Specifications

Prepared for
Defence Housing Australia
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DHA
Defence Housing Australia

0171 GENERAL REQUIREMENTS

1 GENERAL

1.1 STANDARDS

Use referenced Australian or other standards (including amendments), and the BCA, including state and territory variations, as in force at the time of the application for the construction certificate, except where other editions or amendments are required by statutory authorities or regulations. Any local authority requirements take precedence.

1.2 RESPONSIBILITIES

This specification is to be read with the Principal's Contract and the documents listed in within the contract.

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

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

Certification and compliance: The Contractor is responsible for obtaining all relevant certification where requested in individual worksections or the ITCPs. The Contractor is required to comply with all statutory requirements in the relevant state or territory to deliver the project complete, fit for purpose, and fully compliant.

Items to be designed by the contractor include the following;

- Mechanical services (including air-conditioning) and installation.
- Hydraulic services and installation.
- Electrical services (including lighting) and installation.
- Structural support systems and installation.

1.3 INTERPRETATION

For the purposes of this specification the following abbreviations apply:

- AS: Australian Standard.
- BCA: National Construction Code Series Volume Two: Building Code of Australia Class 1 and Class 10 Buildings.
- NATA: National Association of Testing Authorities.
- NCC: National Construction Code.
- NZS: New Zealand Standard.
- PCA: National Construction Code Series Volume 3: Plumbing Code of Australia.
- SDS: Safety data sheets.
- VOC: Volatile Organic Compound.
- WHS: Work Health and Safety.

For the purposes of this document the definitions given below apply:

- Owner: Has the same meaning as client, principal or proprietor and is the party to whom the Contractor is legally bound to construct the works.

- Contract administrator: Has the same meaning Superintendent and is the person appointed by the Owner or Principal under the contract.
- Contractor: Means the same as builder.
- Contract Documents: Drawings and other documents provided by the Principal, or the contractor provided drawings and other documents issued as part of the tender process.
- 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 BCA.
- Proprietary: A product, system or process identifiable by naming manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Provide: Provide and similar expressions, mean supply and install and include development of the design beyond that documented.
- Registered testing authority:
  . An organisation registered by the National Association of Testing Authorities (NATA) to test in the relevant field; or
  . An organisation outside of Australia registered by an authority recognised by NATA through a mutual recognition agreement; or
  . An organisation recognised as being a Registered Testing Authority under legislation at the time the test was undertaken.
- Required: Means required by the contract documents, the local council or statutory authorities.
- Sample: A physical example that illustrates workmanship, materials or equipment, and establishes standards by which the work will be judged. It includes samples, prototypes and sample panels.
- Statutory Authority: A public sector entity created by legislation, that is, a specific law of the Commonwealth, State or Territory.
- 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.

1.4 PRECEDENCE

Requirements for precedence of worksections and referenced documents is in accordance with the Principal/ Contractor Contract.

1.5 INSPECTION

Conduct all testing and inspections as detailed in the relevant Inspection Test and Conformity Plan (ITCP).

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

Minimum notice for inspections to be made: 48 hours.

Light level requirements: To AS/NZS 1680.2.4.

Provide attendance for documented inspections and tests.

1.6 SUBMISSIONS

Submit to the Superintendent.

Make submissions at least 10 working days before ordering products for, or starting installation of, the respective portion of the works.

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

- Shop drawings: 10 working days.
- Samples and prototypes: 10 working days.
- Manufacturers' or suppliers' recommendations: 10 working days.
- Product data: 10 working days.
- Product/design substitution or modification: 10 working days.

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

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

Submissions - electronic copies:

- File format: pdf.
- Transmission medium: email.

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.

Submit documents showing approval by the authorities whose requirements apply to the work.

Submit copies of correspondence and notes of meetings with authorities whose requirements apply to the work.

1.7 MATERIALS AND COMPONENTS

Wherever possible, source products, materials, components and equipment from Australian manufacturers/ suppliers which are locally produced, manufactured and fabricated in Australia.

Where products, materials, components and equipment are sourced from outside Australia, provide datasheets that show details of performance and testing to internationally recognised standards (ISO, BS, EN, ASTM, etc), for acceptance by the Superintendent, prior to use.

For proprietary materials, components and equipment, submit the manufacturer's product data as follows:

- Technical specifications and drawings.
- Type-test reports certified by a registered testing authority.
- Performance and rating tables.
- Recommendations for installation and maintenance.

1.8 SUBSTITUTIONS

Identification of a proprietary item does not necessarily imply exclusive preference for the item so identified, but indicates the necessary properties of the item.

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 standard.
- Samples.
- Essential technical information, in English.
- Reasons for the proposed substitutions.
- Statement of the extent of revisions to the item and/ or location.
- 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.

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

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

Pay the cost of submissions and of evaluations and tests of proposed alternatives, whether subsequently adopted or not. The costs will be calculated at the current charge-out rates of the relevant Principal's representative or consultant(s).

1.9 SAMPLES

A sample is defined herein as a physical example that illustrates products, workmanship, materials and finishes, or equipment, and establish standards by which the work will be judged.

Where samples are required to be submitted in the Specification, provide a minimum of 3 samples of each requested finish or sufficient to show the finish range of the sample.

The Superintendent shall arrange for review of the samples by the required Principal's representative or consultant. When the sample is deemed satisfactory, written acceptance will be provided by the Superintendent before it will be tagged as 'approved'. Where the Superintendent rejects the sample, an alternative must be re-submitted promptly. Until the sample is 'approved' the item or material cannot be used in the work.

One set of approved samples shall be kept on site for comparison with the installed works, until the date of practical completion.

Provide a Samples Schedule in accordance with the schedules in section 4, for agreement with the Superintendent, prior to commencement of work. The Samples Schedule shall be revised and resubmitted as necessary.

The Contractor must allow for sufficient time in the program for samples to be reviewed, acknowledging that the steps outlined above may require more than one iterative process. Delays to the program resulting from this process will be at the risk of the Contractor.

1.10 SHOP DRAWINGS

Include dimensioned drawings showing details of the fabrication, assembly, installation, fixing and waterproofing methods of specific structural elements, building components, services and

equipment, including relationship to building structure and other services, cable type and size and marking details. These shall include necessary explanatory notes and specifications.

Do not stockpile, manufacture, assemble or supply anything depicted in the shop drawings until acceptance has been obtained. The Principal's Representative may examine shop drawings to indicate general or design approval, amendments, corrections and the like, but their comments shall not constitute an instruction under the contract, unless expressly stated.

Acceptance of shop drawings shall in no way relieve the Contractor of their obligation to construct and complete the works correctly and accurately.

Delays caused by late or incomplete submission of shop drawings will not be recognised as a reason for a contract sum adjustment or an extension of time.

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

Submission medium: pdf via email.

Drawing size: As required to adequately convey all necessary information.

Make sure that the drawings have been checked before submission.

Submit detailed drawings showing clearly all relevant information, and are to include dimensions 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. The drawings will also show the assembly of the elements to demonstrate that the design intent and Principals requirements has been achieved.

The Contractor must allow for sufficient time in the program to allow for shop drawings to be reviewed, acknowledging that the steps outlined above may require more than one iterative process. Delays to the program resulting from the review process will be at the risk of the Contractor.

1.11 WARRANTIES

If a warranty is documented or if a manufacturer's standard warranty extends beyond the end of the defects liability period, name the owner as warrantee.

Register with manufacturers as necessary.

Retain copies delivered with components and equipment.

Commence warranty periods at practical completion or at acceptance of installation, if acceptance is not concurrent with practical completion.

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.

Refer to the warranty schedule for specific warranty periods.

1.12 OWNER'S MANUAL

Provide an Owner's Manual which shall include, but not be limited to, the following:

- Schedules of all colours, finishes, fixtures, fittings, equipment and appliances, including manufacturer and/ or supplier details.
- Operation and maintenance instructions for all appliances and equipment.

- All applicable warranties.

All documents associated with the Owner's Manual shall be incorporated into a ring binder and suitably organised using durable dividers and clear plastic sleeves, as necessary.

1.13 RECORD DRAWINGS

On completion, provide record drawings showing the work as finally fabricated and installed.

Record drawings shall be issued in the following format:

- Three hard copies.

- Electronic file in pdf format.

Sign and date all record drawings.

If errors in, or omissions from, the record drawings are found, amend the drawings and reissue.

Date for submission: Not later than 2 weeks after the date for practical completion.

1.14 MANUFACTURER'S INSTRUCTIONS

Where proprietary products, systems or items are specified, ensure that the method of installing, handling, storing, protecting, finishing and preparation of substrates, etc, is strictly in accordance with the manufacturer's instructions and recommendations.

1.15 BUSHFIRE PROTECTION

Bushfire Attack Level (BAL) to AS 3959 and the BCA.

1.16 WIND LOADS

To AS 4055 or AS/NZS 1170.2, as required.

1.17 DILAPIDATION REPORT

Submit a dilapidation report for the following:

- All areas, adjacent to or within the Site that may be affected by the work, including but not limited to trees, nature strips, kerbs and channels, traffic/ parking signs and the like.
- Buildings or any built works that are either near, adjacent to or within the Site and which may be affected by work activities including, but not limited to, structures, landscaping, pavements, services, fences and the like.
- Services including but not limited to electricity, phone/ cable systems, water and gas supply, drainage and stormwater lines, services pits and the like.

The report shall include detailed records, comprising drawings, written descriptions, and photographs, of conditions existing within the site and adjoining properties, paying particular attention to structural defects and other damage or defacement.

Arrange for at least 3 copies of each record to be endorsed by the owners, or their representatives, as evidence of conditions existing before commencement of work.

Submit 2 endorsed copies of each record and keep the other endorsed copy on site.

Submit to the owner of each adjacent property a copy of the part of the record relating to that property and obtain their written agreement to the contents of the record, before commencement of work.

On completion of work, inspect the site and adjacent properties with the owners and occupants of the properties, recording any damage that occurred during the work.

1.18 ENERGY EFFICIENCY

Minimum 6 star Energy Efficiency Rating (HER) as certified by an independent accredited assessor, using AccuRate (NatHERS replacement) or other equivalent method (e.g. state systems such as BERS Pro and BASIX), or where permitted, NCC Performance Requirements.

2 PRODUCTS

2.1 GENERAL

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

Proprietary items/systems/assemblies: Assemble, install or fix to substrate in accordance with the current written recommendations and instructions of the manufacturer or supplier.

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

2.2 TIMBER

All new timber shall be forest certified to either:

- AS 4708 offered by the Australian Forest Certification Scheme.
- The Forest Stewardship Council Scheme.

Provide timber labelled with either of the following:

- AFS/PEFC (Australian Forestry Standard/ Program for the Endorsement of Forest Certification Schemes).
- Woodmark and SmartWood as accredited by the Forest Stewardship Council.

Chain of Custody shall be to either:

- AFS Certification: To AS 4707.
- FSC certification: To FSC requirements.

Make milled products from timbers seasoned:

- To within 3% of the equilibrium moisture content appropriate to the timber and its intended conditions of use.
- With no more than 3% difference between any two pieces in any one group.

Acclimatise timber by stacking them for two weeks in the in-service conditions with air circulation to all surfaces after the following construction operations are complete:

- Air conditioning operational.
- Lighting operational.
- Site drainage and stormwater works are complete.
- Space fully enclosed and secure.
- Wet work complete and dry.

If unseasoned timber is provided, or variation in moisture content is likely, make allowance for shrinkage, swelling and differential movement.

Where recycled timber is used, it shall be grit blasted or re-machined with all nails and screws removed and visually graded to AS 2082 (Hardwood) or AS 2858 (Softwood).

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

- Natural durability class of heartwood: To AS 5604.
- Preservative treatment: To the AS 1604 series.

Where preservative treated timber is used, provide supplementary preservative treatment to all cut and damaged surfaces.

CCA treated timber: If proposed to be used, provide details.

Do not provide timbers containing Lyctus susceptible sapwood.

Hardwood timber: To AS 2796.1. Grade description to AS 2796.2.

Softwood timber: To AS 4785.1. Grade description to AS 4785.2.

Seasoned cypress pine: To AS 1810.

2.3 COMPOSITE WOOD PRODUCTS

Plywood

- Interior use generally: To AS/NZS 2270.
- Interior use, exposed to moisture, and external use: To AS/NZS 2271.
- Marine grade: To AS/NZS 2272.
- Structural plywood: To AS/NZS 2269.0

Non-structural glued laminated timber: AS 5067.

Wet processed fibreboard (including hardboard): To AS/NZS 1859.4.

Particleboard: To AS/NZS 1859.1.

Dry processed fibreboard (including medium density fibreboard): To AS/NZS 1859.2.

Decorative overlaid wood panels: To AS/NZS 1859.3.

Formaldehyde emissions:

- Plywood: Certified formaldehyde emission level tested to AS/NZS 2098.11 method 11: <1.0mg/L.
- Particleboard: Certified formaldehyde emission level tested to AS/NZS 4266.16 method 16: <1.5mg/L.
- MDF: Certified formaldehyde emission level tested to AS/NZS 4266.16 method 16: <1.0mg/L.

2.4 STEEL

Provide steel products protected from corrosion to suit the conditions of use.

The atmospheric corrosivity category for the site shall be determined in accordance with AS/NZS 2312.1.

Built-in products below damp proof course: Stainless steel 316 or engineered polymer.

Corrosion resistance table

Atmospheric corrosivity category to AS/NZS 2312	**Heavy steel members including lintels more than 3.2 mm thick**	**Steel cladding, lining, trims and flashings**
C1 and C2 (Low)	Galvanize after fabrication 600g/m^2	Metallic-coated sheet AZ150
C3 (Medium)	Galvanize after fabrication 600g/m^2	Metallic-coated sheet AZ200
C4 and C5 (High)	Stainless steel 316 or 316L or galvanize after fabrication	Metallic-coated sheet AZ200 plus organic coating

Atmospheric corrosivity category to AS/NZS 2312	Heavy steel members including lintels more than 3.2 mm thick	Steel cladding, lining, trims and flashings
	600g/m^2 plus organic coating	

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

- Exposed to weather and not otherwise nominated to be painted.
- Embedded in masonry.
- Exposed to or in air spaces behind external leaves of masonry walls.
- In contact with chemically treated timber.

2.5 PROTECTIVE COATINGS

Environment: To AS/NZS 2312 clause 2.3.

Coating designation: To AS/NZS 2312 Table 6.3.

Before placing bolts or other metal components in contact with CCA-treated timber, paint contact surfaces or coat in grease or a bituminous coating.

Do not fix steel framing in contact with unseasoned timber without fully painting the contact surfaces of timber and steel.

2.6 TOUGHENED GLASS

Toughened glass, wherever used, shall be heat soak tested in accordance with EN 14179-1 or to other recognised industry standards or practices.

2.7 FASTENERS

Masonry anchors: To be proprietary expansion or chemical types.

Plain washers: To AS 1237.1.

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

Plugs: To be proprietary purpose-made plastic.

Powder-actuated fasteners: To AS/NZS 1873.4.

Steel nails: To AS 2334. Length shall be 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 10mm thick.

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

Coach bolts: To AS/NZS 1390.

Hexagon bolts Grades A and B: To AS 1110.1.

Hexagon bolts Grade C: To AS 1111.1.

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 and AS/NZS 1421.

Machine screws: To AS/NZS 1427.

Self-drilling screws: To AS 3566.1 and AS 3566.2.

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.

Washers and screw cups shall be of the same material as the screw.

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.

Packings, where used, shall be concealed in the finished work.

Electroplating coatings to threaded fasteners (metric): To AS 1897 (Metric) or AS 4397 (Imperial).

3 EXECUTION

3.1 FIXING

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

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

3.2 REPAIRS TO EXISTING

Where there is a requirement for an existing building element, substrate, surface or finish to be repaired, do so to the acceptance of the Superintendent.

Should an existing building element be found to be defective and in need of repair and has not been described as such in the documents, alert the Superintendent and await further instruction.

In all instances of 'repairs to existing', agree the extent and level of quality that is required to be achieved, with the Superintendent, prior to commencement.

3.3 MAKING GOOD

Where existing building elements have been cut away, damaged or received any other detrimental effect as a result of undertaking work, these shall be made good to the acceptance of the Superintendent.

3.4 COMPLETION

Remove temporary work services and construction plant within 10 working days after occupation of the works.

Remove rubbish and surplus material from the site and clean the works throughout including interior and exterior surfaces exposed to view. Vacuum clean carpeted and soft surfaces. Clean debris from the site, roofs, gutters, downpipes and drainage systems.

Remove non-incorporated samples.

Register with manufacturers, as necessary, and provide copies of manufacturers' warranties.

Provide all manufacturers' instruction manuals.

Ensure moving parts operate safely and smoothly.

Provide a certificate which confirms that all structures, including boundary fences, have been correctly located.

Provide a plan which shows the location of underground services.

Provide evidence of approval of the local authority or principal accredited certifier and statutory authorities whose requirements apply to the work.

4 SCHEDULES

4.1 WARRANTY SCHEDULE

The following warranties shall be provided, as a minimum:

Item	**Warranty Period**
Cladding – AAC panel	7 years
Cladding – Fibre cement sheet	10 years
Cladding – Sheet metal	As offered by the manufacturer
Doors	5 years
Door Hardware	5 years
Joiney	10 years
Overhead doors - curtain	7 years
Overhead doors - operator	2 years
Painting generally	7 years
Powder coatings	15 years
Protective coatings to steel	15 years
Roofing – metal rainwater goods	10 years
Roofing – metal roofing	As offered by the manufacturer

Roofing – roof tiles	50 years
Roofing – polycarbonate roofing	10 years
Termite protection	10 years
Window coverings	2 years
Tiles	As offered by the manufacturer
Carpet	5 years
Waterproofing - External membrane systems	20 years
Waterproofing - Internal membrane systems	10 years
Window and glazed door systems	10 years
Insulation generally	10 years

4.2 INSPECTION, TEST AND CONFORMITY PLAN SCHEDULE

The following ITCPs, provided in the Appendix, shall be complied with:

ITCP
Brickwork
Concrete
Painting
Tiling
Waterproofing

4.3 SAMPLE AND SUBMISSION SCHEDULE

The following samples and submissions shall be provided, as a minimum and in accordance with the detailed requirements in each individual worksection and the ITCPs.

The following table sets out the key points at which the Contractor is required to present design documentation and samples for review and approval by the Principal. Where logical, these are to be incorporated within the relevant Site Inspection points. The Contractor is to incorporate the hold points below into the Contract Program.

In reviewing drawings, samples or other documents, the Principal does not relieve the Contractor of the Contractor's responsibility for dimensions, quantities, calculations or performance. Nor does a review imply that all relevant information is necessarily shown. The purpose of the reviews is limited to enabling the Principal to assess whether the detailed design meets the design intent and project requirements.

Item	**Type**

Landscaping: Turf, mulch and soils	Sample
Paving: All paving types	Sample
Concrete: Off form and worked concrete finishes	Sample
Masonry: All masonry types including mortar, sealants and accessories	Sample
Cladding: All cladding types	Sample
Joinery: Typical panels, finishes, benchtop, skirting, edge details and hardware	Sample
Rendering: All render types	Sample
Tiling: All tiles to be selected including grout and silicone	Sample
Carpets: All carpets to be selected including underlay	Sample
Painting: All typical paint colours and finishes	Sample
Powder coating: All typical powder coating colours and finishes	Sample
Light steel and timber framing	Shop Drawing
Windows and glazed doors	Shop Drawing
All bathroom layouts including plan and elevations	Shop Drawing
All kitchen layouts including plan and elevations	Shop Drawing
Work as executed services drawings	Record Drawing
Operating and maintenance manuals	Manual
Slip resistance type testing for all floor tiling	Test

0184 TERMITE MANAGEMENT

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- The soil classification, for the site, shall be determined through on site soil testing.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171 General requirements.*
- *0222 Earthwork.*
- *0310 Concrete.*
- *0331 Masonry construction.*
- *0382 Light timber framing.*
- *0383 Structural sheet flooring.*

1.3 STANDARDS

Termite management to new buildings: To AS 3660.1.

Termite management in and around existing buildings and structures: To AS 3660.2.

1.4 WARRANTIES

Prior to Practical Completion a written warranty shall be submitted for the following:

- Termite protection system:
  - . Period: 10 years.
  - . Type: Renewable.

1.5 SUBMISSIONS

Termite management system: Submit installation certificate to AS 3660.1 Appendix A.

Woven stainless steel management systems: Submit certification that stainless steel type 725 has been used to the manufacturer's recommendation.

Site tests: Submit a Registered testing authority laboratory analysis certificate.

1.6 INSPECTION

Notice
Inspection: Give sufficient notice so that inspection may be made of the completed termite management system.

2 SELECTIONS

2.1 CHEMICALLY IMPREGNATED SHEET BARRIER

To AS 3660.1 Section 4.

Physical and chemical termite protection system installed at perimeters and penetrations of concrete slabs.

Product: Kordon TB or acceptable equivalent.

2.2 WOVEN STAINLESS STEEL MESH

To AS 3660.1 Section 6.

Marine grade stainless steel woven mesh.

Product: Termimesh Stainless Steel Termite Control Barrier or acceptable equivalent.

2.3 GRANULAR MATERIALS

To AS 3660.1 Section 6.

Natural, non-toxic, graded stone material forming a physical termite barrier.

Product: Granitgard Termite Management System or acceptable equivalent.

2.4 TERMITE CAP AND STRIP SHIELDS

To AS 3660.1 Section 5.

3 EXECUTION

3.1 TERMITE MANAGEMENT SYSTEM NOTICE

Provide a durable notice, permanently fixed in a prominent location, to BCA 3.1.3.2(b) and AS 3660.1.

3.2 WASTE MATERIALS

Make sure no waste materials, which could attract termites, remain on the site.

3.3 CERTIFICATE OF INSTALLATION

To AS 3660.1 Appendix A.

3.4 COMPLETION INSPECTION

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

0201 DEMOLITION

1 GENERAL

1.1 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0221 Site preparation.*

1.2 STANDARDS

Demolition of structures: To AS 2601.

1.3 SUBMISSIONS

Hazardous materials

Audit: Prepare and submit a hazardous substances management plan to AS 2601 clause 1.6. 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.

Off-site disposal

Disposal location: Submit the locations and evidence of conformance with the relevant authorities for the disposal of material required to be removed from the site.

Records

Dilapidation record: Submit a copy of the dilapidation record for inspection. Submit to each owner of each adjacent property a copy of the part of the record relating to that property and obtain their written agreement to the contents of the record, before commencement of demolition.

Recycling

Delivery location: Submit the name and address of the proposed recycling facility.

Certification: Provide evidence of delivery to the nominated recycling facility.

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.

1.4 INSPECTION

Notice

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

- Adjacent structures before commencement of demolition.
- Services before disconnection or diversion.
- Trees to be retained, before commencement of demolition.
- Contents of building before commencement of demolition.

- Structure after stripping and removal of roof coverings and external cladding.
- Underground structures after demolition above them.
- Excavations remaining after removal of underground work.
- Site after removal of demolished materials.
- Services after reconnection or diversion.

2 PRODUCTS

2.1 DEMOLISHED MATERIALS

Except for items nominated to be recovered for re-use in the works, or delivered to the owner and materials to be recycled in the works, take possession of demolished materials and remove them from the site. Do not burn or bury demolished materials on the site. Prevent spillage of demolished materials in transit.

Where possible, dismantle building components for off-site recycling.

3 EXECUTION

3.1 TEMPORARY SUPPORT

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

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

3.2 PROTECTION

Provide protection to all items which are to remain on the site during the works.

Prevent the encroachment of demolished materials onto adjoining properties, including public places.

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

Before commencing demolition, locate and mark existing underground services in the areas which will be affected by the demolition operations. Contact DIAL BEFORE YOU DIG to identify location of underground utility services pipes and cables. Do not excavate by machine within 1 m of existing underground services.

3.3 DEMOLITION – BUILDING SERVICES

Decommission, isolate, demolish and remove from the site all existing redundant equipment including associated components that become redundant as a result of the demolition. Disassemble or cut up equipment where necessary to allow removal.

Recover all components associated with the items to be reused. Minimise damage during removal and deliver to the locations agreed.

Clean components to be re-used and test for compliance with current Australian Standards before returning to service. Provide results of compliance tests.

3.4 HAZARDOUS MATERIALS REMOVAL

To AS 2601 clause 1.6.2.

Refer to the NOHSC 2002 Code of Practice for the Safe Removal of Asbestos.

Examine the site and items to be demolished and determine the nature and extent of any hazardous materials required to be removed. Handle and dispose of them in a safe manner.

Where a Hazardous Materials Report has been provided, the Contractor shall satisfy itself that the report is complete and correct.

3.5 NOTICE OF COMPLETION

Give at least 7 working days notice of completion of demolition so that adjacent structures may be inspected following completion of demolition.

Make good any damage arising out of demolition work. Obtain written acceptance from the owner of each adjoining property of completeness and standard of making good.

0221 SITE PREPARATION

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The soil classification, for the site, shall be determined through on site soil testing.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.

1.3 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 CONTROL AND PROTECTION

Plan and carry out the work so as to avoid erosion, contamination, and sedimentation of the site, surrounding areas, and drainage systems.

Ensure that wash out does not enter waterways or stormwater drains and that there are no cross connections between the stormwater and the public sewerage system.

Keep earthworks free of water. Provide and maintain slopes, crowns and drains on excavations and embankments to ensure free drainage. Place construction, including fill, masonry, concrete and services, on ground from which free water has been removed. Prevent water flow over freshly laid work.

2.2 TREE PROTECTION

Retain and protect all trees not marked for removal.

Tree protection zone: To AS 4970 Section 3.

Tree protective measures: To AS 4970 Section 4.

Keep the area within the dripline free of sheds and paths, construction material and debris.

Do not remove topsoil from, or add topsoil to, the area within the dripline of the trees.

Use hand methods to locate, expose and cleanly remove the roots on the line of excavation.

Where necessary, provide fences or safety barriers for tree protection.

2.3 SITE CLEARING

Clear only areas to be occupied by works such as structures, paving, excavation, regrading and landscaping or other areas designated to be cleared.

Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable matter and organic debris, scrub, trees, timber, stumps, boulders and rubble, unless noted to be retained.

Remove turf to a depth just sufficient to include the root zone.

Grub out stumps and roots over 75mm diameter, to a minimum depth of 500mm below subgrade under buildings, embankments or paving, and 300 mm below the 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.

Remove cleared and grubbed material from the site and dispose of legally.

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.

Continually remove unwanted stripped soil and other material from the site as the work proceeds, including any material dropped on footpaths or roadways.

0222 EARTHWORK

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- The soil classification, for the site, shall be determined through on site soil testing.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0221 Site preparation.*
- *0223 Service trenching.*
- *Structural Engineer's documentation.*

1.3 STANDARDS

Earthworks: To the recommendations of AS 3798.

1.4 INTERPRETATION

For the purposes of this worksection the following definitions apply:

- Site classification: To AS 2870 and BCA 3.2.4.
- Bad ground: Ground unsuitable for the purposes of the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground which is, or becomes, soft, wet or unstable.
- Rock: Monolithic material, with volume greater than 0.5m^3, which cannot be removed until broken up by rippers or percussion tools.
- Subgrade: The trimmed or prepared portion of the formation on which the pavement, footing or slab is constructed. Generally taken to relate to the upper line of the formation.
- Zone of influence: A foundation zone bounded by planes extending downward and outward from the bottom edge of a footing, slab or pavement and defining the extent of foundation material having influence on the stability or support of the footings, slab or pavement.

1.5 TOLERANCES

Finish the surface to the required level, grade and shape within the following tolerances:

- Under building slabs and load bearing elements: + 0, - 25 mm.
- Pavement subgrades: + 0, - 40 mm.
- Batters: No steeper than the slope shown on the drawings. Make sure flatter slopes do not impact on boundaries or required clearances to buildings, pavements or landscaping.
- Other ground surfaces: ± 50 mm, provided the area remains free draining and matches adjacent construction where required. Provide smoothness as normally produced by a scraper blade.

1.6 INSPECTION

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

- Items to be measured as listed in **RECORDS OF MEASUREMENT**.
- Areas to be cleared and/or stripped of topsoil.

- Areas stripped of topsoil.
- Excavation completed to contract levels or founding material.
- Proof roll subgrade before placing fill.
- Filling completed to contract levels.
- Stockpiled topsoil before spreading.

2 PRODUCTS

2.1 FILL MATERIALS

To AS 3798 clause 4.4 including inorganic, non-perishable material suitably graded and capable of compaction to the documented density.

Do not use unsuitable material for fill in conformance with AS 3798 clause 4.3.

Do not stockpile excavated material against tree trunks, buildings, fences or obstruct the free flow of water along gutters where stockpiling is permitted along the line of the trench excavation. If stockpiling is not permitted under the contract, dispose of excavated material off-site to AS 3798 clause 6.1.8.

3 EXECUTION

3.1 GEOTECHNICAL

If the following are encountered, give notice immediately and obtain instructions before carrying out any further work in the affected area:

- Bad ground.
- Rock.

3.2 RECORDS OF MEASUREMENT

Excavation and backfilling

Agreed quantities: If a schedule of rates applies, provisional quantities are specified, or there are variations to the contract levels or dimensions of excavations, do not commence backfilling or place permanent works in the excavation until the following have been agreed and recorded:

- Depths of excavations related to the datum including piering depths.
- Final plan dimensions of excavations.
- Quantities of excavations in rock.

Method of measurement: By registered surveyor unless otherwise agreed.

Rock

Level and class: If rock is measured for payment purposes, whether as extra over excavation of material other than rock or for adjustment of provisional measurements, do not remove the rock until the commencing levels and the classes of rock have been determined.

3.3 REMOVAL OF TOPSOIL

Remove topsoil from areas of cut or fill and areas occupied by structures, pavements and embankments.

Stockpile site topsoil intended for re-use and imported topsoil where necessary.

Establish stockpiles to maximum height of 1.5m.

Protect the topsoil stockpiles from contamination by other excavated material, weeds and building debris.

3.4 EXCAVATION

Excavate over the site to give correct levels and profiles required as the basis for structures, paving and landscaping. Allow for compaction, settlement or heaving.

Excavate for footings to the required sizes and depths. Confirm that the foundation conditions meet the design bearing capacity.

Provide a clear space under timber or steel bearers, minimum 400mm.

Do not use explosives.

