ARCHITECTURAL SPECIFICATION

MORPETH COURTHOUSE (MUSEUM) IMPROVEMENTS

123 Swan Street
Morpeth NSW 2321

for

Maitland City Council (Infrastructure & Works)

Project No. 18-043
Specification prepared using NATPSEC – Subscriber No. 06043295

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CONTENTS AND ISSUE REGISTER

The following architectural deliverables are attached as separate documents but form an integral part to the Architectural Specification

Deliverable	Issue	Date
18-043 AD05_11 001 Schedule of External Selections	3	21 June 2024
18-043 AD05_2 001 Schedule of Internal Selections	3	21 June 2024
SB000382 - Door Hardware Schedule, by Frost Security Locksmiths		26 August 2019
Height Safety Systems Quotation, by Combined Safety Services – Ref. R190816B		16 August 2019

Where amendments to the Architectural Specification and Appendix deliverables are necessary, the above contents and revision register will be updated accordingly. All amendments will adopt the following format:

Superseded text – ~~single line strike and coloured blue~~
New text - underlined text and coloured red

Amendments will revert to normal black coloured text format should subsequent issues be required.

0121 TENDERING

1 CONDITIONS OF TENDERING

1.1 RESPONSIBILITIES

General
Requirement: Provide a complete genuine tender.

1.2 GENERAL

Status
General: These conditions of tendering do not form part of the contract.

Code of practice
Tendering procedure: Conform with the principles of AS 4120 – 1994: *Code of tendering*.

Interpretation
General: In these conditions of tendering, the word principal has the same meaning as owner and proprietor.

Number of tenders invited
Tenders invited: To be confirmed by MCC.

1.3 PROJECT INFORMATION

Outline description of the works
The proposed improvements to the museum primarily focus on the southern rear yard area behind the southern extents of the existing building, as well as improving general connectivity between exhibition spaces and making provision for compliant disability access to the site and building interior. In addition to these visible improvements, there is a historical part to the design proposal which recognises the past legacy of the site. This work recognises now buried and preserved archaeological artefacts which will be exhibited through careful positioning and selection of external finishes and services. These concealed artefacts include an old underground water cistern which is a domed-shaped structure constructed of masonry elements; the remains of an old masonry dish drain; sandstone footings previously used to support a horse stable structure for law enforcement officers; and an old cesspit adjacent to the discovered horse stable footings.

Practically, the existing rear yard space is currently ill-defined in terms of its public use and is plagued by in-ground and surface level moisture issues affecting the useability of the yard space and building access conditions. These issues affect potential outdoor uses for the site that, if addressed, could enhance museum attendance and more safely protect its contents.

The design proposal can be defined into three key areas:

- A building addition, which provides 2 new accessible unisex toilets complete with baby change tables, a cleaner's store and a passageway that clearly defines a new internal circulation link between the current exhibition spaces in both the east and west building wings. The building addition most importantly makes provision for a step-free access condition into the museum (compliant disabled access is currently not provided).
- A new paved and roofed outdoor learning / external exhibition space to be carefully constructed over the existing sandstone footings of the old horse stables.
- A new external landscape design consisting of both soft and hard elements, as well as heritage interpretation exhibits. The following inclusions are proposed:
    - sealed pedestrian pathways
    - gates and picket fences to secure the rear yard space
    - a continuous masonry wall at the rear of the yard which will also form as a substrate for external exhibits
    - bench seating
    - lawns
    - gardens
    - screened bin enclosure

- new stormwater infrastructure
- new underground hydraulic and electrical services
- special paving treatments over buried archaeological artefacts, and
- miscellaneous visual and audible interpretive installations to convey information to visitors about Morpeth and the site's original use as a courthouse

Description of the site

Location: 123 Swan Street, Morpeth NSW 2321.

Investigations carried out:

- Detail Survey, 3 sheets (Plan Ref. F003 091203), as prepared by MCC's Assets & Infrastructure Planning
- Architect's site record measured drawings (drawings REF1, REF2, REF3A, REF3B, REF4 and REF5)
- Excavation Report, as prepared by Archaeologist Sue Singleton, October 2014.
- Statement of Heritage Impact (SoHI), as prepared by Placemark Consultants, 29 August 2019.
- MCC's record of hazardous materials. Refer to MCC Asbestos Register Update 2015, as prepared by Environmental Planning Professionals, November 2015. Report is available on request.
- Geotechnical Investigation Report for Morpeth Museum Refurbishment, as prepared by Cardno Geotech Solutions March 2013 (Cardo Ref: 1661-002/0). This report was prepared for previously planned works in 2013 to provide results of for boreholes underneath the existing building and is available on request for reference.

Warning: Lead paint layers should be assumed as present where new works are to be undertaken. The Contractor is to allow for testing prior commencing works where paint layers will be disturbed.

Tender documents

The tender documents comprise all of the deliverables as listed in the Invitation to tender correspondence, inclusive of the conditions of tendering:

Security: Do not disclose to third parties tender documents marked with a classification such as Restricted, Confidential or Secret, except with prior written approval of the principal and subject to the conditions imposed.

1.4 FURTHER INFORMATION

Contact person

Inquiries: Refer inquiries to the following:

- Name: Ben Griffin.
- Position: Senior Project Architect – MCC Infrastructure & Works.
- Telephone: (02) 4934 9638
- Email: Ben.Griffin@maitland.nsw.gov.au

Examination

General: A full set of documents is available for examination, which may be arranged through the contact person.

Site inspections

General: Information on dates and times at which the site will be available for inspection can be obtained from the contact person.

Attendance

General: All tenderers - along with their preferred project critical subcontractors - must attend a compulsory site inspection prior to the submission of tenders.

Addenda/Clarifications

General: Written addenda or tender clarifications issued by the principal or architect are the only recognised explanations of, or amendments to, the tender documents.

1.5 PREPARATION OF TENDERS

Tender form

Form: Submit the tender on the *Tender form* provided.

Addenda or tender clarifications: Confirm on the *Tender form* that allowance has been made of each addendum and any extensions of the tender period.

Name and address of tenderer: State the following:

- If an individual, the name in full and address of the individual.
- If an unincorporated body, the registered business name and address of the body and the name in full and address of each member of the body.
- If a company, the name, ABN and registered office address of the company.

Address for service of notices: Include on the *Tender form* an address for service of notices for the purpose of this tender and any subsequent contract arising out of this tender.

Execution: Sign the *Tender form* or, if a company, comply with the relevant provisions of the Corporations Law and regulations.

Scope

Scope: Tender for the whole of the work described in the tender documents unless the tender documents provide otherwise.

Exclusions: If unable to tender on parts of the works, inform the contact person in writing as soon as possible, defining the relevant parts and giving reasons.

Completion

General: Complete in full the *Tender form* and other required documents.

Alterations: Do not alter or add to tender documents except as may be required by these conditions of tendering.

Selected subcontracts

General: Submit with the tender the identity of subcontractors proposed for selected subcontract work.

Alternatives

General: Alternative proposals may be submitted with the tender for consideration, but the following must also be submitted:

- A conforming tender that complies with the tender documents.
- A detailed description of the alternative stating clearly how it differs from the requirements of the tender documents whilst complying with the principal's commercial and technical objectives.

Alternative time for practical completion: Consideration will be given to alternative tenders which offer different times for practical completion.

Alternative working hours and working days: If the tender includes an allowance for work at times other than the working hours or working days prescribed in the tender documents, submit the working hours and days proposed.

Prequalified subcontractors

Nominated works: Select a subcontractor from the **Prequalified subcontractor schedule**.

Prequalified subcontractor schedule

Works	**Subcontractor**
Roof access safety system	Combined Safety Systems
Door hardware and componentry	Frosts Security Locksmiths & Architectural Hardware

Preferred suppliers

Nominated works: Select a subcontractor from the **Preferred suppliers schedule**.

Preferred suppliers schedule

Works	**Suppliers**

Evidence of contractor's registration or licensing

Submit with the tender evidence of registration or licence.

Supporting costing information

Tenderers are required to provide an itemised trade summary as part of their tender. The trade summary will also be utilised at the commencement of construction, to assist in the accurate assessment of monthly progress claims and to ensure that the contractor will be properly paid for all works completed.

The trade summary shall be itemised in the following format:

1. Preliminaries
2. Demolition
3. Concrete & Paving
4. Civil Works & Drainage
5. Termite Protection
6. Brickwork & Blockwork
7. Metalwork and Carpentry
8. Cladding
9. Roofing
10. Roof Access Safety
11. External Waterproofing Membranes
12. Windows, Glazed Doors & Hardware
13. Internal Doors and Hardware
14. Internal Linings
15. Floor Finishes
16. Painting
17. Tiling & Waterproofing
18. Internal Fixtures & Equipment
19. Electrical, Dry Fire, Security, Audio-Visual and Communications Services
20. Hydraulic Services
21. Landscaping, including fences, gates, bench seats, soft plantings and garden edging

The relevant trade summary items listed above shall be broken down and/or repeated where required in to the following work stages:

- Stage 1: Landscaping Works & Miscellaneous Items (refer to Drawing A090: Plan Illustrating Stage 1 Works)
- Stage 2: Horse Stable Roof Works
- Stage 3: Building Addition (Amenities, Alterations & Additions, including Passageway and Entries)

Design and documentation

Undertake and submit the following design and documentation work if appointed as the successful building contractor: Detailed design of aluminium framed glass roof in compliance with AS 1288.

Cost: The cost of this work will not be reimbursed.

Time for submission: TBA.

Program

General: Submit a construction program in the form of a preliminary bar chart and network diagram, showing the following:

- Commencement date of construction/contract period.
- Sequence of work.
- Periods within which various stages or parts of the work are to be executed.
- Critical paths of activities related to the work.
- Allowance for holidays.
- Restraints imposed by the contract documents.
- Significant milestones including separable parts, if any.
- Activity inter-relationships, including those activities to be undertaken by subcontractors and suppliers, both on and off site.
- External dependencies including provision of access, document approvals and work by others.

- The estimated value of work completed for each month.

Time for submission: At tender submission.

Method statements

Submit method statements describing proposals any works to the proposal that is either excluded or varies from the contract documentation.

Time for submission: [complete/delete]

Attestation of probity

Conflict of interest

Quality system

Tenderer's submission: Submit a statement of quality control resources.

1.6 SUBMISSION OF TENDERS

Lodgement

Procedure: As required by MCC.

Late tenders

Late tenders submitted by prepaid post or facsimile may be considered, if the principal is satisfied that in the ordinary course of post or transmission they would have been received by the date and time for closing of tenders.

Late tenders delivered by hand or via email may be considered if the principal is satisfied that under normal circumstances they would have been received by the date and time for closing of tenders and that the delay was beyond the control of the tenderer.

Other: Late tenders sent by other forms of delivery or transmission will not be considered.

Closing of tenders

Date: TBA by MCC.

Time: TBA by MCC.

Place for lodgement

Tender box location: TBA by MCC.

Address for postal tenders: TBA by MCC.

1.7 PROCEDURES AFTER TENDER PERIOD

Tender validity period

General: Unless withdrawn, tenders must remain valid from the date and time for closing of tenders, for a period of 60 days. This must be clearly stated on the tender submission. [complete/delete]

Public opening of tenders

Date: TBA by MCC.

Time: TBA by MCC.

Acknowledgment of tenders received

General: MCC will promptly notify the participating tenderers. Tenderers shall not consider this acknowledgement to be advice of which tender, if any, will be accepted.

Evaluation of tenders

General: In evaluating the tenders, the principal may take into consideration the following:

- Conformity with tender documents.
- Capital cost compared with estimated cost.
- Construction period and program.
- Proposed use of local subcontractors and suppliers.
- Proposed alternatives following assessment of complying tender in the first instance.
- Maintenance and running costs.
- Quality of prototypes.
- Proposed methods.
- Quality assurance.
- Conflicts of interest.
- Life of proposed equipment.

- Standardisation of proposed equipment.
- Value for money.
- Tenderer's resources.
- Tenderer's current commitments.
- Tenderer's previous performance.
- Industrial relations and safety records.

Qualifications: Tenders containing unauthorised alterations, additions or qualifications may be rejected by the Principal.

Unpriced items: Costs relating to items not priced will be assumed to have been included elsewhere in the tender.

Correction of errors in tenders

Permitted:

Tenderers are given the choice of confirming or correcting genuine errors in the tender offer. The choice, and corrections, shall all be promptly submitted in writing. Where the tenderer confirms the offer, the offer shall be endorsed to the effect that all rates or prices (except preliminary items and provisional sums) are reduced or increased in the same proportion as the corrected total.

Arithmetical evaluation of tenders are confidential.

Additional information

General: If required, submit additional information, by the stipulated date and time, to allow further consideration of the tender before any tender is accepted. Failure to meet this requirement may result in the tender being rejected.

Confidentiality

General: Treat as confidential any information provided after the tender period.

Acceptance of tender

Non-acceptance: The principal is not bound to accept the lowest or any tender, or to give reasons.

Acceptance: A tender is not accepted until notice in writing of acceptance is delivered by one of the following methods:

- Handed to the tenderer.
- Sent by prepaid post to, or left at, the address for service of notices stated in the Tender form.
- Transmitted by email to the tenderer's preferred email address.

Partial acceptance: Tenders may be accepted for the whole of the work or for the works in any of the 3 nominated Stages (refer to above).

Formal instrument of agreement: Required.

Period between acceptance of tender and possession of site

Anticipated maximum period: TBA by MCC.

2 TENDER FORM (AVAILABE AS A SEPARATE MS WORD FILE ON REQUEST)

Name of principal: Maitland City Council (Infrastructure & Works)
Name of project: Morpeth Courthouse (Museum) Improvements
Tender – lump sum I/We tender to perform the work for the above project as described in, and in conformance with, the tender documents referenced in the *Conditions of tendering* and in conformance with the attached *Schedule of rates/Contract sum analysis*/priced *Bills of quantities* and for the lump sum (which includes specified provisional sums) of
…….. including GST (sum in words and figures)
The contract duration will be ……. weeks from the date of site possession. This tender remains open for consideration for …… 60 days from the date and time of closing of the tender period. I/We acknowledge the receipt of addenda numbered ……. during the tender period.
Name of tenderer
ABN/ACN

Telephone
Email
Tenderer's address or registered business office address
Address for service of notices
Tenderer's bank and branch address
Execution if tenderer is an individual or unincorporated body
Tenderer's signature
Witness' signature
Execution if tenderer is a company The common seal of the tenderer was affixed in conformance with the Articles of Association
Director's signature
Secretary's signature
OR
Authorised officer's signature
Witness' signature
Date of tender

0131 PRELIMINARIES

1 GENERAL

1.1 GENERAL

General conditions

Contract: MCC's General Conditions of Contract Amended from AS4000-1997 (inc. Amendments 1, 2 & 3). This is to be confirmed by the Superintendent prior to close of tenders, particularly in relation to smaller staged components of the project.

Interpretation

General: The words principal and contract administrator have the same meaning, respectively, as owner and architect, unless the context requires otherwise.

Cross reference: The clause **GENERAL**, **INTERPRETATION**, in *0171 General requirements*, also applies.

1.2 THE SITE

Site induction

The Contractor shall be responsible for communicating to all subcontractors, all suppliers and all visitors to the site that they are entering the site of a listed heritage item, located within Morpeth's Heritage Conservation Area. At the same time that the Site Safety Induction is carried out, dated and signed a Heritage Significance Awareness Induction must also be read to the inductees that informs them of their individual responsibility to protect the heritage significance of the former courthouse site, its structures and archaeology. All inductees share the responsibility to protect the original built fabric of the place and to notify the Contractor's site manager of anything that might be an artefact or relic. The Heritage Significance Awareness Induction is also to be dated, signed and filed with the Safety Induction . This is to be made available to the Superintendent at each project / site meeting.

Site restrictions

Site limitations: Comply with the following restrictions on the use of the site: To be agreed with the Principal prior to the commencement of contract works.

Access: Access onto and within the site, use of the site for temporary works and constructional plant, including working and storage areas, location of offices, workshops, sheds, roads and parking, is restricted to the following areas: To be agreed with the Principal prior to the commencement of contract works.

Archaeological artefacts

Known artefacts: The design has been prepared to preserve, maintain and not disturb the following known buried archaeological artefacts:

- Masonry water cistern
- Masonry dish drain
- Sandstone footings for old horse stables
- Remains of old cesspits

Do not disturb known artefacts: The new works have been setout to preserve and maintain the known buried archaeological artefacts to the best of intentions with limited setout information of the buried artefacts known. Should it transpire that the dimensional set of new work would trigger disturbance of the buried archaeological artefacts stop work at the localised area in question and seek advice from the Superintendent prior to recommencing work in the area.

Procedure for unknown artefacts: Should additional historical artefacts be uncovered or disturbed during the course of the contract works, stop work at the localised area and within its vicinity and seek advice from the Superintendent prior to recommencing work in the area.

Secure areas

Designated secure areas: To be agreed with the Principal prior to the commencement of contract works.

Conditions of entry: To be agreed with the Principal prior to the commencement of contract works.

Entry permits: Make available, to persons entering designated secure areas, valid entry permits. Make sure these persons comply with conditions of entry.

Personnel: At least 10 working days before entry is required, submit the full name, address, and date and place of birth of persons required to enter designated secure areas.

- Purpose of submission: Review.

Occupied premises

General: For the parts of the site and building that will remain occupied during the contract works,:

- Allow occupants to continue in secure possession and occupancy of the premises for the required period.
- Maintain safe access for occupants.
- Arrange work to minimise nuisance to occupants and for their safety.
- Protect occupants against weather, dust, dirt, water or other nuisance.

Proposals: Submit details of proposed methods.

- Purpose of submission: Information only.

Protection of persons and property

Temporary works: Provide and maintain required hoardings, barricades, guards, fencing, shoring, temporary roadways, footpaths, signs, lighting, watching and traffic management.

Accessways, services: Do not obstruct or damage roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Determine the location of such services.

Property: Do not interfere with or damage trees and property which are to remain on or adjacent to the site, including adjoining property encroaching onto the site.

Control of runoff stormwater: Refer to notations provided on Drawing A003, and comply with MCC's erosion and sediment control measures.

Northumberland Street frontage: Protect and maintain in their current condition the following items:

- Kerb and gutter (heritage significant stonework).
- Driveway crossing.
- Footpath paving units (other than those which are to be disturbed and re-laid as part of the works).
- Street trees.
- Authority services and infrastructure.

Protec

Rectification

Accessways and services: Rectify immediately any obstruction or damage to roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Provide temporary services whilst repairs are carried out.

Property: Rectify immediately any interference or damage to trees and property which are to remain on or adjacent to the site, including adjoining property encroaching onto the site.

Existing services

Service to be continued: Repair, divert or relocate service, as documented.

Trenches: If the existing service crosses the line of a required trench or will lose support when the trench is excavated, provide permanent support for the existing service.

Redundant services: Remove redundant parts and make safe.

Interruption to services: Minimise the number and duration of interruptions.

Proposals: Submit proposals for action to be taken to existing services before starting this work.

- Purpose of submission: For review.

Adjoining property

Notice: At least 10 working days before commencing work, submit to owners and occupants of adjoining property written notice of intention to commence work and an outline description of the type and extent of work.

Conditions for work on adjoining property: To be agreed with the Principal prior to the commencement of contract works.

Revealed encroachments: If the works reveal unknown encroachments of adjoining property on to the site or of existing site structures on to adjoining property, immediately seek instructions.

Records: For each property described in the **Adjoining properties to be recorded schedule**:

- Inspect the property with the architect and owner and occupant of the property, before commencement of work.
- Make detailed records of conditions existing within the property, especially structural defects and other damage or defacement.
- Arrange for at least 2 copies of each record, including drawings, written descriptions, and photographs, endorsed by the owner and occupant of the property, or their representatives, as evidence of conditions existing before commencement of work.

Endorsed copies: Submit one endorsed copy of each record. Keep the other endorsed copy on site.

- Purpose of submission: Information only.

Adjoining properties to be recorded schedule

Title	Owner	Description
No. 4 Northumberland Street Lot 1 DP 723894	Private	Single Storey Residence
No. 121 Swan Street Lot 2 DP 526098	MCC	Public Park, including amenities, playground equipment and street furniture
Northumberland Street property frontage	MCC	Stone kerb and gutter Footpath Vehicular crossing Bitumen roadway
Swan Street property frontage	MCC	Stone kerb and gutter Footpath Bitumen roadway

Dilapidation survey and report

Procedure: The Contractor is to walk the site and surrounding areas around the site with the Principal and Superintendent to observe and record all noticeable defects in the built environment.

Requirement: The Contractor shall prepare a written report complete with referenced photographs and submit final report to the Superintendent for project records.

Scope: The dilapidation survey shall include the former courthouse building itself (where are adjacent to the building fabric, the condition of the surrounding street network (Northumberland Street) where access to the site can be achieved. The condition of the existing stone kerb and gutter, along with any other notable heritage significance features shall also be recorded. The Contractor should note that the museum site and surrounding areas are within Morpeth's Heritage Conservation Area

Reference: The dilapidation report will be utilised as a reference document for review prior to practical completion. Any defects observed at this time, which are deemed to be attributed to the result of the contract works will be required to be rectified by the Contractor prior to practical completion

1.3 CONSTRUCTION PLANT

Access roads

Owner's existing roads: Use only designated roads.

Parking

Location: On street parking only available for use.

Use of existing services

General: Existing services may be used by the Contractor as temporary services for the performance of the contract. The Principal will pay for the Contractor's usage.

Contractor's site office

General: Provide a weathertight site office for use before major site operations are started and as follows:

- Pay charges for services.
- Maintain in good order and in clean condition, with secure access, for duration of the work.
- Obtain permission for removal.
- Remove on completion.

Protective clothing

Protective clothing: Make available protective clothing for the use of visitors, as follows:

- Safety helmets: To AS/NZS 1801, Type 1.
- Certification provider: Submit product certification from an organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Number of helmets: 2.

Temporary fence

Requirement: Provide to safely secure rear yard space from unauthorised access.

Project signboards

General: Provide project-specific signboards and as follows:

- Locate where directed.
- Maintain in good condition for duration of the work.
- Obtain permission for removal.
- Remove on completion.

1.4 SITE SAFETY PLAN

As required by law, the Contractor shall put in place procedures to ensure the safety of workers and visitors to the site. The Contractor shall prepare a Site Safety Plan or equivalent detailing safe work method statements required for specific activities. A copy of the Site Safety Plan is to be kept on site at all time during the contract works.

1.5 PROJECT CONTACTS

Key personnel and consultants

Company/Organisation	Role	Contact Person	Phone Numbers
MCC (Client)	Senior Project Architect Infrastructure & Works	Ben Griffin	(02) 4934 9638 0428 233 616
MCC (Assets & Infrastructure Planning)	Surveyor		(02) 4934 9700
MCC (Infrastructure & Works)	Structural Engineer	Scott Warner	(02) 4934 9639
MCC (Infrastructure & Works)	Civil Engineer	Chris Pinchen	(02) 4934 9837 0409 813 350
donn architects	Architect	Peter Donn	(02) 4967 2806 0407 010 319
Placemark Consultants	Heritage Architect	Mark Fenwick	0400 381 575
Eureka Heritage	Archaeologist	Sue Singleton	(02) 6778 7118
EPA	Electrical Services Consultant	Matthew Sutic	(02) 4967 5999 0429 687 688
McCallum PFCA	Hydraulic Services Consultant	Callum Baillie	(02) 4946 2633 0417 691 113

1.6 BUILDING THE WORKS

Surveys

Setting out: Refer to architectural drawings.

Survey marks

Definition: A survey peg, bench mark, reference mark, signal, alignment, level mark or any other mark used or intended to be used for the purpose of setting out, checking or measuring the work.

Care of survey marks: Preserve and maintain the principal's survey marks in their true positions.

Rectification: If survey marks are disturbed or obliterated, immediately rectify.

Safety

Accidents: Promptly notify the architect of the occurrence of the following:

- Accidents involving death or personal injury.
- Accidents involving loss of time.
- Incidents with accident potential such as equipment failure, slides and cave-ins.

Accident reports: Submit reports of accidents.

- Purpose of submission: Information only.

Contractor's representative

General: Must be accessible, and fluent in English and technical terminology.

Subcontracting

General: Submit a complete list of proposed subcontractors and suppliers.

Program of work

Construction program: Show the following:

- Sequence of work.
- Critical paths of activities related to the work.
- Allowance for holidays.
- Activity inter-relationships.
- External dependencies including provision of access, document approvals and work by others.
- Periods within which various stages or parts of the work are to be executed.

Time scale: Working days.

Updates to the program: The Contractor is to provide an updated program for review at each site meeting, identifying changes since the previous issue, and show the estimated percentage of completion for each item of work. The construction program is to be a baseline program indicating all changes to the original baseline during the construction phase. The Contractor is to provide a detailed two week look ahead construction program at each fortnightly site meeting. This program is to align with the overall construction program targeting the date of Practical Completion.

- Frequency: TBA by MCC

Program chart: Display in the contractor's site office an up-to-date bar chart and network diagram based on the construction program.

Site meetings

General: Hold and attend site meetings throughout the contract and arrange attendance of appropriate subcontractors, the architect, and appropriate consultants.

Frequency: TBA by MCC.

Minutes: Make a record of site meetings. Within 5 working days after each meeting, distribute a copy of the minutes to each party.

- Purpose of submission: Review.

Contacts: At the first site meeting, submit names and telephone numbers of responsible persons who may be contacted after hours during the course of the contract.

- Purpose of submission: Information only.

Progress photographs

General: Take colour progress photographs within 5 working days, before each site meeting. At each site meeting submit 2 sets of prints and the digital files. Identify the project, date, time, location and orientation.

- Purpose of submission: Information only.

Minimum frequency: TBA by MCC.

Minimum number: TBA by MCC.

Format: TBA by MCC.

Items supplied by owner

General: Materials and other items supplied free of charge to the contractor for installation in the execution of the works.

Items supplied by owner schedule

Location	Item	Quantity	Date
External Works	Old railway signal	1	Available immediately
External Works	Street Lamps (Poles)	2	Available immediately

Persons other than contractor

Facilities: Refer to person other than contractor documentation.

Contractor/person other than contractor interfaces: Refer to person other than contractor documentation.

Salvage and waste

The Contractor shall minimise waste and sort all waste (including from demolition, material off-cuts, etc.) into appropriate categories for recycling or disposal off site.

The Contractor shall ensure that all recyclables are placed into appropriate recycling processes and uses (e.g. scrap metal, concrete rubble, etc) and that recyclables and waste materials are safely disposed of at a registered off site waste facility.

1.7 REGULAR CLEAN UP

Regular cleaning

The Contractor is to ensure that the site and immediate surrounds are kept clean at the end of each working day in accordance with Workcover NSW codes of practice, applicable safety standards, the Contractor's own Safe Work Method Statements and the current Principal's house-keeping standards (available from the Principal on request).

1.8 COMPLETION OF THE WORKS

Final cleaning

General: Before the date for practical completion, clean throughout, including interior and exterior surfaces exposed to view. Vacuum softball floor surfaces. Clean debris from the site, roofs, gutters, downpipes and drainage systems. Remove waste and surplus materials.

Samples: Remove non-incorporated samples, prototypes and sample panels.

Reinstatement

General: Before the date for practical completion, clean and repair damage caused by installation or use of temporary work and restore existing facilities used during construction to original condition.

Adjoining property

Evaluation: At practical completion, for each property described in the **Adjoining properties to be recorded schedule**, inspect the property with the architect and owner and occupant of the property, recording any damage that has occurred since the pre-commencement inspection.

Pest eradication

General: Employ suitably qualified pest exterminators. At practical completion, verify that completed works are free of pest types and provide clearance certificates to the Principal.

Removal of plant

General: Within 10 working days after practical completion, remove temporary works and construction plant no longer required. Remove the balance before the end of the defects liability period.

1.9 PAYMENT FOR THE WORKS

Anticipated progress claims schedule

General: At commencement of the works, submit a schedule of anticipated progress claims for the contract period. Submit a revised schedule with each progress claim.

- Purpose of submission: Information only.

Progress claims

Break-down: With each progress claim, submit a statement of amounts claimed in respect of each worksection or trade heading designated in the specification.

- Purpose of submission: Review.

Method of measurement

General: In conformance with the principles of the Australian Standard Method of Measurement of Building Works (ASMM6).

1.10 MISCELLANEOUS

Contractor and owner to observe confidentiality

Publicity: Do not issue information concerning the project for publication in the media without prior written approval of the owner. Refer to the owner, enquiries from the media concerning the project.

Compliance with the law

Requirements of authorities: Unless specified in a specification worksection, the owner advises - before entering into the contract – that all notices have been given, fees have been paid, and permits, approvals and other authorisations have been obtained relevant to the contract works.

0171B GENERAL REQUIREMENTS

1 GENERAL

1.1 RESPONSIBILITIES

Noise levels
General: Install systems within the limits of the contract design and documented equipment performance and as documented.

Structure
General: If required, provide structures, installations and components as follows:

- Fixed accessways: To AS 1657.
- Structural design actions: To the AS/NZS 1170 series.

BCA and energy efficiency
General: The Contractor is to ensure compliance with sections of the BCA, along with any associated specialist's reports issued and provide documentation of the verification method and compliance.

Where other parts of this specification call for higher values for materials, the higher value shall be taken as being applicable for the installation.

Project heritage significance
Inform all construction workers associated with the project and the site that all care and efforts must be taken to protect the heritage significance, built fabric and archaeology of the Courthouse site and nearby structures.

1.2 DESIGN

Design development
General: The works include development of the design beyond that documented, as required.

Design by contractor: If the contractor provides design, use only appropriately qualified persons and conform to all statutory requirements.

Conflict with the documents: If it is believed that a conflict exists between statutory requirements and the documents, notify the contract administrator immediately and provide a recommendation to resolve the conflict.

1.3 PRECEDENCE

General
Order of precedence:

- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of worksections override conflicting requirements of their referenced documents. The requirements of the referenced documents are minimum requirements.

Reference
All documentation, including, but not limited to schedules, drawings (irrespective of scale) and the architectural specification are to be read in conjunction with one another. Where there is a discrepancy, seek instruction from the Superintendent before proceeding.

Cross referencing architectural documentation with other design consultant documentation
Architectural drawings and specifications are coordinated with specialist design consultant documentation with the best intentions. Should elements of the design appear on other design consultant documentation and not appear on the architectural documentation; or on the architectural documentation and not on other design consultant documentation, the Contractor is to immediately notify the Contract Administrator. The fact that a design element might be excluded from one contract document but included on another contract document makes it part of the overall contract documentation set and shall not give rise to a variation adjustment to the contract price. During the course of the contract works, should such an inconsistency lead to a specific alteration to the building fabric in order to accommodate an excluded element from any of the documentation, the Contractor shall submit information highlighting any such discrepancy to the Contract Administrator for review.

1.4 CROSS REFERENCES

General

Where specific worksections are cross-referenced at the commencement of each specification worksection the listed worksections are provided for general guidance only. Compliance with all specification worksections is required and additional worksections may be cross-referenced beyond those which are cross-referenced when required.

Common requirements

Requirement: Conform to the following worksections:

- *0131 Preliminaries*
- *0181 Adhesives, sealants and fasteners*.
- *0183b Metals and prefinishes*.
- *0184 Termite management*.
- *0185 Timber products, finishes and treatment*.

Cross referencing styles

General: Within the text, titles are cross referenced using the following styles:

- Worksection titles are indicated by *Italicised* text.
- Subsection titles are indicated by **BOLD** text.
- Clause titles are indicated by **BOLD** text.
- Subclause titles are indicated by **Bold** text.

1.5 REFERENCED DOCUMENTS

General

Contractual relationships: Responsibilities and duties of the principal, contractor and contract administrator are not altered by requirements in the documents referenced in this specification.

Current editions: Use referenced documents which are the editions, with amendments, current 3 months before the closing date for tenders, except where other editions or amendments are required by statutory authorities.

Site copies: One.

Building Code of Australia (National Construction Code) all 3 volumes

- Australian Standards as appropriate to the type and nature of the construction in particular and not limited to the following:
    - AS 1428.1.
    - AS 2870.
    - AS 3660.
    - AS 3700.
    - AS 3740.
- Council's development consent approval documents including stamped plans (Council's Notice of Determination).
- Statement of Heritage Impact (report prepared by heritage architect). This document will inform contractor and subcontractors induction process.
- Any other authority's approval documents in relation to site services.
- PCA's CC approval including stamped plans and any conditions relating to the approval.

European standards: Any national European Standard (e.g. BS EN or DIN EN) may be used in place of the equivalent referenced European Standard (EN).

1.6 INTERPRETATION

Documentation conventions

Imperative mood and streamlined language: The words shall or shall be are implied where a colon is used following a keyword or within a sentence or sentence fragment.

Subject of sentences and phrases: Specification requirements are to be performed by the contractor, unless stated otherwise.

Abbreviations

General: For the purposes of this specification the following abbreviations apply:

- AS: Australian Standard.
- ASMM: Australian Standard Method of Measurement (of Building Works) published by the Australian Institute of Quantity Surveyors
- BCA: National Construction Code Series Volume One: Building Code of Australia Class 2 to 9 Buildings and Volume Two: Building Code of Australia Class 1 and Class 10 Buildings.
- BMT: Base Metal Thickness.
- CC: Construction Certificate.
- Council: Maitland City Council.
- DA: Development Application.
- DFT: Dry Film Thickness.
- DLP: Defects Liability Period.
- DPC: Damp Proof Course.
- EN: European Norm (European Standard).
- EP&A Act: Environmental Planning & Assessment Act
- EP&A Reg: Environmental Planning & Assessment Regulation
- excl: Excluding
- FE: Fire Extinguisher
- FH: Fire Hydrant
- FHR: Fire Hose Reel
- FRL: Fire Resistance Level.
- FSC: Forest Stewardship Council.
- GAL: Galvanised.
- GPO: General Power Outlet
- GRP: Glass Reinforced Plastic.
- HMR: High Moisture Resistant.
- incl: Including
- IP: Ingress protection.
- m: metres.
- mm: millimetres.
- MCC: Maitland City Council.
- N: Newtons (force)
- N/A: Not Applicable
- NATA: National Association of Testing Authorities.
- NCC: National Construction Code (or BCA).
- NOHSC: National Occupational Health and Safety Commission.
- NZS: New Zealand Standard.
- PCA: Principal Certifying Authority.
- PVC: Polyvinyl Chloride.
- PVC-U: Unplasticised Polyvinyl Chloride. Also known as UPVC.
- RMS: Road and Maritime Services .
- SDS: Safety data sheets.
- SoHI: Statement of Heritage Impact.
- TBA: To be advised.
- TBC: To be confirmed
- VOC: Volatile Organic Compound.
- UNO: Unless Noted Otherwise

- WFT: Wet Film Thickness.
- WHS: Work Health and Safety.

Definitions

General: For the purposes of this specification, the following definitions apply:

- Access for maintenance: Includes access for maintenance, inspection, measurement, operation, adjustment, repair, replacement and other maintenance related tasks.
- Accessible, readily: Readily accessible, easily accessible, easy access and similar terms mean capable of being reached quickly and without climbing over or removing obstructions, using a movable ladder, and in any case not more than 2.0 m above the ground, floor or platform.
- Accredited Testing Laboratory:
  . An organisation accredited by the National Association of Testing Authorities (NATA) to test in the relevant field; or
  . An organisation outside of Australia accredited to undertake the relevant tests by an authority recognised by NATA through a mutual recognition agreement; or
  . An organisation recognised as being an Accredited Testing Laboratory under legislation at the time the test was undertaken.
- Architect: A person using the title architect in the state of NSW offering services to the public and is registered with the NSW Architects Registration Board.
- Attendance: Attendance, provide attendance and similar expressions mean give assistance for examination and testing.
- Competent Fire Safety Practitioner: A consultant (fire safety engineer) qualified to undertake annual fire safety inspections of buildings and to prepare and certify Annual Fire Safety Statements in accordance with the EP&A Reg.
- Contract: The signed building contract between the Principal and the Contractor, inclusive of any accompanying Schedules.
- Contract administrator: Has the same meaning as superintendent and is the person appointed by the owner or principal under the contract.
- Contractor: Has the same meaning as builder and is the person or organisation bound to carry out and complete the work under the contract.
- Default: Specified value, product or installation method which is to be provided unless otherwise documented.
- Design life: The period of time for which it is assumed, in the design, that an asset will be able to perform its intended purpose with only anticipated maintenance but no major repair or replacement being necessary.
- Documented: Documented, as documented and similar terms mean contained in the contract documents.
- Economic life: The period of time from the acquisition of an asset to the time when the asset, while still physically capable of fulfilling its function and with only anticipated maintenance, ceases to be the lowest cost alternative for satisfying that function.
- Electricity distributor: Any person or organisation that provides electricity from an electricity distribution system to one or more electrical installations. Includes distributor, supply authority, network operator, local network service provider, electricity retailer or electricity entity, as may be appropriate in the relevant jurisdiction.
- Fire hazard properties: Terminology to BCA A5.5.
- Geotechnical site investigation: The process of evaluating the geotechnical characteristics of the site in the context of existing or proposed construction.
- Give notice: Give notice, submit, advise, inform and similar expressions mean give notice (submit, advise, inform) in writing to the contract administrator.
- High level interface: Systems transfer information in a digital format using an open system interface.
- Hot-dip galvanized: Zinc coated to AS/NZS 4680 after fabrication with coating thickness and mass to AS/NZS 4680 Table 1.
- Ingress protection: IP, IP code, IP rating and similar expression have the same meaning as IP Code in AS 60529.

- Joints:
  - . Construction joint: A joint with continuous reinforcement provided to suit construction sequence.
  - . Contraction joint: An opening control joint with a bond breaking coating separating the joint surfaces to allow independent and controlled contraction of different parts or components, induced by shrinkage, temperature changes or other causes. It may include unbound dowels to assist vertical deflection control.
  - . Control joint: An unreinforced joint between or within discrete elements of construction which allows for relative movement of the elements.
  - . Expansion joint: A closing control joint with the joint surfaces separated by a compressible filler to allow axial movement due to thermal expansion or contraction with changes in temperature or creep. It may include unbound dowels to assist vertical deflection control.
  - . Sealant joint: A joint filled with a flexible synthetic compound which adheres to surfaces within the joint to prevent the passage of dust, moisture and gases.
  - . Structural control joint: A control joint (contraction, expansion and isolation) in structural elements when used with applied material and finishes.
  - . Substrate joint: A joint in the substrate which includes construction joints and joints between different materials.
  - . Weakened plane joint: A contraction joint created by forming a groove, extending at least one quarter the depth of the section, either by using a grooving tool, by sawing, or by inserting a premoulded strip.
- Local (government) authority: A body established for the purposes of local government by or under a law applying in a state or territory.
- Low level interface: Systems transfer information via terminals and voltage free contacts.
- Manufacturer's recommendations: Recommendations, instructions, requirements, specifications (and similar expressions) provided in written or other form by the manufacturer and/or supplier relating to the suitability, use, installation, storage and/or handling of a product.
- Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
  - . Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.
  - . Ferrous open sections zinc coated an in-line process: To AS/NZS 4791.
  - . Ferrous hollow sections zinc coated by a continuous or specialised process: To AS/NZS 4792.
- Network utility operator: The entity undertaking the piped distribution of drinking water or natural gas for supply or is the operator of a sewerage system or external stormwater drainage system.
- Obtain: Obtain, seek and similar expressions mean obtain (seek) in writing from the contract administrator.
- Pipe: Includes pipe and tube.
- Practical completion or defects free completion: The requirements for these stages of completion are defined in the relevant building contract for the project.
- Principal: Principal has the same meaning as owner, client and proprietor and is the party to whom the contractor is legally bound to construct the works.
- Professional engineer: As defined by the NCC.
- Proprietary: Identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Prototype: A full size mock-up of components, systems or elements to demonstrate or test construction methods, junctions and finishes, and to define the level of quality.
- Provide: Provide and similar expressions mean supply and install and include development of the design beyond that documented.
- Record drawings: Record drawings has the same meaning as as-installed drawings, as-built drawings and work-as-executed drawings.
- Referenced documents: Standards and other documents whose requirements are included in this specification by reference.
- Required: Required by the contract documents, the local council or statutory authorities.
- If required: A conditional specification term for work which may be shown in the documents or is a legislative requirement.

- Sample: A physical example that illustrates workmanship, materials or equipment, and establishes standards by which the work will be judged. It includes samples and sample panels.
- Services Engineer: A professional engineer responsible for the design, documentation and certification of the mechanical, electrical, hydraulic and fire prevention systems required for the safe, comfortable and environmentally friendly operation of buildings to meet BCA Section J requirements).
- Statutory authority: A public sector entity created by legislation, that is, a specific law of the Commonwealth, State or Territory.
- Superintendent: Has the same meaning as Contract Administrator and is the person appointed by the owner or principal under the contract.
- Supply: Supply, furnish and similar expressions mean supply only.
- Tests – completion: Tests carried out on completed installations or systems and fully resolved before the date for practical completion, to demonstrate that the installation or system, including components, controls and equipment, operates correctly, safely and efficiently, and meets performance and other requirements. The superintendent may direct that completion tests be carried out after the date for practical completion.
- Tests – pre-completion: Tests carried out before completion tests, including:
  . Production: Tests carried out on a purchased item, before delivery to the site.
  . Progressive: Tests carried out during installation to demonstrate performance in conformance with this specification.
  . Site: Tests carried out on site.
  . Type: Tests carried out on an item identical with a production item, before delivery to the site.
- Tolerance: The permitted difference between the upper limit and the lower limit of dimension, value or quantity.
- Verification: Provision of evidence or proof that a performance requirement has been met or a default exists.
- Works: The complete construction works as set out in the contract documentation (refer to Contract).

1.7 CONTRACT DOCUMENTS

Services diagrammatic layouts

General: Layouts of service lines, plant and equipment shown on the drawings are diagrammatic only, except where figured dimensions are provided or calculable.

Before commencing work:

- Obtain measurements and other necessary information.
- Coordinate the design and installation in conjunction with all trades.

Levels

General: Spot levels take precedence over contour lines and ground profile lines.

Warranty: No warranty is given as to the completeness or accuracy of drawings and/or manuals of existing services.

1.8 CONTRACT DOCUMENTS

General

General: The architectural specification, selection and drawings shall be read in conjunction with the drawings, all of which are intended to be mutually explanatory. All work called for by the one, even if not by the other, shall be fully executed. The drawings, specification and schedules are intended to generally include everything necessary for the proper completion of the Works. Minor items used in normally accepted trade practice and which are not specifically mentioned, shall be included.

Dimensions: The drawings are not to be scaled. Refer to figured dimensions, grid set-outs and the like to calculate and determine all set-out information. If dimensional setout information is lacking and not ascertainable, request additional dimensions from the Superintendent. Verify all dimensions on the site before commencing any work of ordering any materials. Where existing work may critically affect set-out dimensions shown, particularly in relation to position of buried

archaeology, check that such dimensions can be achieved on site.

Conflict with documents

General: If it is believed that conflict exists between statutory requirements and the documents, notify the Superintendent immediately and submit a recommendation to resolve the conflict.

1.9 SUBMISSIONS

Requirement

General: Submit to the Superintendent the following:

- Authority approvals: Notes of meetings with authorities whose requirements apply to the work and evidence that notices, fees and permits have been sought and paid, that authority connections are complete and that statutory approvals by the authorities whose requirements apply to the work have been received.
- Building penetrations: Details of the methods to maintain the required structural, fire and other properties to **EXECUTION**, **BUILDING PENETRATIONS**.
- Certification: Certification of conformance to documented requirements, including certification that the plant and equipment submitted meets all requirements of the contract documents and that each installation is operating correctly.
- Design documentation: Design data and certification of proposed work, if required and as documented.
- Execution details: Execution programs, schedules and details of proposed methods and equipment. For building services include the following:
  - . Embedded services: Proposed method for embedding services in concrete walls or floors or chasing into concrete or masonry walls.
  - . Fixing of services: Typical details of locations, types and methods of fixing services to the building structure.
  - . Inaccessible services: If services will be enclosed and not accessible after completion, submit proposals for location of service runs and fittings.
- Fire performance: Evidence of conformity to requirement for combustibility, fire hazard properties and fire-resistance of building elements.
- Marking and labelling: Samples and schedules of proposed marking and labels to **EXECUTION**, **MARKING AND LABELLING.**
- Operation and maintenance manuals: For the whole of the work to **EXECUTION**, **OPERATION AND MAINTENANCE MANUALS**.
- Products: Products and materials data, including manufacturer's technical specifications and drawings, type tests results, evidence of conformance to product certification schemes, performance and rating tables and installation and maintenance recommendations.
- Prototypes: Prototypes of components, systems or elements.
- Records: As-built documents, photographs, system diagrams, schedules and logbooks to **EXECUTION**, **RECORD DRAWINGS**.
- Samples: Representative of proposed products and materials and including proposals to incorporate samples into the works, if any to **EXECUTION**, **SAMPLES**.
- Shop drawings: To **EXECUTION**, **SHOP DRAWINGS**.
- Substitutions: To PRODUCTS**, GENERAL, Substitutions**.
- Tests:
  - . Inspection and testing plan consistent with the construction program including details of test stages and procedures.
  - . Test reports for testing performed under the contract.
- Warranties: To **EXECUTION**, **WARRANTIES**.

Contractor review: Before submissions, review each submission item and check for coordination with other work of the contract and conformance to contract documents.

Submission times

Default timing: Make submissions at least 5 working days before ordering products or starting installation of the respective portion of the works.

Submission response times: Allow in the construction program for at least the following times:

- Shop drawings:
- 10 working days. Do not overlap shop drawing package submissions. Ensure that trades are separated into minimum 10 working day response times. Shop drawings shall include all accompanying notes and specifications necessary to fully describe the work and shall be submitted to the Superintendent in sufficient time ahead of early ordering, stockpiling, manufacture, assembly, or supply as required but in all cases allowing at least 10 working days in addition to such time as is required by the Contractor for its examination and review.
- Resubmission of shop drawings: Should the Superintendent require amendments to the shop drawings, the amendments shall be made and the amended drawings shall be re-submitted to the Superintendent within 5 working days. The Contractor shall allow the Superintendent a further 10 working days to examine all resubmitted shop drawings.
- Final copies of shop drawings: Submit to the Superintendent a full set of final shop drawings for project records in PDF format.
-
- Samples and prototypes: 5 working days.
- Manufacturers' or suppliers' recommendations: 10 working days.
- Product data: 10 working days.
- Product/design substitution or modification: 15 working days.

Proposed products schedules: If major products are not specified as proprietary items, submit a schedule of those proposed for use within 3 weeks of site possession.

Identification

Requirement: Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include relevant contract document references. Include service connection requirements and product certification.

Non-conformance: Identify proposals that do not conform with project requirements, and characteristics which may be detrimental to successful performance of the completed work.

Errors

Requirement: If a submission contains errors, make a new or amended submission as appropriate, indicating changes made since the previous submission.

Electronic submissions

Electronic copies file format: Acrobat .pdf and AutoCAD .dwg file.

Quantity: One.

Transmission medium: Email or web based file transfer or Contractor's document control system for larger files if arranged and managed by the Contractor.

Hard copy submissions

Hard copy quantity: One.

Standard contract drawing size: A1.

Substitutions

Identification of a proprietary item indicates the item required and necessary properties of the item. Where alternatives to the documented products, methods or systems are proposed by the Contractor due to the specified item being unavailable, submit sufficient information to permit evaluation of the proposed alternatives, including the following:

- Evidence that the performance is equal to or greater than that specified in all respects.
- Evidence of conformity to a cited or applicable standard.
- Samples of the alternative item, clearly identified by the manufacturer.
- Essential technical information, drawings and specifications in English.
- Reasons for the proposed substitutions.
- Changes to delivery times.
- Maintenance requirements.
- Recommendations for installation and maintenance.
- Availability of materials and accessories.

- Tests, Test Reports and evidence of compliance with Australian Standards and other applicable authority requirements.
- Performance and rating tables.
- Where used on other projects.
- Life cycle cost analysis.
- Warranties.
- Statement of the extent of revisions to the contract documents.
- Statement of the extent of revisions to the construction program.
- Statement of cost implications including costs outside the contract.
- Statement of consequent alterations to other parts of the works.

If the documented products or systems are unavailable within the time constraints of the construction program, submit evidence. The Contractor is to ensure that sufficient time is allowed in the construction program to allow for the documented materials especially for special / non-standard items. Insufficient time allowance will not be accepted as a reason for substitution.

Criteria: If the substitution is for any reason other than unavailability, submit evidence that the substitution:

- Is of net enhanced value to the principal.
- Is consistent with the contract documents and is as effective as the identified item, detail or method.
- Does not change the documented design intent.
- Does not require additional or more expensive maintenance than the documented item.
- Provides an identical or superior warranty.

Costs: In relation to the assessment of alternative products or materials suggested by the Contractor - which are unrelated to potential long lead times associated with specified items - the Contractor shall pay the costs of all submissions, evaluations and tests including time taken for consideration and evaluation by the Principal's representatives whether subsequently accepted as a variation or change or not. The costs shall be calculated at current charge-out rates of the relevant consultant(s) and shall include time allowed for all inspection costs for off-site inspections. The total time taken for assessment of substitutions offered by the Contractor shall not impact on the construction program.

Principal's Obligations: The Principal will not be obliged in any case to accept an alternate item or system.

Samples and prototypes

Submission: Submit nominated samples.

Approval: After approval of samples by the Superintendent, the Contractor shall label it and keep it in a safe place on Site, for inspection purposes. Where this procedure is not practicable, the Contractor is to make other arrangements for approval.

Incorporation of samples: If it is intended to incorporate samples into the works, submit proposals. Incorporate samples in the works which have been endorsed for inclusion only after written approval from the Superintendent. Do not incorporate other samples.

All relevant work shall conform to approved samples. Failure to do so will mean the work is rejected and will be required to be replaced until the specified standards are attained, the cost of which shall be borne by the Contractor. Any claims for extensions of time or extra costs resulting from this process will not be allowed.

The Contractor shall carry out all prototyping to the extent specified in detail and referred to under the trades concerned.

Retention of samples: Keep endorsed samples in good condition on site, until the date of practical completion.

1.10 NON CONFORMING WORK

General: Where a section of the Works does not comply with the requirements of the contract documentation (including requirements for inspection and testing) the Contractor shall submit a non-conformance report detailing the proposed rectification method to the Superintendent for approval.

Where the Superintendent deems that the proposed rectification method and work is to be reviewed and/ or inspected by the relevant consultant(s), this review and inspection shall be at the Contractor's expense.

1.11 INSPECTION

Notice

Concealment: If notice of inspection is required for parts of the works that are to be concealed, advise when the inspection can be made before concealment.

Tests: Give notice of the time and place of documented tests.

Minimum notice: As documented in the **Notices schedule**. The times in the **Notices schedule** are minimum requirements. Refer to particular requirements in relation to inspections and hold points within each individual trade worksection.

Light levels

Requirements: To AS/NZS 1680.2.4.

Attendance

General: Provide attendance for documented inspections and tests.

2 PRODUCTS

2.1 GENERAL

Manufacturers' or suppliers' recommendations

General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in conformance with the recommendations of the manufacturer or supplier.

Proprietary items/systems/assemblies: Assemble, install or fix to substrate in conformance with the recommendations of the manufacturer or supplier.

Project modifications: Advise of activities that supplement, or are contrary to the recommendations of the manufacturers or supplier.

Product identification

Sealed containers: If materials or products are supplied by the manufacturer in closed or sealed containers or packages, bring the materials or products to point of use in the original containers or packages.

Other products: Marked to show the following, as applicable:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

Sources policy

General: A preference for Australian or New Zealand goods.

Prohibited materials

General: Do not provide the following:

- Materials, exceeding the limits of those listed, in the Safe Work Australia *Hazardous Chemical Information System* (HCIS).
- Materials that use chlorofluorocarbon (CFC) or hydrochlorofluorocarbon (HCFC) in the manufacturing process.

Substitutions

Identified proprietary items: Identification of a proprietary item does not imply exclusive preference for the identified item, but indicates the necessary properties of the item.

