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F A B R I C

Fabric Architecture Ltd

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

2 Short Court - 'The Rocks' - Stage 2

2 Short Court

Queenstown Hill

Queenstown

Issued for Consent

FA0952

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PROJECT OVERVIEW

Scope

Earthworks, construction of garages & associated landscaping on site. Installation of two modular homes built off site in stage 1.

Address

Site Address	2 Short Court
Suburb	Queenstown Hill
City	Queenstown
Lot #	167
DP #	548793

Site Conditions

Wind Zone	H - High Wind Speed
Earthquake Zone	Zone 2
Exposure Zone	Zone B - Low
Snow Loading Zone	Zone N5

Related Parties

Architect

Fabric Architecture, Mitchell Coll, NZRAB 5348, mitchell@fabricarchitecture.co.nz, 14 Walker Street, Christchurch Central, Christchurch, 8011, (03) 359 7391

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1 PRELIMINARIES & GENERAL

1.1 Project Overview

1.1.1 Contract Documents

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

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

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

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

1.1.2 Site

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

1.1.3 Adjacent Owners

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

1.1.4 Protection

Take all appropriate precautions to protect all third party property, services, etc., and indemnify the Principal against any claims arising from the construction operations. Any damage to third party property caused by construction activities or failure to protect shall be rectified as soon as possible by the person causing the damage, or by appropriately qualified trades-persons employed by the person responsible for the damage if necessary.
Suspend operations during weather which would affect the quality of work in progress. Secure the works as soon as possible against adverse weather, dust and vandals. Avoid structural damage that is

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

1.1.5 Responsibility

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

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

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

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

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

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

1.1.6 Specification

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

1.1.7 Standards

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

1.1.8 Authorities and Charges

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

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

1.1.9 Code Compliance Certificate

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

1.1.10 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.

1.1.11 Documents Interpretation

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

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1.1.12 Work Shown and Mentioned

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

1.1.13 Site Safety

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

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

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

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

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

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

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

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

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

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

1.1.14 Variations

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

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

The Main Contractor's Variations Margin agreed pre-contract will be the maximum accepted for any trade unless higher rates are nominated pre-contract and are accepted. The Main Contractor's agreed Variations Margin shown shall be deemed to include all preliminary and general costs, overheads, variation processing costs, and profit. If no margin is given, a 5% overall margin will be

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applied.
Note that 'loss of anticipated profit' claims consequent upon reduction of works extent will NOT be recognised, and that the cost of processing Variations is deemed to be included in the P & G Allowance.
Also note that for Variations pricing all materials shall be charged at the actual net invoiced cost plus margin; i.e. recognised 'Trade Price', volume discounted where appropriate.

1.1.15 Cleaning and Completion

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

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

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

1.2 Project Specifics

1.2.1 Nominated Subcontractors

There are no Nominated Subcontractors within this Contract.

1.2.2 Separate Contractors

There are no Separate Subcontractors

1.2.3 Contingencies Sums

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

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1.2.4 Prime Cost Sums

There are no Prime Cost Sums within this Contract.

1.2.5 Provisional Sums

There are no Provisional Sums within this Contract.

1.2.6 Contractor's Performance Bond

A Contractor's Performance Bond is not required.

1.2.7 Principal's Bond

A Principal's Bond is not available.

1.2.8 Principal Supplied Items

The Principal is supplying the following items to be incorporated into the works:-

Aether pizza oven (U1)

Fireplace to U2 (as specified in drawings)

Contractor to confirm any other principal supplied items with principal.

1.2.9 Defects Liability Period

The Defects Liability Period is 3 months, commencing on the date that Practical Completion is achieved.

1.2.10 Liquidated Damages

Liquidated Damages do not apply to this Contract.

1.2.11 Early Completion Bonus

There is no Early Completion Bonus within this Contract.

1.2.12 Contract Sum

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

1.2.13 Insurance of the Works

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

1.2.14 Other Insurance

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

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1.2.15 Sundry

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

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

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

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

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

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

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

1.2.16 Warranties

1.2.16.1 Provision of Warranties

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

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

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1.2.16.2 Warranty for Weathertightness and Watertightness

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

1.2.16.3 Installer/Applicator Warranties

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

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

1.2.16.4 Manufacturer/Supplier Warranties

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

- The terms and conditions of the Manufacturer/Supplier warranty provided shall not negate the minimum remedies available under common law as if no warranty had been offered.
- Failure to provide the required Manufacturer/Supplier warranty does not reduce liability for execution and materials required for that section of work.
- Conform to the Manufacturer's/Supplier's standard warranty form.
- Commence all Manufacturer/Supplier warranties from the date normally applicable.
- Maintain the effectiveness of all Manufacturer/Supplier warranties for the period stated.
- Provide all Manufacturer/Supplier warranties before practical completion.

1.3 Establishment & Enabling

1.3.1 Site Establishment

1.3.1.1 Safety

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

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

1.3.1.2 Site Inspection Assessment

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

1.3.1.3 Site Boundaries

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

1.3.1.4 Regulatory Authorities

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

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

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

1.3.1.5 Network Utility Operators

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

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

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

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

1.3.1.6 Existing Services

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

As necessary:
- obtain all records of existing underground services held by the relevant utility network operators;
- give all required notices to the service authorities or companies and the Territorial Authority, and pay all relevant fees and charges;

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- carry out a detection survey of the site to ensure there are no buried operative electric cables;
- protect existing services on the site, and rectify any damage or interference to them, and provide temporary services while repairs are being carried out;
- extinguish and remove existing services designated redundant by the contract works.

1.3.1.7 Temporary Buildings & Site Amenities

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

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

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

1.3.1.8 Temporary Roads & Surfaces

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

1.3.1.9 Hoardings, Gantries, Lighting

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

1.3.1.10 Setting Out

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

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

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

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

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

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1.3.2 Temporary Works & Services

1.3.2.1 General

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

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

1.3.2.2 Site Water

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

1.3.2.3 Site Electricity

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

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

1.3.2.4 Site Phone & Data Facilities

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

1.3.2.5 Site Perimeter Fencing

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

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

1.3.2.6 Site Perimeter Hoardings

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

Site hoardings adjacent to public spaces shall:
- extend at least 2.0m from ground level on the side accessible to the public; and
- have a maximum 100mm gap between bottom of the hoarding and ground; and

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- have continuous cladding in any of the following materials:
  - close-butted timber at least 19mm thick; or
  - 6mm exterior-grade plywood on studs spaced at maximum 600mm centres; or
  - 9mm exterior-grade plywood on studs spaced at maximum 1000mm centres; or
  - continuous metal cladding constructed with studs and rails to provide comparable strength and rigidity.

1.3.2.7 Site Cleaning & Waste Management

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

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

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

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

1.3.2.8 Site Security

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

1.3.2.9 Dust & Noise Control

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

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

Noise:
- Permitted construction noise levels shall be less than the maximum limits required by the Territorial

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Authority and NZS 6803.
- Comply with the conditions of the Resource Consent/Building Consent related to noise control.
- As required, prepare a site-specific Construction Noise Management Plan.

1.3.2.10 Stormwater & Sediment Control

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

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

1.3.2.11 Concrete & Cement Wash-Water Control

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

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

1.3.2.12 Construction Vibration

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

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

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

1.3.2.13 Shoring

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

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

Shoring - generally:
- Shoring shall be undertaken in accordance with the 'Approved Code of Practice for Safety in Excavation and Shafts for Foundations'.
- Shoring must be designed in accordance with sound engineering practice, and materials used must be suitable and of sound quality.
- Shoring for large and extensive excavations shall be designed by a Registered Engineer.
- Shoring must be placed in a proper and workmanlike manner.
- Drawings of the temporary works must be available at the job site.
- The shoring of a face must be carried along with the excavation with the least possible delay between the excavation of the face and the completion of the shoring.
- Shoring must not be altered, dismantled or interfered with, except on the instructions of the Contractor.

1.3.2.14 Construction-Keyed Locksets

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

1.3.3 Protection of Existing Features

1.3.3.1 Survey Marks

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

1.3.3.2 Adjacent Sites

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

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

1.3.3.3 Existing Buildings & Structures

Take all necessary precautions and make appropriate provisions to protect from damage and contamination any existing building or other structure within the site designated to remain intact while the contract works are being carried out.

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1.3.3.4 Existing Site Services

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

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

1.3.4 Traffic Control, Crossings & Plant

1.3.4.1 Traffic Control & Management

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

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

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

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

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

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

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

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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:

2439.1:2007(AS)	Perforated plastics drainage and effluent pipe and fittings Part 1: Perforated drainage pipe and associated fittings
2566.1:1998(AS/NZS)	Buried flexible pipelines - Structural design
2566.2:2002(AS/NZS)	Buried flexible pipelines - Installation
3500.3:2018(AS|NZS)	Plumbing and drainage Part 3: Stormwater drainage

2.3 Drives, Paths & Paving

2.3.1 Driveway

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.

2.3.2 Insitu Concrete Paving

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.

2.3.3 Asphalt

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

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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.

2.3.4 Vehicle Crossing

The contractor shall arrange for the construction of a new 6m wide vehicle crossing (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 Excavation & Siteworks

2.4.1 Excavation

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

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

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

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

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

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

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

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

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

Batter all excavation cuts at a stable slope.

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

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

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

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

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

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

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

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

2.4.2 Excavation Completion

As soon as excavation and filling is complete and before any concrete is placed or other work proceeded with the foundation material will be inspected by the Engineer, and any necessary changes to foundation widths or details will be directed.

2.4.3 Filling

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

On completion clean up the stockpile areas and the site.

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2.4.4 Hardfill & Blinding

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

2.4.5 Sealing Retaining Walls

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

(manufacturer & product info here)

2.4.6 Backfilling

Backfill as soon as possible after retaining walls are in place and sealing, field drains and FormFlow are in place, and fully checked. Remove any timber offcuts and any/all other rubbish prior to backfilling.

2.5 Glass Balustrade

2.5.1 General

2.5.1.1 Scope

Pool fencing to comply with F9/AS1 clause 1. Where relevant the fence must also comply with requirements of F4/AS1. Fencing must be installed to manufacturers specifications and requirements.

2.5.2 Guardian Glass Balustrade System

2.5.2.1 System

Proprietary floor mounted residential glass balustrade system, to be installed over continuous 140mm purpleheart decking for fixing. Must be installed to manufacturers requirements. Refer to all manufacturer's documentation in supporting documents before install.

2.5.2.2 Heights

- 1200mm minimum height where used in a pool area
- 1100mm minimum height at top landing of common stairs
- 1000mm minimum height elsewhere

2.5.2.3 Fixing - Timber

4x stainless steel 316 M8 coach bolts through continuous 140mm purple heart into timber joist/blocking. Minimum 140mm embedment.

2.6 Groundwater Drainage

2.6.1 Scope

Supply, install and commission new gravity groundwater subsoil drains on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for the satisfactory completion and performance of the groundwater drainage system. All

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aspects of this works shall comply with the requirements of the NZ Building Code, relevant Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the approved drawings and schedules.

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

2.6.2 Requirements

2.6.2.1 Safety

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

2.6.2.2 Compliance

Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the drainlaying works.

The Drain Layer shall be deemed to have allowed for all work associated with the safe and orderly execution of the drainlaying work, including complying with all Territorial Authority requirements, Building Consent, Building Act, Health and Safety requirements, and all other acts, laws, by-laws and regulations that may affect the execution of the work.

2.6.2.3 Subsoil Drains

Construct subsoil drains in natural ground, in accordance with AS/NZS 3500.3 or as otherwise specified herein, to the locations, layout and details shown on the drawings. As shown on the approved drawings, outlets from subsoil drains shall be connected (downstream) to the stormwater system or constructed to discharge clear of embankments.

The groundwater drainage plans are diagrammatic only. Allow for all necessary pits and connections indicated on the drawings and as required by the controlling Territorial Authority. Refer to the drawings for the dimensioned locations of pits etc.

As necessary, check on site before excavation of trenches commences to ensure the required minimum gradient and cover are achieved.

The groundwater subsoil drains are intended as a permanent feature of the contract works, and not construction purposes. The use of permanent groundwater subsoil drains for construction purposes during the construction period is not permitted.

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2.6.2.4 Inspections

Inspection of the groundwater drainage work shall take place at each of the stages as scheduled in the Building/Resource Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

2.6.2.5 Records & Testing

Maintain records of the type, size, and location and levels of subsoil drains laid for documenting subsequent As-Built drawings.

On completion, demonstrate by flow-testing to the satisfaction of the Contract Administrator that a clear waterway has been provided and the subsoil drains perform the required standard. Any deficiencies in the performance of subsoil drains during the Contract Period or Maintenance Period shall be remedied by the Drain Layer, at no additional expense to the Principal.

2.6.2.6 Co-operation

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

Coordinate with other trades as necessary to install groundwater subsoil drains to the required locations, tolerances and standards.

2.6.2.7 Workmanship

All drainlaying work shall be carried out by qualified and experienced tradespersons, familiar with the specified system design requirements and installation techniques, under the direct supervision of a NZ certified Registered Drainlayer, in accordance with the manufacturer's installation requirements, AS/NZS 3500.3 in compliance with the New Zealand Building Code, and with all local codes and regulatory authority requirements, and as shown on the drawings. Comply with the requirements of the Building Consent.

All pipe cutting, jointing, and supporting techniques shall be exactly as recommended by the pipe manufacturer. Pipes, fittings and accessories shall be handled and installed in such a manner that prevents any damage to the component.

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

Carry out all necessary inspections and tests during installation to ensure compliance with the design documents and the specification is achieved. Submit test result sheets to show compliance with the design drawings and specification.

Ensure that any installed drain is adequately protected from any damage and excessive loading during the remaining construction period.

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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.

2.6.2.8 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected groundwater drainage materials and/or work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional expense to the Principal.

2.6.2.9 Delivery & Handling

Store ground water darainagel pipes and accessories undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep pipes and accessories out of direct sunlight and protected from damage and contamination at all times.

Do not used damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC/uPVC materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

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

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

2.6.2.10 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare and submit scaled 'As-Built' drawings of the new groundwater subsoil drainage system that accurately record the new and/or modified groundwater drainage installation

Information shall include, but not limited to, subsoil drain pipe type and size, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

2.6.3 Materials

2.6.3.1 Pipe

Perforated corrugated plastic pipes used in subsoil drains shall comply with AS 2439.1.

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Pipe Schedule:
- Subsoil Drains NOT Subject to Traffic Loading: Iplex Novaflo or approved-equivalent pre-perforated single-wall corrugated high-density polyethylene (HDPE) subsoil drainage pipe; pre-fitted with a full-length polypropylene or polyester filter sock.
- Subsoil Drains Subject to Traffic Loading: Iplex Nexus Hi-Way or approved-equivalent heavy-duty pre-perforated double-wall corrugated high-density polyethylene (HDPE) roadworthy subsoil drainage pipe; pre-fitted with a full-length polypropylene or polyester filter sock.

Pipe diameters shall be as indicated on the drawings. Pipes shall be installed only with the use of proprietary components recommended by the pipe manufacturer for all joints, bend fittings, couplers, end caps, etc., and in accordance with the manufacturer's requirements to the locations, layout and details shown on the drawings.

Do not allow pipes and fittings to be exposed to direct sunlight for extended periods of time - refer to the manufacturer's technical literature.

2.6.3.2 Drainage Aggregate

Unless specified otherwise on the drawings, filter and bedding material shall be drainage 40/20 open coarse graded clean (preferably washed) durable aggregate.

2.6.3.3 Geotextile

Unless specified otherwise on the drawings, geotextile fabric shall be Strength Class B, Filtration Classes 1-4, non-woven needle-punched continuous filament polyester geotextile. Installed in accordance with the manufacturer's requirements and as shown on the drawings.

Pins for securing the geotextile shall be of steel, a minimum of 5mm in diameter, and at least 400 mm in length. Other equivalent securing devices may be substituted if recommended by the geotextile manufacturer.

The geotextile shall not be left exposed for more than two weeks without being covered by backfill. Geotextile that becomes torn or otherwise damaged through any cause shall be removed and replaced with undamaged geotextile with a minimum 500mm overlap requirement in all directions.

2.6.4 Trench Excavation

2.6.4.1 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.

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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.

2.6.4.2 Excavation

Unless specified otherwise, the excavation for trenches shall be taken out by open cut to the depths shown or implied on the drawings. Excavate trenches to the depths which will provide for the appropriate bedding depth.

Trenches shall be cut in such a manner as will ensure that the geotextile wrapped aggregate subsoil drains, and pipes if included, will be laid true to the depths, grades and lines shown on the drawings.

Unless otherwise specified trenches shall have: a minimum gradient of 1:100; vertical sides; and a minimum depth that will ensure that the invert level shall be not less than 1 metre below finished subgrade level; and a minimum depth of cover over the flexible pipes.

Where a trench has been excavated deeper than necessary, the excess depth shall be filled either with embedment material compacted to achieve a density as near to the original soil density as possible.

Excavated material shall be stacked at least the excavated depth away from the edge of the excavation and the size of the spoil bank shall be limited to avoid any danger to stability of the trench or adjacent buried services.

All spoil shall be managed so as to avoid contamination of the clean drainage aggregate.

Surplus excavated material shall be disposed of as detailed in the Siteworks specification.

Trenches shall be graded to obtain smooth side and bottom surfaces so that the geotextile will not bridge cavities in the soil or be damaged by projecting rock.

2.6.4.3 Dewatering

Take all necessary precautions to keep trenches and pits free from water. Provide all necessary pumps, drainage pipes and other equipments required for dewatering. Install all necessary filtering and detention measures required by the Territorial Authority.

If the bottom of the trench is likely to be adversely affected by rain, remove the final 80mm of excavation as a separate operation immediately before placing the bedding material.

2.6.5 Laying Subsoil Drains

2.6.5.1 Perforated Corrugated Plastic Pipe Subsoil Drain

Perforated corrugated plastic pipe subsoil drains shall be installed with a geotextile fabric filter to the trench perimeter, and generally as follows:

- Following trench excavation the geotextile filter fabric shall be placed in the trench so as to conform loosely to the shape of the trench. The geotextile shall be laid flat, but not stretched on the soil, and

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shall be anchored with securing pins.
- Use single full width fabric sections only cut to suit the required trench width, drainage height and fabric overlap. Longitudinal joints in the fabric are not permitted.
- Geotextile fabric end-joints (transverse) shall be overlapped minimum 500mm and shall be anchored with securing pins to ensure this required overlap is maintained.
- Geotextile fabric sides shall be cut to size to provide a minimum longitudinal lap of 300mm on the top of the drainage aggregate when placed to the specified depth.
- Place a 100mm thick bedding layer of drainage aggregate in the base of the fabric lined trench.
- Lay pipe straight and true along the centre of the trench.
- Back fill with drainage aggregate at least 150mm above the pipe - to the depth specified.
- Wrap the sides of the fabric over the top of the drainage aggregate, longitudinally overlapped 300mm minimum.
- Backfill above the geotextile fabric shall be as specified on the drawings.
- Backfill shall be compacted to provide support of not less than that of the adjacent soil.
- As shown on the approved drawings, outlets from subsoil drains shall be connected to the stormwater system or constructed to discharge clear of embankments.

2.6.6 Reinstatement of Surfaces

2.6.6.1 Reinstatement of Surfaces

Refer to separate specification section - Siteworks - Reinstatement of Surfaces. Ground and paved surfaces above excavated groundwater drainage trenches shall be reinstated to the standard specified. Reinstatement shall generally achieve a standard equal to or better than the pre-existing situation - in no case will a lower standard be accepted.