If excavation is required within the zone of influence of an existing footing, use methods including (temporary) shoring and underpinning which maintain the support of the footing and ensure that the structure and finishes supported by the footing are not damaged.

Contact DIAL BEFORE YOU DIG to identify the location of underground utility services pipes and cables.

Provide even plane bearing surfaces for loadbearing elements including footings. Step to accommodate level changes. Make the steps to the appropriate courses if supporting masonry.

If excavation exceeds the required depth, or deteriorates, reinstate with fill to the correct depth, level and bearing value.

Grade to give falls away from buildings, minimum 1:100.

Consult the Geotechnical Engineer before forming vertical cuts in rock.

Grade the ground surface under suspended floors to drain ground or surface water away from buildings without ponding.

3.5 PREPARATION FOR FILLING

Prepare the ground surface before placing fill (including topsoil fill), ground slabs or load bearing elements to AS 3798 clause 6.1.5. Remove materials which will inhibit or prevent satisfactory placement of fill layers, loose material, debris and organic matter.

3.6 PLACING FILL

Placement: To BCA 3.2.2.

Place fill in near-horizontal layers of uniform thickness no greater than 150 mm after compaction, deposited systematically across the fill area.

Place and compact fill in layers simultaneously on both sides of structures, culverts and pipelines to avoid differential loading.

Adjust the moisture content of fill during compaction within the range of 85% to 115% of the optimum moisture content determined by AS 1289.5.1.1 or AS 1289.5.2.1 as appropriate, in order to achieve the required density.

Compact the subgrade and each layer of fill to the required depth and density, as a systematic construction operation. Shape surfaces to provide drainage and prevent ponding.

Unless nominated otherwise, soil compaction shall comply with the following:

Location	**Cohesive soils. Minimum dry density ratio (standard compaction) to AS 1289.5.4.1**	**Cohesionless soils. Minimum density index to AS 1289.5.6.1**
Residential: Lot fill, house sites.	95	70
Pavements: Fill to support pavements Subgrade to 300 mm deep	 95 98	 70 75

3.7 COMPACTION REQUIREMENTS FOR FILL AND SUBGRADE

Density

General: Compact the subgrade and each layer of fill to the required depth and density, as a systematic and construction operation. Shape surface to provide drainage and prevent ponding.

Excavated and stripped ground surface: After excavation and/or stripping, compact these surfaces to a minimum depth of 150 mm.

Maximum rock and lump size in layer after compaction: To AS 3798 clause 6.2.2.

Fill batter faces: Either compact separately, or overfill and cut back. Form roughened surfaces to the faces.

Minimum relative compaction: To AS 3798 Table 5.1.

Compaction control tests

Compaction control tests: To AS 1289.5.4.1 or AS 1289.5.7.1.

Compaction control test frequency

Standard: To AS 3798 Table 8.1.

Confined operations: 1 test per 2 layers per 50 m^2.

0223 SERVICE TRENCHING

1 PRODUCTS

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- The soil classification, for the site, shall be determined through on site soil testing.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171 General requirements*.
- *0221 Site preparation.*
- *0222 Earthwork.*
- *Structural Engineer's documentation.*

1.3 FILL MATERIALS

Backfill material shall comply with the *0222 Earthwork* worksection and be free from stones larger than 100mm maximum dimension and as follows:

- Next to services: Do not place any particles greater in size than 25mm within 150mm of services.
- Under paved areas and within 4 m of structures: Coarse sand, controlled low strength material or fine crushed rock.
- In reactive clay: In sites classified M, M-D, H1, H1-D, H2, H2-D, E or E-D to AS 2870, re-use excavated site material at a moisture content within ± 1% of that of the adjoining in situ clay.

1.4 SUBMISSIONS

Submit a plan of trench works noting the location and type of service. Advise proposed duration of open excavation. Submit details of proposed equipment and method of excavation.

If shuttering and/or bracing of the sides of a trench is required for safety and stability, provide proposals.

Provide a geotechnical report supporting the procedures proposed for trenching and/or boring.

Identify WHS hazards that may be encountered with deep trenches including toxic gases and liquids.

Submit boring proposals for the following:

- Limits on length.
- Existence of other services and method of protection.
- Pressure grouting to voids.
- The effect of pressure grouting on other services, ground heave and proposals for minimising such effects.
- Access to properties outside the site.
- Council permits.
- Service interruptions including a plan for minimising unintended interruptions.

Submit the locations and evidence of compliance with the relevant authorities for the disposal of material required to be removed from the site.

1.5 INSPECTION

Give notice so that inspection may be made at the following stages:

- Service trenches excavated before laying the service.
- Services laid in trenches and ready for backfilling.

2 EXECUTION

2.1 EXISTING SURFACES

Sawcut trench set out lines in concrete and asphalt pavements for the full depths of the bound pavement layers except where the set out line is located along expansion joints.

Take up segmental paving units, both full and cut by hand, between the trench set out lines, and neatly stack on wooden pallets at locations as directed.

2.2 EXCAVATING

Excavate for underground services in conformance with the following:

- To required lines and levels, with uniform grades.
- Straight between access chambers, inspection points and junctions.
- With stable sides.

Keep trench widths to the minimum consistent with the laying and bedding of the relevant service and construction of access chambers and pits.

2.3 TRENCH BACKFILL

Backfill service trenches as soon as possible after laying and bedding the service, if possible on the same working day.

Place fill in accordance with the *0222 Earthwork* worksection.

Compact all material in layers not exceeding 150 mm compacted thickness. Compact each layer to the relative compaction specified before the next layer is commenced.

2.4 SURFACE RESTORATION

Reinstate existing surfaces removed or disturbed by trench excavation to match existing and adjacent work.

0241 LANDSCAPE – WALLING AND EDGING

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide walling and edging as shown on the drawings.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171 General requirements*.

1.3 INSPECTION

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

- Setting out before commencement of construction.
- Geotextiles and subsurface drainage in place before backfilling.

2 PRODUCTS

2.1 TIMBER

Hazard class
General: As defined in AS 1604.1.

Hardwood
General: To AS 2796.1 Section 2.

For structural purposes: To AS 2082.

Durability class: To AS 1720.2.

Softwood
General: To AS 4785.1 Section 2.

Seasoned cypress pine: To AS 1810 Section 2.

For structural purposes: To AS 2858.

Preservative treatment
Timber type: Provide only timbers with preservative treatment appropriate to the Hazard class.

Cut surfaces: Provide supplementary preservative treatment to all cut and damaged surfaces.

CCA treated timber: If proposed, provide details.

2.2 STEEL

Steel tubes
Posts, rails, stays: To AS/NZS 1163.

- Grade: C350L0.

Wire
Chainwire, cable wire, tie wire and barbed wire: To AS 2423.

2.3 CONCRETE

General
Standard: To AS 1379.

Exposure classification: To AS 3600 Table 4.3.

Grade: Where there are cast in metal items:

- Exposure classification:
  . A1, A2: N25.
  . B1: N32.
  . B2, C: N40.
  . Otherwise: N20.

2.4 DRY STONE WALLS

Walling stone
Natural stone: Stone of uniform quality, sound and free from defects liable to affect its strength, appearance or durability.

Field stone: Local weathered uncut random sized natural stones.

Quarried stone: Cut or uncut random or regular size stone.

2.5 SLEEPER WALLS

Sleepers
General: To AS 3818.2.

Hardwood: Sound durability class or preservative treated hardwood railway sleepers.

Softwood: Sound preservative treated softwood sleepers.

2.6 GEOTEXTILES

General
Type: Polymeric fabric formed from a plastic yarn composed of at least 85% by weight of propylene, ethylene, amide or vinyledenechloride and containing stabilisers or inhibitors to make the filaments resistant to deterioration due to ultraviolet light.

Identification and marking: To AS 3705.

Protection
General: Provide heavy duty protective covering. 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.

2.7 EDGING

Sawn timber
Size: Minimum 20mm thickness

Concrete
Standard: To AS 1379 – Grade N20.

Size: 150-300mm

Steel
Finish: Hot-dip galvanized.

3 EXECUTION

3.1 GENERAL

Set-out
General: Set out the positions of walls and edging and mark the positions of furniture as shown on the drawings.

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 footings as shown on the drawings.

Drainage
Extent: All retaining walls are to have suitably placed subsurface drains behind walls, backfilled with blue metal aggregate or similar, to the full height of the wall, with geotextile fabric and waterproofing membrane applied to back of wall.

3.2 DRY STONE WALLS

Construction
Generally: Select the stones for their locations and lay them in the wall with the minimum of stonecutting as follows:

- Each stone is stable, non-rocking, and firmly interlocked with its neighbours without mortar.
- The wall face shows reasonably regular, flat and vertical stone faces.
- Vertical joints or perpends between stones are spanned by the next stone above.
- Stones are laid generally as through stones whenever possible.
- At least 50% of footings, 30% of wall stones, and all coping stones are laid as through stones.

Footings: Select the largest, flattest and most regular stones for footings, and set them one third of their depth into the ground.

Copings: Select stones of reasonably uniform size and finish the top of the wall to a level line.

Retaining walls
Construction: Where dry stone walls act as retaining walls, construct the stonework to be free draining through the wall. Batter back the wall face 50 mm to 70 mm for every 300 mm in height. Secure the top course of the wall with cement mortar bedding. Backfill progressively, with a layer at least 300 mm thick of porous material, such as coarse aggregate or crushed rock in the size range 20 to 40 mm.

Minimum thickness: 300 mm.

Rip-rap retaining walls
Construction: Construct as dry stone retaining walls with large random sized boulders recovered from excavations, to form gravity walls retaining, and supported by, embankments. Place boulders with large face down and stepped back from boulders below.

3.3 SLEEPER WALLS

Construction
Wall: Erect sleeper posts at 2 m centres, buried one third. Brace at half height of wall with sleepers returned into embankment, spiked to posts. Lay sleepers in stretcher bond behind the verticals and

securely spike together at joints and at 2 m centres. Back with geotextile and place a 100 mm draining layer of coarse sand or fine gravel between the fabric and backfill.

Backing: Backfill to ground level with compacted fine crushed rock or gravels.

3.4 EDGING

Sawn timber

Installation: Timber edgings to be minimum 20mm thick. Set edgings flush with adjoining surfaces. Pegs to be nominally 450mm length. Drive pegs into the ground at 1200 mm centres on the planting side of the edging and on both sides of joints between boards, with peg tops 15 mm below top of edging. Fix the pegs with galvanised nails, two per fixing.

Curving: Space the pegs to hold edging to a uniform curve. Reduce edging thickness to 20mm if required to enable it to be bent.

Concrete

Edging strip: Concrete edging strip to be 150mm width. Place in a shallow trench between timber forms. Wood float finish flush with the adjacent finished grass level. Provide control joints, filled with resilient bituminous material, at 3 m maximum centres.

Concrete kerb: Fixed form, extrusion or slip forms to AS 2876.

Steel

Installation: Nominal gauge range 2-5 mm. Set edgings flush with adjoining surfaces. Pegs nominally 10 x 10 x 200 mm. Drive steel pegs into the ground at 1200 mm centres on the planting side of the edging, with peg tops 15 mm below top of edging. Fix the pegs with spot weld fixing to edge.

0242 LANDSCAPE – FENCES AND BARRIERS

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide fences and barrier systems as shown on the drawings.

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:

- 0171 General requirements.

1.3 INSPECTION

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

- Boundary survey location if requested.
- Set-out before construction.
- Foundation conditions before placing concrete in footings.

2 PRODUCTS

2.1 TIMBER

Durability
Durability Class to AS 1720.2

Hazard Class to AS 1604.1

Posts and rails
Hardwood: To AS 2082.

Softwood: To AS 2858.

Preservative treatment
Timber type: Provide only timbers with preservative treatment appropriate to the Hazard class.

Cut surfaces: Provide supplementary preservative treatment to all cut and damaged surfaces.

CCA treated timber: If proposed to be used, provide details.

2.2 STEEL

Steel tubes
Posts, rails, stays and pickets: To AS/NZS 1163.

Grade: C350L0.

Post and rail finish: Hot-dip galvanize.

Wire
Cable wire, tie wire: To AS 2423.

Coating: Plastic, black or recessive colour

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Set-out
General: Set out the fence line and mark the positions of posts, gates and bracing panels as shown on the drawings.

Property boundaries: Confirm by survey.

Clearing
Fence line: Except for trees or shrubs to be retained, clear vegetation within 1 metre of the fence alignment. Grub out the stumps and roots of removed trees or shrubs and trim the grass to ground level, but 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.

Erection
Line and level: Erect posts vertically. Set heights to follow the contours of natural ground.

Earth footings
Base: Place 100 mm of gravel in the footing base under posts.

Compaction: Backfill with earth around posts, compacting firmly by hand or machine in 150 mm deep layers.

Concrete footings
In ground: Size and strength to the Engineer's approval. 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.

3.2 GATES

Hardware
General: Provide the following:

- Drop bolt and ferrule to each leaf of double gates.
- Latch to one leaf of double gates.

- Provision for locking by padlock.

- Hinges with smooth operation and adjustment for future sagging.

Hand access
Requirement: Depending on gate system installed, provide hand holes to give access from outside to reach locking provision, if required.

3.3 TIMBER FENCING

Radiata pine paling fence
Height (mm): Maximum 1800mm

Maximum post spacing:

- General: 2400 mm.

- For lap and cap: 2700 mm.

Member sizes (sawn):

- Intermediate posts: 140 x 45 mm.

- End, corner and gate posts: 100 x 100 mm.

- Rails: 75 x 50 mm.

- Palings:

  . General: 100 x 15 mm.
  . For lap and cap: 150 x 15 mm.

Footing type: Concrete, size and strength to the Engineer's approval.

Footing size: 250 mm diameter x 600 mm depth.

Hardwood paling fence
Height (mm): Maximum 1800mm

Maximum post spacing: 2700 mm.

Member sizes (sawn):

- Intermediate posts: 125 x 50 mm.

- End, corner and gate posts: 125 x 125 mm.

- Rails: 75 x 50 mm.

- Capping for lap and cap type: 100 x 50 mm dressed with weathered top.

- Palings, general: 100 x 13 mm.

- Palings, for lap and cap: 150 x 13 mm.

Footing type: Earth.

Footing size: 250 mm diameter x 600 mm depth.

Installation
General: Mortice posts, taper splice rails and nail twice in mortices. Set pickets and palings clear of the ground.

Picket fence: 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.

Gates
Ledges and braces: Match fence rails.

Pickets or palings: Match fence.

3.4 CHAIN LINK FABRIC FENCING

Security fencing and gates
Standard: To AS 1725.1.

Design options:

- Type 1: Rail-less security fencing (with 3 cables).
- Type 2: Pipe rail security fencing (nominate pipe rail positions).

Installation: To AS 1725.1.

0251 LANDSCAPE – SOILS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide landscape soil to all planted and turfed areas as shown on the drawings.

Performance

Identification of fit for purpose as outlined below.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0222 Earthwork*.

1.3 STANDARDS

Soils

Site and imported topsoil: To AS 4419.

Potting mixes: To AS 3743.

Composts, soil conditioners and mulches: To AS 4454.

1.4 INTERPRETATION

Definitions

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

- Bad ground: Ground unsuitable for the work, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground which is, or becomes, soft, wet or unstable.
- 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 1, as follows:
  - Fine: Clay loam, fine sandy loam, sandy clay loam, silty loam, loam.
  - Medium: Sandy loam, fine sandy loam.
  - Coarse: Sand, loamy sand.
- Low density soil: Soil for use on an artificial base material, e.g. roof top garden or large landscape containers. Such soils will usually be blends of mineral and organic compounds, and will typically have:
  - Bulk density: 0.3 to 0.6 Kg/L.
  - Organic matter: 10% to 40% by mass.
- Natural soil: A soil that has been dug from the landscape and is presented for use with no more than minor amendment. This soil could be topsoil, subsoil or a mixture of them and have a bulk density greater than 0.6 Kg/L.
- Organic soil: A general purpose soil (normally an amended natural soil or soil blend) that has:
  - Bulk density: > 0.6 Kg/L.
  - Organic matter: 15% to 25% by mass. Naturally occurring organic soil can be 95% organic by mass.
- Site rock: Rocks selected for salvage.

- Site topsoil: Soil excavated from the site which contains organic matter, supports plant life, conforms generally to the fine-to-medium texture classification to AS 4419 (loam, silt, clay loam) and is free from:
  . Stones more than 25 mm diameter.
  . Clay lumps more than 75 mm diameter.
  . Weeds and tree roots.
  . Sticks and rubbish.
  . Material toxic to plants.
- Soil blend: A general purpose soil derived from the blending of two or more of sand, natural soil material or organic materials, and with a bulk density and organic matter content to meet site specific requirements.
- Top dressing: A soil which is suitable for surface application to lawn.

1.5 SITE INVESTIGATION

Notice

Requirement: If the following are encountered, give notice immediately and obtain instructions before carrying out any further work in the affected area:

- Bad ground.
- Discrepancies.
- Rock.
- Springs, seepages.
- Topsoil less than 100 mm deep.

1.6 SUBMISSIONS

Execution

Program: Submit a work program in the form of a bar chart, for the landscape works, to be incorporated into the main program.

Materials

Supplier's data: Submit supplier's data including the following:

- Material source of supply for topsoil, filling, stone and filter fabrics.

Compost: Submit a certificate of proof of compost pH value.

Samples

General: Submit representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: Submit a 1 kg sample of each type specified. Submit bulk material samples, with required test results, at least 5 working days before bulk deliveries.

Suppliers

Statements: Submit statements from suppliers of soils and other materials, giving the following, where applicable:

- Particulars of the supplier's experience in the required type of work.
- Production capacity for material of the required type, sizes and quantity.
- Lead times for delivery of material to the site.

1.7 INSPECTION

Notice

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

- Setting out completed.

- Subgrades cultivated or prepared for placing topsoil.
- Topsoil spread before planting.
- Grassing bed prepared before turfing, seeding, or temporary grassing.

2 PRODUCTS

2.1 TOPSOIL

Source
General: If the topsoil type cannot be provided from material recovered from the site, provide imported topsoil.

General
Deliveries: Documentation to AS 4419, clause 8.

Additives: If using additives to raise topsoil to the required standard, ensure compliance with the relevant test criteria of AS 4419.

Nitrogen drawdown: If the NDI_{150} value is less than 0.5 to AS 4419 Appendix E add a source of soluble nitrogen to bring the value above zero.

Compost: Provide well rotted vegetative material or animal manure, free from harmful chemicals, grass and weed growth to the organic content by mass as documented in the **SELECTIONS**.

Bushland restoration nutrient levels: Provide topsoil with nutrient levels related to the soils of the local natural bushland.

Site topsoil
General: Provide site topsoil, as documented in the **Site topsoil schedule**.

Soil blend: If required, stripped topsoil with ameliorants.

Imported topsoil
General: Provide imported topsoil as documented in the **Imported topsoil schedules**.

Topsoil particle size table (% passing by mass)

Sieve aperture to AS 1152 (mm)	Soil textures		
	Fine	Medium	Coarse
2.36	100	100	100
1.18	90 – 100	95 – 100	95 – 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

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

Nutrient	Unit	Sufficiency range
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 & Higginson (1992) 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		

2.2 STRUCTURAL SOIL

Structural soil type table

Type	Description	Fertiliser	Depth
Structural soil 40 mm	80% 40 mm basalt aggregate 20% filler soil.	Trace element mix: 300 g/m^3 Potassium nitrate: 500 g/m^3 Ammonium nitrate: 500 g/m^3 Superphosphate: 500 g/m^3 Ion sulphate: 1.5 kg/m^3 8/9 month Controlled Release: 2 kg/m^3 Gypsum: 500 g/m^3 Magnesium sulphate: 400 g/m^3 Magrilime: 600 g/m^3	Varies

2.3 TESTING

Soil tests

General: To AS 4419, Table 1.

Sampling: As recommended in AS 4419 Appendix A.

Laboratory: NATA registered.

Imported topsoil tests: Type tests to AS 4419 Appendix B to I (topsoil), or AS 3743 Appendix D to G (potting mixes), as applicable.

Site topsoil tests: To AS 4419 Appendix C to I.

3 EXECUTION

3.1 PREPARATION

Vegetative spoil

Spoil suitable for mulch or spreading for bushland restoration: Spread freshly harvested native plant biomass, free of weed propagules.

Unsuitable material: Remove vegetative spoil from site. Do not burn.

3.2 TOPSOIL

Site topsoil preparation

Screeding: By a power hydraulic screen capable of handling 100 tonne per hour, with sieves grading from 20 mm to 15 mm.

Waste: Remove from site all clay lumps, balled compacted particles greater than 20 mm, stones and trash foreign to the normal composition of soil.

Contamination: Give notice to the Superintendent of any contamination. If diesel oil, cement or other phytotoxic material has been spilt on the site topsoil, excavate the contaminated soil and dispose of it off the site.

Admixtures: During the screening process add the following:

- 15% by weight coarse sand minimum particle size 0.2 mm.
- Ameliorants if recommended in the soil tests specified in **SUBMISSIONS**.

Additives program: 8 weeks before stolonizing or turfing.

Placing topsoil

Site topsoil: Do not incorporate site topsoil into the works until soil testing certification has been approved. Remove unauthorised material from the site.

General: Spread the topsoil on the prepared subsoil and grade evenly, making the necessary allowances to permit the following:

- Required finished levels and contours may be achieved after light compaction.
- Grassed areas may be finished flush with adjacent hard surfaces such as kerbs, paths and mowing strips.

Spreading: On 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:

  . If using organic mulch, 225 mm.
  . If using gravel mulch, 250 mm.
- Irrigated grassed areas generally: 150 mm.
- Irrigated grassed areas, heavy use (e.g. playing fields, playgrounds, 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.

3.3 STRUCTURAL SOIL

Preparation

Existing soil: Remove.

Subsoil: Break up the surface and shape to drains. Remove rock.

Construction

Spreading: Maintain a self-draining surface.

Compaction: To the *0222 Earthwork* worksection **COMPACTION REQUIREMENTS FOR FILL AND SUBGRADE**.

Protection: Limit the size of compaction equipment or compact by hand to prevent damage.

Moisture content: Adjust the moisture content at the time of works to 12.5% of the optimum moisture content to AS 1289.5.4.1.

Contaminated structural soil: Excavate and dispose off-site.

Surplus structural soil: Remove.

0252 LANDSCAPE – SOFT SURFACES

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide soft surfaces for landscaping as shown on the drawings.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171 General requirements*.

1.3 SUBMISSIONS

Execution details
Program: Submit a work program in the form of a bar chart, for the landscape works, to be incorporated into the main program.

Maintenance program: Submit a proposed planting maintenance program.

Material storage on site: Submit proposal showing the location, size, and duration of the storage.

Materials
Supplier's data: Submit supplier's data including the following:

- Material source of supply.

Samples
General: Submit representative samples of turf selected, packed to prevent contamination and labelled to indicate source and content.

Suppliers
Statements: Submit statements from suppliers, giving the following, where applicable:

- Particulars of the supplier's experience in the required type of work.
- Production capacity for material of the required type and quantity.
- Lead times for delivery of material to the site.

1.4 INSPECTION

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

- Clearing completed.
- Setting out completed.
- Grassing bed prepared before turfing, seeding, or temporary grassing.
- Grassing or turfing completed.

2 PRODUCTS

2.1 GRASS

Turf
Supplier: Obtain turf from a specialist grower of cultivated turf.

Quality: Provide turf of even thickness, free from weeds and other foreign matter.

Stolons
Characteristics: Well established fibrous runners 50 to 100 mm in length, with minimum green leaf material, obtained from a specialist grower of cultivated turf.

2.2 FERTILISER

General
Requirement: Provide proprietary fertilisers, delivered to the site in sealed bags marked to show manufacturer or vendor, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

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 recommended maximum rate.

Manual weeding: Remove rubbish and weed growth 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 eradication 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 TURFING

Supply
Elapsed time: Deliver the turf within 24 hours of cutting, and lay it within 36 hours of cutting. Prevent it from drying out between cutting and laying. If it is not laid within 36 hours of cutting, roll it out on a flat surface with the grass up, and water as necessary to maintain a good condition.

Laying
General: Lay the turf in the following manner:

- In stretcher pattern with the joints staggered and close butted.
- Parallel with the long sides of level areas, and with contours on slopes.
- To 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. Apply a layer of top dressing between the strips of turf. Finish with an even surface.

Tamping
General: Lightly tamp to an even surface immediately after laying. Do not use a roller.

Pegging
Stabilising: Peg the turf (on steep slopes) to prevent downslope movement. Remove the pegs when the turf is established.

Fertilising
General: Mix the fertiliser thoroughly into the topsoil before placing the turf. Apply lawn fertiliser at the completion of the first and last mowings, and at other times as required to maintain healthy grass cover.

Watering
General: Water immediately after laying until the topsoil is moistened to its full depth. Continue watering to maintain moisture to this depth.

Mowing
Height: 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 within 7 days before the end of the planting establishment period. Remove grass clippings from the site after each mowing.

Maintenance
General: Maintain and mow turfed areas until the attainment of a dense continuous sward of healthy grass over the whole turfed area, evenly green and of a consistent height. Maintain the turf for the duration of the agreed establishment period (minimum 4 weeks after Practical Completion).

Failed turf: Lift failed turf and relay 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.

Top dressing
General: When the turf is established, mow. Remove cuttings and lightly top dress to a depth of 10 mm. Rub the dressing well into the joints and correct any unevenness in the turf surface.

0253 LANDSCAPE – PLANTING

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide planting as shown on the landscape drawings.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171 General requirements*.

1.3 SUBMISSIONS

Certification
Species: Submit evidence of conformance to EXECUTION, **COMPLETION**, **Product Certification**.

Execution details
Program: Submit a work program in the form of a bar chart, for the landscape works, to be incorporated into the main program.

Maintenance program: Submit a proposed planting maintenance program.

Planting machine: If a planting machine is to be used as an alternative to hand planting, submit proposal.

Spraying: Submit proposal.

Plants – open rooted stock: If open rooted stock is to be used, submit proposal.

Material site storage: Submit proposal.

Maintenance manuals
General: Submit recommendations for maintenance of plants.

Materials
Supplier's data: Submit supplier's data including the following:

- Material source of supply.

Compost: Submit a certificate of proof of compost pH value.

Samples
General: Submit representative samples of mulch, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: Submit a 1 kg sample of each mulch type specified. Submit bulk material samples, with required test results, at least 5 working days before bulk deliveries.

1.4 INSPECTION

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

- Setting out completed.
- Plant holes excavated and prepared for planting.

- Plant material set out before planting.
- Planting, staking and tying completed.
- Completion of planting establishment work.

2 PRODUCTS

2.1 GENERAL

Marking
Identification: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern.

2.2 SOIL CONDITIONING COMPOST

Compost
General: Provide mature soil conditioning compost free from harmful chemicals, grass and weed growth. Apply at an application rate that accounts for the immediate fertilizer equivalence of the compost as part of the overall fertilizer management schedule.

Particle size as a soil conditioner, pH, physical and chemical contaminants: To AS 4454 Table 3.1(A).

Mature compost: To AS 4454 Appendix N Table N3.2.

Soil conditioning properties
Wettability: ≤ 2 to AS 3743 Table 2.1 as tested to Appendix C.

Total water holding capacity: ≥ 40 to AS 3743 Table 2.1 tested to Appendix B.

Nitrogen draw down index: ≥ 0.7 to AS 3743 Table 2.1 tested to Appendix E.

Chlorine content: < 1000 mg/kg to Raymond and Lyons 2010 test method.

Compost Fertiliser equivalence properties values
Standard: To the test methods in Raymond and Lyons 2010, *Soil chemical methods – Australasia* for nitrate N, total N or total Kjeldahl N, total P and Cowell P, and extractable K.

Requirement: Establish the following values for each type of soil conditioning compost:

- Nitrogen content (kg/ton):
  - . Total N.
  - . Nitrate.
- Phosphorus content (kg/ton):
  - . Total P.
  - . Colwell P.
- Plant available Potassium (kg/ton).

2.3 FERTILISER

General

Delivery: Provide proprietary fertilisers, delivered to the site in sealed bags marked to show manufacturer or vendor, 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 MULCH

Requirement: Provide mulch which is free of deleterious and extraneous matter such as soil, weeds and sticks. Do not include fine mulch.

Standard:

- Particle size, physical and chemical contaminants: To AS 4454 Table 3.1(A).
- pH, electrical conductivity, ammonium, chlorine and other nutrients: To AS 3743 Table 2.1 for regular mix.

Organic mulches: Free of stones.

Mulch material: Brush chippings and leaf litter recovered from site clearing, if available; otherwise, pine bark.

Organic mulch types

Brush chippings and leaf litter: Vegetative material processed through a chipper to pieces not larger than 75 x 50 x 15 mm as follows:

- Material permitted: Leaf matter and tree loppings from *Eucalyptus*, *Tristania and Pinus species*.
- Material not permitted: Leaf matter and tree loppings from privet, camphor laurel, coral tree, poplar, willow, and noxious weeds.

Pine bark: From mature trees, graded in size from 50 x 50 x 25 mm to 25 x 15 x 15 mm, free from wood slivers.

Pine flake: Pinus species sapwood slivers of size range 250 x 25 mm to 30 x 3 mm, including fragments of pine bark.

Straw: Cereal straw, wood fibre, or other suitable vegetative material (but not meadow hay) free from weeds and seeds, applied in conjunction with a bitumen emulsion or polymer binder.

Inorganic mulch types

Washed river pebble: Uniform size or graded material, minimum size 20mm.

Decomposed granite gravel: Uniform size or graded material minimum size 20mm, of uniform colour and low plasticity. Keep clear of plant stems.

Crushed quartz: Uniform size or graded material minimum size 20mm, of uniform colour.

Marble chip gravel: Uniform size or graded material minimum size 20mm, of uniform colour.

Slate: Plum slate slivers minimum size 20mm.

Scoria: Uniform size or graded material.

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 recommended maximum rate.

Removal: Regularly remove, by hand, rubbish and weed growth throughout grassed, planted and mulched areas. Remove weed growth from an area 750 mm diameter around the base of the trees in grassed areas. Continue eradication 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 PLANTING

Locations

General: If it appears necessary to vary plant locations and spacings to avoid service lines, or to cover the area uniformly, or for other reasons, give notice and provide revised landscape drawings showing the proposed changes.