Alternatives: If alternatives to the documented products, methods or systems are proposed, submit sufficient information to permit evaluation of the proposed alternatives, including the following:

- Evidence that the performance is equal to or greater than that specified.

- Evidence of conformity to a cited or applicable standard.
- Samples of the specified and alternative item, clearly identified by the manufacturer.
- Essential technical information, drawings and specifications in English.
- Reasons for the proposed substitutions.
- Statement of the extent of revisions to the contract documents.
- Statement of the extent of revisions to the construction program.
- Statement of cost implications including costs outside the contract.
- Statement of consequent alterations to other parts of the works.
- Changes to delivery times.
- Maintenance requirements including additional and more expensive maintenance requirements..
- Recommendations for installation and maintenance.
- Availability of materials and accessories.
- Tests, Test Reports and evidence of compliance with Australian Standards and other applicable authority requirements.
- Performance and rating tables.
- Where used on other projects.
- Life cycle cost analysis.
- Warranties.

Availability: If the documented products or systems are unavailable within the time constraints of the construction program, submit evidence from the supplier, including evidence that the product had been ordered in time to meet the construction program requirements.

The Contractor is to ensure that sufficient time is allowed in the construction program to allow for the documented materials especially for special / non-standard items. Insufficient time allowance will not be accepted as a reason for a substitution..

Criteria: If the substitution is for any reason other than unavailability, submit evidence that the substitution:

- Is of net enhanced value to the principal.
- Is consistent with the contract documents and is as effective as the identified item, detail or method.

Costs: The contractor shall pay the cost of all submissions and evaluations and tests including time taken for consideration and evaluation by the Principal's representatives whether subsequently accepted as a variation or change or not. The costs shall be calculated at current charge-out rates of the relevant consultant(s).

2.2 MATERIALS AND COMPONENTS

Consistency

General: For each material or product use the same manufacturer or source and provide consistent type, size, quality and appearance.

Corrosion resistance

General: Conform to the following atmospheric corrosivity category as defined in AS 4312 and the AS/NZS 2312 series.

Exterior atmospheric corrosivity category: C4 High.

Interior atmospheric corrosivity category: C3 Medium.

Galvanizing

Severe conditions: Galvanize mild steel components (including fasteners) to AS/NZS 1214 or AS/NZS 4680 as appropriate, if:

- Exposed to weather.
- Embedded in masonry.
- Exposed to or in air spaces behind the external leaf of masonry walls.
- In contact with chemically treated timber, other than copper chrome arsenate (CCA).

2.3 SLIP RESISTANCE

Slip resistance classification
General: Ensure all floor finishes comply with the following minimum requirements. Provide both manufacturer's test certificates showing compliance and carry out site wet pendulum testing to verify compliance.

Testing
Test to AS4586 using Slider 96.

Stairways, Landings and Ramps
Refer to and comply with NCC.

All other areas not covered by NCC
Refer HB197:1999 & SA HB 198:2014.

Minimum requirements for:

- External pavements and ramps (including driveways, footpaths etc. steeper than 1:14 meet P5 wet pendulum test.
- External pavements and ramps (including driveways, footpaths etc. under 1:14 meet P4 wet pendulum test.
- Entries and access areas, common areas of public buildings, internal entry areas:
  . Wet area to meet P4 wet pendulum test.
  . Transitional area to meet P2 wet pendulum test.
  . Dry area to meet P2 wet pendulum test.
- Internal wet areas to meet P3 wet pendulum test.
- General: Refer to Schedules of External and Internal Selections for project-specific requirements in relation to slip resistance.

3 EXECUTION

3.1 SAMPLES

General
General: Include dimensioned drawings showing details of the fabrication and installation of structural elements, building components, services and equipment, including relationship to building structure and other services, cable type and size, and marking details.

Incorporation of samples: Only incorporate samples in the works which have been endorsed for inclusion. Do not incorporate other samples.

Retention of samples: Keep endorsed samples in good condition on site, until the date of practical completion.

Unincorporated samples: Remove on completion.

3.2 SHOP DRAWINGS

General
Documentation: Include dimensioned drawings showing details of the fabrication and installation of structural elements, building components, services and equipment, including relationship to building structure and other services, cable type and size, and marking details.

Diagrammatic layouts: Coordinate work shown diagrammatically in the contract documents, and prepare dimensioned set-out drawings.

Record drawings: Amend all documented shop drawings to include changes made during the progress of the work and up to the end of the defects liability period.

Services coordination: Coordinate with other building and service elements. Show adjusted positions on the shop drawings.

Space requirements: Check space and access for maintenance requirements of equipment and services indicated diagrammatically in the contract documents.

Before submitting shop drawings the Contractor shall be satisfied that the work shown or described complies with the requirements of the Contract, on-site dimensions and with the drawings, specifications and any other related directions issued by the Superintendent.

The drawings shall show adjoining materials and services to fully describe the works.

Refer to additional requirements noted in the individual worksections and building services documentation

Delays: Late submission of shop drawings to the Superintendent or delays attributed to inadequate or insufficient information shown on the shop drawings after review will not be accepted as a reason for extensions of time claims or claims for extra costs.

Services coordination: Coordinate with other building and service elements. Show adjusted positions on the shop drawings.

Space requirements: Check space requirements of equipment and services indicated diagrammatically in the contract documents.

Responsibilities: The Superintendent's examination of Shop Drawings does not remove from the Contractor from the responsibility for the correctness of the dimensions, techniques of construction and quantities on such drawings nor does it imply that all relevant information is necessarily shown. Corrections, comments or endorsement of the drawings do not relieve the Contractor of the requirements of the Contract Documents. Any approval implied by the Superintendent, or by a Consultant's examination of the drawings on behalf of the Superintendent shall be limited to procedural approval only, and shall not waive or prejudice any of the Contractor's responsibilities or the Principal's rights under the Contract

Submission medium: Email or preferred Principal's or Contractor's web-based documentation control.

Drawing size: A1 and drafted electronically. Manual drawings will be rejected.

Standard: To AS 1100 Parts 101, 201, 301, 401 and 501 as applicable.

Stamping: The Contractor shall include electronically on every drawing the Superintendents Representatives Shop Drawing "Stamp" showing the name of the person viewing the drawings, date received and commentary box.

Checking: The Contractor is to ensure that the drawings have been checked before submission.

Building work drawings for building services: On dimensioned drawings show all:

- Access doors and panels.
- Conduits to be cast in slabs.
- Holding down bolts and other anchorage and/or fixings required complete with loads to be imposed on the structure during installation and operation.
- Openings, penetrations and block-outs.
- Sleeves.
- Plinths, kerbs and bases.
- Required external openings.
- Waterproofing to items where membranes are penetrated.

Tests

General: Submit an inspection and testing plan which is consistent with the construction program. Include particulars of test stages and procedures.

Test reports: Submit written reports on nominated tests.

CAD base drawings: dwg files only. The Contractor may use the architectural CAD drawings provided the Architect's data transfer agreement is completed and returned to the architect by the Contractor which assumes responsibility of any subcontractor utilising the drawing files.

3.3 OFF-SITE DISPOSAL

Removal of material

General: Dispose of building waste material off site to the requirements of the relevant authorities.

3.4 WALL CHASING

Holes and chases

General: If holes and chases are required in masonry walls, make sure structural integrity of the wall is maintained. Do not chase walls nominated as fire-resistance or acoustic rated.

Parallel chases or recesses on opposite faces of a wall: Not closer than 600 mm to each other.

Chasing in blockwork: Only in core-filled hollow blocks or in solid blocks which are not designated as structural.

Concrete blockwork chasing table

Block thickness (mm)	Maximum depth of chase (mm)
190	35
140	25
90	20

3.5 FIXING

General

Suitability: If equipment is not suitable for fixing to non-structural building elements, fix directly to structure and trim around penetrations in non-structural elements.

Fasteners

General: Use proprietary fasteners capable of transmitting the loads imposed, and sufficient for the rigidity of the assembly.

3.6 SERVICES CONNECTIONS

Connections

General: Connect to network distributor services or service points. Excavate to locate and expose connection points. Reinstate the surfaces and facilities that have been disturbed.

Network distributors' requirements

General: If the network distributor elects to perform or supply part of the works, make the necessary arrangements. Install equipment supplied, but not installed, by the authorities.

3.7 SERVICES INSTALLATION

General

Fixing: If non-structural building elements are not suitable for fixing services to, fix directly to structure and trim around holes or penetrations in non-structural elements.

Installation: Install equipment and services plumb, fix securely and organise reticulated services neatly. Allow for movement in both structure and services.

Concealment: Unless otherwise documented, conceal all cables, ducts, trays and pipes except where installed in plant spaces, ceiling spaces and riser cupboards. If possible, do not locate on external walls.

Lifting: Provide heavy items of equipment with permanent fixtures for lifting as recommended by the manufacturer.

Suspended ground floors: Keep all parts of services under suspended ground floors at least 150 mm clear of the ground surface. Make sure services do not impede access.

Arrangement: Arrange services so that services running together are parallel with each other and with adjacent building elements.

Dissimilar metals

General: Join dissimilar metals with fittings of electrolytically compatible material.

Temporary capping

Pipe ends: During construction protect open ends of pipe with metal or plastic covers or caps.

Piping

General: Install piping in straight lines at uniform grades without sags. Arrange to prevent air locks. Provide sufficient unions, flanges and isolating valves to allow removal of piping and fittings for maintenance or replacement of plant.

Spacing: Provide at least 25 mm clear between pipes and between pipes and building elements, additional to insulation.

Changes of direction: Provide long radius elbows or bends and sets where practicable, and swept branch connections. Provide elbows or short radius bends where pipes are led up or along walls and then through to fixtures. Do not provide mitred fittings.

Vibration: Arrange and support piping so that it remains free from vibration whilst permitting necessary movements. Minimise the number of joints.

Embedded pipes: Do not embed pipes that operate under pressure in concrete or surfacing material.

Valve groupings: If possible, locate valves in groups.

Pressure testing precautions: Isolate items not rated for the test pressure. Restrain pipes and equipment to prevent movement during pressure testing.

Differential movement

General: If the geotechnical site investigation report predicts differential movements between buildings and the ground in which pipes or conduits are buried, provide control joints in the pipes or conduits, as follows:

- Arrangement: Arrange pipes and conduits to minimise the number of control joints.
- Magnitude: Accommodate the predicted movements.

3.8 BUILDING PENETRATIONS

Penetrations

Requirement: Maintain the required structural, fire and other properties when penetrating or fixing to the following:

- Structural building elements including external walls, fire walls, fire doors and access panels, other tested and rated assemblies or elements, floor slabs and beams.
- Membrane elements including damp-proof courses, waterproofing membranes and roof coverings. If penetrating membranes, provide a waterproof seal between the membrane and the penetrating component.

Sealing

Fire-resisting building elements: Seal penetrations with a system conforming to AS 4072.1.

Non fire-resisting building elements: Seal penetrations around conduits and sleeves. Seal around cables within sleeves. If the building element is acoustically rated, maintain the rating.

Sleeves

General: If piping or conduit penetrates building elements, provide metal or PVC-U sleeves formed from pipe sections as follows:

- Movement: Arrange to permit normal pipe or conduit movement.
- Diameter (for non fire-resisting building elements): Sufficient to provide an annular space around the pipe or pipe insulation of at least 12 mm.
- Prime paint ferrous surfaces.
- Sealing: Seal between pipes or conduits and sleeves to prevent the entry of vermin.
- Terminations:
  - . If cover plates are fitted: Flush with the finished building surface.
  - . In fire-resisting and acoustic rated building elements: 50 mm beyond finished building surface.
  - . In floors draining to floor wastes: 50 mm above finished floor.
  - . Elsewhere: 5 mm beyond finished building surface.
  - . Termite management: To AS 3660.1.
- Thickness:
  - . Metal: 1 mm or greater.
  - . PVC-U: 3 mm or greater.

Sleeves for cables: For penetrations of cables not enclosed in conduit through ground floor slabs, beams and external walls provide sleeves formed from PVC-U pipe sections.

3.9 CONCRETE PLINTHS

Construction

General: Provide concrete plinths as documented and under all equipment located on concrete floor slabs as follows:

- Height: 75 mm or greater, as documented.
- Concrete: Grade N20.

- Finish: Steel float flush with the surround.
- Reinforcement: Single layer of F62 fabric.
- Surround: Provide galvanized steel surround at least 75 mm high and 1.6 mm thick. Fix to the floor with masonry anchors. Fill with concrete.

3.10 SUPPORT AND STRUCTURE

General

Requirement: Provide incidental supports and structures to suit the services.

3.11 PIPE SUPPORTS

Support systems

General: Provide proprietary support systems of metallic-coated steel construction.

Vertical pipes: Provide anchors and guides to maintain long pipes in position, and supports to balance the mass of the pipe and its contents.

Saddles: Do not provide saddle type supports for pipes greater than DN 25.

Dissimilar metals: If pipe and support materials are dissimilar, provide industrial grade electrically non-conductive material securely bonded to the pipe to separate them. Provide fixings of electrolytically compatible material.

Uninsulated pipes: Clamp piping supports directly to pipes.

Insulated pipes:

- Spacers: Provide spacers at least as thick as the insulation between piping supports and pipes. Extend either side of the support by at least 20 mm.
- Spacer material: Rigid insulation material of sufficient strength to support the piping and suitable for the temperature application.

Support spacing

Cold and heated water pipes: To AS/NZS 3500.1 Table 5.6.4. Provide additional brackets, clips or hangers to prevent pipe movement caused by water pressure effects.

Sanitary plumbing: To AS/NZS 3500.2 Table 10.2.1.

Fuel gas: To AS/NZS 5601.1 Table 5.5.

Other pipes: To AS/NZS 3500.1 Table 5.6.4.

Hanger size table

Nominal pipe size (DN)	Minimum hanger diameter for single hangers (mm)
50 maximum	9.5
65 to 90	12.7
100 to 125	15.8
150 to 200	19.0

3.12 PLANT AND EQUIPMENT

General

Location: Locate so that failure of plant and equipment (including leaks) does not create a hazard for the building occupants and causes a minimum or no damage to the building, its finishes and contents including water sensitive equipment or finishes.

Safe tray and an overflow pipe: Provide to each tank, hot water heater and storage vessel.

3.13 ACCESS FOR MAINTENANCE

General

Requirement: Provide access for maintenance of plant and equipment.

Standards: Conform to the relevant requirements of AS 1470, AS 1657, AS/NZS 1892.1, AS 2865 and AS/NZS 3666.1.

Work Health and Safety: Conform to the requirements of the applicable Work Health and Safety regulations.

Protection from injury: Protect personnel from injury caused by contact with objects including those that are sharp, hot or protrude at low level.

Plant room flooring surfaces: R10 Slip resistance classification to AS 4586.

Trip hazards: Do not run small services including drains and conduits across floors where they may be a trip hazard.

Manufacturer's standard equipment: Modify manufacturer’s standard equipment when necessary to provide the plant access documented.

Clearances

Minimum clearances for access: Conform to the following:

-

Removal of components: Allow sufficient space for removal and replacement of equipment components including air filters, tubes of shell and tube heat exchangers, removable heat exchanger bundles, coils and fan shafts. Provide access panels or doors large enough to permit the safe removal and replacement of components within air handling units.

Facilities for access

Equipment behind hinged doors: Provide doors opening at least 150°.

Equipment behind removable panels: Provide panels with quick release fasteners or captive metal thread screws.

Removable panels: Provide handles to permit easy and safe removal and replacement.

Insulated plant and services: If insulation must be removed to access plant and services provide access for maintenance, arranged so it can be repeatedly removed and replaced without damage.

Piping

Requirement: Conform to the following:

- Provide access and clearance at fittings which require maintenance, inspection or servicing, including control valves and joints intended to permit pipe removal.
- Arrange piping so that it does not interfere with the removal or servicing of associated equipment or valves or block access or ventilation openings.
- Preferably run piping, conduits, cable trays and ducts at high level and drop vertically to equipment.

Electrical and controls

Electrical equipment: Provide clearances and access space to AS/NZS 3000.

Switchboards and electrical control equipment: Locate near the main entrance to plant space. Arrange plant so that, to the greatest extent possible, switchboards are visible from the plant being operated.

Control panels: Locate near and visible from the plant controlled.

3.14 VIBRATION SUPPRESSION

General

Requirement: Minimise the transmission of vibration from rotating or reciprocating equipment to other building elements.

Standard

Rotating and reciprocating machinery noise and vibration: Vibration severity in Zone A to ISO 20816-1 and ISO 10816-3.

Speeds

General: If no maximum speed is prescribed do not exceed 1500 r/min for direct driven equipment.

Connections

General: Provide flexible connections to rotating machinery and assemblies containing rotating machinery. Isolate pipes by incorporating sufficient flexibility into the pipework or by use of proprietary flexible pipe connections installed so that no stress is placed on pipes due to end reaction.

Inertia bases

General: If necessary to achieve the required level of vibration isolation, provide inertia bases having appropriate mass and conforming as follows:

- Construction: Steel or steel-framed reinforced concrete. Position foundation bolts for equipment before pouring concrete.
- Supports: Support on vibration isolation mountings using height saving support brackets.

Vibration isolation mountings

General: Except for external equipment that is not connected to the structure of any building, support rotating or reciprocating equipment on mountings as follows:

- For static deflections < 15 mm: Single or double deflection neoprene in-shear mountings incorporating steel top and base plates and a tapped hole for bolting to equipment.
- 15 mm: Spring mountings.

Selection: Provide mountings selected to achieve 95% isolation efficiency at the normal operating speeds of the equipment.

Installation: Set and adjust vibration isolation mounting supports to give clearance for free movement of the supports.

Spring mountings: Provide freestanding laterally stable springs as follows:

- 12 mm between springs and other members such as bolts and housing.
- High frequency isolation: 5 mm neoprene acoustic isolation pads between baseplate and support.
- Levelling: Provide bolts and lock nuts.
- 150% of the designated minimum static deflection.
- Ratio of mean coil diameter to compressed length at the designated minimum static deflection: 0.8:1.
- Snubbing: Snub the springs to prevent bounce at start-up.
- Vertical resilient limit stops: To prevent spring extension when unloaded, to serve as blocking during erection and which remain out of contact during normal operation.

3.15 SEISMIC RESTRAINT OF NON-STRUCTURAL COMPONENTS

General

Requirement: Seismic restraint to AS 1170.4: Refer to the Professional Engineer's documentation.

Earthquake design category: Refer to the Professional Engineer's documentation.

3.16 FINISHES TO BUILDING SERVICES

General

Requirement: If exposed to view (including in plant rooms), paint building services and equipment.

Surfaces painted or finished off-site: Conform to *0183 Metals and prefinishes*.

Exceptions: Do not paint chromium or nickel plating, anodised aluminium, GRP, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Surfaces with finishes applied off-site need not be re-painted on-site provided the corrosion resistance of the finish is not less than that of the respective finish documented.

Standard: Conform to the recommendations of AS/NZS 2311 Sections 3, 6 and 7 or AS 2312.1 Sections 6, 7 and 8, as applicable.

Inaccessible surfaces: If surfaces are inaccessible after installation, complete finishing before installation.

Painting systems

New unpainted interior surfaces: To AS/NZS 2311 Table 5.1.

New unpainted exterior surfaces: To AS/NZS 2311 Table 5.2.

Paint application

Coats: Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur. Make sure each coat of paint or clear finish is uniform in colour, gloss, thickness and texture and free of runs, sags, blisters or other discontinuities.

Combinations: Do not combine paints from different manufacturers in a paint system.

Protection: Remove fixtures before starting to paint and refix in position undamaged when painting is complete.

Underground metal piping

Corrosion protection: Provide corrosion protection for the following:

- Underground ferrous piping.
- Underground non-ferrous metal piping in corrosive environments.

Protection methods: Select from the following:

- Cathodic protection: Sacrificial anodes or impressed current. Incorporate a facility for periodic testing. Conform to the recommendations of AS 2832.1.
- Continuous wrapping using proprietary petroleum taping material.
- Impermeable flexible plastic coating.
- Sealed polyethylene sleeve.

Aggressive soils: If metallic piping or components are installed in chemically aggressive soil, provide the following in addition to the corrosion protection above:

- Material: Continuous polyethylene sleeve to ASTM D1248 with a minimum thickness of 0.25 mm.

- Installation: Wrap or sleeve pipes and components. Tape joints between sections of polyethylene and between polyethylene and piping.

Low VOC emitting paints

Paint types: To the recommendations of AS/NZS 2311 Table 4.2.

Repairs to finishes

Requirement: Repair damaged finishes to restore their corrosion resistance, appearance and service life.

3.17 MARKING AND LABELLING

General

Requirement: Mark and label services and equipment for identification purposes as follows:

- Locations exposed to weather: Provide durable materials.
- Pipes, conduits and ducts: To AS 1345 throughout its length, including in concealed spaces.
- Cables: Label to indicate the origin and destination of the cable.

Consistency: Label and mark equipment using a consistent scheme across all services elements of the project.

Asset management labels and tags: Refer to the Services Engineer's documentation.

Label samples and schedules

Submission timing: Before marking or labelling.

Schedule: For each item or type of item include the following:

- A description of the item or type of item for identification.
- The proposed text for marking or labelling.
- The proposed location of the marking and labelling.

Electrical accessories

Circuit identification: Label isolating switches and outlets to identify circuit origin.

Operable devices

Requirement: Mark to identify the following:

- Controls.
- Indicators, gauges, meters.
- Isolating switches.

Equipment concealed in ceilings

Location: Provide a label on the ceiling, indicating the location of each concealed item requiring access for routine inspection, maintenance and/or operation. In tiled ceilings, locate the label on the ceiling grid closest to the item access point. In flush ceilings, locate adjacent to closest access panel. Items to be labelled include but are not limited to:

- Fan coil units and terminal equipment (e.g. VAV terminals).
- Fire and smoke dampers.
- Isolating valves not directly connected to items otherwise labelled.
- Motorised dampers.
- Wall mounted equipment in occupied areas: Provide labels on wall mounted items in occupied areas including the following:
  - Services control switches.
  - Temperature and humidity sensors.

Points lists

Automatic control points: Provide plasticised, fade-free points lists for each automatic control panel. Store in a pocket on the door of the panel. Lists to include terminal numbers, point addresses, short and long descriptors.

Pressure vessels

General: Mount manufacturer's certificates in glazed frames on a wall next to the vessel.

Valves and pumps

General: Label to associate pumps with their starters and valves. Screw fix labels to body or attach label to valve handwheels with a key ring.

Underground services

Survey: Accurately record the routes of underground cables and pipes before backfilling. Include on the record drawings.

Records: Provide digital photographic records of underground cable and pipe routes before backfilling. Include in operation and maintenance manual.

Location marking: Accurately mark the location of underground cables and pipes with route markers consisting of a marker plate set flush in a concrete base, engraved to show the direction of the line and the name of the service.

Markers: Place markers at ground level at each joint, route junction, change of direction, termination and building entry point and in straight runs at intervals of not more than 100 m.

Marker bases: 200 mm diameter x 200 mm deep, minimum concrete.

Direction marking: Show the direction of the cable and pipe run by means of direction arrows on the marker plate. Indicate distance to the next marker.

Plates: Brass, aluminium or stainless steel with black filled engraved lettering, minimum size 75 x 75 x 1 mm thick.

Plate fixing: Waterproof adhesive and 4 brass or stainless steel countersunk screws.

Marker height: Set the marker plate flush with paved surfaces, and 25 mm above other surfaces.

Marker tape: Where electric bricks or covers are not provided over underground wiring, provide a 150 mm wide yellow or orange marker tape bearing the words WARNING – electric cable buried below, laid in the trench 150 mm below ground level.

Plastic pipe: Provide a detectable marker tape with trace wire to identify the route of buried piping. Terminate with 1000 mm coil in a readily accessible location. Tag to match the record drawings.

Labels and notices

Materials: Select from the following:

- Cast metal.
- For indoor applications only, engraved two-colour laminated plastic.
- Proprietary pre-printed self-adhesive flexible plastic labels with machine printed black lettering.
- Stainless steel or brass minimum 1 mm thick with black filled engraved lettering.

Emergency functions: To AS 1319.

Colours: Generally to AS 1345 as appropriate, otherwise black lettering on white background except as follows:

- Danger, warning labels: White lettering on red background.
- Main switch and caution labels: Red lettering on white background.

Edges: If labels exceed 1.5 mm thickness, radius or bevel the edges.

Labelling text and marking: To correspond to terminology and identifying number of the respective item as shown on the record drawings and documents and in operating and maintenance manuals.

Lettering heights:

- Danger, warning and caution notices: Minimum 10 mm for main heading, minimum 5 mm for remainder.
- Equipment labels within cabinets: Minimum 3.5 mm.
- Equipment nameplates: Minimum 40 mm.
- Identifying labels on outside of cabinets: Minimum 5 mm.
- Isolating switches: Minimum 5 mm.
- Switchboards, main assembly designation: Minimum 25 mm.
- Switchboards, outgoing functional units: Minimum 8 mm.
- Switchboards, sub assembly designations: Minimum 15 mm.
- Valves: Minimum 20 mm.
- Self-adhesive flexible plastic labels:
  - Labels less than 2000 mm above floor: 3 mm on 6 mm wide tape.
  - Labels minimum 2000 mm above floor: 8 mm on 12 mm wide tape.
  - Other locations: Minimum 3 mm.

Label locations: Locate labels so that they are easily seen and are either attached to, below or next to the item being marked.

Fixing: Fix labels securely using screws, rivets, proprietary self-adhesive labels or double-sided adhesive tape and as follows:

- If labels are mounted in extruded aluminium sections, use rivets or countersunk screws to fix the extrusions.
- Use aluminium or monel rivets for aluminium labels.

Vapour barriers: Do not penetrate vapour barriers.

3.18 SOFTWARE

General

Requirement: Provide the software required for the operation and management of building services systems and equipment.

3.19 WARRANTIES

General

Requirement: If a warranty is documented, or if a manufacturer's warranty extends beyond the end of the DLP name the Principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

Warranty period: Start warranty periods at practical completion or at acceptance of installation, if acceptance occurs after practical completion.

Approval of installer: If installation is not by manufacturer, and product warranty is conditional on the manufacturer's approval of the installer, submit the manufacturer's written approval of the installing firm. This must be provided and approved before any work is commenced or materials ordered.

3.20 RECORD DRAWINGS AND AS-BUILT DRAWINGS

General

Requirement: The Contractor is to submit record drawings of all as-built construction documents of all disciplines at practical completion showing the following:

- Installed locations of building elements, services, plant and equipment.
- Off-the-grid dimensions and depth if applicable.
- Any provisions for the future.
- Revisions and updated to have included all review comments.

Record drawings

Progress recording during construction: Keep one set of design consultant drawings of all disciplines on site at all times, expressly for the purpose of marking changes made during the progress of the works.

Endorsement: The Contractor is to sign and date all amendments record drawings referenced on site.

As-built drawings

Contractor's as-built CAD drawings: The Contractor is to submit record drawings of all as-built construction documents of all disciplines at practical completion in CAD format.

Architectural CAD drawings: The Contractor should obtain CAD files from the architect prior to practical completion in order to complete as-built CAD drawings and shall sign the Architect's Data Transfer Agreement and return a copy to the Architect prior to any issue of architectural CAD drawings for the Contractor's use.

Consultant CAD drawings: The Contractor shall liaise with the other design consultants to comply with their individual data transfer arrangements to obtain CAD drawings for the Contractor's use in preparing as-built documentation.

Contractor's as-built PDF drawings: The Contractor is to submit record drawings of all as-built construction documents of all disciplines at practical completion in PDF format.

Quantity and format: Conform to the drawing sheet size utilised for the project. Endorsement: Sign and date all record drawings.

Date for submission: At or before the date for practical completion.

As-built services record drawings

General: The Contractor's as-built drawings of all building services are to include the following as a minimum

- Contents: As for the respective shop drawings.
- Penetrations: Record the location of, size of and any sealants used at all floor penetrations Extensions and/or changes to existing: If a drawing shows extensions and/or alterations to existing installations, include sufficient of the existing installation to make the drawing comprehensible without reference to drawings of the original installation.
- Detention: If on-site detention tanks or pondage are provided, include the volume required on the drawing and the permitted flow rate to the connected system.
- Domestic cold water or fire mains: Show the pressure available at the initial connection point and the pressure available at the most disadvantaged location on each major section of the works.
- Stormwater: If storm water pipes are shown, include the pipe size and pipe grade together with the maximum acceptable flow and the actual design flow.
- All in-ground to be accurate including depths (not diagrammatic)
- All as-built electrical services
- All as-built hydraulic services
- All as-built mechanical services
- All as-built dry and wet fire services
- Connection to authority infrastructure
- All isolation valves
- All switches
- All junction boxes

Diagrams: Provide diagrammatic drawings of each system including the following:

- Controls.
- Piping including all valves and valve identification tags.
- Principal items of equipment.
- Single line wiring diagrams.
- Acoustic and thermal insulation.
- Access provisions and space allowances.
- Fixings.
- Fixtures.
- Switchgear and control gear assembly circuit schedules including electrical service characteristics, controls and communications.
- Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

CAD base drawings: The Contractor may use the architectural CAD drawings provided the Architect's data transfer agreement is completed and returned by the Contractor.

Subsurface services: Record information on underground or submerged services to the documented quality level, conforming to AS 5488.

As-built record drawings of particular installations

The Contractor is to submit as-built drawings showing location of and materials used of the following installations:

- All termite barriers
- All roof access safety equipment

Certification

The Contractor is to liaise with their services subcontractors to obtain sign off for each discipline inclusive of Statutory Declaration as proof that all as-builts are guaranteed by the Contractor, manufacturer and designer.

3.21 REPORTS AND PHOTOGRAPHS

General

General: Submit Fortnightly Building Reports or as required by the Principal describing the following:

- Written account of building activities during the preceding month
- Forecast written summary of building activity for the next month
- Detailed photographs of work carried out – emphasising those areas where work will be permanently covered up during the later stages of construction (ie. installed waterproof membranes to basement areas, etc.)
- Sub-contract letting status
- Building Program update
- Record of any Delays and Extensions of Time (if any)
- Record of Contract administrator instructions
- Summary of Requests for Information (RFI) if any
- Summary of Variation Claims and Approvals (if any)
- Record of actions required or closed out against Approval Authorities
- Construction Documentation Register inclusive of any revisions during construction

Progress photographs

General: Ensure that coloured progress photographs are taken within 3 days before each site meeting. At each site meeting submit a digital record of site progress to the Contract Administrator. Identify project, date, time, location and orientation.

Purpose of submission: Information only.

Frequency: Fortnightly.

Minimum number: Ten.

Scope: Provide a variety of photographs from different directions. Include detailed photographs together with overall views of the works with each photographic submission. If particular elements of the works are critical or are subject to RFIs, design development or dispute then these elements must be included in the weekly progress photographs.

Photographs works that will be concealed: The Contractor shall take particular attention to photographing works that will be concealed as a result of adjacent construction materials. It is important to record this information to document quality. Examples include ceiling void services, waterproof membranes and termite protection measures.

Photographs works adjacent to archaeological artefacts: Provide photographs recording trenches prior to back-filling adjacent to any exposed archaeological artefacts. Document finish levels of exposed archaeology to match project survey bench mark.

3.22 OPERATION AND MAINTENANCE MANUALS

General

Authors and compilers: Personnel experienced in the maintenance and operation of equipment and systems installed, and with editorial ability.

Referenced documents: If referenced documents or technical worksections require that manuals be submitted, include corresponding material in the operation and maintenance manuals.

Subdivision: By installation or system, depending on project size.

Contents

General: Submit operation and maintenance manuals for the whole of the work.

Provide documentation for the purpose of enabling the Principal to operate and maintain the plant and equipment and for referenced documents or technical worksections which require that manuals be submitted, include corresponding material in the operation and maintenance manuals. Together with all relevant information that would assist the Principal in carrying out the operation, maintenance, additions and/or alterations to the installation.

Requirement: Include the following:

- Table of contents: For each volume. Title to match cover.

- Directory: Names, addresses, email addresses and telephone and facsimile numbers of principal consultant, subconsultants, contractor, subcontractors and names of responsible parties.
- Record drawings: Complete set of record drawings, full size.
- Drawings and technical data: As necessary for the efficient operation and maintenance of the installation. Include:
  . Switchgear and controlgear assembly circuit schedules including electrical service characteristics, controls and communications.
  . Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- Installation description: General description of the installation.
- Systems descriptions and performance: Technical description of the systems installed and mode of operation, presented in a clear and concise format readily understandable by the principal's staff. Identify function, normal operating characteristics, and limiting conditions.
- Systems performance: Technical description of the mode of operation of the systems installed.
- Baseline data: To AS 1851, AS 1668.1 and AS 1670.1.
- Documentation to AS 1851 including the schedule of essential functionality and performance requirements.
- Documentation shall include:
  . As installed drawings
  . Manufacturer's documentation of all equipment
  . Instructions for operation of the system
  . Maintenance procedures
  . Listings of all entered programmable parameters
  . Information relating to the expected operational life of all major system components.
  . Warranty details in excess of the defects liability period
- Digital photographic records to **Underground services**.
- Equipment descriptions:
  . Name, address, email address and telephone and facsimile numbers of the manufacturer and supplier of items of equipment installed, together with catalogue list numbers.
  . Schedules (system by system) of equipment, stating locations, duties, performance figures and dates of manufacture. Provide a unique code number cross-referenced to the record and diagrammatic drawings and schedules, including spare parts schedule, for each item of equipment installed. Equipment schedules in tabular form including the equipment designation used on the drawings, manufacturer's name and contact details, equipment name plate data, function of item, associated system and capacity data.
  . Manufacturers' technical literature for equipment installed, assembled specifically for the project, excluding irrelevant matter. Mark each product data sheet to clearly identify specific products and component parts used in the installation, and data applicable to the installation.
  . Supplements to product data to illustrate relations of component parts. Include typed text as necessary.
- Certificates:
  . Certificates from authorities.
  . Copies of manufacturers' warranties.
  . Product certification.
  . Test certificates for each service installation and all equipment.
  . Test reports
  . Test, balancing and commissioning reports.
  . Control system testing and commissioning results.
- 7 day record of all trends at commissioning.
- Operation procedures:
  . Manufacturers' technical literature as appropriate.

  - . Safe starting up, running-in, operating and shutting down procedures for systems installed. Include logical step-by-step sequence of instructions for each procedure.
  - . Control sequences and flow diagrams for systems installed.
  - . Legend for colour-codes services.
  - . Schedules of fixed and variable equipment settings established during commissioning and maintenance.
  - . Procedures for seasonal changeovers.
  - . If the installation includes cooling towers, a water efficiency management plan.
- Maintenance procedures:
  - . Detailed recommendations for periodic maintenance and procedures, including schedule of maintenance work including frequency and manufacturers' recommended tests.
  - . Manufacturer's technical literature as appropriate. Register with manufacturer as necessary. Retain copies delivered with equipment.
  - . Safe trouble-shooting, disassembly, repair and reassembly, cleaning, alignment and adjustment, balancing and checking procedures. Provide logical step-by-step sequence of instructions for each procedure.
  - . Schedule of spares recommended to be held on site, being those items subject to wear or deterioration and which may involve the principal in extended deliveries when replacements are required. Include complete nomenclature and model numbers, and local sources of supply.
  - . Schedule of normal consumable items, local sources of supply ,and expected replacement intervals up to a running time of 40 000 hours. Include lubrication schedules for equipment.
  - . Schedules for recording recommissioning data so that changes in the system over time can be identified.
  - . Instructions for use of tools and testing equipment.
  - . Emergency procedures, including telephone numbers for emergency services, and procedures for fault finding.
  - . Safety data sheets (SDS).
  - . Instructions and schedules conforming to AS 1851, AS/NZS 3666.2, AS/NZS 3666.3 and AS/NZS 3666.4.
- Maintenance records:
  - . Prototype service records conforming to AS 1851 prepared to include project specific details.
  - . Prototype periodic maintenance records and report to AS/NZS 3666.2, AS/NZS 3666.3 and AS/NZS 3666.4 as appropriate, prepared to include project specific details.
  - . For hard copies: In binders which match the manuals, loose leaf log book pages designed for recording completion activities including operational and maintenance procedures, materials used, test results, comments for future maintenance actions and notes covering the condition of the installation. Include completed log book pages recording the operational and maintenance activities performed up to the time of practical completion.
  - . Number of pages: The greater of 100 pages or enough pages for the maintenance period and a further 12 months.
- Emergency information: For each type of emergency, including fire, flood, gas leak, water leak, power failure, water failure, system or sub system failure, chemical release or spill, include the following:
  - . Emergency instructions.
  - . Emergency procedures including:
    - * Instructions for stopping or isolating.
    - * Shutdown procedures and sequences.
    - * Instructions for actions outside the property.
    - * Special operating instructions relevant to the emergency.
    - * Contact details relevant to the emergency.

Additional details to be contained within the documents are specified in the Scope and Quality Requirements sections of this specification.

Ensure that the Scope and Quality Requirements sections of the specification include details of the items to be included in the Operation and Maintenance Manual

The above documents shall be collated into a Manuals section containing printed texts and a Drawings section containing the drafted drawings.

Submit a draft copy of the document for approval prior to practical completion.

An interim copy of the sections of the Operating and Maintenance Manual which refers to essential and emergency services shall be provided prior to practical completion for site use until the final versions of the manual are supplied.

Emergency information manual

Form of emergency information: Provide one of the following:

- An index and coloured tabs identifying emergency information for each type of emergency within the Operation and maintenance manual.
- A separate Emergency manual containing copies of emergency information from the main Operation and maintenance manual.

Preferred structure

The Contractor shall comply with Principal's preferred organisational structure for all Operations and Maintenance Manuals. Seek instructions from the Superintendent prior to finalising the Manuals.

Format – electronic copies

Scope: Provide the same material as documented for hardcopy in electronic format.

Quantity and format: Conform to **SUBMISSIONS , Electronic submissions**.

Printing: Except for drawings required in the **RECORD DRAWINGS** clause provide material that can be legibly printed on A4 size paper.

Format – hard copy

General: A4 size loose leaf, in commercial quality, 4 ring binders with hard covers, each indexed, divided and titled. Include the following features:

- Cover: Identify each binder with typed or printed title *OPERATION AND MAINTENANCE MANUAL*, to spine. Identify title of project, volume number, volume subject matter, and date of issue.
- Dividers: Durable divider for each separate element, with typed description of system and major equipment components. Clearly print short titles under laminated plastic tabs.
- Drawings: Fold drawings to A4 size with title visible, insert in plastic sleeves (one per drawing) and accommodate them in the binders.
- Pagination: Number pages.
- Ring size: 50 mm maximum, with compressor bars.
- Text: Manufacturers' printed data, including associated diagrams, or typewritten, single-sided on bond paper, in clear concise English.

Number of copies: 3.

Date for submission

Draft submission: The earlier of the following:

- 4 weeks before the date for practical completion.
- Commencement of training on services equipment.

Final submission: Within 2 weeks after practical completion.

Manuals

The manuals shall be concise and written in English language to describe the systems installed, method of operation and maintenance procedures.

All text in the manual shall be written in terminology which is understood by non-technical personnel and prepared by personnel who are familiar with the system design and capable of providing a detailed description of the system operation and related items.

The manuals shall include:

- a title section including the project name, address, Principal and Contractor
- a listing of the name, address, telephone, facsimile, e-mail and WEB address contacts of equipment manufacturers, system installers, service companies and maintenance contractors for the contract works

- a comprehensive index of the contents of each volume of the manual including associated drawings
- a description of all systems in the installation including the method of operation
- building services information and descriptions
- a schedule of routine maintenance and testing procedures and periods between activities
- manufacturer's brochures and documentation on all equipment and accessories used in the installation
- test reports including the results of commissioning tests including a statement from the independent Commissioning Agent as applicable for equipment and systems which have been formally tested and commissioned as required by the specification
- details of essential services inspections including all test results and certificates
- approval and compliance certificates and notices issued by Authorities, Agencies, Suppliers, Installers and Contractors, inclusive of all actions closed out from Council's Notice of Determination.
- Section J BCA compliance statements.
- Job Safety Analysis documentation.

3.23 CLEANING

Final cleaning
General: Before the date for practical completion, clean throughout, including all exterior and interior surfaces except those totally and permanently concealed from view.

Labels: Remove all labels not required for maintenance.

3.24 TRAINING

Reference
General: Refer to Services documentation for additional service specific items.

General
Duration: Instruction to be available for the whole of the commissioning and running-in periods.

Format: Conduct training at agreed times, at system or equipment location. Also provide seminar instruction to cover all major components.

Operation and maintenance manuals: Use items and procedures listed in the final draft operation and maintenance manuals as the basis for instruction. Review contents in detail with the principal's staff.

Certification: Provide written certification of attendance and participation in training for each attendee. Provide register of certificates issued.

Demonstrators
General: Use only qualified manufacturer's representatives who are knowledgeable about the installations.

Maintenance
General: Explain and demonstrate to the principal's staff the purpose, function and maintenance of the installations.

Operation
General: Explain and demonstrate to the principal's staff the purpose, function and operation of the installations.

Seasonal operation
General: For equipment requiring seasonal operation, demonstrate during the appropriate season and within 6 months

3.25 PERIODIC MAINTENANCE OF SERVICES

General
Requirement: During the maintenance period, carry out periodic inspections and maintenance work as recommended by manufacturers of supplied equipment, and promptly rectify faults.

Emergencies: Attend emergency calls promptly.

Annual maintenance: Carry out recommended annual maintenance procedures before the end of the maintenance period.

Maintenance period: The greater of the defects liability period and the period documented in the **Maintenance requirements schedule**.

Reference
General: Refer to Services documentation for additional service specific items.

Maintenance program
General: Submit details of maintenance procedures and program, relating to installed plant and equipment, 6 weeks before the date for practical completion. Indicate dates of service visits. State contact telephone numbers of service operators and describe arrangements for emergency calls.

Reference: Refer to documentation prepared by all Service Engineers to confirm maintenance requirements for services. Ensure that the specified maintenance of building services are carried out in accordance with the manufacturer's data.

Maintenance records
General: Record in binders provided with the Operation and maintenance manuals.

Referenced documents: If referenced documents or technical worksections require that log books or records be submitted, include this material in the maintenance records.

Certificates: Include test and approval certificates.

Service visits: Record comments on the functioning of the systems, work carried out, items requiring corrective action, adjustments made and name of service operator. On completion of the visit, obtain the signature of the principal's designated representative on the record of the work undertaken.

Site control
General: Report to the principal's designated representative on arriving at and before leaving the site.

3.26 POST-CONSTRUCTION MANDATORY INSPECTIONS AND MAINTENANCE

General
Requirement: For the duration of the defects liability period, provide inspections and maintenance of safety measures required by the following:

- AS 1851.
- Other statutory requirements applicable to the work.
- Final Fire Safety Certificate in accordance with the requirements of the EP&A Reg, inclusive of Contractor's engagement of a qualified Competent Fire Safety Practitioner to undertake an inspection and certification for lodgement of Annual Fire Safety Statement with Council

Records: Provide mandatory records.

Certification: Certify that mandatory inspections and maintenance have been carried out and that the respective items conform to statutory requirements.

Annual inspection: Perform an annual inspection and maintenance immediately before the end of the defects liability period.

3.27 PRACTICAL COMPLETION

General

Prior to practical completion the following conditions precedent must be satisfied:

- Provide all documentation, and obtain all approvals necessary for the Principal to occupy the building.
- Close out and complete all actions required by the Contractor to address Council's Notice of Determination.
- Complete successfully all testing and commissioning of services.
- Submit:
    - Final survey certificate.
    - Certificates with respect to each essential service installed in the building. Certificates shall state:
        - that the service has been inspected by a person who is competent to carry out such an inspection; and
        - that the service was or was not (as at the date on which it was inspected) found:
            - in the case of a previously-existing service - to have been maintained, and to be capable of operating, at a standard not less than that to which it was originally designed and installed; and

in the case of a new service - to have been designed and installed, and to be capable of operating, to a standard not less than that specified by Council in the conditions of development consent.

- Annual Fire Safety Certificate (certified by a Competent Fire Safety Practitioner in accordance with the EP&A Reg
- Certificate of Occupancy
- All record/ as-built drawings and photographs, described and dated
- Guarantees and warranties and all instruction books and manuals
- Guarantees and subcontractors' warranties for materials and finishes where called for in the contract documents
- Contractor's warranty
- Operating & Maintenance Manuals
- Keys and electronic swipes

Samples

General: Remove unincorporated samples, sample panels and prototypes on completion.

Cleaning

General: Before practical completion, clean throughout, including all exterior and interior surfaces except those totally and permanently concealed from view.

3.28 NOTICE TO ATTEND SITE AND HOLD POINTS

Notification

Where the Contractor requires the Superintendent, the Principal, or any design consultant or agent engaged by the Principal to attend the site, allow for the notification periods stated in the **Notices schedule.**

Notices schedule

Item	**Minimum notice**
On site	2 working days
Off site	2 working days
Any disturbance of buried archaeological artefacts	Immediate

Hold Points

The Contractor is to observe the hold points specified in each worksection and notify the Superintendent when site attendance may be carried out.

0181 ADHESIVES, SEALANTS AND FASTENERS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide adhesives, sealants and fasteners, as documented.

Performance

Requirements: Conform to the following:

- Fitness for purpose: Capable of transmitting imposed loads, sufficient to maintain the rigidity of the assembly, or integrity of the joint.
- Finished surface: That will not cause discolouration.
- Compatibility: Compatible with the products to which they are applied.
- Sealant replacement: Capable of safe removal without compromising the application of the replacement sealant for future refurbishment.
- Movement: If an adhered or sealed joint is subject to movement, select a system certified to accommodate the projected movement under the conditions of service.
- Fasteners: Suitable for the particular use, capable of transmitting imposed loads and maintaining the rigidity of the assembly.

BCA Section J

Requirement: at any opening such as a window, door or the like the formed opening must be constructed to minimise air leakage. Internal linings are to close fitting at ceiling, wall and floor junctions and sealed with caulking, skirting, architraves, cornices and the like.

1.2 PRECEDENCE

General

Order of precedence:

- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of worksections override conflicting requirements of their referenced documents. The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.
- *0621 Waterproofing - wet areas* for additional sealant requirements.

1.4 SUBMISSIONS

Products and materials

Sealants: Submit technical data sheets.

Samples

Visible joint sealants: Colour match sealants to adjacent finishes, Contractor to give notice for inspection at the time of inspection of adjacent finishes.

Tests

Compatibility testing: Submit adhesion and compatibility testing data demonstrating that adhesive, sealant or fastener is compatible with materials to be fixed and is suitable for the project conditions.

Warranties

Manufacturer’s warranty: Submit the manufacturer’s published product warranties.

Sealants

Samples: Submit colour samples of visible joint sealants.

1.5 INSPECTION

Hold points

General: Do not commence work or proceed to the next stage of work before approval of the required Hold Points .

Submit the following documentation on the products and installation detail:

- Manufacturers statement certifying that the products and systems being supplied are in accordance with this specification and are suitable for the intended use, required detailing and performance.
- Confirmation regarding UV stability.
- Installers/manufacturer's acceptance of the substrates.
- Manufacturers statement that the Contractors proposed applicator is qualified and accredited to install the systems.

1.6 PERFORMANCE

Adhesives and sealants

General: Provide adhesives and sealants capable of transmitting imposed loads, sufficient to make sure the rigidity of the assembly, or integrity of the joint and which will not cause discolouration of finished surfaces.

Compatibility: Do not use sealants or adhesives that are incompatible with the products to which they are applied.

Movement: Where an adhered or sealed joint may be subject to movement, select a system accredited to accommodate the projected movement under the conditions of service.

Refurbishment: Use sealants that can be safely removed and prepared for refurbishment.

Fasteners

Provide fasteners accredited for the particular use, capable of transmitting imposed loads and maintaining the rigidity of the assembly.

2 PRODUCTS

2.1 ADHESIVES

Standards

Gypsum plaster adhesive: To AS 2753.

High strength adhesive tape

General description: A foam of cross linked polyethylene or closed cell acrylic coated both sides with a high performance acrylic adhesive system, encased in release liners of paper or polyester.

Product classification: Select tape to suit substrate as follows:

- Firm high strength foam tapes: For high energy surfaces including most bare metals such as stainless steel and aluminium.
- Conformable high strength foam: For the following:
  - . Medium energy surfaces including many plastics and paints, and bare metals.
  - . Lower energy surfaces including many plastics, most paints and powder coatings, and bare metals.

Thickness: Select the tape to make sure a mismatch between surfaces does not exceed half the tape thickness under the applied lamination pressure.

Total VOC limits

Requirement: Conform to MCC asset management requirements.

2.2 SEALANTS

Standards

General: To ISO 11600.

Sealing compound (polyurethane, polysulphide, acrylic):

- Single component: To ASTM C920

Sealing compound (silicone)

- Single Component: To TT-S-1543B

External masonry joints

General: Provide sealant and bond breaking materials which are non-staining to masonry. Do not use bituminous materials with absorbent masonry units.

Bond breaking backing:

- Bond breaking materials: Non-adhesive to sealant, or faced with a non-adhering material.
- Foamed materials: Closed-cell or impregnated, not water-absorbing.
- Consult manufacturers for joint fillers e.g. closed cell expanded polythene with regard to compatibility with the sealant. Rigid fillers such as pulp board, cork or semi-rigid foam should not be specified.

Lightweight building element joints

Joints subject to rapid changes of movement: Provide sealants that accommodate the movement of the contact materials.

Floor control joints

General: Provide trafficable sealants.

Bond breaking backing:

- Bond breaking materials: Non-adhesive to sealant, or faced with a non-adhering material.
- Foamed materials: Closed-cell or impregnated, not water-absorbing.

Total VOC limits

Requirement: Conform to MCC asset management requirements.:

2.3 FASTENERS

General

Masonry anchors: Proprietary expansion or bonded type anchors conforming to **SELECTIONS, ANCHORS**.

Plain washers: To AS 1237.1.

- Provide washers to the heads and nuts of bolts, and the nuts of coach bolts.

Plugs: Proprietary purpose-made plastic.

Stainless steel fasteners: To ASTM A240/A240M.

Steel nails: To AS 2334.

- Length: At least 2.5 times the thickness of the member being secured, and at least 4 times the thickness if the member is plywood or building board less than 10 mm thick.

Unified hexagon bolts, screws and nuts: To AS/NZS 2465.

Fasteners in CCA treated timber: Epoxy coated or stainless steel.

Bolts

Coach bolts: To AS/NZS 1390.

Hexagon bolts Grades A and B: To AS 1110.1.

Hexagon bolts Grade C: To AS 1111.1.

Corrosion resistance

Atmospheric corrosivity category: To *0171 General requirements*.

Steel products: Conform to the **Corrosion resistance table** or provide proprietary products with metallic and/or organic coatings of equivalent corrosion-resistance.

The following are minimum requirements. Refer to the Professional Engineer's documentation and other architectural worksections for higher levels as required.

Corrosion resistance table

Atmospheric corrosivity category to AS 4312	**Threaded fasteners and anchors**		**Powder actuated fasteners**
	Material	**Minimum local metallic coating thickness (µm)**	**Material**

Atmospheric corrosivity category to	Threaded fasteners and anchors		Powder actuated fasteners
C1 and C2	Electroplated zinc or Hot-dip galvanized	30	Stainless steel 316
C3	Hot-dip galvanized	50	Stainless steel 316
C4 and T	Stainless steel 316	-	Stainless steel 316

Finishes

Electroplating:

- Metric thread: To AS 1897.
- Imperial thread: To AS 4397.

Galvanizing:

- Threaded fasteners: To AS/NZS 1214.
- Other fasteners: To AS/NZS 4680.

Mild steel fasteners: Galvanize if:

- Embedded in masonry.
- In external timbers.
- In contact with chemically treated timber other than CCA treated timber.

Epoxy coated: CCA treated timber.

Nuts

Hexagon chamfered thin nuts Grades A and B: To AS 1112.4.

Hexagon nuts Grade C: To AS 1112.3.

Hexagon nuts Style 1 Grades A and B: To AS 1112.1.

Hexagon nuts Style 2 Grades A and B: To AS 1112.2.

