paint putties within one month of glazing timber frames; paint to impinge on glass to assist sealing.

11.3.9 Materials

11.3.9.1 Materials

All Painter materials shall be ready mixed and delivered in unopened containers. Materials shall be used only for the purpose and in the manner intended by the manufacturer; any apparent scheduled discrepancy in this respect shall be referred to the Architect/Designer immediately for clarification.

Where surfaces are specified to be finished in a particular manner or material, all preparatory work, priming, or undercoating, that is necessary to ensure a proper finish shall be provided, irrespective of any apparent omission herein.

Thinning shall only be to manufacturer's specification. Thoroughly stir as required to lift any settled pigment and ensure the paint is homogeneous. Paints shall be factory or shop tinted to the colour required. Undercoats shall be fully tinted to match the final colour scheduled. All paints shall have the finished film thickness that is specified by the manufacturer (checked by monitoring the coverage per litre).

11.3.10 Completion

11.3.10.1 Completion

Allow to touch up to approval any Painter work which is damaged during the finishing works of other trades. Replace all hardware, remove all masking, covers, containers etc., thoroughly clean all affected surfaces, and leave all spaces ready for immediate occupation. Avoid scratching or abrading glass or hardware during any cleaning.

12 PLUMBING

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

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 Systems

12.4.1 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.

12.4.2 Cold Water System

12.4.2.1 Supply From Existing Toby

All cold water supply pipework shall be medium/high-density polyethylene (MDPE/HDPE), arranged and fixed so that all joints are in a fully ‘relaxed' condition, without any stress or tension.
Lay on a 20mm main from the existing toby along the route shown on the Site Plan to the connection position noted on the Floor Plan (pipe depth, protection, backfilling, signal strip etc. to comply with all Supply Authority requirements). At the connection position take a branch feed off for the hosecocks (and reticulate to the positions shown and install angle hosecocks) and toilet cisterns and then take the main feed through an accessibly positioned cleanable in-line sediment and dirt filter.
Primary distribution from the water filter shall be in 20mm piping, reducing to 15mm for the final feed to individual items. Install conveniently located isolating valves to turn off each group of fittings, and install a small isolating valve alongside each toilet cistern not integrally fitted with one. (Note that these isolating valves and the hosecocks are not covered by the Plumbing Hardware Prime Cost Sum).

12.4.3 Hot Water System

12.4.3.1 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.

12.4.4 Central Heating

12.4.4.1 Scope

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.

12.4.4.2 Qualifications

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.

12.4.4.3 Co-operation

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.

12.4.4.4 Quality

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.

12.4.4.5 Delivery

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.

12.4.4.6 Completion

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.

12.5 Elements

12.6 Rinnai Hot Water Systems

12.6.1 Scope

Supply, install and commission the selected Rinnai 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 Rinnai technical literature and installation requirements (check www.Rinnai.co.nz, info@rinnai.co.nz or call 0800 RINNAI (0800 746 624) 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 Rinnai Hot Water Systems.

12.6.2 Mains Pressure Hot Water Systems - Stainless Steel – Lower Element MRT Thermostat

Stainless Steel Mains Pressure Indoor Cylinders - 250 L
Standard Lower Element MRT Thermostat - MS25055020 2 kW
Diameter: 550mm x 1730mm high
Connections: Hot and cold-water connections ¾ " (20 mm)
Maximum working pressure: 850 kPa
Pressure testing: To 15 bar
TPR valve: Rating of TPR supplied with cylinder— factory set to 850 kPa and 90 °C.

Stainless Steel Mains Pressure Indoor Cylinders - 250 L
Standard Lower Element MRT Thermostat - MS25055030 3 kW
Diameter: 550mm x 1730mm high
Connections: Hot and cold-water connections ¾ " (20 mm)
Maximum working pressure: 850 kPa
Pressure testing: To 15 bar
TPR valve: Rating of TPR supplied with cylinder— factory set to 850 kPa and 90 °C.

12.6.3 Mains Pressure Hot Water Systems - Stainless Steel – Dual Element MRT Thermostat

Stainless Steel Mains Pressure Indoor Cylinders – 250 L
Standard Dual Element MRT Thermostat - MS250550D30 2 x 3kW
Diameter: 550mm x 1730mm high
Connections: Hot and cold-water connections ¾ " (20 mm)
Maximum working pressure: 850 kPa
Pressure testing: To 15 bar
TPR valve: Rating of TPR supplied with cylinder— factory set to 850 kPa and 90 °C.