Watering

Timing: Thoroughly water the plants before planting, immediately after planting, and as required to maintain growth rates free of stress for the duration of the agreed establishment period (minimum 4 weeks after Practical Completion).

Placing

Method: Remove the plant from the container with minimum disturbance to the root ball. Root prune to ensure all circling roots have been either severed or aligned radially into the surrounding soil. Make sure that the root ball is moist, place it in its final position, in the centre of the hole and plumb, and with the top soil level of the plant, level with the finished surface of the surrounding soil. Compact lightly so as to minimise subsidence without compacting the backfill. Avoid mixing mulch with topsoil.

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. Lightly tamp 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.

3.3 MULCHING

Placing mulch

General: Place mulch to the required depth, clear of plant stems, and rake to an even surface flush with the surrounding finished levels. Spread and roll mulch so that after settling, or after rolling, it is smooth and evenly graded between design surface levels sloped towards the base of plant stems in plantation beds, and not closer to the stem than 50 mm in the case of gravel mulches.

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.

Extent: Provide mulch to 750 mm diameter, to surrounds of plants planted in riplines and grass areas.

Depths: Spread organic mulch to a depth of 75 mm, and gravel mulch to a depth of 50 mm.

3.4 COMPLETION

Product certification

Certification: Submit the supplier's written statement certifying that plants are true to the required species and type and free from diseases, pests and weeds.

Cleaning

Stakes and ties: Remove those no longer required at the end of the planting establishment period.

Temporary fences: Remove temporary protective fences at the end of the planting establishment period.

0256 LANDSCAPE – ESTABLISHMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide plant establishment to all landscape areas as shown on the drawings.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.

1.3 INTERPRETATION

Definitions

General: For the purpose of this worksection the following definitions apply:

- Plant establishment period: The period between the date of practical completion and the end of the defects liability period.

1.4 SUBMISSIONS

Execution details

Notice: Provide two days notice of the following operations:

- Application of herbicide.
- Application of fertiliser.
- Watering.
- Each site maintenance visit.

Log book

Records: Log the following on a weekly basis:

- Description, time and method of application of toxic material.
- Maintenance work details.
- Inclement weather to verify inability to carry out work within the specified time frame.

Availability: Upon request.

Monitoring program

General: Provide a monitoring program developed by a specialist monitoring consultant and incorporating the following:

- Photographic record including:
  - . Colour photographs.
  - . Documented monitoring locations and photograph angles.
- Reporting periods including photographic records at the following:
  - . Before commencement of the works.
  - . Date of practical completion.
  - . Three monthly intervals during the plant establishment period.
  - . Date of final completion.
  - . Benchmark definition based on remnant communities.
  - . Replicated measurements over time and comparative analysis with regard to the benchmark.

Specialist consultant: Submit the name, qualifications including research papers and scientific publication details, and contact details of the specialist monitoring consultant.

Replacement plants
Species: Provide written certification that all plant material is true to the required species and type.

1.5 INSPECTION

Notice
Inspection: Give adequate notice so that inspection of the contract area may be made at the following:

- Date of practical completion.
- Regular intervals during the plant establishment period (minimum 4 weeks after Practical Completion).
- Date of final completion.

2 EXECUTION

2.1 GENERAL

Special instructions
Priority: If instructed by the Superintendent, attend to certain areas and procedures as a priority. Obtain approval for additional costs before commencement of works.

Reporting
Monthly report: Submit regular reports by the last Friday of each month:

- Of the general status of works.
- Include soil test results as required for the fertilising programs.
- Plant replacement requirements.

Incident reports: Report immediately verbally and confirm in writing any disturbance or incidence affecting or likely to affect the day to day scheduling of works.

Disruption of works by others
Other contractors: Make arrangements to work around the disturbance.

2.2 PLANTING WORKS

Planting
Planting: Ensure the general appearance and presentation of the landscape and the quality of plant material at date of practical completion is maintained for the full planting establishment period.

Existing plant material: Maintain existing planting and grass within the landscape contract area as specified for the corresponding classifications of new grassland or planting.

Replacements: Replace failed, dead and/or damaged plants at maximum 3 week intervals as necessary throughout the full plant establishment period.

Pruning
Prune: To AS 4373 and as documented in the **Pruning schedule**.

Fertilising
Soil tests: Take samples from both planting beds and lawn areas and conduct tests.

Fertilising: Base the fertilisation program on the soil testing results. Fertilise trees once every two years. Generally apply an all purpose fertiliser of N:P:K (Nitrogen:Phosphorus:Potassium) 10:4:6 at recommended rates. Alternatively apply 12 month slow release fertiliser at the manufacturer's

recommended rate. Apply all purpose fertiliser to shrubs annually in two bands and cultivated into the soil 100 mm deep.

Season: Fertilise shrubs and trees in September and March according to their seasonal growth requirement.

Insect and disease control
Period for treatment: Until the problem has been eliminated.

Chemical spray: Apply outside of normal working hours.

2.3 GRASS

Mowing and trimming
Litter: Remove litter and fallen branches before mowing.

Height: Consistent with the growth habit of the grass variety and maintained at 25 mm to 40 mm throughout the year.

Program: Weekly during the mowing season, November to March, and at bi-weekly intervals during April to October. Do not mow under wet conditions.

Raking: Once every month before mowing, during the mowing season, with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Edges: At the same time as mowing, trim lawn edges to plant beds, pathways, base of trees and other obstacles. Ensure trees and shrubs are not damaged.

Topdressing
Topdressing material for established lawns: Weed free imported sandy topsoil to a depth of 5 mm.

Program: The spring following establishment.

Topdressing material for remediation of depressions or irregularities: Apply coarse or medium soil to AS 4419 suitable for application to turf or grass seeded areas.

Fertilising
Fertilising: Apply lawn fertiliser at the completion of the first and last mowings of the plant establishment period, and at other times as required to maintain healthy grass cover.

2.4 GARDEN BEDS

Weeding
Weeds: Unwanted plants and grasses considered invasive to the locality.

Program:

- Lawns: Quarterly, and as determined by the relationship of the general lawn condition and weed growth.
- Trees and shrubs: As required for planted, paved and mulched areas to be weed free when observed at bi-weekly intervals.

Method: Clear and keep clear vigorous ground covers 200 mm from the base of any shrub or tree:

- Small areas: By hand.
- Large areas: Proprietary herbicides.

Herbicide application: Avoid windy days or if rain is likely to follow within 12 hours. Apply:

- To the manufacturer's instructions and Safety Data Sheets.
- When the weather is humid with moderate temperatures and maximum sunlight.

- When the ground has recommended soil moisture.

Mulched surfaces

Inspection: Bi-weekly to determine mulch requirements.

Depth: Maintain a minimum depth of:

- 75 mm for organic mulch.
- 50 mm for gravel mulch.

Remulching: Maintain the original ground levels around the base of plants.

2.5 CONTROL MEASURES

Weed mats

Generally: Maintain mats in a weed free condition and reinstate missing or damaged mats to the standard previously specified until completion of the plant establishment period.

Rabbit control

Generally: Implement rabbit control if deemed necessary until the completion of the plant establishment period as described below.

Rabbit guards: Maintain rabbit guards in a working upright and taut order with three stakes. Replace missing or damaged guards with the same materials as previously specified.

Removal: At the completion of the plant establishment period.

2.6 WATERING

Establishment

Water quality:

- pH between 5.5 and 7.5.
- Total soluble salts less than 1000 mg/litre.
- No substances that would be toxic to plant growth.

Watering program: Minimum three complete waterings, soaking to a depth of 150 mm at fortnightly intervals for the first 6 weeks of plant establishment irrespective of natural rainfall. Confirm soaked depth and record in the log book.

Water restrictions: Coordinate the water supply and confirm the watering regime against state and territory government legislation and restrictions at the time.

Hand watering

General: Manually water all lawn and planting areas, soaking to a depth of 150 mm for lawn and 300 mm for planting. Avoid frequent dampening of the surface. Allow the surface of the soil to partially dry out between waterings.

2.7 PAVING AND STRUCTURES

Drains

General: Inspect and clean all drainage structures and pit covers and ensure that they are in proper working order.

Frequency: As required, so that all overflow drains are cleared when observed at fortnightly intervals.

2.8 COMPLIANCE

Criteria

Generally: Plant establishment shall be deemed complete, subject to the following:

- Repairs to planting media completed.

- Ground surfaces are covered with the specified treatment to the specified depths.
- Pests, disease, or nutrient deficiencies or toxicities are not evident.
- Organic and rock mulched surfaces have been maintained in a weed free and tidy condition and to the specified depth.
- Vegetation is established and well formed.
- Vegetation cover to cell, seeded and/or hydromulched areas.
- Plants have healthy root systems that have penetrated into the surrounding, undisturbed ground and not able to be lifted out of its planting hole.
- Vegetation is not restricting essential sight lines and signage.
- Only frangible species are growing within road side clear zones.
- All hard landscape works have been installed and are operating as specified.
- Collection and removal of litter.
- Removal of mulch from drainage and access areas.
- All non-conformance reports and defects notifications have been closed out.

Plant establishment compliance table

Plant material	**Acceptable failure per area**	**Acceptable concentration of failure**
Tube stock	< 5%	< 10% in any given location
140 mm	< 5%	< 10% in any given location
300 mm or larger	< Nil%	Nil %
Turf	< 5%	Nil %
Cells	< 5%	< 15% in any given location
Direct seeded native species and cover crop – including hydromulch, drilled and broadcasted areas	No less than 3 [Nominate as appropriate] specified species per 1 m^2 grid (determined on a testing frequency of 20 grid areas per 500 m^2)	Nil grids with < three (3) [Nominate as appropriate] specified plant species
Direct seeded grass species and cover crop	< 15% (determined by a 1 m^2 grid on a testing frequency of 1 grid area per 500 m^2)	< 10%
Cover crop	< 5%	Nil %

0271 PAVEMENT BASE AND SUBBASE

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide base and subbase courses to all paved areas shown on the drawings.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0222 Earthwork*.

1.3 INTERPRETATION

Abbreviations

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

- CRB: Crushed rock base.
- CRS: Crushed rock subbase.
- NGB: Natural gravel base.
- NGS: Natural gravel subbase.
- RCCB: Recycled crushed concrete base.
- RCCS: Recycled crushed concrete subbase.

Definitions

General: For the purposes of this worksection the definitions given in AS 1348 and the following apply:

- Base: Layer(s) of material, forming the uppermost structural element of a pavement and on which the surfacing may be placed.
- Flexible pavement: A pavement which obtains its load-spreading properties from intergranular pressure, mechanical interlock and cohesion between the particles of the pavement material.
- Subbase: Material laid on the subgrade (or selected material), below the base, either for the purpose of making up additional pavement thickness, to prevent intrusion of the subgrade into the base, or to provide a working platform.

1.4 SUBMISSIONS

Execution details

General: Submit details of the proposed work methods and equipment for each pathway and roadworks operation, including the following:

- Staging of the work, access and traffic control methods.
- Disposal of surface water, control of erosion, contamination and sedimentation of the site, surrounding areas and drainage systems.

Compaction: If a layer is proposed to exceed 200 mm in thickness, submit evidence that the proposed compaction equipment can achieve the required density throughout the layer.

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.

Conformance: Submit type test results for each material listed in the **Base material properties table** and **Subbase material properties table** from a Registered Testing Authority as evidence of material conformance to documented requirements.

1.5 INSPECTION

Notice

Inspection: Give adequate 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 and recycled material class

Requirement: Provide crushed rock and recycled material as documented, from the following classes:

- Class 1: Pavement base material (with a minimum plasticity index) for unbound pavements requiring a very high standard of surface preparation for a sprayed sealed or thin asphalt surfacing.
- Class 2: Pavement base material (with no minimum plasticity index) for unbound pavements which may not require a very high standard of surface preparation.
- Class 3: Not applicable.
- Class 4: Subbase material for unbound flexible pavements.

Crushed rock

Designation: Unbound crushed rock materials are designated as follows:

- CRB20-1: 20 mm nominal sized class 1 crushed rock base.
- CRB20-2: 20 mm nominal sized class 2 crushed rock base.
- CRS20: 20 mm nominal sized crushed rock subbase.
- CRS40: 40 mm nominal sized crushed rock subbase.

Recycled crushed concrete

Designation: Recycled crushed concrete materials are designated as follows:

- RCCB20-1: 20 mm nominal sized class 1 recycled crushed concrete base.
- RCCB20-2: 20 mm nominal sized class 2 recycled crushed concrete base.
- RCCS20: 20 mm nominal sized recycled crushed concrete subbase.

Natural gravel

Designation: Unbound natural gravel materials are designated as follows:

- NGB20: 20 mm nominal sized natural gravel base.
- NGS20: 20 mm nominal sized natural gravel subbase.
- NGS40: 40 mm nominal sized natural gravel subbase.

Base material properties table

Test method	Description	CRB20-1	CRB20-2	RCCB20-1	RCCB20-2	NGB20
AS 1289.3.6.1	Particle size distribution (sieve % passing)					
	26.5 mm	100	100	100	100	100
	19.0 mm	95-100	95-100	95-100	95-100	93-100

Test method	Description	CRB20-1	CRB20-2	RCCB20-1	RCCB20-2	NGB20
	13.2 mm	77-93	77-93	78-92	78-92	-
	9.5 mm	63-83	63-83	63-83	63-83	71-87
	4.75 mm	44-64	44-64	44-64	44-64	47-70
	2.36 mm	29-49	29-49	30-48	30-48	35-56
	0.425 mm	13-23	13-23	13-21	13-21	14-32
	0.075 mm	5-11	5-11	5-9	5-9	6-20
AS 1289.3.1.1	Liquid limit	max 25%	max 25%	max 30%	max 30%	max 25%
AS 1289.3.3.1	Plasticity index:					
	All areas	min 2%	-	min 2%	-	-
	Areas with annual rainfall > 500 mm	max 6%	max 6%	max 6%	max 6%	max 6%
	Areas with annual rainfall < 500 mm	max 10%	max 10%	max 10%	max 10%	max 10%
AS 1289.3.4.1	Linear shrinkage:					
	All areas:	min 0.7%	-	min 0.7%	-	-
	Areas with annual rainfall > 500 mm	max 2.0%	max 2.0%	max 2.0%	max 2.0%	max 2.0%
	Areas with annual rainfall < 500 mm	max 4.0%	max 4.0%	max 4.0%	max 4.0%	max 4.0%
RMS T276	Undesirable constituent material type: (% retained on the 4.75 mm sieve)					
	Type I - Metal, unprocessed glass and ceramics	-	-	max 2.0	max 2.0	-
	Type II - Plaster, clay lumps and other friable material	-	-	max 5.0	max 5.0	-
	Type III - Rubber, plastic, paper, cloth, paint, wood and other vegetable mater	-	-	max 1.0	max 1.0	-
AS 1141.52	Maximum dry compressive strength on fraction passing 19 mm sieve (only applies if plasticity index is less than 1)	min 1.7 MPa	min 1.7 MPa	min 1.7 MPa	min 1.7 MPa	min 1.7 MPa

Test method	Description	CRB20-1	CRB20-2	RCCB20-1	RCCB20-2	NGB20
AS 1141.14	Particle shape by proportional calliper - % misshapen (2:1)	max 35%	max 35%	max 35%	max 35%	-
AS 1141.22	Aggregate wet strength*	min 100 kN	min 80 kN	min 100 kN	min 80 kN	-
	Wet/dry strength variation* (dry - wet)/dry	max 35%	max 35%	max 35%	max 35%	-
AS 1141.23	Los Angeles value	max 35%	max 35%	max 40%	max 40%	-
AS 1289.6.1.1	4 day soaked CBR (98% modified compaction)	min 80%	min 80%	min 80%	min 80%	min 80%
NOTES: * All fractions of the proposed mix must satisfy this requirement. Use the fraction with the highest wet/dry strength variation as the value for determining conformance. Test the fraction 19.0 mm to 9.5 mm. In the case of blended materials, also test the fraction 9.5 mm to 4.75 mm. Test any other fraction which is at risk of failing in the opinion of the Engineer.						

Subbase material properties table

Test method	Description	CRS20	CRS40	RCCS20	NGS20	NGS40
AS 1289.3.6.1	Particle size distribution (sieve % passing)					
	53.0 mm	-	100	-	-	100
	37.5 mm	-	90-100	-	-	95-100
	26.5 mm	100	74-97	100	100	80-97
	19.0 mm	90-100	62-86	95-100	96-100	-
	13.2 mm	74-96	-	74-95	-	-
	9.5 mm	61-85	42-66	60-90	65-90	48-85
	4.75 mm	42-66	28-50	42-76	47-80	35-73
	2.36 mm	28-50	20-39	28-60	32-67	25-58
	0.425 mm	11-27	8-21	10-28	14-42	10-33
	0.075 mm	4-14	3-11	2-10	6-26	3-21
AS 1289.3.1.1	Liquid limit	max 25%	max 25%	max 30%	max 25%	max 35%
AS 1289.3.3.1	Plasticity index:					
	Areas with annual rainfall > 500 mm	max 12%	max 12%	max 12%	max 12%	max 12%
	Areas with annual rainfall < 500 mm	max 12%	max 12%	max 12%	max 12%	max 12%
AS 1289.3.4.1	Linear shrinkage:					
	Areas with annual rainfall > 500 mm	max 4.5	max 4.5	max 4.5	max 4.5	max 4.5
	Areas with	max 6.0	max 6.0	max 6.0	max 6.0	max 6.0

Test method	Description	CRS20	CRS40	RCCS20	NGS20	NGS40
	annual rainfall < 500 mm					
RMS T276	Undesirable constituent material type: (% retained on the 4.75 mm sieve)					
	Type I - Metal, unprocessed glass and ceramics	-	-	max 3.0	-	-
	Type II - Plaster, clay lumps and other friable material	-	-	max 1.0	-	-
	Type III - Rubber, plastic, paper, cloth, paint, wood and other vegetable mater	-	-	max 2.0	-	-
AS 1141.52	Maximum dry compressive strength on fraction passing 19 mm sieve (only applies if plasticity index is less than 1)	min 1.0 MPa	min 1.0 MPa	min 1.0 MPa	min 1.0 MPa	min 1.0 MPa
AS 1141.14	Particle shape by proportional calliper - % misshapen (2:1)	max 35%	max 35%	max 35%	-	-
AS 1141.22	Aggregate wet strength*	min 50 kN	min 50 kN	min 50 kN	-	-
	Wet/dry strength variation* (dry - wet)/dry	max 40%	max 40%	max 40%	-	-
AS 1141.23	Los Angeles value	max 40%	max 40%	max 40%	-	-
AS 1289.6.1.1	4 day soaked CBR (95% modified compaction)	min 30%	min 30%	min 30%	min 30%	min 30%
NOTES: * All fractions of the proposed mix must satisfy this requirement. Use the fraction with the highest wet/dry strength variation as the value for determining conformance. Test the fraction 19.0 mm to 9.5 mm. In the case of blended materials, also test the fraction 9.5 mm to 4.75 mm. Test any other fraction which is at risk of failing in the opinion of the Engineer.						

Tests
Material property testing: Conform to the **Base material properties table** and the **Subbase material properties table** test methods.

Frequency of material property tests: Not less than the following:

- Particle size distribution: 1 per 1000 t (or part of).
- Liquid limit: 1 per 1000 t (or part of).
- Plasticity index: 1 per 1000 t (or part of).
- Linear shrinkage: 1 per 1000 t (or part of).
- Foreign materials content: 1 per 1000 t (or part of).
- Maximum dry compressive strength: 1 per 5000 t (or part of).
- Particle shape: 1 per 1000 t (or part of).
- Los Angeles value: 1 per 1000 t (or part of).
- Aggregate wet strength: 1 per 5000 t (or part of).
- Wet/dry strength variation: 1 per 5000 t (or part of).

3 EXECUTION

3.1 SUBGRADE PREPARATION

General
Requirement: Prepare the subgrade in conformance with the *0222 Earthwork* worksection.

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
Base: ≤ 5 mm from a 3 m straightedge laid on the surface.

3.4 BASE AND SUBBASE COMPACTION

General
Construction operation: Compact each layer of fill to the required depth and density, as a systematic construction operation.

Unstable areas: If unstable areas develop during rolling or are identified by proof rolling, open up, dry back and recompact, to the requirements of this worksection. If dry back is not possible, remove for the full depth of layer, dispose of and replace with fresh material.

Minimum relative compaction table

Item description	Minimum dry density ratio (modified compaction) to AS 1289.5.2.1
Subbase	95%
Base	98%

Compaction requirements
General: Apply uniform compactive effort, over the whole area to be compacted, until the required density is achieved or until failure is acknowledged. If failure is acknowledged, conform to **Rectification**.

Equipment: Use rollers appropriate to the materials and compaction requirements documented.

Moisture content
General: During spreading and compaction, maintain material moisture content within the range of -2% to +1% from the optimum moisture content (modified compaction).

Spraying: Use water spraying equipment to distribute water uniformly in controlled quantities over uniform lane widths.

Dry back: Allow material to dry back to 60% to 80% of the optimum moisture content before applying the seal or wearing course.

Rectification
General: If a section of pavement material fails to meet the required density or moisture content after compaction, remove the non-conforming material, dispose of off-site or rectify for re-use, replace with fresh material, and recompact.

Level corrections
General: Rectify incorrect levels as follows:

- High areas: If the area can be rectified by further trimming to produce a uniform, hard surface by cutting without filling, trim so that the rectified area conforms to **TOLERANCES**.
- Low areas and high areas not rectifiable by further trimming: Remove layers to a minimum depth of 75 mm, lightly tyne and replace with new material and recompact.

3.5 TESTING

Site tests

Compaction control tests: To AS 1289.5.4.1 and AS 1289.5.4.2.

Frequency of compaction control tests: Not less than the following (whichever requires the most tests):

- 1 test per layer per 100 lineal metres for two-lane roads.
- 1 test per layer per 2000 m^2 for carparks.
- 3 tests per layer.
- 3 tests per visit.

0274 CONCRETE PAVEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide concrete pavement to the locations shown on the drawings.

Design

Coordination: Determine the local authority requirements initially as they may affect grades, transition, zones for the works. Considerations include:

- Drainage.
- Tree's (due to settlement).
- Adjacent structures.

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 the minimum details of thickness, reinforcement and concrete strength for pavements within the kerb-and-gutter property boundaries.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0222 Earthwork*.
- *0310 Concrete.*
- *Structural Engineers documentation (if applicable).*

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 definitions given in AS 1348 and the following apply.

- Absolute level tolerance: Maximum deviation from design levels.
- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Average ambient temperature: Average value of the daily maximum and minimum ambient temperatures over the relevant period at a site.
- Concrete class – normal: Concrete which is specified primarily by a standard compressive strength grade and otherwise in conformance with AS 1379 clause 1.5.3.

- Concrete class – special: Concrete which 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.
- Green concrete: Concrete which has set but not appreciably hardened.
- Relative level tolerance: Maximum deviation from a 3 m straight edge laid on the surface.
- Weather – cold: Ambient shade temperature less than 10°C.
- Weather – hot: Ambient shade temperature greater than 30°C.

1.5 TOLERANCES

General

Edges abutting gutters: Within ± 5 mm of the level of the actual gutter edge.

Rigid pavement surface:

- Absolute tolerance: + 10 mm, - 0 mm.
- Relative tolerance: ± 5 mm.

Joint locations in plan (rigid pavement): ± 15 mm.

1.6 SUBMISSIONS

Certification

Compliance certificate: As an alternative to testing a product, submit the manufacturer's certificate together with the results of recent tests undertaken by the manufacturer, showing compliance with test criteria.

Test certificates and records: Submit test certificates, and also retain results on site.

Execution details

Work method statements: Submit proposals for the methods and equipment to be used for the pavement works, including the following:

- Staging of the work, access and traffic control methods.
- Disposal of surface water, control of erosion, contamination and sedimentation of the site, surrounding areas and drainage systems.
- Methods and equipment for each operation.
- Sources of materials.
- Material stockpiles.
- Methods of concrete manufacture.
- Temperature control, curing and protection methods for concrete.

Mix design variation: If a variation is proposed, submit a further mix design report.

Concrete: Submit proposals for mixing, placing, finishing and curing concrete including the following:

- Addition of water at the site.
- Changes to the plastic concrete mix.
- Curing and protection methods.
- Cutting or displacing reinforcement, or cutting hardened concrete.
- Handling, placing, compaction and finishing methods and equipment, including pumping.
- Sequence and times for concrete pours, and construction joint locations and relocations.

Cores, fixings and embedded items: If required, submit shop drawings showing the proposed locations, clearances and cover, and indicate any proposed repositioning of reinforcement.

Cutting or coring: If cutting or coring of hardened concrete is proposed, provide details.

Sawn joints: Submit proposed methods, timing and sequence of sawing joints.

Damaged galvanizing: If repair is required, submit proposals to AS/NZS 4680 Section 8.

Splicing: If splicing not documented is proposed, submit details.

Welding: If welding of reinforcement is proposed, provide details and give notice before welding reinforcement.

Joint sealants: Submit proposals for installation methods and sealant performance.

Concrete placing: Submit proposals for size of the area to be placed and the spacing of planned construction joints before placement commences.

Crack assessment: If unplanned cracks occur in the finished pavement, submit proposals for investigation.

Surface repair method: If required, submit details of the proposed method before commencing repairs.

Trial section: Submit trial pavement.

Products

Aggregates: Nominate the source for all aggregates proposed.

Reinforcement: Submit the manufacturer's certificate of compliance with AS/NZS 4671, or submit test certificates from an independent testing authority.

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.

Subcontractors: Submit names and contact details of proposed pre-mixed concrete suppliers, and alternative source of supply in the event of breakdown of pre-mixed or site mixed supply.

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

Conduct all testing and inspections as detailed in the relevant ITCP.

2 PRODUCTS

2.1 REINFORCEMENT

Steel reinforcement

Standard: To AS/NZS 4671.

To Structural Engineers specification.

2.2 AGGREGATE

Characteristics

Standards: AS 2758.1.

Quality: Provide at least 40% by mass of the total aggregates in the concrete mix of quartz sand aggregate having a nominal size of less than 5 mm and containing at least 70% quartz by mass.

Durability: All constituent, fraction of constituent or aggregates to conform to AS 1141.22 and the following:

- Wet strength not less than 80 kN.
- 10% Fines Wet/Dry Variation not to exceed 35%.

Recycled concrete aggregate (RCA): Use coarse aggregates from demolition concrete or RCA.

Blending: If blending coarse RCA with natural aggregates, make sure substitution rates are below 30%.

2.3 CEMENT

General

Standard: To AS 3972.

Transport: Cement in watertight packaging and 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.

2.4 WATER

General

Standard: Chloride ion to AS 3583.13 and sulphate ion to AS 1289.4.2.1.

Quality: Water used in the production of concrete to be potable, free from materials harmful to concrete or reinforcement, and be neither salty nor brackish.

Limits: Not containing more than:

- 600 parts per million of chloride ion, determined to AS 3583.13.
- 400 parts per million of sulphate ion, determined to AS 1289.4.2.1.

2.5 ADMIXTURES

General

Standard: Chemical admixtures to AS 1478.1.

Quality: Provide admixtures 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 air temperature and setting time in conformance with the manufacturer's recommendations.

Types of admixtures

Air entraining agent: Adjust mix for workability allowing up to 5% air entrainment.

Warm season retarder: During the warm season, (October to March inclusive), use a lignin or lignin-based (ligpol) set-retarding admixture (Type Re or Type WRRe) as approved to control slump within the limits stated in Concrete mix, properties.

Cool season retarder: During the cool season, (April to September inclusive), use only a lignin or lignin based set-retarding admixture containing not more than 6% reducing sugars (Type WRRe complying with AS 1478.1).

2.6 CURING COMPOUNDS

General

Curing compounds: To AS 3799 and AS 1160, Type 2, white pigmented or containing aluminium reflective pigments.

Sheet material covering: To ASTM C171, white opaque or clear polyethylene film, or white burlap-polyethylene sheet, or equivalent material.

3 EXECUTION

3.1 GENERAL

Traffic control

Traffic restriction: Do not allow traffic or construction equipment other than those associated with testing, sawcutting, cleaning or joint sealing on pavement for minimum 10 days after placing, or when the concrete has reached compressive strength of at least 20 Mpa, and joints have been completely sealed.

3.2 SUBGRADE

Preparation

Conformance: Prepare subgrade in conformance with the *0222 Earthwork* worksection.

Extent: Prepare a uniform subgrade for the full pavement formation, extending at least to the back of kerbs.

Reinstatement: Make sure of uniformity for backfilling of any utility trenches.

3.3 SUBBASE

Thickness

To Structural Engineers specification.

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.

Unbound subbase materials and installation: Conform to the *0271 Pavement base and subbase* worksection.

Bound subbase materials and installation: Conform to the *0271 Pavement base and subbase* worksection.

Tolerance and friction reduction

Tolerance: Subbase finished surface level, + 0 mm to - 10 mm.

Friction reduction: Provide 200 µm thick polyethylene sheeting with 200 mm taped minimum laps and/or a 20 mm thick layer of sand (silt and clay material less than 5%) directly beneath the concrete pavement.

3.4 CONCRETE MIX

Standard
Concrete mix and supply: To AS 3600 Section 17 and AS 1379.

Properties
Concrete pavement thickness: Minimum 75mm

Workability: Slump values to conform to the following:

- Fixed form paving with manual operated vibration: 50 to 60 mm.
- Drying shrinkage: Maximum 450 µε after 21 days of air drying.

Elapsed time delivery
General: Make sure that the elapsed time between the wetting of the mix and the discharge of the mix at the site is in conformance with the **Elapsed delivery time table**. Do not discharge at ambient temperature below 10°C or above 32°C.

Elapsed delivery time table

Concrete temperature at time of discharge (°C)	Maximum elapsed time (hours)
10 – 24	2.00
24 – 27	1.50
27 – 30	1.00
30 – 32	0.75

Site mixed supply
Emergencies: If mixing by hand is carried out, provide details.

Plant: Mix concrete in a plant located on the construction site.

Pre-mixed supply
Addition of water: Do not add water.

Transport: Make sure the mode of transport prevents segregation, loss of material and contamination of the environment, and does not adversely affect placing or compaction.

Concrete delivery docket: For each batch, submit a docket listing the information required by AS 1379 clause 1.7.3, and the following information:

- Any binders or additives.
- Method of placement and climate conditions during pour.
- Name of concrete delivery supervisor.
- The concrete element or part of the works for which the concrete was ordered, and where it was placed.