Screws

Coach screws: To AS/NZS 1393.

Hexagon screws Grades A and B: To AS 1110.2.

Hexagon screws Grade C: To AS 1111.2.

Hexagon socket screws: To AS 1420.

Self-drilling screws: To AS 3566.1.

Self-tapping screws:

- Crossed recessed countersunk (flat – common head style): To AS/NZS 4407.
- Crossed recessed pan: To AS/NZS 4406.
- Crossed recessed raised countersunk (oval): To AS/NZS 4408.
- Hexagon: To AS/NZS 4402.
- Hexagon flange: To AS/NZS 4410.
- Hexagon washer: To AS/NZS 4409.
- Slotted countersunk (flat – common head style): To AS/NZS 4404.
- Slotted pan: To AS/NZS 4403.
- Slotted raised countersunk (oval – common head style): To AS/NZS 4405.

Blind rivets

Description: Expanding end type with snap mandrel.

Type: Closed end for external application, open end for internal application.

End material:

- Aluminium base alloy for metallic-coated or prepainted steel.
- Stainless steel for stainless steel sheet.
- Copper for copper sheet.

Size:

- For sheet metal to sheet metal: 3 mm.
- For sheet metal to supports, brackets and rolled steel angles: 4.8 mm.

3 EXECUTION

3.1 ADHESIVES

General

Requirement: Install to the manufacturer’s recommendations.

Preparation

Substrates: Conform to the following:

- Remove any deposit or finish which may impair adhesion.
- If framed or discontinuous, provide support members in full lengths without splicing.
- If solid or continuous, remove excessive projections.
- If previously painted, remove cracked or flaking paint and lightly sand the surface.

Contact adhesive

Precautions: Do not use contact adhesive if:

- A substrate is polystyrene foam.
- A PVC substrate may allow plasticiser migration.
- The adhesive solvent can discolour the finished surface.
- Dispersal of the adhesive solvent is impaired.

Two-way method: Immediately after application, press firmly to transfer adhesive and then pull both surfaces apart. Allow to tack off and then reposition and press firmly together. Tap areas in contact with a hammer and padded block.

One-way method: Immediately after application, bring substrates together and maintain maximum surface contact for 24 hours by clamps, nails or screws as appropriate. If highly stressed, employ permanent mechanical fasteners.

High strength adhesive tape

Preparation:

- Non-porous surfaces: Clean with surface cleaning solvents such as isopropyl alcohol/water, wash down and allow to dry.
- Porous surfaces: Prime the surface with a contact adhesive compatible with the tape adhesive system.

Application to copper, brass, plasticised vinyl and hydrophilic surfaces such as glass and ceramics in a high humidity environment: Conform to manufacturer's recommendations.

Applied lamination pressure: Make sure the tape experiences 100 kPa.

Application temperature: Generally above 10°C and to the manufacturer's recommendations.

Completion: Do not apply loads to the assembly for 72 hours at 21°C.

3.2 JOINT SEALING

General

Requirement: Install to the manufacturer’s recommendations.

Joint preparation

Cleaning: Cut flush joint surface protrusions and rectify if required. Mechanically clean joint surfaces free of any deposit or finish which may impair adhesion of the sealant. Immediately before sealant application, remove loose particles from the joint, using oil-free compressed air.

Bond breaking: Install bond breaking backing material.

Taping: Protect the surface on each side of the joint using 50 mm wide masking tape or equivalent means. On completion of sealant application, remove the tape and remove any stains or marks from adjacent surfaces.

Primer: Apply the recommended primer to the surfaces in contact with sealant materials.

Sealant joint proportions
General weatherproofing joints (width:depth):

- 1:1 for joint widths less than 12 mm.
- 2:1 for joint widths greater than 12 mm.
- Refer and coordinate also with material manufacturer for specific requirements.
- Structurally designed joints: Refer to Professional Engineer's requirements and documentation.

Sealant application
General: Apply the sealant to dry joint surfaces using a pneumatic applicator gun. Make sure the sealant completely fills the joint to the required depth, provides good contact with the full depth of the sides of the joint and traps no air in the joint. Do not apply the sealant outside the recommended working time for the material or the primer.

Weather conditions
Two pack polyurethanes: Do not apply the sealant if ambient conditions are outside the following:

- Temperature: Less than 5°C or greater than 40°C.
- Humidity: To the manufacturer's recommendations.

Joint finish
General: Force the sealant into the joint and finish with a smooth, slightly concave surface using a tool designed for the purpose.

Excess sealant: Remove from adjoining surfaces using cleaning material nominated by the sealant manufacturer.

Protection
General: Protect the joint from inclement weather during the setting or curing period of the material.

Rectification
General: Cut out and remove damaged portion of joint sealant and reinstall so repaired area is indistinguishable from undamaged portion.

3.3 FASTENERS

General
Requirement: Install to the manufacturer's recommendations.

Fastening to wood and steel
Timber substrates: To AS 1720.1 Section 4.

Self-drilling screws: To AS 3566.1 for timber and steel substrates.

Masonry anchors
Installation: To the manufacturer's recommendations.

4 SELECTIONS

4.1 ADHESIVES

Application schedule
The following are minimum requirements. Refer to and adjust the adhesive type as required where part of a proprietary lining or other system is proposed. Refer to proprietary system manufacturer's specification in these cases for the product type.

Application	Product	Relevant worksections
Drywall lining/wall panels	High strength contact adhesive	*0511 Lining*
Mirrors	Utilise 1 part polyurethane sealant/adhesive with permanent elasticity to manufacturer's specification	*0467 Glass components*
Trim, mouldings, skirtings and architraves	Utilise High strength contact adhesive	*0511 Lining*

4.2 SEALING, POINTING AND BEDDING

Application schedule

Application	Product	Relevant worksections
Metal flashings and rainwater goods	Silicone neutral cure	*0423p LYSAGHT roofing - profiled sheet metal*
Metal flashings and sealing non-porous substrates	1 part elastomeric polyurethane	*0431 Cladding – combined*
Window and external doors	1 part elastomeric polyurethane	*0451 Windows and glazed doors*, *0453 Doors and access panels*

Adhesives, sealants and fasteners combined function schedule

Application	Product	Relevant worksections
Control joints, tile adhesives and wet area sealants	2 part elastomeric polyurethane	*0631 Ceramic tiling*

0183B METALS AND PREFINISHES

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirements: Provide metal and prefinishes, as documented.

Performance

Requirement: Provide metals in sections of strength and stiffness suited to their required function, finish and method of fabrication.

1.2 PRECEDENCE

General

Order of precedence:

- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of worksections override conflicting requirements of their referenced documents. The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.

1.4 SUBMISSIONS

Samples

General: Submit samples of the following:

- Stainless steel: One sample of every documented surface finish process if not incorporated into a prototype or sample assembly..
- Anodising: One sample of every colour and finishing option.

2 PRODUCTS

2.1 METALS

Coated steel

Electrogalvanized (zinc) coating on ferrous hollow and open sections: To AS 4750.

Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:

- Ferrous open sections by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections by a continuous or specialised process: To AS/NZS 4792.
- Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.

Steel wire: To AS/NZS 4534.

Stainless steel

Bars: To ASTM A276/A276M.

Plate, sheet and strip: To ASTM A240/A240M.

Welded pipe (plumbing applications): To AS 1769.

Welded pipe (round, square, rectangular): To ASTM A554.

3 EXECUTION

3.1 GENERAL

Metal separation

Incompatible sheet metals: Prevent direct contact between incompatible metals. Provide separation by one of the following:

- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
- Insert a concealed, non-metallic separation layer such as polyethylene film, adhesive tape, neoprene, nylon or bituminous felt.

Incompatible fixings: Do not use.

Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous or paper products.

Brazing

General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.

Butt joints: Do not use butt jointing for joints subject to load. If butt joints are used, do not rely on the filler metal fillet only.

Filler metal: To AS/NZS 1167.1.

Finishing

Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Make sure self-finished metals are without surface colour variations after jointing.

Preparation

General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.

Standard: To AS 1627 series.

Priming steel surfaces: If site painting is documented to otherwise uncoated mild steel or similar surfaces, prime as follows:

- After fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to unprimed surfaces.

Welding

Aluminium: To AS 1665.

Stainless steel: To AS/NZS 1554.6.

Steel: To AS/NZS 1554.1.

Quality: Provide finished welds which are free of surface and internal cracks, slag inclusion, and porosity.

Visible welds: all welds viewed at a distance less or equal to 6 m are to comply with the following:

. Sharp edges ground smooth
. Continuous weld appearance
. Weld spatters removed
. Provide samples
. One-half standard fabrication tolerances
. Fabrication marks not apparent
. Welds uniform and smooth
. Mill marks removed
. Butt and plug welds ground smooth and filled
. RHS/CHS weld seam not apparent or orientated to reduce visibility
. Cross sectional abutting surface aligned
. Joint gap tolerances minimised
. All welded connections unless otherwise detailed.

Site welds: Avoid site welding wherever possible. If required locate site welds in positions for down hand welding.

Butt weld quality level: General non visible not inferior to the appropriate level recommended in AS 1665 Appendix A. Refer **Visible welds**.

3.2 STAINLESS STEEL FINISHES

General

Requirement: Provide a surface finish to match the approved sample.

Sample identification: Code and retain signed samples.

Pre-assembly

Mechanically polished and brushed finishes: Apply grit faced belts or fibre brushes that achieve uni-directional finishes with buffing, as required to provide the following:

- Finish designation: Linished finish to a maximum of 0.5 RA prior to electropolishing for all external stainless steel and linished finish to a maximum of 0.5 RA for internal stainless steel,

Bead blasted finish: Provide a uniform non-directional low reflective surface by bead blasting. Do not use sand, iron or carbon steel shot. Blast both sides of austenitic stainless steel to equalise induced stress.

Post-assembly pre-treatment

Heat discolouration: Remove by pickling.

Welds: Grind excess material, brush, and polish to match the pre-assembly finish.

Post-assembly finish

Electropolish finish for external installations: Provide an electro-chemical process to stainless steel type 316.

Brushed electropolish finish: Conform to the following:

- Pre-assembly finish: No. 4 brushed finish.
- Post-assembly finish: Provide an electro-chemical processed finish to achieve a No. 7 to No. 8 brushed finish.

Mirror electropolish finish:

- Pre-assembly finish: Mill finish 2B or mirror polished finish.
- Post-assembly finish: Provide an electro-chemical processed finish to achieve a No. 8 mirror like finish.

Completion

Cleaning: Clean and rinse to an acid free condition and allow to dry. Do not use carbon steel abrasives or materials containing chloride.

Protection: Secure packaging or strippable plastic sheet.

3.3 ELECTROPLATING

Electroplated coatings

Chromium on metals: To AS 1192.

- Service condition number: At least 2.

Nickel on metals: To AS 1192.

- Service condition number: At least 2.

Zinc on iron or steel: To AS 1789.

3.4 ANODISING

General

Standard: To AS 1231.

Thickness grade: To AS 1231 Table H1.

Sample

General: Provide a finish to match the sample in terms of colour and finishing options.

3.5 PREPAINTING

Air-drying enamel

Application: Spray or brush.

Finish: Full gloss.

General use:

- Primer: Two-pack epoxy primer to AS/NZS 3750.13.
- Top coats: 2 coats to AS 3730.6.

Oil resistant use:

- Primer: Two-pack epoxy primer to AS/NZS 3750.13.
- Top coats: 2 coats to AS/NZS 3750.22.

Equipment paint system

Description: Brush or spray application using paint as follows:

- Full gloss enamel finish coats, oil and petrol resistant: To AS/NZS 3750.22, two coats.
- Prime coat to metal surfaces generally: To AS/NZS 3750.19 or AS/NZS 3750.20.
- Prime coat to zinc-coated steel: To AS 3730.15 or AS/NZS 3750.16.
- Undercoat: To AS/NZS 3750.21.

Prepainted metal products

Standard: To AS/NZS 2728.

Product type as noted in AS/NZS 2728: Not lower than the type appropriate to the atmospheric corrosivity category.

Stoving enamel

Application: Spray or dip.

Two-pack liquid coating

Application: Spray.

Finish: Full gloss.

Primer: Two pack epoxy primer to AS/NZS 3750.13.

Topcoat:

- Internal use: Proprietary polyurethane or epoxy acrylic system.
- External use: Proprietary polyurethane system.

3.6 COMPLETION

Damage

Damaged prefinishes: Remove and replace items, including damage caused by unauthorised site cutting or drilling.

Repair

Metallic-coated sheet: If repair is required to metallic-coated sheet or electrogalvanizing on inline galvanized steel products, clean the affected area and apply a two-pack organic primer to AS/NZS 3750.9.

0184 TERMITE MANAGEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide termite management systems, and related work for a complete installation including but not limited to the following:.

- Installation by a specialist subcontractor, fully experienced and licensed for installation of the specified system
- Eradication of new colonies discovered on site
- Ongoing maintenance inspection contract at intervals required by the system manufacturer and at Final Completion.

Performance

Objective: To achieve building protection.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.

1.3 COMPANY CONTACTS

KORDON technical contacts

Website: www.kordontmb.com.au.

1.4 STANDARD

General

Termite management systems: To AS 3660.1.

1.5 SUBMISSIONS

Certification

Certificate of installation: Submit certificate to AS 3660.1 Appendix A3.

Operation and maintenance manuals

Maintenance regime: For systems requiring post construction monitoring, provide a maintenance manual with the details of the following:

- Inspection frequency.
- Instructions for inspection of termite activity and treatment effectiveness.
- Contact details of installers and manufacturer's authorised supplier of replacement parts/components.
- Reapplication requirements.

Products and materials

Product data: Submit manufacturer's data for each product/material of the following:

- Construction details, material description and dimensions of individual components.
- Treatments and application procedures.

Type tests: Submit results, as follows:

- Termite management systems to AS 3660.3.

Records

Soil treatment application report: After completing treatment application, submit a report with the following details:

- Date and time of application.
- Moisture content of soil before application.
- Termiticide brand name and manufacturer.

- Quantity of undiluted termiticide used.
- Dilutions, methods, volumes used, and rates of application.
- Areas of application.
- Water source for application.
- Termiticide brand name and manufacturer.
- Quantity of termiticide used.

Management system report: At the end of the defects liability period, submit a report on the efficacy and status of the termite management system.

Tests

Site tests: Submit test results for chemical termite management systems.

Warranties

Management system warranty: Submit the manufacturer's warranty.

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Completed earthworks or substrate preparation before system application/installation.
- The completed termite management system.

1.7 SUBCONTRACTOR'S WARRANTY

Warranty: Provide a warranty against any breach of the management system by termites and providing for materials and labour required to replace any specified materials and work arising directly or indirectly as a result of such breach.

Conditions: Owners to maintain regular inspections by a licensed termite controller.

Period (from practical completion): 10 years.

Extensions to period of warranty: 5 year option – nominate cost.

1.8 MANUFACTURER'S DOCUMENTS

Technical manuals

Reference: Kordon Reference Manual, as prepared by Bayer Environmental Science.

2 PRODUCTS

2.1 PHYSICAL SYSTEMS

Concrete slab

Standard: To AS 3660.1 Section 4.

Reinforced concrete slab is physical termite barrier when constructed in accordance with AS 2870.

Slab edge perimeter barrier type: Kordon TB Perimeter.

Slab penetration and joint protection : Kordon Kollar.

3 EXECUTION

3.1 GENERAL

General: The work required shall be carried out in accordance with the requirement of the system manufacturer, whom holds the Local Authority approval for the termite control system.

Liaison with other trades: In-ground joints to hollow elements (such as pipes, conduits) which penetrate any slab on ground shall be fully sealed so as to prevent access by termites through the inside of the element. Also ensure that such elements are solidly cast in, leaving no voids.

3.2 PHYSICAL SYSTEMS

General

Provide to all areas of construction, as required/recommended by the system manufacturer for

a complete installation. These areas shall include, but not be limited to the following:

- All external (perimeter) veneer walls at ground level at the DPC level or below, under the cavity flashing and across the cavity
- All penetrations to slabs on ground such as services and structural elements
- All slab on ground control and construction joints and any crack inducing joints (tooled joints)
- All external concrete slabs on ground with tiled finishes, under the first row of tiles adjacent to all external wall junctions.
- Under all suspended slabs where a cavity wall supports the slab, across the cavity immediately under the slab.
- All suspended slab penetrations that cannot be otherwise easily accessed for visual inspection.
- Under tiling to external terrace slabs integral with the main floor slabs
- At leading edge of slab where flush accessible thresholds are required to meet the requirements of AS 1428.1
- All other locations recommended by the system manufacturer and as may be required to achieve an installation which complies with all relevant and current standards, codes and local authority regulations.

Concrete slab

Standard: To AS 3660.1 Section 4.

3.3 COMPLETION

Termite management system notice

General: Permanently fix a durable notice in a prominent location to BCA B1.4(i)(ii) or BCA 3.1.4.4.

Waste materials

Progressive cleaning: Make sure no waste materials which could attract termites remain on the site.

Warranties

Provide a warranty on completion to cover materials and installation. Provide written certification that the whole of the installation comply to AS 3660.1 and the documents.Minimum period: 10 year on installation, 10 years on material.

Form of warranty: Written in the name of the proprietor covering material and workmanship.

Completion inspection

Report: At the end of the defects liability period, inspect the termite management systems and prepare a report on their efficacy and status.

Maintenance requirements

Inspection service: Arrange for the termite management system installer to:

- Provide an inspection of the building/s at no cost to owner to detect any breach of the

management system by termites, and to supply a written report, within 30 days of the expiry of a period of 12 months after issue of Final certificate, and

- Contact the owner with a proposal for a maintenance contract scheduling further inspections and reporting at 12-monthly intervals to detect any on-going breach of management systems by termites.

4 SELECTIONS

Whole of building protection

Extent of work: Form a complete termite barrier system for the new work only, inclusive of interface and junction between new work and existing building.

Termite barriers schedule

The following are minimum requirements, allow for a complete termite barrier system to cover all buildings in this contract in accordance with Kordon Reference Manual.

Location	Barrier designation
Slab on ground	Constructed in accordance with AS 2870
Slab on ground penetrations	Kordon Kollar with Parging Material to comply with AS 3660.1.
Slab control joints and	Kordon TB with Parging Material to comply with AS 3660.1.

footing/slab joints	Apply to the Contract Administrator if alternative means are proposed.
Under slabs (generally) – other than those areas specified above	N/A Slab to be constructed in accordance with AS 3660.1.
Building perimeters	Kordon TB Perimeter with Parging Material to comply with AS 3660.1.

0185 TIMBER PRODUCTS, FINISHES AND TREATMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide timber products with finishes and treatments, as documented.

Performance

Requirements:

- Appropriate for durability and fire-resistance.
- Appropriate certification for the finishing applications.

1.2 PRECEDENCE

General

Order of precedence:

- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of worksections override conflicting requirements of their referenced documents. The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.
- *0184 Termite management*.
- *0671p DULUX painting*.

1.4 STANDARDS

General

Sawn and milled products:

- Hardwood: To AS 2796.1.
- Softwood: To AS 4785.1.

Reconstituted wood based panels:

- Particleboard: To AS/NZS 1859.1.
- Dry process fibreboard: To AS/NZS 1859.2.
- Decorative overlaid wood panels: To AS/NZS 1859.3.
- Wet process fibreboard: To AS/NZS 1859.4.

Plywood:

- Structural: To AS/NZS 2269.0.
- Interior: To AS/NZS 2270.
- Exterior: To AS/NZS 2271.
- Marine: To AS/NZS 2272.

Glued laminated timber: To AS/NZS 1328.1.

Laminated veneer lumber: To AS/NZS 4357.0.

1.5 INTERPRETATION

Abbreviations

General: For the purposes of this worksection the following abbreviations apply:

- EWPAA: Engineered Wood Products Association of Australasia.
- LVL: Laminated Veneer Lumber.

- MDF: Medium Density Fibreboard.

Definitions

General: For the purposes of this worksection the definitions given in AS/NZS 4491 and the following apply:

- Dry process fibreboard (MDF): Panel material with a nominal thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and/or pressure, the bond of which is derived from a synthetic adhesive added to the fibres and the panels are manufactured with a forming moisture content of less than 20%.
- Particleboard: Panel material manufactured under pressure and heat from particles of wood (wood flakes, chips, shavings, sawdust and similar) and/or lignocellulosic material in particle form (flax shives, hemp hurds, bagasse fragments, rice hulls, wheat straw and similar) with the addition of an adhesive.
- Wet process fibreboard: Panel material with a nominated thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and/or pressure, the bond of which is derived from the felting of the fibres and the panels are manufactured with a forming moisture content greater than 20%.

1.6 SUBMISSIONS

Products and materials

Rainforest species: Submit source certification.

Pressure preservative treatment: For timber required to be pressure treated, submit a certificate or other evidence showing that the timber has been treated.

Treated timber: Submit safety data sheets for preservative treated timber.

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Deliver timber products to site in unbroken wrapping or containers and store so that the moisture content is not adversely affected.

Product identification

Preservative treated timber: Marking to include the following:

- A unique identifier for the treatment plant.
- A unique identifier for the preservative.
- Hazard class.

2.2 CERTIFICATION

Timber source certification

Requirement: Provide forest certification, chain of custody certification and corresponding product labelling for all timber applications documented as requiring source certification.

Timber product certification and branding

Branding: Brand timber products under the authority of a certification scheme applicable to the product. Locate the brand on faces or edges which will be concealed in the works.

Inspection: If neither branding nor certification is adopted, have an independent inspecting authority inspect the timber.

2.3 DURABILITY

General

Requirement: Provide timbers with natural durability appropriate to the conditions of use, or preservative-treated timber of equivalent durability.

Natural durability class: To AS 5604.

Naturally termite-resistant timbers: To AS 3660.1 Appendix C.

Timber quality: Free of core wood (material within 50 mm of the tree's centre) and free of splits, checks, loose knots and cavities. Free of sapwood (lighter coloured wood found on the outer layer of the tree).

Lyctid susceptible timbers: Do not provide untreated timbers containing lyctid susceptible sapwood.

Untreated sapwood: If used, place to the outside of joints or in locations exposed to higher levels of ventilation.

Preservative treatment

Sawn and round timbers: To AS 1604.1.

Reconstituted wood-based products: To AS/NZS 1604.2.

Plywood: To AS/NZS 1604.3.

Laminated veneer lumber (LVL): To AS/NZS 1604.4.

Glued laminated timber products: To AS/NZS 1604.5.

Moisture content

Test: Methods as follows:

- Timber: To AS/NZS 1080.1.
- Plywood: To AS/NZS 2098.1.
- Reconstructed wood-based products: AS/NZS 4266.1.

Protection: Protect timber and timber products stored on site from moisture and weather. For milled, prefinished, prefabricated and similar elements that are to be protected in the final structure, provide temporary weather protection until the permanent covering is in place.

Termite management

Requirement: To *0184 Termite management*.

2.4 FINISHING

Production finish

Hardwood: To AS 2796.1 Table B1.

Softwood: To AS 4785.1 Table B1.

Surface coating

Painting and staining: To *0671p DULUX painting*.

Application: To the manufacturer's specification.

2.5 RECYCLED TIMBER

General

Type of species: Hardwood – mixed species.

Source: Council depot and site (paling fence).

Application: External landscaping elements (refer to drawings).

Grit blasted or re-machined: Remove all nails and screws.

Classification: Visually graded.

3 EXECUTION

3.1 JOINTS

General

Joints and connections: Use hot-dipped galvanized or stainless steel fasteners, composite bolts, nails or nailed metal connectors.

Timber-to-timber interfaces: Provide a seal coating of preservative treatment and include inside bolt holes and the end grain of the timber.

Water retention: Avoid details that may trap water including housed, checked or birdsmouth joints.

Fasteners: To prevent chemical treatments reacting with fasteners, install to manufacturer's recommendations.

3.2 SHRINKAGE RESTRAINT

General

Requirement: Use seasoned timber, if possible, to avoid shrinkage restraint, particularly where timber elements are integrated with steel and/or concrete.

Moisture content: Use finishes and end-grain sealants to minimise moisture content changes.

Fasteners: Align fasteners along member axis and use single fasteners at joints.

Connections: Use connections that allow for movement without adversely affecting the performance of the connection.

Unseasoned timber: Provide as follows:

- Drill holes 10% oversize.
- Use species with similar shrinkage values to reduce movement and shrinkage.
- For framing provide adequate clearance at the top of masonry veneer and face fixed members to reduce vertical movement.

3.3 FINISHING

Ploughing

General: Back plough boards liable to warp (e.g. if exposed externally on one face). Make the width, depth and distribution of ploughs appropriate to the dimensions of the board and degree of exposure.

Painting

Edges: Chamfer edges of work to receive paint or similar coatings.

Priming: For woodwork to be painted, prime hidden surfaces before assembly.

Working with treated timber

Safety: Handle preservative treated timber to the manufacturer's recommendations and to NOHSC 2003 and the recommendations of NOHSC 3007.

0193 BUILDING ACCESS SAFETY SYSTEMS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide and install a fully certified building access safety installation system which complies with WorkCover NSW WHS requirements.

Performance

Roofing and cladding: Maintain waterproofing integrity without damage or distortion. Maintain the structural integrity of the supporting elements.

1.2 DESIGN

General

Requirements

Responsibility: The Contractor is to provide a compliant shop drawing design, installation and certification of a building access safety system. System to be installed by an approved specialist subcontractor, certified as approved by WorkCover Authority.

On completion provide to the Principal a complete operation and training programme including manuals for use of the system and equipment. Coordinate with other trades, especially the roofing and waterproofing subcontractors to ensure their systems, are not compromised.

Performance requirements: Horizontal lifeline and rail systems to AS/NZS 1891.2 Section 4.

Authority requirements: Comply with Council's development consent conditions, CC approval and WHS requirements.

Access: Provide a system for three workers at any one time, to access the following:

- Full extent of gutters.
- Roof mounted plant and equipment.
- Roof areas within 2.5 m of fall hazards not otherwise protected by parapets or guard rails.

Extent:

- To roof areas.
- Required access ladders.
- Dedicated anchor points and rail system maintenance access to all areas that are and not accessible from ground level..

Assembly

General: The system shall include but not be limited to fall restraint lifeline system suitable for three person use, anchors, cables and vertical ladders (fixed and portable) including landings, cage and securable from public access where necessary. Allow for fall arrest system if a restraint system is not adequate to meet compliance.

All fixings, anchor points, bolts, cables and accessories shall be stainless steel. All associated fixings, intermediate brackets, corner units, energy absorbers, end tensioner units, flashings, structural supports and associated materials are to be provided as required for a complete system.

Provide minimum two sets of inertia reels and full body harnesses, shock absorbing lanyard or adjustable rope grab system with shock absorber and offer equipment required for the safe use of the final installed equipment.

The system shall incorporate pass through technology allowing the operators to travel past the intermediate and corner brackets without need to disconnect and shall be capable of utilising a detachable shuttle that has the ability to operate on both sides of the system. The use of twin tail lanyards on the system is not acceptable.

The system shall be installed by an approved specialist subcontractor, certified and approved by Workcover.

Fixing: to Professional Engineer's requirements.

Documentation

General: Provide roof layout of all elements including other documentation required to show, ladders components and accessories to describe the complete system.

Calculations: Provide all calculations and certification from a Professional Engineer to confirm the proposed structural assembly will be stable, safe and in compliance with code and standard requirements.

Components: Show all components, additional fixings, flashings and the like to fully describe the system to be installed.

Drawing schedule: Provide roof plans showing layouts of all elements including other documentation required to cover, ladders, components and accessories to describe the complete system.

Manufacturers and suppliers documents related to this worksection: Provide all manufacturers technical data, samples and warranties.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.

1.4 STANDARDS

General

Industrial fall-arrest system: To AS/NZS 1891.1, AS/NZS 1891.2, AS/NZS 1891.3 and AS/NZS 1891.4.

Industrial rope access system: To AS/NZS 4488.1 and AS/NZS 4488.2.

1.5 INTERPRETATION

Abbreviations

General: For the purposes of this worksection the following abbreviations apply:

- PPE: Personal protective equipment.

Definitions

General: For the purposes of this worksection the definitions given in AS/NZS 1891.1 and AS/NZS 5532 apply.

1.6 PREFERRED SUPPLIER

General

Requirement: All roof level building access safety systems are to supplied by Combined Safety Services. Refer to their design deliverable (roof plan markup) and quotation attached to this specification.

1.7 SUBMISSIONS

Certification

General: Submit certification of installed system.

Product data sheets

Installation: Submit the manufacture’s Installation Data Sheets/Specification Manual.

Design documentation

Calculations: Submit calculations by a professional engineer experienced in building access safety systems.

Certification: Submit certification by a professional engineer experienced in building access safety systems design as evidence of conformance to documented requirements.

Drawings: Submit the following drawings:

- Layout of anchors and system components in plan and elevation.
- Proposed methods of fixing to each substrate type in the building.

Marking and labelling

Requirement: Samples and schedules of proposed marking and labels for each system component.

Operation and maintenance manuals

General: Submit a manual describing the following:

- Limitations of the system.
- Operation procedures and methods.
- PPE user manuals.
- Care and maintenance requirements.

Products and materials

Manufacturers data: Submit manufacturer's data including the following:

- Product technical data sheets.
- Installation and maintenance recommendations.

Type tests: Submit results, as follows:

- Industrial fall arrest systems and devices.
- Industrial rope access systems.
- Fixed ladders.
- Single point anchors.

Samples

Samples required: N/A.

Hold Points

General: Do not commence work or proceed to the next stage of work before approval of the required Hold Points. Submit the following documentation on the products and installation detail:

- Manufacturer's statement certifying that the products and systems being supplied are in accordance with this specification and are suitable for the intended use, required detailing and performance.
- Shop drawings and Professional Engineer's certification.
- Rescue Plan.
- Acceptance of substrate for fixings.
- Manufacturers technical details, samples and warranties for all items and accessories to be installed.
- Professional engineer's certificate covering the entire system including fittings, fixings.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers as recommended by the manufacturer.

Tests

Site tests: Submit results proof load tests of drilled-in anchors.

Warranties

Requirement: Submit the warranties for each type of building access safety system, as documented.

1.8 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Shop fabricated or assembled items ready for delivery to the site.
- Commencement of shop or site welding.
- All equipment attachments with concealed fixings, before they are covered.
- Site erected assemblies on completion of erection, before applying finishes.
- Steel surfaces prepared for, and immediately before, site applied finishes.

Installation inspector: Registered height safety inspector or engineer.

Post installation inspection

Inspection interval: Maximum 12 months.

Anchor inspection requirements: To AS/NZS 4488.2 clause 7.1.3.

Suspension equipment inspection interval: Maximum 6 months.

2 PRODUCTS

2.1 GENERAL

Product identification

General: Mark to show the following:

- Manufacturer's identification.
- Installer's contact details.
- Intended location.
- Load rating and direction.
- Current inspection/service date.
- Batch number or serial number of the components.

2.2 FALL PROTECTION SYSTEMS

Access safety system

Fall arrest system will include a combination of some or all of the following;

- Harness gear and ancillary equipment.
- Horizontal lifeline and rail systems.
- Rail and saddles.
- Inertia reels.
- Anchorage devices.
- Access Ladders.

Restraint systems need to be rated for fall arrest but it is recommended that restraint technique is used to avoid a fall situation.

Fall restraint systems

Description: Cable based systems positioned so that the user cannot reach a fall hazard when continuously connected to the system using a standard 2 m shock absorbing lanyard. Adjustment of the Personnel Protective Equipment (PPE) is not required whilst connected to the system.

Demonstrators: Use only manufacturer's representatives competent in connecting the appropriate travelling device to and from the cable.

Fall arrest systems

Description: Either cable based where the user is continuously attached to the system, rope based series of anchor points or a single anchor point from which the users can attach themselves when working at height. Whilst attached to these systems they are at risk of falling. The system relies on a rescue plan being in place.

Anchors

Single point anchors: To AS/NZS 5532.

Vertical lifeline and ladder systems

Product: Vertical rail systems including cables, fixed ladders, guides and fall arrestor trolleys.

Fixed ladders: To AS 1657.

Personal protective equipment (PPE)

Harness: Supply two full body harnesses with shock absorbing lanyards to AS/NZS 1891.1.

Storage: PPE storage holdall supplied by the manufacturer.

Tests

Industrial fall-arrest systems: Tested as follows:

- Horizontal lifeline and rail systems: To AS/NZS 1891.2.
- Fittings components and assemblies: To AS/NZS 1891.3 Section 3.

Industrial rope access systems:

- Rope grabs and descenders: Static load test to AS/NZS 4488.1 Appendix A.
- Back-up type rope grabs and descenders: Dynamic load and performance test to AS/NZS 4488.1 Appendix B.

Warranties

3 EXECUTION

3.1 INSTALLATION

Standards

Industrial fall arrest systems: To AS/NZS 1891.2.

Industrial rope access systems: to AS/NZS 4488.1.

Subcontractor

Installer: Registered installer, approved by the manufacturer.

Labels and signage

General: To AS/NZS 1891.4 clause 2.2.9.

3.2 TESTING

Proof load test for anchors

Standard: To AS/NZS 4488.2 clause 5.3.

Drilled-in anchors: Load test drilled-in anchors used in shear and not in axial tension (direct pull-out) before use.

Proof load test for horizontal lifeline and rail systems

Standard: To AS/NZS 1891.3 clause 3.1.

3.3 TRAINING

General

Responsibilities: Coordinate the training of owner's facilities management personnel in conformance with *0171b General requirements*.

Training records: Video record all training sessions. Catalogue and include recordings with the operation and maintenance manuals.

3.4 COMPLETION

Reinstatement

Extent: Repair or replace damage to the roofing and rainwater system. If the work cannot be repaired satisfactorily, replace the whole area affected.

Touch up: If it is necessary to touch up minor damage to prepainted metal roofing, do not overspray onto undamaged surfaces.

Cleaning

Roofing and rainwater drainage system: Remove debris, metal swarf, solder, sealants and unused materials.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier/manufacturer.

3.5 MAINTENANCE

General

Preventative and mandatory system maintenance: By an Accredited Height Safety Inspector/Certifier, in conformance with AS/NZS 1891.4 Section 9 and manufacturer's maintenance/recertification recommendations.

Checklist for all inspections: To AS/NZS 1891.2 Supp 1 Table 8, and AS/NZS 1891.4 Section 9 and Appendices C and D.

The installer/competent person: To AS/NZS 1891.2 clause 1.2.1.

Requirement: The Contractor shall allow for a 12 month inspection and service to AS/NZS 1891.4 prior to Final Completion at the end of the DLP.

Periodic inspections
Standard: To AS/NZS 1891.2 clause 9.2.

Completion certificate:

- Provide inspection, testing and certification by an Accredited Installer and/or Accredited Height Safety Inspector:
  . Upon completion of the installation at the date for practical completion.
  . Upon the expiry of the defects liability period or 12 months after completion of the installation whichever is the lesser, and valid for a further 12 months period.
- Record the date of the next system inspection and period of validity and display the certificate at the access points of the work area or on the individual system components where provision is made.

Regular scheduled periodic inspections
Standard: To AS/NZS 1891.2 clause 9.2.

Completion certificate:

- Provide inspection, testing and certification by an Accredited Installer and/or Accredited Height Safety Inspector:
  . Upon completion of the installation at the date for practical completion.
  . Upon the expiry of the defects liability period or 12 months after completion of the installation whichever is the lesser, and valid for a further 12 months period.
- Record the date of the next system inspection and period of validity and display the certificate at the access points of the work area or on the individual system components where provision is made.

Inspection after a fall or other event
Standard: To AS/NZS 1891.2 Supp 1 clause 9.3.

Proof testing of drilled-in anchorages
Standard: To AS/NZS 1891.2 Supp 1 clause 9.4.

On-going maintenance
Certificate: Submit the completion certificates and notify the proprietor of the requirement for continued interval testing.

4 SELECTIONS

Refer to design deliverable (roof plan markup) and quotation attached to this specification, as prepared by Combined Safety Services.

0194P RAVEN DOOR SEALS AND WINDOW SEALS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide RAVEN door seals and window seals, as documented.

Performance

Handing: Before supply, verify on site, the correct handing of hardware items.

Operation: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

1.2 COMPANY CONTACTS

RAVEN technical contacts

Website: www.raven.com.au.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.
- *Schedule of Internal Selections*
- Door Hardware Schedule, as prepared by Frost Security Locksmiths & Architectural Hardware.

1.4 STANDARDS

Seals general

Quality management for manufacture: To ISO 9001.

Acoustic applications: Tested to AS 1191 or EN ISO 10140-2 and rated to AS/NZS ISO 717.1.

Fire door assemblies: To AS 1530.4 and AS 1905.1.

Smoke door assemblies: To BCA Spec C3.4, tested to AS 1530.7 and rated to AS 6905, and tested to EN 1634-3.

Combined fire and smoke door assemblies: To BCA Spec C3.4, AS 1530.4, AS 1905.1, AS 1530.7 and AS 3959 for weather seals providing BAL FZ.

Buildings in bushfire prone areas: To AS 3959:

- BAL-40: Flame retardant silicon, PVC-U and TPE weather seals with a Flammability Index not more than 5 when tested to AS 1530.2.
- BAL-FZ: Approved door seals for use with fire doorsets tested to AS 1530.4.

Weather and energy saving seals for proprietary windows and door assemblies: To AS/NZS 4420.1 clause 5 and clause 6, and AS 2047.

Door bottom and perimeter seals for glazed external doors: To AS 2047.

Threshold plates: To AS 1428.1.

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: www.raven.com.au/catalogue.

1.6 INTERPRETATION

Abbreviations and definitions

General: For the purposes of this worksection the following abbreviations and definitions apply:

Ordering abbreviations:

- C/A: Clear anodised (15 µm for perimeter seals. 25 µm for threshold plates).
- B/A: Bronze anodised. (15 µm for perimeter seals. 25 µm for threshold plates).

- EPDM: Ethylene Propylene Diene Monomer.
- PE: Painted Polyester Enamel finish (special order and extra cost).
- TPE: Thermo Plastic Elastomer.

1.7 SUBMISSIONS

Samples
Particular samples required: Not required.

2 PRODUCTS

2.1 GENERAL

Product substitution
Other products: Conform to PRODUCTS, **GENERAL**, **Substitutions** in *0171 General requirements*.
Product identification
General: Marked to show the following:
- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

2.2 MATERIALS

Aluminium extrusions
Material: Commercial grade alloy B6060 T5 or T6 hardness.
Finish to visible extrusions:
- Satin clear or medium bronze anodised, or as documented.
- Anodising thickness:
  . Perimeter seal extrusions: Minimum 15 µm.
  . Threshold plates and threshold plate seals: Minimum 25 µm.

PVC-U
RAVEN proprietary grade PVC-U extrusions:
- Highest quality available.
- Added UV inhibitors where exposed to sunlight.
- Self-extinguishing grade.
- Service temperature - 5ºC to + 70ºC.

Silicon rubber
RAVEN proprietary grade silicon rubber extrusions:
- Are unique and where designated (SE) are self-extinguishing.
- Added UV inhibitors.
- Service temperature - 60ºC to + 230ºC.

TPE
RAVEN proprietary grade TPE extrusions:
- Highest quality available.
- Added UV inhibitors.
- Flammability Index less than 5 to AS 1530.2 where indicated for Bushfire prone areas.

Service temperature - 40ºC to + 100ºC.

EPDM
RAVEN proprietary grade closed cell EPDM rubber extrusions:
- Highest quality available as developed by the automotive industry.

- Added UV inhibitors.
- Classified SE/B self-extinguishing burn rate to SAE J 369, and ISO 3795.
- Service temperature - 40ºC to + 70ºC.

3 EXECUTION

3.1 INSTALLATION

Handing

Requirement: Match door seals to the handing of doors.

Supply

Factory fit and retrofit: Deliver door seals for door perimeter seals and door bottom seals in complete sets for each door, ready for installation.

Identification: Mark packaging with relevant floor level and door location number.

Packaging: For rigid length seals, provide recyclable cartons and recyclable polythene with fixings and fitting instructions.

Off-site installation to proprietary window and door assemblies: Supply RAVEN TPE and silicon rubber weather stripping on bulk reels.

Door assemblies

Modification: Rebate and groove door assemblies to suit the dimensions recommended by RAVEN.

Fitting instructions: Conform to RAVEN's fitting instructions, supplied with each product.

Fixing

Fasteners:

- Unexposed applications: Zinc-plated self-tapping fasteners supplied by RAVEN with each product.
- External coastal exposure applications: Substitute the standard fasteners supplied with equivalent stainless steel fasteners.

Backset: Allow backset clearances as required for hinging, latching and automatic closers.

Proprietary aluminium door/window frames: Select the fixing options to suit the documented RAVEN perimeter/frame seals.

3.2 COMPLETION

Warranties

Raven seals are to be guaranteed for 2 years against defects in materials and workmanship, provided seals are fitted in accordance with manufacturer's specifications. Defective goods identified by Raven to be replaced. No claim for work done thereon or damage incurred will be allowed.

Self-adhesive backed; closed cell and open cell foam tape seals are not guaranteed. Defective goods identified by Raven are to be replaced.

0201B DEMOLITION

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Carry out demolition, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- *0171b General requirements*.

1.3 STANDARDS

General
Demolition: To AS 2601.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection, the following definitions apply:
- Demolition: The complete or partial dismantling of a building or structure, by pre-planned and controlled methods or procedures.
- Dilapidation record: The photographic or video and written record of the condition of the portion of the existing building retained, adjacent buildings, and other relevant structures or facilities, before the start of demolition work.
- Dismantle: The reduction of an item to its components in a manner to allow re-assembly.
- Recover: The disconnection and removal of an item in a manner to allow re-installation.

1.5 SUBMISSIONS

Execution details
Off-site disposal locations: The Contractor is to submit details of the proposed locations for the disposal of material required to be removed from the site, and evidence of conformance with the requirements of relevant authorities.

Recycling: The Contractor is to submit details of the proposed recycling facility.
- Certification: Submit evidence of delivery of recycled materials.
- Concrete crushing: If proposed on site, submit details of plant and environmental controls.

Stockpile locations: The Contractor is to submit details of the proposed locations of on-site stockpiles for demolished materials for recycling in the works. Coordinate with the locations for storage of other waste streams, and prevent mixing or pollution.

Tests
Requirement: Submit test results of compliance tests for building service components to be re-used.

1.6 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Adjacent structures before starting and at completion of demolition.
- Services before disconnection or diversion.
- Trees documented to be retained, before starting demolition.
- Contents of building before starting demolition.
- Structure after stripping and removal of roof coverings and external cladding.
- Excavations remaining after removal to meet design levels.

- Site after removal of all demolished materials.
- Services after reconnection or diversion.
- Any discovered items during earthworks, which could be archaeological artefacts. Stop work immediately and seek instruction from the Superintendent.

2 EXECUTION

2.1 HAZARDOUS SUBSTANCES

Identified hazardous substances

Register: Hazardous substances have been identified as present on site and a Hazardous substances register has been prepared.

Availability: Request from the Superintendent.

Audit

Requirement: Prepare a Hazardous Substances Management Plan to AS 2601 clause 1.6.1. Include the following:

- Asbestos or material containing asbestos.
- Flammable or explosive liquids or gases.
- Toxic, infective or contaminated materials.
- Radiation or radioactive materials.
- Noxious or explosive chemicals.
- Tanks or other containers which have been used for storage of explosive, toxic, infective or contaminated substances.

Removal of hazardous substances

Standard: To AS 2601 clause 1.6.2.

Procedure for asbestos removal: Refer to WHS authority's Code of Practice and *How to safely remove asbestos*, as prepared by Safe Work Australia.

2.2 INVESTIGATION AND WORK PLAN

General

Requirement: Before demolition or stripping work, prepare the work plan to AS 2601 Section 2. Include the check list items appropriate to the project from AS 2601 Appendix A, and the following:

- Method of protection and support for adjacent property.
- Locations and details of service deviations and terminations.
- Sequence of work.
- If the demolition program results in components temporarily cantilevered, provide a certificate from a professional engineer.
- Proposals for the safe use of mobile plant on suspended structural members including provisions for the protection of lower floors in the event of structural failure.
- If implosion methods are proposed, provide a separate report of methods and safeguards.
- Wheel loads of tipping or loading vehicles.

2.3 SUPPORT

Temporary support

General: If temporary support is required, certification for its design and installation is required from a professional engineer engaged by the contractor.

Existing buildings: Until permanent support is provided, provide temporary support for sections of existing buildings which are to be altered and which normally rely for support on work to be demolished.

Ground support: Support excavations for demolition of underground structures.

Adjacent structures: Provide supports to adjacent structures where necessary, sufficient to prevent damage resulting from the works.

- Lateral supports: Provide lateral support equal to that given by the structure to be demolished.
- Vertical supports: Provide vertical support equal to that given by the structure to be demolished.

Permanent supports

General: If permanent supports for adjacent structures are necessary and are not documented, give notice and obtain instructions.

2.4 PROTECTION

Encroachment

General: Prevent the encroachment of demolished materials onto adjoining property, including public places.

Weather protection

General: If walls or roofs are opened for alterations and additions or the surfaces of adjoining buildings are exposed, provide temporary covers to prevent water penetration. Provide covers to protect existing plant, equipment and materials intended for re-use.

Dust protection

General: Provide dustproof screens, bulkheads and covers to protect existing finishes and the immediate environment from dust and debris.

Security

General: If walls or roofs are opened for alterations or additions, provide security against unauthorised entry to the building in the process of being demolished.

Temporary screens

General: Fill the whole of designated temporary openings or other spaces using dustproof and weatherproof temporary screens, fixed securely to the existing structure, and installed to shed water to avoid damage to retained existing elements or adjacent structures and contents.

Type: Timber framed screens sheeted with 12 mm plywood and painted. Seal the junctions between the screens and the openings.

Temporary access

General: If required, provide a substantial temporary doorset fitted with a rim deadlock, and remove on completion of demolition.

Exposed surfaces

General: Where necessary, protect and weatherproof the surfaces of adjacent structures exposed by demolition.

Treatment of exposed surface: Permanent weatherproof and secure covering, metal or fibre cement cladding.

Existing services

Location: Before starting demolition, locate and mark existing underground services in the areas which will be affected by the demolition operations.

Utility services: Contact DIAL BEFORE YOU DIG to identify location of underground utility services pipes and cables prior to the commencement of works.

Excavation: Do not excavate by machine within 1 m of existing underground services.

DIAL BEFORE YOU DIG www.1100.com.au The Essential First Step

Recovered items

General: If items are documented for recovery and re-use, minimise damage during removal and recover all associated components required for their re-use.

2.5 DEMOLITION – BUILDING WORKS

Encroachment
General: If encroachments from adjacent structures are encountered and are not documented, give notice to the Contract Administrator and obtain instructions.

Concrete slabs
General: Using a diamond saw, neatly cut back or trim to new alignment with a clean true face existing concrete slabs to be partially demolished or penetrated. Do not overcut at corners.

Material below grade
Extent: Demolish the following:

- Retaining walls and landscaping elements
- footings
- redundant services and yard pits.

Remaining voids: Stabilise and provide barriers.

Explosives
General: Do not use explosives.

2.6 DEMOLITION – BUILDING SERVICES

General
Requirement: Decommission, isolate, demolish and remove from the site all equipment and associated components that become redundant as a result of the demolition.

Breaking down: Disassemble or cut up equipment where necessary to allow removal.

Components for re-use
General: Before returning to service, clean components and test for conformance to Australian Standards, as required.

2.7 COMPLETION

General
The Contractor shall:

- prior to the commencement of demolition work, liaise with the Principal to confirm in writing to the Contract Administrator that the buildings and grounds are secured with site fencing around construction compound that the area is ready for take-over to commence demolition and construction works
- provide the required quantity of bins, skips and mounded stockpiles to safely secure demolished and dismantled materials within construction compound for the duration of the Contract
- promptly remove all bins, skips and stockpiles not scheduled for retention on site at the completion of the works, and
- during the course of the Contract have the liberty to salvage any fixtures and fittings that are not documented for reuse as they wish (refer to drawings for items to be reused in the works).

Notice of completion
General: Give at least 5 working days' notice of completion of demolition so that adjacent structures may be inspected following completion of demolition.

Reinstatement
Assessment of damage: Use the dilapidation record to assess the damage and rectification work arising from the demolition work.

Rectification: Repair damage arising out of demolition work. Obtain written acceptance from the owner of each adjoining property of the completeness and standard of the rectification work.

Temporary support
General: Remove at completion of demolition.

0221 SITE PREPARATION

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide site preparation, as documented.

The scope of work of this trade section is the site management prior to and during the construction period. The extent of work includes, but is not limited to, the following:

- Alteration work to existing site supplied services as documented.
- Preparation of the site for the construction work as defined in the contract documentation, including provision of temporary facilities, ensuring that the construction process is in full compliance with all statutory requirements, carrying out all necessary investigation work and provision of excavation and removal of all redundant material and services from site.

Investigation

Geotechnical site investigation report, as prepared by Cardo is submitted for the Contractor's information only. The contents of the report has been utilised by the consultants to prepared the documentation. The Contractor is to investigate site conditions and provide their own assessment of the site prior to commencing work.

Provide all necessary investigation work prior to commencing site services work and excavation work

Incidental works

Generally: Undertake the following:

- Reinstatement: Reinstate undeveloped ground surfaces to the condition existing at the commencement of the contract.
- Minor trimming: As required to complete the works, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0131 Preliminaries*
- *0171b General requirements*.

Reference

General: Refer to the following and coordinate with this worksection.

- Structural Engineer's documentation.
- Services Engineers' documentation.
- Council's development consent conditions.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Authorities: Any authority or agency covering statutory requirements relating to the project, including clearances for work in that particular area.
- Clearances: A formal certificate, approval or condition issued by an authority to allow work to be carried out in a particular area.
- Dilapidation record: The photographic or video and written record made before commencement of site preparation work of the condition of the portion of adjacent properties, existing infrastructure and facilities.
- Network Utility Operator: The entity undertaking the piped distribution of drinking water or natural gas for supply or is the operator of a sewerage system or external stormwater drainage system.

1.4 SUBMISSIONS

Execution details

Requirement: Submit details of methods and equipment proposed for the following:

- Clearing and grubbing.
- Tree removal and transplanting.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Enclosures around trees to be retained.
- Trees to be removed.

2 EXECUTION

2.1 COMMUNITY LIAISON

Notification

General: Notify residents about construction activities which will affect access to, or disrupt the use of, their properties.

Notice: Minimum 5 working days, unless the work is of an urgent nature with safety implications.

Notification content:

- The nature of the work.
- The reason for it being undertaken.
- The expected duration.
- Changes to traffic arrangements and property access.
- The 24-hour contact number of the representative responsible.

2.2 EXISTING SERVICES

General

Requirement: Before commencing earthworks, locate and mark existing underground services in the areas which will be affected by the earthworks operations including clearing, excavating and trenching.

Utility services: Contact DIAL BEFORE YOU DIG to identify location of underground utility services pipes and cables.

Excavation: Do not machine excavate within 1 m of existing underground services.

Existing service lines: If required, divert services detected during excavation to new routes, clear of the building, and reconnect to the Network Utility Operator's requirements.

2.3 SITE CLEARING

Extent

Requirement: Clear only areas to be occupied by works such as structures, paving, excavation, regrading and landscaping or other areas designated to be cleared.

Contractor's site areas: If not included within the areas documented above, clear generally only to the extent necessary for the performance of the works.

Clearing and grubbing

Clearing: Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable matter and organic debris, scrub, trees, timber, stumps, boulders and rubble.

Grubbing: Grub out stumps and roots over 75 mm diameter to a minimum depth of 500 mm below subgrade under buildings, embankments or paving, or 300 mm below finished surface in unpaved

areas. Backfill holes remaining after grubbing with sand material to prevent ponding of water. Compact the material to the relative density of the existing adjacent ground material.

Redundant/decommissioned works: Remove works, including slabs, foundations, pavings, drains and access chambers covers found on the surface.

Batters

Temporary protection: Where change in level between crest and toe is more than 1.5 m, protect from erosion with geofabric, a hessian and tar or heavy duty black polythene sheet waterproof cover. Seal joints and securely fix down at crest and toe.