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

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3 CONCRETE

3.1 Preliminary

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

3.2 Compliance

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

Comply with all relevant provisions and recommendations of:

3101.1&2:2006(NZS)	Concrete Structures Standard
3104:2003(NZS)	Specification for concrete production
3109:1997(NZS)	Concrete construction
3112.1:1986(NZS)	Methods of test for concrete - Tests relating to fresh concrete
3112.2:1986(NZS)	Methods of test for concrete - Tests relating to the determination of strength of concrete
3114:1987(NZS)	Specification for concrete surface finishes
3121:2015(NZS)	Water and aggregate for concrete
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
3125:1991(NZS)	Specification for portland-limestone filler cement
3604:2011(NZS)	Timber-framed buildings

3.3 Concrete

3.3.1 Scope

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

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

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

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

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'.

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

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

3.3.2.2 Quality Assurance - Option 1

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

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

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

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

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

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3.3.2.3 Tolerances

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

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

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

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

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

3.3.2.4 Erection & Temporary Works

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

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

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

3.3.2.5 Inspections

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

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

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

Any instructions issued shall be carried out before concrete placing commences. Unless approval is given by the Contract Administrator and/or BCA, no concrete shall be placed in that section of work.

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Any concrete placed without authorisation may require removal from the works at the Contractor's expense.

3.3.2.6 Materials & Workmanship

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

3.3.2.7 Producer Statement

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

3.3.3 Reinforcement

Refer to separate section Reinforcing Steel.

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

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

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

3.3.4 Formwork

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

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

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

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

Plywood formwork shall be constructed from Formply plywood sheets or C-grade faced standard plywood sheets (according to concrete finish), placed in a regular pattern and tightly butted together to avoid grout loss. The joints shall be sealed to prevent grout loss. Plywood formwork shall not be

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permitted to stain visually exposed concrete. Unless indicated otherwise on the drawings, timber or plywood formwork shall have 20mm fillets at the inside corners of beams, columns and walls.

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

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

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

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

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

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

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

3.3.5 Finishes

3.3.5.1 NZS 3114

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

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

3.3.5.2 Slab Finishes

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

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

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

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

3.3.5.3 Formed Finishes

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

Concrete which will be concealed within the finished building shall be cast with minimum grout loss, honeycombing, and without conspicuous off-sets or bulges.

3.3.6 Concrete

3.3.6.1 Normal Concrete

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

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

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

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

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

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

Normal Concrete used in the works shall have the following minimum strengths at 28 days unless noted otherwise on the drawings:
- Blinding concrete: *10 MPa.*
- 'No fines' concrete: no minimum strength.
- Bored piles: *25 MPa*.

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- Foundation pads and strip footings: *25 MPa*.
- Floor slab-on-grade: *30 MPa*.
- Superstructure generally: *30 MPa*.
- Precast concrete: *30 MPa*.
- Toppings to proprietary suspended floor systems: *30 MPa*.
- All other structural concrete not specifically mentioned: *25 MPa*.
- Driveways, pavements, landscaping: *20 MPa*.

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

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

3.3.6.2 Concrete Tests & Non-Compliant Concrete

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

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

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

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

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

3.3.7 Concreting

3.3.7.1 Handling, Placing & Compaction

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

Concrete shall be transported, handled, placed and compacted so as to:
- Prevent segregation or loss of materials;
- Produce a monolithic mass between planned joints or the extremities of members, or both;
- Completely fill the formwork to the intended level, expel entrapped air, and closely surround all reinforcement, tendons, ducts, anchorages and embedments; and

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- Provide the specified finish to the formed surfaces of the member;
- Ensure there is no contamination of the concrete;
- Ensure that the transporting, handling, placing and compaction of the concrete is complete before setting reactions have passed the point which prevents the concrete from attaining its potential fully cured properties.

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

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

3.3.7.2 Curing & Protection

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

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

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

3.3.7.3 Unfavourable Conditions

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

3.3.8 Construction Joints

3.3.8.1 Construction Joints

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

3.3.9 Penetrations and Detailing

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

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

3.3.10 Foundations

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

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

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

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

3.3.11 On-Ground Floor Slabs

3.3.11.1 Concrete Floor Slab-on-Grade

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

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

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

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

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

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

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

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shall be to the depth shown on the drawings and shall be made using a self-propelled diamond-tipped floor saw machine.

3.3.11.2 Damp-Proof Membrane

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

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

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

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

3.3.12 Precast Concrete

3.3.12.1 Precast Concrete

Unless specified otherwise, precast concrete units shall be constructed on steel beds and with steel forms. Precast concrete surfaces that will have concrete cast against them shall be roughened by green cutting to remove all surface laitance and any inferior surface concrete.

Unless specified otherwise in the Schedule of Surface Finishes, precast concrete shall be manufactured with the following surface finishes:
- Formed surfaces: *F5 - off steel formwork*.
- Unformed surfaces: *U3X - a high level U3 finish with minimum deviations and blemishes*.

The colour of uncoloured, Normal Concrete (N) grade precast concrete units shall be 'Grey Scale 1' as per NZS 3114, except where specified otherwise.

As specified, prepare and submit samples of precast concrete finishes approval - refer to Sample clause. Do not commence manufacture until the samples have been approved.

Reinforcement and connection details shown on the drawings are for the erected precast in its permanent position. If additional reinforcements is required in the precast during lifting, it is the Contractor's responsibility to provide this.

The Contractor is responsible for the provision and subsequent removal of lifting eyes. Submit details of the proposed lifting system to the for approval prior to casting. Such items shall not appear on the visible faces of the precast unless approved otherwise by the Contract Administrator.

Unless specified otherwise on the drawings, cast-in weld plates, inserts, bolts and the like required for fixing of the precast shall be positioned to a tolerance of ±5mm and where detailed as being flush with the precast surface the misalignment of surfaces shall be to a tolerance of ±3mm.

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Precast shall not be lifted until the concrete has reached a compressive strength of 20 MPa. Field cylinders cast at the same time as the precast concrete and field cured shall be used to determine concrete lifting strengths. Any precast brought to site showing signs of cracking, over-stress or damage shall be rejected.

Curing and protection of precast concrete shall comply with NZS 3109: Section 7.8. Ensure compatibility of proprietary release agents or curing compounds with any specified subsequent finish to be applied to the surface.

3.3.12.2 Installation

Precast concrete units shall be handled and placed in accordance with the American PCI publication 'Standards and Guidelines for the Erection of Precast Concrete Products'. Erection procedures shall be agreed in advance with the Contract Administrator. Accurately place precast items, and provide all necessary props, shores, scaffolding or any other means of temporary support to precast items during installation.

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4 BLOCKWORK

4.1 Preliminary

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

4.2 Compliance

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

Comply with all relevant provisions and recommendations of:

3103:1991(NZS)	Specification for sands for mortars and plasters
3104:2003(NZS)	Specification for concrete production
3112.1:1986(NZS)	Methods of test for concrete - Tests relating to fresh concrete
3121:2015(NZS)	Water and aggregate for concrete
4210:2001(NZS)	Masonry construction: Materials and workmanship
4229:2013(NZS)	Concrete masonry buildings not requiring specific engineering design
4230:2004(NZS)	Design of reinforced concrete masonry structures
4455.1:2008(AS/NZS)	Masonry units, pavers, flags and segmental retaining wall units - Masonry units
4455.3:2008(AS/NZS)	Masonry units, pavers, flags and segmental retaining wall units - Segmental retaining wall units
CCANZ CP 01:2011	Code of Practice for Weathertight Concrete and Concrete Masonry Construction
NZBC E2/AS3	Concrete and concrete masonry buildings

4.3 Concrete Blockwork

4.3.1 Scope

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

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

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4.3.2 Requirements

4.3.2.1 Safety

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

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

4.3.2.2 Workmanship

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

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

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

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

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

4.3.2.3 Observation Types

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

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

Type B Observation:
- Observation Requirement: Shall be inspected by a design engineer or by a nominated representative thereof, who may be a mason deemed to comply with the competency requirements of NZS 4210. Such inspection shall establish that the design is being interpreted correctly and that the work is being carried out generally as specified.

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- Admissible Use: Elastic, nominally ductile, limited ductile or ductile structures.
- Maximum Specified Compressive Strength: 12 MPa.

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

4.3.2.4 Inspections

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

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

4.3.2.5 Temporary Bracing

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

4.3.2.6 Co-operation

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

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

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

4.3.2.7 Producer Statement

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

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4.3.3 Blocks

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

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

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

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

4.3.4 Mortar

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

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

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

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

4.3.5 Grout

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

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

4.3.6 Reinforcement

Refer to separate section Reinforcing Steel for specification of reinforcement.

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

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

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

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

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

4.3.7 Block Laying

4.3.7.1 Block Laying

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

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

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

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

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

Build blockwork to vertical reinforcing with open-end type blocks and end closers. Provide bond beam and open ended bond beam type blocks and end closures for horizontal reinforcement. Where blockwork is not course-bonded at wall junctions, cut blocks at all levels to allow horizontal reinforcing and grout to pass through. Blockwork shall be constructed so that filling grout is fully contained within the grout spaces and does not leak from these.

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

4.3.7.2 Building In

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

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

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

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

4.3.7.3 Cleaning Out

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

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

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

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

4.3.7.4 Pointing & Finishing

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

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

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

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

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

4.3.7.5 Control Joints

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

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

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

4.3.7.6 Seismic Movement Joints

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

4.3.8 Grout Filling

4.3.8.1 General

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

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

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

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

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

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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.

5.3 Membrane Tanking & Damp Proofing

5.3.1 Scope

Supply and install the specified below-ground membrane tanking and damp-proofing, complete with all components and accessories, to the locations shown on the drawings. All aspects of this work shall be in strict accordance with the manufacturer's technical guidelines, installation specifications and details, other relevant product manufacturers' recommendations, and as shown on the drawings.

5.3.2 Membrane System

5.3.2.1 Under-slab Damp Proof Membrane

Under-slab Damp Proof Membrane.
250 micron thick (0.25mm), tear resistant, polyethylene film sheet. Installed over nominal 10mm (max. 25mm) thick compacted sand blinding layer, over a properly prepared base course, as a moisture vapour barrier under concrete slabs on-ground (prior to concreting), in accordance with the manufacturer's requirements and as shown on the drawings.

Manufacturer, brand name & type:
Location:

5.3.3 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings. Co-ordinate with other trades to install below-ground membrane tanking and membrane damp proofing as required.

5.3.4 Workmanship

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

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

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5.3.5 Delivery & Handling

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

5.3.6 Preparation

5.3.6.1 Under-Slab Basecourse

Check that the under-slab basecourse has been correctly laid and compacted as specified, and that the surface has been prepared, rolled to a smooth flat surface to the required levels, to the manufacturer's requirements and as shown on the drawings. Ensure that any required sand blinding is free of aggregate, sharp protrusions, hollows, and any ponded water prior to laying the under-slab membrane.

5.3.6.2 Under-Slab Tidy Slab

Check that the concrete tidy slab blinding has been laid to the required level and is neatly completed to the manufacturer's requirements and as shown on the drawings. Ensure the concrete tidy slab is dry and free of all loose aggregate, sharp protrusions, hollows, and any ponded water prior to laying the under-slab membrane.

5.3.7 Installation

5.3.7.1 Under-slab Damp Proof Membrane

Install the specified under-slab damp proof membrane, including membrane laying, jointing, and sealing, etc., in accordance with the manufacturer's specifications, and as shown on the drawings.
Membrane laid over sand blinding, with joints lapped minimum 150mm and sealed with 50mm wide PVC adhesive tape, neatly finished straight and parallel.
All pipe, duct, and other services penetrations PVC tape sealed. Consult the manufacturer regarding any detail where a standard detail does not exist.
Protect installed membrane as required, avoid puncturing or damaging the membrane during installation; tape repair damaged DPM as soon as it occurs, and inspect DPM for damage prior to pouring and repair as necessary.

5.3.8 Completion

Check that the tanking system has been installed correctly, and that all system accessories are correctly installed and finished. Check membrane for damage and punctures, repair or replace as necessary.
Complete all tanking leak free and watertight in accordance with the manufacturer's requirements in preparation for backfilling against protected wall membranes and/or for concreting over under-slab membranes.
Completely clean the works area and remove all rubbish and waste material from the site.

All drainage coils, and backfilling etc. installed by others in accordance with the manufacturer's recommendations and as specified and shown on the drawings.

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Issue to the Owner a copy of any necessary maintenance requirements and the system product and installation warranties.

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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
1397:2001(AS)	Steel sheet and strip - Hot-dip zinc-coated or aluminium/zinc-coated
1491:1996(AS/NZS)	Finger jointed structural timber
1530.3:1999(AS/NZS)	Methods for fire tests on building materials, components and structures - Simultaneous determination of ignitability, flame propagation, heat release and smoke release
1859.1:2017(AS|NZS)	Reconstituted wood-based panels - Specifications - Part 1: Particleboard
1859.2:2017(AS|NZS)	Reconstituted wood-based panels - Specifications - Part 2: Dry process fibreboard
2097:2006(AS/NZS)	Methods for sampling veneer and plywood
2098.0:2006(AS/NZS)	Methods of test for veneer and plywood - General introduction and list of methods
2270:2006(AS/NZS)	Plywood and blockboard for interior use
2271:2004(AS/NZS)	Plywood and blockboard for exterior use
2295:2006(NZS)	Pliable, permeable building underlays
2588:2018(AS|NZS)	Gypsum plasterboard
2589:2017(AS/NZS)	Gypsum linings - Application and finishing
2904:1995(AS/NZS)	Damp-proof courses and flashings
2908.2:2000(AS/NZS)	Cellulose-cement products - Flat sheets
3601:1973(NZS)	Metric dimensions for timber
3602:2003(NZS)	Timber and wood-based products for use in building
3603:1993(NZS)	Timber Structures Standard
3604:2011(NZS)	Timber-framed buildings
3617:1979(NZS)	Specification for profiles of weatherboards, fascia boards, and flooring
3622:2004(NZS)	Verification of timber properties
3631:1988(NZS)	New Zealand timber grading rules
3640:2003(NZS)	Chemical preservation of round and sawn timber

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AS/NZS 1080.1:2012	Timber - Methods of test - Method 1: Moisture content
AS/NZS 1604.3:2012	Specification for preservative treatment - Part 3: Plywood
AS/NZS 2269.0:2012	Plywood - Structural - Part 0: Specifications
NASH Standard	Residential and Low-rise Steel Framing - Part 1: Design Criteria
NZBC B2/AS1	Durability
NZBC C/AS2-AS6	Protection from Fire
NZBC G6	Airborne and Impact Sound
NZBC H1	Energy Efficiency

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 Deck

6.4.1 Preparation

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

6.4.2 Installation

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

6.4.3 Decking

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

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

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

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6.5 Residential Garage Doors

6.5.1 Scope

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

6.5.2 Requirements

6.5.2.1 Wind Performance

All residential garage doors shall comply with the wind performance requirements of AS/NZS 4505 according to the applicable NZS 3604 Wind Zone. Residential garage door components shall be designed, constructed and installed to resist pressures corresponding to the ultimate wind pressure rating.

6.5.2.2 Sample

Provide samples of the specified door facing materials, upon request, for the approval of the Architect/Designer. Manufacture should not commence until approval has been gained.

6.5.3 Rolling Garage Doors

6.5.3.1 Steel Rolling Overhead Door

Steel Rolling Overhead Garage Door - as specified herein and/or door schedule. The door shall be made of a steel slat curtain and a retractable head infill panel. The curtain opens/closes along vertical and horizontal door guides. Classified according to AS/NZS 4505: Table 5.1; and according to the ultimate wind pressure rating given in AS/NZS 4505: Table 5.3.

General Specification:
- Construction & Performance Criteria: In accordance with the requirements and limitations of AS/NZS 4505.
- Door Curtain Material: Refer to Material, Finish & Colour clause.
- Door Guides: Roll-formed galvanised steel guides with full-length running strips.
- Weather Seal: Neoprene base weather strip, attached to the bottom closing surface of the door.
- Mounting: Face mounted - fixed to the interior face of the wall opening.
- Opening Operation: Refer to Door Opening Operation clause.
- Durability Requirements: Not less than 15 years in accordance with NZBC B2/AS1.

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

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6.5.4 Door Material & Finish

6.5.4.1 Pre-Painted Steel (COLORSTEEL) - Steel Rolling Overhead Door

Steel Rolling Overhead Garage Door curtain shall be manufactured from COLORSTEEL® or approved equivalent pre-painted hot-dipped galvanised zinc coated steel coil conforming with AS/NZS 2728. Curtain colour as specified below.

Curtain Colour: Refer to colour schedule

6.5.5 Door Opening Operation

6.5.5.1 Automatic Door Opener - Steel Rolling Overhead Door

Steel Roller Garage Doors - Automatic Door Opener - as specified below. The steel roller garage doors scheduled below shall be operated by an automatic door opener as recommended by the garage door manufacturer - to suit the door size, loads, and application. Installed as a component of the steel rolling garage door(s), complete with accessories, and commissioned to the required operating functionality. Except where clearly identified on the approved drawings, the handing (LH, RH) of roller door openers shall be as instructed by the Architect/Designer.

6.5.6 Co-operation

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

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

6.5.7 Workmanship

Where required by the NZ Building Amendment Act 2012 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All installation and commissioning of residential garage doors shall be carried out by experienced and competent installers, familiar with the selected products and installation techniques, to fully comply with all warranty requirements and in accordance with the manufacturer's requirements.

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

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

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

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

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6.5.8 Delivery & Handling

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

Inspect components and accessories upon delivery to site and reject any damaged or defective items. Contact the manufacturer for replacement of rejected items at time of delivery to site. Do not use or use or install damaged or defective components or accessories.

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

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

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

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

6.5.9 Preparation

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

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

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

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

Supporting concrete structures shall be within the scope of NZBC E2/AS3, and comply with NZS 3109. New concrete must have aged for a minimum of 28 days prior to installation.

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Supporting concrete masonry structures within the scope of NZBC E2/AS3, and shall comply with NZS 4229, or with NZS 4230 and AS/NZS 1170 for specific design, and NZS 4210.

Supporting heavy steel structures shall comply with NZS 3404.

Check all aspects of preparatory works, including but not limited to:
- Check that garage door openings are correctly sized for fitting tolerances, are square and correctly aligned, with all sides plumb, level and true to line and plane.
- Check threshold rebates are correctly size and formed to suit the door operation.
- Check door installation clearances for headroom, sideroom and backspace.

6.5.10 Installation

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

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

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

6.5.11 Completion

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

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

Leave this work complete and in full working order, to the required operating performance and functionality, in accordance with the manufacturer's warranty requirements. Leave all locking keys with the Contractor.

Leave the surrounding work area clean and free of rubbish. Remove rubbish and waste material from the site.

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

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6.6 GIB® Intertenancy Barrier Systems for Terrace Homes

6.6.1 Scope

Supply and install the specified GIB® Intertenancy Barrier Systems for Terrace Homes to the locations identified on the drawings, incorporating GIB Barrierline® central barrier 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® Intertenancy Barrier Systems for Terrace Homes Specification and Installation Manual and the current GIB® Site Guide (check www.gib.co.nz, or call 0800 100 442 for the latest editions), BRANZ Appraisal No.940, other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for GIB® Intertenancy Barrier Systems for Terrace Homes, GIB® Plasterboard Linings, GIB® Systems or GIB® System components and accessories.

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

For the purpose of this specification, the GIB® Intertenancy Barrier System for Terrace Homes Specification and Installation Manual has been abbreviated to 'GIB® Intertenancy Manual'.