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 NATA registered laboratory.

Concrete testing methods
Slump: Test at least one sample from each batch before placing concrete from that batch in the work.

- Standard: To AS 1012.3.1.
- Maximum slump variation: ± 10 mm.

Compressive strength: Test to AS 1012.8.1.

Drying shrinkage: Test to AS 1012.8.4 and AS 1012.13.

Flexural strength: To AS 1012.8.2 and AS 1012.11.

Acceptance criterion: The average strength of any set of 3 consecutive project samples must be equal to or greater than the specified minimum value.

Project assessment sampling frequency table

Number of batches for each type and grade of concrete per day	Minimum number of samples
1	1
2-5	2
6-10	3
11-20	4
each additional 10	1 additional

3.6 INSTALLATION

Junctions with existing pavements
Trimming: Where the pavement is to be joined to an existing pavement, remove a strip of the existing pavement at least 300 mm wide for its full depth and trim the edge vertically before placing new pavement material.

Existing sealed pavement: Trim the seal to a neat edge.

Fixed formwork
Description:

- Steel forms.
- Seasoned, dressed timber planks, free of warps, bends or kinks, with the full width of their top edges covered with steel angle sections finishing flush with the form face.

Depth: Equal to the edge thickness of the slab and in one piece.

Tolerances on position:

- Absolute level tolerance: ± 5 mm.
- Relative level tolerance: ± 5 mm.
- Horizontal tolerance: ± 10 mm (maximum departure of face 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. Clean the reinforcement to remove all traces of release agent.

Re-use: Clean and recoat the forms each time before placing concrete.

Keyways: Form the keyways of keyed construction joints using steel 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 proprietary concrete, metal or plastic supports to AS/NZS 2425 and as follows:

- 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, or are used with galvanized or zinc-coated reinforcement.
- Minimum spacing:
  . Bars: ≤ 60 diameters.
  . Fabric: ≤ 800 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 project beyond reinforcement mats or cages, through formwork or from cast concrete, provide a plastic protective cap to each bar until it is incorporated into subsequent work.
- Tying: Secure the reinforcement against displacement by tying at intersections with either wire ties, or clips. Bend the ends of wire ties away from nearby faces of forms so that the ties do not project 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, reposition but do not cut reinforcement, and maintain cover to reinforcement.

Isolation: Isolate embedded items so that water cannot track 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 placing. Hand spread concrete using shovels, not rakes.

Remove: Any water ponding on the ground.

Placing sequence: Commence from one corner (usually the lowest point) and proceed continuously out from that point.

Weather: Do not place concrete in 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
General: Keep on site and make available for inspection a log book recording each placement of concrete, including the following:

- Date of concrete placement.
- Delivery dockets noting the specified grade and source of concrete.
- Slump measurements to AS 1012.3.1.
- The portion of work.
- Volume placed.

Rain
General: During placement and before setting, do not expose concrete to rain.

Protection: Protect surface from damage by covering until hardened.

Concrete placing in cold weather
Cement: Do not use high alumina cement.

Placing concrete: Maintain the temperature of the freshly mixed concrete at 5°C.

Formwork and reinforcement: Before and during placing maintain temperature at 5°C.

Severe weather: If severe weather conditions are predicted, use high early strength cement.

Temperature control: Heat the concrete materials, other than cement, to the minimum temperature necessary to ensure that the temperature of the placed concrete is within the limits specified.

Admixtures: Do not use calcium chloride, salts, chemicals or other material in the mix to lower the freezing point of the concrete.

Frozen materials: Do not allow frozen materials or materials containing ice to enter the mixer, and keep free of frost and ice any forms, materials, and equipment coming in contact with the concrete.

Maximum temperature of water: 60°C when it is placed in the mixer.

Plastic concrete: Prevent plastic concrete from freezing, without using salts or chemicals.

Concrete placing in hot weather
Handling: Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses.

Hot weather placing: Maintain freshly mixed concrete at the following temperature limits:

- Normal concrete in footings, beams, columns, wall and slabs: ≤ 35℃.
- Concrete section: ≥ 1 m in all dimensions: ≤ 27℃, except where concrete strength is 40 Mpa or greater.
- Section thickness > 600 mm: ≤ 27℃.

Formwork and reinforcement: Before and during placing maintain temperature at 35°C.

Severe weather: If ambient shade temperature more than 38°C, do not mix concrete.

Temperature control: Select one or more of the following methods of maintaining the specified temperature of the placed concrete:

- Cool the concrete using liquid nitrogen injection before placing.
- Cover the container in which the concrete is transported to the forms.
- Spray the coarse aggregate using cold water before mixing.
- Use chilled mixing water.

Evaporation control barriers: Erect barriers to protect freshly placed concrete from drying winds.

3.8 CONCRETE PRIMARY FINISH

General

Finishing: Do not commence finishing until all bleed water has evaporated from the surface.

Commence: Immediately after placement and spreading and compaction of the plastic concrete, start finishing operations to achieve the documented finish.

Unformed surfaces

General: Strike off, screed and level slab surfaces to finished levels, to the tolerance class and finish required. Finishes may be selected from exposed aggregate finish, cove finish, or broom finish.

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.

Surface repairs

Method: If surface repairs are required, submit proposals.

3.9 CONCRETE CURING

General

Curing: Commence curing as soon as possible after finishing and extend for a minimum period of 3 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.

Cold weather curing

General: Maintain concrete temperature between 10°C and 20°C for curing period.

Hot weather curing

Curing compounds: If it is proposed to use curing compounds, provide details.

Protection: Select a protection method as applicable.

- If the concrete temperature exceeds 25°C or if not protected against drying winds, protect the concrete using a fog spray application of aliphatic alcohol evaporation retardant.
- If ambient shade temperature is more than 35°C, protect from wind and sun using an evaporative retarder until curing is commenced.
- Immediately after finishing, either cover exposed surfaces using an impervious membrane or hessian kept wet until curing begins, or apply a curing compound.

Curing methods

Covering sheet method: Immediately after finishing operations, 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: Immediately after finishing operations and when the concrete has set sufficiently not to be damaged by the curing process, 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.

Self-levelling toppings: To AS 3799, if also used for curing.

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.

Curing compound
Application: 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.

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 to the Engineer’s specification and drawings.

Contraction joints
Installation: Construct transverse and longitudinal contraction joints by early power sawing or by placing an insert in the fresh concrete.

Dowelled joints
Dowelled contraction joint: Dowel dimensions to the Engineer’s specification. Place dowels at 300 mm centres orthogonal to the joint direction and parallel to the pavement surface, accurate alignment is critical, ensure proper field supervision.

Dowel assembly: Use a dowel-assembly support frame firmly secured to the subbase during concrete placement. Prevent the dowel assembly support frame from passing through the joint. Do not insert dowels during the placement of concrete.

Debond dowel: Coat with a debonding coating to 0.5 length + 25 mm. Embed the unpainted half of the dowels in the slab placed first.

Movement: Do not distort or displace beyond the alignment tolerances under testing or during construction. Do not remove and replace dowels in pre-formed holes.

Tie bar joints
Longitudinal contraction joints: Tie bar dimensions to Engineers specification. Place tie bars at 800 mm centres. Alignment accuracy of tie bars is not critical.

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

Requirement: Provide formed full depth joints around structures and features which project through, into or against the pavement, and elsewhere as required.

Dowelled expansion joints: Cap dowels at one end with a compressible material.

Formed joints

Full depth joints: Form the edge of the concrete placed first to provide a smooth, vertical face. After stripping and cleaning fix the joint filler with a suitable waterproof adhesive to the face of the slab, and place the adjoining concrete after the adhesive has set.

Weakened plane joint: Cut a crack-inducing groove by using a suitable tool into the plastic concrete during finishing of the concrete surface. Compact and refinish the plastic concrete around the groove after forming the joint.

Rebated groove joints: Form the rebate by securely fixing removable steel or timber form strips to the form or forms on the slab which is placed first, so that the top of the steel strip is flush with the top of the form. After stripping and cleaning, fix the joint filler in the rebate after placing the adjoining concrete.

Sawn joints

Weakened plane joint: Saw the hardened concrete to depth at least ¼ to ⅓ of the pavement thickness and to a uniform width in the range of 3 to 5 mm as follows:

- Timing: Commence sawing, regardless of time or weather conditions, as soon as the concrete has hardened sufficiently to permit cutting with only minor ravelling of the edges of the saw cut. Complete sawing no later than 24 hours after concrete placement.
- Sequence: If possible, saw every third transverse joint initially, then saw the intermediate joints. Start where concrete placement has commenced.
- Cracking: If the concrete has already cracked near the location chosen for a joint, do not saw a joint in that location. If a crack develops ahead of the saw cut, discontinue sawing and submit proposals for extra sawn joints. If uncontrolled cracking occurs, suspend concrete placing.
- Stand-by machines: Provide one stand-by sawing machine for each machine planned to be used.
- Cleaning and protection: Immediately after each joint is sawn, flush the saw cut and adjacent concrete surface using water, until the waste from sawing is removed from the joint. Temporarily caulk the joint using plastic or rubber tubing, or a suitable Tee shaped extrusion. Leave the caulking in place until grooving and sealing.

Rebated groove joints: Saw straight, parallel sided grooves for joint seals on top of and centred on the sawn weakened plane joints.

- Timing: Commence sawing after the curing period has ended, immediately before joint sealing. Saw during daylight hours.

Protection: Where there is a time elapse after sawing and before joint sealing, install a thin-splined rubber strip with a free width slightly larger than the saw cut at the bottom of the saw cut after washing slurry from sawn groove to temporarily prevent ingress of solid material.

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.

Curing sealer compound: If using the sealer as a curing compound, apply directly after finishing.

3.11 COMPLETION

Completion tests
Slip resistance of completed installation: To AS 4663.

Protection
General: Keep traffic, including construction plant, off the pavement entirely during curing. Permit access only to necessary construction plant vehicles which conform to the predetermined load limits appropriate to the use of the concrete.

Rectification
Reinstating adjacent surfaces: Reinstate surfaces next to new pavements and associated elements. If an existing road pavement has been disturbed, trim back to a straight and undisturbed edge, 250 to 300 mm from and parallel to the new concrete for the full depth of the slab.

Concrete pavement: If pavement does not conform to the tolerances, submit rectification proposal.

Unplanned cracking:

- 0.3 mm wide crack is acceptable.
- > 1 mm must be assessed, submit a proposal for possible cause and rectification processes.

Cleaning
Excavated material: Remove from site.

0275 PAVING – MORTAR AND ADHESIVE BED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide paving as shown on the drawings.

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:

- *0171 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. Portland 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 straight edge 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

Execution details

Grouting: Submit proposals for grouting methods and materials.

Margins: If it appears that minor variations in joint widths or overall dimensions will avoid cut pavers, submit a proposal.

Operation and maintenance manuals

General: Submit a manual describing care and maintenance of the paving, including procedures for maintaining the slip-resistance grading stating the expected life of the slip-resistance grade.

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:

- Size: ≥ 2 m^2.
- Include samples of junction details and trim.
- Preserve each panel until related work is complete.

Tests

Site tests: Submit results, as follows:

- Slip resistance of completed installation.
- Stone paver properties tests.
- Salt efflorescence of paver prototype testing.

1.7 INSPECTION

Notice

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

- Substrate immediately before paving.
- Trial set-outs before execution.
- Control joints before sealing and grouting.

2 PRODUCTS

2.1 GENERAL

Marking

Identification: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern.

2.2 ADHESIVES

General

Standard: To AS ISO 13007.1.

Type

General: Provide adhesives compatible with the materials and surfaces to be adhered.

Prohibited uses: Do not provide the following combinations:

- 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: To AS 3972.

- Type: GP.
- Iron salt content:
  - White cement: ≤ 1%.
  - Off-white cement: ≤ 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.

2.4 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.

2.5 PAVERS

Concrete and clay pavers

Standard: To AS/NZS 4455.2.

Properties: To AS/NZS 4455.2 Table 2.8.

Stone pavers

Description: Provide sound stone pavers of uniform quality. Reject stone pavers with any of the following defects liable to affect strength and durability:

- Vents.
- Cracks.
- Fissures.
- Seams.
- Porous inclusions.
- Foreign material.
- Loose surface material.
- Discolouration.

Matching: Select for optimum matching of colour and pattern.

Split flagging thickness: Minimum 50 mm, maximum 75 mm.

Face size: Use smaller sizes for pathways and larger sizes for open areas and maintain traditional stone flagging appearance.

Stone setts

Description: Igneous stone, cubed, cobble-style setts.

2.6 OTHER MATERIALS

Tactile ground surface indicators

Standard: To AS/NZS 1428.4.1.

Control joint types

General: As documented in the **Control joints schedule**.

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.

Sandstone flagging
Mortar bed thickness: Minimum 50 mm to maximum 60 mm.

Laying pattern: Random, with smaller stones filling the gaps to produce roughly uniform joint widths. Lay flags and fill joints in one operation.

Stone setts dry bed
Description: Lay and tamp setts on to a dry sand and cement mix, compact and moisten as follows:

- Mortar bed mix proportion (cement:sand): 1:3 screeded to the level required to allow setts to be firmly tamped.
- Select the top side of the sett for surface uniformity and tap into the mix to the pre-compaction position.
- Compact with a hand ram or mechanical compactor.
- Water spray the surface and allow the bedding to harden.
- Grout joints.

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

Spares

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.

Cleaning

Completion: Clean progressively and leave pavements clean on completion.

0276 SEGMENTAL PAVERS – SAND BED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide segmental paving.

Design

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 segmental 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 worksection(s):

- *0171 General requirements*.
- *0222 Earthwork*.
- *0271 Pavement base and subbase*.

1.3 STANDARDS

General

Concrete and clay segmental pavers: To AS/NZS 4455.2.

Slip resistance

Classification: To AS 4586.

Slip resistance measurement of completed installations: To AS 4663.

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 usually constituting the uppermost structural element of a pavement on which the surfacing may be placed.

- Clay segmental pavers: Manufactured from clay, shale or argillaceous materials and which may be mixed with additives. Clay pavers may have square, bevelled (chamfered), rounded or rumbled edges. The pavers are generally rectangular in shape, with the length twice the width, plus 2 mm.
- 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 and rely on dimensional accuracy and accuracy of laying to develop interlock.
- Density ratio: Percentage of the maximum density at optimum moisture content as determined by AS 1289.5.2.1.
- Lippage: Height deviation between adjacent pavers or other surface features.
- 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

Execution details

Base material: Submit test results on quality, grading and compaction.

Segmental pattern: If it appears that minor variations to joint widths will minimise cutting, submit proposals.

Products

Compliance certificate: Submit compliance certificates for the pavers, as documented.

Samples

General: Submit labelled samples of pavers, illustrating the range of variation in colours and finish.

Tests

Type tests: Submit results, as follows:

- Type test slip resistance of tiles to AS 4586.

Other tests: Submit results, as follows:

- Site slip resistance test of completed installations to AS 4663.
- Accelerated wear test.

1.7 INSPECTION

Notice

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

- Completed base preparation.
- Completed trial set-out for segmental paving.

- Completed paving.

2 PRODUCTS

2.1 MARKING

Identification

General: Deliver materials to the site in the manufacturer's original sealed packaging, legibly marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern. Provide technical data sheets if not shown on labels.
- Handling and installation instructions.
- Safety data sheets.

2.2 SAND

Bedding sand

Quality: Free of deleterious material, such as soluble salts which may cause efflorescence.

Grading: To the **Bedding sand grading table** when 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** when 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

2.3 CONCRETE SEGMENTAL PAVERS

Properties

Requirements: To AS/NZS 4455.2 Table 2.8.

Permeable interlocking concrete pavers: To CMAA PE01.

Proprietary product: As documented.

2.4 CLAY SEGMENTAL PAVERS

Properties

Requirements: To AS/NZS 4455.2 Table 2.8.

Proprietary product: As documented.

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.

Subgrade preparation: To the *0222 Earthwork* worksection.

Drainage of subgrade

Subgrade drainage: Prepare piped or channelled stormwater and subsoil as required.

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 the *0271 Pavement base and subbase* worksection.

3.3 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.

3.4 LAYING PAVING

General
Segmental 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.

3.5 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.

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.

0310 CONCRETE

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- The soil classification, for the site, shall be determined through on site soil testing.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.

1.2 CROSS REFERENCES

Conform to the following:

- *0171 General requirements.*
- *0184 Termite management.*
- *Inspection Test and Conformity Plan (ITCP).*
- *Structural Engineer's documentation.*

1.3 STANDARDS

Formwork design and construction, formed surfaces: To AS 3610 and AS 3610.1.

Plywood formwork: To AS 6669.

Profiled steel sheeting including shear connectors: To AS 2327.1.

Specification and supply of concrete: To AS 1379.

Reinforced concrete construction: To AS 3600.

Residential ground slabs and footings: To AS 2870.

Cement: To AS 3972 Type GP unless otherwise noted in the Structural Engineer's documentation.

Curing compounds: To AS 3799.

Slip resistance classification: To AS 4586.

Slip resistance measurement of completed installations: To AS 4663.

1.4 INTERPRETATION

For the purposes of this worksection the following definitions apply:

- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Average ambient temperature: Average value of the daily maximum and minimum ambient temperatures over the relevant period at a site.
- Weather – Cold: Ambient shade temperature less than 10℃.
- Weather – Hot: Ambient shade temperature greater than 30℃.

1.5 TOLERANCES

Quality of formed surface finish: To AS 3610.1 Table 3.3.2 for the appropriate class of finish.

Unformed surfaces: Flatness of horizontal concrete shall not exceed the following:

- Floors to receive carpet: The maximum deviation under a 3m straight edge shall be 5mm and under a 150mm straight edge shall be 1mm, when laid in any direction.
- Floors specified or scheduled to receive resilient finishes: The maximum deviation under a 2 metre straight edge shall be 4mm and under a 150mm straight edge shall be 1mm, when laid in any direction.
- Floors to be exposed in the finished work: The maximum deviation under a 3m straight edge laid in any direction shall be 6mm.
- All other as-laid floors: The maximum deviation under a 3m straight edge laid in any direction shall be 12mm.
- Rectify non-conforming 'as laid' concrete by suitable procedures, such as levelling compounds or grinding.

1.6 SUBMISSIONS

Prior to submitting the following samples for acceptance, provide details of the concrete mix from the concrete supplier for all concrete types.

In accordance with Section 0171, provide samples of the following:

- Sample discs from the concrete supplier of the range of concrete mixes/ colours available from which the desired mix/ colour for the project can be selected.

- 300mm x 300mm sample of each type of off-form and worked concrete finish using proposed formwork, concrete mix, oxide admix and surface treatments as specified and as applicable.

1.7 SAMPLE PANELS

Prior to commencement, construct sample panels of the following, where applicable:

- Class 2 off form concrete finish, nominally 1200mm x 1200mm, with regularly spaced form ties, and demonstrating the quality of finish and colour consistency to be achieved in the finished work.

- Polished concrete slab finish, nominally 1200mm x 1200mm, including applied finish, showing variations in the level of grit used in the grinding process.

- Washed concrete slab finish, nominally 1200mm x 1200mm, including applied finish.

Obtain acceptance prior to commencing any subsequent work. If a panel is rejected, construct further sample panels, as necessary, until acceptance is obtained.

1.8 OTHER SUBMISSIONS

Submit names and contact details of proposed suppliers and subcontractors including details of experience with similar projects.

For other than profiled steel sheeting composite formwork, submit certification by a professional engineer experienced in formwork design verifying conformance of the design.

Submit certification by a professional engineer experienced in formwork design and construction verifying conformance of the completed formwork, including the suitability of the formwork for the documented surface finish class.

The design of the formwork, other than profiled steel sheeting composite formwork, is the Contractor's responsibility. This applies to all formwork types, including conventional, proprietary (non-composite profiled steel sheeting) or purpose made formwork.

Submit formwork layout drawings prior to commencement of off-form concrete works on Site.

1.9 SLIP RESISTANCE AND SLIP RESISTANCE TESTING

Pedestrian areas shall be stable, safe and minimise the risk of slipping or tripping due to slippery surfaces or misaligned joints. Slip resistances shall comply with the requirements of HB 197 and HB 198.

Provide slip resistance test certificates to confirm that slip resistance values are in accordance with AS 4663.

Arrange and pay for on-Site slip resistance testing of all types of concrete floor surfaces that are left exposed in the finished work and in sufficient number to cater for all areas and conditions including ramps, steps, entrances etc. Testing shall be undertaken by a registered testing laboratory. Tests shall include wet pendulum and dry floor friction testing in accordance with AS 4663.

1.10 INSPECTION

Conduct all testing and inspections as detailed in the relevant ITCP.

2 PRODUCTS

2.1 GENERAL

Concrete mix shall contain no fly ash.

2.2 CLASS 2 OFF FORM CONCRETE

Class 2 concrete: Concrete with finish of uniform quality and texture, in accordance with AS 3610.1.

Making good to off form concrete shall be minimal and consistent to an accepted sample. As far as possible, the finished surface shall be achieved without making good. The improvement of the surface finish by the Contractor (eg filling noticeable surface blemishes) shall be agreed prior to any work being carried out.

Formwork tie-rod holes shall be at uniform centres and in-line, horizontally and vertically, with dimpled finish.

All off-form concrete that is visible in the finished work shall achieve this level of finish.

2.3 OFF FORM CONCRETE FINISH - CLASS 3

Class 3 concrete shall be in accordance with AS 3610.1.

Off-form concrete that is concealed in the finished work shall achieve a class 3 level of finish, unless otherwise accepted by the Superintendent.

2.4 PRE-MIXED CONCRETE

To AS 1379 by the batch production process.

Maximum slump of concrete shall be 100mm, unless agreed otherwise.

2.5 LOST FORMWORK

Lost formwork, where required, shall be free of timber or chlorides and shall not impair the structural performance of the concrete members.

2.6 PROFILED STEEL SHEET COMPOSITE FORMWORK

Profiled steel sheet composite formwork shall be hot-dipped zinc-coated sheet steel to AS 1397. Minimum steel grade: G550. Corrosion protection: Zinc coating weight: Z350 for non-aggressive areas and Z450 for severe and aggressive environments where a build up of airborne corrosive contaminants can affect the coating.

Accessories: Adopt material and corrosion protection to match the profiled steel sheeting.

2.7 PLYWOOD FORMWORK

Plywood sheeting shall be to AS 6669.

Use the appropriate grade for the documented design dimensions, loading and surface quality.

Seal the joints consistent with the documented surface finish class.

Use unused full sized boards for all Class 2 off-form concrete.

Confirm board layouts for all Class 2 off-form concrete. Provide layout drawings for approval. Minimise jointing wherever possible.

2.8 VAPOUR BARRIERS

Vapour barriers to slabs: To AS 2870 clause 5.3.3.

Vapour barrier shall comprise medium impact resistant polyethylene film.

Minimum thickness: 0.2mm.

3 EXECUTION

3.1 POLYMERIC FILM UNDERLAY

Under slabs on ground, including integral ground beams and footings, provide a vapour barrier or, in areas prone to rising damp or salt attack, a damp-proofing membrane.

Install in accordance with AS 2870.

3.2 FORMWORK

Before placing concrete, remove free water, dust, debris and stains from the formwork and the formed space.

Chamfer at re-entrant angles, and fillet at corners. Face of bevel: 25mm.

Keep void formers dry until time of use. Place them on a firm level surface and place reinforcement and concrete with minimum delay.

3.3 REINFORCEMENT

Provide chairs, spacers, stools, hangers and ties, as follows:

- Able to withstand construction and traffic loads.
- Constructed from plastic or concrete.

Spacing of supports to reinforcement:

- Bars: ≤ 60 diameters.
- Mesh: ≤ 800 mm.

Prevent damage to waterproofing membranes or vapour barriers. If appropriate, place a metal or plastic plate under each support. In special conditions, pieces of stainless steel reinforcement, welded to standard reinforcement, may be used in place of standard supports.

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.

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 so that the ties do not project into the concrete cover.

Splice as follows:

- Mesh sheets: 225mm.
- Trench mesh: 500mm.
- Bars: Greater of either 500mm or 25 x bar diameter.
- Strip footing intersections and corners: Full width of intersecting reinforcement.

Cover to reinforcement shall comply with AS 2870 or as otherwise nominated by the Structural Engineer.

3.4 CONCRETE

Placing

Avoid segregation and loss of concrete, and minimise plastic settlement. Maintain a nominally vertical and plastic concrete edge during placement.

Place concrete in layers not more than 300 mm thick. Compact the following layer into previous layer before previous layer has taken initial set.

Compaction

Use immersion and screed vibrators accompanied by hand methods as appropriate to remove entrapped air and to fully compact the mix.

Do not allow vibrators to contact set concrete, reinforcement or items including pipes and conduits embedded in concrete. Do not use vibrators to move concrete along the formwork. Avoid causing segregation by over-vibration.

Rain

During placement and before setting, protect the surface from damage.

Placing in hot and cold weather

Maintain temperature of freshly mixed concrete, formwork and reinforcement between 5°C and 35°C.

Select one or more of the following methods of maintaining the temperature of the placed concrete:

- Heat the concrete materials, other than cement, to the minimum temperature necessary so that the temperature of the placed concrete is within the documented limits.
- Cover the horizontal transport containers.
- Spray the coarse aggregate using cold water prior to mixing.
- Use chilled mixing water.

Erect barriers to protect freshly placed concrete from drying winds.

3.5 CURING

General

Taking into account the average ambient temperature at site over the relevant period affecting the curing and adopt procedures to ensure the following:

- Cure continuously from completion of finishing until the total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above 10°C, conforms to the following:
  - . Fully enclosed internal surfaces: 3 days.
  - . Other concrete surfaces: 7 days.
- Prevent rapid drying out at the end of the curing period.
- Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.

Curing compounds

Provide a uniform continuous flexible coating without visible breaks or pinholes, which remains unbroken at least for the required curing period after application.

Do not use wax-based or chlorinated rubber-based curing compounds on surfaces forming substrates to applied finishes, concrete toppings and cement-based render.

Cold weather curing

Maintain concrete surface temperature above 5°C for the duration of the curing period.

Hot weather curing

Immediately after finishing, either cover exposed surfaces using an impervious membrane or hessian kept wet until curing begins, or apply a curing compound.

Water curing

Select a method of ponding or continuously sprinkling water to prevent damage to the concrete surface during the required curing period.

3.6 JOINTS

Do not relocate or eliminate construction joints, or form undocumented construction joints. If emergency construction joints are made necessary by unforeseen interruptions to the concrete pour, submit a report on the action taken.

Roughen and clean the hardened concrete joint surface. Remove loose or soft material, free water, foreign matter and laitance. Dampen the surface just before placing the fresh concrete and coat with a neat cement slurry.

Where concrete slabs are supported on masonry, provide proprietary slip joints.

3.7 FORMED SURFACES

Do not damage concrete works through premature removal of formwork.

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.

If surface repairs are required, submit proposals.

3.8 UNFORMED SURFACES

Float the concrete to an even surface with no ridges or steps. When the concrete is suitably stiff, trowel, by hand trowel or power float, to give a uniform, smooth surface, free from trowel marks and other blemishes and suitable to receive the nominated flooring material.

Generally, hand trowelling shall be used for areas to receive tiled finishes and power float shall be used for areas to receive sheet flooring, such as carpet, vinyl, or sealers.

3.9 HONED/POLISHED FINISH

Honed/ polished concrete floors shall be in accordance with the requirements of the CCAA publication 'The Specification of Honed or Polished Concrete Finishes'.

When cured, the concrete shall be ground to expose the aggregate and honed/ polished as necessary.

3.10 WASHED FINISH

Washed concrete finish shall be in accordance with the requirements of the CCAA Publication 'Exposed Aggregate Finishes for Flatwork'.

Washed finish shall be achieved by blast cleaning the concrete surface to expose the aggregates. The blast process shall be agreed prior to commencement. 3mm maximum aggregate exposure.

Slip resistance: Wet pendulum test value: Minimum P4.

3.11 COMPLETION

Remove formwork, other than profiled steel sheeting composite formwork and lost formwork, including formwork in concealed locations.

Do not disturb formwork until concrete is hardened enough to withstand formwork movements and removal without damage.

Leave formwork for suspended structures in place after pouring concrete for the following periods:

- Vertical surfaces: 2 days.
- Bottom surfaces: 7 days with shoring and backprops left in position for 21 days.

Protect the concrete from damage due to construction loads, physical and thermal shocks and excessive vibrations, particularly during the curing period.

Protect finished concrete surfaces and applied finishes from damage.

0331 MASONRY CONSTRUCTION

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

Conform to the following:

- *0171 General requirements.*
- *0184 Termite management.*
- *0342 Light steel framing.*
- *0382 Light timber framing.*
- *0471 Insulation and pliable membranes.*
- *0611 Rendering.*
- *Inspection Test and Conformity Plan (ITCP).*
- *Structural Engineer's documentation.*

1.3 STANDARDS

Materials and construction: To AS 4773.1 and AS 4773.2.

1.4 TOLERANCES

To AS 3700 Table 12.1.

1.5 SUBMISSIONS

In accordance with Section 0171, provide samples of the following:

- Two samples of each masonry unit type, including bricks, blocks and stone in a 1m x 1m assembled prototype.
- Samples of mortar.
- Samples of joint sealants.
- Two of each type of accessory.

1.6 INSPECTION

Conduct all testing and inspections as detailed in the relevant ITCP.

2 PRODUCTS

2.1 DURABILITY

Exposure environment: Mild (Inland), Moderate (Most parts of Melbourne, Adelaide and Hobart), Marine (100m to 1km from sheltered bay and 1km to 10km from surf beach) or Severe marine (up to 100m from sheltered bay and up to 1km from surf beach), to suit the location of the Site and to AS 4773.1 clause 4.3.

Exposure locations: Interior/ Exterior to AS 4773.1 clause 4.4.

2.2 CLAY MASONRY UNITS

To AS/NZS 4455.1 and AS/NZS 4455.3.

Minimum age of clay bricks: 7 days.

Salt attack resistance grade: To AS 4773.2 Table 2.1.

2.3 CONCRETE BLOCKWORK UNITS

Smooth faced, monolithic, concrete blocks.

- Hollow block units core filled and reinforced as necessary.
- Nominal face size: 390mm x 190mm.
- Finish: Smooth.
- Colour: Grey.