Stockpiles

Location: Submit the locations for on-site stockpiles for demolished materials for recycling in the works. Coordinate with the locations of storage for other waste streams and prevent mixing or pollution

Surplus material

Topsoil and excavated material: Continually remove unwanted stripped soil and other material from the site as the work proceeds, including any material dropped on footpaths or roadways.

2.4 HAZARDOUS MATERIALS

Procedure if hazardous materials are discovered

Procedure: Notify the Superintendent immediately, isolate the area where hazardous materials may be present and await instruction.

2.5 STORMWATER AND SEDIMENT CONTROL

General

Erosion and sediment control measures: Provide in accordance with Council's policy.

Waterways and drains

Waterways: Temporarily divert, as necessary, ditches, field drains and other waterways affected by excavation and reinstate on completion.

Stormwater drains: Divert drains detected during excavation to new routes, clear of the building, and reconnect to the Network Utility Operator's requirements.

2.6 EXISTING WORKS TO BE RETAINED

Marking

Requirement: Mark out works with 1 m high 50 x 50 mm timber stakes with yellow plastic tapes attached to prevent accidental damage.

2.7 TREES TO BE REMOVED

Designation

Marking: Mark trees and shrubs to be removed 1000 mm above ground level.

Extent: Refer to drawings.

Tags: Surveyor's ribbon.

2.8 TREE PROTECTION

General

Warning signs: Display in a prominent position at each entrance to the site, warning that trees and plantings are to be protected during the contract. Remove on completion.

Lettering: Road sign type sans serif letters, 100 mm high to AS 4970 Appendix C.

Protection measures: Provide before commencement of earthworks.

Trees to be retained

Extent: All trees NOT marked for removal.

Tree protection

Tree protection zone (TPZ): To AS 4970 Section 3.

Tree protective measures: To AS 4970 Section 4.

Monitoring and certification: To AS 4970 Section 5.

Work near trees

Harmful materials: Conform to the following:

- Keep the area within the dripline free of sheds and paths, construction material and debris.
- Do not place bulk materials and harmful materials under or near trees.
- Do not place spoil from excavations against tree trunks.
- Prevent wind-blown materials such as cement from harming trees and plants.

Damage: Prevent damage to tree bark. Do not attach stays, guys and the like to trees.

Work under trees: Do not remove topsoil from, or add topsoil to, the area within the dripline of the trees.

Excavation: If excavation is required near trees to be retained, give notice. Minimise period of excavation under tree canopies.

Hand methods: Use hand methods to locate, expose and cleanly remove the roots on the line of excavation. If it is necessary to excavate within the drip line, use hand methods so that root systems are intact and undamaged.

Roots: Do not cut tree roots exceeding 50 mm diameter. Where it is necessary to cut tree roots, use cutting methods that do not excessively disturb the remaining root system. Immediately after cutting, water the tree and apply a liquid rooting hormone to stimulate the growth of new roots.

Backfilling: Backfill excavations around tree roots. Place the backfill in layers of 300 mm maximum depth and compacted to a dry density similar to that of the original or surrounding soil. Do not backfill around tree trunks to a height greater than 200 mm above the original ground surface. Immediately after backfilling, thoroughly water the root zone surrounding the tree.

Backfill material:

- Mix proportions (topsoil:well-rotted composts) by volume: 3:1.
- Neutral pH value.
- Free from weed growth and harmful materials.

Compacted ground: Do not compact the ground or use skid-steel vehicles under the tree dripline. If compaction occurs, give notice.

Compaction protection: Protect areas adjacent the tree dripline. Submit proposals for an elevated platform to suit the proposed earthworks machinery.

Watering: Water trees as necessary, including where roots are exposed at ambient temperature more than 35°C.

Mulching: Spread 100 mm thick organic mulch to the whole of the area covered by the drip line of all protected trees.

2.9 COMPLETION

Temporary works

Remove at completion: Any temporary tree enclosures and temporary construction barriers.

Clean up

Progressive cleaning: Keep the work included in the contract clean and tidy as it proceeds and regularly remove from the site waste and surplus material arising from execution of the work, including any work performed during the defects liability period or the plant establishment period.

Removal of plant: Within 10 working days of the date of practical completion, remove temporary works, construction plant, buildings, workshops and equipment which does not form part of the works, except what is required for work during the defects liability period or the plant establishment period. Remove these on completion.

Waste disposal: In accordance with Council's development consent conditions.

Vermin management

Requirement: Employ an approved firm of pest exterminators and provide a certificate from the firm stating that the completed works is free of vermin.

0241 LANDSCAPE – WALLING AND EDGING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide landscape walling and edging, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.

1.3 INSPECTION

Notice

Inspection: Give notice so inspection may be made of the following:

- Set out before starting construction.
- Geotextiles and subsurface drainage in place before backfilling.

2 PRODUCTS

2.1 STEEL

Steel tubes

Posts, rails, stays: To AS/NZS 1163.

- Grade: C350L0.

Wire

Chainwire, cable wire, tie wire and barbed wire: To AS 2423.

2.2 CONCRETE

General

Standard: To AS 1379.

Exposure classification: To AS 3600 Table 4.3.

Grade, if there are cast-in metal items: To AS 3600 Table 4.4.

2.3 GEOTEXTILES

General

Type: Polymeric fabric formed from a plastic yarn composed of at least 85% by weight of propylene, ethylene, amide or vinylidene chloride and containing stabilisers or inhibitors to make the filaments resistant to deterioration due to ultraviolet light.

Identification and marking: To AS 3705.

2.4 EDGING

Steel

Product: Plate with pre-welded stakes (on garden side).

Size and profile: Refer to drawings.

Finish: Hot-dip galvanized.

Brick

Brick type: Refer to Schedule of External Selections

Laying pattern: Refer to drawings.

3 EXECUTION

3.1 GENERAL

Set-out
General: Set out the position of walls and edging and mark the position of furniture.

Clearing
Extent: Except for trees or shrubs to be retained, clear vegetation within 1 m of the landscape walls. Grub out stumps and roots of removed trees or shrubs and trim the grass to ground level, but do not remove the topsoil.

Excavation
Extent: Excavate for foundations and footings.

Geotextiles
Storage and handling: Store clear of the ground and out of direct sunlight. During installation do not expose the filter fabric to sunlight for more than 14 days.

3.2 EDGING

Steel
Fixing:

- Angle section: Fixed in place by the mass of surrounding soil works.
- Flats: Fix in place with 250 mm long x 10 mm galvanized steel spikes driven through 50 x 50 mm fixing plates. Weld holed plates at right angles to the face of the flat at 1000 mm centres on alternate sides set parallel and 25 mm below the top of the edging.

Spade edge
Edges: Define mass planting beds by cutting through soil with garden spade at approximately 70° to vertical. Remove sods from garden beds and spread throughout grassed areas.

Finish: Free from kinks in alignment with one curve grading evenly into the next, and free of straight sections.

Brick
Setting: On a 1:1:6 (cement:lime:sand) mortar haunch.

Joints: 3 mm struck flush.

Alignment: Even and free from dips, humps and bends.

Cleaning: Wash off mortar progressively.

0242B LANDSCAPE – FENCES AND BARRIERS

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide fences and barrier systems, as documented.

Performance
Requirements:

- Complete for their function.
- Conforming to the detail and location drawings.
- Firmly fixed in position.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171b General requirements*.
- *0131 Preliminaries*

1.3 SUBMISSIONS

Samples
Submit samples as follows: [complete/delete]

Shop drawings
Custom-built items: Submit shop drawings to a scale that best describes the details, showing methods of construction, assembly and installation, with dimensions and tolerances.

Warranties
Requirements: Submit the manufacturer's published product warranties.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:

- Boundary survey location.
- Set-out before construction.
- Foundation conditions before constructing in footings.
- Completion of installation.

2 PRODUCTS

2.1 GENERAL

Storage and handling
General: Deliver, unload and store components and accessories in unbroken manufacturer's packaging.

2.2 TIMBER

Durability
Hazard Class to AS 1604.1: H3.

Rails
Hardwood: To AS 2082.
Stress grade: F11.

Pickets and palings
Hardwood: To AS 2796.1, Section 8.

- Grade to AS 2796.2: Select.

Preservative treatment

Timber type: Provide only timbers with preservative treatment to the documented Hazard class.

Cut surfaces: Provide supplementary preservative treatment to all cut and damaged surfaces.

CCA treated timber: If proposed to be used, provide details.

2.3 STEEL

Steel tubes

Posts: To AS/NZS 1163.

- Grade: C350L0.

Post finish: Hot-dip galvanize.

2.4 CONCRETE

General

Standard: To AS 1379.

Exposure classification: To AS 3600 Table 4.3.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Set-out

General: Set out the fence line and mark the positions of posts, gates and bracing panels.

Property boundaries: Confirm by survey.

Clearing

Fence line: Except for trees or shrubs to be retained, clear vegetation within 1 m of the fence alignment. Grub out the stumps and roots of removed trees and shrubs, and trim the grass to ground level. Do not remove the topsoil.

Excavation

Posts: Excavate post holes so that they have vertical sides and a firm base. Spread surplus material on the principal's side of the fence.

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Concrete footings

In ground: Place mass concrete around posts to protect posts from waterlogged conditions and finish with a weathered top falling 25 mm from the post to ground level.

On slabs: Provide welded and drilled post base flanges for fixing with masonry anchors to the concrete.

Erection

Line and level: Erect posts vertically. Set heights to follow the contours of natural ground, unless documented otherwise.

3.2 GATES

Hardware

General: Provide the following:

- Latch
- Hinges with smooth operation and adjustment for future sagging.

Reference

Refer to Door Hardware Schedule, as prepared by Frosts Security.

Hand access

Requirement: Where required, provide hand holes to give access from outside to reach locking provision.

3.3 TIMBER PICKET AND STEEL POST FENCING

Hardwood picket fencing

General: As documented along side boundaries.

Footing type: Concrete.

Footing size: Refer to drawings.

Installation

General: Pre-welded cleats on posts to receive timber rails. Set pickets clear of the ground.

Pickets: Nail twice to each rail.

Timber picket and steel framed gates

Ledges and braces: Steel to match fence posts.

3.4 TIMBER PALING AND STEEL POST FENCING

Hardwood paling fencing

General: As documented around bin storage area.

Footing type: Concrete.

Footing size: Refer to drawings.

Installation

General: Pre-welded cleats on posts to receive timber rails. Set palings clear of the ground.

Palings: Nail twice to each rail.

Plain paling fence: Provide 2 rails for fences up to 1800 mm high, and locate 200 mm from the tops and bottoms of the palings. Close butt palings and nail twice to each rail.

Lap and cap paling fence: Provide 2 rails for fences up to 1800 mm high, and locate 200 mm from the bottoms of the palings and abutting the tops of palings. Close-butt larger palings and nail twice to each rail. Fix smaller palings over joints and nail twice to each rail. Nail capping to the top rail.

Timber gates

Ledges and braces: Match fence rails.

3.5 COMPLETION

Cleaning

Requirement: Remove excess debris, metal swarf and unused materials. Clean all visible metal surfaces with soft clean cloth or brush and clean water or approved cleanser, finishing with a clean cloth. Do not use abrasive or alkaline materials.

Powder coated aluminium architectural applications: Clean completed assembly to AS 3715 Appendix C.

Powder coated metal, other than aluminium, architectural applications: Clean completed assembly to AS 4506 Appendix D.

Protection: Remove protective coatings using methods required by the manufacturer after completion.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

4 SELECTIONS

Refer to Schedule of External Selections and detail drawings for assemblies.

0250B LANDSCAPE – COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide landscaped planting, as documented.

Performance

Plants: Grown to a standard that allows rapid establishment and growth to maturity.

Maintenance: Encourage and maintain healthy growth for the duration of the contract.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Imported topsoil: Similar to naturally occurring local topsoil, suitable for the establishment and ongoing viability of the selected vegetation, free of weed propagules and of contaminants, and classified by texture to AS 4419 Appendix K Table KI, as follows:
  - . Fine: Clay loam, fine sandy clay loam, sandy clay loam, silty loam, loam.
  - . Medium: Sandy loam, fine sandy loam.
  - . Coarse: Sand, loamy sand.
- Plant establishment period: The period between the date of practical completion and the end of the defects liability period.
- Site topsoil: Natural soil excavated from the site which contains organic matter, supports plant life, conforms generally to the fine-to-medium texture classification to AS 4419 and free from the following:
  - . Stones more than 25 mm diameter.
  - . Clay lumps more than 50 mm diameter.
  - . Weeds and tree roots.
  - . Sticks and rubbish.
  - . Material toxic to plants.

1.4 SUBMISSIONS

Products and materials

Supplier’s data: Submit supplier’s data including the following:

- Material source of supply for topsoil, filling, stone and filter fabrics.

Samples

General: Submit representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: At least 5 working days before bulk deliveries, submit a 1 kg sample of each type documented with required test results.

2 PRODUCTS

2.1 TOPSOIL

Standard

Site and imported topsoil: To AS 4419.

Potting mixes: To AS 3743.

Composts, soil conditioners and mulches: To AS 4454.

Source

General: If the topsoil of documented quality cannot be provided from material recovered from site, provide imported topsoil.

Imported topsoil

General: Provide imported topsoil, as documented.

Imported topsoil particle size table (% passing by mass)

Sieve aperture (mm)	Soil textures		
	Fine	Medium	Coarse
2.36	100	100	100
1.18	90 – 100	90 – 100	90 – 100
0.60	75 – 100	75 – 100	70 – 90
0.30	57 – 90	55 – 85	30 – 46
0.15	45 – 70	38 – 55	10 – 22
0.075	35 – 55	25 – 35	5 – 10
0.002		2 – 15	2 – 8

Imported topsoil nutrient level table

Nutrient	Unit	Sufficiency range
Nitrate-N (NO_3)	mg/kg	> 25
Phosphate-P (PO_4) – P tolerant	mg/kg	43 - 63
Phosphate-P (PO_4) – P sensitive	mg/kg	< 28
Phosphate-P (PO_4) – P very sensitive	mg/kg	< 6
Potassium (K)	mg/kg	178 - 388
Sulphate-S (SO_4)	mg/kg	39 - 68
Calcium (Ca)	mg/kg	1200 - 2400
Magnesium (Mg)	mg/kg	134 - 289
Iron (Fe)	mg/kg	279 - 552
Manganese (Mn)	mg/kg	18 - 44
Zinc (Zn)	mg/kg	2.6 - 5.1
Copper (Cu)	mg/kg	4.5 - 6.3
Boron (B)	mg/kg	1.4 - 2.7

Method References

pH in H_2O (1:5), pH in $CaCl_2$ (1:5) and Electrical Conductivity (EC) by Rayment & Higginson (1992) method 4A2, 4B2, 3A1
Soluble Nitrate-N by APHA 4500
Soluble Chloride by Rayment and Lyons 2011 modified method 5A2
Extractable P by Mehlich 3 – ICP
Exchangeable cations – Ca, Mg, K, Na by Mehlich 3 – ICP
Extractable S by Mehlich 3 – ICP
Extractable trace elements (Fe, Mn, Zn, Cu, B) by Mehlich 3 - ICP

Site topsoil
General: Provide site topsoil, as documented.

Soil blend: If required, stripped natural soil with sand and/or organic matter and recommended ameliorants.

2.2 GRASS

Turf
Description: Cultivated turf of even thickness, free from weeds and other foreign matter.

Supplier: A specialist grower of cultivated turf.

2.3 FERTILISER

General
Type: Proprietary fertilisers, delivered to the site in sealed bags marked to show manufacturer or supplier, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

Application rate: Vary the application rate to allow for the plant-available immediate fertilizer equivalence value of the soil conditioning compost.

2.4 PLANTS - GENERAL

Supply
Supply trees to AS 2303 and with the following properties:

- Stress: Free from stress resulting from inadequate watering, excessive shade or excessive sunlight experienced at any time during their development.
- Site environment: Grown and hardened off to suit anticipated site conditions at the time of delivery.
- Pests and disease: Free from attack by pests or disease.
- Native species with a history of attack by native pests: Restrict plant supply to those with evidence of previous attack to less than 15% of the foliage and make sure actively feeding insects are absent.

Labelling
General: To AS 2303 clause 4.2.1.

Label type: To withstand transit without erasure or misplacement.

Root system
Requirement: Supply plant material with a root system that is:

- Well proportioned in relation to the size of the plant material.
- Conducive to successful transplantation.
- Free of any indication of having been restricted or damaged.

Root inspection: If inspection is by the removal of soil test, such as investigative inspection, sample as follows:

- For > 100 samples: Inspect 1%.
- For < 100 samples: Inspect 1 sample.

Sample plants: Replace plants used in investigative inspection.

Rejection: Do not provide root bound stock.

3 EXECUTION

3.1 PREPARATION

Weed eradication
Herbicide: Eradicate weeds using environmentally acceptable methods, such as a non-residual glyphosate herbicide in any of its registered formulae, at the maximum application rate.

Manual weeding: Regularly remove weed growth by hand throughout grassed, planted and mulched areas. Remove weed growth from an area of 750 mm diameter around the base of the trees in grassed areas. Continue weeding throughout the course of the works and during the planting establishment period.

Vegetative spoil
Disposal: Remove vegetative spoil from site. Do not burn.

3.2 EARTH MOUNDS

Construction
Placing: Place clean fill in layers approximately 150 mm thick compacted to 85% of the dry density ratio of the surrounding soil tested to AS 1289.5.4.1. Minimise slumping and further compacting.

Edges: Construct changes in grade over a minimum width of 500 mm to smooth, gradual and rounded profiles with no distinct joint.

Existing trees: Maintain the natural ground level under the canopy.

Pipes, culverts and associated structures: Construct mounding to avoid unbalanced loading.

Drainage: Construct mounds to allow free drainage of surface water and to eliminate ponding.

3.3 SUBSOIL

Ripping
General: Rip parallel to the final contours. Do not rip when the subsoil is wet or plastic. Do not rip within the dripline of trees and shrubs to be retained.

Ripping depths: Rip the subsoil to the following typical depths:

- Compacted subsoil: 300 mm.
- Heavily compacted clay subsoil: 450 mm.

Planting beds
Excavated: Excavate to reduce the subsoil level to at least 300 mm below finished design levels. Shape the subsoil to fall to subsoil drains, if required. Break up the subsoil to a further depth of 100 mm.

Unexcavated: Remove weeds, roots, rubbish and other debris. Reduce the planting bed level to 75 mm below finished design levels.

Cultivation
Minimum depth: 100 mm.

Services and roots: Do not disturb services or tree roots. If required, cultivate these areas by hand.

Cultivation: Cultivate manually within 300 mm of paths or structures. Remove stones exceeding 25 mm, clods of earth exceeding 50 mm, and weeds, rubbish or other deleterious material brought to the surface during cultivation. Trim the surface to design levels after cultivation.

Additives
General: Apply additives after ripping or cultivation and incorporate into the upper 100 mm layer of the subsoil as documented.

Gypsum: Incorporate at the rate of 0.25 kg/m^2.

3.4 TOPSOIL

Placing topsoil
Spreading: Spread the topsoil on the prepared subsoil and grade evenly, making allowances, if appropriate, for the following:

- Required finished levels and contours after light compaction.
- Grassed areas finished flush with adjacent hard surfaces such as kerbs, paths and mowing strips.

Steep batters: If using a chain drag, make sure there is no danger of batter disturbance.

Finishing: Feather edges into adjoining undisturbed ground.

Consolidation
General: Compact lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface which has the following characteristics:

- Finished to design levels.
- Smooth and free from stones or lumps of soil.
- Graded to drain freely, without ponding, to catchment points.

- Graded evenly into adjoining ground surfaces.
- Ready for planting.

Topsoil depths

General: Spread topsoil to the following typical depths:

- Excavated planting areas:
  - . For organic mulch: 225 mm.
  - . For gravel mulch: 250 mm.
- Irrigated grassed areas generally: 150 mm.
- Irrigated grassed areas, heavy use (e.g. playing fields, playgrounds, and public parks): 200 mm.
- Non-irrigated grass areas: 100 mm.
- Earth mounds:
  - . Mass planted surfaces: 300 mm.
  - . Grassed surfaces: 100 mm.
- Top dressing: 10 mm.

Surplus topsoil

General: Spread surplus topsoil on designated areas on site or dispose off-site.

3.5 TURFING

Supply

Elapsed time: Deliver the turf within 24 hours of cutting, and lay within 36 hours of cutting. Prevent turf from drying out between cutting and laying. If not laid within 36 hours of cutting, roll turf out on a flat surface with the grass up, and water as required to maintain a good condition.

Application

Method: Lay the turf as follows:

- Stretcher bond pattern with the joints staggered and close butted.
- Parallel with the long sides of level areas, and with contours on slopes.
- Finish flush, after tamping, with adjacent finished surfaces of ground, paving edging, or grass seeded areas.

Strip turf: Close butt the end joints and space the strips 300 mm apart. Lay top dressing between the turf strips. Finish with an even surface.

Tamping: Lightly tamp to an even surface immediately after laying. Do not use a roller.

Stabilising on steep slopes: Peg the turf to prevent downslope movement. Remove the pegs when the turf is established.

Watering

General: Water immediately after laying until the topsoil is moistened to its full depth. Maintain moisture to this depth.

Establishment

General: Maintain turfed areas until there is a dense continuous sward of healthy grass over the whole turfed area, evenly green and of a consistent height.

Failed turf: Lift failed turf and replace with new turf.

Levels: If levels have deviated from the design levels after placing and watering, lift turf and regrade topsoil to achieve design levels.

Fertiliser: Apply lawn fertiliser at the completion of the first and last mowings, and at other times as required to maintain healthy grass cover.

Mowing: Mow to maintain the grass height within the required range. Do not remove more than one third of the grass height at any one time. Carry out the last mowing not more than 7 days before the end of the planting establishment period. Remove grass clippings from the site after each mowing.

Top dressing: Mow the established turf and remove cuttings. Lightly top dress to a depth of 10 mm. Rub the dressing into the joints and correct any unevenness in the turf surface.

3.6 PLANTING

General

Plant location and spacing : If necessary to vary plant locations and spacings to avoid service lines, or to cover the area uniformly, or for other reasons, give notice.

Planting conditions

Weather: Do not plant in unsuitable weather conditions, including extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation when the soil is wet, or during frost periods.

Watering

Timing: Thoroughly water the plants before planting, immediately after planting, and as required to maintain growth rates free of stress.

Preparation

Individual plantings in grassed areas: Prepare for planting as follows:

- Excavate a hole twice the diameter of the root ball and at least 100 mm deeper than the root ball.
- Break up the base of the hole to a further depth of 100 mm.
- Loosen compacted sides of the hole to prevent confinement of root growth.

Ripline planting: Prepare for planting as follows:

- Rip the row and excavate a plant hole for each plant large enough to accept the root ball plus 0.1 m^3 of backfilling with topsoil.
- Clear weeds and other vegetative material within 300 mm radius of the plants.
- If planting holes are excavated by mechanical means, increase the hole size by 100 mm and loosen compacted sides to prevent confinement of root growth.

Placing

General: Place plants as follows:

- Remove the plant from the container with minimum disturbance to the root ball. Make sure that the root ball is moist.
- If required, root prune to make sure all circling roots have been either severed or aligned radially into the surrounding soil.
- Place the plant in its final position, in the centre of the hole and plumb, and with the topsoil level of the plant root ball level with the finished surface of the surrounding soil.

Fertilising

Pellets: In planting beds and individual plantings, place fertiliser pellets around the plants at the time of planting.

Backfilling

General: Backfill with topsoil mixture. Tamp lightly and water to eliminate air pockets. Make sure that topsoil is not placed over the top of the root ball, so the plant stem remains the same height above ground as it was in the container. Avoid mixing mulch with topsoil.

Watering basins for plants in grassed areas

Location: To each individual plant not located in irrigated grassed areas or naturally moist areas.

Watering basin: Construct around the base of each individual plant, consisting of a raised ring of soil capable of holding at least 10 L.

3.7 MULCHING

Placing mulch

General: Place mulch to the required depth and clear of plant stems, so that after settling it conforms to the following:

- Smooth and evenly graded between design surface levels.
- Flush with the surrounding finished levels.
- Sloped towards the base of plant stems in plantation bed.
- For gravel mulches: Not closer to the stem than 50 mm.

Extent: Provide mulch to 750 mm diameter to surrounds of plants planted in riplines and grassed areas.

Depths:

- Organic mulch: 75 mm.
- Gravel mulch: 50 mm.

Installation:

- In ripline and grassed areas: Place mulch to 750 mm diameter around plants.
- In mass planted areas: Place after the preparation of the planting bed but before planting and other work.
- In smaller areas (e.g. planter boxes): Place after the preparation of the planting bed, planting and other work.

3.8 TREATMENT

General

Insect attack or disease: If evidence of insect attack or disease of plant material is discovered, immediately give notice.

Physical removal

General: Remove insect infestation and diseased plant material by hand if appropriate.

Pesticide

Product: Spray with insecticide, fungicide or both, as required.

3.9 STAKES AND TIES

Stakes

Material: Hardwood, straight, free from knots or twists, pointed at one end.

Installation: Drive stakes into the ground at least one third of their length, avoiding damage to the root system.

Stake sizes and quantities:

-

0261 LANDSCAPE – FURNITURE AND FIXTURES

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide landscape furniture and fixtures, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- *0171b General requirements*.

1.3 SUBMISSIONS

Operation and maintenance manual
Requirement: Submit the manufacturer's published use, care and maintenance requirements for each item.

Products and materials
Requirement: Submit the manufacturer’s standard drawings and details showing methods of construction, assembly and installation; with dimensions and tolerances.

Shop drawings
Custom-built furniture and fixtures: Submit shop drawings to a scale that best describes the details, showing methods of construction, assembly and installation, with dimensions and tolerances.

Subcontractors
General: Submit names and contact details of proposed suppliers and installers.

Warranties
Requirement: Submit the manufacturer's published product warranties.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Custom-built furniture and fixtures fabricated and ready to be delivered to the site.
- Furniture items delivered to site before installation.
- Site locations or substrates prepared to receive furniture or fixtures before installation.
- Set-out of furniture and fixtures.
- Completed installation.

2 PRODUCTS

2.1 GENERAL

Storage and handling
General: Deliver, unload and store products and accessories in sealed manufacturer's packaging.

Preservative treatment
CCA treated timber: If proposed, provide details.

Labelling
Playground equipment: To AS 4685 series.

Weathering steel
Standard: To AS/NZS 3678.
Grade: WR350.

3 EXECUTION

3.1 INSTALLATION

Erection

Line and level: Erect posts or poles vertically. Erect furniture items level. Where installed on slopes, provide a level area around benches and seats.

3.2 COMPLETION

Cleaning

General: On completion, remove protective coatings, clean all surfaces and remove all labels not required for maintenance, or by AS 4685 series.

0271B PAVEMENT BASE AND SUBBASE

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide base and subbase courses as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- *0171b General requirements*.

1.3 INTERPRETATION

Definitions
General: For the purposes of this worksection, the following definitions apply:
- Base: One or more layers of material, forming the uppermost structural element of a pavement and on which the surfacing may be placed.
- Subbase: Material laid on the subgrade below the base either for the purpose of making up additional pavement thickness required, to prevent intrusion of the subgrade into the base, or to provide a working platform.

1.4 SUBMISSIONS

Products and materials
Source of material: Submit the supplier name, material type (crushed rock, natural gravel, recycled concrete aggregate) and source quarry or recycling site.

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Prepared subgrade.
- Proof rolling of subbase before spreading of base.
- Proof rolling of base before sealing.

2 PRODUCTS

2.1 BASE AND SUBBASE MATERIAL

Granular material
Requirement: Provide unbound granular materials, including blends of two or more different materials, which when compacted develop structural stability and are uniform in grading and physical characteristics.

Crushed rock
Requirement: Provide crushed rock as follows:
- Base: 20 mm nominal.
- Subbase: 40 mm nominal.

Recycled materials
Requirement: Provide recycled materials as follows:
- Base and subbase: Conform to the **Limits on use of recycled and manufactured materials as constituent materials table** and the **Undesirable material properties table**.

Natural gravel
Requirement: Provide unbound natural gravel materials as follows:
- Base: 20 mm nominal.

- Subbase: 40 mm nominal.

Subbase material properties and test methods table

Property and test method	Differentiating criteria	Material requirements	
		Crushed rock	Natural gravel
Particle size distribution or grading (% passing through sieve) to AS 1289.3.6.1	**Sieve size (mm)**	—	—
	53.0 mm	100	100
	37.5	90 - 100	95 - 100
	26.5	74 - 96	80 - 97
	19.0	62 - 86	—
	13.2	—	—
	9.5	42 - 66	48 - 85
	4.75	28 - 50	35 - 73
	2.36	20 - 39	25 - 58
	0.425	8 - 21	10 - 33
	0.075	3 - 11	3 - 21
Maximum dry compressive strength on fraction passing 19 mm sieve (only applies if plasticity index is less than 1) to AS 1141.52	—	min 1.0 MPa	min 1.0 MPa
4 day soaked CBR (98% modified compaction) to AS 1289.6.1.1	—	min 30%	min 30%

Limits on use of recycled and manufactured materials as constituent materials table

Recycled material	Unbound or modified base and subbase	Bound base and subbase
Iron and steel slag	100%	100%
Crushed concrete	100%	100%
Brick	20%	10%
RAP	40%	40%
Fly ash	10%	10%
Furnace bottom ash	10%	10%
Crushed glass fines	10%	10%

Undesirable material properties table

Property and test method	Differentiating criteria	Material requirements		
		Crushed rock	Recycled material	Natural gravel
Undesirable constituent materials (% retained on a 4.75 mm sieve) to RMS T276	**Material type**	—	—	—
	Type I - Metal, glass, stone, ceramics and slag	—	max 2.0 %	—
	Type II - Plaster, clay lumps and other friable material	—	max 0.5%	—
	Type III - Rubber, plastic, paper, cloth, paint, wood and other vegetable matter	—	max 0.1%	—

Base material properties and test methods table

Property and test method	Differentiating criteria	Material requirements

Property and test method	Differentiating criteria	Material requirements		
		Crushed rock	**Recycled material**	**Natural gravel**
Particle size distribution or grading (% passing through sieve) AS 1289.3.6.1	**Sieve size (mm)**	—	—	—
	26.5	100	100	100
	19.0	95 - 100	95 - 100	93 - 100
	13.2	77 - 93	78 - 92	—
	9.5	63 - 83	63 - 83	71 - 87
	4.75	44 - 64	44 - 64	47 - 70
	2.36	29 - 49	30 - 48	35 - 56
	0.425	13 - 23	13 - 21	14 - 32
	0.075	5 - 11	5 - 9	6 - 20
CBR (98% modified compaction) to AS 1289.6.1.1	—	min 80%	min 80%	min 80%
Unconfined compressive strength to AS 5101.4	—	max 1.0 MPa	max 1.0 MPa	—

3 EXECUTION

3.1 SUBGRADE PREPARATION

General

Requirement: Prepare the subgrade in conformance with *0222 Earthwork*.

3.2 PLACING BASE AND SUBBASE

General

Weak surfaces: Do not place material on a surface that is weakened by moisture and is unable to support, without damage, the construction plant required to perform the works.

Spreading: Spread material in uniform layers without segregation.

Moisture content: Maintain wet mixed materials at the required moisture content before and during spreading. Add water to dry mixed materials through fine sprays to the entire surface of the layer after spreading, to bring the material to the required moisture content.

Compacted layer thickness: 200 mm maximum and 100 mm minimum. Provide layers of equal thickness in multilayer courses.

Joints

General: Plan spreading and delivery to minimise the number of joints. Offset joints in successive layers by a minimum of 300 mm.

Start of shift: Remix last 2 m of previous days' work for continuity of compaction.

Final trimming

General: Trim and grade the base course to produce a tight even surface with no loose stones or slurry of fines.

3.3 TOLERANCES

Surface level

General: Provide a finished surface level which is free draining and evenly graded between level points.

Subbase: + 10 mm, - 25 mm.

Base: + 10 mm, - 5 mm.

Base abutting gutters: ± 5 mm from the level of the lip of the gutter, minus the design thickness of the wearing course.

Surface deviation

0274B CONCRETE PAVEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide concrete pavement as documented.

Performance

Requirement: Provide finished surfaces conforming to the following:

- Free draining and evenly graded between level points.
- Even and smooth riding.

Conformance: Conform to the local authority requirements for levels, grades and minimum thickness, reinforcement and concrete strength for pavements within the kerb-and-gutter property boundaries.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.

Reference

Comply with Maitland City Council – Manual of Engineering Drawings – Standard Drawings:

- *Drawing SD012*

1.3 STANDARDS

Concrete

Specification and supply: To AS 1379.

Materials and construction: To AS 3600.

Slip resistance

Classification: To AS 4586.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Concrete class – normal: Concrete that is specified primarily by a standard compressive strength grade up to 50 MPa and otherwise in conformance with AS 1379 clause 1.5.3.
- Concrete class – special: Concrete that is specified to have certain properties or characteristics different from, or additional to, those of normal-class concrete and otherwise in conformance with AS 1379 clause 1.5.4.
- Weather – cold: Ambient shade temperature less than 10°C.
- Weather – hot: Ambient shade temperature greater than 30°C.

1.5 TOLERANCES

General

Surface abutting gutters: ± 5 mm from the level of the gutter edge.

Rigid pavement surface:

- From design level: + 10 mm, - 0 mm.
- From a 3 m straightedge placed anywhere on surface: 5 mm.

Horizontal position of outer concrete edge: 30 mm from documented position.

Joint locations in plan : 10 mm from documented position.

1.6 SUBMISSIONS

Products and materials

Aggregates: Nominate the source for all aggregates.

Reinforcement: Submit the manufacturer's certificate of compliance with AS/NZS 4671, or submit test certificates from an Accredited Testing Laboratory.

Liquid curing compounds: Submit certified test results, including the application rate and the efficiency index to AS 3799 Appendix B.

Curing by covering: Submit details of the proposed covering material.

Repair materials: Submit proposals for epoxy resin/grout and elastomeric sealant.

Concrete: Submit the concrete supply delivery dockets.

Trial mix design report: Six weeks before commencing production, submit a report for each mix design containing the information required in AS 1012.2, the individual and combined aggregate particle size distribution, and the records and reports for the tests.

Tests

Site tests: Submit results, as follows:

- Slip resistance test of completed installations.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Base or subgrade before covering.
- Membrane or film underlay installed on the base or subgrade.
- Concrete formwork, reinforcement and dowels in position.
- Commencement of concrete placing.
- Completion of concrete placing.
- Evaluation of surface finish.

2 PRODUCTS

2.1 REINFORCEMENT

Steel reinforcement

Standard: To AS/NZS 4671.

Surface condition: Free of loose mill scale, rust, oil, grease, mud or other material that may reduce the bond between the reinforcement and concrete.

Accessories

Reinforcement supports: To AS/NZS 2425.

Tie wire: Galvanized annealed steel 1.25 mm diameter minimum.

Dowels

General: Provide each dowel in one piece, straight, cut accurately to length with ends square and free from burrs.

Standard: To AS/NZS 4671.

Grade: 250R steel bars 450 mm long.

Tie bars

Type: Deformed bar, 12 mm diameter, grade 500N, 1 m long.

2.2 AGGREGATE

Characteristics

Standards: AS 2758.1.

Durability: Tested to AS 1141.22:

- Wet strength not less than 80 kN.
- 10% Fines Wet/Dry Variation not to exceed 35%.

Recycled concrete aggregate (RCA): If blending coarse RCA with natural aggregates, make sure substitution rates are below 30%.

2.3 CEMENT

General

Standard: To AS 3972.

Moisture: Protect from moisture until used. Do not use caked or lumpy cement.

Age: Less than 6 months old.

Storage: Store cement bags under cover and above ground.

Supplementary cementitious materials

Fly ash: To AS/NZS 3582.1.

Slag: To AS 3582.2.

Amorphous silica: To AS/NZS 3582.3.

2.4 WATER

General

Quality: Potable water free from materials harmful to concrete or reinforcement, and not salty or brackish.

Limits: Not containing more than:

- 600 parts per million of chloride ion, tested to AS 3583.13.
- 400 parts per million of sulphate ion, tested to AS 1289.4.2.1.

2.5 ADMIXTURES

General

Standard: Chemical admixtures to AS 1478.1, used to the manufacturer's recommendations.

Quality: Free from calcium chloride, calcium formate, or triethanolamine or any other accelerator. Do not use admixtures or combinations of admixtures without prior written approval.

Dosage: Vary the dosage of chemical admixture to account for factors such as air temperature, setting time and cement content to the manufacturer's recommendations.

2.6 CURING COMPOUNDS

General

Curing compounds: To AS 3799 and AS 1160, Type 2.

Sheet material covering: To ASTM C171, white opaque or clear polyethylene film, or white burlap-polyethylene sheet, or equivalent material.

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3 EXECUTION

3.1 GENERAL

Traffic control

Traffic restriction: Do not allow traffic or construction plant other than that associated with testing, sawcutting, cleaning or joint sealing on pavement for minimum 10 days after placing, or when the concrete has reached a compressive strength of at least 20 MPa, and joints have been completely sealed.

3.2 SUBGRADE

Preparation

Conformance: Prepare subgrade in accordance with Council's Manual of Engineering Drawings – Standard Drawings.

Extent: Prepare a uniform subgrade for the full pavement formation, extending at least to the back of kerbs or at least 300 mm beyond each side of the carriageway if kerbs are not proposed.

Reinstatement: Make sure of uniformity for backfilling of any utility trenches.

3.3 SUBBASE

Thickness

Subbase thickness: In accordance with Council's Manual of Engineering Drawings – Standard Drawings.

Width

Subbase width: Extend the subbase at its full depth to at least the back of kerbs or other edge stops before their installation.

No integral kerbs: Extend granular unbound subbase at least 300 mm beyond each side of the carriageway.

Tolerance

Subbase finished surface level: + 0 mm, - 10 mm.

3.4 CONCRETE MIX

Standard

Concrete mix and supply: To AS 3600 clause 17.1 and AS 1379.

Properties

Concrete pavement thickness: Refer to Council's Manual of Engineering Drawings – Standard Drawings.

Concrete pavement strength: Refer to Council's Manual of Engineering Drawings – Standard Drawings.

Slump: Maximum 100 mm.

Drying shrinkage: Maximum 450

3.5 TESTING

Standards

Sampling, identification, testing and recording: To the AS 1012 series.

Specimens: Sample the concrete on-site, at the point of discharge from the agitator.

Type and frequency: To AS 1379.

Testing authority: Concrete supplier or Accredited Testing Laboratory.

Concrete testing methods

Slump: To AS 1379 clause 5.2.

Compressive strength: Test to AS 1012.8.1 and AS 1012.9.

Drying shrinkage: Test to AS 1012.8.4 and AS 1012.13.

Flexural strength: Test to AS 1012.8.2 and AS 1012.11.

Acceptance criterion for strength: The average strength of any set of 3 consecutive project samples must be equal to or greater than the specified minimum value.

Sampling frequency: Provide a minimum of one sample from each 50 m^3 of concrete.

3.6 INSTALLATION

Junctions with existing pavements

Trimming: If new pavement is to be joined to an existing pavement, trim the edge of the existing pavement to create a neat vertical edge for its full depth before placing new pavement material.

Fixed formwork

Description:

- Steel forms.
- Seasoned, dressed timber planks, free of warps, bends or kinks.

Depth: Equal to the edge thickness of the slab and in one piece.

Tolerances on position:

- Level of top of form: - 0 mm, + 10 mm from pavement surface design level.
- Horizontal tolerance: 10 mm (maximum departure from a plane surface).
- Verticality: 3 mm departure from vertical.

Staking: Stake forms in position using at least 3 steel stakes per form, not more than 1.5 m apart. Lock joints between form sections to prevent movement.

Release agent: Before placing reinforcement, apply a release agent compatible with the contact surfaces, to the interior of the formwork, except where the concrete is to receive an applied finish for which there is no compatible release agent.

Re-use: Clean and recoat the forms each time before placing concrete.

Keyways: Form the keyways of keyed construction joints using steel or timber form strips accurately located at the mid-depth of the slab and securely fastened flush against the formwork face.

Reinforcement

Tolerances in fabrication and fixing: To AS 3600.

Locate reinforcement: Place reinforcement in the top half of the pavement.

Minimum cover to reinforcement: 30 mm.

Splicing mesh: Overlap a minimum of 2 crosswires.

Supports: Provide reinforcement supports as follows:

- Able to withstand construction and traffic loads and maintain the concrete cover, as documented.
- With a protective coating if they are ferrous metal extending to the surface of the concrete.
- Use plastic or concrete supports with galvanized or zinc-coated reinforcement.
- Spacing:
  - . 60 diameters.
  - . mm.
- Supports over membranes: Prevent damage to waterproofing membranes or vapour barriers. If appropriate, place a metal or plastic plate under each support.

Projecting reinforcement: If starter or other bars extend beyond reinforcement mats or cages, through formwork or from cast concrete, provide a plastic protective cap to each bar until it is cast into later work.

Tying: Secure the reinforcement against displacement at intersections with either wire ties, or clips. Bend the ends of wire ties away from nearby faces of formwork or unformed faces to prevent the ties projecting into the concrete cover.

Mats: For bar reinforcement in the form of a mat, secure each bar at alternate intersections.

Cores, fixings and embedded items

Position: Fix cores and embedded items to prevent movement during concrete placing. In locating cores, fixings and embedded items, displace but do not cut reinforcement, and maintain cover to reinforcement.

Isolation: Isolate embedded items to prevent water tracking to concrete providing minimum cover to reinforcement.

3.7 CONCRETE PLACING AND COMPACTION

Concrete placing

General: Place concrete uniformly over the width of the slab or lane and so that the face is generally vertical and normal to the direction of placement. Hand spread concrete using shovels, not rakes.

Ponding: Remove any water ponding on the base or subbase before starting placement.

Placing sequence: Commence from one corner (usually the lowest point) and proceed continuously out from that point.

Weather: Do not place concrete in ambient temperatures above 30°C or below 10°C, without adequate precautions.

Compaction

Thickness 100 mm or less: Compact by placing, screeding and finishing processes. If required use a hand-held vibrating screed at the surface. Do not use immersion vibrators.

Thickness more than 100 mm and downturns: Use an immersion vibrator.

Placing records

Log book: Keep on site and make available for inspection a log book recording each placement of concrete, including the following:

- Date.
- Specified grade and source of concrete.
- Slump measurements.
- The portion of work.
- Volume placed.

Rain

Protection: During placement and before setting, protect surface from damage.

3.8 CONCRETE FINISH

General

Commencement: Immediately after placement, spreading and compaction of the concrete, start initial finishing procedures to achieve the documented finish.

Final finishing: Do not commence final finishing until all bleed water has evaporated from the surface after initial finishing procedures.

Unformed surfaces

General: Strike off, screed and level slab surfaces to finished levels, to the tolerance class and finish documented.

Formed surfaces

Damage: Do not damage concrete works through premature removal of formwork.

Curing: If forms are stripped when concrete is at an age less than the minimum curing period, commence curing exposed faces as soon as the stripping is completed.

Finishing methods - primary finish

Machine float finish:

- After levelling, consolidate the surface using a machine float.
- Cut and fill and refloat immediately to a uniform, smooth, granular texture.
- Hand float in locations inaccessible to the machine float.

Wood float finish: After machine floating use wood or plastic hand floats to produce the final consolidated finish free of float marks and uniform in texture and appearance.

Broom finish: After machine floating and steel trowelling draw a broom or hessian belt across the surface to produce a coarse even-textured transverse-scored surface.

Scored or scratch finish: After screeding, give the surface a coarse scored texture using a stiff brush or rake drawn across the surface before final set.

Sponge finish: After machine floating and steel trowelling, obtain an even textured sand finish by wiping the surface using a damp sponge.

Finishing methods - supplementary finish

Abrasive blast: After steel trowelling, abrasive blast the cured surface to provide texture or to form patterns without exposing the coarse aggregate, using hard, sharp graded abrasive particles.

Coloured applied finish: After machine floating, apply a proprietary liquid or dry shake material to the manufacturer's recommendations and trowel to achieve the required appearance.

Stamped and coloured faux paved or cobblestone finish: Provide finishing system.

Surface repairs

Repair method: If required, detail proposals.

3.9 CONCRETE CURING

General

Curing: Commence curing as soon as possible after finishing, when the concrete has set sufficiently not to be damaged by the curing process, and extend for a minimum period of 7 days.

End of curing period: Prevent rapid drying out at the end of the curing period.

Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.

Curing methods

Covering sheet method: Cover concrete using damp hessian or cotton mats overlapped at least 150 mm and anchored against displacement by wind or other interference. Keep the mats continuously damp until covered by the covering sheet material. Repair tears immediately.

Moist curing method: Keep the concrete surface continuously damp by ponding or spraying constantly with water, fog, or mist, using suitable spraying equipment. Continue wetting for the curing period.

Curing compound: Provide a uniform continuous flexible coating to AS 3799, without visible breaks or pinholes. Make sure coating remains unbroken at least for the required curing period after application. Respray defective areas within 30 minutes. Respray within 3 hours after heavy rain.

Self-levelling toppings: If used also as curing compounds, conform to AS 3799.

Coloured concrete: Do not cure with plastic sheeting, damp sand or wet hessian. Use only chemical curing compounds compatible with the sealer or a sealer to the manufacturer's recommendations.

3.10 JOINTS

General

Requirement: Construct expansion, contraction and construction joints straight and plumb. Make transverse joints normal to longitudinal joints. Extend transverse expansion and contraction joints continuously from edge to edge of the pavement through interconnected slabs.

Joint layout: Install joints as documented.

Joint spacings: Refer to drawings and Council’s Manual of Engineering Drawings – Standard Drawings.

Joint widths: Refer to Council’s Manual of Engineering Drawings – Standard Drawings.

Contraction joints

Installation: Construct transverse and longitudinal contraction joints by early power sawing at an appropriate time, tooling or by placing an insert in the fresh concrete.

Construction joints

Installation: Place header board on the subbase or subgrade at right angles to the pavement centre line.

Planned location: Terminate each day's placing operation at a transverse construction joint located to coincide with a planned contraction or expansion joint.

Unplanned joints: If placement is interrupted for 30 minutes or longer, form a tied transverse construction joint within the middle third of the distance between planned joints but no closer than 1.5 m to the nearest planned joint. If necessary remove placed concrete back to the required location.

Expansion joints

Joint filling: Fill with jointing materials as documented. Finish visible jointing material neatly flush with adjoining surfaces.

Jointing materials: Provide jointing materials compatible with each other, and non-staining to concrete in visible locations.

Foamed materials (in compressible fillers): Closed-cell or impregnated, not water absorbing.

Preparing joints

Stripping time: At least 12 hours.

Clean: Immediately before installation of the sealer, make sure the joint space is dry, clean and free from loose material. Remove laitance, curing compound and protrusions of hardened concrete from the sides and upper edges of the joint.

Joint sealing

Sealant type: Provide silicone sealant in conformance with the manufacturer's recommendations.

Backing rod: Compressible closed cell polyethylene foam with a bond breaking surface.

3.11 COMPLETION

Completion tests

Slip resistance of completed installation: To AS 4663.

Cleaning

Excavated material: Remove from site.

0275B PAVING – MORTAR AND ADHESIVE BED

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide paving, as documented.

Performance
Requirements:

- Consistent in colour and finish.
- Firmly bonded to substrates for the expected life of the installation.
- Resistant to expected impacts in use.
- Set out with joints accurately aligned in both directions.
- To direct all water flowing from supply points to drainage outlets without leakage to the substrate or adjacent areas.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171b General requirements*.

1.3 STANDARDS

Slip resistance
Classification: To AS 4586.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the following definitions apply.

- Absolute level tolerance: Maximum deviation from design levels.
- Adhesives - cementitious (C): Adhesive in which the binders are hydraulic, e.g. General purpose cement, with aggregates and organic additives.
- Bedding: Mixtures of materials which are applied to substrates in a plastic state and which dry, cure and adhere tiles to substrates:
  - . Adhesive bedding: Paving/tiling adhered by adhesives.
  - . Mortar bedding: Paving/tiling adhered in a cementitious mortar bed.
- Lippage: Height deviation between adjacent units.
- Pavers: Units made from clay, stone, precast concrete, ceramic, terrazzo and/or other inorganic raw materials, generally over 20 mm thick, used as coverings for horizontal surfaces. Larger pavers are often referred to as flags.
- Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface.
- Substrate: The surface to which a material or product is applied.

1.5 TOLERANCES

Completed paving
Lippage:

- Unpolished pavers: Less than 2 mm.
- Polished pavers 300 x 300 mm or less: 1 mm, with 5% not exceeding 1.5 mm.
- Polished pavers over 300 x 300 mm: 1.5 mm, with 5% not exceeding 2 mm.

Paving surface level tolerances table

Item	Level tolerance	
	Absolute	Relative

Vehicular pavements	± 5 mm	5 mm
Pedestrian pavements	± 10 mm	10 mm

1.6 SUBMISSIONS

Products and materials

Product conformity: Submit current assessments of conformity as follows:

- Marking and classification of adhesive to AS ISO 13007.1.

Type tests: Submit results, as follows:

- Slip resistance of pavers.
- Accelerated wear test of pavers.
- Stone paver properties.

Samples

General: Submit labelled samples of pavers, grout and sealants, illustrating the range of variation in colour and finish.

Sample panel: Prepare a sample panel of each type of finish as follows:

-

. Off- 2.5%.

Lime: To AS 1672.1.

Sand: Fine aggregate with a low clay content selected for grading, sharp and free from efflorescing salts.

Water: Clean and free from any deleterious matter.

Measurement of volume: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

Bedding mortar

Mix proportion (cement:sand): Select from the range 1:3 to 1:4 to obtain satisfactory adhesion. Provide minimum water.

Mixing: To AS 3958.1 clause 2.15.

Gauging: Site gauged by volume.

2.3 GROUT

Type

Portland cement based grout: Mix with fine sand. Provide minimum water to achieve workability.

- Mix proportion (cement:sand): 1:3.

Pigments

Pigments for coloured grout: Provide colourfast pigments compatible with the grout material. For cement-based grouts, provide inorganic mineral pigments or lime-proof synthetic metallic oxides compatible with cement.

Water

General: Clean and free from any deleterious matter.

2.4 PAVERS

Concrete and clay pavers

Standard: To AS/NZS 4455.2.

Application to AS/NZS 4455.2 Table 2.8: Pedestrian traffic only.

Properties: To AS/NZS 4455.2 Table 2.8.

Salt attack resistance grade to AS/NZS 4455.2 Table 2.7: Exposure grade.

2.5 OTHER MATERIALS

Control joint types

General: As documented.

Divider strip: A proprietary expansion joint consisting of a neoprene filler sandwiched between plates with lugs or ribs for mechanical keying. Set flush with the finished surface.

Proprietary slide plate divider strip: An arrangement of interlocking metal plates grouted into pockets formed in the concrete joint edges.

Sealant: Two-pack self-levelling flexible mould resistant, one-part silicone or polyurethane sealant applied over a backing rod. Finish flush with the paver surface.

- Floors: Trafficable, shore hardness more than 35.

Backing rod: Compressible closed cell polyethylene foam with a bond-breaking surface.

3 EXECUTION

3.1 PREPARATION

Trial set-out

General: Prepare a trial paving set-out to each area as follows to:

- Maximise the size of equal margins of cut pavers.
- Locate control joints.
- Note minor variations in joint widths to eliminate cut pavers at margins.

Ambient temperature

General: If the ambient temperature is less than 5°C or more than 35°C, do not lay pavers.

Substrates

General: Make sure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location of pavers.
- Projections are hacked off and voids and hollows are filled with a cement:sand mix not stronger than the substrate nor weaker than the bedding.

Drying and shrinkage: Before paving, allow at least the following times to elapse (for curing and initial shrinkage) for these substrates:

- Concrete slabs: 28 days.
- Toppings on slabs: A further 21 days.

Absorbent substrates: If suction is excessive, control it by dampening but avoid over-wetting and do not apply mortar bedding to substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 3 mm of the surface and expose the aggregate then apply a bonding treatment.