12.6.4 Accessories

Galvanised safe tray 600x600
Code: COGADT600
Dimensions: 600 x 600 x 50 mm

Seismic cylinder restraint kit
Rinnai's indoor cylinder seismic restraint kit contains:
• 1 x 1170 mm galvanised strap
• 1 x galvanised turnbuckle
• 2 x galvanised wall brackets
Code: COSEISRES

12.6.5 Workmanship

Workmanship
Rinnai 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.

12.6.6 Delivery & Handling

Delivery & Handling
Store Rinnai Hot Water Systems 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 Rinnai products in accordance with the manufacturer's recommendations.

Do not tilt more than 45degs from vertical any heat pump hot water systems.

12.6.7 Installation

Rinnai Hot Water System - Cylinders
Install the selected Rinnai Hot Water Systems, complete with accessories, to the locations shown on the drawings in accordance with the Rinnai 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 Rinnai 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 Rinnai 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 Rinnai Hot Water Systems in accordance with the manufacturer's instructions.

12.6.8 Completion

Completion
Rinnai Hot Water System - Cylinders
Check that the Rinnai Hot Water Systems 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 Rinnai Domestic Electric Water Heater maintenance requirements and a copy of the Rinnai Warranty for the installed water heaters.

Issue all As-Built Documentation required to the relevant parties.

13 DRAINLAYING

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
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
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 Foul Water Drainage

13.4.1 Scope

13.4.1.1 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.

13.4.1.2 Extent of Work

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:

13.4.2 Requirements

13.4.2.1 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', and the 'Excavation Safety - Good Practice Guidelines'

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

13.4.2.2 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.

13.4.2.3 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.

13.4.2.4 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.

13.4.2.5 Explosives

The use of explosives is NOT permitted.

13.4.2.6 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.

13.4.2.7 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.

13.4.2.8 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.

13.4.2.9 Redundant Drains

Where an existing foul water drain or part thereof is no longer required, it shall be disconnected from the service at the junction of the live drain or at the property boundary, and be appropriately sealed-off watertight in accordance with AS/NZS 3500.2. Advise the controlling Territorial Authority of the final sealing treatment.

13.4.2.10 Co-operation

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

Coordinate with other trades as necessary to install foul water drains to the required locations and layouts.

13.4.2.11 Workmanship

Foul water drainage work shall be carried out by qualified and experienced tradespersons, familiar with the required installation requirements, under the direct supervision of a NZ certified Registered Drainlayer, in accordance with AS/NZS 3500.2 in compliance with the New Zealand Building Code, and all local codes and regulatory authority requirements, and the conditions of the Building Consent.

All pipe cutting, jointing, and supporting techniques shall be exactly as recommended by the pipe manufacturer. Pipes, fittings and accessories shall be handled and installed in such a manner that prevents any damage to the component.

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

Carry out all necessary inspections and tests during installation to ensure compliance with the design specifications and regulatory requirements. Provide test result sheets to the Contract Administrator to show compliance has been achieved.

Take all necessary measures during installation to protect the foul water drainage system from damage, and to prevent the entry of:
- extraneous water;
- soil, sand, or rock,
- the contents of any septic tank; or
- any other substance, the discharge or which could impede the operation of the foul water drainage network.

Ensure that any installed drain is adequately protected from any damage and excessive loading during the remaining construction period.

Protect adjacent finished work and surfaces from damage and contamination during installation. Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Drain Layer's expense.

Any associated electrical wiring and prescribed electrical work (by others) shall be carried out by a qualified electrician in accordance with the electrical standards and regulations and the Electrical specification.

13.4.2.12 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected foul water drainage materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional expense to the Principal.

13.4.2.13 Delivery & Handling

Store foul water drain pipes and accessories undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep pipes and accessories out of direct sunlight and protected from damage and contamination at all times.

Where possible, store pre-packed PVC pipes in the original delivery crate.
Store loose PVC pipes on evenly spaced bearers at maximum 1.0m centres, with pipe sockets alternated so the the sockets do not bear on each other, and with side supports if pipes are stacked more than two layers high. When loose PVC pipes are stacked in a pyramid, the maximum stack height shall be 1.0m and the bottom pipes shall be chocked.

Do not used damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

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

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

13.4.2.14 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare As-Built Drawings of the foul water drainage system, that accurately record the new and/or modified foul water drainage installation.

Information shall include, but not limited to, type, class and size of all pipes, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, manholes, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

13.4.2.15 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.

13.4.3 Materials

13.4.3.1 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.