Bond: Stretcher.

Joints: Ironed (where exposed), flush (where concealed), raked (where rendered).

2.4 STONE TYPES AND SELECTION

Sandstone defects: Minor shale laminae or interbeds and minor concentrations of carbonaceous material (tea leaves) are acceptable in visible faces at ground level. Neither defect is acceptable in carved or moulded work.

Granite: Igneous stone (e.g. granite) obtained from quarry stone extracted in blocks sufficiently large to suit the project requirements and containing no more than a small degree of microcracking.

Grading: Select stone of the designated quality grade.

Matching: Within each grade, select stone for the optimum matching of visual properties such as colour and pattern.

2.5 MORTAR MATERIALS

Cement: To AS 3972 Type GP, unless nominated otherwise.

Masonry cement: To AS 1316.

Sand: Fine aggregate with a low clay content and free from efflorescing salts, selected for colour and grading.

Proportions: To AS 4773.1 Table 3.1.

2.6 BUILT-IN COMPONENTS

Durability class: To AS 4773.1 Table 4.1.

2.7 STEEL LINTELS

Angles and flats: Sizes to AS 4773.1 Table 12.1.

Cold-formed lintels: Designed to AS/NZS 4600.

Corrosion protection: To AS/NZS 2699.3.

Galvanizing: Do not cut after galvanizing.

2.8 WALL TIES

To AS/NZS 2699.1. Type: A.

Corrosion protection: To AS/NZS 2699.1.

2.9 CONNECTORS AND ACCESSORIES

To AS/NZS 2699.2.

Corrosion protection: To AS/NZS 2699.2.

2.10 FLASHINGS AND DAMP-PROOF COURSES

To AS/NZS 2904.

Suitable flashings and DPCs: To AS 4773.2 Table 5.2.

3 EXECUTION

3.1 GENERAL

Protect masonry materials and components from ground moisture and contamination.

Masonry units shall be laid in a stretcher bond, unless nominated otherwise.

Provide special shapes where required for bond beams, lintels, corners, jambs, control joints, pilasters, headers and other special conditions.

Build in wall ties and accessories as the construction proceeds. If it is not practicable to obtain the required embedment wholly in the mortar joint in hollow masonry units, fill appropriate cores with grout or mortar.

In timber/ steel frame brick veneer construction, leave clearances between window frames and brick sill and between roof frames and the brick veneer as follows:

- Additional clearance: Accommodate additional shrinkage of unseasoned floor timbers.
- Single storey frames and ground floor windows (not for slab on ground): 10mm.
- Two storey frames and upper floor windows: 20mm.

3.2 STONE MASONRY

Perform the necessary cutting and shaping of stone to designated profiles including weathering, jointing, chasing, forming grooves and drilling for handling and fixing. Work the bed, face and back joints of the stone square and true. Achieve a clean sharp finish.

Regulate the rate of construction to eliminate joint deformation, slumping or instability.

3.3 CONSTRUCTION AT DIFFERENT RATES OR TIMES

Monolithic structural action: 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 so that monolithic structural action is obtained in the completed work.

3.4 MORTAR JOINTS

To AS 4773.1 clause 14.2.

Measure volumes, for mortar mixes, accurately to the documented proportions. Machine mix for at least six minutes.

Lay masonry units on a full bed of mortar, fill perpends solid and cut mortar flush.

Finish:

- Externally: Tool to give a dense water-shedding finish, either upstruck, flush or concave.
- Internally: If wall is to be plastered/ rendered, do not rake more than 10mm to give a key.

Thickness: 10mm.

Set out masonry with joints of uniform width and the minimum of cutting of masonry units.

When mortar is thumbprint hard, tool to the required finish.

Regulate the rate of construction to eliminate joint deformation, slumping or instability.

3.5 SET OUT

Construct masonry to the following modules:

- 75mm high units: 7 courses to 600mm.
- 90mm high units: 6 courses to 600mm.
- 190mm high units: 3 courses to 600mm.

3.6 FACEWORK

Clean progressively, as the work proceeds, to remove mortar smears, stains and discolouration. Do not erode joints if using pressure spraying. Diluted acid solutions may be used for cleaning, where required.

Where masonry of ranging colour is used in facework, distribute the colour ranges evenly to prevent colour concentrations and banding.

3.7 SILLS AND THRESHOLDS

Solidly bed sills and thresholds and lay them with the top surfaces drain away from the building.

Minimum size of units shall be three quarters full width.

3.8 SUBFLOOR WORK

Provide engaged or free standing unreinforced masonry piers to support bearers at 1800mm maximum centres.

Pier sizes shall be as follows:

Type	Minimum size (mm)
Engaged	230 x 110 bonded or tied to walls

Type	Minimum size (mm)
Freestanding up to 1500 mm high	230 x 230
Freestanding 1500 to 2700 mm high	350 x 350

In internal walls, below floor level, leave door-width openings beneath doorways to give access to underfloor areas.

Provide air vents, below damp proof course to internal and external walls, to give adequate cross ventilation to the space under suspended ground floors.

For subfloor ventilation, refer to BCA 3.4.1 and AS 4773.2 clause 6.2.

In cavity walls, provide matching vents in the internal leaves located as near as practicable to the air vents in the external leaves.

3.9 CAVITY WORK

Keep cavities clear at all times.

Fill the cavity with mortar to 1 course above adjacent finished (ground) level. Fall the top surface towards the outer leaf.

Provide minimum cavity widths in conformance with the following:

- Double masonry walls:
  . Generally: Minimum 50mm.
  . Where cavity insulation is used: Minimum 65mm or as otherwise recommended by the cavity insulation manufacturer.
- Masonry veneer walls: 40 mm between the masonry leaf and the loadbearing frame and 25 mm minimum between the masonry leaf and sheet bracing.

Do not close the cavity at the jambs of external openings.

Provide clean out bricks/ blocks at a minimum of 1.2m centres.

Install wall ties, connectors and accessories to prevent water passing across the cavity.

3.10 DAMP-PROOF COURSES

Provide 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: In the bottom course of the outer leaf, continuous horizontally across the cavity. Fastened to the inner frame 75mm 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 40mm and dress down over the membrane turned up against the wall.

Height: Not less than:

- 150mm above adjacent finished ground level.
- 75mm above finished paved or concrete area.
- 50mm above finished paved or concreted area and protected from the direct effect of the weather.

Lay in long lengths. Lap the full width of angles and intersections and 150mm at joints. Step as necessary, but not more than 2 courses per step for brickwork and 1 course per step for blockwork. Sandwich damp-proof courses between mortar.

Preserve continuity of damp-proofing at junctions of damp-proof courses and waterproof membranes.

3.11 FLASHINGS

Provide flashings as follows:

- Floors: Full width of outer leaf immediately above slab, continuous across cavity and up the inner face bedded in mortar, turned 30mm into the inner leaf 2 courses above for brick and 1 course for block. If the slab supports the outer skin and is not rebated, bed the flashing in a suitable sealant.
- Under sills: 30mm 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. Extend at least 150mm beyond the reveals on each side of the opening.
- Over lintels to openings: Full width of outer leaf immediately above the lintel, continuous across cavity, turned 30mm into the inner leaf 2 courses above for brick and 1 course for block or turned up against the frame and fastened to it. Extend at least 150mm beyond the ends of the lintels.
- At abutments with structural frames or supports: Vertical flash in the cavity from 150 mm wide material, wedged and grouted into a groove in the frame opposite the cavity.
- At jambs: Vertically flash jamb extending 75mm 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.

Any significant interruption of the cavity, including at conduits, should be flashed. Head and sill flashings shall not be taut across the cavity and threshold flashings shall be bedded in mortar to run vertically and horizontally, not diagonally.

Sandwich flashings between mortar except where on lintels.

Point up joints around flashings to fill voids.

3.12 WEEPHOLES

To AS 4773.2 clause 10.5.

Bushfire prone areas: To AS 3959. All vents and weepholes shall incorporate corrosion resistant wire mesh to prevent ingress of embers.

Provide weepholes, comprising plastic inserts with corrosion-resistant insect screens to match adjacent wall in colour, to external leaves of cavity walls in the course immediately above flashings, and cavity fill, and at the bottoms of unfilled cavities.

Maximum spacing: 1200mm.

3.13 WALL TIES

Spacing: To AS 4773.2 clause 9.7 and clause 10.6.

Wall ties shall be embedded at least 50mm into mortar ensuring that mortar cover is 15mm minimum to the outside face of the mortar.

3.14 CONTROL JOINTS

Provide contraction joints, expansion joints and articulation joints to AS 4773.2 Section 7.

Generally align joints with adjacent windows and doors, where possible, and in accordance with the Structural Engineer's documentation.

Clean the joints thoroughly and insert an easily compressible backing material before sealing.

Fill all joints with a gun-applied, flexible, UV resistant, sealant for a depth of at least two-thirds the joint width.

Provide stabilising ties at control joints and abutting structural elements, including columns, beams and slab soffits.

3.15 REINFORCED AND GROUTED BLOCKWORK

Reinforcement and core filling to blockwork shall be in accordance with the Structural Engineer's documentation.

Provide purpose-made cleanout blocks or machine cut a cleaning hole at the base of each grouted core. Locate on the side of the wall which is to be rendered or otherwise concealed.

Clean cores to dislodge mortar protruding from the inside of blocks and mortar droppings from reinforcement. Remove through the clean-out blocks.

Do not commence grouting until grout spaces have been cleaned out and the mortar joints have attained sufficient strength to resist blow-outs.

Limit the height of individual lifts of grout, in any pour, to ensure that the grout can be thoroughly compacted to fill all voids.

Compact grout by vibration or by rodding.

On the completion of the last lift, top up the grout after 10 min to 30 min, and vibrate or rod to mix with the previous pour.

3.16 STEEL LINTELS

Do not cut on site. Keep lintels 10mm clear of heads of frames.

Pack mortar between any vertical component and supported masonry units. For angles install with the long leg vertical.

Provide temporary props to lintels to prevent deflection or rotation.

3.17 BAGGING

Cut joints flush before bagging.

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.

3.18 WALL CHASING

Make holes and chases required in masonry walls so that the structural integrity of the wall is maintained. Do not chase walls nominated as fire or acoustic rated.

Parallel chases or recesses on opposite faces of a wall shall not be closer than 600mm to each other.

Chase only core-filled hollow blocks or solid blocks not designated as structural and to the following maximum depths:

Block thickness (mm)	Maximum depth of chase (mm)

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

3.19 COMPLETION

All masonry surfaces, that are to be exposed, shall be thoroughly cleaned of all loose mortar and stains, to the satisfaction of the Superintendent.

Clean as the work proceeds to remove mortar smears, stains and discolouration. Do not erode joints if using pressure spraying.

Use a stiff wire brush and a diluted acid solution.

Surfaces shall be cleaned from the top of the wall to the bottom to avoid staining from runoff.

0342 LIGHT STEEL FRAMING

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The soil classification, for the site, shall be determined through on site soil testing.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*
- *0342 Light steel framing.*
- *0382 Light timber framing.*
- *0383 Structural sheet flooring.*
- *Structural Engineer's documentation.*

1.3 STANDARDS

Design, materials and protection: To AS/NZS 4600.

Preparation and metal treatment of metal surfaces: To AS 1627 series.

Residential and low-rise steel framing: To NASH.1.

1.4 CONTRACTOR DESIGN

Conform to the following requirements:

- Suitable for having flooring, linings, cladding and roofing fixed to it.
- In conformance with the documented performance criteria.
- Independently designed and documented.
- Independently certified by a professional engineer for the design and the erected framing.

The Contractor shall determine the gauge thickness, stud size and spacing, bracing requirements and nogging requirements, including additional noggings/ supports for items fixed to walls.

1.5 TOLERANCES

Manufacturing, assembly and installation tolerances: To NASH-1 Appendix D.

1.6 SUBMISSIONS

Submit independent design, documentation and certification from a professional engineer, including for the erected work.

Provide location and magnitude of reactions to be accommodated by the support structure.

Submit the name and contact details of the proposed manufacturer.

1.7 SHOP DRAWINGS

Submit shop drawings or product design guides, certified by a professional engineer, stating that the design has been carried out in accordance with the documented project and AS/NZS 4600 requirements for the configurations and loadings.

Roof trusses: Prepare drawings to show:

- On a plan, the truss layout.
- On elevations, the arrangement of members allowing for the accommodation of in-roof services and the size and section type of each member.
- Details demonstrating capability to resist lateral and uplift forces.
- The method of assembly, connection, holding down and bracing.

Wall frames: If wall framing is to be pre-fabricated, prepare drawings to show:

- On plan, the wall layout.
- On elevations, the arrangement of members, and the size and section type of each member.
- The method of assembly, connection, holding down and bracing.

1.8 INSPECTION

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

- Steel framing erected on site before lining or cladding.

2 PRODUCTS

2.1 GENERAL

Transport all components to site and store if required in a manner so as not to damage or distort the components.

2.2 COMPONENTS

Cold-form sections from metallic-coated steel: To AS 1397.

Corrosion protection: To BCA 3.4.2.2.

Cold-formed steel framing: For a proprietary system, comply with NASH.1.

3 EXECUTION

3.1 GENERAL

Cut members accurately to length so that they fit firmly against abutting members.

Form service holes by drilling or punching.

Provide plastic bushes or grommets to site cut holes.

Do not fabricate on site where welded connections are required.

Avoid welding procedures that result in greater than localised burning of the sheets or framing members.

Protect frames from damage or distortion during storage, transport and erection. Provide temporary protection for members until permanent covering is in place.

Install lagging to separate non-ferrous service pipes and accessories from the framing. Timber noggings or supports can be used to isolate the service pipes and accessories from the steel framing.

Do not fix unseasoned or CCA treated timber in contact with framing without fully painting the timber and/or the steel.

3.2 FLOOR FRAMING

Floor framing, for ground floor construction, shall be protected from moisture.

If construction loading exceeds design loading, provide additional support so as to avoid overstressing of members.

3.3 WALL FRAMING

Provide studs in single lengths without splices. Place a stud under, or within 40 mm from, each structural load point from roof or ceiling, except for openings. Provide multiple studs at points of concentrated load.

Maximum stud spacing: 600 mm.

Provide lintels, over openings, appropriate to the load and span.

Provide additional support in the form of noggings, trimmers and studs for support and fixing of lining, cladding, hardware, accessories, fixtures and fittings.

For brick veneer construction, provide vermin barriers comprising 10mm steel wire mesh fixed to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork.

3.4 DAMP-PROOF COURSE

Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, as follows:

- External walls (not masonry veneer): Turn up at least 75mm on the inside and tack. Project 10mm beyond the external slab edge or dwarf wall and turn down at 45°.
- Walls of bathrooms, shower rooms and laundries: Turn up at least 150mm on the wet side and tack to studs.

Lay in long lengths. Lap full width at angles and intersections and at least 150mm at joints.

Preserve continuity of damp-proofing at junctions of damp-proof courses, sarking and waterproof membranes.

3.5 FLASHINGS

Provide flashings to external openings sufficient to prevent the entry of moisture. Form trays at the ends of sill flashings.

For masonry veneer construction, extend across cavities and build into brickwork.

3.6 PREFABRICATED WALLING

Factory assemble wall frames.

Provide details of bracing.

Obtain certification from a professional engineer for the erected frames.

3.7 ROOF FRAMING

Construct framing for flat or pitched roofs where the ceiling follows the roof line, consisting of rafters or purlins supporting both ceiling and roof covering.

For low pitched roofs, fix appropriate members to the tops of framing at the rear of fascias, to prevent sagging of and ponding on the sarking.

Provide a frame member behind every joint in fibre cement or plasterboard sheeting or lining.

Supply and fix battens suitable for span, spacing and roofing.

3.8 TRUSSES

Factory assemble trusses.

Where a water container or heater is located in the roof space, provide a support platform to AS/NZS 3500.4 clause 5.5.

Permanently mark each truss to show:

- Project identification.
- Manufacturer.
- Tag or number.
- Location.
- Support points.

Fix to support structures, plumb to within H/200, where H is the height at the apex.

Support trusses on the bottom chord at two points only, unless designed for additional support.

Over internal walls provide at least 10 mm vertical clearance and use bracing methods which allow for vertical movements.

Provide details demonstrating capability to resist lateral and uplift forces.

3.9 FASTENINGS

Select from the following:

- Bolts.
- Self-drilling, self-tapping screws.
- Blind rivets.
- Proprietary clinching system.
- Structural adhesives.
- Welding.

3.10 EARTHING

Ensure permanent earthing is provided.

Provide temporary earthing during erection until the permanent earthing is installed.

3.11 PROTECTION

Restore coatings which have been damaged by welding or other causes. Thoroughly clean affected areas to base metal and coat with zinc rich organic primer.

Provide grommets to isolate piping and wiring from cold-formed steel framing.

Remove swarf and other debris from cold-formed steel framing immediately.

3.12 CERTIFICATION

For components, for which independent design certification has been required, provide independent certification for the erected components confirming compliance with the performance criteria.

3.13 COMPLETION

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.

0344 STEEL – HOT-DIP GALVANIZED COATINGS

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*
- *Structural Engineer's documentation.*

1.3 STANDARDS

Coating: To AS/NZS 4680.

Coating on fasteners: To AS 1214.

Durability: To AS 2309 and AS/NZS 2312.

Steel preparation methods: To AS 1627 series.

Coating mass/thickness minimum: To AS/NZS 4680.

Threaded fasteners coating mass/thickness minimum: To AS 1214 Table 2.

2 PRODUCTS

2.1 CONCEALED STEELWORK

Hot dipped galvanised to 600g/m2.

3 EXECUTION

3.1 GENERAL

If design and fabrication features of items to be galvanized are likely to lead to dimensional change or distortion, identify these and submit proposals for its minimisation.

Take due care to avoid embrittlement of susceptible steels.

Avoid mechanical damage. Ensure that mechanical properties of the base metal do not change.

3.2 SURFACE PREPARATION

Surface contaminants and coatings generally: Chemical clean, then acid pickle.

Chemical cleaning: To AS 1627.1.

Acid pickling: To AS 1627.5.

- Inhibitor: Required.

3.3 POST TREATMENT

General: Passivate.

3.4 DRILLING AFTER COMPLETION OF HOT-DIP GALVANIZING

Repair: Prime drill hole surfaces to AS/NZS 4680 clause 8 before the surfaces begin to corrode.

3.5 COATING

Threaded fasteners: To AS 1214.

3.6 STRUCTURAL SECTIONS

Cold worked items: Except for hollow sections, anneal to 650°C before galvanizing.

Hollow sections: Provide seal plates with breather holes.

3.7 SURFACE FINISH

To AS/NZS 4680 clause 7.

Coating quality: Continuous, adherent, smooth or evenly textured and uniform, free from defects detrimental to the end use of the finished article, such as lumps, blisters, gritty areas, uncoated spots, acids and black spots, dross and flux.

- Silicon killed steels: Dull grey is acceptable.

Friction-type bolted connections: Treat coated contact surfaces to achieve the required design slip factor, without removing excessive coating thickness.

- Contact surface preparation: To GAA After-fabrication hot dip galvanizing Chapter 4.

Slip factor test: To AS 4100 Appendix J.

Surplus zinc on fastener threads: Remove.

3.8 COATING REPAIR

If uncoated surfaces or areas damaged by handling at the galvanizing plant exceed the limits specified for repair in AS/NZS 4680 clause 8, reject the galvanizing.

3.9 PREPARATION FOR PAINT FINISHES

Coarse preparation: Remove spikes, and make sure edges are free from lumps and runs.

Light sweep blasting before painting: Required.

- Maximum zinc removal: 10 microns.
- Abrasive grade (range): 150 to 180 microns.
- Abrasive type - clean ilmenite or garnet.
- Blasting angle to surface: 45° maximum.
- Blast pressure (maximum): 275 kPa.
- Distance of nozzle from surface (range): 350mm to 400mm.
- Nozzle type: 10mm to 13mm minimum diameter venturi type.

3.10 SITE WELDING

Grinding of edges: Permitted.

Weld areas: Reinstate coating to AS/NZS 4680 clause 8.

3.11 SITE COATING REINSTATEMENT

To AS/NZS 4680 clause 8.

0382 LIGHT TIMBER FRAMING

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The soil classification, for the site, shall be determined through on site soil testing.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*
- *0184 Termite management.*
- *0342 Light steel framing.*
- *0383 Structural sheet flooring.*
- *Structural Engineer's documentation.*

1.3 STANDARDS

Framing: To AS 1684.1, AS 1684.2 and AS 1684.3, as applicable.

Design: To AS 1720.1. Design of timber framing shall be performed by a professional engineer.

1.4 CONTRACTOR DESIGN

The Contractor shall determine the stud size and spacing, bracing requirements and nogging details, including additional noggings/ supports for items fixed to walls as detailed on the Drawings.

1.5 SUBMISSIONS

Where the structural drawings define performance criteria, submit independent design, documentation and certification from a professional engineer, including for the erected work.

Provide location and magnitude of reactions to be accommodated by the support structure.

Submit a schedule of proposed member sizes, certified as meeting, AS 1684 series and AS 1720.1 requirements for span, spacings, loadings and deflections.

If CCA treated timber is proposed to be used, provide details.

Submit the name and contact details of the proposed manufacturer.

1.6 SHOP DRAWINGS

Submit shop drawings or product design guide certified by a professional engineer stating that the design has been carried out in accordance with the documented project, AS 1684 series and AS 1720.1 requirements for the configurations and loadings.

Roof trusses: Prepare drawings to show the following:

- On a plan, the truss layout.
- On elevations, the arrangement of members allowing for the accommodation of in-roof services and the size and section type of each member.
- Camber of bottom chord.
- The method of assembly, connection, lifting, holding down and bracing.

Wall frames: If wall framing is to be pre-fabricated, prepare drawings to show the following:

- On plan, the wall layout.
- On elevations, the arrangement of members, and the size and section type of each member.
- The method of assembly, connection, lifting, holding down and bracing.

1.7 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

Do not distort or damage timber or timber products.

Maintain the equilibrium moisture content of seasoned timber.

Provide temporary protection from weather for members until permanent covering is in place.

2.2 BRACING

Bracing shall be to AS 1684.2 Section 8 and AS 1684.3 Section 8, as applicable.

Structural plywood bracing:

- To AS/NZS 2269.0.

- Bond: Type A to AS/NZS 2754.1 (Int).

2.3 STEEL BASES

Provide steel bases to timber posts supported off concrete slabs or footings.

Minimum dimensions:

- Stirrup: 75mm wide x 6mm thick.
- Dowel: 20mm diameter heavy tube.

Finish: Galvanized, after fabrication.

2.4 FASTENERS

Fasteners shall not split or otherwise damage the timber.

Before placing bolts in contact with CCA treated timber, coat the shank of the bolt in a grease or bituminous coating.

2.5 DAMP-PROOF COURSE

To AS/NZS 2904.

Type: 0.55mm thick bitumen coated aluminium.

2.6 FLASHINGS

To AS/NZS 2904.

Type: 0.5mm thick bitumen coated aluminium.

3 EXECUTION

3.1 TRANSPORT AND DELIVERY

Do not distort or damage timber or timber products.

Maintain the equilibrium moisture content of seasoned timber.

Provide temporary protection for members until permanent covering is in place.

3.2 FLOOR FRAMING

Level bearers and joists by checking or by packing for the full width of the member with dense corrosion resistant material which is secured in place:

- Maximum thickness of packing: 3mm.

Lay bearers and joists to allow for straightening under loading.

Locate joints only over supports:

- Minimum bearing of bearers: 50mm.
- Minimum bearing of joists: 30mm.

Secure bearers and joists to supports to provide restraint against lateral movement.

Joist restraint:

- Unseasoned timber: If joist timber is unseasoned, the span ≥ 3000mm, and there is no ceiling lining, provide solid blocking between each joist in rows at 1800mm centres.
- Deep joists: If the joist depth:width ratio is ≥ 4, restrain joists at the ends of the joists over supports and at ≤ 1800mm centres using either of following as appropriate:
  - Continuous trimming joists.
  - Solid blocking or herringbone strutting.
- Trimmers or blocking dimensions:
  - Depth: Joist depth less 25mm.
  - Width: ≥ 25mm.
- Herringbone strutting dimensions: ≥ 38mm x 38mm.

3.3 WALL FRAMING

Bracing material: Timber, galvanised steel, structural plywood or hardwood to suit the application.

Provide additional support in the form of noggings, trimmers and studs for fixing lining, cladding, hardware, accessories, fixtures and fittings as required.

Maximum spacing of noggings: 1350mm centres.

For brick veneer construction, provide vermin barriers comprising 10mm galvanised steel wire mesh close nailed to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork.

3.4 DAMP-PROOF COURSE

Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, as follows to AS/NZS 4200.1:

- External walls (not masonry veneer): Turn up at least 75mm on the inside and tack. Project 10mm beyond the external slab edge or dwarf wall and turn down at 45°.
- Walls of bathrooms, shower rooms and laundries: Turn up at least 150mm on the wet side and tack to studs.

Lay in long lengths. Lap full width at angles and intersections and at least 150mm at joints.

Preserve continuity of damp-proofing at junctions of damp-proof courses, sarking and waterproof membranes.

3.5 FLASHINGS

Provide flashings to external openings sufficient to prevent the entry of moisture. Form trays at the ends of sill flashings.

For masonry veneer construction, extend across cavities and build into brickwork.

3.6 ROOF AND CEILING FRAMING

Fix timber wall plates to masonry, with either straps, bolts or both.

Where timber joists, rafters or purlins bear on or into steel members, provide nailing plates to transfer the design loads, bolted to the steel member at 500mm maximum centres and 100mm maximum from the end of the nailing plate.

Butt ends of rafters together at ridge, and strap each pair together with 900mm long steel strap passing over the ridge, triple nailed to each rafter.

If a water container or heater is located in the roof space, provide a support platform to AS/NZS 3500.4 clause 5.5.

Provide a frame member behind every joint in fibre cement sheeting or lining.

Anti-ponding boards: To AS/NZS 4200.2.

3.7 TRUSSES

Design: To AS 1720.1.

Camber bottom chord upward.

Overhangs shall be free from spring or splits.

Permanently mark each truss to show:

- Project identification.
- Manufacturer.
- Tag or number.
- Location.
- Support points

Nail plated prefabricated roof trusses: Installed to AS 4440.

Support trusses on bottom chord at two points only, unless designed for additional support.

Plumb shall be within the lessor of H/50 or 50mm, where H is the height of the truss at the point where plumb is being measured.

Over internal walls, provide at least 10mm vertical clearance and use bracing methods which allow for vertical movements.

3.8 ROOF TRIM

Supply and fix fascia, valley gutter and barge boards.

3.9 COMPLETION

Tighten bolts, screws and other fixings so that joints and anchorages are secure at practical completion.

0383 STRUCTURAL SHEET FLOORING

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The soil classification, for the site, shall be determined through on site soil testing.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0184 Termite management.*
- *0342 Light steel framing.*
- *0382 Light timber framing.*
- *Structural Engineer's documentation.*

1.3 STANDARDS

Flooring design: To AS 1684.1, AS 1684.2 and AS 1684.3 Section 5, as applicable.

1.4 TOLERANCES

Flatness of sheet flooring shall not exceed the following:

- Floors to receive carpet: The maximum deviation under a 3m straight edge shall be 5mm and under a 150mm straightedge shall be 1mm, when laid in any direction.
- Floors to receive resilient finishes: The maximum deviation under a 2 metre straight edge shall be 4mm and under a 150mm straightedge shall be 1mm, when laid in any direction.
- Floors to receive timber flooring: The maximum deviation under a 3m straight edge shall be 3mm and under a 250mm straight edge shall be 1mm, when laid in any direction.
- Rectify non-conforming flooring by suitable procedures, such as laying underlays.

1.5 INSPECTION

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

- Sheet flooring work after installation but before it is covered.

2 PRODUCTS

2.1 PLYWOOD FLOORING

To AS/NZS 2269.0.

Grading:

- Veneer: CD.
- Grade: Bond Type A.

2.2 PARTICLEBOARD FLOORING

To AS 1860.1, Class 1.

2.3 COMPRESSED FIBRE CEMENT FLOOR SHEETING

To AS/NZS 2908.2.

Externally: Type A Category 3.

Internally: Type B Category 2.

3 EXECUTION

3.1 SHEET FLOORING GENERALLY

Lay the lengths of sheets at right angles to the supports. Stagger end joints and locate them centrally over joists. If sheets are not tongued and grooved, provide noggings or trimmer joists to support edges.

Apply adhesive to edges of sheets and firmly butt join together.

Minimum number of spans across support: 2.

Pre-drill screw holes with 1mm clearance over screw diameter and countersink. Fix with corrosion resistant countersunk screws.

Where sheets are nailed, punch nail head 3mm below the finished surface and, where exposed in the finished work, fill with a material tinted to match and compatible with the floor finish.

Spacing of fasteners:

- Sheet edge and intermediate: < 450mm.
- Corners and sheet edges: At least 12mm from sheet edges and 50mm from corners.

For wet area flooring, stop screw heads with sealant.

3.2 PLYWOOD FLOORING

To AS 1684.2, AS 1684.3 or AS 1684.4, as appropriate.

3.3 PARTICLEBOARD FLOORING

To AS 1860.2.

0411 WATERPROOFING

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.

1.2 CROSS REFERENCES

Conform to the following:

- *0171 General requirements.*
- *0184 Termite management.*
- *0342 Light steel framing.*
- *0382 Light timber framing.*
- *0471 Insulation and pliable membranes.*
- *0611 Rendering.*
- *Inspection Test and Conformity Plan (ITCP).*
- *Structural Engineer's documentation.*

1.3 STANDARDS

Membrane materials for above ground external use: To AS 4654.1.

Membrane design and installation for above ground external use: To AS 4654.2.

Waterproofing to wet areas: To AS 3740 and AS/NZS 4858.

1.4 SUBMISSIONS

In accordance with Section 0171, provide samples of the following:

- Each type of membrane, on a representative substrate where necessary.
- Drainage cell and geotextile fabric.
- Miscellaneous accessories such as reinforcing fabric, sealant, fixings, primers, adhesives, caulking and protective sheeting.

1.5 INSPECTION

Conduct all testing and inspections as detailed in the relevant ITCP.

2 PRODUCTS

2.1 GENERAL

Provide proprietary membrane systems as suitable for their intended purpose and certified in accordance with the ITCP.