Fixtures

General: Before paving make sure that fixtures interrupting the surface are accurately positioned in their designed or optimum locations relative to the paving layout.

3.2 PAVING GENERALLY

Variations

General: If necessary, distribute variations in hue, colour, or pattern uniformly, by mixing pavers or paving batches before laying.

Paving joints

Joint widths: Set out pavers to give uniform joint widths of 6 to 12 mm.

Margins

General: Provide whole or purpose-made pavers at margins where practicable, otherwise set out to give equal margins of cut pavers. If margins less than half paver width are unavoidable, locate the cut pavers where they are least conspicuous.

Protection

Traffic: Keep pedestrian and vehicular traffic off paving until the bedding has set and attained its working strength.

Cleaning: Keep the work clean as it proceeds and protect finished work from damage.

3.3 MORTAR BEDDING

Preparation of pavers

Suction: Soak porous pavers in water for half an hour and then drain until the surface water has disappeared.

Bedding

General: Use bedding methods and materials which are appropriate to the paver, the substrate, the conditions of service, and which leave the paver firmly and solidly bedded in the bedding material and adhered to the substrate. Form falls integral with the substrate.

Mortar beds

Substrate preparation: Either lightly dust the screeded bed surface with dry cement and trowel level until the cement is damp, or spread a thin slurry of neat cement, on to the paver back. Do not provide mortar after initial set has occurred.

Nominal thickness: 30 to 60mm.

3.4 ADHESIVE BEDDING

Preparation of pavers

Adhesive bedding: Fix pavers dry.

Bedding

General: Use bedding methods and materials which are appropriate to the paver, the substrate, the conditions of service, and which leave the paver firmly and solidly bedded in the bedding material and adhered to the substrate. Form falls integral with the substrate.

Thick adhesive beds
General: Provide on substrates with deviations up to 6 mm when tested with a 2 m straight edge, and with pavers having deep keys or frogs.

Nominal thickness: 6 mm.

Adhesive bedding application
General: Apply adhesive by notched trowel to substrates and direct to pavers if required, to provide evenly distributed coverage of more than 90% after laying.

Pattern of distribution of adhesive: Conform to AS 3958.1. Verify by examining one paver in ten as work proceeds.

Grouting: Allow the adhesive to cure for the period recommended by the manufacturer before grouting.

3.5 MOVEMENT JOINTS

General
Requirement: Provide control joints as follows:

- Location:
  - . Over structural control joints.
  - . At internal corners.
  - . Close to external corners in large paved areas.
  - . Around the perimeter at abutments.
  - . At junctions between different substrates.
  - . To divide large paved areas into bays, maximum 5 m wide, maximum area 16 m^2.
  - . At abutments with the building structural frame and over supporting walls or beams where flexing of the substrate is anticipated.
- Depth of joint: Right through to the substrate.
- Sealant width: 6 to 25 mm.
- Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

3.6 GROUTED JOINTS

Grouting
General: Commence grouting as soon as practicable after bedding has set and hardened sufficiently. Clean out joints as necessary before grouting.

Face grouting: Fill the joints solid and tool flush. Clean off surplus grout and wash down as the grouting proceeds.

3.7 TESTING

Completion tests
Slip resistance of completed installation: To AS 4663.

3.8 COMPLETION

Cleaning
Completion: Clean progressively and leave pavements clean on completion.

0276 PAVING – SAND BED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide paving, as documented.

Performance

General: Coordinate with drainage, adjacent structures and trees.

Conformance: Conform to local authority requirements for levels, grades and paving details (including shape, colour and laying pattern) for paving to footpaths and driveways.

Requirements: Provide paving conforming to the following:

- The documented level tolerances.
- Consistent in colour and finish.
- To direct all water flowing from supply points to drainage outlets without leakage to the substrate or adjacent areas.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.
- *0271b Pavement base and subbase*.

1.3 STANDARDS

General

Concrete and clay pavers: To AS/NZS 4455.2.

Slip resistance

Classification: To AS 4586.

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- AGPT: Austroads Guide to Pavement Technology.
- CBR: California Bearing Ratio.
- CCAA: Cement Concrete and Aggregates Australia.
- CMAA: Concrete Masonry Association of Australia.

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Absolute level tolerance: Maximum deviation from design levels.
- Base: One or more layers of material, forming the uppermost structural element of a pavement and on which the surfacing may be placed.
- Concrete segmental pavers: Units of not more than 0.10 m^2 in gross plan area, manufactured from concrete, with top and bottom faces parallel, with or without chamfered edges and identified by the following shape types:
  - Shape Type A: Dentated chamfered units which key into each other on four sides, are capable of being laid in herringbone bond, and by plan geometry, when interlocked, resist the spread of joints parallel to both the longitudinal and transverse axes of the units.
  - Shape Type B: Dentated units which key into each other on two sides, are not (usually) laid in herringbone bond, and by plan geometry, when keyed together, resist the spread of joints parallel to the longitudinal axes of the units and rely on dimensional accuracy and accuracy of laying to interlock on the other faces.

. Shape Type C: Units which do not key together rely on dimensional accuracy and accuracy of laying to develop interlock.

- Density ratio (soil): Percentage of the maximum density at optimum moisture content as determined by AS 1289.5.2.1.
- Lippage: Height deviation between adjacent units.
- Pavers: Units made from clay, stone, precast concrete, ceramic, terrazzo and/or other inorganic raw materials, generally over 20 mm thick, used as coverings for horizontal surfaces. Larger pavers are often referred to as flags.
- Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface.
- Soldier course: A course of whole or trimmed rectangular pavers at the pavement restraint edge.

1.5 TOLERANCES

Finished surface level

General: Conform to the following:

- Absolute level tolerance: ± 8 mm.
- Relative level tolerance: 8 mm.
- Lippage: Less than 2 mm.

1.6 SUBMISSIONS

Authority approvals

Local authority: Submit authority approvals for paving products, laying patterns, alignment and drainage for footpaths or crossovers.

Execution details

Base material: Submit test results on quality, grading and compaction.

Paving pattern: If it appears that minor variations to joint widths will minimise cutting, submit proposals.

Products and materials

Compliance certificate: Submit compliance certificates for the pavers, as documented.

Type tests: Submit results, as follows:

- Slip resistance of pavers.
- Accelerated wear test of pavers.

Samples

General: Submit labelled samples of pavers, illustrating the range of variation in colours and finish.

Tests

Site tests: Submit results, as follows:

- Slip resistance test of completed installations.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Completed base preparation.
- Completed trial set-out for paving.
- Completed paving.

2 PRODUCTS

2.1 SAND

Bedding sand

Quality: Free of deleterious material, such as soluble salts which may cause efflorescence.

Grading: To the **Bedding sand grading table** tested to AS 1141.11.1.

Fines: Do not use single-sized, gap-graded or excessive fine material.

Cement: Do not use cement bound material.

Moisture content: Make sure moisture content is uniform and between 4 to 8%.

Bedding sand grading table

Sieve aperture	Percentage passing (by mass) %
9.52 mm	100
4.75 mm	95 – 100
2.36 mm	80 – 100
1.18 mm	50 – 85
600 µm	25 – 60
300 µm	10 – 30
150 µm	5 – 15
75 µm	0 – 10

Joint filling sand

General: Well-graded sand, free of deleterious material such as soluble salts which may cause efflorescence.

Moisture content: Use dry sand.

Cement: Do not use cement.

Grading: To the **Joint filling sand grading table** tested to AS 1141.11.1.

Joint filling sand grading table

Sieve aperture	Percentage passing %
2.36 mm	100
1.18 mm	90 – 100
600 µm	60 – 90
300 µm	30 – 60
150 µm	15 – 30
75 µm	5 – 10

2.2 GEOTEXTILE MATERIALS

General

Standard: To AS 3705.

Quality: Free of flaws, stabilised against UV radiation, rot proof, chemically stable and with low water absorbency. Filaments resistant to delamination and dimensionally stable.

2.3 CONCRETE AND CLAY PAVERS

General

Standard: To AS/NZS 4455.2.

Permeable interlocking concrete segmental pavers: To CMAA PE01.

Selection: To the **Paver schedule**.

Properties

Requirements: To AS/NZS 4455.2 Table 2.8.

2.4 EDGE RESTRAINT

Concrete

Standard: To AS 1379.

Compressive strength: 32 MPa.

3 EXECUTION

3.1 SUBGRADE

Preparation
Extent: Prepare the subgrade to the required profile and extend to the rear face of the proposed edge restraints or to the face of existing abutting structures.

Drainage of subgrade
Subgrade drainage: Prepare piped or channelled stormwater and subsoil drainage.

Service trenches: Backfill all drainage trenches to perform similar to the undisturbed ground.

3.2 BASE COURSE

Preparation
Base course extent: Extend base course below the edge restraint for its full width except at walls or pits.

Base course: Conform to *0271b Pavement base and subbase*.

3.3 EDGE RESTRAINT

Lateral restraint to segmental paving
Perimeter: If not provided by other structures, provide edge restraints to bedding and units.

Drainage: Position edge restraint and pavers so that the tops of the pavers are slightly above the front edge of the edge restraint.

Edge restraint shape: Make sure the edge restraint has a vertical or near vertical side abutting the pavers.

Concrete edging or kerb
Construction: Fixed form, extrusion or slip forms to AS 2876.

Edging or kerb: Place in a shallow trench between timber forms. Wood float finish flush with the adjacent finished level.

Joints: Provide contraction joints 20 mm deep every 5 m.

Timing: Complete concrete edge restraints before bedding course. Allow concrete edge restraints to harden before vibration of the surface course.

Brick
Setting: On a 1:1:6 (cement:lime:sand) mortar haunch.

Joints: 3 mm struck flush.

Alignment: Even and free from dips, humps and bends.

Cleaning: Wash off mortar progressively.

3.4 BEDDING COURSE

General
Preparation: Remove all loose material from the prepared base.

Geotextile
Position: Place fabric between the base course and the bedding sand and lap 150 mm at joints.

Bedding sand
Spreading: Screed uncompacted sand over prepared base uniformly to achieve a 30 mm thick layer. Maintain sand at a uniform loose density and moisture content.

Bedding course drainage: If water ponding occurs at edge restraint, drain bedding course to existing subsurface drain or drainage pit using geotextile and 20 mm diameter PVC pipe.

Trial section
Moisture content: Prepare a trial section to establish the moisture content limits which will allow paver system compaction to be achieved.

3.5 LAYING PAVING

General
Paving pattern: Prepare a trial set-out for each area.

Laying: Lay paving units on the screeded sand bedding to the documented pattern.

Joints: 2 to 5 mm gap.

Cut courses: 50 mm minimum plan dimension. On footpaths and other linear elements, use at least two cut courses and maintain symmetry.

Control: Control alignment and laying pattern by stringlines or chalked stringlines every 5 m intervals.

Variable width areas: Include in situ concrete infill strips to make a straight area for paving and take up the variable width. If there is a concrete base, provide paving control joints as follows:

- Located over base control joints.
- 10 mm wide and filled with bitumen impregnated fibreboard.

Laying around obstacles

Public utility access pits and penetrations: Adjust access covers as required before commencing paving. Make sure water drains away from pits with lids and into surface inlet drainage structures.

Concrete surrounds:

- Plan shape: Square or rectangular with a smooth connection with the laying pattern of the pavers.
- Pit position: Centring not required.
- Minimum thickness between the pit and paving: 100 mm.
- Strength grade: N32.
- Colour: Natural.

Precast access chamber: Lay pavers to suit specific dimensions of authority access chambers.

Patterns around obstacles: Lay up both sides of the feature from the main or original laying face.

Compaction of bedding

Compaction: Compact the sand bedding after laying paving units with a vibrating plate compactor and appropriate hand methods.

Sequence: Compact paving as follows:

- Progressively behind the laying face.
- Complete compaction of laid paving at end of each day.
- Do not compact within 1 m of the laying face except where adjacent to an edge restraint.

Joint filling: Compact all paving units to design levels before starting of joint filling.

Joint filling

Filling: Spread dry sand over the paving units and fill the joints by brooming. Carry out one or more passes with the vibrating plate compactor and refill the joints with sand. Repeat the process until the joints are completely filled.

Timing: Start joint filling immediately after compaction.

3.6 TESTING

Completion tests

Slip resistance of completed installation: To AS 4663.

3.7 COMPLETION

Protection of the work

Protection: Prevent all vehicular and pedestrian traffic from using the pavement until all compaction and joint filling is completed and all edge restraints are in place.

Spare pavers

General: Supply spare matching pavers of each type for future replacement purposes. Store the spare materials on site.

Quantity: At least 1% of the quantity installed.

Storage location: TBA by MCC.

Cleaning

General: Leave pavements clean on completion.

Final inspection

General: Before the date for practical completion carry out the following inspections:

- Cracking in bound pavements: Width 1.5 mm.
- Subsidence: Offset less than 1.5 m length of the design profile, not more than 5 mm.
- Stepping: Between adjacent elements within the pavement area, not more than 5 mm.
- Chipping and spalling to pavement units: Maximum 10/100 units with chipped or spalled arrises.
- Ponding: Maximum 10 mm deep 15 minutes after rain ceases.
- Paving joints: Refill joints as required.

0315 CONCRETE FINISHES

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide finishes to formed and unformed concrete surfaces, as documented appropriate to the importance (visual or physical) of the constructed concrete elements.

Performance
Requirement: Compatible with documented applied finishes.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171b General requirements*.

Reference
Reference: Refer to the Professional Engineer's documentation and coordinate with this worksection. If any conflict between these documents exists, seek clarification from the Superintendent before proceeding.

1.3 STANDARDS

General
Formed surfaces: To AS 3610.1.

Slip resistance
Classification: To AS 4586.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the following definition applies:

- Green concrete: Concrete which has recently set but has not achieved any design strength.

1.5 TOLERANCES

Formed surfaces
Finish quality: To AS 3610.1 Table 3.3.3.1.

Unformed surfaces
Flatness: To the **Flatness tolerance class table,** using a straightedge placed anywhere on the surface in any direction, for the documented class of finish.

Flatness tolerance class table

Class	Measurement	Maximum deviation (mm)
A	2 m straightedge	4
B	3 m straightedge	6
C	600 mm straightedge	6

1.6 SUBMISSIONS

Execution details
Surface repairs: If surface repairs are required, submit proposed methods.

Prototypes
Test panels: Provide test panels to AS 3610.1 clause 3.7 and as documented by the Professional Engineer and as specified in the **Test panels schedule**.

Manufacture: Cast the panels using the form, concrete, compaction equipment, form release agents, curing and formwork removal methods which are to be used in the final work.

Storage: Once accepted, maintain the panels on site undamaged and protected from the weather, as reference prototypes for evaluation of completed work.

Surface treatment: Do not proceed with the related work until the acceptable range of surface treatments has been determined.

Tests

Site tests: Submit test results, as follows:

- Slip resistance test of completed installations.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Completed formwork before placing concrete.
- Evaluation of the off-form finishes.
- Evaluation of surface finish.

2 PRODUCTS

2.1 MATERIALS

Surface modifiers

Hardeners, sealants and protectors: If documented, proprietary products conforming to the manufacturer's recommendations.

Slip resistance treatment: If documented, proprietary products conforming to the manufacturer's recommendations.

3 EXECUTION

3.1 SURFACE MODIFIERS

General

Application: Apply to clean surfaces, to the manufacturer's recommendations.

3.2 FORMED SURFACES

General

Surface finish: As documented by the Professional Engineer.

Damage: Do not damage concrete works through premature removal of formwork.

Curing

Requirement: If formwork is stripped before the minimum curing period for the concrete has elapsed, continue curing the exposed faces as soon as the stripping is completed.

Evaluation of formed surfaces

General: If evaluation of formed surface is required, complete the evaluation before surface treatment.

Finishing methods

Requirement: If soffits of horizontal concrete elements or faces of vertical concrete elements are to have a finish other than an off-form finish, provide finishes as documented.

Form removal: If vertical face formwork needs to be removed for finishing methods, while the concrete is green, make sure the concrete has sufficiently set to prevent slump.

Blasted finishes:

- Abrasive: Blast the cured surface using hard, sharp graded abrasive particles until the coarse aggregate is in uniform relief.
- Light abrasive: Blast the cured surface using hard, sharp graded abrasive particles to provide a uniform matt finish without exposing the coarse aggregate.

Bush hammered finish: Remove the minimum matrix using bush hammering to expose the coarse aggregate, recessing the matrix no deeper than half the aggregate size, to give a uniform texture.

Exposed aggregate finish: While the concrete is green, wet the surface and scrub with stiff fibre or wire brushes, flushing continuously with clean water, until the aggregate is uniformly exposed. Do not use acid etching. Rinse the surface with water.

Floated finishes:

- Sand floated finish: While the concrete is green, wet the surface and rub using a wood float. Rub fine sand into the surface until a uniform colour and texture are produced.
- Grout floated finish: While the concrete is green, dampen the surface and spread a slurry, using hessian pads or sponge rubber floats. Remove surplus slurry and work until a uniform colour and texture are produced.

Smooth rubbed finish: While the concrete is green, wet the surface and rub using a carborundum or similar abrasive brick until a uniform colour and texture are produced.

3.3 UNFORMED SURFACES

General

Surface finish: As documented in the Schedule of Internal Selections and by the Professional Engineer.

Finished levels: Strike off, screed and level slab surfaces to finished levels and to the flatness tolerance class documented.

Finishing methods – primary finish

Machine float finish:

- After levelling, consolidate the surface using a machine float.
- Cut and fill and refloat immediately to a uniform, smooth, granular texture.
- Hand float in locations inaccessible to the machine float.

Steel trowel finish: After machine floating, finish as follows:

- Use power or hand steel trowels to produce a smooth surface relatively free from defects.
- When the surface has hardened sufficiently, re-trowel to produce the final consolidated finish free of trowel marks and uniform in texture and appearance.

Burnished finish: Continue steel trowelling until the concrete surface attains a polished or glossy finish, uniform in texture and appearance, and free of trowel marks and defects.

Wood float finish: After machine floating, use wood or plastic hand floats to produce the final consolidated finish free of float marks and uniform in texture and appearance.

Broom finish: After machine floating and steel trowelling use a broom or hessian belt drawn across the surface to produce a coarse even-textured transverse-scored surface.

Scored or scratch finish: After screeding, use a stiff brush or rake drawn across the surface before final set, to produce a coarse scored texture.

Sponge finish: After machine floating and steel trowelling, use a damp sponge to wipe the surface to produce an even textured sand finish.

Exposed aggregate finish: After floating and when concrete has stiffened, wet the surface and scrub with stiff fibre or wire brushes, flushing continuously with clean water, until the aggregate is uniformly exposed. Rinse the surface with water.

Finishing methods – supplementary finish

Abrasive blast: After steel trowelling, abrasive blast the cured surface to provide texture or to form patterns without exposing the coarse aggregate, using hard, sharp graded abrasive particles.

Coloured applied finish: After machine floating, apply a proprietary liquid or dry shake material to the manufacturer's recommendations and trowel to achieve the required appearance.

Stamped and coloured faux paved or cobblestone finish: Provide a proprietary finishing system.

Polished finish: After steel trowelling, grind the cured surface of the concrete.

3.4 TESTING

Completion tests

Slip resistance of completed installation: To AS 4663.

4 SELECTIONS

4.1 SCHEDULES

Test panels schedule

Application	Incorporated features	Panel size

Application	Incorporated features	Panel size
Concrete Pavement Finish 1 (CONC-1)	Colour and surface finish	900 x 900
Concrete Pavement Finish 2 (CONC-2)	Colour and surface finish	900 x 900
Concrete Pavement Finish 3 (CONC-3)	Colour and surface finish	900 x 900
Concrete Pavement Finish 4 (CONC-4)	Colour and surface finish	900 x 900

0331B BRICK AND BLOCK CONSTRUCTION

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide brick and block construction, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- *0171b General requirements*.

Reference
Reference: Refer to the Professional Engineer's documentation and coordinate with this worksection. If any conflict between these documents exists, seek clarification from the Superintendent before proceeding.

1.3 STANDARDS

General
Materials and construction: To AS 3700.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions in AS 3700 clause 1.5, AS/NZS 4455.1 and the following apply:
- Brick: A masonry unit that does not exceed 338 mm long x 225 mm wide x 113 mm high, of a size that allows it to be picked up with one hand while the other is used to apply mortar with a trowel.
- Block: A masonry unit exceeding the size of a brick in any dimension, for use in the construction of walls or partitions.
- Brickwork and blockwork types:
  . Common or ordinary: Brickwork and blockwork which is not tested for specified strength values, is not especially treated for texture and colour and can include reject face units.
  . Face units: Bricks or blocks used in facework, including purpose-made units such as squints, sills and thresholds.
. Facework: Masonry intended to be exposed in a wall.

1.5 TOLERANCES

General
Requirement: To AS 3700 Table 12.1.

1.6 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Set-out.
- Unit type, colour and texture.
- Bottoms of cavities, after cleaning out.
- Bottoms of core holes, before grouting.
- Reinforcement type and diameter.
- Positioning of reinforcing before grouting.
- Control joints, ready for insertion of joint filler.
- Damp-proof courses, in position.
- Flashings, in position.

- Lintels, in position.
- Structural steelwork, including bolts and shelf angles, in position.

2 PRODUCTS

2.1 FIRE PERFORMANCE

Fire-resistance of building elements
Fire-resistance level: Tested to AS 1530.4.

2.2 DURABILITY

General
Exposure environment: In accordance with AS 3700 (Clause 5.3 Exposure Environments).
Exposure locations: To AS 3700 clause 5.4.

2.3 MATERIALS

Brick and block units
Selections: As documented.
Standard: To AS/NZS 4455.1 and AS/NZS 4455.3.
Salt attack resistance grade: To AS 3700 Table 5.1.
Minimum age of clay bricks: 7 days.
Mortar materials
Mortar class: To AS 3700 Table 5.1.
Cement: To AS 3972.
Cement type: GP, unless otherwise specified by the Professional Engineer.

Minimum characteristic compressive strength: 12 MPa.

2.4 BUILT-IN COMPONENTS

General

Durability class of built-in components: To AS 3700 Table 5.1.

Steel lintels

Angles and flats: To AS/NZS 3679.1.

Cold formed proprietary lintels: Designed to AS/NZS 4600.

Corrosion protection: To AS/NZS 2699.3.

Galvanizing: Do not cut after galvanizing.

Reinforcement

Standard: To AS/NZS 4671.

Corrosion protection: To AS 3700 clause 5.9.

Minimum cover: To AS 3700 Table 5.1.

Wall ties

Standard: To AS/NZS 2699.1.

Type: Refer to Professional Engineer's requirements.

Corrosion protection: To AS/NZS 2699.1.

Duty classification rating:

- Masonry veneer: Medium duty.
- Normal cavity construction and at abutments:Medium duty.
- Cavities > 60 mm and < 200 mm wide: Heavy duty.
- Cavities > 200 mm wide: Refer to Professional Engineer's requirements.

Connectors and accessories

Standard: To AS/NZS 2699.2.

Corrosion protection: To AS/NZS 2699.2.

Design criteria for flexible masonry ties: Confirm requirements with the Professional Engineer.

Flashings and damp-proof courses

Standard: To AS/NZS 2904.

Slip joints

Standard: To AS 3700 clause 4.14.

Material: Confirm requirements with the Professional Engineer.

Air vents

Blockwork: Select from the following:

- Concrete framed: Bronze wire mesh in concrete frame, 390 x 190 mm.
- Vent blocks: Purpose-made vent blocks.

Brickwork: Select from the following:

- Concrete framed: Bronze wire mesh in concrete frames, 470 x 160 mm.
- Cut brick: 2 cut bricks laid vertically and evenly spaced in a 230 mm wide x 2 course high opening, backed with bronze wire mesh built in.
- Terracotta: Perforated, 230 x 160 mm.

3 EXECUTION

3.1 GENERAL

Mortar mixing

General: Measure volumes accurately to the documented proportions. Machine mix for at least six minutes.

Protection

Masonry materials and components: Protect from ground moisture and contamination.

During construction: Cover the top surface of brickwork and blockwork to prevent the entry of rainwater and contaminants.

Bond

Type: Stretcher bond.

Building in

Embedded items: Build in wall ties and accessories as the construction proceeds. If not practicable to obtain the required embedment within the mortar joint in hollow masonry units, fill appropriate cores with grout or mortar.

Steel door frames: Fill the backs of jambs and heads solid with mortar as the work proceeds.

Clearance for timber frame shrinkage

General: In timber frame brick veneer construction, leave clearances between window frames and brick sill and between roof frames and the brick veneer as follows:

- Single storey frames and ground floor windows (not for slab on ground): 10 mm.
- Two storey frames and upper floor windows: 20 mm.
- Additional clearance: To accommodate additional shrinkage of unseasoned floor timbers.

Monolithic structural action

Construction at different rates or times: If two or more adjoining sections of masonry, including intersecting walls, are constructed at different rates or times, rake back or tie the intersections between those sections to obtain monolithic structural action in the completed work.

Header units: Except in stretcher bond facework, provide brick and block header units, to AS 3700 clause 4.11.2.

- Spacing: 600 mm maximum.
- Location: Provide header units in the following locations:
  . At engaged piers.
  . At engagement of diaphragms with the leaves in diaphragm walls.
  . At intersections of flanges with shear walls.
  . At intersections with supporting walls and buttresses.
  . Between leaves in solid masonry construction.

Joining to existing

General: Provide a control joint where joining to existing structures. Do not tooth new masonry into existing work unless approved by a professional engineer.

Mortar joints

General: Set out masonry with joints of uniform width and minimum cutting of masonry units.

Solid and cored units: Lay on a full bed of mortar. Fill perpends solid. Cut mortar flush.

Face-shell bedded hollow units: Fill perpends solid. Cut mortar flush.

Joint thickness: 10 mm.

Finish: Conform to the following:

- Externally: Tool to give a dense water-shedding finish.
- Internally: If wall is to be plastered, do not rake more than 10 mm to give a key.

Rate of construction

General: Regulate the rate of construction to eliminate joint deformation, slumping or instability.

Rods

Set-out: Construct masonry to the following rods:

- 75 mm high units: 7 courses to 600 mm.
- 90 mm high units: 6 courses to 600 mm.
- 190 mm high units: 3 courses to 600 mm.

Temporary support

General: If the final stability of the masonry is dependent on construction of (structural) elements after the brickwork and blockwork is completed, provide proposals for temporary support or bracing.

3.2 CAVITY WORK

Cavity clearance

General: Keep cavities clear at all times.

Cavity fill

General: Fill the cavity with mortar to 1 course above adjacent finished (ground) level. Fall the top surface towards the outer leaf.

Cavity width

General: Construct minimum cavity widths in conformance with the following:

- Masonry walls: 50 mm (generally) or as documented on architectural wall type drawings..
- Masonry veneer walls: 40 mm between the masonry leaf and the load bearing frame and 25 mm minimum between the masonry leaf and sheet bracing.

Openings

Jambs of external openings: Do not close the cavity.

Wall ties, connectors and accessories

Protection: Install to prevent water passing across the cavity.

3.3 DAMP-PROOF COURSES

Location

General: Locate damp-proof courses, as follows:

- Timber floors: In the first course below the level of the underside of ground floor timbers in internal walls and inner leaves of cavity walls.
- Cavity walls built off slabs on ground: In the bottom course of the outer leaf, continuous horizontally across the cavity and up the inner face bedded in mortar, turned 30 mm into the inner leaf 1 course above.
- Masonry veneer construction built off slabs on ground: In the bottom course of the outer leaf, continuous horizontally across the cavity. Fasten to the inner frame 75 mm above floor level.
- Walls adjoining infill floor slabs on membranes: In the course above the underside of the slab in internal walls and inner leaves of cavity walls. Project 40 mm and dress down over the membrane turned up against the wall.
- External walls in the landscape: Refer to detail drawings.

Height: Not less than:

- 150 mm above the adjacent finished ground level.
- 75 mm above the finished paved or concrete area.
- 50 mm above the finished paved or concreted area and protected from the direct effect of the weather.

Installation

General: Lay in long lengths. Lap full width at angles and intersections and at least 150 mm at joints. Step as necessary, but not exceeding 2 courses per step for brickwork and 1 course per step for blockwork. Sandwich damp-proof courses between mortar.

Junctions: Preserve continuity of damp-proofing at junctions of damp-proof courses and waterproof membranes.

Lap sealing: Seal with a bituminous adhesive and sealing compound.

3.4 FLASHINGS

Location

General: Locate flashings, as follows:

- Floors: Full width of outer leaf immediately above slab or shelf angle, continuous across cavity and up the inner face bedded in mortar, turned 30 mm into the inner leaf 2 courses above for brick and 1 course above for block. If the slab supports the outer skin and is not rebated, bed the flashing in a suitable sealant to provide a watertight seal.
- Under sills: 30 mm into the outer leaf bed joint 1 course below the sill, extending up across the cavity and under the sill in the inner leaf or the frame for masonry veneer. Extend at least 150 mm beyond the reveals or each side of the opening.

- Over lintels to openings: Full width of outer leaf immediately above the lintel, continuous across cavity, turned 30 mm into the inner leaf 2 courses above for brick and 1 course above for block or turned up against the inner frame and fasten to it. Extend at least 150 mm beyond the lintels.
- At abutments with structural frames or supports: Vertical flash in the cavity using 150 mm wide material, wedged and grouted into a groove in the frame opposite the cavity.
- At jambs: Vertically flash jamb, extending 75 mm into the cavity, interleaved with the sill and head flashing at each end. Fix to jambs.
- At roof abutments with cavity walls: Cavity flash immediately above the roof and over-flash the roof apron flashing.

Installation

General: Sandwich flashings between mortar except where on lintels or shelf angles. Bed flashings, sills and copings in one operation to maximise adhesion.

Laps: If required, lap full width at angles and intersections and at least 150 mm at joints. Step as necessary, but not exceeding 2 courses per step for brickwork and 1 course per step for blockwork.

Lap sealing: Seal with a bituminous adhesive and sealing compound.

Pointing: Point up joints around flashings, filling voids.

Weepholes

Requirement: Locate weepholes to external leaves of cavity walls in the course immediately above flashings, and cavity fill, and at the bottoms of unfilled cavities.

Form: Open perpends.

Maximum spacing: 1200 mm.

3.5 WALL TIES

Location

General: Space wall ties in conformance with AS 3700 clause 4.10 and at the following locations:

- Not more than 600 mm in each direction.
- Adjacent to vertical lateral supports.
- Adjacent to control joints.
- Around openings.

Installation

Fixing of masonry veneer ties:

- To timber frames: Screw fix to outer face of timber frames with fasteners to AS 3566.1.
- To concrete: Masonry anchors.
- To steel frames: Screw fix to outer face of steel studs with fasteners to AS 3566.1.

3.6 CONTROL JOINTS

General

Location and spacing: Provide contraction joints, expansion joints or articulation joints to AS 3700 clause 4.8.

Control joint filling

Filler material: Provide compatible sealant and bond breaking backing materials which are non-staining to brickwork and blockwork. Do not use bituminous materials with absorbent masonry units.

- Bond breaking materials: Non-adhesive to sealant, or faced with a non-adhering material.
- Foamed materials: Closed-cell or impregnated, not water-absorbing.

Installation: Clean the joints thoroughly and insert an easily compressible backing material before sealing.

Sealant depth: Fill the joints with a gun-applied flexible sealant for a depth of at least two-thirds the joint width.

3.7 BRICKWORK BED JOINT REINFORCEMENT

Location

General: Locate as follows:

- In 2 bed joints below and above head and sill flashings to openings.

- In 2 bed joints below and above openings.
- In third bed joint above bottom of wall.
- In second bed joint below top of wall.

Maximum vertical intervals: 500 mm.

Installation

General: Lap 450 mm at splices. Fold and bend at corners so that the longitudinal wires are continuous. Stop 50 mm short of control joints. Extend 450 mm beyond each side of openings.

Reinforcement

Material: Galvanized welded wire mesh.

Width: Equal to the width of the leaf, less 15 mm cover from each exposed surface of the mortar joint.

3.8 REINFORCED AND GROUTED BLOCKWORK

Cleaning core holes

General: Provide purpose-made cleanout blocks or machine cut a cleaning hole at the base of each grouted core.

Location: Locate on the side of the wall which is to be rendered or otherwise concealed.

Cleaning: Rod cores to dislodge mortar fins protruding from the blocks and mortar droppings from reinforcement. Remove through the clean-out blocks.

Grouting

Commencement: Do not commence until grout spaces have been cleaned out and the mortar joints have attained sufficient strength to resist blow-outs.

Height of lift: Limit the height of individual lifts in any pour to make sure that the grout can be thoroughly compacted to fill all voids.

Compaction: Compact by vibration or by rodding.

Topping up: On the completion of the last lift, top up the grout after 10 min and within 30 min, and vibrate or rod to mix with the previous pour.

3.9 LINTELS

Location

General: Install one lintel to each wall leaf as documented in the **Lintel schedule**.

Installation

General: Do not cut on site. Keep lintels 10 mm clear of heads of frames.

Steel lintels: Pack mortar between any vertical component and supported masonry units. For angles, install the long leg vertical.

Minimum bearing each end:

- 1000 mm: 100 mm.
- Span > 1000 3000 mm: 150 mm.
- Span > 3000 mm: To structural drawings.

Propping: Provide temporary props to lintels to prevent deflection or rotation.

- Minimum propping period: 7 days.

3.10 CONNECTORS AND ACCESSORIES

Slip joints

General: Install slip joints to top of all unreinforced masonry walls supporting concrete slabs and other concrete elements.

Protection: Keep the slip joints in place and protect from displacement.

Flexible masonry ties

General: Install stabilising ties at control joints and abutting structural elements, including columns, beams and slab soffits.

Locations and details: As documented.

3.11 ARCHES

Arch voussoirs
General: Cut units using a masonry saw.

Shapes and dimensions
General: Form arches using solid or cored (not hollow) masonry units.

3.12 BAGGING

Preparation
General: Cut joints flush before bagging.

Dry bagging
Application: Apply laying mortar to the surface using a hessian bag or similar. Flush up irregularities, but leave a minimum amount of mortar on the surface.

Textured bagging
Application: Apply laying mortar to the surface using a sponge float. Flush up irregularities, but leave approximately 2 mm of mortar on the surface. When initial set is reached, texture using a hand bristle brush.

4 SELECTIONS

4.1 SCHEDULES

Lintel schedule

Opening dimensions (mm)	Lintel type	Depth[1] (mm)	Width (mm)	Thickness (mm)
950	Galvanised steel		50	10
1050	Galvanised steel		75	10
1200	Galvanised steel	75	75	8
1350	Galvanised steel	90	90	8
1500	Galvanised steel	90	90	8
1650	Galvanised steel	100	75	8
1800	Galvanised steel	100	75	8
2100	Galvanised steel	125	75	10
2400	Galvanised steel	125	75	10
3000	Galvanised steel	150	90	12
>3000	Refer to the Structural Engineer's documentation.			
Note: Lintel length required is equal to sum of (opening dimension + 2x bearing at each end).				

For all selections, Refer to Schedule of External Selections.

0382 LIGHT TIMBER FRAMING

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide light timber floor, wall and roof framing, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- *0171b General requirements*.
- *0181 Adhesives, sealants and fasteners*.
- *0185 Timber products, finishes and treatment*.

Reference
Reference: Refer to the Professional Engineer's documentation and coordinate with this worksection. If any discrepancies exist, allow for the higher requirement and confirm with the Professional Engineer before installation

1.3 STANDARDS

General
Framing: To AS 1684.2, AS 1684.3 or AS 1684.4, as appropriate.

Design: To AS 1720.1.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given in the AS 1684 series apply.

1.5 TOLERANCES

Floors
Maximum deviation from a 3 m straightedge laid in any direction on the floor framing: 5 mm.

Walls tolerances table

Property	Permitted deviation
Generally: Verticality in 2 m	1:500
Generally: Flatness[1] in 2 m	3 mm
Features[2]: Verticality in 2 m	1:1000
Features[2]: Horizontality in 2 m	1:1000
1. Flatness: Measured under a straightedge laid in any direction on a surface. 2. Features: Conspicuous horizontal or vertical lines including external corners, parapets, reveals, heads, sills.	

1.6 SUBMISSIONS

Certification
Requirement: Submit certification by a professional engineer of the design, documentation and erected work to AS 1684 and AS 1720.1. Include the following:
- Reactions: Provide location and magnitude of reactions to be accommodated by the support structure.
- Floor, wall and roof frame member sizes: A schedule of proposed member sizes, certified as meeting stated project requirements for spans, spacings, loadings and deflections.
- Species and stress grade.

Products and materials

Identification: Submit a supplier's certificate (which may be included on an invoice or delivery docket) verifying that the timber conforms to the documented requirements.

Inspection: Submit the inspection authority's certificate verifying that the timber conforms to the documented requirements.

Moisture content: Submit records of moisture content.

CCA treated timber: If proposed to be used, submit details.

Shop drawings

General: Submit shop drawings, to a scale that best describes the detail, certified by a professional engineer stating that the design has been carried out to AS 1684 series and AS 1720.1 requirements for the documented configurations and loadings.

Prefabricated roof trusses: Include the following:

- Marking plans.
- Truss plan layout.
- Elevations, with the arrangement of members allowing for the accommodation of in-roof services and the size and section type of each member.
- Camber of all elements.
- The method of assembly, connection, lifting, holding down and bracing.

Prefabricated wall frames: Include the following:

- Wall plan, showing all wall layouts.
- Elevations showing the arrangement of members, and the size and section type of each member.
- The method of assembly, connection, lifting, holding down and bracing.

Subcontractors

Prefabricated items: Submit the name and contact details of proposed manufacturers, suppliers and installers.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Prefabricated units before installation.
- Fabricated items before priming or water-repellent treatment.
- Bolts after final tightening.
- Timber work after erection but before it is covered.

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Do not distort or damage timber or timber products.

Moisture content: Maintain the equilibrium moisture content of seasoned timber.

Protection from weather: Provide temporary protection for members until permanent covering is in place.

Marking

Branding: Brand structural timber, under the authority of a recognised product certification scheme to *0185 Timber products, finishes and treatment* as applicable to the product. Locate the brand mark on faces or edges which will be concealed in the works. Include the following data for timbers not covered by branding provisions in Australian standards or regulations for which branding is required:

- Stress grade.
- Method of grading.
- If seasoned, the word, SEASONED or DRY, or an abbreviation of seasoned, such as SEAS or S.
- The certification mark of the product certification scheme.

- The applicable standard.

Trusses: Permanently mark each truss to show:

- Project identification.
- Manufacturer.
- Tag or number.
- Location.
- Support points.

2.2 TIMBER

Certification

Requirement: Certification, chain of custody and product labelling to *0185 Timber products, finishes and treatment*.

Fascias and barge boards

Hardwood: To AS 2796.1.

Hardwood grade: F11.

Preservation treatment including termite treatment: To *0185 Timber products, finishes and treatment*.

Fascia dimensions:

- Width x thickness (mm): Refer to drawings and Schedule of External Selections.
- Profile: Refer to drawings.

Barge board dimensions:

- Width x thickness (mm): Refer to drawings and Schedule of External Selections.
- Profile: Refer to drawings.

2.3 LAMINATED VENEER LUMBER AND GLUED LAMINATED TIMBER

Laminated veneer lumber

Standard: To AS/NZS 4357.0.

Glued laminated timber

Standard: To AS/NZS 1328.1.

2.4 STRUCTURAL PLYWOOD

General

Standard: To AS/NZS 2269.0.

Bond: Type A to AS/NZS 2754.1.

Bracing

Unit type: Refer to documentation prepared by Professional Engineer.

Thickness (mm): Refer to documentation prepared by Professional Engineer.

Veneer

Veneer quality to visible surfaces: CD (minimum).

2.5 COMPONENTS

Nailplated joined beams

Standard: To AS 4446.

Type: Engineered beam made from stress-graded timber pieces joined together with nailplates.

Mild steel post bases

Minimum dimensions: Conform to AS 1684.2 Table 9.20(p) and AS 1684.3 Table 9.20(p), as appropriate.

Location: To timber posts supported off concrete slabs or footings.

Finish: Galvanize after fabrication.

Fasteners

General: Conform to *0181 Adhesives, sealants and fasteners*.

Installation: Do not split or otherwise damage the timber.

Coating: Before placing bolts in contact with CCA treated timber, coat the shank of the bolt in a grease or bituminous coating.

Damp-proof course

Material: To AS/NZS 2904.

Flashings

Material: To AS/NZS 2904.

2.6 FINGER JOINTED STRUCTURAL TIMBER

General

Performance: To AS/NZS 8008 (Int).

Production: To AS 5068.

2.7 RECONSTITUTED STRUCTURAL TIMBER PRODUCTS

Wet-process fibreboard (including hardboard)

Standard: To AS/NZS 1859.4.

3 EXECUTION

3.1 WALL FRAMING

Bracing

Bracing material: Refer to documentation prepared by Professional Engineer.

Additional support

Requirement: Provide additional support in the form of noggings, trimmers and studs for fixing lining, cladding, hardware, accessories, fixtures and fittings, as required.

Spacing of noggings: Maximum 1350 mm centres.

Vermin barriers

Requirement: Provide vermin barriers as follows:

- Brick veneer barrier: Close nail 10 mm galvanized steel wire mesh to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork.

Damp-proof course

Requirement: Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, as documented or as follows if not documented otherwise:

- External walls (not masonry veneer): Turn up at least 75 mm on the inside and tack. Project 10 mm beyond the external slab edge or dwarf wall and turn down at 45°.
- Walls of bathrooms, shower rooms and laundries: Turn up at least 150 mm on the wet side and tack to studs.

Installation: Lay in long lengths. Lap full width at angles and intersections and at least 150 mm at joints.

Junctions: Preserve continuity at junctions of damp-proof courses, sarkings and waterproof membranes.

Flashings

Location: Provide flashings to external openings to prevent the entry of moisture. Form trays at the ends of sill flashings.

Masonry veneer construction: Extend flashing across cavities and build into brickwork.

3.2 ROOF AND CEILING FRAMING

Wall plates

Fixing: Fix timber wall plates to masonry, with straps, bolts or both.

Fixing plates

Requirement: Provide 45 mm minimum thick timber fixing plates to transfer the design loads where timber joists, rafters or purlins bear on or into steel members. Bolt to the steel member at maximum 500 mm centres and at maximum 100 mm from the end of the fixing plate.

Beam framing
Ridge straps: Butt ends of rafters together at ridge, and strap each pair together with 900 mm long steel strap passing over the ridge, triple nail to each rafter.

Ridge strap material: Refer to documentation prepared by Professional Engineer.

Water tank or heater in roof space: Provide a support platform to AS/NZS 3500.4 clause 5.5.1.

Additional support: Provide a frame member behind every joint in fibre cement sheeting or lining.

Anti-ponding boards
Standard: To AS 4200.2.

Material: Marine grade plywood or FormPly.

3.3 ROOF TRIM

Fascia, valley and barge boards
Requirement: Fix fascia, valley gutter boards and barge boards.

3.4 COMPLETION

Fasteners
Requirement: Make sure all bolts, screws and other fixings have been tightened so that joints and anchorages are secure at the date of practical completion.

Cleaning
General: On completion of framing remove debris from any gaps between members and make sure void between bottom chord of roof trusses and top of any non-supporting internal wall is clear.

0411B WATERPROOFING – EXTERNAL AND TANKING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide roof and deck waterproofing and tanking systems to substrates, as documented and as follows including preparation and all associated work and materials:.

Performance

Requirements: Conform to the following:

- Graded to falls to dispose of stormwater without ponding above the depth of lapped seams.
- Able to accommodate anticipated building movements.
- Able to resist water under hydrostatic pressure.
- Able to accommodate anticipated environmental conditions including UV light if exposed.
- Able to remain serviceable after material shrinkage and loss of elastic properties.
- Resistant to traffic and falling objects including hail if exposed.
- Chemically compatible with the surrounding building materials.
- Able to withstand hydrostatic pressure equivalent to that generated with the full height of the wall saturated by soil including permanent immersion.
- Tanking to all submerged or underground walls and structures to all surfaces, including horizontal surface of footing and over vertical edge of footing including but not limited to:
  - Retaining walls associated with building structure and landscaping works
  - Construction joints

Substrates: Include preparation of substrates and all associated work and material required to complete the waterproofing.

Selections: Conform to **Selections** as documented.

Quality Requirements

Subcontractor Qualifications: Perform work of this worksection only with tradesmen licensed by the appropriate authority and capable of demonstrating significant history of quality of work required with the products on previous jobs.

Pre-installation conference: Meet on site with installer, material manufacturer and installers of any related work and other appropriate parties prior to commencement of waterproofing work. Provide adequate notice to all, minute meeting and record decisions.

Quality Assurance: Installer to maintain QA records in accordance with ISO9000.

Field Quality Control: Arrange for attendance of manufacturer's representative with adequate notice to all parties, as may be required.

1.2 COMPANY CONTACTS

Ardex Australia

Website: https://ardexaustralia.com/

Contact: John Welemann – Technical Support Advisor (02) 9851 9155.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.

1.4 STANDARDS

External waterproofing

Membrane materials: To AS 4654.1.

Membrane design and installation: To AS 4654.2.

Stormwater drainage

Standard: To AS/NZS 3500.3.

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given in AS 4654.1 and AS 4654.2 and the following apply:

- Bitumen: A viscous material from the distillation of crude oil comprising complex hydrocarbons, which is soluble in carbon disulphide, softens when it is heated, is waterproof and has good powers of adhesion. It is produced as a refined by-product of oil.
  - . APP Bitumen: Bitumen modified with Atactic (meaning non-crystalline or amorphous) polypropylene wax to form a plastomeric sheet. The membrane is reinforced with fibreglass or non-woven polyester (NWP).
  - . SBS bitumen: Bitumen modified with Styrene Butadiene Styrene, a thermoplastic rubber that undergoes a phase inversion at elevated temperature and converts to an elastomeric material. The membrane is reinforced with fibreglass or non-woven polyester (NWP).
- Bond breaker: A system preventing a membrane bonding to the substrate, bedding or lining.
- Concrete underlay: Vapour barriers, moisture barriers and damp-proofing membranes comply with AS 2870 clause 5.3.3. Refer to Professional Engineer's documentation.
- Double detail joint: A joint formed by turning up and bonding the horizontal membrane to a vertical substrate and adding an overflashing of membrane material bonded to the vertical substrate and folded over and bonded to the horizontal membrane. In certain situations the double detail can be achieved by bonding an angle profile of membrane material to the junction prior to laying the membrane.
- Liquid applied: A water-based formulation which cures to form an elastomeric membrane.
- Polyurethane: Water or solvent based formulations which moisture cure to form an elastic rubber membrane.
- PVC membrane: Flexible plastic sheet membrane (vinyl).
- Slip sheet: A sheet used to isolate the membrane system from the supporting substrate or from the topping or mortar bedding. The most common material is polyethylene.
- Substrate: The surface to which a material or product is applied.
- Urethane modified acrylics to comply with AS3740/4654.2 Class3 CSIRO approved. Products include acrylics mixed with special cements.

1.6 SUBMISSIONS

Prototypes

General: Apply waterproofing to 10m^2 of area to be waterproofed to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality. Install final surface finish to demonstrate aesthetic affects and quality of materials and execution.

Records

Placing records: Photographically record the application of membranes and label with the following information:

- Date.
- Portion of work.
- Substrate preparation.
- Weather during application and curing.
- Protection provided from traffic and weather.

Liquid membrane applications:

- Record wet film thickness once every 10 m^2 and compare to the manufacturers requirements.
- On completion of every 100 m^2 of each coat compare the amount of membrane used with the manufacturer's application rate and record the result.

Samples
Requirement: Not required.
Shop drawings
Not required if installation is completed strictly in accordance with the manufacturer's product installation literature by an accredited waterproofing subcontractor registered with the manufacturer. Otherwise submit shop drawings showing the following as a minimum for review:

- Junctions with vertical surfaces.
- Drainage details.
- Control joints.
- Flashings.
- Penetrations.
- Corners.
- Terminations and connections.
- Membrane layers.
- Insulation and protection.

Testing
Flood tests: Photographically record flooded area and adjacent areas noted in **Flood test**. Label photographs with date and location.
Subcontractors
General: Submit names and contact details of proposed suppliers and installers as recommended by the manufacturer.

Evidence of experience: Submit evidence of accreditation and experience of waterproofing subcontractor prior to commencement of work.

1.7 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of following:

- Substrate preparation completed.
- Secondary layers preparation completed.
- Before membranes are covered up or concealed.
- Underflashings complete before installation of overflashings.
- After flood testing.

Hold Points
General: Before installation begins, submit the following documentation on the products and installation detail:

- Manufacturers statement certifying that the products and systems being supplied are in accordance with this specification and are suitable for the intended use, required detailing and performance.
- Confirmation regarding UV stability.
- Manufacturers statement that the Contractors proposed applicator is qualified and accredited to install the systems.
- The applicators statement certifying that the building structure and or sub-base is satisfactory for receiving the installation.

During progression of the works manufacturer's inspections are required with a minimum of one inspection (or as otherwise recommended by the manufacturer or Superintendent) of each alternate product system used in the project, and to each of the following areas:

- Behind concrete drop edge beams and retaining walls
- External decks/terraces
- Door thresholds required disabled access condtions
- any additional locations and extents recommended by the manufacturer
- any additional inspection requested by the Superintendent.

- any additional inspection required to ensure the manufacturers full warranty is given

1.8 DESIGN AND PERFORMANCE

Drawings

General: The drawings are indicative of the waterproofing membranes and details. They do not limit the requirement to install a complete waterproofing system.

Services: Refer also to the services drawings for the location, number and extent of services penetrations, and the like.

Design completion

Contractor's documentation: Prepare and submit full documentation of each proposed waterproofing installation, by mark-ups or original documents including:

- Contractor's schedule of all the waterproofing applications as confirmation of the specifications and drawings.
- Drawings of all the proposed details at terminations, penetrations, interruptions, changes in direction, and the like. Include finishing at all perimeters to manufacturer’s specifications.
- Plan drawings keyed to the proposed details, to show all proposed details.
- Verification and acceptance of sub base including falls to wastes and the like.

Verify and confirm all extents at every location prior to installation.

Where not otherwise clear, provide not less than the following extent to the various respective locations.

- Any relevant Australian Standard
- Manufacturer’s written requirements
- Where and if required, extend the termination installation to meet adjacent surfaces finishes and treatments, so as to avoid gaps in finishes between adjacent trades.

Examination

Inspect site conditions before start of work on site, before delivery of materials. Ensure conditions are satisfactory for installation.

Arrange with waterproofing subcontractor for any rectification required before commencement of works.

Substrates

Grade substrates to fall and drains without ponding. Refer also to minimum falls required by the manufacturer and relevant standards.

Movement joints: Provide movement joints over movement joints in the substructure.

Preparation

Prepare all surfaces in accordance with material manufacturer's instructions.

Protection

Protect the installation from damage as and where specified.

Waterproof installations

Complete installations: Supply all materials and perform all work to make each installation completely waterproof. Each complete waterproofing installation shall generally include, but not be limited to, the following components:

- Membranes: Single, or multiple layers of waterproofing membrane sheets and or liquid applied system.
- In-situ treatment of membranes at:
  - . preparation before application
  - . upon laying or applying each layer
  - . laps and joins between sheets of the membrane
  - . laying of reinforcement, where applicable
  - . changes of direction
  - . penetrations
  - . terminations

Accessories: Provide related materials and tools as necessary to complete the installation including protection boards and the like.

Manufacturer's instructions and details: For each waterproofing installation all materials and work shall be part of an integrated waterproof installation, and all from the one manufacturer or supplier and shall conform in every detail with the manufacturer's material specifications and installation instructions, whether written, drawn or verbal.

Flashings and sealing: Provide the following.

- All flashings, caulking and sealing to all vents, curbs, stacks, pipes and the like penetrating the membrane.
- All flashings at walls, parapets, verges, gutters and the like.

1.9 WARRANTY

Requirement

On completion of the work, provide a warranty to the Contract Administrator stating that the work is secure against defects for the required period from the date of Practical Completion.