6.6.2 Requirements

6.6.2.1 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, particularly those for construction and building maintenance.

6.6.2.2 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.

6.6.2.3 Piped & Cabled Services

GIB® Intertenancy Barrier Systems for Terrace Homes allow installation of piped and cable services in the cavities either side of the central barrier. Refer to page 9 of the GIB® Intertenancy Manual for further information.

Only where shown and specified on the approved drawings shall penetrations be made through the GIB Barrierline® central barrier within a roof space and fire-sealed to the specified fire resistance rating. Do not permit piped or cabled services to penetrate the GIB Barrierline® central barrier under

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any circumstances unless clearly shown and specified on the approved drawings, or without prior written approval from the Architect/Designer.

6.6.2.4 Exposure to Elements

The construction programme must ensure that the GIB Barrierline® central barrier is left exposed to the elements for as short a time as possible. Take all necessary precautions to protect the erected central barrier from exposure to moisture and adverse weather conditions.

Once installed and in a vertical orientation, GIB Barrierline® plasterboard can be exposed to the elements for up to 12 weeks before the building is closed in.

Once installed and in a vertical orientation, 16mm GIB Fyreline® plasterboard can be exposed to the elements for up to 4 weeks before the building is closed in.

GIB® plasterboard linings must not be exposed to water or be installed in situations where extended exposure to humidity above 90% RH can reasonably be expected. GIB® plasterboard linings must not be exposed to temperatures in excess of 52°C for prolonged periods.

6.6.2.5 Quality Assurance

Ensure that the installation and finishing of GIB® Intertenancy Barrier Systems for Terrace Homes 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.

6.6.2.6 Inspection & Acceptance of GIB® Intertenancy Barrier Systems for Terrace Homes

Carry out all necessary pre-installation, installation and finishing inspections necessary for GIB® Intertenancy Barrier Systems for Terrace Homes for each area of work in accordance with the requirements of the GIB® Intertenancy Manual, GIB® Site Guide, GIB® Systems literature.

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

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

6.6.2.7 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected GIB® Intertenancy Barrier Systems for Terrace Homes 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.

6.6.2.8 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 other GIB® System components for alternative brands is not permitted under any circumstances.

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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.

6.6.3 Performance

6.6.3.1 Bracing Performance

Bracing Performance - GIB EzyBrace® Systems. 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.

6.6.3.2 Fire Rating Performance

Fire Rating Performance - GIB® Fire Rated Systems. To the areas noted as 'Fire-rated' on the drawings, additionally comply with all relevant aspects of the latest 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.

6.6.3.3 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 (2017), and other relevant product manufacturers' recommendations. Refer to separate specification GIB® Noise Control Systems.

6.6.4 GIB® Intertenancy Barrier System

6.6.4.1 GBTLAB 60a

GIB® Intertenancy Barrier System for Terrace Homes - GBTLAB 60a. Refer to the GIB® Intertenancy Manual.

Note this system is to be partially installed in stage 1, with final insulation, clips, and wall linings installed once units have been placed on site. Refer to stage 1 drawings for details.

6.6.5 System Components

6.6.5.1 System Components

System Components, including, but not limited to:
- GIB Barrierline®;
- 2/10mm GIB standard
- GIB® H-Stud;

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- GIB® Rondo® 140 Perimeter Channel;
- GIB® Wall Clip;
- GIB® Wall Strap;
- Timber framing;
- Wall cavity insulation;
- Fire stopping consisting of treated timber battens or mineral wool cavity insulation;
- GIB® plasterboard wall linings;
- Fasteners.

Refer to pages 10-11 of the GIB® Intertenancy Manual for further information.

6.6.6 Co-operation

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

Coordinate with other trades to install GIB® Intertenancy Barrier Systems for Terrace Homes to the required layout and standard, and to ensure:
- the clear distance between the GIB Barrierline® central barrier and wall framing on both sides is between 25-40mm.
- the appropriate tolerances and clearances allow for correct installation of the central barrier, mineral wool cavity insulation; and
- any building services located within the wall cavities are correclty installed to maintain the integrity and performance of the system; and
- when installed and in a vertical orientation, GIB Barrierline® is not exposed to the elements for more than 12 weeks before the building is closed in; and
- when installed and in a vertical orientation, 16mm GIB Fyreline® is not exposed to the elements for more than 4 weeks before the building is closed in.

Refer to the GIB® Intertenancy Manual for further information.

6.6.7 Workmanship

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

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

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

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

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

6.6.8 Delivery & Handling

GIB Barrierline® has a water and mould resistant core. Despite this it is important to remember that paper-faced gypsum plasterboard should only be handled when dry. Therefore GIB Barrierline® and GIB Fyreline® must be kept dry after delivery and before installation. All GIB Barrierline® and GIB Fyreline® pallets shall be delivered with waterproof covers fitted.

Once installed and in a vertical orientation, GIB Barrierline® plasterboard can be exposed to the elements for up to 12 weeks before the building is closed in.
Once installed and in a vertical orientation, 16mm GIB Fyreline® plasterboard can be exposed to the elements for up to 4 weeks before the building is closed in.

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

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

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

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

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

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

6.6.9 Preparation

Carry out all necessary inspections and preparatory work to the supporting elements in accordance with the GIB® Site Guide prior to installation.

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

Supporting elements and substrates for plasterboard wall linings shall be at least to the requirements of AS/NZS 2589.

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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 of plasterboard linings.

Supporting concrete structures shall comply with NZS 3109, and new concrete must have aged for a minimum of 28 days prior to installation.

Supporting steel structures shall comply with NZS 3404.

The building must be fully enclosed, weathertight and suitably dry before installation of internal GIB® plasterboard ceiling and wall linings commences.

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.

6.7 Timber Framing

6.7.1 Scope

Supply and install timber framing to the floors, walls, roofs, and other timber framed elements, as identified and detailed on the drawings. All aspects of this work shall be in accordance with NZS 3604, product manufacturers' recommendations, and as shown on the drawings and the specification.

6.7.2 Workmanship

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

All work shall be carried out to current best trade practise by experienced and competent tradesmen, familiar with the materials and installation techniques, in accordance with NZS 3604 and as shown on the drawings.

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

6.7.3 Timber Framing

6.7.3.1 Timber Grade and Quality

Unless otherwise noted or specified on the drawings or specification, all framing timber shall be minimum structural grade SG 8 Radiata pine in accordance with NZS 3622.
Framing timber shall be seasoned or kiln dried, and be straight and true and free from wind, warp and distortion, and in lengths suitable for the members required, and shall have a moisture content of between 12% and 18% before installation.
Do not used damaged, faulty or defective materials.

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6.7.3.2 Timber Treatment

All non-durable timber framing shall be appropriately treated against moisture and/or insect decay by treatment plants with recognised quality assurance systems that are administered by the Timber Preservation Council (NZTPC). Treatment of timber and wood-based building products shall be to the requirements of NZS 3602 as an absolute minimum, and all treated timber shall be identified and marked as required.
Carefully manage treated framing during installation to avoid accidental use of timber with a lower performance or durability treatment than that required or specified.

6.7.3.3 Storage & Handling

Check timber framing upon delivery and reject sub-standard or damaged material.
Store timber framing dry under cover, fillet stacked and well clear of the ground, and protect from damage, moisture, and contamination.
Ensure all appropriate personal protection equipment is worn at all times when handling and cutting treated framing.

6.7.3.4 Framing Installation

All timber framing members, including all dwanging, strutting, blocking, bracing etc, shall be sized, setout, fitted and fixed to the requirements of NZS 3604 and as shown on the drawings to accommodate structural loadings, cladding and lining setout and support, and the installation of other building components, fixtures and fittings.

All framing shall be erected without deviation, true to line, level, angle and plumb, and evenly aligned and square, and within the tolerances allowed in NZS 3604 Table 2.1. Framing members accurately cut, lapped, housed, joined, and seated so as to provide full contact over the bearing surfaces.

Temporarily prop, brace, tie, and secure framing members and elements as required until the framing is complete and self supporting. Leave in place for safety purposes as long as required.

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

6.7.3.5 Concrete Separation

Separate timber framing with an approved continuous damp proof course when in direct contact with concrete or masonry. Ensure that the DPC material is compatible with the timber treatment.
Free draining separations to external vertical faces shall be 12mm minimum and as noted on the drawings.

6.7.3.6 Timber Re-treatment

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

6.7.3.7 Edge Notching and Centre Holes

The notching, checking, and boring of framing members shall be in strict accordance with the requirements of NZS 3604.

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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.

6.7.3.8 Framing Protection

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

6.7.3.9 Built-up Framing Members

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

6.7.4 Steel Fixings

6.7.4.1 Fastenings and Connectors

Unless otherwise noted or specified, timber framing fastenings and connectors shall be as specified in the relevant fixing schedules of NZS 3604 or have an equivalent capacity as specified therein. Timber framing connectors and fixings shall comply with the product information as required in NZS 3604 2.4.6, and shall be used and installed in accordance with the manufacturer's recommendations. Pre-drill nail holes in split-prone framing as necessary.

6.7.4.2 Durability of Fixings & Fastenings

Unless otherwise noted or specified, the minimum durability of timber framing fixings and fastenings, excluding nails and screws, shall comply with the durability requirements of NZS 3604 Table 4.1.
Galvanised steel fixing components, excluding nails and screws, shall have galvanised coating masses in accordance with NZS 3604 Table 4.2.
Unless noted or specified otherwise, the materials for nails and screws shall be as given in NZS 3604 Table 4.3.
Steel fixings and fastenings in contact with timber treated with copper based timber preservatives (H3.2 or higher) shall be in accordance with NZS 3604 4.4.4.
Stainless steel nails shall be minimum Grade 304 unless otherwise specified or noted.

6.7.4.3 Bolts and Coachscrews

Unless specified or shown otherwise, all bolted and coach screwed connections shall be M12 or M16 in accordance with the relevant fixing requirements given in NZS 3604.
Bolted and coach screwed connections shall have either a 50mm x 3mm square, or a 55mm x 3mm round, washer to each head and nut for M12 and M16 fixings. Washers shall be of the same material and durability as the bolt or coach screw.

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6.7.5 Wall Framing

6.7.5.1 Plates

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

6.7.5.2 Studs

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

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

6.7.5.3 Lintels

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

6.7.5.4 Sill & Head Trimmers

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

6.7.5.5 Dwangs

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

6.7.6 Roof Framing

6.7.6.1 Rafters

All rafters (including hip, valley and jack rafters) shall be to the dimensions, spacings, pitch, and layout shown on the drawings.

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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

6.7.6.2 Ridge Beams

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

6.7.6.3 Rafters Seated onto a Ridge Beam

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

6.8 Workmanship & Materials

6.9 Pro Clima SOLITEX EXTASANA Wall Underlay

6.9.1 Scope

Supply pro clima SOLITEX EXTASANA wall underlay, together with pro clima system products TESCON EXTORA weathertightness sealing tape, TESCON EXTOSEAL Sill Tape, ORCON liquid adhesive, and ROFLEX pipe and KAFLEX cable penetrations sealing grommets, etc., as noted or required, and install to the outside of the framing as detailed and noted as on the drawings. All aspects of this work shall be in accordance with the pro clima Application Guide.

SOLITEX EXTASANA is CodeMark assured with the NZ Building Code: CodeMark Certificate of Conformity No:GM-CM30032 (Rev E), issued by Global-Mark Pty Ltd.

6.9.2 Installation

Install horizontally with vertical joins over studs, lapped 150mm and taped with pro clima TESCON EXTORA weathertightness sealing tape, horizontal joins weather-lapped 150mm and additionally taped if so noted, carried 35mm minimum below the bottom plate, and stainless steel staple fixed at 300mm centres to all framing members.

Cut and dress into window and door and similar openings and finish weathertight with pro clima TESCON EXTOSEAL Sill Tape along sills, returned up minimum 100mm, and to head corners minimum 100mm in both directions, exactly to E2/AS1 and in accordance with pro clima requirements.

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Provide additional restraint where studs are at more than 450mm centres to prevent insulation bulging into ventilated cavities.

Seal against adjoining concrete or similar with ORCON as noted, ensuring that the adjoining surfaces are stable, dry, and free from dirt, dust, silicon, grease or loose or flaking material (and are not frozen).

Seal against adjoining joinery with TESCON EXTORA weathertightness sealing tape as noted, ensuring that the adjoining surfaces are stable, dry, and free from dirt, dust, silicon, grease or loose or flaking material (and are not frozen).

Ensure that the SOLITEX EXTASANA is not exposed to the weather or UV light for more than 90 days.

6.10 GIB® Plasterboard Linings

6.10.1 Scope

Supply and install GIB® Plasterboard Linings specified herein, as sheet lining materials to the walls, ceilings and other elements identified on the drawings, complete with all accessories required for proper installation, finishing and performance. All aspects of this work shall be in complete accordance with the current GIB® Site Guide and relevant GIB® Systems literature (check www.gib.co.nz, or call 0800 100 442 for the latest editions), and other relevant product manufacturers' recommendations.

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

This specification must be read in conjunction with relevant GIB® Systems specifications - GIB® EzyBrace® Systems, GIB® Fire Rated Systems, GIB® Noise Control Systems, GIB® Aqualine® Wet Area Systems, GIB® X-Block® Systems, GIB® Quietline®, GIB® Intertenancy Barrier System, and GIB® Rondo® Metal Batten Systems - and other specifications sections, as they are interrelated.

6.10.2 Requirements

6.10.2.1 Safety

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

6.10.2.2 Warranty

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:

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- 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.

6.10.2.3 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.

6.10.2.4 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.

6.10.2.5 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.

6.10.2.6 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.

6.10.2.7 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

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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.

6.10.2.8 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.

6.10.3 Performance

6.10.3.1 Limitations of GIB® Plasterboard

GIB® plasterboard products must NOT be:
- used in external situations, or
- exposed to water or be installed in situations where extended exposure to humidity above 90% RH can reasonably be expected, or
- exposed to temperatures in excess of 52°C for prolonged periods.

6.10.3.2 Bracing Performance - Timber Framing

Bracing Performance - GIB EzyBrace® Systems - Timber Framing. To the timber framed elements noted as 'Bracing' on the drawings, additionally comply with all relevant aspects of the GIB EzyBrace® Systems (2016) publication and GIB Ezybrace® Bracing Software according to the specified bracing unit rating, BRANZ Appraisal No.928, and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

6.10.3.3 Fire Rating Performance

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

6.10.3.4 Sound Insulation Performance

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

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6.10.4 GIB® Plasterboard Linings

6.10.4.1 GIB® Standard Plasterboard, 10mm

GIB® Standard Plasterboard, 10mm. A 10mm thick standard plasterboard interior lining. Suitable for use in residential and commercial applications on walls. Manufactured to exceed the requirements of AS/NZS 2588. Refer to the GIB® Site Guide.

Installed Location:

6.10.5 Components & Accessories

6.10.5.1 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.

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6.10.5.2 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.

6.10.5.3 Fire-Resistant Sealant

Fire-Resistant Sealant. Used in accordance with the sealant manufacturer's requirements, and according to the GIB® Site Guide and GIB® System literature.

6.10.5.4 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.

6.10.6 Level of Finish

6.10.6.1 Level of Finish

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

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

6.10.6.2 Acceptance of Levels of Finish

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

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

6.10.7 Co-operation

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

Coordinate with other trades to install GIB® Plasterboard Linings as required, and to ensure that:
- appropriate tolerances and clearances allow for adjacent internal linings, fixtures, fittings, services, etc; and
- the linings correctly allow for proper door and window installation; and
- penetrations for building services are correctly handled to maintain sheet integrity and system performance.

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6.10.8 Workmanship

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

Installation and finishing work of GIB® Plasterboard Linings shall be carried out by qualified and experienced tradespersons, familiar with the specified materials and installation and finishing techniques, in accordance with the GIB® Site Guide and the relevant GIB® product technical literature, and to fully comply with all warranty requirements. Submit evidence of experience on request, e.g. National Certificate of Interior Systems, or Certified Business Member of AWCINZ.

GIB® Plasterboard Linings shall be jointed and finished to the specified Finish Levels in accordance with AS/NZS 2589 and GIB® Site Guide. Make all necessary arrangements for the quality assessment of plasterboard jointing and finishing Finish Levels prior to commencing decorating.

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

Protect surrounding surfaces and areas from jointing compound splashes and sanding dust.

6.10.9 Delivery & Handling

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

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

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

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

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

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

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6.10.10 Preparation

6.10.10.1 General

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

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

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

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

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

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

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

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

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

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

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

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

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

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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.

6.10.10.2 Framing Check

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

6.10.10.3 Work above Ceilings

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

6.10.11 Installation

6.10.11.1 General

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

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

6.10.11.2 Standard Ceiling - Timber Ceiling Battens

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

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

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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.

6.10.11.3 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.

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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.

6.10.11.4 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

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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.

6.10.11.5 Jointing & Finishing

Joint and finish GIB® Plasterboard Linings with GIB® joint and finishing compounds appropriate for the plasterboard type and durability, and the finish level required. Refer to Joint & Finishing Compounds clause.

Carry out jointing and finishing according to the specified Finish Level in accordance with the GIB® Site Guide and GIB® Compounds brochure. Reinforce sheet joints and internal corners with joint tape or paper-faced trim embedded into the Taping (first) Coat.

Sheet joints, internal and external corners, and fastener heads shall be evenly finished with GIB® compounds. When dry, lightly sand to a smooth finish with 220 grit sandpaper or drywall sanding screen to remove tool marks, ridges and other imperfections prior to subsequent sealing and decorating.

6.10.12 Completion

Check that GIB® Plasterboard Linings have been installed in accordance with the GIB® Site Guide and GIB® Systems literature, and are finished to the specified finish levels.

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

Ensure that inspection and assessment of the plasterboard Finish Level has been carried out, and that written agreement stating the completed jointing and finishing is acceptable for subsequent surface sealing and decoration has been provided.

Ensure that the GIB® Installation Sign-Off Certificate has been completed and signed by the Interior Plasterer/Stopper.

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

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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.

6.11 Plytech Plywood Interior Linings

6.11.1 Scope

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

Supply and install Plytech Plywood Interior Linings, as specified herein, to the locations identified on the drawings, complete with all components and accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with Plytech International Ltd technical literature (check www.plytech.co.nz, or email sales@plytech.co.nz, or call 0800 900 905 for the latest editions), other relevant product manufacturers' recommendations, and the New Zealand Building Code.

No substitutions are permitted for Plytech Plywood Interior Linings.

This specification should be read in conjunction with other specification sections, in particular Painting & Decorating, as they are interrelated.

6.11.2 Requirements

6.11.2.1 Safety

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

6.11.2.2 Warranty - Product

Plytech International Ltd Product Warranty - as applicable and according to warranty terms and conditions.
- For Plytech interior lining materials.
- Provide the warranty on the Plytech International Ltd standard warranty form.
- Commence the warranty no later than three days after delivery.

6.11.2.3 Warranty - Installation

Installer's Installation Warranty - according to warranty terms and conditions.
- 2 Years Workmanship Warranty for all Plytech Plywood Interior Linings installed.
- Provide the Installation Warranty on the Installer's Standard Warranty Form.
- Commence the warranty from the date of practical completion of the contract works.

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6.11.2.4 Substitutions

Plytech Plywood Interior Linings materials shall be as specified herein and as indicated on the design drawings. The substitution of the specified Plytech Plywood Interior Lining materials for an alternative brand or material is not permitted under any circumstances.