Liquid applied membranes:

- Cold-applied, one component, water based, polyurethane or polymer modified acrylic membrane.
- Reinforcement: Membrane shall be reinforced at joints with an embedded reinforcing fleece or jointing tape compatible with and as recommended by the membrane manufacturer.

Sheet membranes:

- To concrete substrates, where pre-installed prior to pouring concrete: Waterproofing system consisting of an embossed, flexible polyolefin membrane, with non-woven fleece or HDPE film with pressure sensitive adhesive and weather resistant protective coating, suitable for bonding to wet concrete.
- Where post-applied to installed substrates: Fully adhered, thermoplastic membrane or a rubber bitumen sheet membrane with HDPE carrier film.

Performance requirements:

- Generally resistant to permanent wetness.
- Capable of withstanding all loads anticipated in service.
- Resistant to root attack where laid against subterranean surfaces or planting mediums.
- UV resistant where exposed externally.
- Trafficable where exposed to foot or vehicular traffic.

2.2 BALCONY MEMBRANE

Substrate: Concrete slab/ graded screed/ plywood/ FC sheet flooring.

Overlay: Tiling/ paving or as otherwise documented.

Membrane type: Liquid applied or sheet membrane suitable for external above ground use.

2.3 PLANTERBOX MEMBRANE

Substrate: Concrete slab and masonry walls.

Overlay: Protection board, drainage cell, geotextile fabric and garden.

Membrane type: Liquid applied or sheet membrane suitable for subterranean use.

2.4 RETAINING WALL MEMBRANE

Substrate: Behind concrete or masonry retaining walls.

Overlay: Protection board, drainage cell, geotextile fabric and back fill.

Membrane type: Liquid applied or sheet membrane suitable for subterranean use.

2.5 IN GROUND MEMBRANE

Substrate: Below slabs on ground where hydrostatic water pressure is present.

Membrane type: Sheet membrane, pre-installed prior to pouring concrete.

2.6 INTERNAL WET AREA MEMBRANE

Substrate: Concrete slab, particleboard or fibre cement sheet flooring and plasterboard/ fibre cement sheet wall linings.

Overlay: Tiling or as otherwise documented.

Membrane: Liquid applied membrane suitable for internal wet areas. Provide sealants that are waterproof, flexible, mould-resistant and compatible with host materials in accordance with AS 3740 clause 2.6.

2.7 PROTECTION BOARD

Fibre cement sheet, Corflute or extruded polystyrene foam sheet.

2.8 SLIP SHEETS

If recommended by the membrane manufacturer, provide 0.2mm thick polythene sheet to isolate movement of overlaying finish, such as screeds, from the membrane.

2.9 DRAINAGE CELL PANELS

Provide drainage cell panels which allow free drainage and capable of withstanding the loads anticipated in service.

Product: Elmich VersiDrain 8 Geo or acceptable equivalent.

2.10 GEOTEXTILE FABRIC

Polymeric fabric woven from plastic yarn composed of at least 85% by weight of propylene, ethylene, amide or vinylidenechloride, and containing stabilisers or inhibitors which provide resistance to deterioration caused by ultraviolet light.

3 EXECUTION

3.1 PREPARATION

Substrates shall be clean and free of any deposit or finish which may impair adhesion of membranes.

Prepare substrates as follows:

- Fill all cracks in substrates wider than 1mm with a filler compatible with the membrane system.
- Fill depressions, voids and hollows in substrates with a suitable compound compatible with and not stronger than the substrate.
- Remove projections.
- Remove deleterious and loose material.
- Remove all traces of curing compounds, if used, unless compatible with membrane.

Leave the surface free of contaminants, clean and dust free.

3.2 MOISTURE CONTENT OF CONCRETE SUBSTRATES

Cure concrete substrates for at least 21 days.

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.

3.3 FALLS

Verify that falls in substrates are greater than 1:100 or in accordance with AS 3958.1.

3.4 JOINTS AND FILLETS

Round or arris edges of external corners.

Prepare all substrate joints to suit the membrane system, in accordance with the manufacturer's recommendations.

3.5 PRIMING

If required, prime the substrates with compatible primers for adhesion of membrane systems, in accordance with the manufacturer's recommendations.

3.6 APPLICATION

Application of membranes shall be in strict accordance with the manufacturer's recommendations.

Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage.

Prevent moisture from tracking under the membranes at drainage locations.

Protect edges of the membrane.

External membranes: To AS 4654.2.

Internal wet area membranes: To AS 3740.

After application of liquid applied membranes, record the dry film thickness of the membrane and confirm it is in accordance with the manufacturer's recommendations.

3.7 CONTROL OF MOVEMENT

Provide joints in membranes to coincide with control joints in the substrate, maintaining the watertightness of the membrane across the joint.

Fillets and bond breakers shall be sized to allow the membrane to accommodate movement.

For bonded membranes, carry control joints in the substrate through to and into the surface finish.

3.8 MEMBRANE TERMINATIONS

Provide upturns above the maximum water level expected from the exposure conditions of rainfall intensity and wind.

- Height: Minimum 150mm or to AS 4654.2 Appendix A.
- Secure sheet membranes along the top edge.
- Protect edges of the membrane.
- Waterproofing above terminations: Waterproof the structure above the termination to prevent moisture entry behind the membrane using cavity flashings, capping, waterproof membranes or waterproof coatings.

3.9 MEMBRANE VERTICAL PENETRATIONS

Provide separate sleeves for all pipes, ducts, and vents and have them fixed to the substrate.

3.10 MEMBRANES AT DOORS AND WINDOWS

To AS 4654.2 clause 2.8.3.

3.11 OVERLAYING FINISHES ON MEMBRANES

If a membrane is to be overlayed with a finish such as tiles, pavers, ballast, insulation or soil, provide an overlaying system that is compatible with and will not cause damage to the membrane.

If the topping or bedding mortar requires to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

If the topping or bedding mortar is structurally sufficient not to require bonding to the substrate, lay a slip sheet over the membrane to separate it from the topping or bedding mortar.

3.12 FLOOD TEST

Perform a flood test on completion of the installation and before the installation of surface finishes, in accordance with the ITCP.

Moisture measurement method: AS 1884 Appendix A.

Set-up:

- Measure the wall/floor junction of adjacent spaces, where applicable, and the floor soffit below for dryness.
- Record the result for each area.
- Seal floor wastes and drainage outlets to allow 50 mm water level.
- Fill space with clean water and leave for 24 hours.

Evaluation:

- Make a visual inspection 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.

3.13 COMPLETION

Keep traffic off membrane surfaces until bonding has set or for 24 hours after laying, whichever period is the longer.

Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

3.14 WARRANTIES

Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the installer, equal to or exceeding the periods nominated in the Warranty Schedule included in Section 0171.

Form: Against failure of materials and execution under the normal environment and use conditions anticipated for the site.

0421 ROOFING

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.
- Rainfall intensity to AS/NZS 3500.3.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*
- *0342 Light steel framing.*
- *0382 Light timber framing.*
- *0471 Insulation and pliable membranes.*

1.3 STANDARDS

Sheet metal roofing design and installation: AS 1562.1.

Prepainted and organic film/metal laminate products: To AS/NZS 2728.

Polycarbonate sheet roofing:

- Materials: To AS 4256.5.
- Installation: To AS 1562.3.

Roof tiling:

- Materials: To AS 2049.
- Installation: To AS 2050.

Skylights: To AS 4285.

Skylights in bushfire prone areas: To AS 3959 clause 5.6.5, AS 3959 clause 6.6.5, AS 3959 clause 7.6.5, AS 3959 clause 8.6.5, or AS 3959 clause 9.6.3, as applicable to the site's Bushfire Attack Level (BAL).

Roof mounted heat exhaust vents: To AS 2427.

Proprietary roof mounted ventilators or smoke/heat ventilating systems: To AS 2665.

Roof plumbing: To AS/NZS 3500.3.

Metal rainwater goods: To AS/NZS 2179.1.

Flashings and cappings: To AS/NZS 2904.

1.4 TOLERANCES

Rainwater goods: Deviations in straightness shall not exceed ±6.5mm per 1830mm length.

Deviations in thickness of flat rolled steel sheet: To AS/NZS 1365.

Sheet roofing: Deviations from planes shall be limited to long wave formations with maximum amplitude of 3mm.

1.5 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

Store metal roofing materials away from uncured concrete and masonry, on a level base. Do not store materials in contact with other materials which may cause staining, denting or other surface damage.

Handle 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.

2.2 METAL SHEET ROOF CLADDING

Roofing shall be to accepted samples.

Provide all accessories, compatible with the roof sheeting, as necessary to complete the system.

2.3 POLYCARBONATE SHEET ROOF CLADDING

Roofing shall be to accepted samples.

Provide all accessories, compatible with the roof sheeting, as necessary to complete the system.

2.4 ROOF TILING

Roof tiles shall be to accepted samples.

Provide all accessories, compatible with the tiles, as necessary to complete the system.

2.5 GLAZED ROOFING

Provide sloped overhead glazing fixed to glazing bars or directly to the roof framing. Provide all necessary trim, flashings and sealants.

Glass selection and installation: To AS 1288.

Provide certification from an organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

2.6 SKYLIGHTS

Provide a proprietary skylight system including framing, fixing, trim, seals, accessories and flashings.

2.7 FIXINGS

Fix roofing with prefinish exposed fasteners with an oven baked polymer coating, generally to match the roofing material.

2.8 ROOF PLUMBING

Provide all flashings, cappings, gutters, rainwater heads, outlets and downpipes, as necessary and as detailed on the Drawings, to complete the roof system.

Roof plumbing shall be formed from material to match associated roofing.

2.9 FLASHINGS AND CAPPINGS

To AS/NZS 2904.

Provide proprietary flashings and cappings to match roof cladding or with finish as otherwise scheduled.

2.10 ROOF VENTILATORS

A proprietary roof ventilator system, including framing, fixing, trim, seals, accessories and flashings.

Finish to match adjacent roofing.

2.11 LEAF GUARDS

Provide a proprietary leaf guard system, to all gutters, consisting of corrosion resistant protective mesh that allows water to pass through but stops leaves and other debris from entering the gutter.

2.12 RAINWATER TANKS

Design and installation: To the recommendations of SAA HB 230.

Polyethylene tanks: To AS/NZS 4766.

Size: As appropriate to suit the roof size.

Provide all accessories necessary to complete the installation and constructed from corrosion resistant material compatible with the tank material, including, but not limited to, the following:

- Inlet and outlet connections.
- Floating outlet to draw water from the upper part of the tank.
- Tight fitting lids or insect proof screens at all openings.
- Flap valves at every opening to the tank.
- Calmed inlet to the tank to prevent stirring sediment.
- Flywire screened overflow siphon to skim surface contaminants.
- Vermin proof, child proof access opening.
- Easily cleanable filter prior to the entry to the tank with maximum 1mm mesh size.

Provide a first flush diverter, as follows, arranged to drain completely:

- Size: Select for at least 20L/100m^2 rainwater catchment area.
- Corrosion resistant and compatible with the rainwater plumbing and tank.
- Discharge waste water from the first flush diverter either:
  . If permitted by the local authority, onto grassed areas away from tank and building footings.
  . To the stormwater installation.

Provide structural support to withstand the mass of the tank when full without deformation or excessive settling. Support connecting piping independently of the tank. Provide a 300mm long section of reinforced flexible hose to prevent piping exerting a load on the tank. Pipe overflow to discharge away from the tank. Prevent the entry of sunlight to the interior of the tank.

Above ground tanks: Restrain the tank to prevent movement, when empty, caused by wind and other loads. Provide a level base with gaps not exceeding 10mm, free of sharp projections and projecting beyond the edge of the tank at all points.

Polyethylene tanks: Trim and compact the ground and place a level bed of sand at least 50mm thick.

Wash and flush tanks to remove manufacturing and other contaminants.

3 EXECUTION

3.1 INSTALLATION

Keep the roofing and rainwater system free of debris and loose material during construction, and leave them clean and unobstructed on completion. Repair damage to the roofing and rainwater system.

Provide for thermal movement in the roof installation and the structure, including movement in joints and fastenings.

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:

- Applying an anti-corrosion, low moisture transmission coating to contact surfaces.
- Inserting a separation layer.

3.2 SHEET METAL ROOFING

Runs shall be in single sheets along the full length of falls.

Treat free ends of sheets by closing off ribs at tops and bottoms of sheets by mechanical means or with purpose-made fillers or end caps.

Project sheets 50mm into gutters.

Turn pans of sheets up at tops and down into gutters by mechanical means.

Provide pre-cut notched eaves flashing and bird proofing if required.
Close off ridges with purpose-made ridge fillers of closed cell polyethylene foam.

Remove swarf and other debris as soon as it is deposited.

Provide flashing and capping material with the same finish as the associated roofing.

3.3 TILING

Set out the roof to give an even tile gauge in each course, with full or saw cut tiles at verges.

Bed and point accessories including ridges, hips and verges, in coloured mortar to match the tiles and accessories.

At pointed verges, bed and point tiles on 100mm x 5mm fibre cement pointing strips.

3.4 ROOF PLUMBING GENERALLY

Seal fasteners and mechanically fastened joints. Fill the holes of blind rivets with silicone sealant.

Flash projections above or through the roof with two part flashings consisting of an apron flashing and an over-flashing, with at least 100 mm vertical overlap. Provide for independent movement between the roof and the projection.

Provide overflashings where roofs abut walls, stepped to the roof slope in masonry and planked cladding, otherwise raking.

In masonry, build into the full width of the outer leaf. Turn up within cavity, sloping inward across the cavity and fixed to or built in to the inner leaf at least 75mm above.

3.5 BOX GUTTERS

Box gutters shall be fixed with support framing comprising galvanised steel angles at maximum 700mm centres with Spandek, or acceptable equivalent, support. Suspend from roof framing by means of threaded rods.

3.6 GUTTERS

Minimum slope of gutters: 1:100.

Minimum width overall of valley gutters: 400mm.

Provide overflows to high fronted gutters to prevent back flow into roof or building structure.

3.7 DOWNPIPES

Prefabricate downpipes to the required section and shape where possible. Connect heads to gutter outlets and, if applicable, connect feet to rainwater drains.

Provide supports and fixings for downpipes.

3.8 METAL ROOF TRIM

Supply and fix fascia, valley gutter and barge boards in conformance with the manufacturer's requirements.

3.9 TIMBER FASCIAS AND BARGE BOARDS

Provide hardwood timber fascias and bargeboards, as necessary, to complete the roofing system.

Finish: Painted.

Fixing: Nailed.

3.10 COMPLETION

Remove excess debris, metal swarf, solder, sealants and unused materials.

Clean exposed metal surfaces of substances that interfere with uniform weathering or oxidisation.

Replace materials that have been damaged or deteriorated.

Clean out spoutings, gutters and rainwater pipes after completion of roof installation.

3.11 WARRANTY

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 the normal environment and use conditions anticipated for the site.

- Period:
  . Roof tiles: 50 years.
  . Metal roofing: As offered by the manufacturer, to suit the location, based on proximity to salt water.
  . Polycarbonate roofing: 10 years.
  . Metal rainwater goods: 10 years.

0431 CLADDING

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0342 Light steel framing.*
- *0382 Light timber framing.*
- *0471 Insulation and pliable membranes.*

1.3 STANDARDS

Sheet metal cladding design and installation: AS 1562.1.

Aerated autoclaved cement (AAC) panels: To AS 5146.1.

Prepainted and organic film/metal laminate products: To AS/NZS 2728.

Polycarbonate sheet cladding:

- Materials: To AS 4256.5.
- Installation: To AS 1562.3.

Fibre cement cladding: To AS/NZS 2908.2.

1.4 SAMPLES

In accordance with Section 0171, provide samples of the following:

- 300mm x 300mm sample of each type of cladding.
- 300mm length of each type of extrusion/ flashing.
- All fixing types.

1.5 TOLERANCES

Deviations in thickness of flat rolled steel sheet: To AS/NZS 1365.

Sheet cladding: Deviations from planes shall be limited to long wave formations with maximum amplitude of 3mm.

Fibre cement sheet:

- Deviations in panel/plank length, width and diagonal dimensions shall not exceed ±1mm.
- Maximum deviation from a flat plane shall be no greater than 4mm in 3000mm.
- The width of any joint shall not deviate from the nominal width by more than 1mm and the misalignment between joints shall not exceed 1mm.

1.6 INSPECTION

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

- Framing, sarking, vapour barrier, and insulation before covering up or concealing.

2 PRODUCTS

2.1 GENERAL

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.

2.2 METAL SHEET WALL CLADDING

Metal sheet wall cladding shall be to selected samples.

Provide all accessories, compatible with the wall cladding, as necessary to complete the system.

2.3 AAC PANEL CLADDING

A proprietary system of aerated autoclaved cement (AAC) panels.

Joints: Proprietary adhesive to the manufacturer's recommendations.

Sealant: Flexible sealant to the manufacturer's recommendations.

Provide control joints at all external and internal corners, adjacent to all openings and at maximum 6m centres, or as required by the manufacturer.

2.4 FIBRE CEMENT CLADDING

Provide a proprietary system of single faced fibre cement sheets.

Compressed FC cladding: Type A Category 3.

Blue board (to be rendered): Type A Category 2.

Set out in even panels with joints coinciding with framing.

Joints, corners and edges: PVC-U extrusion

Sealant and bond breaking tape: To the manufacturer's recommendations.

2.5 FIBRE CEMENT EAVES/ SOFFIT LININGS

Flush jointed fibre cement sheet lining:

- Product: James Hardie Villaboard or acceptable equivalent.
- Flush the joints, with a suitable external grade proprietary compound, to achieve a level 4 finish in accordance with AS/NZS 2589.

Express jointed fibre cement sheet lining:

- Product: James Hardie Versilux or acceptable equivalent.
- Joints: PVC jointers.

2.6 FLASHINGS

To AS/NZS 2904.

3 EXECUTION

3.1 GENERAL

Before fixing cladding check the alignment of substrates or framing and adjust if necessary.

Fixing methods to manufacturer's recommendations.

Provide all accessories and trim necessary to complete the installation.

Do not install component parts which are defective, including warped, bowed, dented, abraded or broken members.

Remove damaged parts and replace damaged members during installation.

Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by either:

- Applying an anti-corrosion, low moisture transmission coating to contact surfaces.
- Inserting a separation layer.

3.2 SHEET METAL CLADDING

Remove swarf and other debris as soon as it is deposited.

Provide flashing and capping material with the same finish as the associated cladding.

Finish off at corners with purpose-made folded flashing strips.

3.3 AAC PANEL CLADDING

Make sure the panel is clean and free of dust and loose particles.

Apply joint adhesive to vertical and horizontal joints. Remove excess adhesive from the face after panels are butted together.

Caulk control joints with sealant, gaps between panels and infill or penetration framing with flexible sealant.

Finish flush all vertical joints.

For render finishes, minimise cracking at joints to the manufacturer's recommendations.

3.4 FIBRE CEMENT CLADDING

Cut sheets shall give clean, true lines with no distortion. Remove burrs.

Remove all drilling dust and any other foreign matter before finally fixing sheets into position.

Corrosion resistant fibre cement nails or screws to the manufacturer's recommendations.

3.5 COMPLETION

Remove excess debris, metal swarf, solder, sealants and unused materials.

Clean exposed metal surfaces of substances that interfere with uniform weathering or oxidisation.

Remove protective coatings using methods required by the manufacturer after completion.

Clean surfaces of composite panels with soft, clean cloths and clean water to the manufacturer's recommendations.

3.6 WARRANTY

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

- Form: Against failure of materials and execution under the normal environment and use conditions anticipated for the site.
- Period:
  - . Fibre cement sheet: 10 years.
  - . Sheet metal cladding: As offered by the manufacturer, to suit the location, based on proximity to salt water.
  - . AAC panel cladding: 7 years.

0451 WINDOWS AND GLAZED DOORS

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*
- *0455 Hardware.*
- *0461 Glazing.*
- *0574 Window coverings.*
- *0673 Powder coatings.*

1.3 STANDARDS

Window and glazed door selection and installation: To AS 2047.

Glass type and thickness: To AS 1288, if no glass type or thickness is nominated.

Safety glass: To AS/NZS 2208.

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

Double glazed units: To AS/NZS 4666.

Flashings: To AS/NZS 2904.

Aluminium extrusions: To AS/NZS 1866.

Window labelling and certification: To AS 2047 clause 8.1.

1.4 SUBMISSIONS

Submit evidence that window and door assemblies conform to AS 2047.

Submit statements from all parties to the installation certifying the compatibility of sealants and glazing systems to all substrates.

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.

Submit evidence, certifying that the proposed bushfire screens and seals conform to AS 3959 and to suit the Bushfire Attack Level (BAL) of the site.

1.5 SHOP DRAWINGS

Submit Shop Drawings showing the following:

- Full-sized sections of members.
- Hardware, fittings and accessories.
- Junctions and trim to adjoining surfaces.
- Layout (sectional plan and elevation) of assemblies.
- Lubrication requirements.
- Methods of assembly.
- Methods of installation, including fixing, caulking and flashing.
- Provision for vertical and horizontal expansion.
- Method of glazing.

1.6 WARRANTIES

Prior to Practical Completion, a written warranty shall be submitted for the following:

- External window and glazed door systems: 10 years.

1.7 TOLERANCES

Show the provisions intended to accommodate the construction tolerances of the surrounding elements. Obtain any further information necessary when completing the Shop Drawings.

Specific tolerances shall be adhered to. The accuracy required shall be:

- Level of horizontal members: ±2mm from datum in any 1500mm, non-cumulative.
- Plumb of vertical members: ±2mm in the height.

1.8 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 ALUMINIUM FRAMED WINDOWS

Windows comprising extruded aluminium frames and glazing to accepted samples.

Glazing performance shall be determined based on the requirements of the BCA, to suit the climate zone applicable to the site.

Provide aluminium framed glazed sliding and swinging doors as part of the external window systems.

2.2 LOUVRE WINDOW ASSEMBLIES

Glazed louvre windows shall comprise louvre blades clipped into blade holders, pivoted to stiles or coupling mullions, linked together in banks, with each bank operated by a handle incorporating a latching device, or by a locking bar. The system shall be able to withstand the permissible-stress-design wind pressure for that location without failure or permanent distortion of members and without blade flutter.

2.3 FIXED ALUMINIUM FRAMED INSECT SCREENS

Provide aluminium extruded or folded box frame sections with mesh fixing channel, mitred, staked and screwed at corners. Provide an extended frame section where necessary to adapt to window opening gear.

Bead the mesh into the frame channel with a continuous resilient gasket, so that the mesh is taut and without distortion.

Screens shall be incorporated into window frames with a clipping device that permits removal for cleaning.

2.4 BUSHFIRE SCREENS AND SEALS

To AS 3959.

Provide protection to glazed windows and doors from the ingress of embers where required to suit the Bushfire Attack Level (BAL) of the site.

2.5 SECURITY SCREENS

Provide proprietary aluminium framed security screens with expanded aluminium mesh insert at doors and windows, where required, fixed to the building structure with tamper resistant fastenings. Where a security screen is required, mesh is to be suitable as an insect screen.

Product: Crimsafe or acceptable equivalent.

Security grilles and screen doors: To AS 5039.

Installation: To AS 5040.

2.6 SECURITY BARS

Provide aluminium rod security bars, where permitted and required, at louvre windows.

2.7 WINDOW FRAME AND SECURITY/ INSECT FRAME FINISHES

Powder coating: To AS 3715.

Anodising: To AS 1231:

- Thickness: ≥ 15 microns to 20 microns.

2.8 TRIM

Provide timber/ MDF mouldings, architraves, reveal linings, and other internal trim to complete the window/door installation. Install to make neat and clean junctions between frames and the adjoining building surfaces.

2.9 HARDWARE

Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, compatible with associated hardware, and fabricated with fixed parts firmly joined and in accordance with *0455 Hardware.*

2.10 VISUAL INDICATORS ON GLAZING

Any glazing capable of being mistaken for a doorway or opening, where there is no chair rail, handrail or transom, shall be clearly marked with a contrasting line that complies with BCA Volume 2 Clause 3.6.4.6.

3 EXECUTION

3.1 INSTALLATION

Supply windows and glazed doors inclusive of glazing, shop preglazed.

Install as follows:

- Plumb, level, straight and true within acceptable 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.

3.2 SEALS

All operable window sashes and glazed doors shall be fitted with rubber weatherproofing seals.

3.3 WEATHERPROOFING

Install flashings, weather bars, drips, storm moulds, caulking and pointing so that water is prevented from penetrating the building between frames and the building structure under prevailing service conditions, including normal structural movement of the building.

Pack behind fixing points with durable full width packing.

3.4 COMPLETION

Leave the hardware with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Clean all frames and glass surfaces inside and out with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.

0453 DOORS

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0455 Hardware.*
- *0461 Glazing.*
- *0671 Painting.*

1.3 STANDARDS

Security grilles and screen doors: To AS 5039.

Security grilles and screen doors installation: To AS 5040.

1.4 INTERPRETATION

For the purposes of this worksection the following definition applies:

- Doorset: An assembly comprising a door or doors, including supporting frame, guides and tracks and all hardware and accessories necessary for satisfactory operation.

1.5 SUBMISSIONS

Submit evidence, certifying that the proposed bushfire screens and seals conform to AS 3959 and to suit the Bushfire Attack Level (BAL) of the site.

1.6 WARRANTIES

Prior to Practical Completion a written warranty shall be submitted for the following:

- Timber doors: 5 years.

1.7 TOLERANCES

Squareness: The difference between the lengths of diagonals of a door: ≤ 3 mm.

Twist: The difference between perpendicular measurements taken from diagonal corners: ≤ 3 mm.

Nominal size:

- Height: ±2mm.
- Width: +2mm/ -0mm.

1.8 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 GENERAL

Doors shall be proprietary products, manufactured for interior or exterior applications and for the finish required.

Door thickness: 40mm, generally.

All timber doors shall have hardwood edge strips, minimum 10mm thick. Increase overall thickness to greater than 15mm 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.

2.2 SOLID CORE TIMBER DOORS

Plywood/MDF faced solid core timber doors with flush panels or decorative mouldings.

Provide internal and external grade facings as necessary to suit the installation.

Provide rebated meeting stiles to double doors, unless detailed otherwise.

2.3 SEMI SOLID CORE TIMBER DOORS

Plywood/MDF faced door with internal frame comprising top and bottom rails, stiles, lock blocks and stiffening members, constructed with either a cellular core or skeleton core and with flush panels or decorative mouldings.

Top/bottom rails and stiles of frame shall be of sufficient width to provide a strong and robust door, fit for the intended purpose. Provide blocks to accommodate all door hardware as scheduled.

Provide rebated meeting stiles to double doors, unless detailed otherwise.

2.4 FACE MOUNTED SLIDING INTERNAL DOORS

Provide overhead track supports and head and jamb linings appropriate to the arrangement of the door, and removable pelmets at the head to allow access to the wheel carriages for adjustment.

Wheel carriages shall be fully adjustable precision ball race type providing smooth, quiet operation.

2.5 CAVITY SLIDING DOORS

Cavity sliding doors shall comprise steel and timber frame construction with rigid steel top, base and rear supporting members and incorporating the overhead door track, ball race type wheel carriages guides, stops, split jamb linings and removable pelmet.

2.6 INSECT SCREEN DOOR

Provide insect screen doors comprising insect screen mesh beaded into a frame to match the doorset material.

Sliding or side hung as appropriate to the doorset.

Sized and detailed to fully screen the door opening.

Include all necessary hardware and accessories to complete the installation.

2.7 TIMBER DOOR FRAMES

Timber frames shall be manufactured from hardwood, unless nominated otherwise.

Grade: Select.

Joints:

- Morticed head and through tenons.
- Trenched head:
  - Bare faced tenons on jambs.
  - Full let-in jambs.

2.8 STEEL DOOR FRAMES

Product: Ezy-Jamb Door Jambs or acceptable equivalent.

System shall include all necessary accessories such as buffers, strike plates, spreaders, mortar guards, fixing ties or brackets and with provision for fixing documented hardware.

Form from coated steel sheet: To AS 1397. Coating class: ZF100.

Thickness: 1.2mm.

Fully weld and grind smooth all joints and cold galvanise.

2.9 BUSHFIRE SCREENS AND SEALS

To AS 3959.

Provide protection to doors from the ingress of embers where required to suit the Bushfire Attack Level (BAL) of the site.

2.10 SECURITY SCREENS DOORS

Provide proprietary aluminium framed security screens with expanded aluminium mesh insert at doors and windows where required, fixed to the building structure with tamper resistant fastenings. Where a security screen is required, mesh is to be suitable as an insect screen.

Product: Crimsafe or acceptable equivalent.

Security grilles and screen doors: To AS 5039.

Installation: To AS 5040.

2.11 TRIM

Provide timber/ MDF mouldings, architraves, reveal linings, and other internal trim to complete the door installation. Install to make neat and clean junctions between frames and the adjoining building surfaces. Profiles shall be as detailed on the Drawings.

2.12 FLASHINGS

To AS/NZS 2904.

3 EXECUTION

3.1 PRIMING

Prime timber door leaves on top and bottom edges before installation.

3.2 FRAMES GENERALLY

Install 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.

3.3 TIMBER FRAMES

When fixing timber frames to masonry openings, build in seasoned timber plugs to masonry joints or use proprietary expansion anchors and screw twice through jambs at each fixing.

When fixing to stud frame openings, back screw twice to jambs at each fixing.

Conceal heads of fasteners, where possible, otherwise sink the head below the surface and fill the sinking flush with a material compatible with the surface finish.

3.4 STEEL FRAMES

Building in to 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: Attach galvanised steel brackets to jambs and screw twice to studs at each fixing.

3.5 SLIDING INTERNAL DOORS

Face mounted

Provide overhead track supports and head and jamb linings appropriate to the arrangement of the door, and removable pelmets at the head to allow access to the wheel carriages for adjustment.

Provide wheel carriages that are fully adjustable precision ball race type providing smooth, quiet operation.

Cavity sliding

Proprietary door assemblies comprising steel and timber frame construction with rigid steel top, base and rear supporting members and incorporating the overhead door track, ball race type wheel carriages, guides, stops, split jamb linings and removable pelmet.

3.6 SEALS

All external doors shall be fitted with rubber weatherproofing seals. Product: Raven RP5 or acceptable equivalent.