Provide a warranty, co-signed by the manufacturer and his authorised installers, covering the whole of the membrane system (including acceptance of the overlaying finishes and materials) stating that such installations will remain weather-tight and waterproof for the required warranty period from the date of Practical Completion.

Throughout the warranty period rectify any defect, whether by renewal, replacement, repair or otherwise as directed by the Contract Administrator or the Principal (after DLP). Also rectify any incidental work of other trades, which may be involved in the rectification of the defect.

Replacement and repairs: The warranties shall specifically provide for making good by replacement or by repairs without cost to the Proprietor any part of the work which may prove defective or unsatisfactory within the terms of the warranty.

Included in the warranty all penetrations for equipment supports, pipes, flues, up-stands, flashings, etc, including those installed after the membrane has been completed.

Materials

Provide a written warranty from the manufacturers of the waterproofing materials against defective materials and workmanship, including their full replacement in rectification.

Installation

Provide a written warranty from the waterproofing installers against defective installation, including rectification.

Warranty period:

20 years minimum from the date of Practical Completion.

Execution

Execute the warranties and submit prior to the commencement of the waterproofing work

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Store and handle to the manufacturer's recommendations and as follows:

- Protect materials from damage.

2.2 MEMBRANES

Membrane systems

Requirement: Provide a proprietary membrane systems suitable for the intended external waterproofing.

Certificate: A current CSIRO or BRANZ Appraisal Certificate.

Tanking systems

Requirement: Provide a proprietary membrane system suitable for the intended below ground tanking.

Certificate: A current CSIRO or BRANZ Appraisal Certificate.

2.3 ACCESSORIES

Flashing

Pressure seal flashing: Proprietary item which forms part of the waterproofing system, stainless steel or aluminium clamp flashing with compatible sealant.

Fixing: Surface fixed and sealed or where shown fixed to cast in reglets to manufacturer's specifications.

Sealant: Polyurethane modified silicone (exterior grade).

Control joint covers

Proprietary item: Use sealants approved by the manufacturer and installer suitable for the application and location. Check colour and obtain approval before installation.

Corners, crossovers, tees and bends: Factory mitred, welded and provided with 500 mm legs.

End closures: Factory folded and sealed to match joint cover profile.

Fixing hobs: Concrete.

2.4 PROTECTION

Protection board

Description: Hollow twin wall plastic board manufactured from lightweight extruded thermoplastic sheet as recommended by the supplier.

2.5 SLIP SHEETS

Sheet material

Description: Provide slip sheet over membranes to receive concrete toppings or reinforced slabs over or to waterproofing manufacturer's recommendation.

3 EXECUTION

3.1 PREPARATION

Substrates

General: Prepare substrates as follows:

- Fill all cracks in substrates wider than 1.5 mm with a filler compatible with the membrane system.
- Fill voids and hollows in concrete substrates with a concrete mix not stronger than the substrate.
- Remove projections.
- Remove deleterious and loose material.
- Remove all traces of a concrete curing compound if used.
- Leave the surface free of contaminants, clean and dust free.

Concrete substrates: Cure for more than 28 days.

Moisture content

Requirement: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to AS 1884 Appendix A.

Falls

Requirement: Verify that falls in substrates are greater than 1:80 unless otherwise approved by the membrane manufacturer. Consult the membrane supplier to determine a fall that minimises ponding at lapped seams and achieves minimum falls required for the membrane system to outlets and puddle drains..

Joints and fillets

Internal corners: Provide fillets to manufacturer's recommendations.

Fillet material: Polyurethane.

External corners: Round or arris edges.

Control joints: Prepare all substrate joints to suit the membrane system.

Priming

Compatibility: If required, prime the substrates with compatible primers for adhesion of the membrane system.

3.2 APPLICATION

Protection during installation

Damage: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage.

Drains

General: Prevent moisture from tracking under the membranes at drainage locations.

Drains and cages: Provide removable grates or cages to prevent blockage from debris. If the finished surface is above the level of the membrane, provide a slotted extension piece to bring the grate up to the level of the finished surface.

Overflows: Apply a bond breaker to the perimeter of the overflow outlet at its junction with the surface to which the membrane will be fixed. Turn the membranes into the overflow to prevent moisture from tracking behind the membrane.

Curing of liquid applied systems

General: To the manufacturers' instructions.

Control of movement

General: Provide control joints located over control joints in the substructure.

Fillets and bond breakers: Size to allow the membrane to accommodate movement.

Backing rod: Closed cell polyethylene foam with 25% - 50% compression.

Joint Sealant: To be compatible with membrane.

Joint backing gutter: Closed cell backing rod.

Control joint covers: Install after fixing hobs and membranes.

Bonded membranes: Carry control joints in the substrate through to and into the surface finish.

Membrane terminations

Membrane upturns: Provide upturns above the maximum water level expected from the exposure conditions of rainfall intensity and wind.

- Height: To AS 4654.2 Appendix A, Table A1.
- Anchoring: Secure sheet membranes along the top edge.
- Edge protection: Protect edges of the membrane.

Waterproofing above vertical terminations: Waterproof the structure above the termination to prevent moisture entry behind the membrane using cavity flashings, capping, waterproof membranes or waterproof coatings.

- Vertical upward terminations for liquid membranes: Terminate under an over-flashing, or an over-flashing of liquid applied membrane as detailed on the drawings or required by the manufacturer.

Vertical downward terminations: Terminate into cast–in reglet unless otherwise detailed or required by waterproofing manufacturer.

Horizontal terminations: Do not provide. Use vertical terminations.

Membrane vertical penetrations

Pipes, balustrades, ducts, and vents: Provide separate sleeves for all pipes, ducts and vents, and fix to the substrate.

Membrane horizontal penetrations

Sleeves: Protect rigid PVC-U conduits and pipes with a sleeve of SBS bitumen in order to seal to the membrane without burning the PVC-U. Do not use high density polyethylene (HDPE), polypropylene (PP) pipes or flexible PVC conduit.

Membrane at balcony doors and windows

Requirement: Install membrane before the fixing of door or window frames.

Membrane upturn:

- Vertical height above external finished floor level: Refer to drawings.

Hobless and flush thresholds: Install membrane before the fixing of door or window frames with a continuous grated drain abutting the external face of the door or window sill.

Membrane to below ground structures

Membrane: Externally apply membrane to all walls and return to horizontal surfaces to prevent water tracking around structure at joints and corners.

Protection board: Provide protection board to the full extent of the membrane.

Drainage cell: Provide geo-filter fabric wrapped drainage cell to vertical surfaces of the structure.

Reinforcement: Provide reinforcement to the membrane at junctions, corners and over joints to the manufacturer's recommendations.

Overlaying finishes on membranes

Compatibility: If a membrane is to be overlaid with another system such as tiles, pavers, ballast, insulation or soil, provide an overlaying system that is compatible with and will not cause damage to the membrane.

Bonded or partially bonded systems: If the topping or bedding mortar is to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

Slip sheet: If the topping or bedding mortar is structurally sufficient not to require bonding to the substrate, lay a double slip sheet over the membrane to separate it from the topping or bedding mortar.

Paint coatings: If maintenance pathways are indicated by a paving paint, use a paving paint which is compatible with the membrane.

3.3 TESTING

Flood test

Application: Perform a flood test before the installation of surface finishes.

Moisture content measurement method: Conform to AS 1884 Appendix A.

Set-up:

- Measure the wall/floor junction of adjacent spaces and of the slab soffit below for dryness.
- Record the result for each area.
- Dam the access openings and seal drainage outlets to allow 50 mm water level but no higher than 25 mm below the weir level of the perimeter flashings.
- Provide temporary overflows of the same capacity as the roof outlets to maintain the flood level.
- Fill space with clean water and leave overnight.

Evaluation:

- Make a visual inspection after a minimum period of 2 hours, of the wall/floor junction of adjacent spaces and of the slab soffit below for obvious water or moisture.
- Test the same areas for dryness using a moisture meter, and compare the results to the measurements taken before flooding.

Conformance:

- Evidence of water from the visual test: Failure.
- No visual evidence of water: Proceed with the moisture meter test.
- Increase in test results before and after flooding: Failure.

Records: Submit records of all flood tests.

3.4 COMPLETION

Protection

General: Keep traffic off membrane surfaces until bonding has set or for 24 hours after laying, whichever period is the longer.

Reinstatement: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Warranties

Waterproofing: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.
- On completion of the work, provide a warranty to the Contract Administrator stating that the work is secure against defects for the required period from the date of Completion.

- Provide a warranty, co-signed by the manufacturer and his authorised installers, covering the whole of the membrane system (including acceptance of the overlaying finishes and materials) stating that such installations will remain weather-tight and waterproof for the required warranty period from the date of Completion. Include in the warranty all penetrations for equipment supports, pipes, flues, up-stands, flashings, etc, including those installed after the membrane has been completed.
- Throughout the warranty period rectify any defect, whether by renewal, replacement, repair or otherwise as directed by the Contract Administrator. Rectify any incidental work of other trades, which may be involved in the rectification of the defect.
- Replacement and repairs: The warranties shall specifically provide for making good by replacement or by repairs without cost to the Proprietor any part of the work which may prove defective or unsatisfactory within the terms of the warranty.
-

4 SELECTIONS

Refer to Schedule of External Selections.

0423P LYSAGHT ROOFING – PROFILED SHEET METAL

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide a LYSAGHT profiled sheet metal roofing system and associated work, as documented and which:

- satisfies the product performance requirements as documented.
- deals with vapour pressure, condensation, corrosion and thermal movement
- remains intact and waterproof under the local or regional ambient climatic conditions
- protects people, property and the environment from the adverse effects of stormwater
- supports the specified imposed loads and types of roof access without impairment of performance
- provides a compliant roof safety access system to cover the entire roof area.
- complies with all statutory sound insulation requirements
- assists with complying with the minimum thermal resistance R-Value specified on the Schedule of External Selections

Ambient climatic conditions

Design rainfall intensity (mm/h) to AS/NZS 3500.3: Refer to Hydraulic Services documentation.

Location exposure severity

Exposure severity category: Moderate.

Roof access

Type: Refer to *0193 Building access safety systems*.

1.2 COMPANY CONTACTS

LYSAGHT technical contacts

Website: professionals.lysaght.com/contact-us

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.
- *0471 Thermal insulation and pliable membranes*.

1.4 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: professionals.lysaght.com/resources/manuals

1.5 TOLERANCES

Sheet metal roofing

Supporting members: To AS 1562.1 clause 4.2.3.

1.6 SUBMISSIONS

Certification

Design of glazed roofing: Submit an engineer's certificate confirming conformance to AS 1288.

Operation and maintenance manuals

On completion: Submit a manual of recommendations from the roofing manufacturer or supplier for the maintenance of the roofing system including, frequency of inspection and recommended methods of access, inspection, cleaning, repair and replacement.

Products and materials

Type tests: As appropriate for the project, submit evidence of conformance to the following:

- Metal roofing generally: Roof sheeting and fastenings to AS 1562.1 clause 5.4 for resistance to concentrated load and AS 1562.1 clause 5.5 for resistance to wind pressure.
- Metal roofing in cyclonic regions to AS/NZS 1170.2: Roof sheeting and fastenings to AS 1562.1 clause 5.6.
- Plastic sheet roofing: Roofing and fastenings to AS 1562.3 Section 5 for resistance to wind forces and resistance to impact.

Warranties

Requirement: Submit the manufacturers published warranties.

-

Roofing materials: Submit the manufacturer's product warranties.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Roof supports.
- The parts of the roofing, sarking, vapour barrier, insulation and roof plumbing installation before covering up or concealing.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to PRODUCTS, **GENERAL**, **Substitutions** in *0171 General requirements*.

Storage and handling

Storage: Store metal roofing materials, as follows:

- Away from uncured concrete and masonry, on a level base, and not in contact with other materials that cause staining, denting or other surface damage.

Handling: Handle metal roofing materials as follows:

- Use gloves when handling precoated metal roofing material.
- Use soft soled shoes when fixing or working on roofs.
- Protect edges and surfaces from damage. Do not drag sheets across each other or over other materials.

Product identification

General: Marked to show the following:

- Manufacturer’s identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

2.2 COMPONENTS

Fasteners

Finish: Prefinished exposed fasteners with an oven baked polymer coating to match the roofing material.

Fastenings to timber battens: Provide fastenings long enough to penetrate the thickness of the batten without piercing the underside.

LYSAGHT fasteners

Type, size, corrosion resistance class and spacing: To LYSAGHT recommendations.

Profiled fillers

Type: Purpose-made closed cell polyethylene foam profiled to match the roofing profile.

Location: Provide profiled fillers under flashings to the following:

- Ridges.
- Eaves.
- Lapped joints in roof sheeting.

Safety mesh
Standard: To AS/NZS 4389.

2.3 LYSAGHT SHEET METAL ROOFING

Standards
Design and materials: To AS 1562.1.

Proprietary steel roofing
Product brand: LYSAGHT steel roofing.

Profile: Refer to Schedule of External Selections.

Product material type: Refer to Schedule of External Selections.

Thickness, Base Metal Thickness (BMT) (mm): Refer to Schedule of External Selections.

Colour: Refer to Schedule of External Selections.

Location: Refer to Schedule of External Selections.

2.4 ROOF PLUMBING

Description: Flashings, cappings, gutters, rainheads, outlets, downpipes and accessories necessary to complete the roofing system.

Flashing and capping: Notched to match profile of roof sheeting.

Matching fascia/barge capping: If the selected eaves gutter is a proprietary high front pattern forming part of a combined system of gutter, fascia and barge, provide matching proprietary fascias and barge cappings to roof verges and edges.

Standards
Roof drainage: To AS/NZS 3500.3.

Metal rainwater goods: To AS/NZS 2179.1.

Flashings and cappings: To AS/NZS 2904.

2.5 GLAZED ROOFING

General
Description: Sloped overhead glazing fixed to glazing bars or directly to the roof framing with the required necessary supports, trim, flashings and sealants.

Glass selection: To AS 1288.

- Certification: Required.
- Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

3 EXECUTION

3.1 INSTALLATION

Protection
General: Keep the roofing and rainwater system free of debris and loose material during construction.

Thermal movement
Requirement: Allow for thermal movement in the roof installation and the structure, including movement in joints and fastenings.

Metal separation
Requirement: Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by one of the following methods:

- Applying an anti-corrosion, low moisture transmission coating to contact surfaces.
- Inserting a separation layer.

3.2 SHEET METAL ROOFING

Roof sheet installation

Standard: To AS 1562.1.

LYSAGHT steel roofing: To the manufacturer's recommendations.

Permalite aluminium roofing: To the manufacturer's recommendations.

Set out point: Refer to the manufacturer's written specifications. Submit layout for review before installation.

Fixings type, size, corrosion resistance class, and spacing: To the sheet metal roofing manufacturer's printed recommendations. Refer to Corrosion Resistance schedules for higher standards.

Eaves: Treat ends of sheets as follows:

- Generally: Close off ribs at tops and bottoms of sheets by mechanical means or with purpose-made fillers or end caps.

At gutters: Project sheets 50 mm into gutters so that ends of sheets are parallel with edge of gutter.

Reference: Refer to notations on architectural roof plan drawings for particular requirements in relation to roof sheeting lay sequence for sheet overlap against prevailing wet weather conditions experienced on the site.

Swarf: Remove swarf and other debris as soon as it is deposited.

Accessories: Provide accessories with the same finish as roofing sheets to complete the roofing installation.

Expansion joints: In accordance with the manufacturer's written instructions.

3.3 BUILDING ELEMENTS

Ridges and eaves

Sheet ends: Treat as follows:

- Project sheets 50 mm into gutters.
- Close off ribs at bottom of sheets using mechanical means or with purpose-made fillers or end caps.
- Turn pans of sheets up at tops and down into gutters by mechanical means.
- Pre-cut notched eaves flashing and birdproofing if required.
- Close off ridges with purpose-made ridge fillers of closed cell polyethylene foam.

Ridge and barge

Capping: Finish off along ridge and verge lines with purpose-made ridge capping or barge rolls.

3.4 ROOF PLUMBING

Jointing sheet metal rainwater goods

Butt joints: Make joints over a backing strip of the same material.

Soldered joints: Do not solder aluminium or aluminium/zinc-coated steel.

Sealing: Seal fasteners and mechanically fastened joints. Fill the holes of blind rivets with silicone sealant.

Jointing system: : In accordance with the manufacturer's written instructions. Blind rivet colour-matched to roof sheeting material where metal is used.

Flashings

Installation: Flash roof junctions, upstands, abutments and projections through the roof. Preform to required shapes if possible. Notch, scribe, flute or dress down as necessary to follow the profile of adjacent surfaces. Mitre angles and lap joints 150 mm in running lengths. Provide matching expansion joints at 6 m maximum intervals.

Upstands: Flash projections above or through the roof with two part flashings, consisting of a base flashing and a cover flashing, with at least 100 mm vertical overlap. Provide for independent movement between the roof and the projection.

Large penetrations in low pitch roofs: Extend the base flashing over the roofing ribs to the ridge to prevent ponding behind the penetrating element.

Wall abutments: Where a roof abuts a wall, provide flashing as follows:

- In masonry walls, planked cladding or concrete: Step in courses to the roof slope. Interleave with damp proof course, if any.
- Raking in masonry: Build into the full width of the outer leaf. Turn up within cavity, slope inward across the cavity and fix to or build into the inner leaf at least 75 mm above the roofing line.
- Raking in concrete: Turn 25 mm into joints or grooves, wedge at 200 mm centres with compatible material and point up.

Fixing to pipes: Solder or seal with neutral cured silicone rubber and secure with either of the following:

- Clamping ring.
- Proprietary flexible clamping shoe with attached metal surround flashing.

Eaves gutters

General: Form stop ends, downpipe nozzles, bends and returns. Dress downpipe nozzles into outlets. Position outside edge of gutter in relation to ends of roof sheeting to provide overflow of rainwater if required and to prevent back-flooding back into building interior..

Gutter support: Provide proprietary external gutter support brackets and framing and lining to support eaves gutters.

Box gutters

Gutter and sump support: Provide framing and lining to support gutter and sumps. Line the whole area under the gutters and sumps.

Support: Refer to detail drawings.

Lining: Refer to detail drawings.

Gutter fabrication: Prefabricate box gutters to the required section and shape. Form stop ends, downpipe nozzles, bends and returns. Dress downpipe nozzles into outlets.

- Hail guards: Install grating over the whole of the box gutter, over all box gutter sumps and over the edges of roofing sheeting entering box gutters.
- Overflows: Provide overflows to prevent back-flooding. Size to pass 100% of the design rainfall. Discharge overflows in visible locations and so water does not enter the building or cause damage to the building.
- Sumps: Minimum 150 mm deep and the full width of the box gutter.

Gratings: Install removable gratings over rainheads and sumps.

Leaf guard location: All gutter outlets.

External downpipes

General: Prefabricate downpipes to the required section and shape where possible. Connect heads to gutter outlets and, if applicable, connect feet to rainwater drains.

Access cover: Provide a removable watertight access cover at the foot of each downpipe stack.

Downpipe support: Provide supports and fixings for downpipes.

Internal downpipes

Jointing method: Solvent cement jointing.

Access: Provide access openings as follows:

- At each junction and bend.
- At the foot of each stack.
- At every second floor level.

Type of access opening: UPVC.

Acoustic insulation: Mineral fibre pipe insulation 50 mm thick, spirally bound on with 1.5 mm wire at 150 mm pitch.

Building in: If pipes are built into masonry or concrete, spiral wrap the pipe (and insulation, if any) with building paper.

Rainwater disposal

System: Refer to drawings.

3.5 GLAZED ROOFING

Installation

Standard: To AS 1288.

Fixing: Document and detail to the recommendations of the manufacturer of the aluminium framing system.

3.6 TESTING

Site tests

Internal downpipes: Test each stack hydrostatically in stages, each test to run over two storeys high for two hours. Remedy defects and retest if necessary.

3.7 COMPLETION

Reinstatement

Extent: Repair or replace damage to the roofing and rainwater system. If the work cannot be repaired satisfactorily, replace the whole area affected.

Touch up: If it is necessary to touch up minor damage to prepainted metal roofing, do not overspray onto undamaged surfaces.

Cleaning

Roofing and rainwater drainage system: Remove debris, metal swarf, solder, sealants and unused materials.

Exposed metal surfaces: Clean surfaces of substances that interfere with uniform weathering or oxidisation.

Roof plumbing: Clean out spoutings, gutters and rainwater pipes after completion of roof installation.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier/manufacturer.

4 SELECTIONS

Refer to Schedule of External Selections.

0431 CLADDING – COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide lightweight external wall cladding and associated work, as documented for a complete installation as follows and including but not limited to:

- Satisfies the product performance requirements.
- Deals with vapour pressure, condensation, corrosion, thermal and building movement.
- Remains intact and waterproof under the local or regional ambient climatic conditions.
- Provides the minimum added thermal resistance (R) (m^2 K/W) to meet the wall or wall system requirements.
- Designed for local cladding wind pressure effect..

Location exposure severity

Exposure severity category: Moderate.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.
- *0382 Light timber framing*

Reference

Refer to written specifications and installation instructions by James Hardie.

Website: http://www.jameshardie.com.au/products/external-cladding

1.3 INTERPRETATION

Abbreviations

General: For the purposes of this worksection the following abbreviations apply:

- CFC: Compressed fibre cement.
- FC: Fibre cement.
- LOSP: Light organic solvent preservative.

1.4 TOLERANCES

Permitted deviations

Flat sheet and panel cladding: To the manufacturer's recommendations.

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1.5 SUBMISSIONS

Fire performance

Combustibility: Submit evidence of conformance to PRODUCTS, **FIRE PERFORMANCE**, **Combustibility**.

Fire hazard properties: Submit evidence of conformance to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Operation and maintenance manuals

General: Submit manufacturer’s published use, care and maintenance requirements.

Shop drawings

Composite panels: Submit shop drawings to a scale that best describes the detail, showing the following:

- Dimensioned elevations of all elements.
- Details of construction, connections and all support systems.

- Dimensions of all typical elements and of any special sizes and shapes.
- Provision for the exclusion and/or drainage of moisture.
- Jointing details and method of fixing between individual elements and between this installation and adjacent work, including adjustment.
- Sealant types and full size sections of all sealant-filled joints and backing rods.
- Provision for thermal movement.
- Provision for movement under seismic and wind loads.
- Sequence of installation.
- Co-ordination requirements with other work.
- Schedule of materials, finishes, componentry, hardware and fittings.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Warranties

Provide warranty information to be included in the Operation and Maintenance Manuals. Details shall also be individually submitted to the Superintendent for approval directly following installation and completion of the relevant work. Extent is for all proprietary lining products and where otherwise required in the documents.

Certification: Provide certification of requested details, immediately following supply, and prior to integration into the works. Extent as required in the documents.

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Workshop assemblies before delivery to the site.
- Framing, sarking, vapour barrier and insulation before covering up or concealing.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Requirement: Store and handle materials to the manufacturer's recommendations and the following:

- Protect materials including edges and surfaces from damage.
- Keep dry and unexposed to weather.
- Do not drag sheets or panels across each other or over other materials.
- AAC panels: Stack on edge, support off the ground and level to avoid sagging and damage to ends, edges and surfaces.
- Composite panels: Store unpacked panels by size in racks and protect from scratching, warping or bending.
- Sheeting: Stack flat and off the ground on at least 3 evenly placed bearers.
- Store metal materials away from uncured concrete and masonry on a level base.
- Do not store metal materials in contact with other materials which may cause staining, denting or other surface damage.
- Use gloves when handling precoated metal cladding material.

Components

Fasteners and ties: Type, size, corrosion resistance class and spacing to the cladding manufacturer's recommendations.

Flashings: To AS/NZS 2904.

2.2 FIRE PERFORMANCE

Combustibility

Cladding: Tested to AS 1530.1.

Fire hazard properties

Bonded laminated materials: Tested to AS/NZS 1530.3. Fire hazard indices, as follows:

- Spread of Flame Index: 0.
- Smoke-

- Minimum slope: 1:15.
- Staining: Slope away from visible vertical facade areas to prevent staining.

Defective components: Do not install component parts which are defective, including warped, bowed, dented, abraded or broken members.

Damaged parts: Remove and replace damaged members during installation.

Accessories and trim

Requirement: Provide accessories and trim required to complete the installation, or as documented.

Corner flashing for profiled and seamed metal sheets: Finish off at corners with purpose-made folded flashing strips.

Metal separation

Requirement: Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by either of the following methods:

- Apply an anti-corrosion, low moisture transmission coating to contact surfaces.
- Insert a separation layer.

Incompatible metal fixings: Do not use.

Proprietary systems or products

Product fixing: Fix proprietary systems to the manufacturer's recommendations.

3.3 CFC SHEET CLADDING

Preparation

Requirement: Cut sheets to suit the layout as documented, allowing a joint gap of 10 mm between panels.

Joints

Control joint:

- Locate between the panel and fixing system and the supporting structure, as documented.
- Sheet edges: Square cut.
- Sealant: Do not apply finish coating over joint sealants.

Prefinished metal backing/jointing strip: Fix proprietary backing strip to the rear face of the panel with proprietary closed cell self-adhering foam and horizontal gasket.

- Seal the joint with a 3 mm epoxy fillet.

Vertical joints: Vertical gasket or prefinished jointing strip to framing member.

Arrangement: Set out in even panels with joints coinciding with framing or as documented.

Fixing

General: Screw fix to proprietary framing supports at centres to the manufacturer's recommendations.

Concealed fixings:

- Predrill oversized holes.
- Countersink so that the top of the screw is 2 to 3 mm below the surface.
- Finish: Stop screw heads with epoxy filler. Smooth and level upon application and sand flush after curing.

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3.4 FC SHEET CLADDING

Preparation

Requirement: Cut sheets to suit the layout as documented.

Joints

Control joints:

- Locate between the panel and fixing system and the supporting structure, as documented.
- Sheet edges: Square cut.
- Sealant: In accordance with the manufacturer's installation instructions.

Arrangement: Set out in even panels with joints coinciding with framing or as documented.

Fixing

General: Corrosion resistant nails or screws to the manufacturer's recommendations.

Eaves and soffit lining: Fix at 150 mm centres to soffit bearers at a maximum of 450 mm centres.

3.5 PLYWOOD SHEET CLADDING

Preparation

Requirement: Cut sheets to suit the layout, as documented.

Cut edges: Seal before fixing and install facing upwards.

Bottom edges: Prime or pre-coat before fixing.

Installation

Layout for sheets with shiplap joints: Start at a corner and install shiplap joints facing away from the prevailing weather.

Labels: Install panels so that any certification scheme labels are concealed.

Joints

Movement allowances:

- Between sheets: 2 mm minimum gap. Apply elastomeric sealant.
- Between the bottom of sheets and flashings: 5 mm gap.

Control joints:

- Location: To coincide with structural movement joints, as documented.

Fixing

Timber frames: 12 mm thick sheets:

- Nails: 40 x 2.5 mm.
- Screws: No. 8 x 40 mm.

Steel frames: 12 mm thick sheets:

- 1.5 mm steel: 10 gauge to 16 thread pitch x 45 mm screws.
- 2.8 mm steel: 10 gauge to 16 thread pitch x 45 mm screws.

Nail fixing centres:

- Edges: At 150 mm centres and not less than 9 mm from sheet edge.
- Intermediate framing: At 300 mm centres.
- Sheet corners: Not less than 50 mm from corner on vertical edges.

Finish: Flush with surface. Do not punch.

Shiplap joint top lap: Do not nail.

3.6 COMPLETION

Reinstatement

Extent: Repair or replace damage to the cladding. If the work cannot be repaired satisfactorily, replace the whole area affected.

Touch up: If it is necessary to touch up minor damage to prepainted metal cladding, do not overspray onto undamaged surfaces.

Cleaning

Requirement: Remove excess debris, metal swarf, solder, sealants and unused materials.

Exposed metal surfaces: Clean surfaces of substances that interfere with uniform weathering or oxidisation.

Protection: Remove protective coatings using methods required by the manufacturer after completion.

Composite panels: Clean surfaces with soft, clean cloths and clean water to the manufacturer's recommendations.

Warranties

Requirement: Cover materials and workmanship in the form of interlocking warranties from the supplier and installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

4 SELECTIONS

Refer to Schedule of External Selections.

0451P ALSPEC ALUMINIUM WINDOWS AND DOORS

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide ALSPEC aluminium systems, as documented.

1.2 COMPANY CONTACTS

ALSPEC Aluminium Systems technical contacts
Website: www.alspec.com.au/contact.php
Contact: Paul Hiscock – Business Development Manager (0410 332 497)

1.3 CROSS REFERENCES

General
Requirement: Conform to the following:
- *0171b General requirements*.

Reference
Refer to the Drawing A040: Door & Window Schedule.

1.4 STANDARDS

General
Selection and installation: To AS 2047.
Building classification (BCA): Class 9b.

Glazing
Glass type and thickness: To AS 1288, if no glass type or thickness is nominated.
- Materials and installation: To AS 1288.
- Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals
Commercial Systems - ALSPEC Aluminium Systems: www.alspec.com.au.
Security Systems - Invisi-Gard Stainless Steel Security: www.invisi-gard.com.au.
Specifiers' guides and CAD drawings: www.alspec.com.au.

1.6 INTERPRETATION

Abbreviations
General: For the purposes of this worksection, the following abbreviations apply:
- AWA: Australian Window Association.
- WERS: Window Energy Rating Scheme.

Definitions
General: For the purposes of this worksection the definitions given in AS/NZS 4668 and the following apply:
- Aluminium joinery: The collective term used for aluminium framed and glazed windows and doors.
- Hardware: To AS 4145.1 Section 2.
- Total system SHGC: Solar heat gain coefficient as defined by the NCC and tested in conformance with NFRC 200.
- Total system U-Value: Thermal transmittance as defined by the NCC and tested in conformance with NFRC 100.

1.7 SUBMISSIONS

Certification

Conformance: Submit evidence that window and door assemblies conform to AS 2047.

Sealant compatibility: Submit statements from all parties to the installation certifying the compatibility of sealants and glazing systems to all substrates.

Opacified glass: Submit a report, from the manufacturer, certifying that the proposed method of opacifying the glass will not be detrimental to the glass or affect the glass product warranty.

Toughened glass: For each batch of glass, submit certification from the manufacturer of heat soaking.

Protection of openable windows: Submit a certificate of on-site fall prevention testing.

Operation and maintenance manuals

ALSPEC operation and maintenance manual: Submit on completion.

Products and materials

Safety glazing materials: Submit evidence of conformance to AS/NZS 2208 Appendix A.

Prototypes

Sample installations: Install the designated typical aluminium joinery assemblies in their final position incorporating at least one example of each component in the system, including attachments to the structure, flashing, caulking, sealing, glazing, operating hardware, locks and keys.

Samples in prototypes: Required samples may form part of prototypes.

Samples

Aluminium joinery: Submit the following:

- Colour samples of prefinished production material showing the limits of the range of variation in the documented colour.
- Joints made by proposed techniques.
- Sections for frames, sashes, louvres and slats.

Glazing: Submit samples of glazing materials, each at least 200 x 200 mm, showing the visual properties and range of variation, if any, for each of the following :

- Tinted or coloured glass or glazing plastics.
- Surface modified or surface coated glass.
- Patterned or obscured glass or glazing plastics.
- Ceramic-coated glass.
- Wired glass.
- Mirror glass.

Hardware and accessories: Submit samples of the following:

- Window manufacturer’s standard hardware and accessories including locks, latches, handles, catches, sash operators, anchor brackets and attachments, masonry anchors and weather seals (pile or extruded).
- Generic hardware: Submit samples of generic hardware not documented as proprietary items.

Labelling: Label each sample, giving the series code reference and date of manufacture.

Shop drawings

General: Submit shop drawings to a scale that best describes the detail, showing the following:

- Full size sections of members.
- Hardware, fittings and accessories including fixing details.
- Junctions and trim to adjoining surfaces.
- Layout (sectional plan and elevation) of the window assembly.
- Lubrication requirements.
- Methods of assembly.
- Methods of installation, including fixing, caulking and flashing.
- Provision for vertical and horizontal expansion.
- Method of glazing, including the following:
  . Rebate depth.

. Edge restraint.
. Clearances and tolerances.
. Glazing gaskets and sealant beads.

Subcontractors
General: Submit names and contact details of proposed subcontractors endorsed by ALSPEC.

Warranties
Requirement: Submit ALSPEC warranty.

1.8 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Openings prepared to receive windows (where windows are to be installed in prepared openings).
- Fabricated window assemblies at the factory ready for delivery to the site.
- Fabricated window assemblies delivered to the site, before installation.
- Commencement of window installation.

2 PRODUCTS

2.1 GENERAL

Product substitution
Other products: Conform to PRODUCTS, **GENERAL**, **Substitutions** in *0171b General requirements*.

Storage and handling
Storage: Store in a clean, dry area and unaffected by weather, to the manufacturer's recommendations. Protect from building materials and loose debris such as wet plaster, mortar, paint and welding splatter.

Handling: Handle frames to the manufacturer's recommendations and the following:
- Stack upright, off the ground and against a flat, vertical surface.
- Carry in the vertical position with sashes locked.
- Do not rack frames out of square.
- Do not remove any bands and corner bracing until after installation.

Product identification
General: Marked to show the following:
- Manufacturer’s identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

Marking
Window assemblies: To AS 2047 Section 8.

2.2 ALSPEC COMMERCIAL WINDOWS AND DOORS

Torrens 45 mm Commercial Shopfront Door
Description: 45 mm double bead glazed door.

Hinged and pivot doors:
- Maximum panel height: 2700 mm.
- Maximum panel width: 1000 mm.
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- .

2.3 ALSPEC COMMERCIAL FRAMING

McArthur Evo Commercial Centre Pocket Framing
Description: Single glazed centre pocket framing system with self-draining subsill.

Framing sections:

- 101.6 mm x 44.4 mm.

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Hastings Front Glazed Framing
Description: Front glazed framing system. Use double glazing adaptor for double glazing option, if required.

Framing section:

- 101.6 mm x 50 mm.
- 150 mm x 50 mm.

550 Front Glazed Plant-on Sections
Description: 50 mm capped glazing system of adaptor and covers for fixing to other structures including aluminium, steel or timber.

2.4 GLASS

Performance
Glass: Free from defects which detract from appearance or interfere with performance under normal conditions of use.

Glazing plastics: Free from surface abrasions, and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Safety glasses
Standard: To AS/NZS 2208.

Type: Grade A to AS 1288.

- Certification: Required.
- Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Heat soaking
Requirement: All toughened and heat strengthened glass products.

Standard: To EN 14179-1.

Unacceptable blemishes in heat-treated flat glass (including tinted and coated glass)
Standard: To AS/NZS 4667.

2.5 GLASS IDENTIFICATION

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Heat soaked glass
Requirement: Marked to EN 14179-1 or certified by the manufacturer to AS 1288 clause 3.8.2.

Safety glazing materials
Identification: To AS 1288.

2.6 GLAZING MATERIALS

General
Requirement: Glazing materials including putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges appropriate for the conditions of application and required performance.

Jointing materials
Requirement: Provide jointing and pointing materials to manufacturer's recommendations that are compatible with each other and with the contact surfaces and non-staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Elastomeric sealants
Sealing compound (polyurethane, polysulfide, acrylic): To ASTM C920 or ISO 11600.

Sealing compound (silicone): To ASTM C920 or ISO 11600.

Sealing compound (butyl): To ASTM C1311.

Primer

Compatibility: Apply the manufacturer's recommended primer to the surfaces in contact with sealant materials.

Control joints

Depth of elastomeric sealant: One half the joint width or 6 mm, whichever is the greater.

Foamed materials (in compressible fillers and backing rods): Closed-cell or impregnated types that do not absorb water.

Bond breaking: Provide backing rods, and other back-up materials for sealants, that do not adhere to the sealant.

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2.7 ALUMINIUM FRAME FINISHES

Anodised

Standard: To AS 1231.

2.10 KEYING

Contractor's keys

Master key systems: Do not use any key under a master key system.

Identification

Labelling: Supply each key with a purpose-made plastic or stamped metal label legibly marked to identify the key, attached to the key by a metal ring.

Key material

Pin tumbler locks: Nickel alloy, not brass.

Lever locks: Malleable cast iron or mild steel.

Keying system

Requirement: Keying system, as documented.

Coding of locks: If window locks are included in building key code groups, provide cylinder or pin tumbler locks coded to match.

Number of keys table

Code	Key type	Minimum number of keys
KD	Locks keyed to differ	2 for each lock
KA#	Locks keyed alike:	
	- 2 locks in code group	4
	- 3-10 locks in code group	6
	- 11-40 locks in code group	10
	- 41 and over locks in code group	1 for every 4 locks or part thereof

3 EXECUTION

3.1 GLASS PROCESSING

General

Processing: Perform required processes on glass, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arrised.

3.2 INSTALLATION

Glazing

General: Install the glass as follows:

- Permanently fix in place each piece of glass to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- No transfer of building movements to the glass.
- Watertight and airtight for external glass.

Temporary marking: Use a method which does not harm the glass. Remove marking on completion.

Toughened glass: Do not cut, drill, edge-work or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.

Heat absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Windows and glazed doors

General: Install windows and glazed doors frames as follows:

- Plumb, level, straight and true within building tolerances.
- Fixed or anchored to the building structure in conformance with the wind action loading requirements.
- Isolated from any building loads, including loads caused by structural deflection or shortening.

- Allow for thermal movement.

Weatherproofing

Flashing and weatherings: Install flashings, weather bars, drips, storm moulds, joint sealant and pointing to prevent water penetrating the building between the window frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

Fixing

Fasteners and fastener spacing: To the recommendations of the AWA (Australian Window Association) *Fixing - An industry guide to the correct fixing of windows and doors*.

Packing: Pack behind fixing points with durable full width packing.

Fasteners: Conceal fasteners.

Joints

General: Make accurately fitted tight joints so that neither fasteners nor fixing devices such as pins, screws, adhesives and pressure indentations are visible on exposed surfaces.

Sealants:

- If priming is recommended, prime surfaces in contact with jointing materials.
- If frames are powder coated apply a neutral cure sealant.

Operation

General: Make sure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and are lubricated.

Protection

Removal: Remove temporary protection measures from the following:

- Contact mating surfaces before joining up.
- Exposed surfaces.

Trim

General: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the window frames. Install to make neat and clean junctions between frames and the adjoining building surfaces.

3.3 HARDWARE

Fasteners

Materials: Use materials compatible with the item being fixed and of sufficient strength, size and quality to perform their function.

- Concealed fixings: Provide a corrosion-resistant finish.
- Exposed fixings: Match exposed fixings to the material being fixed.

Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings.

- Hollow metal sections: Provide backing plates drilled and tapped for screw fixing, or provide threaded inserts (rivet nuts) with machine thread screws. Do not use self-tapping screws or pop rivets.

Proprietary window systems

Requirement: Provide the standard hardware and internal fixing points for personnel safety harness attachment, if required by and conforming to the governing regulations.

Operation

General: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

Supply

Delivery: Deliver window hardware items, ready for installation, in individual complete sets for each window set, as follows:

- Clearly labelled with the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, fixings and fixing instructions.

3.4 COMPLETION

Hardware

Adjustment: Leave the hardware with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Keys

Contractor's keys: Immediately before the date for practical completion, replace cylinders to which the contractor has had key access during construction with new cylinders that exclude the contractor's keys.

Keys: For locks keyed to differ and locks keyed alike, verify quantities against key records, and deliver to the contract administrator at practical completion.

Key codes: Submit the lock manufacturer's record of the key coding system showing each lock type, number and type of key supplied, key number for re-ordering, and name of supplier.

Repair of finish

Polyester or fluoropolymer coatings: Contact supplier for approval to apply touch up products, otherwise replace damaged material.

Cleaning

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.

Extent: All frames and glass surfaces inside and out.

Warranties

Aluminium joinery excluding hardware:

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: 7 years, conditional on compliance with the AWA Code of Conduct.

0453B DOORS

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide doors, frames, doorsets, security screen doors and fire-resisting doorsets, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- *0171b General requirements*.
- *0185 Timber products, finishes and treatment*.
- *0455 Door hardware*.

1.3 STANDARDS

General
Timber and composite doors: To AS 2688.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Door frames in place before building in to masonry.
- Door frames installed before fixing trim.

2 PRODUCTS

2.1 FRAMES

Aluminium frames
Construction: Assembled from aluminium sections, including accessories such as buffers, pile strips, strike plates, fixing ties or brackets and cavity flashings, with provision for fixing documented hardware.

Threshold: If the frame includes a threshold member, provide a self-draining section with anti-skid surface.

Timber frames
Hardwood: To AS 2796.1:
- Grade: Select.

Softwood: To AS 4785.1:
- Grade: Select.

Joints:
- Morticed head and through tenons.
- Trenched head:
  . Bare faced tenons on jambs.
  . Full let-in jambs.

2.2 DOORS

General
Doors: Proprietary products manufactured for interior or exterior applications and for the finish required.

Materials

Standards: Conform to the following:

- Decorative laminated sheets: To AS/NZS 2924.1.
- Wet process fibreboard (including hardboard): To AS/NZS 1859.4.
- Dry process fibreboard (including medium density fibreboard): To AS/NZS 1859.2.
- Particleboard: To AS/NZS 1859.1.
- Plywood and blockboard for interior use: To AS/NZS 2270.
- Plywood and blockboard for exterior use: To AS/NZS 2271.
- Seasoned cypress pine: To AS 1810.
- Timber – hardwood: To AS 2796.1.
- Timber – softwood: To AS 4785.1.

Identification

Panel doors: Provide panels branded under the authority of a recognised certification scheme to *0185 Timber products, finishes and treatment*, as applicable to the product. Locate the brand on faces or edges which will be concealed in the works.

Flush panel doors

General: Provide flush panel doors of balanced construction, as documented.

Medium density fibreboard doors: Single thickness of moisture resistant general purpose medium density fibreboard with the same surface finish to both sides, for internal use.

Construction

Adhesives:

- Internal: To AS/NZS 2270.
- External: To AS/NZS 2271.

Door thickness:

- General: 35 mm (unless documented otherwise on door schedule drawings).
- External doors and doors over 900 mm wide: 40 mm.

Cut-outs: If openings are required in flush panel doors (e.g. for louvres or glazing), do not make cut-outs closer than the width of the stiles at the edges of the doors.

Edge strips: Minimum thickness 10 mm. Increase overall thickness to greater than 15 mm to accommodate the full depth of the rebate in rebated doors. Apply to the external edges of door after the facings are bonded to the door framing/core and finish flush with outside surface of the facings.

Edge strip location: Fix all round.

Tolerances

Standard: To AS 2688 clauses 4.1 and 5.3.

2.3 DOORSETS

Floor access panels

Frame: Weld from 50 x 50 x 6 mm angle, with two 40 mm cogged fixing lugs each side and shop prime.

Covers: 6.5 mm checker floorplate, on 40 x 40 x 6 mm angle welded frame with 32 x 6 mm diagonal stiffening flats. Cut, radius and grind off 100 x 25 mm lifting slots in each end of covers.

2.4 ANCILLARY MATERIALS

Trims

Timber: Solid timber at least 19 mm thick, mitred at corners.

Extruded gaskets and seals

Materials: Non-cellular (solid) elastopressive seals as follows:

- Flexible polyvinyl chloride (PVC): To BS 2571, 100% solids with high consistency, ultraviolet stabilised.
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.

Flashings
General: Corrosion resistant, compatible with the other materials in the installation, and coated with a non-staining compound where necessary.

Standard: To AS/NZS 2904.

Jointing materials
General: Compatible with each other and with the contact surfaces and non-staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Nylon brush seals
General: Dense nylon bristles locked into galvanized steel strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door with double sided PVC foam tape.

Pile weather strips
General: Polypropylene or equivalent pile and backing, low friction silicone treated, ultraviolet stabilised.

Standard: To AAMA 701/702.

Weather bars
General: Provide a weather bar under hinged external doors, locate under the centres of closed doors.

Type: Refer to Door Hardware Schedule

3 EXECUTION

3.1 FRAMES

General
Frames: Install the frames as follows:

- Plumb, level, straight and true.
- Fixed or anchored to the building structure.
- Isolated from any building loads, including loads caused by structural deflection or shortening.

Frame fixing
Brackets: Metallic-coated steel:

- Width: Minimum 25 mm.
- Thickness: Minimum 1.5 mm.

Depth of fixing for building into masonry:

- Brackets: Minimum 200 mm.
- Expansion anchors: Minimum 50 mm.
- Plugs: Minimum 50 mm.
- Rods: Minimum 60 mm.

Jamb fixing centres: Maximum 600 mm.

Joints
General: Make accurately fitted joints where fasteners, pins, screws, adhesives and pressure indentations are not visible on exposed surfaces.

Aluminium frames
Building into masonry: Screw galvanized steel brackets twice to jambs and build in.

Fixing to masonry openings: Build in seasoned timber plugs to masonry joints or use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Screw once to studs at each fixing.

Timber frames
Fixing to stud frame openings: Back screw twice to jambs at each fixing.

Fixing to thresholds: Dowel external door frames to thresholds other than timber with 10 mm diameter brass dowels, 100 mm long.

Heads of fasteners: Conceal if possible, otherwise sink the head below the surface and fill the sinking flush with a material compatible with the surface finish.

Finishing
Trim: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the door frames to make neat and clean junctions between the frame and the adjoining building surfaces.

Seals
General: Provide the fixings, rebates, grooves, and clearances required for installation and operation of the seals. Allow seals unwound from coils to settle before use.

Weatherproofing
Flashings and weatherings: Install flashings, weather bars, drips, storm moulds, caulking and pointing to prevent water from penetrating the building between the door frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

3.2 DOORS

Priming
General: Prime timber door leaves on top and bottom edges (at least 2 coats) before installation.

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3.3 COMPLETION

Operation
General: Make sure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and that they are lubricated where appropriate.

Protection
Temporary coating: On or before the date for practical completion, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

0455 DOOR HARDWARE

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide door hardware, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- *0171b General requirements*.
- *0453b Doors*.
- *Door Hardware Schedule (by Frost Security Locksmiths & Architectural Hardware).*

1.3 INTERPRETATION

Abbreviations
General: For the purposes of this worksection, the abbreviations given in AS 4145.1 Appendix D apply.

Definitions
General: For the purposes of this worksection, the general definitions given in AS 4145.1 Section 2 apply.

1.4 SUBMISSIONS

Execution details
Key control system:
- New works: Submit details of the proprietary key control security system proposed by the lock manufacturer for locks required to accept a group key (master, grandmaster).
- Alterations and additions: Submit details to extend the existing key control security system for locks required to accept a group key.

Operation and maintenance manuals
Manual: Submit the manufacturer's published recommendations for use, care and maintenance of the hardware provided.

Samples
Generic items: Submit samples of hardware items offered as meeting the description of items not specified as proprietary items.

Subcontractors
Automatic door operators: Submit names and contact details of proposed supplier and installer.

Pressure floor mat: Submit names and contact details of proposed supplier and installer.

Warranties
Requirement: Submit themanufacturer's published product warranties.

2 PRODUCTS

2.1 GENERAL

Execution
Door-by-door schedule: The Contractor shall refer to the door-by-door hardware schedule, as prepared by Frost Security Locksmiths & Architectural Hardware.

Supply
Delivery: Deliver door hardware items, ready for installation, in individual complete sets for each door, as follows:
- Clearly labelled to show the intended location.

- In a separate dust and moisture proof package.
- Including the necessary templates, accessories fixings and fixing instructions.

2.2 LOCKS AND LATCHES

Standard
General: To AS 4145.2.

Lock and latch classification
Rating systems: To AS 4145.1 Section 3.

Performance requirements: To AS 4145.2 Section 3.

2.3 HINGES

Butt hinge materials
Timber doors in timber or steel frames:
- Material: Refer to Door hardware Schedule.
- Product: Refer to Door hardware Schedule.

Aluminium framed doors in aluminium frames:
- Material: Refer to Door hardware Schedule.
- Product: Refer to Door hardware Schedule.

Doors fitted with closers: Provide low friction ball bearing hinges.

Lift-off doors: If toilet cubicles require lift-off doors, provide lift-off hinges and allow for door panel with sufficient clearance at the head allow door removal.

Timber solid core doors
Number of hinges: Determine the number of hinges required based on the nominated door leaf size and weight only. For other door leaf sizes or for doors with applied finishes, use the weight of the door to determine the number of hinges required. For a door leaf over 80 kg, use pivot hinges.

Size of hinges: Determine the size of the hinge based on the door leaf thickness:
- 35 to 43 mm thick door: 100 x 75 mm butt hinges with a minimum thickness of 2.5 mm.
- 44 to 55 mm thick door: 100 x 100 mm butt hinges with a minimum thickness of 2.5 mm.
- > 55 mm thick door: To the door by door hardware schedule.

Hinge pin: Supply fixed pins to hinges of doors opening out or designated as a security doors. For all other doors, provide loose pins.

Wide throw: If necessary, use wide throw hinges to achieve the required door swings in the presence of obstacles such as nibs, deep reveals and architraves.

Hinges for timber doors table

Nominal door leaf size (L x W x T) (mm)	Door leaf weight (kg)	Number of hinges
2040 x 400 x 35		

Nominal door leaf size (L x W x T) (mm)	Door leaf weight (kg)	Number of hinges
2400 x 720 x 40	50	4
2400 x 820 x 40	52	4
2400 x 920 x 40	55	4
2400 x 1020 x 40	60	4
2400 x 1220 x 50	72	5
2040 x 920 x 70	88	Pivot hinges
Length (L) is the dimension along the knuckles, not including hinge tips, if any, and width (W) is the dimension across both hinge leaves when opened flat.		

Aluminium doors

Application: Aluminium hinges for aluminium doors, or for doors of other materials in aluminium frames of a weight of 40 kg or less.

Hinges for aluminium doors table

Nominal hinge size (L x W x T) (mm)	Door leaf weight (kg)	Knuckles (minimum)	Screws/hinge leaf (minimum)
100 x 70 x 3	30	3	3
100 x 80 x 3.5	50	5	4
130 x 50 x 3.4	75	Interfold	3
Length (L) is the dimension along the knuckles, not including hinge tips, if any, and width (W) is the dimension across both hinge leaves when opened flat.			

2.4 ANCILLARIES

Bolts

General: Barrel bolts, flush bolts and tower bolts with keepers, including lock plates, staples, ferrules or floor sockets.

Mortar guards

General: For steel door frame installations, provide mortar guards designed to allow the full extension of the lock tongue or similar devices and the correct operation of the locking mechanism.

Rebated doors

General: For mortice locks or latches to rebated doors, provide purpose-made rebated pattern items.

Strike plates

General: Use strike plates supplied with the locks or latches. Do not provide universal strike plates.

2.5 DOOR CONTROLLERS

Standard

General: To AS 4145.5.

Performance

Requirement: Door controllers, pivots, floor or overhead door closers, and automatic door operators, suitable for the door type, size, weight, sliding action and swings required and the operating conditions, including wind and air conditioning pressure.

2.6 KEYING

Keying requirements

Requirement: Provide door hardware and keys, as documented.

Temporary construction keys and cylinders

Requirement: Provide one of the following:

- Loan cylinder: Install for construction locks and replace at practical completion.
- Construction keyed master key cylinder: Keep up-to-date records of keys issued including recipient’s name, company and contact details, date issued and date returned.

Delivery of keys

Great grandmaster, grandmaster and master keys: Arrange for delivery direct to the principal.

For locks keyed to differ and locks keyed alike: Check the quantity against key records, and deliver keys to the contract administrator at practical completion.

Group keying

Keying system: As documented.

Existing system extension: Obtain the details of existing group or master key systems of the system to be extended.

Extensions to existing system: Required.

Future extensions: Provide master and grandmaster group keying systems capable of accommodating future extensions.

Proprietary keying control security system: Provide for cylinder or pin-tumbler locks that accept a group key (e.g. master key, maison key).

Stamping: Stamp keys and lock cylinders to show the key codes and/or door number as scheduled.

Identification

Labelling: Supply each key with a purpose-made plastic or stamped metal label legibly marked to identify the key, attached to the key by a metal ring.