13.4.3.2 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.

13.4.3.3 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.

13.4.3.4 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).

13.4.3.5 Reinforcing Steel

Steel reinforcing materials for cast-insitu concrete elements shall comply with AS/NZS 4671. Unless specified otherwise on the drawings, bars shall be Grade 300 deformed.

13.4.3.6 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.

13.4.3.7 Bedding & Surround Material

Except where specified otherwise on the drawings, bedding (underlay, side support, overlay) material shall be compacted clean granular non-cohesive material - crushed rock or gravel screenings - of nominal particle size range of 7-10mm with a maximum particle size of 20mm, that is free from organic material and clay, and have a moisture content appropriate to the degree of compaction required. If the bedding material is contaminated or an excessive amount of oversized particles are present, the bedding material shall be rejected and not used.

13.4.3.8 Backfill Material

Except where specified otherwise, backfill material above the pipe embedment layer (150mm above the top of pipe) shall be selected excavated material that is free from any builder's waste, any organic material, any rocks or hard matter larger than 20mm, and any soil lumps larger than 75mm.

Except where specified otherwise, pipes beneath private roadways and where subject to vehicular traffic - all backfill from the top of the embedment layer (150mm above top of pipe) to the underside of the pavement layer shall be GAP 65 - General All Passing 65mm.

Mechanically compact backfill material in layers not exceeding 300mm to a relative compaction no less than 95% of the NZ Standard Compaction.

Trenches in public footpaths and roads shall be backfilled in accordance with the requirements of the controlling authority.

13.4.3.9 Marking Tape

Marking tape shall be located just above the top of the pipe embedment zone, and centred over the pipe.

Non-Detectable Marking Tape:
- Non-detectable marking tape shall comply with AS/NZS 2648.1.
- Tape width shall be 100mm minimum.
- Height of message letters shall be 40mm minimum.

Detectable Marking Tape:
- Detectable marking tape shall comply with AS/NZS 2648.1.
- Tape width shall be 100mm minimum.
- Tracer wire shall be stainless steel grade 316 or copper alloy designation 122.
- Tracer wire shall allow at least 25% elongation of the plastic tape before breakage of the wire.
- Height of message letters shall be 40mm minimum.

13.4.4 Trench Excavation

13.4.4.1 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.

13.4.4.2 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.

13.4.4.3 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.

13.4.4.4 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.

13.4.5 Pipe Laying

13.4.5.1 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.

13.4.5.2 Laying Pipes

Install foul water drains in accordance with AS/NZS 3500.2 to the layout, levels and grades shown on the drawings Drain pipes shall be laid to provide maximum falls, in straight lines and at an even grade, without obstruction to flow, and with full allowance for bedding.

Before installing the pipes, check the bore of each pipe is free from foreign matter and that the pipe exterior and the socket have not been damaged in handling or storage. All pipelines shall be kept clean and free of dirt and debris at all times during installation, testing and commissioning.

PVC-U foul water drain pipes shall be properly jointed (rubber ring joint or solvent welded joint) to produce a watertight seal in accordance with the manufacturer's instructions.

Start laying main drains at the point of outfall and insert junctions for branch drains as the work proceeds. Pipes shall be laid with the least number of bends, in the centre of the trench, in straight lines between bends, and to the grades and locations shown on the drawings.

Install all necessary fittings, including vents, inspection openings and access points, bends and junctions, to the locations shown on the drawings and in accordance with the manufacturer's instructions. Where not specified on the drawings or schedules, fittings for inspection openings, bends, junctions, etc., shall be selected from the PVC pipe system range of products and installed in accordance with the manufacturer's instructions.

Other than precautions against damage by displacement or floating pipes, no bedding surround material or backfill shall be placed until the laying of the drain has been inspected by the Territorial Authority.

13.4.5.3 Underground Drains Near & Under Buildings

Protect underground drains near and under buildings against damage in accordance with AS/NZ 3500.2 where the minimum cover specified cannot be provided.

13.4.5.4 Concrete Support

Concrete pads used to support foul water drains, gully traps, risers, etc., shall be minimum 100mm thick and in accordance with AS/NZS 3500.2: Section 5.3.

13.4.5.5 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.

13.4.5.6 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.

13.4.5.7 Pipe Cover

Unless specified otherwise on the drawings, the minimum pipe cover (finished surface to top of pipe) shall be:

- where not subject to vehicular loading: 300mm.
- where subject to vehicular loading - not in roadways: 500mm.
- where subject to vehicular loading - in sealed roadways: 500mm.
- where subject to vehicular loading - in unsealed roadways: 500mm.
- pipes in embankment conditions or subject to loading from heavy construction equipment: 750mm.