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

6.11.2.5 Samples

Submit a clearly identified, 300 x 300mm sample of each Plytech plywood material specified for assessment by the Contract Administrator - do not proceed until the samples have been approved.

6.11.2.6 Reserve Material

On completion of the installation works supply and deliver to the Principal/Owner the specified quantity of Plytech Plywood Interior Lining sheets - new, unused and free from damage and defects - for each plywood lining material specified.

Quantity:

6.11.2.7 Producer Statement (other manufacturer's system)

Producer Statement PS1 - where required. Where Plytech Plywood Interior 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.

6.11.2.8 Quality Assurance

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

Ensure that the installation and finishing of Plytech Plywood Interior Linings comply in all respects with the approved design drawings and specifications, and Building Consent.

6.11.2.9 Inspections & Reporting

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

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

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

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

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6.11.2.10 Defective Materials & Work

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

6.11.3 Performance

6.11.3.1 Limitations

Plytech Plywood Interior Linings 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 50°C for prolonged periods.

Except for specific engineering design (SED) ceiling systems, plywood used for ceiling linings shall not exceed 17.5 kg/m².

6.11.3.2 Bracing Performance - Walls

Bracing Performance (structural grade plywood) - Walls. Where noted as 'Bracing' on the drawings, additionally comply with all relevant aspects of NZS 3604: Section 5, Bracing Design, according to the specific bracing demand, and as specified on the approved drawings and bracing schedule.

6.11.3.3 Ceiling Diaphragms

Plywood lined ceiling diaphragms shall comply with the requirements of NZS 3604: Section 13.5; and the minimum plywood panel size shall be no less than 1800mm x 900mm.

6.11.3.4 Producer Statement (other manufacturer's system)

Where Plytech Plywood Interior 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.

6.11.4 Plytech Unfinished Plywood - Walls

6.11.4.1 Plytech Birch Elite - 12mm

Plytech Birch Elite - 12mm. A 9-ply, high quality, appearance grade, interior plywood to EN 636-2. 2440mm long x 1220mm wide x 12mm thick panel, featuring a decorative A-grade Finnish Birch veneer face.

Technical Specification - to EN 636-2:
- Wood Raw Material: European Birch.
- Density: average 700kg/m³.
- Class: Hardwood, non-durable.

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- Glue Bond (EN 314-2): Class 3 Exterior.
- Glue Formaldehyde Emissions: Ultra-Low Emitting Formaldehyde (ULEF).

Installed as an interior wall lining in accordance with Plytech technical literature, to the layout and details shown on the design drawings.

6.11.5 Plytech Unfinished Plywood - Ceilings

6.11.5.1 Plytech Birch Elite - 12mm

Plytech Birch Elite - 12mm. A 9-ply, high quality, appearance grade, interior plywood to EN 636-2. 2440mm long x 1220mm wide x 12mm thick panel, featuring a decorative A-grade Finnish Birch veneer face.

Technical Specification - to EN 636-2:
- Wood Raw Material: European Birch.
- Density: average 700kg/m³.
- Class: Hardwood, non-durable.
- Glue Bond (EN 314-2): Class 3 Exterior.
- Glue Formaldehyde Emissions: Ultra-Low Emitting Formaldehyde (ULEF).

Installed as an interior ceiling lining in accordance with Plytech technical literature, to the layout and details shown on the design drawings.

6.11.6 Ancillary Components & Accessories

6.11.6.1 Fixings

Plywood Fixings. Fixings for plywood interior linings shall be selected and used according to best fixing practices and Plytech recommendations; and shall be appropriate for the lining application and performance, and to suit the supporting frame material. Fixing type and placement (frequency) shall be as specified herein and/or on the design drawings. Refer to Fixing clause.

6.11.6.2 Adhesive

Adhesive. Bostik Gold Ultra - or approved-equivalent - water-based, high-bond strength construction adhesive. Used to adhere plywood interior linings, in accordance with the adhesive manufacturer's requirements.

6.11.6.3 Applied Finishes

Applied Finishes. Make all necessary provisions for the preparation and application of coating finishes by others as required. Refer to Finish Coating clause and to separate specification section Painting & Decorating.

6.11.7 Finish Coating

6.11.7.1 Applied Finishes

The preparation for and application of coatings and finishes for Plytech Plywood Interior Linings shall be carried out in accordance with the coating manufacturer's requirements and AS/NZS 2311. Refer to separate specification section Painting & Decorating.

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6.11.8 Co-operation

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

Coordinate with other trades to install Plytech Plywood Interior Linings as required, and to ensure that:
- appropriate tolerances and clearances allow for adjacent building work and fixtures and fittings; and
- penetrations for building services are correctly handled to maintain sheet integrity and performance; and
- the preparation for and application of applied coatings and finishes is carried out to the required installation sequence and standard.

6.11.9 Workmanship

Where required by the NZ Building Act 2004, it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner. The building shall be completely enclosed and weathertight before plywood lining installation commences.

Installation of plywood interior linings shall be carried out by qualified and experienced tradespersons, familiar with the specified materials and installation techniques, in accordance with the manufacturer's technical literature, and to fully comply with all warranty requirements.

All cutting, drilling and notching of plywood materials shall be carried out using suitable tools and equipment.

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

Take all reasonable measures during installation to protect plywood panels from damage and surface marking likely to affect the appearance of the finished lining.

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

6.11.10 Delivery & Handling

Upon delivery to site, inspect materials and reject those items found to be damaged, defective or substandard, and contact Plytech immediately.

Store plywood panels inside in a weatherproof and well ventilated area; stacked flat and level and clear of the floor on evenly spaced bearers; without sagging or bending, and free from excessive compression - if available, store panels on the supplied delivery pallet. Keep stored plywood panels and accessories clean and dry, and protected from damage, moisture and contamination at all times.

Do not use damaged or defective plywood panels or accessories, or products that are beyond the designated shelf life.

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Should a problem be encountered with any Plytech plywood product, immediately contact Plytech International Ltd on 0800 900 905. Do not continue to use the product that is not performing to specification or expectation. Keep the product in question, and where possible, document numbers and/or manufacturing details.

Handle materials in accordance with the manufacturer's recommendations, and in a manner that prevents damage, surface marking, and does not reduce its performance.

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

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

6.11.11 Preparation

6.11.11.1 General

Carry out all necessary substrate inspections and preparatory work in accordance with the plywood manufacturer's recommendations.

All framing and substrates shall be complete and ready for plywood 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 plywood interior lining installation. Carry out all necessary moisture readings. Do not commence installation until the moisture readings are below the required level.

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 plywood lining 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 plywood lining 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 plywood 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 plywood linings, concrete masonry substrates must below 75% relative humidity prior to installation.

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

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

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.

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.

6.11.11.2 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 given in the relevant standard (NZS 3604 or other).
- 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.

6.11.11.3 Negative Joint Prep

Pre-paint framing, battens or backing situated behind expressed negative joints Matt Black, or other specified treatment/colour, prior to installing plywood linings.

6.11.11.4 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.

6.11.12 Installation

6.11.12.1 General

Install Plytech Plywood Interior Linings to the locations, layout and details shown on the design drawings.

Prior to installation, confirm:
- The specific installation, jointing, fixing details and requirements for the plywood linings - including plywood wall and ceiling bracing systems;
- The locations and construction details of all movement control joints within the plywood linings;
- The locations and details of building services and other fixtures and fittings penetrating the plywood linings;
- Any subsequent site-applied surface coating or finishing treatment for the plywood linings.

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6.11.12.2 Plywood Panels - Walls

Install plywood wall lining panels and panel trim to the layout and details shown on the design drawings. Framing/battens behind expressed negative detail joints must be painted Matt Black (or other specified colour or treatment) prior to plywood panel installation.

Except where shown otherwise on the design drawings, plywood wall panel joints (vertical/horizontal) and panel edges shall be true to plumb and level, straight and accurately aligned. Panel joints shall be as detailed on the drawings, and centred over the supporting frame/batten line.

Except where detailed otherwise, the panel surface between adjoining/adjacent panels shall be flush and even, without abrupt variation across the joint.

Orientate decorative plywood panels with the face veneer grain facing the layout shown, and with site-cut edges hidden from view. Exposed site-cut edges shall be finished to match the factory-finished edges.

Decorative plywood panels of the same wood species and veneer grade shall be placed so that the face veneer colour and grain between adjacent panels is relatively uniform and non-contrasting and is within the permitted variation limit - any variation occurring shall be gradual and within the permitted limits.

Accurately form cut-outs for power outlets, controls, switches, and other cabled and piped services fixtures and fittings that penetrate the wall lining, to the locations and layout shown on the drawings, with cut-outs correctly sized and to the required tolerances.

Fix plywood panels to framing with the specified fasteners and specified spacings. All fasteners shall be uniformly spaced and accurately aligned.

Install all necessary finishing mouldings and trim as detailed to complete plywood panel joint and edge details.

6.11.12.3 Plywood Panels - Concealed-Fix Wall Panel Mounting System

Install the proprietary concealed fix wall panel mounting system and plywood panels in accordance with the manufacturer's requirements to the plywood panel layout and details shown on the approved drawings. Individual plywood panels shall be hung by the panel-mounted panel rails, and mounted to the wall-mounted carrier rails.

Plywood panels shall be concealed-fixed - with panel-mounting rails screw-fixed to the back of the plywood panels at the required set-out according to the wall-mounted carrier-rail set-out.

Except where detailed otherwise, plywood wall panel joints (vertical/horizontal) and panel edges shall be true to plumb and level, straight and accurately aligned. Panel joints shall be as detailed on the drawings.

Except where detailed otherwise, the panel surface between adjoining/adjacent panels shall be flush and even, without abrupt variation across the joint.

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Orientate decorative plywood panels with the face veneer grain facing the layout shown, and with site-cut edges hidden from view. Exposed site-cut edges shall be finished to match the factory-finished edges.

Decorative plywood panels of the same wood species and veneer grade shall be placed so that the face veneer colour and grain between adjacent panels is relatively uniform and non-contrasting and is within the permitted variation limit - any variation occurring shall be gradual and within the permitted limits.

Accurately form cut-outs for power outlets, controls, switches, and other cabled and piped services fixtures and fittings that penetrate the plywood panels, to the locations and layout shown on the drawings, with cut-outs correctly sized and to the required tolerances.

Install all necessary finishing mouldings and trim as detailed.

6.11.12.4 Plywood Panels - Ceilings

Install plywood ceiling lining panels and panel trim to the layout and details shown on the design drawings. Framing/battens behind expressed negative detail joints must be painted Matt Black (or other specified colour or treatment) prior to plywood panel installation.

Except where shown otherwise on the design drawings, plywood ceiling panels shall be parallel to wall lines; with panel joints straight and accurately aligned. Panel joints shall be as detailed on the drawings, and centred over supporting framing/battens.

Except where detailed otherwise, the panel surface between adjoining/adjacent panels shall be flush and even, without abrupt variation across the joint.

Orientate plywood panels with the the face veneer grain facing the layout shown, and with site-cut edges hidden from view. Exposed site-cut edges shall be dressed and finished to match the factory-finished edges.

Decorative plywood panels of the same wood species and veneer grade shall be placed so that the face veneer colour and grain between adjacent panels is relatively uniform and non-contrasting, and is within the permitted variation limit - any variation occurring shall be gradual and within the permitted limits.

Accurately form cut-outs for recessed luminaires, ceiling diffusers and grilles, sprinkler heads, and other cabled and piped and services fixtures and fittings that penetrate the ceiling lining, to the locations and layout shown on the design drawings, with cut-outs correctly sized and to the required tolerances.

Fix plywood panels with the specified fasteners and specified spacings. All fasteners shall be uniformly spaced and accurately aligned.

Install all necessary finishing mouldings and trim as detailed to complete plywood joint and edge details.

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6.11.12.5 Plywood Panels - Ceiling Diaphragms

Plywood ceiling diaphragms shall comply with the requirements of NZS 3604: Section 13.5, and the minimum plywood panel size shall be no less than 1800mm x 900mm.

Install ceiling diaphragm plywood panels and panel trim to the layout and details shown on the design drawings; at right angles to ceiling battens; with sheet end-joints staggered 600mm or as dimensioned on the drawings; and with panel joints touch fitted and accurately aligned, straight and true to line.

Orientate plywood panels with the face veneer grain facing the layout shown, and with site-cut edges hidden from view. Exposed site-cut edges shall be dressed and finished to match the factory-finished edges.

Fix plywood panels to ceiling battens with the specified fasteners spaced at maximum 150mm centres around the diaphragm boundary and plywood sheet perimeter - 10mm from sheet edges - and at maximum 300mm centres to intermediate supports. All fasteners shall be uniformly spaced and accurately aligned.

Decorative plywood panels of the same wood species and veneer grade shall be placed so that the face veneer colour and grain between adjacent panels is relatively uniform and non-contrasting and is within the permitted variation limit - any variation occurring shall be gradual and within the permitted limits.

Accurately form cut-outs for recessed luminaires, ceiling diffusers and grilles, sprinkler heads, and other cabled and piped and services fixtures and fittings that penetrate the ceiling lining, to the locations and layout shown on the drawings, with cut-outs correctly sized and to the required tolerances.

Install all necessary finishing mouldings and trim as detailed to complete plywood joint and edge details.

6.11.13 Completion

6.11.13.1 Completion

Visually inspect installed Plytech Plywood Interior Linings to ensure they have been installed to the required layout and details shown on the design drawings, and are correctly fixed, and all jointing and panel edges are properly finished and accurately aligned etc.

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

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

As required, protect the completed installation from damage and contamination until hand-over as scheduled or directed.

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Leave this work clean and free of surface marking. Cleaning pre-finished plywood shall be done with a damp cloth - do not use harsh, abrasive cleaners or solvents.

Leave adjacent surfaces and finished work clean and free of damage and contamination. Remove all rubbish and excess material from site.

Issue to the Owner a copy of the Plytech International Ltd plywood cladding maintenance requirements.

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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:

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
4389:2015(AS/NZS)	Roof safety mesh

7.3 Pro Clima SOLITEX MENTO Roof Underlay

7.3.1 Scope

Supply and install the specified Pro Clima SOLITEX MENTO roof underlay to the locations identified on the drawings, complete with accessories.
All aspects of this work shall be in complete accordance with Pro Clima SOLITEX MENTO technical literature and installation guide (check www.proclima.co.nz for the latest edition), relevant Pro Clima BRANZ Appraisal(s), other relevant product manufacturers' recommendations, and as shown on the drawings.

No substitutions are permitted for Pro Clima SOLITEX MENTO roof underlays.

7.3.2 SOLITEX MENTO Underlay

Pro Clima SOLITEX MENTO 1000. Self-supporting, non-porous, synthetic building underlay for use under roof claddings. Manufactured from a monolithic TEEE (thermoplastic elastomer ether ester) water-resistant film laminated between two layers of polypropylene micro-fibre cover fleece (top/bottom). 115g/m² nominal weight. Black-coloured top face, grey-coloured bottom face. Available in 1500mm wide rolls.

Suitable for use on timber and steel framed roofs on building situated in NZS 3604 Wind Zones up to, and including 'Extra High'. Can be used with masonry tile, metal tile and profiled metal roof claddings. Maximum 60 day UV stability and outdoor exposure before covering with roof cladding.

Pro Clima accessories include TESCON EXTORA weathertight sealing tape; ORCON adhesive; TESCON NAIDEC double-sided butyl rubber tape; KAFLEX and ROFLEX weathertight sealing grommets.

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SOLITEX MENTO 1000 must be installed horizontally (at right angles to the roof slope) and fixed directly to the top of rafter members, spaced apart at maximum 1200mm centres, and secured with a continuous 45mm x 45mm counter batten fixed directly over each rafter member (along the length of the rafter). Purlins or tiles battens are installed at the required layout on top of the counter battens and fixed through the counter batten to the rafters. The length of the purlin and/or tile batten fixings must be increased by minimum 45mm to ensure correct fastening embedment into the rafter member.

On roof slopes greater than 15° pitch: all side and end laps must be sealed with TESCON EXTORA sealing tape.

On roof slopes between 10° - 15° pitch: all side and end laps must be double-sealed with ORCON adhesive and TESCON EXTORA sealing tape.

On roof slopes less than 10° pitch: SOLITEX MENTO 1000 must be laid on solid sarking; and all side and end laps must be double-sealed with ORCON adhesive and TESCON EXTORA sealing tape.

Do not install SOLITEX MENTO 1000 on roof slopes less than 3° pitch.

Use TESCON EXTORA sealing tape for all underlay repairs.

Installed in accordance with the manufacturer's requirements, BRANZ Appraisal No.876, and as shown on the drawings.

Location: used where necessary to install stage 1 modular units on site. Refer to coordination details.

Pro Clima SOLITEX MENTO 3000. Self-supporting, non-porous, synthetic building underlay for use under roof claddings. Manufactured from a monolithic TEEE (thermoplastic elastomer ether ester) water-resistant film laminated between two layers of polypropylene micro-fibre cover fleece (top/bottom). 150g/m² nominal weight. Black-coloured top face, grey-coloured bottom face. Available in 1500mm and 3000mm wide rolls.

Suitable for use on timber and steel framed roofs on building situated in NZS 3604 Wind Zones up to, and including 'Extra High'. Can be used with masonry tile, metal tile and profiled metal roof claddings. Maximum 90 day UV stability and outdoor exposure before covering with roof cladding.

Pro Clima accessories include TESCON EXTORA weathertight sealing tape; ORCON adhesive; TESCON NAIDEC double-sided butyl rubber tape; KAFLEX and ROFLEX weathertight sealing grommets.

SOLITEX MENTO 3000 must be installed horizontally (at right angles to the roof slope) and fixed directly to the top of rafter members, spaced apart at maximum 1200mm centres, and secured with a continuous 45mm x 45mm counter batten fixed directly over each rafter member (along the length of the rafter). Purlins or tiles battens are installed at the required layout on top of the counter battens and fixed through the counter batten to the rafters. The length of the purlin and/or tile batten fixings must be increased by minimum 45mm to ensure correct fastening embedment into the rafter member.

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On roof slopes greater than 15° pitch: all side and end laps must be sealed with TESCON EXTORA sealing tape.

On roof slopes between 10° - 15° pitch: all side and end laps must be double-sealed with ORCON adhesive and TESCON EXTORA sealing tape.

On roof slopes less than 10° pitch: SOLITEX MENTO 3000 must be laid on solid sarking; and all side and end laps must be double-sealed with ORCON adhesive and TESCON EXTORA sealing tape.

Do not install SOLITEX MENTO 3000 on roof slopes less than 3° pitch.

Use TESCON EXTORA sealing tape for all underlay repairs.

Installed in accordance with the manufacturer's requirements, BRANZ Appraisal No.855, and as shown on the drawings.

Location: used where necessary to install stage 1 modular units on site. Refer to coordination details.

7.3.3 Workmanship

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

All installation work shall be carried out by experienced and competent tradespersons, familiar with the specified products and installation techniques, to fully comply with all Pro Clima NZ Ltd warranty requirements, in accordance with the manufacturer's installation requirements, relevant Pro Clima BRANZ Appraisals and as noted and detailed on the drawings.

Store SOLITEX MENTO underlay and accessories undercover, away from direct sunlight, on a flat, clean and dry surface - with the underlay rolls stored on their side. Keep materials dry, out of direct sunlight and protected from damage, moisture and contamination while stored. Do not use or install damaged or defective materials, or products that are beyond their designated shelf life.

Handle SOLITEX MENTO underlay and accessories in accordance with the manufacturer's requirements and in a manner that prevents damage or deterioration of the material or reduces its performance.