Key material

Lever locks: Malleable cast iron or mild steel.

Pin tumbler locks: Nickel alloy, not brass.

Number of keys table

Key code	Key type	Minimum number of keys
GGMK	Great grandmaster keys	2
GMK	Grandmaster keys	2
MK	Master keys	2 per code group
KD	Locks keyed to differ	2 per lock
KA	Locks keyed alike:	
	- 2 locks in code group	4
	- 3 to 10 locks in code group	6
	- 11 to 40 locks in code group	10
	- 41 and over locks in code group	1 per 4 locks or part thereof

3 EXECUTION

3.1 INSTALLATION

General

Handing: Before supply, verify on site, the correct handing of hardware items.

Operation: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

Mounting height

Locks and latches: Centreline of the door knob or lever spindle above finished floor: 1000mm above floor level UNO.

Locks

Cylinders: Fix vertically and with consistent key alignment.

Door stops

Fixing: Fix on the floor, skirting or wall, as appropriate, to prevent the door or door furniture striking the adjacent wall or other surface.

Fasteners

Materials: Provide materials compatible with the item being fixed, and of sufficient strength, size and quality to perform their function.

- Concealed fixings: Provide a corrosion resistant finish to concealed fixings.
- Exposed fixings: Match exposed fixings to the material being fixed.

Security: Locate exposed fixings to lock furniture on the inside faces of external doors and on the inside faces of internal doors to lockable rooms.

Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings.

- Hollow metal sections: Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws. Do not use self-tapping screws or blind rivets.

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Hinges

Metal frames: Fix hinges using metal thread screws.

Timber doorsets: Install butt hinges in housings equal in depth to the thickness of the hinge leaf (except for hinges designed for mounting without housing), and fix with countersunk screws.

3.2 COMPLETION

Adjustment

General: Leave the hardware properly adjusted with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Automatic door operators: Maintain and adjust the system throughout the defects liability period.

Keys

Contractor's keys: Immediately before practical completion, replace or reset cylinders to which the contractor has had key access during construction to exclude the contractor's keys.

Warranties

General: Cover materials and workmanship in the form of interlocking warranties from the manufacturer or distributor and the installer.

0461B GLAZING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide glazing, as documented.

Performance

Thermal qualities: U-Value and Solar heat gain coefficient (SHGC) as documented.

Certification: Provide certification prior to integration into the works. Extent as required in the documents.

Loading: All glazing systems shall be designed, manufactured and installed to resist wind and human impact loading conditions applicable under the relevant Standards and Codes to the particular glazing locations.

Safety Glass: Toughened and laminated safety glass shall comply with relevant standards and Codes: Submit written certification of compliance to the Superintendent prior to Practical Completion.

System Warranty: All glazing materials shall be guaranteed for minimum ten (10) years from Date of Practical Completion or longer where offered as standard warranty by the manufacturer. Materials and workmanship which prove faulty within that time shall be repaired or replaced at no cost to the Proprietor. The warranty cover shall include security of installation, flashings, prevention of water penetration, hardware operation and certification from a registered structural engineer that the design and installation conforms to the standards to resist the design wind speed.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.
- *0451b windows and glazed doors*

1.3 STANDARDS

Glazing

Glass type and thickness: To AS 1288, if no glass type or thickness is nominated.

Materials and installation: To AS 1288.

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

Roof glazing: To AS 1288 Section 6.

1.4 SUBMISSIONS

Certification

Design: Submit an engineers' certificate confirming conformance to AS 1288.

Opacified glass: Submit a report, from the manufacturer certifying that the proposed method of opacifying the glass will not be detrimental to the glass or affect the glass product warranty.

Toughened glass: For each batch of glass, submit certification from the manufacturer of heat soaking.

Installation: Submit certification from the fabricator that the method of glazing, the selection of sealant systems and conditions next to the glass conform to the following:

- Compatible with the edge seal of insulating glass units (IGUs) and self-cleaning glass.
- Will not be detrimental to the long term structural performance, weathering capabilities and visual qualities of the glass.

Glazier's data: Submit the glazing subcontractor's statement certifying the following:

- A satisfactory thermal safety assessment.

- The assembled frame provides the required glazing clearances and tolerances, and maximum and minimum joint configurations, based on the bow, warp and kink characteristics of the required glass types, and is ready for glazing.

Execution details
Site glazing: If site glazing is intended, submit proposals.

Operation and maintenance manuals
Requirement: Submit manufacturers' published recommendations for in service use.

Products and materials
Safety glazing materials: Submit evidence of conformance to AS/NZS 2208 Appendix A.

Samples
General: Submit samples of glazing materials, each at least 200 x 200 mm, showing specified visual properties and the range of variation, if any, for each of the following:

- Tinted or coloured glass or glazing plastics.
- Surface modified or surface coated glass.
- Patterned or obscured glass or glazing plastics.
- Ceramic-coated glass.
- Wired glass.
- Insulating glass units.
- Mirror glass.

Shop drawings
Requirement: Submit shop drawings showing the following:

- Method of glazing
- Rebate depth.
- Edge restraint.
- Clearances and tolerances.
- Glazing gaskets and sealant beads.

Warranties
Requirement: Submit warranties covering materials and installation for both systems and stand-alone components and accessories.

2 PRODUCTS

2.1 GENERAL

Heat strengthening
Requirement: Heat strengthen all glass that requires extra strength and thermal resistance.

Standard: To ASTM C1048.

Heat soaking
Requirement: All toughened and heat strengthened glass products.

Standard: To EN 14179-1.

Storage and handling
Storage: Store glass and glazing materials in a clean, dry area and unaffected by weather, to the manufacturer's recommendations. Protect from building materials and loose debris such as wet plaster, mortar, paint and welding splatter.

Handling: Handle glass to the manufacturer's recommendations.

2.2 GLASS

Performance
Glass: Free from defects which detract from appearance or interfere with performance under normal conditions of use.

Glazing plastics: Free from surface abrasions, and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Safety glazing materials
Standard: To AS/NZS 2208.

Type: Grade A to AS 1288.

Certification: Required.

- Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Insulating glass units (IGUs)
Manufacture and installation: To AS 4666.

Glass thickness selection: To AS 1288.

2.3 GLASS IDENTIFICATION

Heat soaked glass
Requirement: Marked to EN 14179-1 or certified by the manufacturer to AS 1288 clause 3.8.2.

Safety glazing materials
Identification: Identify each piece or panel, to AS 1288.

2.4 GLAZING MATERIALS

General
Requirement: Glazing materials including putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks, shims and compression wedges appropriate for the conditions of application and required performance.

Primer
Compatibility: Apply the manufacturer's recommended primer to the surfaces in contact with sealant materials.

2.5 ANCILLARY COMPONENTS AND FITTINGS

Extruded gaskets and seals
General: Provide seals, as documented.

Materials: Non-cellular (solid) elastopressive seals as follows:

- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.
- Flexible polyvinyl chloride (PVC): To BS 2571, E type compounds, colour fastness grade B.

Pile weather strips
Standard: To AAMA 701/702.

Material: Polypropylene or equivalent pile and backing, low friction silicone treated, ultraviolet stabilised.

Finned type: A pile weather seal with a central polypropylene fin bonded into the centre of the backing rod and raised above the pile level.

3 EXECUTION

3.1 GLASS PROCESSING

General
Processing: Perform required processes on glass, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arrised.

3.2 INSTALLATION

Glazing
General: Install the glass as follows:

- Permanently fix in place each piece of glass to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- No transfer of building movements to the glass.
- Watertight and airtight for external glazing.

Temporary marking: Use a method which does not harm the glass. Remove marking on completion.

Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.

Heat absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Preglazing

Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

Site glazing

Minimum dimensional requirements (mm):

- Edge clearance: As required by the specialist glazier.
- Edge cover: As required by the specialist glazier.
- Front clearance: As required by the specialist glazier.
- Back clearance: As required by the specialist glazier.

External timber framed glazing: Glaze with putty.

3.3 COMPLETION

Replacement

Requirement: After replacing damaged glass, leave the work clean, polished, free from defects, and in good condition.

Cleaning

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.

Extent: All frames and glass surfaces inside and out.

Warranties

Glazing subcontractor's warranty: Provide an undertaking conditional only on compliance with the manufacturers' recommendations for maintenance, to repair or replace glass and glazing materials that become defective or prove unsuitable for the nominated application; during the warranty period.

Glass manufacturer's warranty: Provide an undertaking, conditional only on compliance with the manufacturer's recommendation for installation and maintenance, to supply replacement glass units to the site for replacement of defective units defined as follows:

- IGU units: Units in which the hermetic seal has failed as evidenced by intrusion of foreign matter, or internal condensation at temperature above 2°C.
- Coated glass units (including coated super insulating glass units): Units in which the metallic coating shows evidence of manufacturing defects, including but not necessarily limited to cracking or peeling, as determined in conformance with ASTM C1048.

Toughened glass warranty: Provide a manufacturer's warranty certifying that toughened glass supplied for use in curtain walls has been subjected to a heat soaking process that has converted at least 95% of the nickel sulfide content to the stable beta-phase.

0471 THERMAL INSULATION AND PLIABLE MEMBRANES

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide thermal insulation and pliable membrane systems, as documented.

Performance

Requirements:

- Complete for their function.
- Conforming to the detail and location drawings.
- Firmly fixed in position.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.

Reference

Refer to the architectural wall type drawings.

1.3 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- IRMA: Inverted roof membrane assembly.
- PMR: Protected membrane roof.

Definitions

General: For the purposes of this worksection the following definitions apply:

- Fbs-1 (fibre-bio-soluble) mineral wool: Insulation composed of bio-soluble glass or rock fibres.
- Fibre batts: Flexible insulation supplied as factory cut pieces and composed of mineral wool (glass and rock fibre) or polyester fibre.
- Fire hazard properties: Terminology to BCA A5.5.
- Pliable building membrane: To AS/NZS 4200.1 and equivalent to sarking-type materials as defined in the NCC.
- Thermal insulation terminology: To AS/NZS 4859.1.
- Vapour permeable (breathable) membrane: A flexible membrane material, normally used for secondary waterproofing that allows for the transmission of water vapour.

1.4 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformance to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Products and materials

Thermal insulation properties: Submit evidence of conformance to AS/NZS 4859.1 and AS/NZS 4859.2.

Warranties

Manufacturer's published product warranties: Submit on completion.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the installed pliable membrane and insulation before covered up or concealed.

Hold Points
General: Do not commence work or proceed to the next stage of work before approval of the required Hold Points. Submit the following documentation on the products and installation detail:

- Manufacturer's statement certifying that the products and systems being supplied are in accordance with this specification and are suitable for the intended use, required detailing and performance.

Provide thermal certificates confirming that the Section J energy efficiency requirements have been met on site following installation of all insulation materials.

2 PRODUCTS

2.1 GENERAL

Storage and handling
Marking: Deliver mineral wool products to site in packaging labelled FBS-1 BIO-SOLUBLE INSULATION.

2.2 FIRE PERFORMANCE

Fire hazard properties
Insulation materials: Tested to AS/NZS 1530.3. Fire hazard indices as follows:

- Spread-of-Flame Inde

Installation: Firmly butt together fibre blankets or batts, with no gaps except as follows:

- Access openings and vents: Do not obstruct.
- Light fittings: To AS/NZS 3000 clause 4.5.
- Electrical cables: To AS 3999 clause 2.6.

Glass Wool and Rock Wool insulation: Conform to the *ICANZ Industry code of practice for the safe use of glass wool and rock wool insulation*.

Pliable building membrane

Installation: To AS 4200.2 and BCA J1.2 or BCA 3.12.1.1, as appropriate.

3.2 WALLS

Framed walls – thermal break strips

Product type: Proprietary item.

Application: To steel framing with lightweight external cladding.

R-Value: 0.2.

Screw fixing: Button head screws at 1 m centres.

Adhesive fixing: Wallboard adhesive walnuts at 1 m centres.

Framed walls – bulk insulation

Product type: Fibre batts.

Installation: Friction fit between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Vapour permeable (breathable) membrane

Application: Provide a vapour permeable membrane behind external facing material which does not provide permanent weatherproofing or which may be subject to condensation forming on the internal face, including the following:

- Boards or planks fixed vertically or diagonally.
- Boards or planks fixed in exposed locations where wind driven rain can penetrate the joints.

Installation: Run the vapour permeable membrane horizontally on the outer face of external wall framing, over the flashing, from the bottom plate up. Pull taut over the framing and fix to framing members. Seal across the wall cavity at the top.

Horizontal laps: At least 150 mm wide, lapped to make sure water is shed to the outer face of the membrane.

End or vertical overlaps laps: At least 150 mm wide made over framing.

Openings: Run the vapour permeable membrane over the openings and leave covered until windows and doors are installed. Cut the membrane on a 45° diagonal from each corner of the opening, fold the flaps inside and fix to the inside frame of the opening. If the membrane is used to provide a continuous air tight layer, seal all joints with pressure sensitive adhesive tape.

Fixing: Install as follows:

- Timber frames: Metallic-coated clouts, 20 mm long 6 to 8 mm staples or punched multi-point metallic-coated steel brads.
- Plywood: Alternatives:
  - . Metallic-coated clouts, 20 mm long 6 to 8 mm staples or punched multi-point metallic-coated steel brads at minimum 300 mm centres.
  - . Water based contact adhesive with a 50% adhesive cover.

3.3 ROOFS

General

Location: The whole of the roof area including skylight shaft walls, except the following:

- Eaves, overhangs, skylights, vents and openings.
- Roofs to outbuildings, garages, and semi-enclosed spaces such as verandahs, porches and carports.

Mesh support to roof insulation

Locations: Provide support to the following:

- Sarking, vapour barrier or reflective thermal insulation membranes laid over roof framing members which are spaced at more than 900 mm centres.
- Blanket type thermal insulation laid over roof framing members as sound insulation to metal roofing.

Installing wire netting: Lay over the roof framing allowing only natural mesh sag between members to suit the application. Staple to timber frame, wire to steel frame.

Installing welded safety mesh: To AS/NZS 4389.

Pliable building membranes

Sarking membrane:

- Location: Provide sarking under tile and shingle roofing.

Vapour barrier:

- Installation: Lay over the roof framing with sufficient sag to allow the bulk insulation to achieve its full thickness. Overlap all edges 150 mm and seal all joints with pressure sensitive adhesive tape.

Metal roofs – thermal break strips

Product type: Proprietary item.

Application: To steel framing supporting metal sheet roof cladding.

R-

Metal roofs – bulk insulation

Product: Fibre blankets or batts.

Installation:

- Batts: Fit tightly between framing members.
- Blanket for sound insulation: Install over the roof framing, reflective thermal insulation (if any), and mesh support, so that the blanket is in continuous contact with the underside of the metal roofing sheets.
- Combined blanket and reflective insulation: Lay facing reflective insulation face downwards over safety mesh.

Ceiling insulation – bulk insulation

Product type:

- Framed ceilings: Fibre batts.
- Suspended ceiling: Fibre blanket.

Application: Over ceiling lining.

Installation:

- Batts: Fit tightly between framing members.
- Blankets: Butt joint and lay over ceiling panels or lining.

0511B LINING

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide internal lining systems, as documented.

Performance
Requirement: Provide lining system with a surface that is:

- Resistant to impacts expected in use.
- Resistant to moisture encountered under expected environmental conditions.
- Free of irregularities.
- A suitable substrate for the nominated final finish.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171b General requirements*.

1.3 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given in AS/NZS 4491 and the following apply:

- Dry process fibreboard (MDF): Panel material with a nominal thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and/or pressure, the bond of which is derived from a synthetic adhesive added to the fibres and the panels are manufactured with a forming moisture content of less than 20%.
- Fibre cement sheet linings: Treated cellulose fibre in a matrix of cement and sand autoclaved sheet, sealed on one side.
- High pressure decorative laminates (HPDL):
  - Panels consisting of core layers impregnated with phenolic and/or aminoplastic resins and a surface layer(s) impregnated with aminoplastic resins (mainly melamine resins).
  - Sheets consisting of a decorative face and layers of fibrous sheet material (e.g. paper) impregnated with thermosetting resins and bonded together under heat and pressure of at least 5 MPa.
- Wet process fibreboard: Panel material with a nominated thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and/or pressure, the bond of which is derived from the felting of the fibres and the panels are manufactured with a forming moisture content greater than 20%.

1.4 TOLERANCES

Permitted deviations
Bearing surface of finished framing:

- Gypsum lining: To AS/NZS 2589 clause 4.2.2.
- Other lining: 4 mm from a 1.8 m straightedge.

1.5 SUBMISSIONS

Fire performance
Fire hazard properties: Submit evidence of conformance to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Warranties
Lining materials: Submit the manufacturer's published product warranties.

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Substrate or framing before installation of linings.
- Finished surface of installation before applying:
  - . Sealer.
  - . Finish coatings or decorative papers.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Requirement: Dry and undamaged lining stacked in pallets horizontally on a smooth, level surface. Prevent distortion or moisture ingress.

Timber or fibreboard panels: Store off the ground in a well-ventilated area.

Handling: Do not drag sheets across each other or across other materials. Protect edges, corners and surface from damage.

Acclimatisation

Timber panels: Store on-site in final interior conditions for 2 to 3 weeks before installing. Do not install until the air conditioning system of the installation area is operating.

Certification

Timber based products: Label panels under the authority of a recognised certification scheme to *0185 Timber products, finishes and treatment*, as applicable to the product. Locate the label on faces or edges which will be concealed in the works.

2.2 FIRE PERFORMANCE

Fire hazard properties

Group number: To AS 5637.1.

2.3 PLASTERBOARD

General

Standard: To AS/NZS 2588.

Location: Refer to drawings.

Grade: Refer to Schedule of Internal Selections

Thickness (mm): 13.

Sheet width (mm): 1350mm generally (or 1200mm to suit finished ceiling height).

Sheet length (mm): As required to minimise joints.

Edge finish: Recessed to suit flush set finish.

2.4 FIBRE CEMENT

General

Standard: To AS/NZS 2908.2.

Wall and ceiling linings: Type B category 2.

Minimum thickness: 4.5 mm.

Location: Refer to drawings.

Type: Refer to Schedule of Internal Selections.

Category: Type A Category 3, internal linings are Type B Category 2 and compressed sheets are Type A Category 5 unless higher Category recommended by the manufacturer.

Thickness (mm): 6.

2.5 PLYWOOD AND BLOCKBOARD

General

General interior use: To AS/NZS 2270.

Areas requiring moisture resistance: To AS/NZS 2271.

Visible surfaces with a clear finish: Veneer quality A.

Other visible surfaces: Veneer quality B.

Back/face veneer: Veneer quality C or D.

Presealed plywood: Plywood pre-sealed both sides and edges with a machine applied sealer.

2.6 ADHESIVES, SEALANTS AND FASTENERS

Adhesives

For wallboards: Gunnable synthetic rubber/resin based mastic contact adhesive formulated for bonding flooring and wallboards to a variety of substrates.

Sealants

Fire-resistance rated sealant: Non-hardening sealant, compatible with the materials to be sealed and having a fire-resistance rating equal to that of the building element it seals.

Acoustic sealant: Non-hardening sealant compatible with the materials to be sealed.

Fasteners

Steel nails: Hot-dip galvanized.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Conditions

Commencement: Do not start lining work until the building or installation area is enclosed and weathertight, and all wet trades have been completed.

Substrates

Requirement: Plumb, level, in true alignment and to the lining manufacturer's recommendations.

Timber, steel framing and battened masonry: To AS/NZS 2589 clause 4.2.

Preparation: Before fixing linings, check and adjust the alignment of substrates or framing, if necessary.

Battens

General: Fix at each crossing with structural framing members, to solid walls or ceiling support. Provide wall plugs in solid substrates.

Fixings

Fixings shall be of suitable type, load capacity, durability, size and spacing to assemble and fix the work to the substrates or base-structure, and accommodate all imposed loads, and shall be selected for the purpose and location in accordance with the product information and relevant Standards.

Ceiling linings

General: Do not install until the timber roof structure is fully loaded for at least 14 days.

Accessories and trim

General: Provide accessories and trim as necessary to complete the installation.

Adhesives

General: Provide adhesive types appropriate for the purpose, and apply them so they transmit the loads imposed without causing discolouration of the finished surfaces.

Adhesives shall remain stable and not change or decompose due to the long term effects of air, moisture, ultra-violet light or contact with the substrates and applied finishes.

3.2 PLASTERBOARD LINING

Installation

Gypsum plasterboard and fibre reinforced gypsum lining: To AS/NZS 2589.

Level of finish and jointing: To AS/NZS 2589 clause 3.1.

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- Where framing member spacing exceed the recommended spacing.
- Where direct fixing of plasterboard is not possible, due to the arrangement or alignment of the framing or substrate.
- Where the lining is the substrate for tiled finishes.
- If required for penetrations for services, including mechanical grilles and lighting fixtures.
- If required to support fixtures.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Butt joints: Make joints over framing members or provide back blocking.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a PVC-U joining section.

Control joints: Provide purpose-made metallic-coated control joint beads at not more than 12 m centres in walls and ceilings and to coincide with structural control joints.

Wet areas: Install additional supports, flashings, trim and sealants as required.

Joints in tiled areas: Do not apply a topping coat after bedding perforated paper tape in bedding compound.

3.3 FIBRE CEMENT LINING

Installation

Joints and layout: Run sheets across the framing members. In flush jointed applications, stagger end joints in a brick pattern and locate them on framing members, away from the corners of large openings. Provide supports at edges and joints.

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- Where framing member spacing exceed the recommended spacing.
- Where direct fixing of fibre cement is not possible, due to the arrangement or alignment of the framing or substrate.
- Where the lining is the substrate for tiled finishes.
- If required for penetrations for services, including mechanical grilles and lighting fixtures.
- If required to support fixtures.

Fixing

Timber framed construction: Nail only or combine with adhesive.

Steel framed construction: Screw only or combine with adhesive.

Wall framing: Conform to the following:

- Do not fix to top and bottom plates or noggings.
- In tiled areas: Provide an extra row of noggings immediately above wall-to-floor flashings. Fix sheet at 150 mm centres to each stud and around the perimeter of the sheet.

Masonry wall construction: Conform to the following:

- Direct fixing: Adhesive fix to the masonry except where lining forms a substrate for tiled finish.
- Furring channels: Fix using screw and/or adhesive.

Ceilings: Fix using screw and/or adhesive to ceiling furring members. Do not fix sheets directly to the bottom chords of trusses.

- Ceiling battens: Fix at 600 mm maximum centres.

Wet areas: Do not use adhesive fixing alone.

Joints

Joint width:

- Butt joints: 1 to 2 mm.
- Expressed joints: 10 mm maximum.

Joint backing for expressed joints: Black self-adhesive polyurethane tape.

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.
External corner joints: Make joints over metallic-coated steel corner beads.
Dry joints: Provide square edged sheet and finish with a PVC-U joining section.
Control joints: Provide control joints to coincide with structural control joints and as follows:
-

Properties	**Code/Material**
	13mm standard grade plasterboard **(PBD-13)** 6mm fibre cement **(FC-6)**
	(Generally horizontal)
Edge type	Recessed edge.
Joint type	Taped and set flush Movement joints to manufacturer's specifications. Locations and type to be confirmed with the Architect if not documented on drawings.
Fixing	Screw fix.
Level of finish	- Level 3: For concealed surfaces. - Level 4 Default level unless specified otherwise or shown on drawings. - Level 5 to raked ceilings and areas for gloss or semi-gloss paint finish.
Group number	Refer to BCA Specification C1.10a.

4.2

4.2 TRIM

Trim schedule

Component	**Description**
Skirtings	Refer to Schedule of Internal Selections
Architraves	Refer to Schedule of Internal Selections
Ceiling/Wall junction	Varies - refer drawings.

0531B SUSPENDED CEILINGS

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide suspended ceilings, as documented and as follows:
- Consistent in finish treatment.
- Resistant to moisture encountered under expected environmental conditions.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- *0171b General requirements*.

1.3 STANDARDS

General
Suspended ceilings: To AS/NZS 2785.

1.4 TOLERANCES

Suspension system
Flatness, twist, winding and bow: 1.5 mm deviation from a 1.5 m straightedge placed in any position.

Sheeted or flush ceiling system
Suspension system bearing surface for flush lined ceiling: To AS/NZS 2589 Table 4.2.2.

Suspended grid system deflection: To AS/NZS 2785 Table 3.4.4.

1.5 SUBMISSIONS

Fire performance
Fire hazard properties: Submit evidence of conformance to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

1.6 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- The suspension system before the installation of ceiling units or lining.
- The ceiling assembly before the installation of fittings and site painting, if applicable.
- The completed ceiling.

2 PRODUCTS

2.1 GENERAL

Storage and handling
Requirement: Store suspended ceiling system and components in a dry and secure storage area, unaffected by weather.

2.2 FIRE PERFORMANCE

Fire hazard properties
Group number: To AS 5637.1.

2.3 SUSPENSION SYSTEM

Proprietary system
General: As documented.

Protective coatings for steel components: To AS/NZS 2785 Table F1.

2.4 LINING

Plasterboard
Standard: To AS/NZS 2588.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Working environment
General: Do not start work before the building is enclosed, wet work is complete and dry, and all work above the ceiling, including services, is complete.

Protection
General: Protect existing work from damage during the installation.

Partitions
General: If partitions are attached to the underside of the ceiling systems, include the partition mass in the seismic mass of the ceiling.

Stability
General: Install the ceilings level and fix to prevent looseness or rattling of ceiling components under normal conditions.

Structure-borne sound
General: Provide a ceiling system which does not amplify structure-borne sound. Provide suitable proprietary products or systems for reducing contact vibrations between structure and ceiling.

Control of movement
Abutments: Install the ceiling to allow for differential movement at abutting surfaces.

Alignment: Align ceiling control joints with structural control joints. Do not bridge structural control joints.

Prefinishes
General: Repair damaged prefinishes by recoating.

3.2 SUSPENSION SYSTEM

Ceiling grid
Set-out: Align ceiling unit joints and centrelines of visible suspension members with documented grid lines. If not documented, set out with equal margins.

Suspension system
Support members: Install support members as follows:

- Space as required by the loads on the system and the type of ceiling.
- Allow for the installation of services and accessories, including ductwork, light fittings and diffusers.
- Provide additional back support or suspension members for the fixing of services and accessories to prevent distortion, overloading or excessive vertical deflection.
- Allow for access for maintenance of services.

Failure: Provide a ceiling system where failure of any one suspension point does not cause a progressive failure of the ceiling.

Height adjustment: Provide height adjustment with a length adjustment device at each suspension point, permitting length variation of at least 50 mm.

Grid members: If required, notch grid members at the junction with the perimeter trim to make sure the ceiling units lay flat on the perimeter trim.

Restriction: Do not attach the suspension system to the lip or flange of purlins.

Services
Support: Conform to the following:

- If the service has not been designed to accept the ceiling load, do not fix suspension members to services (e.g. ductwork).
- If services obstruct the ceiling supports, provide bridging and suspension on each side of the services.

- Do not support services terminals on ceiling units.

Bracing

General: Provide bracing to prevent lateral movement and to resist the imposed horizontal seismic force.

Bulkheads

General: Integrate bulkheads with the ceiling structure and brace to prevent lateral movement. If the ceiling is terminated at a bulkhead, provide for seismic requirements.

External suspended soffits

General: Support external suspended soffits on rigid members capable of carrying the loads from imposed actions. Install members to minimise any eccentricity, and carry the upward and downward loads from wind actions through to the supporting structure.

Fasteners

General: Provide concealed fasteners. If material supporting hangers is less than 3 mm thick, do not use screw fasteners.

3.3 CEILING SYSTEMS

Installation

Fitting: Fit ceiling units accurately and neatly, without distortion, and free from air leakage and staining.

Lock clips: If ceiling units are exposed to loads from wind actions or if required for security, insert lock clips at the junction of carrier rails and units.

Pattern and texture: Set out patterned or heavily textured materials with a consistent direction of pattern or texture, or as documented.

Service penetrations

General: Provide openings for all services elements, including light fittings, ventilation outlets, detectors, sprinklers and loudspeakers.

Repair: If services pass through ceiling grid members, provide additional grid members and support or relocate service.

Cut ceiling unit edges

General: Conceal, or finish to match prefinished edges, including at openings for services elements.

3.4 PLASTERBOARD LINING

Installation

Gypsum plasterboard and fibre reinforced gypsum plaster: To AS/NZS 2589.

Suspended flush ceilings: Fix using screw or screw and adhesive to ceiling members or support frame.

Multiple sheet layers

Application: Fire-resisting and acoustic rated ceilings.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Butt joints: Make joints over framing members or otherwise provide back blocking.

External corner joints: Make joints over metallic-coated steel corner beads.

Control joints: Align lining control joints with structural control joints and as follows:

- Ceilings: At maximum 12 m centres.
- Control joint beads: Purpose-made metallic-coated.
- Location: If possible, position joints to intersect light fixtures, vents or air diffusers.

Wet areas: Install additional supports, flashings, trim and sealants, as required.

3.5 ACCESS PANELS

Finish

General: Match the access panels to the ceiling in appearance and performance.

Identification

General: Provide each access panel with an identification mark.

Non-demountable ceilings
General: Provide access panels supported and anchored to permit ready removal and refixing.

Reinforcement
General: Reinforce the back of the access panel to prevent warping and facilitate handling.

3.6 TRIM

General
Trim: Provide trim at junctions with other building elements and surfaces, including walls, beams and penetrations, consistent with the materials and finishes of the ceiling system.

Accessories
General: Provide accessories as part of the proprietary ceiling system necessary to complete the installation.

Plasterboard cornices
Fixing: Mitre at corners and adhesive fix with cornice cement. Pin in place at cornice edges until adhesive sets, remove pins and fill holes.

3.7 COMPLETION

Spares
General: Provide spare matching ceiling components, as follows, and store the spare materials on site where directed:

- Supporting system: One spare supporting member (hanger or framework member) for every 100 members or part thereof of the same type installed in the ceiling.
- Ceiling units: One spare unit for every 50 units or part thereof installed in the ceiling.
- Accessories: One spare of each type for every 50 units or part thereof installed in the ceiling.

3.8 WARRANTY

Warranty
General: Provide warranties for materials and workmanship in the form of interlocking warranties from the supplier and the installer.

Form: Against failure of materials and execution under normal environment and conditions of use.

Warranty terms: Submit the manufacturer's published product warranties along with a warranty covering both defects in materials and installation.

Period: 10 years covering materials and workmanship.

4 SELECTIONS

4.1 GENERAL

Proprietary lining and suspension system schedule

Property	
Product	CSR Gyprock Flush Jointed Ceiling System with steel framing by Rondo
Material	Plasterboard fixed to galvanised steel framing system
Demountability	Not required
Loading	Non trafficable
Basic grid (l x b) (mm)	600 x 1200 T-bar rails at 600mm centres Support cross rails at 1200mm centres
Wall angle trim	Refer to drawings
Finish / colour	Refer to Schedule of Internal Selections

0581B SIGNAGE

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide signage systems, as documented.

Performance

Requirement: Provide signage as follows:

- Appropriately secured.
- Located within a clear line of vision.
- To contrast with the background.
- With clean, well defined edges or arrises, and free from blemishes.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.

1.3 STANDARDS

Signs

Safety signs - design and use: To AS 1319.

Signs and graphics for disability access: AS 1428.1 and AS 1428.2.

Tactile wayfinding signs: To AS 1428.4.2.

2 PRODUCTS

2.1 MATERIALS

Materials standards

Aluminium:

- Plate for engraving: Alloy and temper designation 6063-0 to AS 2848.1.
- For casting: To AS 1874.

Stainless steel: Surface finish designation 4 (general purpose polished).

Plastics:

- PVC-U sheet: Semi-rigid sheet.
- Rigid cellular polystyrene: To AS 1366.3, class VH for cut-out shapes.

Photoluminescent exit signs: To BCA E4.8(b).

3 EXECUTION

3.1 WORKMANSHIP

Production

General: Form signage and graphic items accurately with clean, well defined edges or arises, free from blemishes.

Engraving to two layer plastic laminate: Engrave lettering to expose the lower laminate.

Engraved and filled: Lettering precision cut and filled colouring material. Clean faces of all filling material.

Casting: Produce shapes free of pits, scale, blow holes or other defects, hand or machine finished if necessary.

Laser cut lettering: Individual vinyl letters with self-adhesive backing.

Printed lettering: Lettering and graphic images screen/digitally printed on:

- Film with self-adhesive backing.
- Acrylic sheet.
- Aluminium plate.
- Stainless steel plate.

Large format digital printing: Lettering and graphic images screen printed film with self-adhesive backing.

Signwriting: Lettering and graphic images hand painted direct to the background by a tradesman with recognised qualifications and demonstrated skills.

Fabricated: Three dimensional, formed as follows:

- Laser cutting from solid material and hand finished as necessary.
- Moulding: Individual plastic hollow three dimensional characters and shapes formed by:
  - . Injection moulding.
  - . Vacuum forming.
- Built-up individual shapes by fabricating the faces and edges from separate pieces neatly and securely joined.

3.2 INSTALLATION

General

Requirement: Install signage and graphic items level and plumb, securely mounted, with concealed corrosion and theft-resistant fixings.

Self-adhesive signs

Requirement: Fix free of bubbles and creases.

Illuminated signs

Electrical fittings: Provide a junction box for power connection, and the necessary lamps with proper mountings, protection, and accessories including wiring transformers and insulators. Install signs and conceal cabling to *0921 Low voltage power systems*.

3.3 COMPLETION

Cleaning

General: Remove protective coverings, replace damaged signage and leave the work clean, polished, free from defects, and in good condition.

Warranties

Requirement: Installer’s warranty against defective workmanship or wrong installation.

4 SELECTIONS

4.1 NON-STATUTORY SIGNS

Reference

Refer to Schedule of External and Internal Selections for all non-statutory signs

4.2 STATUTORY SIGNS

Termite protection

Position	In or near meter box or similar
Message	Details of termite management system Indicate: - The method of protection - The date of installation - The life expectancy of a chemical barrier as listed on the appropriate authority's pesticides

	register label - The installer's recommendation for inspections
Sign type	Laminated page(s)
Conformance	BCA 3.1.4.4, BCA B1.4(i)(ii) AS 3660.1 Appendix A

Braille and tactile exit signage

Position	To BCA Spec D3.6 for every door described in BCA E4.5
Message	Exit (and) Level (followed by the floor level number)
Letter height (minimum)	BCA Spec D3.6
Sign type	
Conformance	BCA E4.5, BCA D3.6 and BCA Spec D3.6

Portable fire extinguishers – location signs

Position	As nominated in AS 2444 clause 3.2 at every installed extinguisher nominated BCA Table E1.6
Message	Prescribed graphic
Letter height (minimum)	16 mm
Sign type	Computer generated adhesive backed vinyl graphic
Mounting position and height	Refer to drawings.
Selection	Refer to Schedule of Internal Selections
Conformance	AS 2444 clause 3.3 Fire Brigade

Portable fire extinguishers – marker disc signs

Position	Directly above wall mounted location of installed extinguisher (all existing extinguishers reused and repositioned as shown on drawings)
Letter height (minimum)	As supplied
Sign type	Computer generated adhesive backed vinyl graphic
Mounting position and height	Refer to drawings.
Selection	Refer to Schedule of Internal Selections
Conformance	BCA E1.6 AS 2444 Fire Brigade

Unisex accessible sanitary facilities

Position	To BCA Spec D3.6
Message	- Braille and tactile signage incorporating the international symbol of access.

	- Indicate suitability for left or right handed use.
Symbol size	AS 1428.2 clause 16, Table 1.
Letter height (minimum)	Braille: BCA Spec D3.6 Raised characters: Sans serif type font 20 mm.
Sign type	Refer to Schedule of Internal Selections
Conformance	AS 1428.1 BCA D3.6

Ambulant sanitary facilities

Position	To BCA Spec D3.6
Message	Braille and tactile signage incorporating the male/ female ambulant symbol.
Symbol size	AS 1428.2 clause 16, Table 1.
Letter height (minimum)	Braille: BCA Spec D3.6 Raised characters: Sans serif type font 20 mm.
Sign type	
Conformance	AS 1428.1 BCA D3.6

Emergency Evacuation (EVAC) Signs

Position	Wall mounted between 1200mm and 1600mm above floor level
Number & Location	Quantity and location shall be where occupants are able to clearly view the diagram. The number and location of the diagrams shall be confirmed with the preferred supplier and in compliance with AS 3745.
Orientation	Portrait orientation preferred Sign to have correct orientation with regard to the direction of egress and its location to the 'YOU ARE HERE' point.
Size	Overall evacuation diagram: A3 sheet Localised floor plan size: A4 size
Information content (minimum)	Title: 'EVACUATION DIAGRAM' Building name and address Simplified floor plan with blackened in walls and showing all doors, windows and fixtures The 'YOU ARE HERE' location point Path of emergency egress travel (coloured in a green continuous line) Exits (indicated in green) Manual call points (coloured in red) Emergency call points (coloured in a black border) Main controls and panels for occupant warning equipment Fire extinguishers – noting specific types (coloured in red) with an appropriate colour as specified in AS/NZS 1841.1 Fire hose reels (coloured in red) Fire Hydrants – both external and internal (coloured in red)

	Fire Blankets (coloured in red) Break glass alarm points EWIS points Refuges where appropriate External mustering and assembly areas A legend which reflects the symbols used North arrow Nearby streets where appropriate Emergency telephone numbers including '000' Specific notes relating to required fire evacuation procedures Supplier logo and contact details
Letter height (minimum)	Refer to compliance standards
Sign type	Printed on coloured paper Framed in clear acrylic front and back and mount within a picture frame identical to selected artworks to be hung in the building
Mounting position and height	Refer to drawings.
Compliance	AS 3745 NSW Occupational Health & Safety Act 2000 & Regulations 2001 Work Health & Safety Regulation 2011

Reference
Refer to service engineering documentation for additional signage requirements.

0621 WATERPROOFING – WET AREAS

1 GENERAL

1.1 RESPONSIBILITIES

General Requirements

Requirement: The Contractor shall provide wet area waterproofing systems, as documented.

This specification shall be read in conjunction with the manufacturer's data sheets and installation instructions (refer to Schedule of Internal Selections). The specified products shall be applied by a licensed applicator approved by the supplier for the use of its materials.

The Contractor is to coordinate with floor and wall finishes subcontractor to ensure compatibility of adhesives with membrane.

Performance

Requirements:

- Grade to floor wastes, to dispose of water without ponding.
- Prevent moisture entering the substrate or adjacent areas.
- Extent compliant with the BCA and as documented.

Waterproofing membranes to internal wet areas and wet area walls, including but not limited to:

- Priming
- Bond-breaking fillets along horizontal and vertical corner joints
- Un-reinforced waterproofing coating generally to wall areas
- Repair and reinstatement work to existing refurbished areas

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171b General requirements*.

1.3 COMPANY CONTACTS

Ardex Australia

Website: https://ardexaustralia.com/

Contact: John Welemann – Technical Support Advisor (02) 9851 9155.

1.4 STANDARDS

Waterproofing wet areas

Standard: To AS 3740.

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given in AS 3740 and the following apply:

- Bond breaker: A system preventing a membrane bonding to the substrate, bedding or lining.
- Membranes (waterproof): Impervious barriers to liquid water which may be:
  - Installed below floor finishes.
  - Installed behind the wall sheeting or render and termed External.
  - Installed to the face of the wall sheeting or render and termed Internal.
  - Applied in liquid or gel form and air cured to form a seamless film.
  - Applied in sheet form with joints lapped and sealed.
- Substrate: The surface to which a material or product is applied.
- Waterproof (WP): The property of a material that does not allow moisture to penetrate through it.
- Waterproofing systems: Combinations of membranes, flashings, drainage and accessories which form waterproof barriers and which may be:

  . Loose-laid.
  . Bonded to substrates.
- Water resistant (WR): The property of material that restricts moisture movement and will not degrade under conditions of moisture.
- Wet area: An area within a building supplied with a floor waste.

1.6 SUBMISSIONS

Products and materials

Documentation: Submit copies of product manufacturer's:

- Product technical data sheets.
- Safety data sheets (SDS).
- Type tests certificates verifying conformance to AS/NZS 4858 Table 8.1.

Records

Placing records: Photographically record the application of membranes and information as follows:

- Date.
- Portion of work.
- Substrate preparation.
- Protection provided from traffic.

Reports

Provide a concise report or notice to the Superintendent of membrane placed including:

- The location and element where each membrane was placed.
- The method of placing and climatic conditions.
- Include protection supervision and effective spanning of any expansion joints.

Flood tests: Include in the report or notice a photographic record flooded area and adjacent areas noted in **Flood test**. Label photographs with date and location.

Shop drawings

Not required if installation is completed strictly in accordance with the manufacturer's product installation literature and is carried out by a waterproofing subcontractor accredited to install the manufacturers products. Otherwise, submit shop drawings showing the following as a minimum:

- Junctions with vertical surfaces and upstands.
- Junctions at perimeters.
- Drainage details.
- Control joints.
- Flashings.
- Penetrations.
- Corners.
- Terminations and connections.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Evidence of experience: Submit evidence of accreditation and experience of waterproofing subcontractor to the Superintendent prior to commencement of work.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Substrate preparation completed.
- Secondary layers preparation completed.
- Before membranes are covered up or concealed.
- After flood testing, if applicable.

Hold Points
General: Before installation begins, submit the following documentation on the products and installation detail:

- Manufacturer's statement certifying that the products and systems being supplied are in accordance with this specification and are suitable for the intended use, required detailing and performance.
- Contractor's statement that the proposed applicator is qualified and accredited to install the systems.
- The applicator's statement certifying that the building structure and or sub-base is satisfactory for receiving the installation.

During progression of the works manufacturer's inspections are required with a minimum of one inspection (or as otherwise recommended by the manufacturer or Superintendent) of each alternate product system used in the project, and to each of the following areas:

- internal set down wet area
- any additional locations and extents recommended by the manufacturer
- any additional inspection requested by the Superintendent.
- any additional inspection required to ensure the manufacturers full warranty is given

2 PRODUCTS

2.1 GENERAL

Storage and handling
General: Store and handle to the manufacturer's recommendations and as follows:

- Protect materials from damage.

2.2 MEMBRANES

Standards
Standard: To AS/NZS 4858.

Membrane systems
Requirement: Provide a proprietary membrane systems suitable for the intended internal wet area waterproofing.

2.3 ACCESSORIES

Water stop angles
Material: Rigid, corrosion resistant angles compatible with the waterproof membrane system.

Bond breakers
Requirement: Compatible with the extensibility class of the membrane to be used.

Material: Purpose made bond breaker tapes and closed cell foam backing rods or fillets of sealant.

Flashings
Requirement: Flexible waterproof flashings compatible with the waterproof membrane system.

Liquid membrane reinforcement
Requirement: Flexible fabric compatible with the waterproof membrane system.

Sealants
Requirement: Waterproof, flexible, mould-resistant and compatible with host materials.

Adhesives
Requirement: Waterproof and compatible with host materials.

3 EXECUTION

3.1 DESIGN AND PERFORMANCE

Drawings
Indicative: The drawings are indicative of the waterproofing membrane details. They do not limit the requirement for the Contractor to install a complete waterproofing system to all wet areas.

Services: Refer also to the building service drawings for the location, number and extent of services penetrations, and the like.

Extent: All wet areas to NCC requirements and to the following areas:

- Full extent of all floors (full extent of the structural slab set down) installed under the bedding (if bedding is to fall) and turned up edges of structural slab rebate. Installed over the screed to falls where substrate (structural slab) is not to fall.
- Turned up all walls to the full height or min. 300 mm where walls are not required to receive a waterproof membrane.
- All walls of shower recesses with WR applied wall finishes to full extent of the specified finishes (minimum 1800mm high)
- And where otherwise indicated and detailed.

Design completion

Contractor's documentation: Prepare and submit full documentation of each proposed waterproofing installation, by mark-ups or original documents including:

- Contractor's schedule of all the waterproofing applications.
- Drawings of all the proposed details at terminations, penetrations, interruptions, changes in direction, and the like.
- Plan drawings keyed to the proposed details, to show all proposed details.
- Verification and acceptance of substrate including falls to wastes and the like.

Verify and confirm all extents at every location prior to installation.

Where not otherwise clear, provide not less than the following extent to the various respective locations.

- Any relevant Australian Standard
- Manufacturer’s written requirements
- Where and if required, extend the termination installation to meet adjacent surfaces finishes and treatments, so as to avoid gaps in finishes between adjacent trades.

Examination

Inspect site conditions before start of work on site, before delivery of materials. Ensure conditions are satisfactory for installation. The Contractor is to arrange with the waterproofing subcontractor for any rectification work required to be meet the subcontractor’s needs before commencement of works.

Substrates

Grade substrates so they fall to drains in compliance with the relevant standards and without ponding. Refer also to minimum falls required by the manufacturer.

Movement joints: Provide movement joints over movement joints in the substructure.

Preparation

Prepare all surfaces in accordance with material manufacturer's instructions.

Protection

Protect the installation from damage as and where specified. The Contractor is to provide suitable barriers to ensure waterproofed areas are protected from other trades prior to installed of applied floor finishes.

Waterproof installations

Complete installations: Supply all materials and perform all work to make each installation completely waterproof. Each complete waterproofing installation shall generally include, but not be limited to, the following components:

- Membranes: Single, or multiple layers of waterproofing membrane coatings
- Treatment of membranes at:
  - . preparation before application
  - . upon laying or applying each layer
  - . laps and joins between sheets of the membrane
  - . laying of reinforcement, where applicable
  - . changes of direction
  - . penetrations

. terminations

Accessories: Provide related materials and tools as necessary to complete the installation including protection boards and the like.

3.2 PREPARATION

Substrates

General: Make sure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion of membranes.
- If walls are plastered, remove loose sand.
- If walls or floors are framed or discontinuous, support members are in full lengths without splicing.
- If floors are solid or continuous:
  . Excessive projections are removed.
  . Voids and hollows greater than 10 mm with abrupt edges are filled with a cement:sand mix not stronger than the substrate nor weaker than the bedding.
  . Depressions less than 10 mm are filled with a latex modified cementitious product with feathering eliminated by scabbling the edges.
  . Cracks in substrates wider than 1.5 mm are filled with a filler compatible with the membrane system.

Concrete substrates: Cure for more than 28 days.

External corners: Round or arris edges.

Moisture content

Requirement: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to AS 1884 Appendix A.

Falls

Membrane directly under the floor finish: Make sure the fall in the substrate conforms to the fall documented for the finish.

Sheet substrate fastening

Requirement: Fasten or adequately fix to the supporting structure.

Control joints

Finishes: Align control joints in finishes and bedding with control joints or changes in materials in the substrate.

Location of movement control joints: Do not locate building movement joints in wet areas.

Water stop angles

Requirement: Provide water stop angles at door thresholds and shower enclosures to support the waterproof membrane at junctions between waterproofed and non-waterproofed areas.

Sizing: Size the vertical leg of the water stop angle to conform to the requirements of AS 3740.

Corners: Cut the horizontal leg and bend the vertical leg at corners instead of forming vertical joints between separate lengths of angle.

Fixing: Fix water stop angles to the substrate with compatible sealant or adhesive and corrosion-resistant countersunk or wafer head screws.

Priming

Compatibility: If required, prime the substrates with compatible primer for adhesion of the membrane system.

Bond breakers

Requirement: After the priming of surfaces, provide bond breakers at all wall/floor, hob/wall junctions and at control joints where the membrane is bonded to the substrate.

Sealant fillet bond breakers:

- Application: Form a triangular fillet or cove of sealant to internal corners within the period recommended by the membrane manufacturer after the application of the primer.
- Widths: 5 mm x 5 mm to vertical corners. 6 mm x 6 mm to 9 mm x 9 mm to horizontal corners.

Backing rod bond breakers: Retain in position with continuous length of tape pressed firmly in place against the surfaces on each side of the rod.

3.3 APPLICATION

Protection

Damage: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage.

Extent of waterproofing

Waterproof or water resistant surfaces: To the requirements of BCA F1.7 for Class 2, 3 and 4 buildings, or BCA 3.8.1.2 for Class 1 buildings.

Sheet membrane joints

Bituminous sheet membranes:

- Side laps at least 75 mm.
- End laps at least 100 mm.

Synthetic rubber membranes:

- Factory-vulcanized laps at least 40 mm.
- Field side laps at least 50 mm for side laps.
- Field end-laps at least 100 mm for end laps.

PVC membranes:

- Factory welded laps at least 30 mm.
- Field–welded laps at least 75 mm.

Vertical membrane terminations

Upstands: At least 150 mm above the finished tile level of the floor or 25 mm above the maximum retained water level, whichever is the greater.

Anchoring: Secure sheet membranes along the top edge.

Edge protection: Protect edges of the membrane.

Flashings

Junctions between waterproof surfaces: Provide a bond breaker at internal corners behind flashings.

Junctions between waterproof surfaces and other surfaces: Provide a bead of sealant at the following junctions:

- Waterproof and water-resistant surfaces.
- Water-resistant and water-resistant surfaces.
- Water-resistant and non water-resistant surfaces.

Perimeter flashings: Provide continuous flashings to the full perimeter of waterproof areas at wall/floor junctions and to water stop angles.

Vertical flashings: Provide vertical corner flashings continuous across wall/wall junctions to at least 1800 mm above finished floor level.

Vertical liquid applied flashings:

- Return legs at least 40 mm on each wall.
- Overlap the vertical termination of the floor waterproofing membrane at least 20 mm.

Vertical sheet flashings:

- Return legs at least 50 mm on each wall.
- Overlap shower tray upstands at least 50 mm.
- Do not penetrate flashing with wall lining fasteners.

Reinforcement: At coves, corners and wall/floor junctions with gaps greater than 3 mm reinforce liquid applied membranes with reinforcement fabric tape recommended by the membrane manufacturer. Fold the tape in half lengthways and imbed it in the first flashing coat of membrane with one half of the tape on each side of the corner or joint. Apply a second coat of liquid membrane to seal the fabric.

Door jambs and architraves

Requirement: If the bottom of doorjambs and architraves do not finish above the water resistant floor finish, waterproof their surfaces below the water resistant floor level to provide a continuous seal between the perimeter flashing to the wall/floor junction and the water stop angle.

Drainage connections

Floor wastes: Provide floor wastes of sufficient height to accommodate the thickness of floor finishes and bedding at the outlet position. Position drainage flange to drain at membrane level. Turn membrane down 50 mm minimum into the floor waste drainage flanges, and adhere to form a waterproof connection.

Floor wastes in shower trays: Provide drainage of the tile bed and a waterproof connection between the tray and the drain.

Preformed drainage channels:

- With continuous drainage flanges: Provide a continuous waterproof connection between the membrane and the channel.
- Without drainage flanges: Provide continuous waterproofing under the channel and terminate the membrane at a floor waste with a recessed drainage flange.

Taps and spouts

Requirement: Waterproof penetrations for taps and spouts with proprietary flange systems or a sealant.

Provision for servicing: Install taps in a manner that allows tap washers or ceramic discs to be serviced without damaging the waterproofing seal.

Recessed bathroom fixtures

Construction: Support all faces of the recess and line with the same sheet material as the adjacent wall. Fall base of recess towards the shower area. Flash all junctions and waterproof all surfaces.

Curing of liquid applied systems

General: To the manufacturer's instructions.

Curing: Allow membrane to fully cure before tiling.

Overlaying finishes on membranes

Requirement: Protect waterproof membranes with compatible water-resistant surface materials that do not cause damage to the membrane.

Suitable materials: Conform to AS 3740.

Bonded or partially bonded systems: If the topping or bedding mortar is required to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

3.4 TESTING

Flood test

Application: Perform a flood test before the installation of surface finishes.

Moisture content measurement method: Conform to AS 1884 Appendix A.

Set-up:

- Measure the wall/floor junction of adjacent spaces and the floor soffit below for dryness.
- Record the result for each area.
- Dam the doorway(s) and seal floor wastes and drainage outlets to allow 50 mm water level.
- Fill space with clean water and leave overnight.

Evaluation:

- Make a visual inspection after a minimum period of 2 hours of the wall/floor junction of adjacent spaces and of the floor soffit below for obvious water or moisture.
- Test the same areas for dryness and compare the results to the measurements taken before flooding.