13.4.5.8 Marking Tape

Install marking tape on top of the pipe embedment zone and centred over the pipe before commencing backfilling.

13.4.6 Connection

13.4.6.1 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.

13.4.7 Testing

13.4.7.1 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.

13.4.7.2 Water Test Procedure - to AS/NZS 2302

Water test procedure of foul water drains (non-pressure) - to AS/NZS 2302: Section 7.3.2.
- The pipeline shall be filled with water to a height of not less than 1m above the natural ground level at the highest point of the section being tested, or to the flood level of the lowest sanitary fixture, but not exceeding 5m at the lowest point of the test section.
- The pressure shall be maintained without leakage for at least 15 minutes.
- The source of any leaks shall then be ascertained and any defects repaired.
- The pipeline shall then be retested.

Note: Testing should not be carried out if groundwater is present above the pipeline. If groundwater is present, the test pressure should be increased to compensate for the depth of groundwater at a rate of 10 kPa for every 1m of groundwater depth.

13.4.8 Backfilling

13.4.8.1 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.

13.4.9 Reinstatement of Surfaces

13.4.9.1 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.

13.4.9.2 Public Property

Reinstatement of surfaces to public property shall comply with the requirements of the relevant controlling authorities.

13.5 Surface Water Drainage

13.5.1 Scope

13.5.1.1 Scope

Supply, install and commission new, gravity-flow exterior surface water drainage on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for the satisfactory completion and performance of the surface water and stormwater systems. All aspects of this works shall comply with the requirements of the NZ Building Code, related compliance Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the design drawings and schedules. Ancillary work and/or services not specifically mentioned but necessary to complete the installation shall be deemed included.

This specification should be read in conjunction with other relevant specification sections, in particular Stormwater Drainage and Site Works, as they are interrelated.

13.5.1.2 Extent of Work

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:

13.5.2 Requirements

13.5.2.1 Safety

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

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

13.5.2.2 Compliance

Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the drainage works.

13.5.2.3 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.

13.5.2.4 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.

13.5.2.5 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.

13.5.2.6 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.

13.5.2.7 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'.

13.5.2.8 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.

13.5.2.9 Stormwater Drains

Stormwater Drains. Refer to separate specification section - Stormwater Drainage.

13.5.2.10 Paved Surfaces

Paved Surfaces. Refer to separate specification section - Siteworks.

13.5.3 Materials

13.5.3.1 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.

13.5.3.2 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.

13.5.3.3 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:

13.5.3.4 Modular Channel & Grate Drain - Vehicular Traffic, Light Duty

Modular Channel & Grate Drain - Vehicle Traffic, Light Duty. A proprietary, modular channel and grate surface drainage system, as specified, installed to the locations, dimensions, levels and details shown on the drawings in accordance with the manufacturer's requirements, complete with all necessary components and accessories required for satisfactory installation and performance.

Connect installed channel and grate surface drainage system to the stormwater drainage system in accordance with the requirements of the Territorial Authority and as shown on the drawings.

Brand/Series:
Dimensions:

Channel Material & Colour:
Grate Type, Material & Colour:
Wheel Loading (max):
Installed Location:

13.5.3.5 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.

13.5.3.6 Cement Mortar

Cement mortar shall consist of one part cement and two parts of fine aggregate measured by volume, properly mixed with the minimum amount of clean water necessary to render the mix workable. Do not use cement mortar that has been mixed and left standing for more than one hour.

13.5.3.7 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.

13.5.4 Excavation

13.5.4.1 Excavation

Locate all existing buried services before commencing excavation work in any area.

Excavations shall be of sufficient depth and width for proper installation of catchpits and surface water drains (channel, slot), and their connections to in-ground stormwater drains, according to the layout and levels shown or implied on the drawings. Excavate to accommodate all required bedding and encasement. Finish excavations with a flat bottom, relative to the grades and levels of finished paved surfaces.

13.5.4.2 Dewatering

Take all necessary precautions to keep trenches and pits free from water. Provide all necessary pumps, drainage pipes and other equipments required for dewatering. Install all necessary filtering and detention measures required by the Territorial Authority.

If the bottom of the trench is likely to be adversely affected by rain, remove the final 80mm of excavation as a separate operation immediately before placing the bedding material.