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 SOLITEX MENTO roof underlay as necessary.

All cutting, jointing, fixing, sealing and finishing techniques shall be exactly as recommended by the manufacturer. All work shall be such as to leave a neat, efficient, robust and weathertight installation.

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7.3.4 Preparation

Timber Framing; check all aspects of preparatory works, including but not limited to:
Check that timber framing has been completed as shown on the drawings, complies with NZS 3604, or NZS AS 1720 and AS/NZS 1170 for specific design, and is in accordance with Pro Clima requirements.
Check that the roof framing is structurally sound and securely fastened, true to line and plane, and is correctly trimmed along roof edges and at openings and penetrations, and has a maximum moisture content of 20% at the time of installation, and that there are no projections due to structural bracing and bracketry, etc.
Check that any required safety mesh has been installed correctly and is securely fastened to the roof members.

7.3.5 Installation

SOLITEX MENTO 1000 roof underlay shall be installed with the printed face out, directly on top of rafter members and run horizontally across the roof slope, starting from the gutter/lowest point up to the ridge/highest point, extending 20-25mm into eaves gutters, and with minimum 150mm side and end laps, and lapped such that any water will be shed to the outside, and sufficiently tensioned without any sagging. All end laps must be made over solid framing.

Fix SOLITEX MENTO 1000 to framing with 20mm large flat head clouts, 8-12mm stainless steel staples, self-drilling screws or proprietary underlay fixings spaced at maximum 150mm centres.

On roof slopes greater than 15° pitch: seal all side and end laps with TESCON EXTORA sealing tape.
On roof slopes less than 15° pitch: double-seal all side and end laps with ORCON adhesive and TESCON EXTORA sealing tape.

Finish SOLITEX MENTO 1000 underlay along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Seal edge junctions to framing members and/or under-flashings with TESCON EXTORA sealing tape.
Carefully cut underlay at roof openings at 45° angle away from each corner and tape-seal to framed up-stands, ducts and other services penetrating the underlay in accordance with Pro Clima requirements and as detailed. Seal the underlay around pipes, vents, etc. penetrating the underlay with Pro Clima KAFLEX and/or ROFLEX weathertight sealing grommets.
Separate SOLITEX MENTO 1000 underlay 50mm minimum clear distance from the outer liner of flue stacks.

Repair damaged underlay by covering with new material lapping the damaged area by at least 150mm and seal all edges with TESCON EXTORA sealing tape. Repair small tears and holes with TESCON EXTORA sealing tape.

As detailed on the drawings, secure SOLITEX MENTO 1000 to the roof structure with 45mm x 45mm closure battens, fixed directly over each rafter member, along the length of the rafter, prior to installing the purlins or tile battens at the required layout.

Leave the underlay installation work complete in accordance with the manufacturer's installation requirements and as shown on the drawings, and remove all rubbish from the site.

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SOLITEX MENTO 3000 roof underlay shall be installed with the printed face out, directly on top of rafter members and run horizontally across the roof slope, starting from the gutter/lowest point up to the ridge/highest point, extending 20-25mm into eaves gutters, and with minimum 150mm side and end laps, and lapped such that any water will be shed to the outside, and sufficiently tensioned without any sagging. All end laps must be made over solid framing.

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Finish SOLITEX MENTO 3000 underlay along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Seal edge junctions to framing members and/or under-flashings with TESCON EXTORA sealing tape.
Carefully cut underlay at roof openings at 45° angle away from each corner and tape-seal to framed up-stands, ducts and other services penetrating the underlay in accordance with Pro Clima requirements and as detailed. Seal the underlay around pipes, vents, etc. penetrating the underlay with Pro Clima KAFLEX and/or ROFLEX weathertight sealing grommets.
Separate SOLITEX MENTO 3000 underlay 50mm minimum clear distance from the outer liner of flue stacks.

Repair damaged underlay by covering with new material lapping the damaged area by at least 150mm and seal all edges with TESCON EXTORA sealing tape. Repair small tears and holes with TESCON EXTORA sealing tape.

As detailed on the drawings, secure SOLITEX MENTO 3000 to the roof structure with 45mm x 45mm closure battens, fixed directly over each rafter member, along the length of the rafter, prior to installing the purlins or tile battens at the required layout.

Leave the underlay installation work complete in accordance with the manufacturer's installation requirements and as shown on the drawings, and remove all rubbish from the site.

7.4 Architectural Envelopes Standing Seam Roofing

7.4.1 General

7.4.1.1 General

This section relates to the supply and fixing of ARCHITECTURAL ENVELOPES Standing Seam Roofing, complete with accessories.

During stage 2 (site), this specification is relevant to cladding installed to connect modular units constructed offsite during stage 1.

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7.4.1.2 1.1 Related work

1.1.1

Refer to 4161 UNDERLAYS, FOIL AND DPC for underlays, foils and DPC. Refer to 7411 RAINWATER SPOUTING SYSTEMS for rainwater disposal.

7.4.1.3 1.2 Abbreviations & Definitions

1.2.1

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

1.2.2

The following abbreviations apply specifically to this section:

- BMT Base metal thickness
- NZMRM New Zealand Metal Roofing Manufacturers Inc
- LBP Licensed Building Practitioner

7.4.2 Document

7.4.2.1 1.3 Documents

1.3.1

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

- NZBC C/AS1-AS7 Protection from fire
- NZBC E2/AS1 External moisture
- NZBC G12/AS1 Water Supplies
- AS/NZS 1170.2 Structural design actions - Wind actions
- AS 1397 Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
- AS/NZS 2728 Prefinished/pre-painted sheet metal products for interior/exterior building applications - Performance requirements
- NZS 3604 Timber-framed buildings
- NZMRM COP NZ Metal Roof and Wall Cladding Code of Practice.

7.4.2.2 1.4 Manufacturer/Supplier documents

1.4.1

Manufacturer’s and supplier’s documents relating to this part of the work: Architectural Envelopes Ltd. literature, including: Product Guide Product Technical Statements Design Solutions.

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- NZ Steel: Specifiers and Builders Guide
- NZ Steel: Installers Guide
- Ecoply: Structural Plywood Properties & Application Manual

Manufacturer/supplier contact details Company: Architectural Envelopes Ltd. Web:

www.architecturalenvelopes.co.nz Email: bruce@architecturalenvelopes.nz Telephone: 021 578739

Warranties: A sample roofing warranty showing terms and conditions, and information on maintenance requirements is available from Architectural Envelopes Ltd. Ph 021 578739 or on website www.architecturalenvelopes.co.nz.

7.4.2.3 1.5 Warranty - Manufacturer/Supplier

1.5.1

Provide a material manufacturer/supplier warranty: 15 years (minimum) For Perforation 10 years (minimum) For Coatings - Provide this warranty on the, Architectural Envelopes Ltd. standard, Warranty Plus warranty form. - Commence the warranty from the date of installation.

7.4.2.4 1.6 Warranty - Installer/Applicator

1.6.1

Provide an installer/applicator warranty: 5 years for workmanship.

1.6.2

Provide this warranty on the installer/applicator standard form. - Commence the warranty from the date of installation.

1.6.3

Include a copy of the, Architectural Envelopes Ltd. maintenance requirements with the warranty. Refer to the general section 1237 WARRANTIES for additional requirements.

7.4.3 Requirements

7.4.3.1 1.7 Qualifications

1.7.1

Roofers to be ARCHITECTURAL ENVELOPES recommended Installers

7.4.3.2 1.8 No substitutions

1.8.1

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Substitutions are not permitted to any specified ARCHITECTURAL ENVELOPES products, or associated components and products.

7.4.4 Performance

7.4.4.1 1.9 Fixings, wind

1.9.1

Use the fixings appropriate for the design loads of this site as required by NZS 3604 and AS/NZS 1170.2. Allow for specific loadings at corners and the periphery of the roof, where localised pressure factors apply. Contact Architectural Envelopes Ltd. for advice.

7.4.4.2 1.10 Spread of fire

1.10.1

To NZBC C/AS1-AS7, 5.8.2 a) Exterior Surface Finishes.

7.4.4.3 1.12 Co-ordinate

1.12.1

Co-ordinate to ensure substrate and preparatory work is complete and other work programmed in the order required for access and completion of the roof. Ensure that all necessary members are positioned so that flashings can be fastened at both edges through the roof profile or cladding to the primary structure.

7.4.4.4 1.13 Performance

1.13.1

Install roofing material and associated flashings and accessories to form a weather tight and durable system.

7.4.4.5 2. Products/ Materials

2.1 PLYWOOD SUBSTRATE

2.1.1

15mm minimum plywood sarking (such as Ecoply Roofing Grade F11, DD finish ply) and to NZMRM CoP 11.4.2, Substrate. Refer to ARCHITECTURAL ENVELOPES Product Technical Statement and Ecoply: Structural Plywood Properties & Application Manual for technical information. Or 15mm Multiboard eXBound MGO substrate. See Architectural Envelopes for details.

2.2 ROOF UNDERLAY

2.2.1

Refer to 4161 UNDERLAYS, FOIL AND DPC. Breather, absorbent type underlays to NZS 2295.

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2.3 ALUMINIUM/ZINC ALLOY COATED STEEL, UNPAINTED

2.3.1

Formability G300 steel sheet coated to AS 1397. Coating class: AZ 150.

2.4 PRE-FINISHED ALUMINIUM/ZINC ALLOY COATED STEEL

2.4.1

Formability G300 steel sheet coated to AS/NZS 2728. Coating class: AZ 150

2.5 PRE-FINISHED HOT-DIPPED ALUMINIUM/ZINC/MAGNESIUM COATED STEEL

2.5.1

Formability steel sheet, G300 for roll forming. 2.6 ALUMINIUM 5005 or 5052 2.6.1 Alloy H34 or H36 temper to suit application.

2.7 STAINLESS STEEL

2.7.1 Strip grade 445M2.

2.8 COPPER

2.8.1

Half-hardened commercial finished.

2.9 ZINC

2.9.1

Natural or pre-weathered zinc. Refer to SELECTIONS for surface finish.

2.10 ARCHITECTURAL ENVELOPES PROFILES

2.10.1

Refer to SELECTIONS for profile and pan widths.

2.11 FLASHINGS GENERALLY

2.11.1

To E2/AS1, 4.0, Flashings. Formable grade 0.55mm BMT for galvanized, aluminium/zinc-coated and pre-painted steel, and 0.90mm for aluminium (or 0.7mm for small aluminium flashings) to

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the same standards as the profiled sheets, notched where across profile. Where flashings are required but are not detailed, design to ARCHITECTURAL ENVELOPES's approved recommendations and designs.

7.4.5 Components

7.4.5.1 2.12 Fasteners Generally

2.12.1

Minimum Class 4 and durability not less than the roofing material being fixed. Fastener material to be compatible with the material being fastened.

7.4.5.2 2.13 Fixing clips

2.13.1

Galvanized steel (thermoplastic powder coated or stainless steel for aluminium, copper or zinc) to suit the material and profile of the rigid sheet and location as required by ARCHITECTURAL ENVELOPES. Fix to steel with 25mm x 2.5mm anular groove stainless steel nails.

7.4.5.3 2.14 Fixing screws

2.14.1

Appropriate nails to the roofing material, clip type and the supporting structure, as required by the roofing manufacturer and with a minimum Category 5 durability and not less than the material being fixed

7.4.5.4 2.15 Rivets

2.15.1

Sealed aluminium, minimum diameter 4mm, for use with zinc coated, zinc/aluminium coated or aluminium roofing.

7.4.6 Accessories

7.4.6.1 2.16 Sealant

2.16.1

Neutral curing silicone or MS polymer sealant as required by ARCHITECTURAL ENVELOPES and used as directed. For VM Zinc use only Sikaflex 11FC.

7.4.6.2 3. Execution

Conditions

7.4.6.3 3.1 Inspection

3.1.1

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Inspect the roof framing and supporting structure to ensure that it is complete and fully braced ready for roofing and free from any misalignments or protrusions that could adversely affect the roofing.

7.4.6.4 3.2 Framing timber moisture

3.2.1

For transverse flashings the framing moisture content to be a maximum of 18%. Transverse flashings can be temporarily tacked in place and final fixing done when moisture content is acceptable.

7.4.6.5 3.3 Storage

3.3.1

Take delivery of and accept packs of roofing undamaged on delivery. Reject all damaged material. Stack roofing and accessories on clean, level areas of the site and protect from mechanical damage, wind damage and contamination. Loosely cover dry sheeting, with any wet sheeting fillet or cross stack to allow air to circulate. Remove strippable protective film, if applied, prior to prolonged exposure to sunlight.

7.4.6.6 3.4 Handling

3.4.1

Avoid distortion and contact with damaging substances, including cement. Do not drag sheets across each other and other materials. Protect edges and surface finishes from damage. Use soft, flat soled shoes when fixing and for all other work on the roof.

7.4.6.7 3.5 Separation

3.5.1

Place isolators between dissimilar metals and separate roofing from treated timber and cement based materials. Do not use unpainted lead sheet or copper in contact with or allow water run-off onto galvanized or Zincalume® materials.

7.4.6.8 3.6 Plywood substrate

3.6.1

Install plywood substrate in accordance with CHH's: "Ecoply: Structural Plywood Properties & Application Manual."

7.4.7 Application

7.4.7.1 3.7 Set-out

3.7.1

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Carefully set out the planned layout before fixing commences, to ensure true lines and the correct relationship to module, grid and roof features. Check during fixing to eliminate creep or spread.

7.4.7.2 3.8 End laps

3.8.1

Install in continuous lengths without end laps. Where end laps are necessary, install in accordance with the relevant ARCHITECTURAL ENVELOPES Roofing design details.

7.4.7.3 3.9 Lay roof underlay

3.9.1

Fit and lap roofing underlay where specified over the plywood substrate. Lay underlay horizontally or vertically with a 150mm side lap, over sailing the spouting and/or gutters by 10mm.

7.4.7.4 3.10 Avoid damage

3.10.1

Take care to avoid damaging pre-finished roofing both during fixing. Wear only soft-soled shoes on the finished surface.

7.4.7.5 3.11 Marking and cutting profiled metal roofing

3.11.1

Use ink pen, chalk line or coloured pencil for marking roof sheets prior to cutting. Do not use black lead pencil for marking aluminium/zinc- based products. Cut by shear only, using nibblers or hand snips. Remove all cutting and drilling debris from the roof as soon as possible, ensuring that it does not contaminate gutters or lower surfaces.

7.4.7.6 3.12 Installing profiled metal roofing

3.12.1

Install and fix in accordance with NZ Steel's Installers Guide, NZMRM CoP and to ARCHITECTURAL ENVELOPES current product literature. Use only screws as required by the roofing manufacturer. Fixings and accessories to be colour matched before installation.

3.12.2

Fix sheets in place into 15mm plywood substrate (such as Ecoply Roofing Grade F11, DD finish ply), with breather type roof underlay, using ARCHITECTURAL ENVELOPES clips secured with 2 - 8g 25mm x 2.5mm annular groove stainless steel nails, (clips and screws to be of compatible material to that of roofing). Clips to be fastened to ply at typically 330mm centres using a combination of ARCHITECTURAL ENVELOPES fixed and sliding clips for Single Lock profiles. Layout of fixed and sliding clips is dependent on roof design. Consult ARCHITECTURAL

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ENVELOPES for recommended fixing centres and layout. Make provision for due allowance for dynamic local wind pressures on building and thermal movement in sheet.

3.12.4

Plywood substrate to be installed in accordance with Ecoply: Structural Plywood Properties & Application Manual.

7.4.7.7 3.13 Fixings

3.13.1

Refer to the roofing manufacturer’s literature for fixing details, taking care in the higher wind uplift areas at ridges, edges andverges

7.4.7.8 3.14 Valleys

3.14.1

Form valleys as detailed and required by ARCHITECTURAL ENVELOPES, ensuring the valleys provide a weathertight and neat appearance

7.4.7.9 3.15 Install flashings and cappings

3.15.1

Flash neatly to all penetrations and openings through cladding using secret clip systems avoiding visible fastenings. Flashing design and installation to ARCHITECTURAL ENVELOPES Recommended Solutions.

7.4.7.10 3.16 Flashing penetrations

3.16.1

Flash all penetrations through the roof. Fit pipe flashings with a proprietary collar flashing through pan of ARCHITECTURAL ENVELOPES profile only. Other penetrations flash as detailed and to provide a weathertight installation. Ensure that flashings are set to avoid any ponding of water.

7.4.7.11 3.17 Use of sealants

3.17.1

Select and use sealants only as recommended by the roofing manufacturer. Apply sealant in two narrow beads transversely across flashing intersections, close to the two edges. Avoid exposing sealant on outside surfaces.

7.4.7.12 3.18 Remove filings

3.18.1

Remove metal filings from roofing surfaces at least daily.

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7.4.7.13 3.19 Penetrations and junctions

3.19.1

Check that adjoining walls and parapets are prepared ready for the installation of the roofing. Confirm that openings have been prepared ready for the installation of skylights and other penetrations through the roof. Required work includes the following: - underlay turned up at wall and parapet lines - underlay finished and dressed off to all openings, ready for the installation of skylights and other penetrations - roofing installation neatly finished to all sides of openings and to all wall and parapet junctions - installation of flashings (those required to be installed prior to installation of penetrating elements and/or wall linings).

7.4.8 Completion

7.4.8.1 3.20 Replace

3.20.1

Replace damaged or marked elements. Do not attempt to repair coatings by applying colour match paint to pre-finished surfaces

7.4.8.2 3.21 Leave

3.21.1

Leave this work complete with all necessary flashings, under cloaks, valleys, ridges and hips all properly installed as the work proceeds so the finished roof is completely weathertight.

7.4.8.3 3.22 Remove

3.22.1

Remove trade rubbish and unused materials from the roof and surrounds daily during the work. Sweep down at the end of each day, and clean out spouting, gutters and rainwater pipes on completion of the roof. Remove debris, unused materials and elements from the site. Remove any protective strippable film as soon as possible. Do not leave product exposed with strippable film for more than oneweek.

7.4.8.4 4. Selections

For further details on selections go to www.architecturalenvelopes.co.nz, Substitutions, are not permitted to the following, unless stated otherwise.

7.4.9 Coating system

7.4.9.1 4.1 Coating system - Exposure zone B-C (cat 1-3)

4.1.1

Project Exposure Zone B-C to NZS 3604, C 1-3 to ISO 9223.

Profile/location: Single Lock Standing Seam to all exterior roofs and walls

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Base material: 0.55BMT colorcote

Coating system: Colorcote Magnaflow

Coating colour: Confirm with client

7.4.10 Roofing

7.4.10.1 4.6 Architectural Envelopes - SLSS Single Lock Standing Seam

4.6.1

BMT/material: 0.55mm

Pan width: 300mm to 515mm (standard tray should be 515mm)

Clips: AE Fixed and Sliding

Clips Substrate: 16.3mm Strandsarking

Clip Fixing:

7.4.11 Accessories

7.4.11.1 4.7 Flashings - generally

4.7.1

BMT/material: 0.55BMT colorcote

Coating system: To match roofing

Coating colour: To match roofing

7.4.11.2 4.8 Dektite pipe flashings

4.8.1

Brand/type: Dektite

7.5 Rainwater Goods

7.5.1 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.

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

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(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.