Provide bottom seals comprising nylon brush strips, threshold plate seals or cam activated, automatic seals. Product: Raven RP59 or acceptable equivalent.

3.7 LIFT OFF HINGES

Provide lift off hinges to fully enclosed toilets where clear space at the door is not provided, in accordance with BCA Volume 2 Clause 3.8.3.3.

3.8 FINISHING

Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the door frames. Install to make neat and clean junctions between the frame and the adjoining building surfaces.

3.9 WEATHERPROOFING

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.

3.10 COMPLETION

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.

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.

0454 OVERHEAD DOORS

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0455 Hardware.*
- *0671 Painting.*
- *0673 Powder coatings.*

1.3 STANDARD

Garage doors: To AS/NZS 4505.

1.4 WARRANTIES

Prior to Practical Completion a written warranty shall be submitted for the following:

- Garage doors:
  - . Curtain: 7 years.
  - . Operator: 2 years.

1.5 INSPECTION

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

- Framing or structure to receive tracks and motor.
- Tracks and guides installed before doors or shutters are hung.

2 PRODUCTS

2.1 GARAGE DOORS

Garage doors shall be tilt up, sectional or roller type.

Finish: Powder coated to accepted samples.

Operation: Motorised. Provide a minimum of two remote control door activators.

3 EXECUTION

3.1 GENERAL

Install overhead doors in conformance with the manufacturer's recommendations.

Before start of installation, check the alignment of substrates or framing and adjust if required.

Roller doors and sectional doors shall be fitted with nylon end clips to prevent lateral movement of the curtain.

Provide weather seals to bottom rail of doors.

3.2 FRAMES

Install the frames as follows:

- Plumb, level, straight, true and within tolerances and clearances recommended by the manufacturer.
- Fixed or anchored to the building structure using mechanical fixings suitable for the substrate and the imposed loads.
- Isolated from any building loads, including loads caused by structural deflection or shortening.

3.3 COMPLETION

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.

Make sure all safety features are operating.

Make sure remote control devices are programmed and operating.

On or before the date for practical completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used for protection.

0455 HARDWARE

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*
- *0451 Windows and glazed doors.*
- *0453 Doors.*
- *0454 Overhead doors.*

1.3 STANDARDS

Locksets for doors and windows: AS 4145.1, AS 4145.2 and AS 4145.3.

1.4 WARRANTIES

Prior to Practical Completion a written warranty shall be submitted for the following:

- All hardware: 5 years.

1.5 INSPECTION

Give notice so inspection may be made of the following;

- Completed and working hardware to all doors and windows.

2 PRODUCTS

2.1 GENERAL

Hardware selections shall be to accepted samples.

Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, compatible with associated hardware, and fabricated with fixed parts firmly joined.

2.2 HINGES

Conform to the following table for hinges to external doors:

Size of door (mm x mm)	Number of hinges (per door leaf)	Size of hinges (steel)
2040 x 920	3	100 x 75 x 2.5mm
2040 to 2400 x 1020	4	100 x 100 x 2.5mm

Internal doors, not exceeding 2040mm high x 820mm wide and 30kg mass may be installed with two hinges.

If necessary, provide wide throw hinges to achieve the required door swings to avoid obstacles such as deep reveals or architraves.

2.3 LIFT OFF HINGES

Provide lift off hinges to fully enclosed toilets where clear space at the door is not provided, in accordance with BCA Volume 2 Clause 3.8.3.3.

2.4 LOCKSETS

Provide push-button key and knob set and a double-cylinder dead bolt to each external door, unless noted otherwise.

Provide stops with hold open devices/ catches to all doors.

Internal doors:

- Generally: Passage sets.
- Bathrooms, toilets and master bathrooms: Privacy sets.
- Sliding doors and windows: Key-lockable surface mounted bolts.
- Internal garage door: Double cylinder deadlock, entrance set and keyed.
- Security screen doors: Door closer.

External doors:

- Glass sliding doors: Latch and double cylinder deadlock.
- Front entry doors: Trilock '3 in 1' locking system.

2.5 KEYING

Key doors and windows alike.

Provide two keys for each set of locks, keyed alike, and two keys for each lock keyed to differ.

2.6 CONSTRUCTION KEYING

During construction, locks shall be pinned up in a manner that allows a construction key to be issued to the Contractor and Subcontractors. The temporary construction key permits entry into the premises during construction, but will subsequently lock out all construction keys as soon as the occupant's key is inserted after the handover.

2.7 LOCK BOX

Provide an external proprietary lock box, with combination code, for storage of keys.

2.8 WINDOW HARDWARE

Openable windows to bedrooms, greater than 2m above ground, shall be fitted with a device to restrict the opening to a maximum width of 125mm and capable of withstanding an outward horizontal force of 250N in accordance with the BCA volume 2 clause 3.9.2.5.

2.9 COAT HOOKS

Proprietary stainless steel coat hook mounted on a painted timber of MDF board.

2.10 DOOR BELLS

Provide door bells to front entry doors.

Door bells are to be hardwired.

3 EXECUTION

3.1 INSTALLATION

Deliver door hardware items, 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, fixings and fixing instructions.

Door lockset mounting height shall generally be 1000mm above finished floor to centreline of spindle.

Fix lock cylinders vertically and with consistent key alignment.

Fix door stops on the floor, skirting or wall, as appropriate, to prevent the door or door furniture striking the wall surface.

Provide fixings compatible with the item being fixed, and of sufficient strength, size and quality to perform their function.

Provide a corrosion resistant finish to concealed fixings.

Match exposed fixings to the material being fixed.

Locate exposed fixings to lock furniture on the inside faces of external doors.

Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings.

Fix hinges using metal thread screws.

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.

0461 GLAZING

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0451 Windows and glazed doors.*
- *0453 Doors.*

1.3 STANDARDS

Materials and installation: To AS 1288.

Safety glass: To AS/NZS 2208.

Balustrades: To BCA Volume 2 Part 3.9.2.

1.4 SUBMISSIONS

Submit a professional engineers' certificate confirming conformance of balustrade design with AS/NZS 1170.1 clause 3.6.

Submit statements from all parties to the installation certifying the compatibility of sealants and glazing systems to all substrates.

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.

2 PRODUCTS

2.1 MIRRORS

Mirrors shall comprise glass with silver layer and electrolytic copper coating, at least 5 microns thick, with two coats of mirror backing and edge sealing paint having a total dry film thickness of at least 50 microns.

Safety mirrors shall comprise vinyl backed Grade A safety glass.

Where mirrors are required, by AS 1288, to be grade A safety glass, ordinary annealed glass may be substituted when the panel is fully backed by and completely adhered to a solid material.

2.2 SOLID BACKED ANNEALED GLASS MIRRORS

Backing shall be 9mm thick waterproof plywood.

Adhesive for fixing shall be a non-acidic silicone adhesive applied at the rate recommended by the manufacturer.

Clean the back of the glass panel and apply walnuts of adhesive together with double sided adhesive tape for temporary support and affix directly to the backing.

2.3 GLAZED SHOWER SCREENS

Proprietary framed or frameless glazed shower screen system comprising fixed panel glazing and glazed pivoted/ swinging/ sliding doors.

2.4 GLASS BALUSTRADES

Glazing to balustrades shall be grade A safety glass.

Where handrails are supported by glass balustrades, they shall be fixed in such a manner that, should a glass pane fracture, the handrail will remain in position.

2.5 VISUAL INDICATORS ON GLAZING

Any glazing capable of being mistaken for a doorway or opening, where there is no chair rail, handrail or transom, shall be clearly marked with a contrasting line that complies with BCA Volume 2 Clause 3.6.4.6.

3 EXECUTION

3.1 FIXING MIRRORS

To AS 1288.

3.2 GLAZED SHOWER SCREENS

Provide an assembly which sheds water to the inside without retaining it on the frame surfaces. Seal the edge of the frame to adjoining surfaces with a resilient strip.

For sliding assemblies, hang the sliding sash on stainless steel or nylon sheaves on overhead channel track formed in the frame head, and fit nylon or equivalent bottom guides.

Provide pull handles on both sides of sash, or of leading sash in multiple sash arrangements.

3.3 GLASS BALUSTRADES

To AS 1288 Section 7.

3.4 COMPLETION

Clean all frames and glass surfaces inside and out with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.

0471 INSULATION AND PLIABLE MEMBRANES

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.
- The energy efficiency commitment required by the nominated Nathers Star Rating.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*
- *0383 Structural sheet flooring.*
- *0421 Roofing.*
- *0431 Cladding.*
- *0511 Linings.*
- *0531 Ceilings.*

1.3 STANDARDS

Mineral wool blankets and cut pieces: To AS/NZS 4859.1, Section 8.

Polyester: To AS/NZS 4859.1 Section 7.

Reflective thermal insulation: To AS/NZS 4859.1, Section 9.

Bulk insulation: To AS 3999.

Pliable membrane materials: To AS/NZS 4200.1.

Pliable membrane installation: To AS/NZS 4200.2 and BCA 3.12.1.1.

1.4 WARRANTIES

Prior to Practical Completion a written warranty shall be submitted for the following:

- Insulation generally: 10 years.

1.5 INSPECTION

Give notice so that inspection may be made of the pliable membrane and insulation before they are covered up or concealed.

2 PRODUCTS

2.1 GENERAL

Insulation shall have a zero ozone depletion potential (ODP) in its manufacture and composition, be CFC and HFC free in its manufacture and composition and have a global warming potential (GWP) of less than five.

Insulation thicknesses/ R-values shall be determined based on the requirements of the BCA, to suit the climate zone applicable to the site.

2.2 INSULATION TO SUSPENDED FRAMED FLOORS

Product type: Fibre batts.

Install and fit tightly between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

2.3 INSULATION BELOW CONCRETE SLABS

Product type: Rigid cellular extruded sheets.

Install in a stretcher bond laying pattern, with edges tightly butted.

Lay damp proof membrane over insulation.

2.4 METAL ROOF INSULATION

Product type: Fibre blankets or batts.

Install wire mesh across the roof purlins. The wire shall be pulled taught. Dishing will not be acceptable.

Provide proprietary spacers along the roof purlins to ensure that the insulation recovers to its nominal thickness. Depth: To suit insulation thickness.

2.5 TILED ROOF INSULATION

Product type: Proprietary thermo reflective anti-glare insulation.

2.6 FRAMED WALL THERMAL BREAK STRIPS

Product type: Proprietary thermal break item.

Fix to steel or timber framing with lightweight external cladding.

Thickness: 6mm.

Fix with button head screws or adhesive daubs at 1m centres.

2.7 CAVITY MASONRY WALL INSULATION

Product type: Rigid cellular insulation board.

Install to the inner brick skin, with proprietary plastic fixing clips on pre-installed wall ties.

Install horizontally with the tongue to the top edge and firmly against the inner brick skin. Keep boards clean and dry and free from mortar and grout. Do not bridge the cavity.

Install flashings before installing insulation panels. Prevent entry of water behind the insulation boards.

2.8 CEILING INSULATION

Product type: Fibre batts.

Install and fit tightly between framing members.

2.9 EXTERNAL FRAMED WALL INSULATION

Product type: Fibre batts.

Install friction fit between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

2.10 INTERNAL FRAMED WALL INSULATION

Product type: Fibre batts.

2.11 VAPOUR PERMEABLE (BREATHABLE) MEMBRANES

Provide a vapour permeable membrane behind external facing materials which do not provide permanent weatherproofing or may be subject to condensation forming on the internal face.

Run the vapour permeable membrane horizontally on the outer face of external wall framing, over the flashing, from the bottom plate up. Pull taught over the framing and fix to framing members. Seal across the wall cavity at the top.

Laps in sheets shall be at least 150mm wide, and shall ensure water is shed to the outer face of the membrane.

2.12 SARKING MEMBRANE

Provide sarking under roofing.

Lay over roof framing with sufficient sag to allow the bulk insulation to achieve its full thickness. Overlap all edges 150mm and seal all joints with pressure sensitive adhesive tape.

Bulk insulation shall be placed on the cold side of the vapour barrier.

Provide a vapour barrier, below blanket insulation installed over roof battens or purlins, under metal roofing in accordance with AS 3999 clause 4.3.

3 EXECUTION

3.1 GENERAL

Fit insulation tightly between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Ensure fibre batts or blankets are firmly butted 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.

Insulation below metal roof sheeting shall be installed so that the blanket is in continuous contact with the underside of the roofing.

0511 LININGS

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0331 Masonry construction*.
- *0342 Light steel framing*.
- *0382 Light timber framing.*
- *0411 Waterproofing*.
- *0531 Ceilings*.
- *0551 Joinery*.
- *0631 Tiling*.
- *0671 Painting*.

1.3 STANDARDS

Plasterboard: To AS/NZS 2588.

Fibre cement: To AS/NZS 2908.2.

Fire hazard properties Group number: To BCA and AS 5637.1.

1.4 TOLERANCES

Tolerances for gypsum linings and fibre cement sheet linings shall comply with AS/NZS 2589 and the following additional requirements:

- The maximum variation in height from a given datum shall be 2mm.
- The maximum offset in plane, level or section between any two adjacent sections shall be 2mm.
- The maximum variation in plan over a distance of 1800mm shall not exceed 2mm.

1.5 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.

2 PRODUCTS

2.1 GENERAL

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.

Store and handle products so they are dry and undamaged, stacked in pallets horizontally on a smooth, level surface. Prevent distortion or moisture ingress.

Do not drag sheets across each other or across other materials. Protect edges, corners and surface from damage.

2.2 PLASTERBOARD

Gypsum core plasterboard, of standard grade classification, with exposed surface suitable for decoration and tapered edges for smooth seamless jointing.

Product: CSR Gyprock Standard or acceptable equivalent.

Size: Minimum 10mm thick, or to suit fire or acoustic requirements.

2.3 MOISTURE RESISTANT PLASTERBOARD

Gypsum core plasterboard of water resistant grade classification with additives to the core and/ or paper liners to reduce the water absorption rate.

Product: CSR Gyprock Aquachek or acceptable equivalent.

Size: Minimum 10mm thick, or to suit fire or acoustic requirements.

2.4 FIBRE CEMENT SHEET

Fibre cement sheet wall linings.

Product: James Hardie Villaboard or acceptable equivalent.

Size: Minimum 9mm thick, or to suit fire or acoustic requirements.

2.5 CORNICE

Decorative coved plaster cornice to accepted samples.

Size: 90mm.

3 EXECUTION

3.1 GENERAL

Do not commence lining work until the building or installation area is enclosed and weathertight, and all wet trades have been completed.

Before fixing linings check and, if necessary, adjust the alignment of substrates or framing. Substrates are to be plumb, level, in true alignment and to the lining manufacturer's recommendations.

Do not install ceiling linings until at least 14 days after the roof structure is fully loaded.

Provide all accessories and trim necessary to complete the installation and to make neat junctions between lining components, finishes and adjacent surfaces.

Where sealing is required for fire-resisting or acoustic installations, apply sealant to the manufacturer's recommendations and as follows:

- Around services pipes and penetrations.
- Electrical outlets and recessed lights: Line back and sides of fixture with plasterboard and seal around fixture junction with sealant.
- Around perimeter of lining panels: Provide continuous runs of sealant.

3.2 PLASTERBOARD/FIBRE CEMENT SHEET LINING

To AS/NZS 2589.

Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- Where framing member spacing exceeds the recommended spacing.
- Where direct fixing of the plasterboard is not possible due to the arrangement or alignment of the framing or substrate.

Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Form external corner joints over metallic-coated steel corner beads.

Provide purpose-made metallic-coated control joint beads at not more than 12m centres in plasterboard linings or 7.2m centres in fibre cement lining in walls and ceilings and to coincide with structural control joints.

In tiled areas, provide control joints not more than 4.2 m centres and space to suit joints required in tiling.

Install additional supports, flashings, trim and sealants to wet areas as required.

In tiled areas, provide an extra row of noggings immediately above wall-to-floor flashings. Fix sheet at 150mm centres to each stud and around the perimeter of the sheet. Do not apply a topping coat after bedding perforated paper tape in bedding compound.

Reinforce internal corners with metallic-coated steel angles. In corners subject to continuous moisture, flash over the angle and under the sheeting with continuous bitumen coated aluminium flashing.

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.

When fixing to wall framing, do not fix to top and bottom plates or noggings.

In wet areas, do not use adhesive fixing alone.

Cut edges of boards shall be lightly sanded to remove paper burrs. Apply a PVA sealer to exposed cut edges and any other plaster surface to which tape is applied.

Fill joints and gaps, cover with continuous lengths of tape and fully bed. Where joints are to be covered with finish, feather out to provide a smooth seamless surface.

All external angles shall be protected by the use of drywall angle beads with plasterboard edge beads at all visible jointed abutments. Joint finish shall be applied to all external angles. When jointing is complete and dry, apply drywall primer to the complete surface ready to receive decoration.

All beads shall be flush with the board.

Nail and screw depressions shall be filled with joint filler to provide a flush and smooth surface.

Where multiple sheet layers are required for fire-resistance rated or acoustic walls, fill and flush up all joints and fasteners in each layer and caulk up perimeters and penetrations before installing subsequent layers. Stagger all sheet joints by minimum 200 mm.

Flush plasterboard/ fibre cement sheet walls shall generally achieve a level 4 finish, in accordance with AS/NZS 2589. Where dark and/ or glossy paint finishes are used or where surfaces are subjected to glancing light, a level 5 finish shall be achieved.

3.3 WALL/CEILING JUNCTIONS

Where plasterboard ceilings abut walls, provide a square set finish or a decorative plaster cornice fixed with cornice cement.

3.4 COMPLETION

Replace damaged or marked lining and components

Clean completed surfaces to remove irregularities and leave panels smooth and clean, to the manufacturer's recommendations. If required, sand with fine paper to remove irregularities and refinish panel surface.

Remove debris and unused material from the site.

0531 CEILINGS

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0342 Light steel framing*.
- *0382 Light timber framing.*
- *0511 Linings*.
- *0671 Painting*.

1.3 STANDARDS

Luminaire and air diffuser interface: To AS 2946.

Plasterboard: To AS/NZS 2588.

Fibre cement: To AS/NZS 2908.2.

1.4 TOLERANCES

Flatness, twist, winding and bow: 1.5 mm deviation from a 1.5 m straightedge placed in any position.

Bearing surface for flush lined ceiling: To AS/NZS 2589 Table 4.2.2.

1.5 INSPECTION

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

- The ceiling assembly before the installation of fittings and site painting, if applicable.
- The completed ceiling.

2 PRODUCTS

2.1 PLASTERBOARD

Gypsum core plasterboard, of standard grade classification, with exposed surface suitable for decoration and tapered edges for smooth seamless jointing.

Product: CSR Gyprock Standard or acceptable equivalent.

Size: Minimum 10mm thick, or to suit fire or acoustic requirements.

2.2 MOISTURE RESISTANT PLASTERBOARD

Gypsum core plasterboard of water resistant grade classification with additives to the core and/ or paper liners to reduce the water absorption rate.

Product: CSR Gyprock Aqauchek or acceptable equivalent.

Size: Minimum 10mm thick, or to suit fire or acoustic requirements.

2.3 FIBRE CEMENT SHEET

Fibre cement sheet ceiling linings.

Product: James Hardie Villaboard or acceptable equivalent.

Size: Minimum 9mm thick, or to suit fire or acoustic requirements.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

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.

Protect existing work from damage during the installation.

Install the ceiling to allow for differential movement at abutting surfaces.

Align ceiling control joints with structural control joints. Do not bridge structural control joints.

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.

3.2 BULKHEADS

Integrate bulkheads with the ceiling structure and brace to prevent lateral movement.

3.3 PLASTERBOARD/FIBRE CEMENT SHEET LINING

Gypsum plasterboard, fibre reinforced gypsum plaster and fibre cement sheet: To AS/NZS 2589.

Fix using screw or screw and adhesive to ceiling furring members. Do not fix sheets to the bottom chords of trusses.

Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over metallic-coated steel corner beads.

Cut edges of boards shall be lightly sanded to remove paper burrs. Apply a PVA sealer to exposed cut edges and any other plaster surface to which tape is applied.

Fill joints and gaps, cover with continuous lengths of tape and fully bed. Where joints are to be covered with finish, feather out to provide a smooth seamless surface.

All external angles shall be protected by the use of drywall angle beads with plasterboard edge beads at all visible jointed abutments. Joint finish shall be applied to all external angles. When jointing is complete and dry, apply drywall primer to the complete surface ready to receive decoration.

All beads shall be flush with the board.

Nail and screw depressions shall be filled with joint filler to provide a flush and smooth surface.

Flush plasterboard/ fibre cement sheet ceilings shall generally achieve a level 4 finish, in accordance with AS/NZS 2589. Where dark and/ or glossy paint finishes are used or where surfaces are subjected to glancing light, a level 5 finish shall be achieved.

Provide expansion joints to prevent cracking through cornices.

3.4 ACCESS PANELS/ MANHOLES

Provide ceiling access panels and manholes, as necessary, to access ceiling spaces.

Match the associated ceiling in appearance and performance.

Reinforce the back of the access panels and manholes to prevent warping and facilitate handling.

Confirm locations of access panels prior to installation.

3.5 COMPLETION

Replace damaged or marked lining and components

Clean completed surfaces to remove irregularities and leave panels smooth and clean, to the manufacturer's recommendations. If required, sand with fine paper to remove irregularities and refinish panel surface.

Remove debris and unused material from the site.

0551 JOINERY

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0342 Light steel framing*.
- *0382 Light timber framing.*
- *0511 Linings*.
- *0552 Metalwork*.
- *0671 Painting*.
- *0673 Powder coatings*.

1.3 STANDARDS

Domestic kitchen assemblies:

- Kitchen units: To AS/NZS 4386.1.
- Installation: To AS/NZS 4386.2.

Joinery timber:

- Hardwood: To AS 2796.1 and AS 2796.3.
- Softwood: To AS 2796.1 and AS 4785.3.

Finished sizes for milled timber: Not less than the documented dimension unless qualified by a term such as “nominal”, “out of” or “ex” to which industry standards for finished sizes apply.

Plywood: To AS/NZS 2270.

Plywood, exposed to moisture: To AS/NZS 2271.

High pressure decorative laminate sheets: To AS/NZS 2924.1.

Safety glass: To AS/NZS 2208.

Timber veneers: To AS/NZS 2097 and AS/NZS 2098.

Stairs: To AS 1657.

Handrails and balustrades: To BCA Volume 2 Part 3.9.2.

1.4 SAMPLES

In accordance with Section 0171, provide samples of the following:

- Door front.

- Drawer front.
- 500mm length of benchtop including front edge profile and wall junction.
- 300mm length of skirting in the nominated finish.
- 300mm length of each type of handrail including fixings and brackets.
- One sample of each type of hardware.

1.5 SHOP DRAWINGS

Submit Shop Drawings showing the following information:

- Overall dimensions.
- Materials, thicknesses and finishes of elements including doors, divisions, shelves and benches.
- Type of construction including mitre joints and junctions of members.
- Hardware type and location.
- Temporary bracing, if required.
- Procedures for factory and Site assembly and fixing.
- Benchtop layout including joint arrangement and penetrations.
- Locations of sanitary fixtures, sinks, whitegoods and other items to be installed in the units, including elevations and dimensions to show suitable for proposed FFE items.
- Relationship of fixtures to adjacent building elements.
- Details of fabrication involving other trades or components.
- Where items of joinery are required to reticulate services or ventilate appliances, the Shop Drawings shall demonstrate that all services have been adequately coordinated.

1.6 WARRANTIES

Prior to practical completion a written warranty shall be submitted for the following:

- All fixed joinery items: 10 years.

1.7 INSPECTION

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

- Shop fabricated or assembled items once delivered to the site.
- Openings prepared to receive assemblies.
- Site erected assemblies on completion of erection, before covering up by cladding and encasing.
- Surfaces prepared for, and immediately before, site applied finishes.
- Completion of installation.

2 PRODUCTS

2.1 GENERAL

Deliver joinery units to site in unbroken wrapping or containers and store so that its moisture content is not adversely affected. Do not store in areas of wet plaster. Keep storage time to a minimum by delivering items only when required for installation.

2.2 JOINERY AND JOINERY FINISHES

Joinery, joinery finishes and hardware shall be to accepted samples.

2.3 MDF SKIRTINGS

HMR MDF skirtings shall be to selected samples.

Size: Minimum 150mm x 15mm.

Finish: Painted.

Skirtings shall be concealed fixed to walls.

Form straight runs in single lengths wherever possible.

Location and method of forming running joints, where required, shall be agreed prior to commencement of work.

Joints at angles shall be mitred.

2.4 HIGH-PRESSURE DECORATIVE LAMINATES

Laminate sheet thickness (minimum):

- For horizontal surfaces fixed to a continuous substrate: 1.2mm.
- For vertical surfaces fixed to a continuous substrate: 0.8mm.
- For post formed laminate fixed to a continuous substrate: 0.8mm.
- For vertical surfaces fixed intermittently (e.g. to studs): 3.0mm.
- For edge strips: 0.4 mm.

2.5 TIMBER VENEERS

Condition core material and veneers before bonding.

Apply veneers with edges tight butted, with no gaps or other open defects. Set out veneers so that veneers are aligned in regular uniform symmetry, unless otherwise specified.

Finished components shall be free from bow, twist, scratches, chipping, pimpling, depressions, glue spill, staining and other defects. Sand to a fine, smooth finish, free from sanding marks.

2.6 GLASS SPLASHBACKS

Glass splashbacks shall comprise 6mm toughened colourback glass with a factory applied opaque coating to the back.

Glass shall be heat resistant, as required, to suit proximity to appliances.

2.7 HANDRAILS

Provide timber handrails to accepted samples.

Finish: Painted.

2.8 STAINLESS STEEL

Stainless steel shall be grade 316 with fine linished finish, unless nominated otherwise.

2.9 WARDROBE, CUPBOARD AND DRAWER UNITS

Plinths, carcasses, drawer fronts, shelves and doors shall be either:

- Overlaid high moisture resistant particleboard.

- Overlaid high moisture resistant medium density fibreboard.

Thickness (minimum): 18mm for spans less than or equal to 900mm and 25mm for spans greater than 900mm.

Bench and cupboard units:

- Carcass sides, intermediate divisions, back and floor to be constructed from 18mm thick MDF/ particleboard. Cut back sides and intermediate divisions to allow for a 50mm deep clear toe recess.
- Provide Furnco or similar adjustable levellers for true level and alignment. Secure to floor.
- Provide an 18mm thick MDF/ particleboard kickplate to toe recess with finish to accepted samples. Scribe accurately to the floor and provide a silicone seal at the floor junction.
- Internal surfaces of cupboard and drawer units, including fixed/ adjustable shelves to be white melamine finish with laminate edge strips.
- All edges to doors and drawers shall receive ABS edge strips in colour matching the laminate door/ drawer face.
- All external faces of cupboard, drawer and shelf units, including toe recess/ plinth and infill fillets/panels shall have finish as nominated on the Drawings and/ or as scheduled.
- Fixed shelves shall be 18mm thick MDF/ particleboard recessed into sides and/ or intermediate divisions of carcass. Glued and secured with concealed noncorrosive mechanical fasteners. Laminate edging to front edge.
- Adjustable shelves shall be 18mm thick MDF/ particleboard and supported on four stainless steel shelf support lugs. All edges shall have laminate edge strips.
- Provide cutlery inserts to drawers.
- Include a 20mm wide scribed fillet to either side of joinery units where the joinery is 'wall to wall'.
- Overhead units and tall cupboard units shall include a fixed solid front panel over plus side returns where applicable forming a bulkhead that extends to the underside of the ceiling. The bulkhead shall finish flush with cupboard doors and be 18mm proud of shelf units. Finish shall match adjacent walls.

Adjustable shelves shall be supported on proprietary pins in holes bored at equal centres vertically.

Spacing: 32mm.

All fixings shall be concealed.

Rout drawer fronts to provide a recess for drawer bottoms.

Drawer backs and sides:

- PVC film wrapped particleboard.
- Thickness: 16mm.
- Mitre corners leaving outer skin of foil intact, finish with butt joints, glue to form carcass and screw to drawer front. Rout for drawer bottoms.

Drawer bottoms:

- PVC film laminated hardboard.
- Thickness: 6mm.

Sliding doors to wardrobes:

- Provide edge frame to joinery units at sliding door jambs.

2.10 DRAWER AND DOOR HARDWARE

Provide concealed, 135 degree opening, Blum type or similar metal hinges with the following features:

- Adjustable for height, side and depth location of door.
- Self-closing and soft-close action, equivalent to Blum heavy duty.
- Hold-open function.

- Nickel plated.

Drawers shall be fitted with metal runners and plastic rollers with the following features:

- 30kg loading capacity.
- Adjustable stop to prevent accidental full withdrawal of drawer from carcass.
- White thermoset powder coating or nickel plated.
- Soft-close action, equivalent to Blum heavy duty.

Silicone dots shall be installed to doors and drawers to prevent knocking against the carcass.

2.11 LAMINATE BENCHTOPS

Substrate shall be either high moisture-resistant particleboard or medium density fibreboard.

Finish: High pressure decorative laminate sheet.

Extend laminate over shaped nosing, finishing more than 50mm back on underside. Splay outside corners at 45 degrees.

Thickness (minimum): 32mm.

Extend laminate to the undersides of benchtops if subject to excessive moisture from equipment such as dishwashers.

2.12 STONE BENCHTOPS

Stone for joinery units shall be free from vents, cracks, fissures, discoloration or other defects that may adversely affect strength, durability or appearance.

Stone shall be dressed and worked before delivery to Site.

Provide samples of all stone products, which represent the anticipated range of variations in appearance.

In natural stone, repair mud veins or lines of separation that are integral to the selected pattern with resin fillers and back lining.

All edges of stone shall be pencil round with minimum 3mm radius.

3 EXECUTION

3.1 JOINERY

Provide materials in single lengths whenever possible. If joints are necessary, make them over supports and locate away area where water may be present.

Prime surfaces concealed by substrates.

Damp clean and vacuum substrate surfaces that will be permanently concealed.

Examine joinery units for completeness and remedy deficiencies.

Frame and trim where necessary for openings, including those required by other trades.

Provide all accessories and trim necessary to complete the installation.

Secure plinths and carcasses to floors, walls, or both at not more than 600 mm centres.

Do not provide visible fixings except in the following locations:

- Inside cupboards and drawer units.