13.5.5 Connection

13.5.5.1 On-Site - to New Stormwater Drainage System

Connect to discharge surface water drainage lines directly to the new on-site stormwater drainage system in accordance with the requirements of the Territorial Authority and as shown on the drawings.

13.6 Stormwater Drainage

13.6.1 Scope

Supply, install, test and commission new, gravity-flow stormwater drains on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for the satisfactory completion and performance of the stormwater system. All aspects of this works shall comply with the requirements of the NZ Building Code, related compliance Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the design drawings and schedules. Ancillary work and/or services not specifically mentioned but necessary to complete the installation shall be deemed included.

Install stormwater drains in natural ground, beneath and/or external to the building, for the distances indicated on the drawings. Allow for all inspection openings, bends, branches, manholes, inspection chambers, etc., as required and indicated on the drawings. Unless shown otherwise on the drawings, the stormwater drains shall be connected to the roof and surface stormwater installations, and discharge to the stormwater network.

The stormwater drainage plans are diagrammatic only. Allow for all necessary inspection fittings, cleaning eyes, and traps in accordance with AS/NZS 3500.3 and to comply with the New Zealand Building Code, and as required by the Territorial Authority. Refer to the drawings for the dimensioned locations of roof drainage system rainwater pipes and outlets, and surface drainage outlets, etc.

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 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.

13.6.2.3 Inspections

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

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

13.6.2.4 Testing

Carry out all necessary testing of the stormwater drainage installations, and demonstrate to the Contract Administrator and the Territorial Authority that the installations are watertight and comply with the requirements of the New Zealand Building Code, related compliance Standards, and the design documents.

13.6.2.5 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.

13.6.2.6 Co-operation

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

Coordinate with other trades as necessary to install stormwater drains to the required locations and layout.

13.6.2.7 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.

13.6.2.8 Delivery & Handling

Store stormwater drain pipes and accessories undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep pipes and accessories out of direct sunlight and protected from damage and contamination at all times.

Store loose PVC-U pipes on evenly spaced bearers at maximum 1.0m centres, with pipe sockets alternated so the the sockets do not bear on each other, and with side supports if pipes are stacked more than two layers high. When loose PVC-U pipes are stacked in a pyramid, the maximum stack height shall be 1.0m and the bottom pipes shall be chocked.

Do not used damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC-U materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

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

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'.

13.6.2.9 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare As-Built Drawings of the stormwater drainage system, that accurately record the new and/or modified stormwater drainage installation.

Information shall include, but not limited to, type, class and size of all pipes, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, manholes, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

13.6.3 Materials

13.6.3.1 General

Supply and deliver to the site all pipes, junctions, precast manholes, granular bedding material and other materials required for the satisfactory completion of the stormwater drainage works. All drainlaying materials shall be fit for purpose, new and free from damage and defects.

13.6.3.2 PVC-U Pipes & Fittings

PVC-U stormwater drain pipes and fittings for non-pressure applications shall comply with AS/NZS 1254: 'PVC-U pipes and fittings for stormwater and surface water applications'. Installed in accordance with AS/NZS 3500.3 and AS/NZS 2032 or AS/NZS 2566.2

Pipe Classification:
Class SN4-SN6 - Rubber Ring Joint or Solvent Welded Joint. For domestic and residential applications, and low load areas.
Class SN8-SN10 - Rubber Ring Joint or Solvent Welded Joint. For commercial and industrial applications, and medium load areas.
Class SN16 - Rubber Ring Joint or Solvent Welded Joint. For heavy traffic load areas.

13.6.3.3 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.

13.6.3.4 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.

13.6.3.5 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.

13.6.4 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 3500.3.

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.

13.6.5 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 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.

13.6.5.3 Underground Drains Near & Under Buildings

Protect underground drains near and under buildings against damage in accordance with AS/NZS 3500.3 where the minimum cover specified cannot be provided.

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 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.

13.6.6 Connection

13.6.6.1 Public Network - Street Kerb Connection

Connect to discharge the stormwater drainage line directly to the street kerb outlet in accordance with the requirements of the Territorial Authority and as indicated on the drawings.

13.6.7 Testing

13.6.7.1 Stormwater Drains

Test the stormwater installation, including all drains, connections and system components, for water tightness in accordance with the requirements of the Territorial Authority (TA).

Where required by the Territorial Authority, the testing shall be undertaken in the presence of the representative of the TA. Demonstrate to the Contract Administrator and the Territorial Authority that the installation complies with the requirements of the contract documents, related standards and regulatory bodies. Lodge all certificates of approval with the Contract Administrator.