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8 ALUMINIUM 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

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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 Rebated Concrete Block

All windows (and aluminium frame external doors) installation work shall be exactly in accordance with the manufacturer's requirements and as shown on the drawings.
Check concrete block rebate alignment, and that window openings are square and the correct size for fitting tolerances - minimum 5mm installation/packing gap to all sides of opening.
Check that all necessary waterproofing membrane systems have been properly applied and finished to openings, extending over the concrete block rebate into the opening and under the location of the aluminium frame, in accordance with the waterproofing manufacturer's requirements and as shown on the drawings.

Set proprietary plastic shims or packers as necessary and install the frames exactly true and square. Fix frames securely as detailed with due regard for any anticipated movements and for linings, trim etc. Aluminium frames to cover rebate edges by minimum 10mm.

Externally seal between concrete block and head and jambs as detailed with a continuous bead of an approved and suitable flexible sealant – do not seal sills to concrete block and ensure sealant compatibility with any applied finish. Install any required aluminium wind deflection or pressure relief angles to cover the external sealant as detailed.

After frame installation install closed cell backing rods as required and expanding foam air-seal the gap between concrete block and liners.

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8.3.3 Interior Finish

Metal angle finish to concrete walls as shown on details.

8.3.4 Glass Platform

Single Glazed.

8.3.5 Finish

8.3.5.1 Powder Coated Aluminium - Semi Gloss

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

8.3.6 Hardware

Hardware colour matched to Aluminium Joinery.

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

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

8.3.7 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.

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8.3.8 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.

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9 METALWORK

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:

1163:2016(AS/NZS)	Cold-formed structural steel hollow sections
1252.1:2016(AS|NZS)	High-strength steel fastener assemblies for structural engineering - Bolts, nuts and washers - Part 1: Technical requirements
1387:1985(NZS/BS)	Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads
14341:2012(AS/NZS)	Welding consumables – Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels – Classifications
1554.1:2014(AS/NZS)	Structural steel welding - Part 1: Welding of steel structures
1554.6:2012(AS/NZS)	Structural steel welding - Part 6: Welding stainless steels for structural purposes
1554.7:2014(AS/NZS)	Structural steel welding - Part 7: Welding of sheet steel structures
1665:2004(AS/NZS)	Welding of aluminium structures
1734:1997(AS/NZS)	Aluminium and aluminium alloys - Flat sheets, coiled sheet and plate
1866:1997(AS/NZS)	Aluminium and aluminium alloys - Extruded rod, bar, solid and hollow shapes
1897:1976(AS)	Electroplated coatings on threaded components (metric coarse series)
3678:2016(AS/NZS)	Structural steel - Hot-rolled plates, floorplates and slabs
3679.1:2016(AS/NZS)	Structural steel - Part 1: Hot-rolled bars and sections
3679.2:2016(AS/NZS)	Structural steel - Part 2: Welded I sections
3750(AS/NZS):Parts 1-23	Paints for steel structures
4680:2006(AS/NZS)	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles

9.3 Metalwork

9.3.1 Scope

Manufacture and install the Metalwork elements, as specified and identified on the drawings and schedules, to the locations, layout and details shown on the drawings, complete with all components and accessories. All aspects of this work shall be carried out to comply with the requirements of the New Zealand Building Code, relevant Standards, and in accordance with any specific manufacturer's

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requirements, other relevant product manufacturers' recommendations, and as noted and detailed on the drawings and schedules.

9.3.2 Requirements

9.3.2.1 Shop Drawings

Prepare and submit to the Architect/Designer for verification and approval Shop Drawings, issued For Fabrication & Installation, covering the following aspects:

- Fully dimensioned plans, elevations and sections of all elements; to the appropriate scale.
- Assembly jointing and fixing methods and details; to the appropriate scale.
- Jointing details and method of fixing between individual elements/components.
- Methods of installation construction, site assembly connections and all support systems for fixed elements.
- Where required - provision for thermal movement, wind load movement, and seismic movement.
- Installation sequence for large elements.
- Co-ordination requirements with other work and trades.
- A schedule of materials, finishes, fittings, fixings and fastenings, sealants and other accessories.

Shop Drawings are required for the following Metalwork items:

9.3.2.2 Samples

Submit clearly identified material samples of specified finishes requested for approval by the Architect/Designer. Do not commence fabrication until the samples have been approved.

9.3.3 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings prior to installation.
Co-ordinate with other trades as required to manufacture and install Metalwork elements and components to the required locations and tolerances.

9.3.4 Workmanship

All fabrication, assembly and installation work shall be carried out by qualified welders and trade related tradesmen, familiar with the specified products and fabrication and assembly techniques, to the best standard of workmanship under experienced factory supervision and control. All work shall be such as to leave a neat, efficient and robust assembly. Do not use damaged or defective products to fabricate steel metalwork elements and components.

9.3.5 Delivery & Handling

Store Metalwork elements, components and accessories undercover, off the floor and on a flat, level surface. Keep dry and protect from damage, moisture and contamination at all times.
Handle elements without scratching or damaging and in a manner that prevents distortion or

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deformation and pre-finished and vulnerable surfaces from rubbing together. Do no install damaged or defective metalwork elements or accessories.

9.3.6 Fabricated Elements

9.3.6.1 Support Frames

Support Frames. Materials, finish, dimensions, assembly details and installation methods as specified, scheduled and shown on the drawings.

Refer to engineering.

9.3.6.2 Fabricated Brackets

Fabricated Brackets. Materials, finish, dimensions, assembly details and installation methods as specified, scheduled and shown on the drawings.

Refer to engineering.

9.3.6.3 Stairs

Stairs. Materials, finish, dimensions, assembly details and installation methods as specified, scheduled and shown on the drawings.

Unit 1 exterior deck stairs.

9.3.6.4 Balustrades

Balustrades. Materials, finish, dimensions, assembly details and installation methods as specified, scheduled and shown on the drawings.

Custom metal balustrades to exterior stairs and walkway.

9.3.6.5 Handrails

Handrails. Materials, finish, dimensions, assembly details and installation methods as specified, scheduled and shown on the drawings.

Custom handrails to common stairwell.

9.3.7 Steel Materials

9.3.7.1 Structural Sections

Mild Steel Structural Sections. Including mild steel channel, universal beam, universal column and rolled steel joist sections, to AS 3679-300. To the locations and details identified on the drawings and schedules.

9.3.7.2 Hollow Sections

Hollow Sections. Including rectangular and square sections, to NZS 4848.2. To the locations and details identified on the drawings and schedules.

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9.3.7.3 Flat Rolled Sheet

Flat Rolled Sheet. Including cold rolled sheet, hot rolled sheet, electro-galvanised steel sheet and galvanised steel sheet, to AS/NZS 1595, AS/NZS 1594, AS/NZS 1397. To the locations and details identified on the drawings and schedules.

9.3.7.4 Perforated Sheet

Manufactured Perforated Sheet. Perforated mild steel sheet, to the specified perforation pattern. Galvanised sheet, electro-galvanised sheet or black (untreated) sheet. To the locations, layout and details identified on the drawings and schedules.

9.3.8 Fastenings & Accessories

Bolts, Nuts & Washers. Selected to suit the mechanical properties and composition of the parent metal. Bolt type, size and finish shall be selected to suit the assembly and construction and the installed location and environment of the fabricated element.

Screws. Including self-tapping screws, self-tapping and machine screws. Selected to suit the mechanical properties and composition of the parent metal. Screw type, head, gauge and length and finish shall be selected to suit the assembly and construction and the installed location and environment of the fabricated element.

Rivets. Including standard blind rivets, multi-grip rivets, bulb-tite rivets, structural rivets and sealed rivets. Selected to suit the mechanical properties and composition of the parent metal. Rivet type, head style, gauge, length and finish shall be selected to suit the assembly and construction and the installed location and environment of the fabricated element.

Hinges. Including butt hinges (split pin and fixed pin), barrel hinges, pivot hinges, gate hinges, case hinges and piano hinges. Selected to suit the mechanical properties and composition of the parent metal. Hinge type, size, finish and fixings, shall be selected to suit the load, function and operation and the installed location and environment of the hinged element.

Masonry Fasteners. Including split drive pins, nail-in anchors, through-bolts, sleeve anchors, masonry screw-bolts, chemical anchors and drop-in anchors. Selected to suit the mechanical properties and composition of the parent metal. Fastener type, diameter, length and finish shall be selected to suit the installation requirements and environment of the fabricated element.

9.3.9 Fabrication & Assembly

9.3.9.1 General

Ensure that appropriate quality assurance measures are followed during fabrication and assembly of elements.
Check that all materials are free of defects and damage including warping, buckling and fractures prior to manufacture.

All cutting, folding, bending, drilling, welding, grinding and finishing of materials shall be carried out using suitable machinery, tools and equipment and fabrication and finishing techniques in a factory workshop to ensure the accurate fabrication and assembly of elements, without distortion, warp,

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buckling or fracture, to the dimensions and details shown on the approved contract drawings (shop or otherwise).

Take all measures to protect surfaces of the work that will be visible when complete from marking, scratching and other damage likely to affect the quality, finish and appearance of the element. Remove all burrs and sharp edges and form arrised edges.

Corner joints of identical sections shall be mitred unless shown or specified otherwise.

Mechanical joints shall be tight with no visible gaps. Unless shown or noted otherwise, use countersunk screws to mechanically connect cleats to frames. Mastic seal mechanical joints of externally installed metalwork elements, including all mating surfaces, cleats and other fixtures.

All moving parts shall move freely, without binding, to the required operation, functionality and tolerances when the element is fully assembled and installed.

Carrying out any necessary finishing and cleaning requirements and leave surfaces, edges and joints smooth and free of defects and contaminants to the required completion level and in preparation for any specified coating, treatment or finish.

Prior to dispatch and delivery and where necessary; trail assemble multiple components of a single element to the completed/installed arrangement to ensure proper site assembly, fitting and installation.

9.3.9.2 Welding - General

All welds shall be shop welds, unless specified as a field weld, and in accordance with the approved For Fabrication and Installation Shop Drawings.

All weld runs shall be as specified and without a concave surface. Welds shall have proper penetration, with all slag deposits removed as work proceeds and when runs are completed. Welds shall be continuous around joints to prevent the ingress of moisture.

All butt welds are to be full penetration unless specified otherwise on the shop drawings. Butt welds shall be ground flush.
Welding of hollow sections shall incorporate internal sections or backing plates as necessary to complete the specified weld.
Open ended hollow sections shall be capped using 3mm material and seal welded, unless shown otherwise on the approved shop drawings.

Properly prepare materials for welding; ensure that all edges to be welded are dry, clean and free of grease, dirt, rust and other contaminants. Grind off any residue or scale from cutting processes prior to welding.

Tack welds shall only be used for temporary attachment where jigging is impractical and only for permanent attachment where specified on the approved shop drawings as an integral component of the fabrication.

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Protect surfaces of the work that will be visible when complete from weld splatter and other damage likely to affect the quality, finish and appearance of the element.

9.3.9.3 Steel Welding Requirements

Welding methods employed for the manufacture of steel metalwork shall be:

- metal-arc welding for mild steel to AS/NZS 1554.1
- projection welding to BS EN 28167:1992
- seam welding to BS EN ISO 16433:2007
- gas welding
- other methods subject to approval by the Architect/Designer.

9.3.9.4 Aluminium Welding Requirements

Welding methods employed for the manufacture of aluminium metalwork shall be:

- arc welding to AS/NZS 1665
- projection welding to BS EN 28167:1992
- seam welding to BS EN ISO 16433:2007
- gas welding
- other methods subject to approval by the Architect/Designer.

9.3.9.5 Sheet Metalwork

Accurately mark out sheet work square and true to line and as dimensioned with correct allowance for all folds, bends and laps. Use marking methods that do not damage or cause defect to the materials

Cut sheets using mechanical equipment and methods appropriate for the material, leaving edges true, square, and smooth and free from burr.

Use mechanical equipment and methods to form and fold sheets square and true and which leave faces free of deformation, warp and defect. Avoid over-bending and sharp bending of thick sheets - refer to the manufacturer's product specification and recommendations.

Isolate dissimilar materials in close proximity as necessary by painting the surfaces or fitting suitable separating/isolating membranes and gaskets. Place separating strips between metals and treated timber and cement-based materials.

9.3.10 Finish

Powder Coated Metalwork. Metalwork elements, components, and accessories specified on the drawings and schedules as being Powder Coated shall be polyester organic powder coat finished and properly prepared and treated prior to powder coating in accordance with the manufacturer's requirements.

Colour to match window joinery.

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9.3.11 Installation

Check that all necessary building and finishing works have been carried out and completed and that the metalwork elements can be installed.

Install fixed metalwork elements plumb, level and true to line, and to the required tolerances to the locations, layout and details shown on the drawings. Provide all necessary temporary supports, all fixings and fastenings as specified and as required, and apply any required bedding compounds and sealants in accordance with the drawings. Ensure that fixed elements are secure and properly supported. Do not mark or scratch pre-finished metalwork surfaces.

9.3.12 Completion

Check that the metalwork elements have been fabricated and assembled and finished and installed to the required layout and tolerances as specified and shown on the drawings. Check that fixed elements are secure and correctly fastened. Check that all moving parts move freely and without binding to the required operation, functionality. Check for damage and defects and replace/repair as necessary.
Leave the completed works clean and tidy, and remove all rubbish and excess material from site.

Issue to the Owner a copy of any specific maintenance requirements and any manufacturer specific Product Warranty and Installer Warranty for the installed metalwork elements.

Where necessary, provide all Producer Statements.

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10 DRAINLAYING

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:

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
2439.1:2007(AS)	Perforated plastics drainage and effluent pipe and fittings Part 1: Perforated drainage pipe and associated fittings
2566.1:1998(AS/NZS)	Buried flexible pipelines - Structural design
2566.2:2002(AS/NZS)	Buried flexible pipelines - Installation
3500.0:2003(AS/NZS)	Plumbing and drainage - Glossary of terms
3500.2:2018(AS|NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.2:2021 (AS|NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.3:2018(AS|NZS)	Plumbing and drainage Part 3: Stormwater drainage
NZBC E1/AS1	Surface Water
NZBC G13/AS2	Foul Water Drainage

10.3 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.

10.4 Stormwater Drainage

10.4.1 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

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required for the satisfactory completion and performance of the stormwater system. All aspects of this works shall comply with the requirements of the NZ Building Code, related compliance Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the design drawings and schedules. Ancillary work and/or services not specifically mentioned but necessary to complete the installation shall be deemed included.

Install stormwater drains in natural ground, beneath and/or external to the building, for the distances indicated on the drawings. Allow for all inspection openings, bends, branches, manholes, inspection chambers, etc., as required and indicated on the drawings. Unless shown otherwise on the drawings, the stormwater drains shall be connected to the roof and surface stormwater installations, and discharge to the stormwater network.

The stormwater drainage plans are diagrammatic only. Allow for all necessary inspection fittings, cleaning eyes, and traps in accordance with AS/NZS 3500.3 and to comply with the New Zealand Building Code, and as required by the Territorial Authority. Refer to the drawings for the dimensioned locations of roof drainage system rainwater pipes and outlets, and surface drainage outlets, etc.

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

10.4.2 Requirements

10.4.2.1 Safety

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

10.4.2.2 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 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.

10.4.2.3 Work on Public Property

Excavation and reinstatement of public property shall comply with the requirements of the relevant controlling authorities.

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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.

10.4.2.4 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.

10.4.2.5 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.

10.4.2.6 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.

10.4.2.7 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.

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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.

10.4.2.8 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.

10.4.2.9 Co-operation

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

Coordinate with other trades as necessary to install stormwater drains to the required locations and layout.

10.4.2.10 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.

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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.

10.4.2.11 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected stormwater drainage materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional expense to the Principal.

10.4.2.12 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'.

10.4.2.13 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.

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10.4.2.14 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.

10.4.3 Materials

10.4.3.1 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.

10.4.3.2 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.

10.4.3.3 Concrete

Cast insitu concrete used for stormwater drainage installation shall be 20 MPa Normal Concrete complying with NZS 3104. Where specified, used as bedding, capping and surround concrete, and for any cast-insitu concrete elements (to NZS 3104 unless specified otherwise).

10.4.3.4 Reinforcing Steel

Steel reinforcing materials for cast-insitu concrete elements shall comply with AS/NZS 4671. Unless specified otherwise on the drawings, bars shall be Grade 300 deformed.

10.4.3.5 Cement Mortar

Cement mortar shall consist of one part cement and two parts of fine aggregate measured by volume, properly mixed with the minimum amount of clean water necessary to render the mix workable. Do not use cement mortar that has been mixed and left standing for more than one hour.

10.4.3.6 Bedding & Surround Material

Except where specified otherwise, bedding (underlay, side support, overlay) material for PVC-U pipes shall be GAP 7 - General All Passing 7mm - clean, granular, non-cohesive crushed rock or gravel screenings, that is free from organic material and clay, with a moisture content appropriate to the degree of compaction required. If the bedding material is contaminated or an excessive amount of oversized particles are present, the bedding material shall be rejected and not used.

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10.4.3.7 Backfill Material

Except where specified otherwise, backfill material above the pipe embedment layer (150mm above the top of pipe) shall be selected ordinary excavated material that is free from any builder's waste, any organic material, any rocks or hard matter larger than 20mm, and any soil lumps larger than 75mm.

Except where specified otherwise, pipes beneath private roadways and where subject to vehicular traffic - all backfill from the top of the embedment layer (150mm above top of pipe) to the underside of the pavement layer shall be GAP 65 - General All Passing 65mm.

Mechanically compact backfill material in layers not exceeding 300mm to a relative compaction no less than 95% of the NZ Standard Compaction.

Trenches in public footpaths and roads shall be backfilled in accordance with the requirements of the controlling authority.

10.4.4 Trench Excavation

10.4.4.1 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.

10.4.4.2 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 3500.3.

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.

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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.

10.4.4.3 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.

10.4.4.4 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.

10.4.5 Pipe Laying

10.4.5.1 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

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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.

10.4.5.2 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.

10.4.5.3 Steep Gradients

Where the gradient of a stormwater drain pipe exceeds 1:5 (20%), anchor blocks shall be installed at the bend or junction at the top and bottom of the inclined drain, and at intervals not exceeding 3m. Anchor blocks shall be constructed in accordance with AS/NZS 3500.3: Section 7.9.

10.4.5.4 Underground Drains Near & Under Buildings

Protect underground drains near and under buildings against damage in accordance with AS/NZS 3500.3 where the minimum cover specified cannot be provided.

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10.4.5.5 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.

10.4.5.6 Jointing - Solvent Welded Joints

Solvent welded joints shall be used for jointing PVC-U pipes and fittings where rubber-ring jointed fittings are not manufactured. Use only cleaner primers and solvent cements specified by the manufacturer for the application and socket type. Only sockets complying with the relevant Standard shall be installed. Do not use cleaner primers or solvent cements if the 'use by' date has expired. The marking of pipes by scoring is not permitted. All joints shall be watertight and prevent the infiltration of groundwater and the intrusion of tree roots.

Solvent welded joints shall be assembled in accordance with the manufacturer's instructions and generally as follows:
- Solvent welding shall only be carried out in dry conditions above 5°C.
- Ensure the components are dry, clean and free of dust, dirt, grease and surface contaminants during all stages of the jointing process.
- Prior to welding, the components shall be assembled dry and checked for position and alignment to

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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.

10.4.5.7 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: 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.

10.4.6 Manholes

10.4.6.1 Manholes

Construct stormwater manholes to the locations, dimensions, levels and details shown on the drawings, and make all necessary connections to the private stormwater drainage system.