Compliance:

- Evidence of water from the visual test: Failure.
- No visual evidence of water: Proceed with moisture measurements.
- Test results indicating an increase in moisture before and after flooding: Failure.

Records:

- Submit records of all flood tests.

3.5 COMPLETION

Protection

General: Keep traffic off membrane surfaces until bonding has set or for 24 hours after laying, whichever period is the longer.

Reinstatement: Repair or replace faulty or damaged work.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

4 SELECTIONS

Refer to Schedule of Internal Selections.

0631B CERAMIC TILING

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide tiling systems to walls, floors and other substrates, as documented.

Performance
Requirement:

- Consistent in colour and finish.
- Firmly bonded to substrates for the expected life of the installation.
- Set out with joints accurately aligned in both directions and wall tiling joints level and plumb.
- Direct all water flowing from supply points to drainage outlets without leakage to the substrate or adjacent areas.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171b General requirements*.

1.3 STANDARDS

Tiling
General: Conform to the recommendations of those parts of AS 3958.1 which are referenced in this worksection.

Slip resistance
Classification: To AS 4586.

1.4 TOLERANCES

Completed tiling
Requirement: To the recommendations of AS 3958.1 clause 5.4.6.

1.5 SUBMISSIONS

Operation and maintenance manuals
General: Submit a manual describing care and maintenance of the tiling, including procedures for maintaining the slip-resistance classification stating the expected life of the slip-resistance classification.

Samples
General: Submit labelled samples of tiles, including fittings, accessories, grout and sealants, illustrating the range of variation in colour and finish.

Tests
Site tests: Submit results, as follows:

- Slip resistance of completed installation.

1.6 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:

- Substrate immediately before tiling.
- Trial set-outs before execution.
- Control joints before sealing and grouting.
- Grout and sealant colours before application.

2 PRODUCTS

2.1 TILES AND ACCESSORIES

Tiles

Standard: To AS ISO 13006.

Exposed edges: Purpose-made border tiles with the exposed edge (whether round, square or cushion) glazed to match the tile face. If such tiles are not available, mitre tiles on external corners.

Accessories

General: Provide tile accessories which match the composition, colour and finish of the surrounding tiles.

2.2 ADHESIVES

General

Standard: To AS ISO 13007.1.

Type

General: Provide adhesives compatible with the materials and surfaces to be adhered, and as documented**.**

Prohibited uses: Do not provide the following combinations:

- Cement-based adhesives on wood, metal, painted or glazed surfaces, gypsum-based plaster.
- Organic solvent-based adhesives on painted surfaces.
- Organic PVC-based adhesives and organic natural rubber latex adhesives in damp or wet conditions.
- PVA (polyvinyl acetate) based adhesives in wet areas or externally.

2.3 MORTAR

Materials

Cement type to AS 3972: GP.

-

Pigments
Pigments for coloured grout: Provide colourfast fillers compatible with the grout material. For cement-based grouts, provide lime-proof natural or synthetic metallic oxides compatible with cement.

2.5 CONTROL JOINTS

Control joint materials
Control joint strip: A proprietary control joint consisting of a neoprene core sandwiched between metal plates with lugs or ribs for mechanical keying. Set flush with the finished surface.

Proprietary slide plate divider strip: An arrangement of interlocking metal plates grouted into pockets formed in the concrete joint edges.

Sealant: One-part self-levelling non-hardening mould resistant, silicone or polyurethane sealant applied over a backing rod. Finish flush with the finished surface.

- Floors: Trafficable, shore hardness greater than 35.

Backing rod: Compressible closed cell polyethylene foam with a bond-breaking surface.

3 EXECUTION

3.1 SUBSTRATES

Drying and shrinkage
General: Before tiling, allow at least the following times to elapse (for initial drying out and shrinkage) for these substrates:

- Concrete slabs: 42 days.

3.2 PREPARATION

Standard
Preparation: To the recommendations of AS 3958.1 Section 4.

Ambient temperature
General: If the ambient temperature is less than 5°C or greater than 35°C, do not lay tiles.

Substrates without wet area membranes
General: Conform to the following:

- Clean off of any deposit or finish which may impair adhesion or location of tiles.
- If framed or discontinuous, support members are in full lengths without splicing.
- If solid or continuous:
  . Remove excessive projections.
  . Fill voids and hollows greater than 10 mm with abrupt edges with a cement:sand mix not stronger than the substrate or weaker than the bedding.
  . Fill depressions less than 10 mm with a latex modified cementitious product and eliminate feathering by scabbling the edges.

Absorbent substrates: If suction is excessive, control it by dampening but avoid over-wetting and do not apply mortar bedding to substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 3 mm of the surface and expose the aggregate; then apply a bonding treatment.

Substrates with wet area membranes
General: Make sure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location of tiles.
- Compatible with all components of the floor system.

3.3 TILING GENERALLY

Cutting and laying
Cutting: Cut tiles neatly to fit around fixtures and fittings and at margins where necessary. Drill holes without damaging tile faces. Cut recesses for fittings such as soap holders. Rub edges smooth without chipping.

Laying: Return tiles into sills, reveals and openings. Butt up to returns, frames, fittings, and other finishes. Strike and point up beds where exposed. Remove tile spacers before grouting.

Variations

General: Distribute variations in hue, colour, or pattern uniformly, by mixing tiles or tile batches before laying.

Protection

Floor tiles: Keep traffic off floor tiles until the bedding has set and attained its working strength.

Cleaning: Keep the work clean as it proceeds and protect finished work from damage.

3.4 SETTING OUT

Tile joints

Joint widths: Set out tiles to give uniform joint widths within the following limits:

- Floors:
  - . Dry pressed tiles: 3 mm.
  - . Extruded tiles: 6 mm.
  - . Vitrified: 3 to 5 mm.
  - . Quarry tiles: 6 to 12 mm.
  - . Chemical resistant epoxy jointed tiling: 5 to 6 mm.
- Walls:
  - . Dry pressed tile: 1.5 mm.
  - . Extruded tile: 6 mm.

Joint alignment: Set out tiling with joints accurately aligned in both directions and wall tiling joints level and plumb.

Joint position: Set out tiles from the centre of the floor or wall to be tiled.

Margins

General: Provide whole or purpose-made tiles at margins where practicable, otherwise, set out to give equal margins of cut tiles. If margins less than half a tile width are unavoidable, locate the cut tiles where they are least conspicuous.

Fixtures

General: If possible position tiles so that holes for fixtures and other penetrations occur at the intersection of horizontal and vertical joints or on the centre lines of tiles. Continue tiling fully behind fixtures which are not built in to the tiling surface. Before tiling make sure fixtures interrupting the tile surfaces are accurately positioned in their designed or optimum locations relative to the tile layout.

3.5 FALLS AND LEVELS

Grading

General: Grade floor tiling to even and correct falls to floor wastes and elsewhere as required. Make level junctions with walls. Where falls are not required, lay level.

Fall, general: 1:100 minimum.

Change of finish: Maintain finished floor level across changes of floor finish including carpet.

3.6 BEDDING

Standard

Cement mortar: To AS 3958.1 clause 5.5.

Adhesive: To AS 3958.1 clause 5.6.

Preparation of tiles

Adhesive bedding: Fix tiles dry; do not soak.

Mortar bedding: Soak porous tiles in water for half an hour and then drain until the surface water has disappeared.

Bedding

General: Use bedding methods and materials which are appropriate to the tile, the substrate, the conditions of service, and which leave the tile firmly and solidly bedded in the bedding material and adhered to the substrate. Form falls integral with the substrate.

Thin adhesive beds
General: Provide only if the substrate deviation is less than 3 mm, tested with a 3 m straightedge. Cover the entire tile back with adhesive when the tile is bedded.

Thickness: 1.5 to 3 mm.

Thick adhesive beds
General: Provide on substrates with deviations up to 6 mm, tested with a 3 m straightedge, and with tiles having deep keys or frogs.

Nominal thickness: 6 mm.

Adhesive bedding application
General: Apply adhesive by notched trowel to walls and floors and direct to tiles if required, to provide evenly distributed coverage after laying as follows:

- Domestic internal walls: > 65%.
- Domestic internal floors: > 80%.
- Other wall and floors: > 90%.
- Wet areas and bench tops: 100%.

Pattern of distribution of adhesive: To the recommendations of AS 3958.1 clause 5.6.4.3. Verify by examining one tile in ten as work proceeds.

Wall tile spacers: Do not use spacer types that inhibit the distribution of adhesive.

Curing: Allow the adhesive to cure for the period nominated by the manufacturer before grouting or allowing foot traffic.

Mortar beds
For floor tiles: Either lightly dust the screeded bed surface with dry cement and trowel level until the cement is damp, or spread a thin slurry of neat cement, or cement-based thin bed adhesive, on to the tile back. Do not use mortar after initial set has occurred.

- Nominal thickness: 20 to 40 mm.

Thick reinforced beds: Place mortar bed in two layers, and incorporate the mesh reinforcement in the first layer.

3.7 CONTROL OF MOVEMENT

General
Requirement: Provide control joints carried through the tile and the bedding to the recommendations of AS 3958.1 clause 5.4.5 and as follows:

- Floor location:
  . Over structural control joints.
  . To divide complex room plans into rectangles.
  . Around the perimeter of the floor.
  . At junctions between different substrates.
  . To divide large tiled areas into bays.
  . At abutments with the building structural frame and over supporting walls or beams where flexing of the substrate is anticipated.
- Wall location:
  . Over structural control joints.
  . At junctions with different substrate materials when the tiling is continuous.
  . At vertical corners in shower compartments.
- Depth of joint: Right through to the substrate.
- Sealant width: 6 to 25 mm.
- Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

3.8 GROUTED AND SEALANT JOINTS

Grouted joints
General: Commence grouting as soon as practicable after bedding has set. Clean out joints as necessary before grouting.

Face grouting: Fill the joints solid and tool flush. Clean off surplus grout. Wash down when the grout has set. When grout is dry, polish the tiled surface with grout film remover and a clean cloth.

Edges of tiles: Grout exposed edge joints.

Epoxy grouted joints: Make sure tile edge surfaces are free of extraneous matter such as cement films or wax, before grouting.

Sealant joints

General: Provide joints filled with sealant and finished flush with the tile surface as follows:

- Where tiling is cut around sanitary fixtures.
- At internal corners of walls in showers.
- Around fixtures interrupting the tile surface, for example pipes, brackets, bolts and nibs.
- At junctions with elements such as window and door frames and built-in cupboards.

Material: Anti-fungal modified silicone.

Width: 5 mm.

Depth: Equal to the tile thickness.

3.9 JOINT ACCESSORIES

Floor finish dividers

General: Finish tiled floors at junctions with differing floor finishes with a corrosion-resistant metal dividing strip fixed to the substrate using mechanical fixings, with top edge flush with the finished floor. If changes of floor finish occur at doorways, make the junction directly below the closed door. Grout up underneath to provide continuous support.

Type: Refer to Schedule of Internal Selections.

Material: Aluminium.

Stepping: Less than 5 mm.

Adjustments

Requirement: Check that the height of the floor finish divider is sufficient for the topping and tile thickness. Adjust as required with a matching flat bar adhesive fixed to the divider angle.

3.10 TESTING

Completion tests

Slip resistance of completed installation: To AS 4663.

Impact sound insulation: [complete/delete]

3.11 COMPLETION

Cleaning

General: Clean tiled surfaces using an appropriate tile cleaning agent, and polish.

Spare tiles

General: Supply spare matching tiles and accessories of each type for future replacement purposes. Store the spare materials on site.

Quantity: At least 1% of the quantity installed.

Storage location: To be determined by the Principal.

4 SELECTIONS

Refer to Schedule of Internal Selections.

0657 RESIN BASED SEAMLESS FLOORING

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide resin based floor finishes to substrates, as documented.

Performance
Requirement: Provide resin flooring finish which:

- Forms a strong permanent bond to the floor base.
- Is impermeable to liquids.
- Is hygienic and easily cleaned.
- Slip resistant or chemical resistant.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171b General requirements*.

1.3 COMPANY CONTACTS

Ardex Australia
Website: https://ardexaustralia.com/
Contact: John Welemann – Technical Support Advisor (02) 9851 9155.

Hychem
Website: www.hychem.co,.au
Contact: Ludvick Kovacic – Managing Diredctor (02) 4646 1660.

1.4 STANDARDS

Slip resistance
Classification: To AS 4586.

1.5 INTERPRETATION

Abbreviations
General: For the purposes of this worksection the following abbreviations apply:

- MMA: Methyl methylacrylate.

Definitions
General: For the purposes of this worksection the following definitions apply:

- Resin based seamless floor finish: Any combination of a resin based flooring system that combines two part resins, with or without an aggregate, to provide a continuous floor coating without joints except those that may already exist in the substrate.
- Substrate: The surface to which a material or product is applied.

1.6 SUBMISSIONS

Fire performance
Fire hazard properties: Submit evidence of conformance to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Operations and maintenance manuals
Requirement: At completion, submit the manufacturer's published use, care and maintenance instructions.

Products and materials
Manufacturer's data: Submit the manufacturer's technical product data for each type of finish, and recommendations for its application in the project, including the following:

- Composition, thickness, finish and time between coats for multi-coat work.
- Safety data sheets.

Type tests: Submit results as follows:

- Slip resistance.

Samples

Resin based flooring generally: For each required finish, submit a sample of the coating on a suitable base, showing the thickness of each coat.

- Slip resistance: If this is documented, demonstrate conformance in the sample.

Labelling: Label each sample identifying the following:

- Brand.
- Product name.
- Manufacturer's reference code (including the code for each layer of a multi-layer system).

Size: 300 x 300 mm minimum.

Sample panels: If required, construct a panel to verify the floor finish, its aesthetic and material properties, as documented and as follows:

- Location: TBA by the Superintendent.
- Size (mm): Minimum 5m².

Subcontractors

General: Submit names and contact details of proposed suppliers and applicators.

Tests

Site tests: Submit results, as follows:

- Slip resistance test of completed installations.
- Moisture content test.

Warranties

Requirement: On completion, submit interlocking warranties from the supplier and applicator covering materials and workmanship.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier and applicator.

1.7 SLIP RESISTANCE

Slip resistance classification

General: Refer to *0171b General Requirements* worksection.

1.8 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Completion of substrate preparation.
- Substrate joints, thresholds and perimeter walls.
- Completed priming of base.
- Completion of each coat in the flooring system.
- Completed application.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Delivery: All deliveries to site are to be checked by the applicator for quantities, damage and material conformance.

Storage: Store materials to the manufacturer's recommendations, with seals and labels intact and legible. Maintain temperatures at 15 to 20ºC or within the recommended range. Do not use materials that have been stored longer than the manufacturer's maximum recommended shelf life.

2.2 FIRE PERFORMANCE

Fire hazard properties
Critical radiant flux: Tested to AS ISO 9239.1.

2.3 SEAMLESS FINISHES

Resin flooring type table

Finish type	Description	Durability*	Typical thickness
Floor seal	Applied in 2 or more coats. Generally solvent or waterborne.	LD	

3 EXECUTION

3.1 GENERAL

Ambient conditions

General: Do not start work before the building is enclosed and wet work is complete and dry.

Room and floor temperature: Maintain at temperatures recommended by the manufacturer for a period extending minimum 72 hours before and after the floor installation.

Lighting: Provide permanent lighting or if not in place, simulate permanent lighting conditions during flooring application.

Protection

Adjacent surfaces: Protect adjacent surfaces by masking or other methods and maintain free of the flooring finish.

Ventilation: Provide adequate ventilation and fire protection at mixing and application locations to the manufacturer's recommendations including smoke, spark and flame prohibition.

Finished installation: Prevent trafficking, wetting and exposure to chemicals until flooring is fully cured.

Removal of fixtures and fittings

Fixtures: Remove door stops and other fixtures within or adjacent to the work area. Refix in position undamaged on completion of the installation.

- Labelling and storage: Attach labels or mark fixtures using a non-permanent method, identifying the location and refixing instructions. Store and protect against damage.

Difficult to remove fixtures: Where removal is impractical or difficult, apply surface protection before substrate preparation.

Subcontractors

Requirement: Use specialist applicators recommended by the material manufacturer.

3.2 PREPARATION

Substrate condition

Requirement: Sound, clean and free of any deposit or finish, including laitance, efflorescence, curing compounds, dirt and grease, which may impair bonding or is incompatible with the floor coating.

Concrete surface: Cured for at least 28 days and free of water for at least 7 days.

Concrete moisture content: Do not start installation of the resin based seamless flooring until the concrete substrate conforms to AS 1884 Section 3.1 and the adhesive and manufacturers' recommendations.

Substrate alkalinity and adhesion: Verify the concrete pH is within the range recommended by the manufacturer. Perform adhesion tests as recommended by the manufacturer, do not proceed with application unless the substrate passes the test.

Grouts, patching materials and metal embedments: Make sure these are compatible with the resin flooring.

Substrate tolerances table

Property	Length of straightedge laid in any direction	Maximum deviation under the straightedge
Flatness Class A	2 m	4 mm
Smoothness	150 mm	1 mm
Projections	50 mm	0.5 mm

Cleaning

General: Remove loose materials or dust and ensure all constructions setout paint markings (chalk, crayon and aerosol paint markings) are removed from the concrete substrate prior to installation of any levelling compound and resin based seamless floor finishes. Markings to be removed by abrasion, high pressure water jetting etc. Do not use acid, solvents or heat.

Substrate correction

Concrete surface cleaning and preparation: Remove contaminants by high pressure water jetting and roughen mechanically.

Concrete surface treatments: Mechanically remove the following:

- Sealers and hardeners.
- Curing compounds.

Mechanical removal and concrete roughening methods: Shot blasting, planing or grinding.

Thinner resin flooring: For all types other than resin screed flooring, heavy duty flowable flooring, and heavy duty resin flooring, remove laitance or surface sealers by grinding or light contained shot blasting. Do not remove by percussive scabbling.

Precast unit surfaces: Leave as cast and wash and clean by wire brushing to remove any dirt. Do not mechanically scabble.

Old concrete bases: Abrade and remove the uppermost cement matrix mechanically by grinding, planing or shot blasting. Repair damaged and deteriorated concrete to the resin flooring manufacturer's recommendations.

Patching and filling: Remove projections and fill voids and hollows with a reinforced mortar or a polymer modified cementitious self-smoothing and levelling compound, compatible with the seamless flooring system, to the manufacturer's recommendations.

Control joints

Joint treatment: Treat control joints and non-moving substrate cracks to prevent cracks from reflecting through the resin flooring, to the manufacturer's recommendations.

Perimeter edges

Integral cove edges or skirting: Apply cove skirting mix to wall surfaces and perimeter edges before applying flooring. Mask adjacent surfaces, mix, prime, trowel, sand and apply top coat of the skirting to the manufacturer's recommendations. Round all internal and external corners.

3.3 MIXING

Unfilled systems

Two component systems: Blend together with a mechanical mixer to form a homogenous mix.

Filled systems

Requirement: Mix mechanically to the resin flooring manufacturer's recommendations.

Order of mixing: Mix liquid components first, then gradually add fillers and/or aggregates whilst continuing the mixing action. Mix until fillers and/or aggregates have been wetted out by the resin.

3.4 APPLICATION

General

Coating application: Apply components of the resin flooring system to the manufacturer's recommendations to produce a uniform, monolithic wearing surface.

Priming

Coating application: Apply primer over prepared substrate at the manufacturer's spreading rate with a stiff brush, roller or trowelling. Fully saturate the substrate surface.

Porous or open textured surfaces: If required to minimise pin hole, apply a second coat to achieve full saturation.

Multi-layer, flow applied and heavy duty flowable flooring: Allow primer to reach a tack-free state before applying the resin flooring. If required to assist flooring application, incorporate a light scatter of dry graded aggregate whilst the primer is wet.

Curing: Maximum 48 hours at 15 to 20ºC before applying the resin flooring. If curing exceeds 48 hours, mechanically prepare the surface and reapply primer.

Resin coatings

Floor seal, floor coating and high build floor coating: Apply by brush or roller to the manufacturer's recommendations.

Curing: Allow first coat to cure for 16 to 24 hours until it is tack-free before applying second coat.

Flow applied systems

Flow applied and heavy duty flowable flooring: Apply by spreading evenly over the surface, using a serrated trowel, pin rake or squeegee. Immediately follow by rolling with a spiked roller to release entrapped air and assist in smoothing out.

Partially set or thickened areas: Do not use spiked roller on these areas.

Multi-layer flooring
Requirement: Apply to **Resin coatings** and/or **Flow applied systems** to the manufacturer's recommendations.

Trowel applied resin flooring
Resin screed and heavy duty resin: Spread mixed product over the primed substrate by trowel, screed box, or between screeding laths or bars to achieve uniform overall thickness.

Steel trowels: Keep clean at all times by using a minimum amount of solvent or water.

Hygienic surface: Conform to the following:

- Resin screed: If required, seal surface with one or two coats of compatible resin sealer applied by brush, roller or squeegee after the screed has cured sufficiently.
- Heavy duty resin: If an impervious screed system is used, additional resin seals are not required.

Reinforcement
Fibreglass cloth: If reinforcing is required to minimise problems arising from cracks or bay joints in the substrate, after applying the primer and a thin layer of resin, roll in the fibreglass cloth. Overlap the fabric by 50 mm minimum at joins and apply the final resin layer before the first layer fully hardens.

Curing
Finished flooring: Allow to cure to the manufacturer's recommendations before trafficking and 3 to 7 days before wet cleaning, heavy trafficking or exposure to chemicals.

Uncured resin flooring: Maintain minimum 3ºC above dew point or below 75% relative humidity to reduce the risk of blooming on the floor finish.

3.5 JOINTS AND ACCESSORIES

Junctions
General: Finish junctions flush with adjoining surfaces. Where changes of floor finish occur at doorways locate the joint on the centreline of the closed door leaf.

Seamless flooring junctions
Junction type: Typically a V joint. Form the V joint in the concrete substrate base and carry the finish into the joint. Submit the manufacturer's junction type detail for review.

Accessories
Accessory type: Consult with manufacturer for special requirements and submit to the Superintendent for review.

Control joints
Location: Provide control joints in resin based seamless flooring as follows:

- Over structural control joints.
- At junctions between different substrates.

Flooring finish: Where possible, carry the seamless finish material over the edges of the control joint in the substrate. Provide a sealant joint as follows:

- Sealant width: 6 to 25 mm.
- Sealant depth: One half the joint width, or 6 mm, whichever is the greater.
- Sealant: One part, flexible, abrasion resistant sealant applied over a backing rod. Finish flush with the seamless flooring surface.
- Trafficable floors: Shore hardness greater than 35.
- Backing rod: Compressible closed cell polyethylene foam with a bond-breaking surface.

3.6 TESTING

Substrate tests
Moisture content: Test subfloors for suitability for the installation of resin based seamless flooring to AS 1884 Appendix A.

- Maximum relative humidity of concrete: To AS 1884 appendix A3.1.2 and A3.1.3.

Completion tests
Slip resistance of completed installation: To AS 4663.

3.7 COMPLETION

Protection

General: Keep traffic off finished work for 60 hours or as recommended by the applicator, whichever is the greater.

Reinstatement

Extent: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Removed fixtures and fittings

Requirement: Reinstall hardware and fittings on completion.

4 SELECTIONS

Refer to Schedule of Internal Selections

0671P PAINTING

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide DuluxGroup/Dulux coating systems to substrates, as documented.

Performance
Requirement:
- Consistent in colour, gloss level, texture and dry film thickness.
- Free of runs, sags, blisters, or other discontinuities.
- Paint systems which are fully opaque or at the documented level of opacity.
- Clear finishes at the level of transparency consistent with the product.
- Fully adhered.
- Resistant to environmental degradation within the manufacturer's stated life span.

1.2 COMPANY CONTACTS

DuluxGroup/Dulux
Architects and Specifiers' Hotline (Paint, Acratex, Protective Coatings): 13 23 77.
Powder Coatings Technical Advice Hotline: 13 24 99.
Website: www.dulux.com.au/contact-us/architects-and-specifiers

Porter's Original Paints
Customer Service: 1800 656 664.
Website: https://www.porterspaints.com/specifiers/

1.3 CROSS REFERENCES

General
Requirement: Conform to the following:
- *0171b General requirements*.

Reference
Refer to Schedule of External and Internal Selections for all paint finishes and colour selections.

1.4 STANDARDS

Painting
General: To the recommendations of those parts of AS/NZS 2311 referenced in this worksection.

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals
Product Guide: www.dulux.com.au/specifier/product/product-selector
Duspec Product Data Sheets, SDS, paint system selection: www.dulux.com.au/specifier/duspec

1.6 INTERPRETATION

Abbreviations
General: For the purposes of this worksection the following abbreviations apply:
- ASU: Acrylic sealer undercoat multipurpose combo product.
- DFT: Dry film thickness.
- OFC: Off form concrete.
- PDS: Product data sheet.
- PRN: Paint reference number.
- PSU: Primer sealer undercoat multipurpose combo product.

- WFT: Wet film thicknesrs.

Definitions

General: For the purposes of this worksection the definitions in AS/NZS 2310 and the following apply:

- Gloss: The optical property of a surface, characterised by its ability to reflect light specularly.
- Gloss unit: Numerical value for the amount of specular reflection relative to that of a standard surface under the same geometric conditions.
- Levels of gloss finish: When the specular direction is 60 degrees, surfaces with the following specular gloss reading is defined as follows:
  . Full gloss: Over 85 gloss units.
  . Gloss: Over 50 and up to 85 gloss units.
  . Semi-gloss (satin): Over 20 and up to 50 gloss units.
  . Low gloss (low sheen): Over 5 and up to 20 gloss units.
  . Flat finish (matt): Up to 5 gloss units.
- Opacity: The ability of a paint or textured and membrane coating to obliterate the colour difference of a substrate.
- Paint or coating system: A product in liquid form, which when applied to a surface, forms a dry film having protective, decorative or other specific technical properties.
- Primer, prime coat: The first coat of a painting system that helps bind subsequent coats to the substrate and which may inhibit its deterioration.
- Sealer: A product used to seal substrates to prevent the following:
  . Materials from bleeding through to the surface.
  . Reaction of the substrate with incompatible top coats.
  . Undue absorption of the following coat into the substrate.
- Substrate: The surface to which a material or product is applied.
- Undercoat: An intermediate coat formulated to prepare a primed surface or other prepared surface for the finishing coat.

1.7 SUBMISSIONS

Products and materials

General: Dulux coatings systems have been selected for this project. Submit the following details at least 3 weeks before the paint is required:

- Paint brand name and product range quality statement.
- Safety data sheets (SDS) showing the health and safety precautions to be taken during application.
- The published recommendations for maintenance.

Samples

Clear finish coatings: Submit samples of timber or timber veneer matching those to be used in the works as follows:

- Requirement: Label for identification and prepare, putty, stain, seal and coat in conformance with the documented system.
- Size: Large enough to be cut into 4 segments.

Opaque coated samples: Submit labelled samples of each coating system, on representative substrates, showing surface preparation, colour, gloss level, texture, and physical properties.

Coated samples schedule

Substrate	**Sample size**
Joinery (trim)	1m²
Doors	Complete door
Door Frames	One frame
Internal walls	One wall for each colour 2m²
External Walls	One wall for each colour 2m²

Subcontractors
Specialist applicators: Submit names and contact details of proposed specialist applicators.

Warranties
Requirement: Submit the coating manufacturer's warranties at practical completion.
Material warranty: Submit the manufacturer's material warranty as follows:
- Extent: Paintwork generally.
- Terms: Paint systems are suitable for their intended use.
- Warranty period: As defined by the manufacturer.

Material performance warranty: Submit an alternative performance warranty as follows:
- Terms: Submit the performance criteria as defined by the manufacturer.
- Measure: As defined by the manufacturer.
- Warranty period: As defined by the manufacturer.

Timing: Before the application of the paint system.

1.8 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Painting stages:
  . Completion of surface preparation.
  . After application of final coat.
- Clear finishing stages:
  . Before surface preparation of timber.
  . Completion of surface preparation.
  . After application of final coat.

2 PRODUCTS

2.1 GENERAL

Product substitution
Other products: Conform to PRODUCTS, **GENERAL**, **Substitutions** in *0171 General requirements*.

Storage and handling
General: Store materials not in use in tightly covered containers in well-ventilated areas with temperatures maintained at the manufacturer's recommendations.

Delivery: Deliver paints to the site in the manufacturer's labelled and unopened containers.

Product identification
General: Marked to show the following:
- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

2.2 PAINTING MATERIALS

Combinations
General: Do not combine paints from different manufacturers in a paint system. Dulux paint products and coating systems have been selected and specified for this project. Any unauthorised product substitution will void the warranties.

Clear timber finish systems: Provide only the combinations of putty, stain and sealer recommended by the manufacturer of the top coats.

Tinting

General: Provide only products which are colour tinted by the manufacturer or supplier.

Toxic ingredients

General: To the *Poisons Standard - Schedule 1 (SUSMP)* Part 2 Section 7.

Standards

Paint types: Conform to the Australian Standard referenced in the **OCP/Dulux paint type reference table**.

DuluxGroup/Dulux paint type reference table legend

Key:

ASU = Acrylic Sealer/Undercoat.

NE = No Equivalent.

PSU = Primer/Sealer/Undercoat.

Low VOC products are noted in the Table.

^ Use is discouraged in favour of water based paints because of environmental concerns.

These paints have either limited availability or low requirement in the Building Industry.

DuluxGroup/Dulux paint type reference table

Paint type	**DuluxGroup/Dulux material description**	**Dulux PDS No.**	**AS/NZS 2311P RN (Table 4.2)**	**Standard**
Semi-gloss solvent-borne: interior	Dulux Super Enamel Semi-Gloss	DD0028	B3	AS 3730.5
Semi-gloss water-borne, interior /exterior trim (alt B8b)	Dulux Aquanamel Semi Gloss (low VOC)	DD1281	B41	AS 3730.2
Gloss solvent-borne: aerosols	Dulux Spray Pak	DD0009	B4#	NE
Full gloss solvent-borne: exterior	Dulux Super Enamel Full Gloss Dulux Metalshield Premium UV Resistant High Gloss	DD0026 LI 011	B5a	AS 3730.6
Full gloss solvent-borne: interior	Dulux Super Enamel Full Gloss	DD0026	B5b	AS 3730.6
Full gloss waterborne interior/exterior trim (alt B9b)	Dulux Aquanamel Gloss (low VOC)	DD1282	B42	AS 3730.2
Flat latex: interior ceilings	Dulux White Ceiling Paint (low VOC)	DD1403	B6a	AS 3730.1
Flat latex: interior ceilings (tinted colours)	Dulux Professional EnvirO2 Tintable Ceiling Flat (low VOC)	DD1466	B6a	AS 3730.1
Low gloss latex: exterior	Dulux Weathershield Low Sheen Acrylic	DD0053	B7b	AS 3730.8
Low gloss latex: interior	Dulux Wash&Wear Low Sheen Acrylic (low VOC)	DD02070	B7a	AS 3730.3

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311P RN (Table 4.2)	Standard
	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen (low VOC)	DD02074		
Low gloss latex: interior	Dulux Professional Steriguard Acrylic Low Sheen	DD01990	B7a	AS 3730.3
Semi-gloss latex: exterior	Dulux Weathershield Semi Gloss Acrylic	DD0037	B8b	AS 3730.9
Semi-gloss latex: interior	Dulux Wash&Wear Semi Gloss Acrylic (low VOC) Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss (low VOC)	DD02071 DD02075	B8a	AS 3730.2
Semi-gloss waterborne latex: interior	Dulux Professional Steriguard Water Based Enamel Semi Gloss	DD01993	B42	AS 3730.2
Gloss latex: exterior	Dulux Weathershield Gloss	DD0054	B9b	AS 3730.10
Gloss latex: interior	Dulux Wash&Wear Gloss	DD02072	B9a	AS 3730.12
Gloss waterborne interior/exterior trim (alt B9a/B9b)	Dulux Aquanamel Gloss (low VOC)	DD1282	B42	AS 3730.1
Gloss waterborne latex: interior	Dulux Professional Steriguard Water Based Enamel Gloss	DD01992	B42	AS 3730.1
Wood primer, solvent-borne	Dulux 1 Step Oil Based Primer Sealer Undercoat	DD1227	B10	AS 3730.13
Wood primer, latex	Dulux 1 Step Acrylic Primer Sealer Undercoat	DD1192	B10a	AS 3730.17
Metal primer for steel – solvent-borne	Dulux Metalshield All Surface Primer	DI1640	B11	AS 3730.21
Metal primer, latex	Dulux Prepcoat All Metal Primer (water based, low VOC)	DD01891	B11a#	AS 3730.15
Metal primer for zinc-coated surfaces, latex	Dulux Professional Galvanised Iron Primer (water based, low VOC)	DD0156	B12a	AS 3730.15
Metal primer for non ferrous metals	Dulux Prepcoat All Metal Primer (water based, low VOC)	DD01891	B13	AS 3730.17
Zinc-rich organic binder/primer for steel	Dulux Zinc Rich 1P Primer	DI0541	B14	AS 3730.9

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311P RN (Table 4.2)	Standard
Concrete and masonry sealer	Dulux Sealer Binder Dulux Acratex Acraprime 501/2 Berger Gold Label Acrylic Block Filler	DD0074 DA0442 DD0217	B15	AS 3730.22
Clear low viscosity paint for concrete	Dulux AquaTread Concrete Sealer (low VOC) Dulux DureSeal Acrylic Dust Sealer	DD1187 DI1118	B15a	NE
Moisture resistant plasterboard sealer binder	Dulux EnvirO2 Water Based Sealer Binder (low VOC)	DD1449	B15a	AS 3730.18
Concrete and masonry, latex wallboard sealer, sealer/undercoat,	Dulux Acrylic Sealer Undercoat (low VOC) Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC)	DD1402 DD1192	B16	AS 3730.18
Undercoat, solvent-borne	Dulux 1 Step Oil Based Primer Sealer Undercoat	DD1227	B17	AS 3730.14
Undercoat, latex: exterior	Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC) Dulux Acratex Water Based 501/1	DD1192 DD0441	B17a	AS 3730.18
Undercoat, latex: interior	Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC) Dulux Acrylic Sealer Undercoat (low VOC)	DD1192 DD1402	B17a	AS 3730.18
Wood Stain - spirit	Feast Watson Prooftint	DW0729	B18	NE
Wood Stain - oil	Feast Watson Liming White Cabot's Interior Stain Oil Based	DW0749 DW0661	B18	
Wood Stain - latex	Intergrain NaturalStain (interior/exterior) (low VOC) Cabot's Interior Stain Water Based	DW0758 DW1636	B18a	NE
Interior clear varnish, solvent-based, one-pack	Feast Watson Floorclear – Gloss, Satin Feast Watson Clear Varnish – Gloss, Satin, Matt – not suitable for floors Feast Watson Stain & Varnish – not suitable for floors Feast Watson Stain & Varnish Liming White –	DW0736 DW0737 DW1611 DW1612 DW1617 DW1248 DW01804 DW01805	B19	AS 3730.25 or AS 3730.27 (for floors)

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311P RN (Table 4.2)	Standard
	Gloss, Satin – not suitable for floors			
Interior clear latex varnish, water-based, one-pack	Intergrain Ultraclear Interior – Satin, Gloss (low VOC) – not suitable for floors Feast Watson Liming White Floor Finish Cabot's Stain & Varnish Water Based – not suitable for floors	DW0762 DW0761 DW01800 DW1634 DW1635	B19a	NE or AS 3730.27 (for floors)
Floor varnish, solvent based, clear (moisture cure)	Feast Watson Commercial Maxithane – Gloss, Satin	DW0701 DW0703	B20	AS 3730.27
Floor Varnish, water-based, one-pack	Intergrain Enviropro Endure 1 Pack - Matt, Satin, Gloss (low VOC)	DW1420 DW1419 DW1418	B20	AS 3730.27
Floor varnish, clear or tinted, two-pack	Intergrain Enviropro Endure 2 Pack - Gloss, Satin, Matt	DW1421 DW1422 DW1423	B20	AS 3730.27
Exterior latex stain, semi-transparent	Intergrain NaturalStain (low VOC)	DW0758	B22	AS 3730.16
Fence stain, latex paints, opaque	Dulux Weathershield Garden Shades Cabot's Timbercolour	DD0055 DW0660	B22b	AS 3730.16
Exterior stain, solvent-borne, opaque	Cabot's Deck & Exterior Stain	DW1579	B23#	AS 3730.28
Exterior stain, solvent-borne, semi-transparent	Feast Watson Timber & Deck Stain Cabot's Deck & Exterior Stain	DW01894 DW1579	B23a	NE
Paving paint for concrete, solvent	Berger Jet Dry Paving Paint range	DD0081	B24	AS 3730.29
Paving paint for concrete, latex	Berger Jet Dry Aqua Tread Satin	DD1163	B24a	NE
Roofing paint, latex (Solar reflectance)	Dulux AcraTex 962 COOLROOF with InfraCOOL Technology™	DA1471	B25	
Intumescent paints		N/A	B28#	NE
Epoxy paint, two-pack, solvent-borne topcoats, interior only	Dulux Durebild STE 2 Pack Epoxy (high build & surface tolerant) Dulux Duremax GPE	DI1109 DI1115	B29	AS/NZS 3750.1

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311P RN (Table 4.2)	Standard
Epoxy paint, two-pack, solvent-borne topcoats, exterior & pools		N/A	B29	AS/NZS 3750.1
Epoxy paint, two-pack, water based, interior only	Dulux Luxafloor ECO2 (low VOC) Dulux Enviropoxy WBE	I1315 DI1120	B29a	NE
High Build Recoatable two-pack, solvent-borne gloss polyurethane	Dulux Weathermax HBR Luxathane HPX	DI1156 DC02059	B29c B29c	NE
Stain sealer, solvent-borne for water soluble stains	Dulux Precision High Opacity Stain Blocker	DD02065	B30	NE
Stain sealer, water based for oil stains	Dulux Precision Maximum Strength Adhesion Primer	DD02066	B30	
Chalk sealer, surface conditioner	Dulux Sealer Binder Dulux Acraprime Solvent Based Primer	DD0074 DA0442	B31	NE
Anti-mould (treatment or wash for timber)	Intergrain Mould Preventer	DW01967	B32	NE
Water-repellent for masonry	Dulux AquaBan	DD0002	B33	NE
Creosote stain	No longer used	N/A	B35	NE
Paint remover, solvent-borne	Selleys Polystrippa Paint Stripper	Poly	B36a	NE
Paint remover, chemical	Selleys Polystrippa Renovators' Choice	Poly	B36b	NE
Bituminous paints	No longer used	N/A	B37	NE
High build membrane or texture coatings for masonry and concrete: exterior	Dulux Acratex Range	Acratex	B38b	AS/NZS 4548.1 AS/NZS 4548.2 AS/NZS 4548.3 AS/NZS 4548.4
Texture finish latex coatings for masonry and plasterboard:	Dulux Effects Range (interior)		B38a	NE

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311P RN (Table 4.2)	Standard
interior only				
Clear or colourless coatings (waterborne) for timber, exterior	Intergrain UltraClear Exterior – Gloss, Satin Note: not suitable for decking.	DW1401 DW1400	B39	NE
Clear coatings (waterborne) for timber, interior	Intergrain Ultraclear Interior - Gloss, Satin (low VOC)	DW0762 DW0761	B39	NE
Clear or colourless coatings (waterborne) for timber, interior floors	Intergrain Enviropro Endure 1 Pack - Matt, Satin, Gloss (low VOC) Intergrain Enviropro Endure 2 Pack - Matt, Satin, Gloss	DW1420 DW1419 DW1418 DW1423 DW1422 DW1421	B39	AS 3730.27
Sanding sealer	Feast Watson Sanding Sealer	DW0744	B40	NE
Semi-gloss latex, interior trim (alt B8b)	Dulux Aquanamel Semi-Gloss (low VOC)	DD1281	B41	NE
Gloss or full gloss latex, interior trim	Dulux Aquanamel Gloss (low VOC)	DD1282	B42	NE
Penetrating tung oil type varnish for timber floors: interior	Feast Watson Floorseal Oil Feast Watson Tung Oil	DW0734 DW0733	B43	NE
Penetrating tung oil type varnish for timber floors: exterior	Intergrain Nature's Timber Oil Feast Watson Traditional Timber Oil	DW0769 DW01795	B43	NE
Gloss pigmented polyurethane	Dulux Luxathane R Dulux Luxathane HPX Dulux Weathermax HBR	DD1137 DC02059DI1156	B44	AS/NZS 3750.6
Powder coatings for non-ferrous metals	Dulux Powder coat Range		B45b	AS 3715
Powder coatings for ferrous metals	Dulux Powder coat Range (www.duluxpowders.com.au)		B45b	AS 4506

Low VOC compliance reference table

Green Star Interiors	VOC Limits MAX g/litre	DULUX Products compared to the GBCA specification	VOC g/litre Untinted

Green Star Interiors	**VOC Limits MAX g/litre**	**DULUX Products compared to the GBCA specification**	**VOC g/litre Untinted**
COMPLIANCE CRITERIA – GBCA specifications (obtain latest figures).			
Walls and ceilings - interior semi-gloss	16	Dulux Professional Enviro2 Interior Semi-Gloss	2
Walls and ceilings - interior semi-gloss	16	Dulux Wash&Wear Semi Gloss Dulux Wash&Wear +Plus Kitchen&Bathroom Semi Gloss	5 5
Walls and ceilings - interior low sheen	16	Dulux Professional Enviro2 Interior Low Sheen	5
Walls and ceilings - interior low sheen	16	Dulux Wash&Wear Low Sheen Dulux Wash&Wear +Plus Kitchen& Bathroom Low Sheen	16 15
Walls and ceilings - interior flat-washable	16	Dulux Professional Enviro2 Interior Flat	1
Ceilings - interior flat	14	Dulux Professional Enviro2 Interior Flat	1
Ceilings - interior flat	14	Dulux White Ceiling Paint	14
Trim - interior gloss	75	Dulux Aquanamel Gloss Dulux Professional Steriguard Water Based Enamel Gloss	74
Trim - interior semi-gloss	75	Dulux Aquanamel Semi Gloss Dulux Professional Steriguard Water Based Enamel Semi Gloss	<74
Timber primer	30	Dulux Professional Enviro2 Acrylic Sealer Undercoat (ASU)	1
Timber primer	30	Dulux Acrylic Sealer Undercoat Dulux Professional Enviro2 Acrylic Sealer Undercoat (ASU)	2 1
Binding primer	30	Dulux Professional EnvirO2 Water Based Sealer Binder	3
Latex primer for galvanized iron and zincalume	60	Dulux Galvanised Iron Primer	< 40
Latex primer for galvanized iron and zincalume	60	Dulux Professional Galvanised Iron Primer	< 60
Interior latex undercoat	65	Dulux Professional Enviro2 Acrylic Sealer	1

Green Star Interiors	VOC Limits MAX g/litre	DULUX Products compared to the GBCA specification	VOC g/litre Untinted
		Undercoat (ASU)	
Interior latex undercoat	65	Dulux Acrylic Sealer Undercoat	45
Exterior latex undercoat	65	Dulux One Step Acrylic Primer Sealer Undercoat (PSU)	<60
Interior sealer	65	Dulux Professional Enviro2 Acrylic Sealer Undercoat (ASU)	1
Interior sealer	65	Dulux Luxafloor Eco2 (clear) Dulux Luxafloor WB (Clear)	10 10
One and two pack performance coatings for floors	140	Dulux Luxafloor Eco2 Dulux Luxafloor WB Intergrain Enviropro Endure One Pack Intergrain Enviropro Endure Two Pack	10 10 <75 <105

3 EXECUTION

3.1 PREPARATION

Standards

General: To AS/NZS 2311 Sections 3.

Order of work

Other trades: Before painting, complete the work of other trades as far as practicable within the area to be painted, except for the installation of fittings, floor sanding and laying flooring materials.

Clear finishes: Complete clear timber finishes before commencing opaque paint finishes in the same area.

Protection

General: Before painting, clean the area and protect it from dust contamination. Use drop sheets and masking agents to protect surfaces, including finished surfaces and adjacent finishes, during painting.

Fixtures and furniture: Remove door furniture, switch plates, light fittings and other fixtures before painting, and conform to the following:

- Labelling and storage: Attach labels or mark fixtures using a non-permanent method, identifying location and refixing instructions, if required. Store and protect against damage.

Difficult to remove fixtures: Where removal is impractical or difficult, apply surface protection before substrate preparation and painting.

Wet paint warning

Notices: Place in a conspicuous location and do not remove until the paint is dry.

Substrate preparation – generally

General: Prepare substrates to receive the painting systems in conformance with AS/NZS 2311 and the paint manufacturer's recommendations.

Cleaning: Clean down the substrate surface. Do not cause damage to the substrate or the surroundings.

Filling: Fill cracks and holes with fillers, sealants, putties or grouting cements as appropriate for the finishing system and substrate, and sand smooth.

- Clear finish: Provide filler tinted to match the substrate.

Clear timber finish systems: Prepare the surface so that its attributes will show through the clear finish without blemishes, using methods including the following:

- Removal of bruises.
- Removal of discolourations, including staining by oil, grease and nailheads.
- Bleaching where necessary to match the timber colour sample.
- Puttying.
- Fine sanding, with the last abrasive no coarser than 220 grit, so that there are no scratches across the grain.

Treated surfaces: If surfaces have been treated with preservatives or fire retardants, make sure coating is compatible with the treatment and does not adversely affect its performance.

Iron and steel: Remove weld spatter, slag, burrs, or any other objectionable surface irregularities and radius all edges to a minimum of 2 mm. Degrease by solvent or alkaline cleaning.

Iron and steel blast cleaning: To AS 1627.9 and to the class specified in the specified protective treatment. Provide a surface roughness or profile appropriate for the specified treatment. Where steelwork to be abrasive cleaned includes irregular shapes allow for special equipment to achieve required abrasive cleaning.

Structural steel: All exposed fixings including bolts, screws and the like, are to be painted to match adjacent steelwork paint system.

Concrete and masonry: Before application to very smooth concrete, brick or masonry, either acid etch, mechanically grind or abrasive track blast the surface as appropriate to provide a suitable key for the subsequently applied coating and to remove laitance. Remove loose friable matter before filling surface discontinuities.

Set plaster surfaces: Do not apply solvent borne paint or other impervious coatings if the moisture content at the surface, tested with a moisture meter, exceeds 12%.

3.2 PAINTING

Standard

General: To AS/NZS 2311 Section 6.

Light levels

General: During preparation of surfaces, painting and inspection, maintain light levels such that the luminance (photometric brightness) of the surface is equal to the specified permanent artificial illumination conditions or 400 lux, whichever is the greater.

Substrate moisture content

Requirement: Use a moisture meter to demonstrate that the moisture content of the substrate is at or below the recommended maximum level for the type of paint and the substrate material.

Paint application

General: Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur. Apply subsequent coats after the manufacturer's recommended drying period has elapsed.

Painting conditions

General: Unless the paint is recommended for such conditions, do not paint under the following conditions:

- Dusty conditions.
- Relative humidity: > 85%.
- Surface temperature: < 10°C or > 35°C.

Priming before fixing

General: Apply one coat of wood primer, and 2 coats to end grain, to the back of the following before fixing in position:

- External fascia boards.
- Timber door and window frames.
- Bottoms of external doors.
- Associated trims and glazing beads.

- Timber board cladding.

Spraying

General: If the paint application is by spraying, use conventional or airless equipment which conforms to the following:

- Satisfactorily atomises paint being applied.
- Does not require paint to be thinned beyond the maximum amount recommended by the manufacturer.
- Does not introduce oil, water or other contaminants into the applied paint.

Paint with known health hazards: Provide personal protection, masking, ventilating and screening facilities to AS/NZS 4114.1 and AS/NZS 4114.2.

Sanding

Clear finishes: Sand the sealer using abrasives no coarser than 320 grit without cutting through the colour. Take special care with round surfaces and edges.

Repair

Requirement: Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition.

Maintenance painting: To AS/NZS 2311 Section 8.

Repair of galvanizing

Cleaning: For galvanized surfaces which have been subsequently welded, power tool grind to remove all surface contaminants, including rust and weld splatter. Prime affected area immediately after cleaning.

Primer: Type 2 organic zinc-rich coating for the protection of steel to AS/NZS 3750.9.

Tinting

General: Tint each coat of an opaque coating system so that each has a noticeably different tint from the preceding coat where possible, except for top coats in systems with more than one top coat.

Services

General: Paint all new services and equipment, including those in plant rooms, if not embedded, except chromium, anodised aluminium, GRP, PVC-U, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces.

Proprietary items: Repaint only if damaged.

Windows

Operation: Make sure opening windows function correctly before and after painting.

Doors

Drying: Maintain door leaf in the open position during drying. Do not allow door hardware or accessories to damage the door finish during the drying process.

Exclusions

Exclude the following surfaces from paint systems (unless specifically requested):

- Flexible duct connections, rubber hoses and mountings and other non metallic flexible fittings.
- Wire rope and machined surfaces.
- Metals plated or specially finished for appearance, bronze, brass, copper and stainless steel (except as specified in the *Pipe identification* clause of the *Services* worksections).
- Aluminium frames.
- Prefinished aluminium frames to windows and doors, and trim.
- Metal floor duct covers.
- Raised access floors.
- Floors.
- Fair faced brickwork, blockwork, stonework, artificial stone and exposed aggregates.
- Sprayed vermiculite.
- Floors, paving, roads unless otherwise specified.
- Timber roof structure.
- Concealed timber roof structure.

- Timber ceiling and eaves lining.
- Exterior timber sheeting.
- Exterior timber stairs and decking.
- Plastic finishes generally
- Inside of service ducts, heat exchangers, pipes and valves.
- Shower seats, store shelving, work benches.
- Those parts of timber fixtures, such as insides of cupboards, not visible when doors are closed, unless otherwise specified. Insides of bathroom cabinets are not excluded and shall be painted.
- Self finished surface such as glass and plastic laminates.
- Door hardware, including hinges.

3.3 COMPLETION

General

Protection and masking: Remove masking and protection coverings before paint has dried.

Cleaning: On completion of painting, remove splatters by washing, scraping or other methods which do not scratch or damage adjacent finished surfaces.

Reinstatement: Repair, replace or refinish any damage, including works of other trades. Touch up new damaged decorative paintwork or misses only with the paint batch used in the original application.

Removed fixtures: Refix undamaged fixture in the original location, make sure they are properly fitted and in proper working order.

Disposal of paint and waste materials.

Requirement: Conform to requirements of the local government authority.

4 SELECTIONS

4.1 PAINTING SCHEDULES GENERALLY

Reference

Refer to Schedules of External and Internal Selections for all applied paint finish selections and Duspec specifications.

Paint system schedules

Requirement: Apply paint systems as documented in the **Interior painting schedule** and the **Exterior painting schedule**.

General: Apply the paint system nominated for each substrate to the referenced manufacturer's Product Data Sheets (PDS) and Spec Sheets and include:

- The number and order of coats.
- The paint type for each coat.

Additional coats: Apply if necessary to:

- prepare porous or reactive substrates with prime or seal coats consistent with the manufacturer's recommendations;
- achieve the total film thickness or texture specified; or
- achieve a satisfactory opacity, in the specified or required colour.

Painting systems

Standards: The scheduled DuluxGroup/Dulux paint systems override AS/NZS 2311 as follows:

- New unpainted interior surfaces: To AS/NZS 2311 Table 5.1.
- New unpainted exterior surfaces: To AS/NZS 2311 Table 5.2.
- Standard: To AS/NZS 2311 clause 5.2. Provide the following final coats:
  - . High build textured or membrane finishes for concrete and masonry: B38 using products conforming to the AS 4548 series.
  - . Two-pack gloss pigmented polyurethane: B44.
  - . Two-pack epoxy: B29.

. Two-pack water based epoxy: B29A.

Paint Reference Number (PRN): The number in brackets against the individual product refers to the Paint Ref. No. (PRN) listed in the **DuluxGroup/Dulux paint type reference table** (See **PRODUCTS**) and AS/NZS 2311 Appendix D.