Unless specified otherwise by the Territorial Authority, the testing procedure shall be the Water Test procedure as defined in AS/NZS 3500.3: Section 9. Where appropriate, the procedures in NZBC E1/VM1 may be used as an alternative. The acceptability of other test methods are be subject to the approval of the Territorial Authority and the Contract Administrator.

Provide all necessary plant, equipment and instruments required for the specified testing procedure. All testing and commissioning shall be undertaken by suitably skilled and experienced technicians.

Pressure testing shall be carried out after the pipes have been laid and the bedding material has been placed over the pipes as specified.

Prior to testing ensure that all pipe junctions and inspection eyes are exposed, and pipelines have been flushed and all residual debris cleaned out.

Stormwater manholes shall be free of visible faults, or permeable zones, and jointing or penetration repairs shall be to best trade practice and standards.

Test results shall be recorded clearly on properly formatted test result sheets, and submitted to the Contract Administrator within 48 hours of completion of testing.

Repair or replace any materials or workmanship found to be defective or faulty during testing, and repeat the test until a satisfactory test result is achieved.

Leave the installation watertight and free of defects, and operating to the required performance standard.

The work shall be deemed incomplete unless all required testing and commissioning has been carried out and has passed the requirements of the testing specification and the Territorial Authority.

13.6.7.2 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.

13.6.7.3 Air Test Procedure to AS/NZS 3500.3

Air test procedure of stormwater drains (non-pressure) - to AS/NZS 3500.3: Section 9.4:

The procedure shall be as follows:
- Apply a pressure of 30 kPa to the drain and hold this pressure for 3 minutes to allow the air temperature to stabilise.
- Shut off the air supply and measure the time taken for the pressure in the pipe to drop from 25 kPa to 20 kPa.

The drain shall be deemed to have passed the test if the time taken for the pressure to drop is greater than 90 seconds for pipes of size DN 225 or smaller, or 180 seconds for pipes of sizes DN 300 and DN 375.

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 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.

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:

3000:2018(AS|NZS)	Electrical installations - Known as the Australian/New Zealand Wiring Rules
4512:2010(NZS)	Fire detection and alarm systems in buildings
4514:2009(NZS)	Interconnected smoke alarms for houses

14.3 Interconnected Smoke Alarms

14.3.1 Scope

14.3.1.1 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.

14.3.2 Co-operation

14.3.2.1 Co-operation

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

14.3.3 Workmanship

14.3.3.1 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.

14.3.4 Power Supply

14.3.4.1 Permanent 230 V a.c. Mains 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.

14.3.5 Alarm Type

Install interconnected Ionisation type smoke alarms.

Manufacturer, brand name & type:

14.3.6 Installation

Install the interconnected smoke alarms on ceilings, or as shown otherwise, to the layout shown on the drawings in strict accordance with the manufacturer's instructions. Do not install smoke alarms in dead air spaces or obstructions where dead air spaces may be created.

Do not install smoke alarms closer than 400mm to any forced-air supply opening or to any blade of a ceiling fan.

14.3.7 Completion

14.3.7.1 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.

1. James Hardie Eave & Soffit Installation Manual (Feb 2025)
2. BRANZ Appraisal No.427 (2021) - GIB Aqualine Wet Area Systems
3. EXPOL SLABX200 – Technical Data Sheet
4. Mason NZ Contractual Product Warranty
5. EXPOL Expanded Polystyrene and XPS Technical Guide
6. BRANZ Appraisal No.928 - GIB EzyBrace Systems
7. BRANZ Appraisal No.427 (2021) - GIB Aqualine Wet Area Systems
8. GIB® Rondo® Metal Batten Systems Installation
9. BRANZ Appraisal No.394 - GIB Noise Control Systems 2017
10. CodeMark Certificate of Conformity - Masons UNI® and UNI® PLUS Flexible Air Barriers
11. CodeMark Certificate of Conformity - 40 Below & Hydro Flashing Tapes
12. CodeMark Certificate of Conformity - Masons UNI® and UNI® PLUS Flexible Air Barriers
13. CodeMark Certificate of Conformity - 40 Below & Hydro Flashing Tapes
14. BRANZ Appraisal No.472 - ARDEX Undertile Internal Liquid Membranes
15. BRANZ Appraisal No.473 - ARDEX Undertile External Liquid Membranes
16. CodeMark -MASONS Roof Underlays VHP
17. Masons NZ - Roofing v3
18. Masons NZ - Roofing Data
19. Roof Boot Flashings
20. Product Warranty- Roof Boot Flashings