Manholes shall be circular precast concrete manholes, constructed to NZS 4404 and the requirements of the Territorial Authority, and to the dimensions and details shown on the drawings.
- Concrete precast manhole risers: manufactured to the requirements of AS/NZS 4058.
- Concrete precast manhole flanged bases and lids: manufactured to NZS 3109, with a surface finish to NZS 3114.
- Manhole covers and cover frames: cast iron or steel construction conforming to AS 3996 and the requirements of the Territorial Authority.

Connect stormwater drains to concrete precast manholes using purpose-made manhole connectors and pipe stubs/shorts in accordance with the requirements of the Territorial Authority and as shown on the drawings.

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10.4.7 Connection

10.4.7.1 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.

10.4.7.2 Onsite - to Existing Stormwater Drain

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

10.4.8 Testing

10.4.8.1 Stormwater Drains

Test the stormwater installation, including all drains, connections and system components, for water tightness in accordance with the requirements of the Territorial Authority (TA).

Where required by the Territorial Authority, the testing shall be undertaken in the presence of the representative of the TA. Demonstrate to the Contract Administrator and the Territorial Authority that the installation complies with the requirements of the contract documents, related standards and regulatory bodies. Lodge all certificates of approval with the Contract Administrator.

Unless specified otherwise by the Territorial Authority, the testing procedure shall be the Water Test procedure as defined in AS/NZS 3500.3: Section 9. Where appropriate, the procedures in NZBC E1/VM1 may be used as an alternative. The acceptability of other test methods are be subject to the approval of the Territorial Authority and the Contract Administrator.

Provide all necessary plant, equipment and instruments required for the specified testing procedure. All testing and commissioning shall be undertaken by suitably skilled and experienced technicians.

Pressure testing shall be carried out after the pipes have been laid and the bedding material has been placed over the pipes as specified.

Prior to testing ensure that all pipe junctions and inspection eyes are exposed, and pipelines have been flushed and all residual debris cleaned out.

Stormwater manholes shall be free of visible faults, or permeable zones, and jointing or penetration repairs shall be to best trade practice and standards.

Test results shall be recorded clearly on properly formatted test result sheets, and submitted to the Contract Administrator within 48 hours of completion of testing.

Repair or replace any materials or workmanship found to be defective or faulty during testing, and repeat the test until a satisfactory test result is achieved.

Leave the installation watertight and free of defects, and operating to the required performance standard.

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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.

10.4.8.2 Water Test Procedure - to AS/NZS 3500.3

Water test procedure of stormwater drains (non-pressure) - to AS/NZS 3500.3: Section 9.4: The head of water on any section of drain shall not exceed 3m.

The procedure shall be as follows:
- Seal all openings except the top of the section of the below-ground drain to be tested.
- Fill the below-ground drain with water to the highest level in that section.
- 10 minutes for vitrified clay drains; or
- 5 minutes for drains of any other material.

The drain shall be deemed to have passed the test if no make-up water is required.

10.4.8.3 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.

10.4.9 Backfilling

10.4.9.1 Backfilling

Trenches shall be backfilled as soon as possible after the laying, inspecting and testing of the pipeline.

Where required, lay marker tape along the length of the drain, just above the top of the pipe embedment zone, before backfilling.

Trench backfill materials shall be placed on the pipe embedment, and compacted to restore the trench as near as practicable to the normal surrounding ground surface level and reduce the likelihood of subsidence. Backfill material shall be placed in uncompacted layers not exceed 300mm, then mechanically compacted to the required density.

Temporary trench support systems shall be lifted progressively above each layer of backfill to ensure each layer is compacted against undisturbed ground.

Any deficiencies of trench filling exposed by settlement shall be corrected to the required standard.

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10.4.10 Reinstatement of Surfaces

10.4.10.1 Reinstatement of Surfaces

Refer to separate specification section - Siteworks - Reinstatement of Surfaces. Ground and paved surfaces above excavated stormwater drainage trenches shall be reinstated to the standard specified. Reinstatement shall generally achieve a standard equal to or better than the pre-existing situation - in no case will a lower standard be accepted.

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

10.4.10.2 Public Property

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

10.5 Foul Water Drainage

10.5.1 Scope

Supply, install, test and commission new, gravity-flow foul water drains on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for satisfactory completion and performance of the foul water drainage system. All aspects of this works shall comply with the requirements of the NZ Building Code, related compliance Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the approved drawings and schedules. Ancillary work and/or services not specifically mentioned but necessary to complete the work to specified levels of performance shall be deemed included.

Install foul water drains in natural ground, beneath and external to the building, for the distances indicated on the drawings. Allow for all ventilation requirements, inspection openings, bends, branches, manholes, inspection chambers, overflow gully traps, etc., as required and indicated on the drawings. Unless shown otherwise, the foul water drains shall be connected to the building's sanitary drainage system, and discharge to the foul water network.

The foul water drainage plans are diagrammatic only. Allow for all necessary vents, inspection fittings, cleaning eyes, traps and venting in accordance with AS/NZS 3500.2 and to comply with the New Zealand Building Code, and as required by the Territorial Authority. Refer to the drawings for the dimensioned locations of sanitary waste pipes and outlets.

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

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10.5.2 Requirements

10.5.2.1 Safety

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

10.5.2.2 Compliance

Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the foul water drainage works.

The Drain Layer shall be deemed to have allowed for all work associated with the safe and orderly execution of the foul water drainage work, including complying with all Territorial Authority requirements, Building Consent, Building Act, Health and Safety requirements, and all other acts, laws, by-laws and regulations that may affect the execution of the work.

10.5.2.3 Work on Public Property

Excavation and reinstatement of public property shall comply with the requirements of the relevant controlling authorities.

Obtain all necessary approvals and permits from the controlling authorities before commencing work on public property.

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

Before commencing any excavation in or reinstatement work to public footpaths, driveway crossings, roads or other public property, make all necessary enquiries to the relevant controlling authority for their standards for excavation and reinstatement.

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

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

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Remove dirt and contamination deposited on public property to the satisfaction of the controlling authorities.

10.5.2.4 Notifiable Work

Notify WorkSafe NZ of work that is notifiable (particular hazardous work) under the Health and Safety in Employment Regulations 1995, 24 hours before starting the work.

10.5.2.5 Explosives

The use of explosives is NOT permitted.

10.5.2.6 Inspections

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

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

10.5.2.7 Testing

Carry out all necessary testing of the foul water drainage installations, and demonstrate to the Contract Administrator and the controlling Territorial Authority that the installations are watertight and comply with the requirements of the New Zealand Building Code, related compliance Standards, and the design documents.

10.5.2.8 CCTV Inspection

Where required by the Territorial Authority and in addition to pressure testing, CCTV acceptance inspection of new drains shall be carried out in accordance with the New Zealand Pipe Inspection Manual.

All defects identified by the CCTV inspection shall be rectified to the required standard, without cost to the Principal, and the relevant section of pipeline tested and/or inspected again.

10.5.2.9 Redundant Drains

Where an existing foul water drain or part thereof is no longer required, it shall be disconnected from the service at the junction of the live drain or at the property boundary, and be appropriately sealed-off watertight in accordance with AS/NZS 3500.2. Advise the controlling Territorial Authority of the final sealing treatment.

10.5.2.10 Co-operation

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

Coordinate with other trades as necessary to install foul water drains to the required locations and layouts.

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10.5.2.11 Workmanship

Foul water drainage work shall be carried out by qualified and experienced tradespersons, familiar with the required installation requirements, under the direct supervision of a NZ certified Registered Drainlayer, in accordance with AS/NZS 3500.2 in compliance with the New Zealand Building Code, and all local codes and regulatory authority requirements, and the conditions of the Building Consent.

All pipe cutting, jointing, and supporting techniques shall be exactly as recommended by the pipe manufacturer. Pipes, fittings and accessories shall be handled and installed in such a manner that prevents any damage to the component.

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

Carry out all necessary inspections and tests during installation to ensure compliance with the design specifications and regulatory requirements. Provide test result sheets to the Contract Administrator to show compliance has been achieved.

Take all necessary measures during installation to protect the foul water drainage system from damage, and to prevent the entry of:
- extraneous water;
- soil, sand, or rock,
- the contents of any septic tank; or
- any other substance, the discharge or which could impede the operation of the foul water drainage network.

Ensure that any installed drain is adequately protected from any damage and excessive loading during the remaining construction period.

Protect adjacent finished work and surfaces from damage and contamination during installation. Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Drain Layer's expense.

Any associated electrical wiring and prescribed electrical work (by others) shall be carried out by a qualified electrician in accordance with the electrical standards and regulations and the Electrical specification.

10.5.2.12 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected foul water drainage materials and work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional expense to the Principal.

10.5.2.13 Delivery & Handling

Store foul water drain pipes and accessories undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep pipes and accessories out of direct sunlight and protected from damage and contamination at all times.

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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'.

10.5.2.14 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare As-Built Drawings of the foul water drainage system, that accurately record the new and/or modified foul water drainage installation.

Information shall include, but not limited to, type, class and size of all pipes, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, manholes, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

10.5.2.15 Warranties

On completion and before Practical Completion, provide all relevant manufacturer/supplier warranties in favour of the Principal, covering materials, equipment, proprietary products, etc., supplied and installed.

10.5.3 Materials

10.5.3.1 General

Supply and deliver to the site all pipes, fittings, precast manholes, granular bedding material and other materials required for incorporation in the drainlaying work. All drainlaying materials shall be fit for purpose and intended use, new, of good quality and free from defects, and as specified herein and on the approved drawings and schedules.

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10.5.3.2 PVC-U Pipes & Fittings

PVC-U foul water drain pipes and fittings for non-pressure applications shall comply with AS/NZS 1260: 'PVC-U pipes and fittings for drain, waste and vent application'. Installed in accordance with AS/NZS 3500.2, and AS/NZS 2032 or AS/NZS 2566.2.

Pipe Classification:
Class SN4-SN6 - Rubber Ring Joint or Solvent Welded Joint. For domestic and residential applications, and low load areas.
Class SN8-SN10 - Rubber Ring Joint or Solvent Welded Joint. For commercial and industrial applications, and medium load areas.
Class SN16 - Rubber Ring Joint or Solvent Welded Joint. For heavy traffic load areas.

10.5.3.3 Gullies

Gully traps shall be of an approved type and installed in accordance with AS/NZS 3500.2 and the requirements of the Territorial Authority.

Gully traps shall be PVC construction, including dish and lid.

The overflow level of gully dishes shall be set no less than 25mm above paved surfaces, and no less than 100mm above unpaved surfaces.

Provide adequate support to gully riser and dish with compacted bedding or concrete.

Where subject to damage, protect gully traps with a smooth-finished concrete surround, or with 2:1 sand/cement mortar, surrounding the entire gully and separated from the building foundation, in accordance with AS/NZS 3500.2 and as shown on the drawings.

10.5.3.4 Insitu Concrete

Cast insitu concrete used for foul water drainage installation shall be 20 MPa Normal Concrete complying with NZS 3104. Where specified, used as bedding, capping and surround concrete, and for any cast-insitu concrete elements (to NZS 3104 unless specified otherwise).

10.5.3.5 Reinforcing Steel

Steel reinforcing materials for cast-insitu concrete elements shall comply with AS/NZS 4671. Unless specified otherwise on the drawings, bars shall be Grade 300 deformed.

10.5.3.6 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.

10.5.3.7 Bedding & Surround Material

Except where specified otherwise on the drawings, bedding (underlay, side support, overlay) material shall be compacted clean granular non-cohesive material - crushed rock or gravel screenings - of nominal particle size range of 7-10mm with a maximum particle size of 20mm, that is free from organic material and clay, and have a moisture content appropriate to the degree of compaction

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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.

10.5.3.8 Backfill Material

Except where specified otherwise, backfill material above the pipe embedment layer (150mm above the top of pipe) shall be selected excavated material that is free from any builder's waste, any organic material, any rocks or hard matter larger than 20mm, and any soil lumps larger than 75mm.

Except where specified otherwise, pipes beneath private roadways and where subject to vehicular traffic - all backfill from the top of the embedment layer (150mm above top of pipe) to the underside of the pavement layer shall be GAP 65 - General All Passing 65mm.

Mechanically compact backfill material in layers not exceeding 300mm to a relative compaction no less than 95% of the NZ Standard Compaction.

Trenches in public footpaths and roads shall be backfilled in accordance with the requirements of the controlling authority.

10.5.3.9 Marking Tape

Marking tape shall be located just above the top of the pipe embedment zone, and centred over the pipe.

Non-Detectable Marking Tape:
- Non-detectable marking tape shall comply with AS/NZS 2648.1.
- Tape width shall be 100mm minimum.
- Height of message letters shall be 40mm minimum.

Detectable Marking Tape:
- Detectable marking tape shall comply with AS/NZS 2648.1.
- Tape width shall be 100mm minimum.
- Tracer wire shall be stainless steel grade 316 or copper alloy designation 122.
- Tracer wire shall allow at least 25% elongation of the plastic tape before breakage of the wire.
- Height of message letters shall be 40mm minimum.

10.5.4 Trench Excavation

10.5.4.1 Clearing of Surfaces

Where trenches are to be excavated in a grassed area, garden or a berm, the topsoil shall be stripped from the area of the excavation and stockpiled separately adjacent to the trench for use in reinstating the surface.

Where trenches are to be excavated in existing concrete or asphalt paved areas, the paving shall be cut to neat, straight lines, parallel to the trench prior to excavation, with a nominal 100mm trimming allowance either side of the excavation width. The excavation shall be carried out with minimal damage to the existing paved surface.

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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.

10.5.4.2 Excavation

Locate all existing buried services before commencing excavation work in any area.

Excavations for trenches and pits shall be properly executed and supported in accordance with the requirements of AS/NZS 3500.2.

Carry out excavation work to comply with all relevant health and safety regulations and guidelines, including the 'Excavation Safety - Good Practice Guidelines' where appropriate.

Unless specified otherwise, the excavation of trenches shall be taken out by open cut to the levels and grades shown or implied on the drawings. Excavate trenches to the depths which will provide for the appropriate type of bedding.

Trench excavations shall be of sufficient width to allow all operations necessary for the jointing of pipes and placing of the specified backfill. The bottom width of the trenches shall at least the combined measurement of the outside diameter of the pipe plus 200mm - with a minimum clearance of 100mm on each side of the drain barrel. The trench width at the top of the pipe shall not exceed the outside diameter of the pipe plus 600mm unless the pipe in the trench is covered with concrete. The trench above the top of the pipe may be cut wider, either by excavating a wider bench or by battering the trench wall.

10.5.4.3 Shoring

Make all necessary provisions for shoring trench walls to comply with all regulations and for health and safety measures.

Trench shoring materials and equipment must be suitable for the purpose for which they are to be used, of sound quality, and adequate in strength for the particular use.

Shoring shall be placed by experienced operators under competent supervision, and shall not be altered, dismantled, or interfered with except on the instruction of the authorised supervisor.

Ensure no voids are left in the backfill when shoring is removed, and the required compaction density of the backfill is achieved.

10.5.4.4 Dewatering

Take all necessary precautions to keep trenches and pits free from water. Provide all necessary pumps, drainage pipes and other equipments required for dewatering. Install all necessary filtering and detention measures required by the Territorial Authority.

If the bottom of the trench is likely to be adversely affected by rain, remove the final 80mm of excavation as a separate operation immediately before placing the bedding material.

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10.5.5 Pipe Laying

10.5.5.1 Bedding Pipes

Provide a minimum 75mm thick underlay layer of well compacted bedding material for all pipes. A chase shall be excavated in the bedding to accommodate any jointing socket or fitting in the drain. The pipe embedment material shall be laid and compacted so that the pipe is evenly and continuously supported along its length on either side of the pipe, and with an overlay layer minimum 150mm thick.

When trench support systems are used, the bedding material shall be placed and compacted in a manner so that no loss of compaction results from removal of the trench side support systems. The trench support shall be removed in such a way as to ensure that the placing and compaction of the bedding material occurs below the trench supports and directly against the undisturbed ground of the trench walls.

After completion of the jointing and inspection of drain pipes, place and compact the bedding surround material around the pipe to the required depth over the pipe. The material shall be carefully placed around and over the pipe using hand tamping and in a manner that ensures the pipe is uniformly supported all round its perimeter and without voids. Take care during placement and compaction to ensure the pipe is not displaced or damaged.

10.5.5.2 Laying Pipes

Install foul water drains in accordance with AS/NZS 3500.2 to the layout, levels and grades shown on the drawings Drain pipes shall be laid to provide maximum falls, in straight lines and at an even grade, without obstruction to flow, and with full allowance for bedding.

Before installing the pipes, check the bore of each pipe is free from foreign matter and that the pipe exterior and the socket have not been damaged in handling or storage. All pipelines shall be kept clean and free of dirt and debris at all times during installation, testing and commissioning.

PVC-U foul water drain pipes shall be properly jointed (rubber ring joint or solvent welded joint) to produce a watertight seal in accordance with the manufacturer's instructions.

Start laying main drains at the point of outfall and insert junctions for branch drains as the work proceeds. Pipes shall be laid with the least number of bends, in the centre of the trench, in straight lines between bends, and to the grades and locations shown on the drawings.

Install all necessary fittings, including vents, inspection openings and access points, bends and junctions, to the locations shown on the drawings and in accordance with the manufacturer's instructions. Where not specified on the drawings or schedules, fittings for inspection openings, bends, junctions, etc., shall be selected from the PVC pipe system range of products and installed in accordance with the manufacturer's instructions.

Other than precautions against damage by displacement or floating pipes, no bedding surround material or backfill shall be placed until the laying of the drain has been inspected by the Territorial Authority.

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10.5.5.3 Steep Gradients

Where the gradient of a foul water drain pipe exceeds 1:5 (20%), anchor blocks shall be installed at the bend or junction at the top and bottom of the inclined drain, and at intervals not exceeding 3m. Anchor blocks shall be constructed in accordance with AS/NZS 3500.2: Section 3.4.4.

10.5.5.4 Underground Drains Near & Under Buildings

Protect underground drains near and under buildings against damage in accordance with AS/NZ 3500.2 where the minimum cover specified cannot be provided.

10.5.5.5 Concrete Support

Concrete pads used to support foul water drains, gully traps, risers, etc., shall be minimum 100mm thick and in accordance with AS/NZS 3500.2: Section 5.3.

10.5.5.6 Jointing - Rubber Ring Joints

PVC-U drain pipes shall be jointed using rubber ring seals in preference to the solvent welded method - which shall be used where rubber ring jointed fittings are not manufactured. Only use seals and lubricants recommended by the pipe or fitting manufacturer. The marking of pipes by scoring is not permitted. All joints shall be watertight and prevent the infiltration of groundwater and the intrusion of tree roots.

Rubber ring joints shall be assembled in accordance with the pipe manufacturer's instructions and generally as follows:
- Ensure that all components are clean and free of dirt and debris during all stages of the jointing process;
- Ensure the pipe spigot is correctly chamfered and has a clearly visible witness mark to the correct insertion length;
- Clean and generously lubricate with jointing lubricant, especially the chamfer. Do not lubricate the ring groove;
- Where elastomeric seals are required to be fitted, clean and fit the seal, and check the elastomeric seal sits evenly in the housing;
- Apply the manufacturer’s specified lubricant to the end of the spigot and chamfer of the pipe;
- Keep the elastomeric seal and its housing free of lubricant, unless otherwise recommended by the manufacturer;
- Align the pipes so there is no deflection at the joint, then insert the spigot in the socket and push home to the witness mark;
- Hold the socket end firmly during the jointing to prevent previously assembled joints from moving;
- If excessive force is required and/or the jointing process does not comply with the manufacturer's instructions, disassemble and remake the joint.

Field cutting pipes:
- cut the spigot end square and remove all burrs;
- chamfer the cut end of the pipe with a taper of 15° to approx. half the wall thickness, or as specified by the pipe manufacturer;
- as appropriate, witness mark the pipe at the specified insert by the manufacturer.

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10.5.5.7 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.

10.5.5.8 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.

10.5.5.9 Marking Tape

Install marking tape on top of the pipe embedment zone and centred over the pipe before commencing backfilling.

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10.5.6 Connection

10.5.6.1 On-Site - to Existing Foul Water Drain

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

10.5.7 Testing

10.5.7.1 Foul Water Drains

Test the foul water drainage installation, including all drains, connections and system components, for water tightness in accordance with the requirements of the Territorial Authority (TA).

Where required by the Territorial Authority, the testing shall be undertaken in the presence of a representative of the TA. Demonstrate to the Contract Administrator and the Territorial Authority that the installation complies with the requirements of the contract documents, related standards and regulatory bodies. Lodge all certificates of approval with the Contract Administrator.

Unless specified otherwise by the Territorial Authority, the test method shall be the Water Test procedure for non-pressure pipelines as defined in AS/NZS 2302. Where appropriate, the procedures in NZBC E1/VM1 may be used as an alternative. The acceptability of other test methods are be subject to the approval of the Territorial Authority and the Contract Administrator.

Provide all necessary plant, equipment and instruments required for the specified testing procedure. All testing and commissioning shall be undertaken by suitably skilled and experienced technicians.

Pressure testing shall be carried out after the pipes have been laid and the bedding material has been placed over the pipes as specified.

Prior to testing ensure that all pipe junctions and inspection eyes are exposed, and pipelines have been flushed and all residual debris cleaned out.

Foul water manholes shall be tested for watertightness by plugging all pipes and filling with water. After absorption has taken place the water level shall remain constant for thirty minutes.

Test results shall be recorded clearly on properly formatted Test Result sheets, and submitted to the Contract Administrator within 48 hours of completion of testing.

Repair or replace any materials or workmanship found to be defective or faulty during testing, and repeat the test until a satisfactory test result is achieved.

Leave the installation watertight and free of defects, and operating to the required performance standard.

The work shall be deemed incomplete unless all required testing and commissioning has been carried out and has passed the requirements of the testing specification and the Territorial Authority.

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10.5.7.2 Water Test Procedure - to AS/NZS 2302

Water test procedure of foul water drains (non-pressure) - to AS/NZS 2302: Section 7.3.2.
- The pipeline shall be filled with water to a height of not less than 1m above the natural ground level at the highest point of the section being tested, or to the flood level of the lowest sanitary fixture, but not exceeding 5m at the lowest point of the test section.
- The pressure shall be maintained without leakage for at least 15 minutes.
- The source of any leaks shall then be ascertained and any defects repaired.
- The pipeline shall then be retested.

Note: Testing should not be carried out if groundwater is present above the pipeline. If groundwater is present, the test pressure should be increased to compensate for the depth of groundwater at a rate of 10 kPa for every 1m of groundwater depth.

10.5.8 Backfilling

10.5.8.1 Backfilling

Trenches shall be backfilled as soon as possible after the laying, inspecting and testing of the pipeline.

Where required, lay marker tape along the length of the drain, just above the top of the pipe embedment zone, before backfilling.

Trench backfill materials shall be placed over the pipe embedment, and compacted to restore the trench as near as practicable to the normal surrounding ground surface level and reduce the likelihood of subsidence. Backfill material shall be placed in uncompacted layers not exceed 300mm, then mechanically compacted to the required density.

Temporary trench support systems shall be lifted progressively above each layer of backfill to ensure each layer is compacted against undisturbed ground.

Any deficiencies of trench filling exposed by settlement shall be corrected to the required standard.

10.5.9 Reinstatement of Surfaces

10.5.9.1 Reinstatement of Surfaces

Refer to separate specification section - Siteworks - Reinstatement of Surfaces.

Ground and paved surfaces above excavated foul water drainage trenches shall be reinstated to the standard specified. Reinstatement shall generally achieve a standard equal to or better than the pre-existing situation - in no case will a lower standard be accepted.

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

10.5.9.2 Public Property

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

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10.6 Groundwater Drainage

10.6.1 Scope

Supply, install and commission new gravity groundwater subsoil drains on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for the satisfactory completion and performance of the groundwater drainage system. All aspects of this works shall comply with the requirements of the NZ Building Code, relevant Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the approved drawings and schedules.

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

10.6.2 Requirements

10.6.2.1 Safety

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

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

10.6.2.2 Compliance

Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the drainlaying works.

The Drain Layer shall be deemed to have allowed for all work associated with the safe and orderly execution of the drainlaying work, including complying with all Territorial Authority requirements, Building Consent, Building Act, Health and Safety requirements, and all other acts, laws, by-laws and regulations that may affect the execution of the work.

10.6.2.3 Subsoil Drains

Construct subsoil drains in natural ground, in accordance with AS/NZS 3500.3 or as otherwise specified herein, to the locations, layout and details shown on the drawings. As shown on the approved drawings, outlets from subsoil drains shall be connected (downstream) to the stormwater system or constructed to discharge clear of embankments.

The groundwater drainage plans are diagrammatic only. Allow for all necessary pits and connections indicated on the drawings and as required by the controlling Territorial Authority. Refer to the drawings for the dimensioned locations of pits etc.

As necessary, check on site before excavation of trenches commences to ensure the required minimum gradient and cover are achieved.

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The groundwater subsoil drains are intended as a permanent feature of the contract works, and not construction purposes. The use of permanent groundwater subsoil drains for construction purposes during the construction period is not permitted.

10.6.2.4 Inspections

Inspection of the groundwater drainage work shall take place at each of the stages as scheduled in the Building/Resource Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

10.6.2.5 Records & Testing

Maintain records of the type, size, and location and levels of subsoil drains laid for documenting subsequent As-Built drawings.

On completion, demonstrate by flow-testing to the satisfaction of the Contract Administrator that a clear waterway has been provided and the subsoil drains perform the required standard. Any deficiencies in the performance of subsoil drains during the Contract Period or Maintenance Period shall be remedied by the Drain Layer, at no additional expense to the Principal.

10.6.2.6 Co-operation

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

Coordinate with other trades as necessary to install groundwater subsoil drains to the required locations, tolerances and standards.

10.6.2.7 Workmanship

All drainlaying work shall be carried out by qualified and experienced tradespersons, familiar with the specified system design requirements and installation techniques, under the direct supervision of a NZ certified Registered Drainlayer, in accordance with the manufacturer's installation requirements, AS/NZS 3500.3 in compliance with the New Zealand Building Code, and with all local codes and regulatory authority requirements, and as shown on the drawings. Comply with the requirements of the Building Consent.

All pipe cutting, jointing, and supporting techniques shall be exactly as recommended by the pipe manufacturer. Pipes, fittings and accessories shall be handled and installed in such a manner that prevents any damage to the component.

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

Carry out all necessary inspections and tests during installation to ensure compliance with the design documents and the specification is achieved. Submit test result sheets to show compliance with the design drawings and specification.

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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.

10.6.2.8 Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. All rejected groundwater drainage materials and/or work shall be repaired and/or replaced to the satisfaction of the Contract Administrator, without delay and at no additional expense to the Principal.

10.6.2.9 Delivery & Handling

Store ground water darainagel pipes and accessories undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep pipes and accessories out of direct sunlight and protected from damage and contamination at all times.

Do not used damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC/uPVC materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

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

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

10.6.2.10 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare and submit scaled 'As-Built' drawings of the new groundwater subsoil drainage system that accurately record the new and/or modified groundwater drainage installation

Information shall include, but not limited to, subsoil drain pipe type and size, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

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10.6.3 Materials

10.6.3.1 Pipe

Perforated corrugated plastic pipes used in subsoil drains shall comply with AS 2439.1.

Pipe Schedule:
- Subsoil Drains NOT Subject to Traffic Loading: Iplex Novaflo or approved-equivalent pre-perforated single-wall corrugated high-density polyethylene (HDPE) subsoil drainage pipe; pre-fitted with a full-length polypropylene or polyester filter sock.
- Subsoil Drains Subject to Traffic Loading: Iplex Nexus Hi-Way or approved-equivalent heavy-duty pre-perforated double-wall corrugated high-density polyethylene (HDPE) roadworthy subsoil drainage pipe; pre-fitted with a full-length polypropylene or polyester filter sock.

Pipe diameters shall be as indicated on the drawings. Pipes shall be installed only with the use of proprietary components recommended by the pipe manufacturer for all joints, bend fittings, couplers, end caps, etc., and in accordance with the manufacturer's requirements to the locations, layout and details shown on the drawings.

Do not allow pipes and fittings to be exposed to direct sunlight for extended periods of time - refer to the manufacturer's technical literature.

10.6.3.2 Drainage Aggregate

Unless specified otherwise on the drawings, filter and bedding material shall be drainage 40/20 open coarse graded clean (preferably washed) durable aggregate.

10.6.3.3 Geotextile

Unless specified otherwise on the drawings, geotextile fabric shall be Strength Class B, Filtration Classes 1-4, non-woven needle-punched continuous filament polyester geotextile. Installed in accordance with the manufacturer's requirements and as shown on the drawings.

Pins for securing the geotextile shall be of steel, a minimum of 5mm in diameter, and at least 400 mm in length. Other equivalent securing devices may be substituted if recommended by the geotextile manufacturer.

The geotextile shall not be left exposed for more than two weeks without being covered by backfill. Geotextile that becomes torn or otherwise damaged through any cause shall be removed and replaced with undamaged geotextile with a minimum 500mm overlap requirement in all directions.

10.6.4 Trench Excavation

10.6.4.1 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

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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.

10.6.4.2 Excavation

Unless specified otherwise, the excavation for trenches shall be taken out by open cut to the depths shown or implied on the drawings. Excavate trenches to the depths which will provide for the appropriate bedding depth.

Trenches shall be cut in such a manner as will ensure that the geotextile wrapped aggregate subsoil drains, and pipes if included, will be laid true to the depths, grades and lines shown on the drawings.

Unless otherwise specified trenches shall have: a minimum gradient of 1:100; vertical sides; and a minimum depth that will ensure that the invert level shall be not less than 1 metre below finished subgrade level; and a minimum depth of cover over the flexible pipes.

Where a trench has been excavated deeper than necessary, the excess depth shall be filled either with embedment material compacted to achieve a density as near to the original soil density as possible.

Excavated material shall be stacked at least the excavated depth away from the edge of the excavation and the size of the spoil bank shall be limited to avoid any danger to stability of the trench or adjacent buried services.

All spoil shall be managed so as to avoid contamination of the clean drainage aggregate.

Surplus excavated material shall be disposed of as detailed in the Siteworks specification.

Trenches shall be graded to obtain smooth side and bottom surfaces so that the geotextile will not bridge cavities in the soil or be damaged by projecting rock.

10.6.4.3 Dewatering

Take all necessary precautions to keep trenches and pits free from water. Provide all necessary pumps, drainage pipes and other equipments required for dewatering. Install all necessary filtering and detention measures required by the Territorial Authority.

If the bottom of the trench is likely to be adversely affected by rain, remove the final 80mm of excavation as a separate operation immediately before placing the bedding material.

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10.6.5 Laying Subsoil Drains

10.6.5.1 Perforated Corrugated Plastic Pipe Subsoil Drain

Perforated corrugated plastic pipe subsoil drains shall be installed with a geotextile fabric filter to the trench perimeter, and generally as follows:
- Following trench excavation the geotextile filter fabric shall be placed in the trench so as to conform loosely to the shape of the trench. The geotextile shall be laid flat, but not stretched on the soil, and shall be anchored with securing pins.
- Use single full width fabric sections only cut to suit the required trench width, drainage height and fabric overlap. Longitudinal joints in the fabric are not permitted.
- Geotextile fabric end-joints (transverse) shall be overlapped minimum 500mm and shall be anchored with securing pins to ensure this required overlap is maintained.
- Geotextile fabric sides shall be cut to size to provide a minimum longitudinal lap of 300mm on the top of the drainage aggregate when placed to the specified depth.
- Place a 100mm thick bedding layer of drainage aggregate in the base of the fabric lined trench.
- Lay pipe straight and true along the centre of the trench.
- Back fill with drainage aggregate at least 150mm above the pipe - to the depth specified.
- Wrap the sides of the fabric over the top of the drainage aggregate, longitudinally overlapped 300mm minimum.
- Backfill above the geotextile fabric shall be as specified on the drawings.
- Backfill shall be compacted to provide support of not less than that of the adjacent soil.
- As shown on the approved drawings, outlets from subsoil drains shall be connected to the stormwater system or constructed to discharge clear of embankments.

10.6.6 Reinstatement of Surfaces

10.6.6.1 Reinstatement of Surfaces

Refer to separate specification section - Siteworks - Reinstatement of Surfaces. Ground and paved surfaces above excavated groundwater drainage trenches shall be reinstated to the standard specified. Reinstatement shall generally achieve a standard equal to or better than the pre-existing situation - in no case will a lower standard be accepted.

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

10.7 Surface Water Drainage

10.7.1 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.

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This specification should be read in conjunction with other relevant specification sections, in particular Stormwater Drainage and Site Works, as they are interrelated.

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

10.7.2 Requirements

10.7.2.1 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.

10.7.2.2 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.

10.7.2.3 Co-operation

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

Coordinate with other trades as necessary to install surface water drainage facilities at the required locations and layout.

10.7.2.4 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.

10.7.2.5 Stormwater Drains

Stormwater Drains. Refer to separate specification section - Stormwater Drainage.

10.7.2.6 Paved Surfaces

Paved Surfaces. Refer to separate specification section - Siteworks.

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10.7.3 Materials

10.7.3.1 General

Supply and deliver to the site all materials and components required for the satisfactory completion of the surface water drainage works. All manufactured materials shall be fit for purpose, new and free from damage and defects.

10.7.3.2 PVC-U Pipes & Fittings

PVC-U Pipes & Fittings. PVC-U stormwater drain pipes and fittings for non-pressure applications shall comply with AS/NZS 1254: 'PVC-U pipes and fittings for stormwater and surface water applications'. Installed in accordance with AS/NZS 3500.3 and AS/NZS 2032 or AS/NZS 2566.2

Pipe Classification:
Class SN4-SN6 - Rubber Ring Joint or Solvent Welded Joint. For domestic and residential applications, and low load areas.
Class SN8-SN10 - Rubber Ring Joint or Solvent Welded Joint. For commercial and industrial applications, and medium load areas.
Class SN16 - Rubber Ring Joint or Solvent Welded Joint. For heavy traffic load areas.

10.7.3.3 Modular Channel & Grate Drain - Vehicular Traffic, Light Duty

Modular Channel & Grate Drain - Vehicle Traffic, Light Duty. A proprietary, modular channel and grate surface drainage system, as specified, installed to the locations, dimensions, levels and details shown on the drawings in accordance with the manufacturer's requirements, complete with all necessary components and accessories required for satisfactory installation and performance.

Connect installed channel and grate surface drainage system to the stormwater drainage system in accordance with the requirements of the Territorial Authority and as shown on the drawings.

10.7.3.4 Concrete

Except where specified otherwise on the drawings, cast insitu concrete used for surface water drainage installations shall be 20 MPa Normal Concrete complying with NZS 3104.

10.7.3.5 Reinforcing Steel

Steel reinforcing materials for cast-insitu concrete elements shall comply with AS/NZS 4671. Except where specified otherwise on the drawings, bars shall be Grade 300 deformed.

10.7.3.6 Cement Mortar

Cement mortar shall consist of one part cement and two parts of fine aggregate measured by volume, properly mixed with the minimum amount of clean water necessary to render the mix workable. Do not use cement mortar that has been mixed and left standing for more than one hour.

10.7.3.7 Bedding & Surround Material

Granular Material:
- Except where specified otherwise on the drawings, granular bedding and surround material shall be GAP 7 - General All Passing 7mm - clean, granular, non-cohesive crushed rock or gravel screenings, that is free from organic material and clay, with a moisture content appropriate to the degree of

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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.

10.7.4 Excavation

10.7.4.1 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.

10.7.4.2 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.

10.7.5 Connection

10.7.5.1 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.

10.7.5.2 On-Site - to Existing Stormwater Drain

Connect to discharge surface water drainage lines directly to the existing on-site stormwater drainage system in accordance with the requirements of the Territorial Authority and as shown on the drawings.

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11 SPECIALIST SERVICES & EQUIPMENT

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.

11.3 Vacuum Elevators NZ Pneumatic Elevator

11.3.1 PVE37 (two person) elevator

11.3.1.1 General

This specification must be read in tandem with manufacturers documentation. Elevator is to be installed by supplier only. Designed to alternative solution to NZBC D2/AS2:2017 2nd edition, amendment 7 using New Zealand Standard NZS 4334:2012 as per manufacturers PS1.

11.3.1.2 Supplier Info

Vacuum Elevators NZ Ltd.

+64 (9) 947 9805

info@vacuumelevators.co.nz

www.vacuumelevators.co.nz

11.3.1.3 Colour

Black, white, light gray, navy gray, taupe.

To be confirmed by owner.

11.3.1.4 Power Supply

230 VAC - 50 Hz - 5.0 KW

11.3.1.5 Power Supply

230 VAC - 50 Hz - 5.0 KW

11.3.1.6 Size

External cylinder diameter: 933mm

Internal cabin diameter: 820mm

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Internal cabin height: 1,956mm

Entrance way opening: 534mm

11.3.1.7 Lift Capacity

Standard mode4l can carry up to (205kg) - 2 person.

11.3.1.8 Travel Speed

0.15 m/sec.

11.3.1.9 Inside the Car

Automatic interior LED lighting, fan and phone.

11.3.1.10 Electrical Circuits

24 V

11.3.1.11 Lubrication

Not required.

11.3.1.12 Installation

No excavation or shaft required. Elevator rests on floor. Self supported.

11.3.1.13 Door Openings

In-line, 180^{o} and 90^{o}.

11.3.1.14 Structure

Self supporting aluminium and polycarbonate cylinder structure.

11.3.1.15 Safety

Mechanical emergency braking system.

11.3.1.16 Warranty

5 year on parts and labor

11.3.1.17 Installation to Floor

Refer to manufacturers documents for minimum clearances.

Unit 2 floor cut is larger than the unit 1 minimum as unit 2 will have a manufacturer supplied floor penetration ring.

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1. BRANZ Appraisal No.940 - GIB® Intertenancy Barrier Systems for Terrace Homes
2. BRANZ Appraisal No.1163 - SOLITEX EXTASANA® Wall Underlay
3. BRANZ Appraisal No.953 - Kaflex and Roflex Grommets
4. CodeMark Certificate of Conformity No:GM-CM30032
5. BRANZ Appraisal No.838 - TESCON EXTORA SEALING TAPE
6. BRANZ Appraisal No.815 - TESCON EXTOSEAL Sill Tape
7. BRANZ Appraisal No.928 - GIB EzyBrace Systems
8. BRANZ Appraisal No.394 - GIB Noise Control Systems
9. BRANZ Appraisal No.289 - GIB Fire Rated Systems
10. GIB® Fire Rated Systems Specification and Installation Manual
11. BRANZ Appraisal No.855 - SOLITEX MENTO 3000 Roof Underlay
12. BRANZ Appraisal No.876 - SOLITEX MENTO 1000 Roof Underlay
13. BRANZ Appraisal No.838 - TESCON EXTORA SEALING TAPE
14. BRANZ Appraisal No.953 - Kaflex and Roflex Grommets