- Inside open units, in which case provide proprietary caps to conceal fixings.

Fix joinery units to substrate as follows:

- Floor mounted units: 600 mm centres maximum.
- Wall mounted units: To each nogging and/or stud stiffener.

Fixings shall comprise screws with washers into timber or steel framing, or masonry anchors.

Provide adhesives to transmit the loads imposed and to ensure the rigidity of the assembly, without causing discolouration of finished surfaces.

Scribe plinths, benchtops, splashbacks, ends of cupboards, kickboards and returns to follow the line of the structure.

Finish exposed edges of sheets with edge strips which match sheet faces.

Fix benchtops to carcass at least twice per 600mm length of benchtop and fill joints with sealant matching the finish colour and clamp with proprietary mechanical connectors.

Seal benchtops to walls and carcasses with a sealant that matches the finish colour.

Joinery shall incorporate all services and FF&E installations as necessary.

3.2 GLASS SPLASH BACKS

Fix with non-acidic silicone adhesive. Apply at the rate recommended by the manufacturer.

Clean the back of the glass panel and apply walnuts of adhesive together with double sided adhesive tape for temporary support, and affix directly to the substrate.

3.3 TIMBER STAIRS

Set out stairs to give uniform risers and uniform treads respectively in each flight.

Closed strings shall be trenched for treads and risers.

Cut stringers shall be profiled to suit treads and risers. Mitre riser ends.

Treads shall have pencil-round nosings. Return nosings at cut stringers. Groove for riser tongue in closed riser stair. Set riser 19mm back from nosing.

Top tread shall be flush with finished floor. Provide similar tread section as nosing to floor edges around stairwell.

Risers shall be tongued to tread. Mitre to string in cut-string stairs.

Glue joints in internal work. In closed riser stairs, wedge treads and risers to strings. Plant two glue-blocks behind each tread to riser junction. Trim floors to carry ends of stairs and around stairwell.

Stair bolts (to open rise close string stairs) shall be 8mm diameter mild steel, one at each end and one at centre of flight, transversely between strings. Draw strings tight against ends of treads.

Provide beads and mouldings as necessary, including a scotia or similar planted under the tread nosing against the risers and cut strings, a bead between wall strings and wall, and a bead behind the fascia over the ceiling finish.

Where soffit linings are installed below stairs, fix linings to 38mm x 38mm nailing battens notched and nailed to the underside of treads and risers at the centre of flights and at each side.

3.4 TIMBER BALUSTRADES

Provide a timber balustrade to the stairs and landings, consisting of newels, handrail, balusters, and associated mouldings.

3.5 COMPLETION

Protect timber treads and provide full timber or plywood casing.

On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary protective coatings.

Remove all dust, marks and rubbish from all surfaces and internal spaces. Clean and polish all self-finished surfaces such as anodised and powder coated metals, sanitary ware, glass, tiles and laminates.

0552 METALWORK

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0342 Light steel framing*.
- *0382 Light timber framing.*
- *0511 Linings*.
- *0551 Joinery*.
- *0671 Painting*.
- *0673 Powder coatings*.
- *Structural Engineer's documentation.*

1.3 STANDARDS

Handrails and balustrades: BCA Volume 2 Part 3.9.2.

Aluminium structures: To AS/NZS 1664.1 or AS/NZS 1664.2.

1.4 INSPECTION

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

- Shop fabricated or assembled items once delivered to the site.
- Commencement of shop or site welding.
- Site erected assemblies on completion of erection, before covering up by cladding and encasing.
- Steel surfaces prepared for, and immediately before, site applied finishes.

2 PRODUCTS

2.1 STAINLESS STEEL HANDRAILS

Stainless steel handrails shall be fit for purpose.

Finish: Polished.

Stainless steel shall be generally grade 304, unless the corrosivity category of the site requires marine grade 316.

2.2 EXTERNAL METAL SCREENS

External metal screen systems shall be to accepted samples.

Provide supporting structure, as necessary, to suit the anticipated loads in operation. Where exposed, supporting members shall have finish to match the screen.

2.3 MATERIALS AND COMPONENTS

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

3 EXECUTION

3.1 GENERALLY

Provide metals so that they transmit the loads imposed and ensure the rigidity of the assembly without causing deflection or distortion of finished surfaces.

Separate incompatible metals using concealed layers of suitable materials in appropriate thicknesses.

3.2 FASTENERS

Provide non-galvanic corrosion fasteners.

Provide fasteners in materials of mechanical strength and corrosion resistance at least equal to that of the lowest resistant metal joined.

3.3 FABRICATION

Fabricate and pre-assemble items in the workshop wherever practicable.

Keep edges and surfaces clean, neat and free from burrs and indentations. Remove sharp edges without excessive radiusing.

Form bends in metal tubes without visibly deforming the cross section.

Accommodate thermal movement in joints and fastenings.

Tolerances: ± 2 mm from design dimensions.

3.4 JOINTS

Fit joints to an accuracy appropriate to the class of work. Finish visible joints made by welding, brazing or soldering using grinding, buffing or other methods appropriate to the class of work, before further treatment.

3.5 WELDING AND BRAZING

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

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

3.6 PIPE RAIL BALUSTRADES

Produce smooth unbroken surfaces at joints. Scribe the joints between posts and rails. Make end-to-end joints over an internal sleeve.

Make changes of direction in rails by evenly curved pipe bends.

Seal the free ends of pipes with fabricated or purpose-made end caps.

Provide fabricated predrilled or purpose-made brackets or post bases and attach the piping to the building structure with fixings, including bolts into masonry anchors, and coach screws or bolts into timber, of metal compatible with the piping.

3.7 COMPLETION

On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

Remove all dust, marks and rubbish from all surfaces and internal spaces. Clean and polish all self-finished metals.

0574 WINDOW COVERINGS

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0451 Windows and glazed doors*.

1.3 STANDARDS

Uncoated woven and knitted fabrics: To AS 2663.1.

Coated woven and knitted fabrics: To AS 2663.2.

- Performance classification (minimum): 2.

1.4 WARRANTY

Prior to practical completion a written warranty shall be submitted for a period equal to or exceeding that nominated in the Warranty Schedule included in Section 0171.

1.5 INSPECTION

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

- Building locations or substrates prepared to receive window coverings before installation.

2 PRODUCTS

2.1 WINDOW COVERINGS

Fix securely using the manufacturer's fixing components and without causing distortions.

2.2 ROLLER FABRIC BLINDS

Blind material: Block out fabric.

Drum: Powder coated aluminium.

Base rail: Powder coated aluminium.

Brackets: Powder coated steel.

Provide a stainless steel beaded chain for operation.

Width and height to suit window opening.

2.3 VERTICAL BLINDS

Blind material: Polyester suitable for privacy and light control (blockout),

Track material: Extruded aluminium alloy 6063-T6 or as per manufacturers requirements.

Width and height to suit window opening.

Fix slats and panels in single straight lengths finishing 10 mm above floor or sill level, without twists, warp, bows, edge ripples or fraying.

Fix a weight into a pocket formed in the bottom of each slat or a rail to the top and bottom of each panel.

Slat bottoms to be chainless.

Install slats evenly using plastic spacers which lock into the carrier rail to provide a continuous linkage, and fix with sealed plastic slat holders carried by plastic rotation pivots.

3 EXECUTION

3.1 INSTALLATION

General

Install tracks in documented locations using manufacturer's purpose fabricated mounting brackets, clips, track splicing and other hardware. Install window coverings to hang plumb and level, and true to line.

Provide concealed mechanical fixings suitable for mounting tracks to substrate. Match exposed mounting hardware to the finish and colour of adjacent track.

Adjust all operating hardware for smooth operation free from binding, and to provide even, accurate alignment of window covering in open and closed positions.

Install child safety devices on all control cords and chains. Install all control cords and chains in conformance with *Competition and Consumer (Corded Internal Window Coverings) Safety Standard*.

3.2 COMPLETION

Submit the manufacturers' data as follows:

- Recommendations for service use, care and maintenance.
- List of manufacturers and suppliers of replacement parts.

On or before completion of the works, remove all traces of temporary coatings used as a means of protection.

0611 RENDERING

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- Wind loads for the site shall be determined in accordance with AS 4055 or AS/NZS 1170.2.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.
- The Bushfire Attack Level (BAL) Rating, for the site, shall be determined in accordance with AS 3959 and the BCA.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*
- *0331 Masonry construction.*
- *0671 Painting.*

1.3 STANDARDS

Cement: To AS 3972 Type GP.

Lime: To AS 1672.1.

1.4 SAMPLE PANELS

Prior to commencement, a sample panel of external render, in panel sizes of nominally 1200mm x 1200mm, shall be built on Site, but away from other work. The sample panels shall include all associated beads, angles and accessories. Obtain acceptance prior to commencement of construction for each type. If a panel is rejected, construct other sample panels of each type until acceptance is obtained.

1.5 INSPECTION

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

- Prototypes ready for inspection.
- Substrates immediately before applying base coats.
- Finish treatments before decoration.

2 PRODUCTS

2.1 PROPRIETARY RENDER TO FIBRE CEMENT SHEET

Product: Rockcote Polymer Render Grey or acceptable equivalent.

System shall comprise the following:

- Rockcote Patch and Prep with Mesh Tape.

- Rockcote Polymer Render Grey in two coats.

- Rockcote Armour in two coats.

Provide a wood float finish ready to receive decoration.

2.2 PROPRIETARY RENDER TO MASONRY

Product: Rockcote QRender PM100 or acceptable equivalent.

Thickness (minimum): 12mm.

Provide a wood float finish ready to receive decoration.

2.3 SAND CEMENT RENDER TO INTERNAL WALLS

Render shall comprise cement, lime and sand with mix proportion as follows:

- Regular clay or concrete masonry: 1:0.5:4.5 (cement:lime:sand).
- Lightweight concrete masonry: 1:1:6 (cement:lime:sand).

Thickness (minimum): 12mm.

Provide a wood float finish ready to receive adhesive bedded tiles or hard plaster finish.

2.4 INTERNAL HARD PLASTER

Product: CSR Gyprock Hardwall or acceptable equivalent.

Thickness (minimum): 3mm.

Plaster shall be mixed with hydrated lime in accordance with the manufacturer's recommendations.

2.5 BEADS

Provide a PVC-U or stainless steel proprietary bead sections manufactured for fixing to substrates and/or embedding in the plaster to form and protect plaster edges and junctions.

2.6 CONTROL JOINTS

Provide movement joints to render to coincide with structural movement joints in the substrate or at changes in the substrate.

Confirm the location of joints, with the Superintendent, prior to application of render.

Movement joints shall be formed using proprietary PVC or stainless steel joint beads to suit the render thickness.

Galvanised steel beads may be used for internal applications in lieu of stainless steel.

3 EXECUTION

3.1 SUBSTRATE

Provide substrates as follows:

- Clean and free from any deposit or finish which may impair adhesion of render.
- If framed or discontinuous, support members in full lengths without splicing.
- If solid or continuous, remove excessive projections and fill voids and hollows with render stronger than the first coat and not weaker than the substrate.

If suction is excessive, control it by dampening but avoid over-wetting and do not render substrates showing surface moisture.

If the substrate is not sufficiently true to ensure conformity with the thickness limits for the render system, or has excessively uneven suction resulting from variations in the composition of the substrate, apply additional coats without exceeding the thickness limits for the substrate or system.

3.2 BEADS

Fix beads as follows:

- Angle beads: At all external corners.
- Drip beads: At all lower terminations of external render.
- Beads for control of movement: At all control joints.
- Stop beads: At all terminations of render and junctions with other materials or render systems.

Provide dowels in joints to maintain alignment.

Mechanically fix beads to substrate at maximum 300mm centres.

3.3 BONDING TREATMENT

If bonding treatment is required, apply a wet mix onto the background as follows:

- Cement render: 1 part cement to 2 parts sand.
- Gypsum plaster: 1 part gypsum to 2 parts sand.

Keep continuously moist for 5 days or more and allow to dry before applying plaster coats.

Thickness: 3mm to 6mm.

3.4 EMBEDDED ITEMS

Water pipes and other embedded items shall be sheathed to permit thermal movement.

3.5 APPLICATION

Return render into reveals, beads, sills, recesses and niches. Render faces, ends, and soffits of projections in the substrate, such as string courses, sills, pilasters and corbels. Run neatly finished throating on soffits of external projections. Trim around openings.

3.6 JOINING UP

If joining up of render is required, ensure joints are imperceptible in the finished work after decoration.

3.7 WEEP HOLES

Keep opening free of plaster. Maintain consistent opening size.

3.8 CONTROL JOINTS

Provide joints in the finish to coincide with control joints in the substrate. Ensure that the joint in the substrate is not bridged during rendering.

Size:

- Depth: Extend the joint through the render, to the substrate.
- Width: 3mm, or the same width as the substrate joint, whichever is greater.

Do not continue render across damp-proof courses.

Provide V-joints, cut through the render to the substrate, at the following locations:

- Abutments with metal door frames.
- Abutments with other finishes.

- Junctions between different substrates.

3.9 TEMPERATURE

If the ambient temperature is 10ºC or less or 30ºC or more, ensure that the temperature of mixes, substrates and reinforcement at the time of application are between 5ºC and 35ºC.

3.10 TOLERANCES

Finish plane surfaces within a tolerance of 6mm in 2400mm, determined using a 2400mm straightedge placed anywhere in any direction. Finish corners, angles, edges and curved surfaces within equivalent tolerances.

3.11 COMPLETION

Prevent premature or uneven drying out and protect from the sun and wind.

Keeping moist: If a proprietary curing agent is not used, keep the render moist as follows:

- Base coats and single coat systems: Keep continuously moist for 2 days and allow to dry for 5 days before applying further render coats.
- Finish coats*:* Keep continuously moist for 2 days.

0612 CEMENTITIOUS TOPPINGS

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0310 Concrete.*
- *0383 Structural sheet flooring.*
- *0411 Waterproofing*.
- *0631 Tiling*.
- *0652 Carpets*.
- *Structural Engineer's documentation.*

1.3 STANDARDS

Admixtures: To AS 1478.1.

Cement: To AS 3972 Type GP.

Slip resistance classification: To AS 4586.

1.4 TOLERANCES

General

Thickness: Deviation from the documented thickness:

- Thickness < 15 mm: ± 2 mm.
- Thickness ≥ 15 < 30 mm: ± 5 mm.
- Thickness ≥ 30 mm: ± 10 mm.

Flatness: Maximum deviations from a straightedge laid in any direction on a plane surface:

- Floors to receive carpet: The maximum deviation under a 3m straight edge shall be 5mm and under a 150mm straight edge shall be 1mm, when laid in any direction.
- Floors specified or scheduled to receive resilient finishes: The maximum deviation under a 2 metre straight edge shall be 4mm and under a 150mm straight edge shall be 1mm, when laid in any direction.
- Floors to be exposed in the finished work: The maximum deviation under a 3m straight edge laid in any direction shall be 6mm.
- All other as-laid floors: The maximum deviation under a 3m straight edge laid in any direction shall be 12mm.
- Rectify non-conforming 'as laid' concrete by suitable procedures, such as levelling compounds or grinding.

2 PRODUCTS

2.1 GENERAL

Coarse aggregate shall be nominal single size less than or equal to 1/3 topping thickness.

Fine aggregate shall be fine, sharp, well-graded sand with a low clay content and free from efflorescing salts.

Provide proprietary products manufactured for bonding cement-based toppings to the substrate.

Water, for mixing, shall be clean and free from any deleterious matter.

2.2 BONDED SCREED

Bonded screed to set downs as necessary.

Product: Ardex A38 Rapid Set Screed Cement or acceptable equivalent.

Substrate shall be primed with a bonding slurry comprising Ardex A51 Primer and Bonding Agent, in accordance with the manufacturer's recommendations, prior to laying screed.

Trowel the surface to a level of finish suitable for the nominated floor finish.

2.3 BONDED SCREEDS (OVER FC SHEET/ PARTICLEBOARD FLOORING)

Bonded screed to set downs formed with fibre cement sheet/ particleboard flooring.

Product: Ardex Arditex NA or acceptable equivalent.

Substrate shall be primed in accordance with the manufacturer's recommendations, prior to laying screed.

Contractor to confirm thickness and falls.

Trowel the surface to a level of finish suitable for the nominated floor finish.

2.4 SELF-LEVELLING SCREEDS

Where the structural slab does not achieve the specified tolerances for flatness and level for the nominated floor finish, the surface shall be rectified using a self-levelling polymer screed.

Product: Ardex A55 Rapid Drying Levelling and Smoothing Compound or acceptable equivalent.

Bonded construction to receive floor finishes.

3 EXECUTION

3.1 PREPARATION

Substrates shall be clean and free from any deposit which may impair adhesion of monolithic or bonded toppings.

Remove excessive projections and fill voids and hollows with a mix not stronger than the substrate or weaker than the topping.

3.2 BONDED TOPPINGS

Prior to laying bonded toppings, roughen hardened concrete substrates by scabbling or the like to remove 2mm of the laitance and expose the aggregate.

Wash the substrate with water and provide a bonding product or treat as follows:

- Keep wet for a minimum of 2 hours.
- Remove surplus water and brush on neat cement or a clean slurry of cement and water.
- Place the topping while the slurry is wet.

3.3 APPLICATION

Spread the mix and compact. Strike off, consolidate and level surfaces to finished levels.

Toppings over 50mm thick:

- Lay in two layers of equal thickness.
- Place a layer of reinforcement between the layers of toppings. Lap reinforcement 200mm and tie. Do not create four way laps.

3.4 TEMPERATURE

Ensure that the temperature of mixes, substrates and reinforcement are not less than 5ºC or greater than 35ºC, at the time of application.

If the ambient shade temperature is greater than 38°C, do not mix topping.

3.5 CONTROL OF MOVEMENT

Provide control joints as follows:

- 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 topping finished areas into bays. Spacings shall be 6m x 6m internally and 4m x 4m externally.

Joints shall extend the full depth of the screed to the substrate.

Sealant width: 6mm.

Depth of sealant shall be one half the joint width, or 6mm, whichever is the greater.

3.6 JOINT ACCESSORIES

Provide a corrosion resistant metal weather bar under hinged external doors. Locate under the centres of closed doors.

Finish cementitious toppings at junctions with differing floor finishes with a corrosion resistant metal dividing strip suitably fixed to the substrate, with top edge flush to the finished floor. If changes of floor finish occur at doorways, make the junction directly below the centre of the closed door.

3.7 SLIP-RESISTANT TREATMENT

Where a surface treatment is proposed as the final finish, apply silicon carbide granules after floating and before the topping surface has set and trowel into the surface so that the granules remain exposed.

Application rate: 1 kg/m^2 evenly distributed.

3.8 COMPLETION

Prevent premature or uneven drying out and protect from the sun and wind.

Use a curing product or, as soon as it has set sufficiently, keep the toppings moist by covering with polyethylene film for at least seven days.

0631 TILING

1 GENERAL

1.1 CROSS REFERENCES

Conform to the following:

- *0171 General requirements.*
- *0310 Concrete.*
- *0411 Waterproofing.*
- *0612 Cementitious toppings.*
- *Inspection Test and Conformity Plan (ITCP).*

1.2 STANDARDS

Ceramic tiling: To AS ISO 13006.

Ceramic tiling installation: To AS 3958.1.

Ceramic tile grout and adhesives: To AS ISO 13007.1.

Slip resistance classification: To AS 4586.

Slip resistance measurement of completed installations: To AS 4663.

1.3 SUBMISSIONS

In accordance with Section 0171, provide samples of the following:

- Two tiles of each type.
- Grout tag sample.
- Trial set-out: On horizontal surfaces make a trial set-out for each area.
- Silicone sample.

1.4 TOLERANCES

Tiles shall be manufactured within ±0.5mm of the nominated size.

Installation tolerances: To AS 3958.1.

1.5 WARRANTIES

Prior to practical completion a written warranty shall be submitted for a period equal to or exceeding that nominated in the Warranty Schedule included in Section 0171.

1.6 SLIP RESISTANCE AND SLIP RESISTANCE TESTING

Pedestrian areas shall be stable, safe and minimise the risk of slipping or tripping due to slippery surfaces or misaligned joints. Slip resistances shall comply with the requirements of HB 197 and HB 198.

Provide slip resistance test certificates to confirm that slip resistance values are in accordance with AS 4586 and/ or AS 4663.

Arrange and pay for on-Site slip resistance testing of all types of tiled surfaces that are left exposed in the finished work and in sufficient number to cater for all areas and conditions including ramps, steps, entrances etc. Testing shall be undertaken by a registered testing laboratory. Tests shall include wet pendulum and dry floor friction testing in accordance with AS 4586 and/ or AS 4663.

1.7 INSPECTION

Conduct all testing and inspections as detailed in the relevant ITCP.

2 PRODUCTS

2.1 TILES

Tiles, including grouts, shall be to accepted samples.

2.2 ACCESSORIES

Mitre tiles or use preformed corner angles on external corners.

If available, provide tile accessories such as round edge tiles, step treads and nosings to stairs, landings, and thresholds, skirtings, sills and copings, which match the surrounding tiles, composition, colour and finish.

2.3 ADHESIVES

Do not use PVA based adhesives in wet areas or externally.

2.4 MORTAR BEDDING

Mortar bedding, where used for laying floor tiles, shall be a proprietary epoxy resin based compound.

2.5 GROUT

Cement-based proprietary grout shall be mixed in accordance with the manufacturer's recommendations.

Grout colour shall be selected to match the associated tile colour.

Pigments for coloured grout shall be colourfast fillers compatible with the grout material. For cement-based grouts, provide lime-proof natural or synthetic metallic oxides compatible with cement.

2.6 SEALANT JOINTS

Sealant shall extended through tiles and bedding to base/background. Centre over joints in base/background.

Width: 6mm.

Colour: To match grout joints.

2.7 PREFORMED STRIP/ SECTION MOVEMENT JOINTS

Where required, install preformed expansion joints.

Product: Latham Neoprene X-Pansion Tile Strip or acceptable equivalent.

2.8 STONE SEALER

Thin uniform film of proprietary seal shall be applied to unfinished stone tiles.

3 EXECUTION

3.1 SUBSTRATES

Before tiling, allow at least the following times to elapse (for initial drying out and shrinkage) for these substrates:

- Concrete slabs: 42 days.
- Concrete blockwork: 28 days.
- Toppings on slabs and rendering on masonry: A further 21 days.

3.2 PREPARATION

Substrates shall be clean and free of any deposit or finish which may impair adhesion or location of tiles.

If substrates are framed or discontinuous, support members shall be in full lengths without splicing.

If substrates are solid or continuous:

- Excessive projections shall be removed.
- Voids and hollows with abrupt edges shall be filled with a cement:sand mix not stronger than the substrate or weaker than the bedding.
- Depressions shall be filled with a latex modified cementitious product with feathering eliminated by scabbling the edges.

If suction is excessive, control it by dampening but avoid over-wetting and do not apply mortar bedding to substrates showing surface moisture.

If concrete substrates are not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 3mm of the surface and expose the aggregate, then apply a bonding treatment.

3.3 TILING GENERALLY

Do not use tiles that are chipped, scratched, damaged or have any other physical imperfection.

Fix wall tiles before floor tiles.

Cut tiles neatly to fit around fixtures and fitting and at margins where necessary. Drill holes without damaging tile faces. Cut recesses for fittings such as soap holders. Rub edges smooth without chipping.

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 spaces before grouting.

Distribute variations in hue, colour, or pattern uniformly, by mixing tiles or tile batches before laying.

Keep traffic off floors until the bedding has set and attained its working strength.

Finish tiled floors at junctions with differing floor finishes with a corrosion-resistant metal dividing strip fixed to the substrate. If changes of floor finish occur at doorways, make the junction directly below the closed door.

Ventilate the space below fully enclosed baths with at least 2 vermin proofed ventilating tiles.

3.4 SETTING OUT

Set out tiles to give uniform joint widths within the following limits:

- Tile to tile grout joints shall be 2mm ±0.5mm.

- Tile to tile sealant joints shall be 6mm ±1mm.

Set out tiling with joints accurately aligned in both directions and wall tiling joints level and plumb.

Set out tiles from the centre of the floor or wall to be tiled and ensure cut tiles are a half tile or larger.

Position tiles so that holes for fixtures and other penetrations occur at the intersection of horizontal and vertical joints or in the centre of tiles.

Grout joint widths shall be controlled using spacer pegs.

3.5 FALLS AND LEVELS

Grade floor tiling to even and correct falls generally and to floor wastes and elsewhere as required. Make level junctions with walls. If falls are not required, lay level.

Fall, general: 1:100 minimum.

Fall, in bathrooms: 1:80 minimum.

Fall, in shower areas: 1:60 minimum.

3.6 JUNCTIONS WITH OTHER FINISHES

Maintain finished floor level at junctions with other floor finishes. Provide an aluminium L-shaped trim, maximum 3mm thick, at the junction ensuring that floor finishes, on each side, and the top of the trim are finished at the same height.

3.7 BEDDING

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.

3.8 GROUTED JOINTS

Commence grouting as soon as practicable after bedding has set. Clean out joints as necessary before 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 surface with a clean cloth.

3.9 SEALANT JOINTS

Provide sealant joints finished flush with the tile surface, as follows:

- Where tiling is cut around sanitary fixtures.
- At 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.

Sealant shall be anti-fungal modified, polyurethane silicone.

Width: 5mm.

Depth shall be equal to the tile thickness.

0652 CARPETS

1 GENERAL

1.1 CROSS REFERENCES

General
Requirement: Conform to the following:

- *0171 General requirements*.
- *0310 Concrete*.
- *0383 Structural sheet flooring.*
- *0411 Waterproofing*.
- *0612 Cementitious toppings*.

1.2 STANDARDS

Carpet installation: To AS/NZS 2455.1.

Soft underlays: To AS 4288.

Tolerances: To AS/NZS 1385.

1.3 SAMPLES

In accordance with Section 0171, provide samples of the following:

- 300mm x 300mm sample of each type of carpet.

- 300mm sample of each type of linear accessory.

1.4 WARRANTY

Prior to practical completion a written warranty shall be submitted for a period equal to or exceeding that nominated in the Warranty Schedule included in Section 0171.

1.5 INSPECTION

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

- Each batch of material upon delivery on site.
- Substrate immediately before fixing underlay.
- Fixings, edge strips, and underlay installed ready to lay carpet.
- Completed carpet after cleaning and before covering for protection.

2 PRODUCTS

2.1 CARPET

Carpet shall be to accepted samples.

Minimum five star rating (residential) as set out the Australian Carpet Classification System (ACCS).

2.2 UNDERLAY

Minimum 7.5mm thick for rubber, 9mm thick for foam.

2.3 HOT-MELT ADHESIVE TAPE

Glass fibre and cotton thermoplastic adhesive coated tape 60mm wide on a 90mm wide metal foil base and backed with silicon-coated release paper.

2.4 PREFORMED GRIPPER STRIPS

Domestic grade plywood carpet gripper strip with 3 rows of rust-resistant angled pins of length appropriate to the carpet type.

3 EXECUTION

3.1 SUBSTRATE PREPARATION GENERALLY

Remove oil, grease, loose material, dust and other contaminants.

Remove all projections as necessary and rectify floors not meeting the nominated flatness criteria for the appropriate substrate.

Remove door stops and other fixtures, and refix in position undamaged on completion of the installation.

3.2 CONCRETE SUBSTRATE PREPARATION

Do not commence installation unless the moisture content of the concrete has been tested tested to AS/NZS 2455.1 Appendix B and values in AS/NZS 2455.1 clause 2.4.2(c) have been obtained.

Mechanically remove the following surface treatments:

- Sealers and hardeners.
- Curing compounds.

Solvent based spray paint and markers shall not be used on substrates during construction.

3.3 TIMBER SUBSTRATE PREPARATION

Do not commence installation unless the moisture content of battens/joists or plywood substrates have been tested to AS/NZS 1080.1 for timber and AS/NZS 2098.1 for plywood and values obtained as follows:

- Air conditioned buildings: 8% to 10%.
- Intermittently heated buildings: 10% to 12.5%.
- Unheated buildings: 12% to 15%.

3.4 LAYING CARPET

Lay the carpet in continuous lengths without cross joins in the body of the area. If unavoidable, cross joins at doorways and make joins directly below the closed doors.

Ensure joints in underlay do not coincide with carpet joints. Do not carry underlay over carpet grippers or edge strips.

Seaming methods:

- Woven carpet: Machine or hand sew.
- Tufted carpet: Provide hot-melt adhesive tapes.

Carpet shall be fixed at perimeters with gripper strips to AS/NZS 2455.1 clause 3.5.

3.5 LAYING CARPET ON STAIRS

Carpet shall be laid to stairs using the direct stick method to AS/NZS 2455.1 clause 3.10.

3.6 JUNCTIONS WITH OTHER FINISHES

Unless detailed otherwise, junctions with other floor finishes shall occur at doorways and be centred on the door when in the closed position.

Maintain the finished floor level at junctions with other floor finishes. Diminishing strips at changes in floor finishes will not be accepted. Provide an aluminium L-shaped trim, maximum 3mm thick, at the junction ensuring that floor finishes, on each side, and the top of the trim are finished at the same height.

3.7 COMPLETION

Progressively clean the work. Remove waste, excess materials and adhesive.

When the installation is complete, clean the carpet as necessary to remove extraneous matter, marks and soiling and to lift the pile where appropriate.

Provide fabric drop sheets. Do not use plastic sheeting. If wheeled traffic is to follow carpet installation, protect with hardboard sheets butted and fixed with adhesive tape.

0671 PAINTING

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The atmospheric corrosivity category for the site shall be determined in accordance with AS/NZS 2312.1.

1.2 CROSS REFERENCES

Conform to the following:

- *0171 General requirements.*
- *Inspection Test and Conformity Plan (ITCP).*

1.3 STANDARDS

Painting generally: To the recommendations of those parts of AS/NZS 2311 which are referenced in this worksection.

1.4 SUBMISSIONS

In accordance with Section 0171, provide samples of the following:

- 300mm x 300mm sample of each paint type and colour on a representative substrate.
- Provide two samples for each paint colour for final selection.

1.5 WARRANTIES

Prior to practical completion a written warranty shall be submitted for a period equal to or exceeding that nominated in the Warranty Schedule included in Section 0171.

1.6 INSPECTION

Conduct all testing and inspections as detailed in the relevant ITCP.

2 PRODUCTS

2.1 PAINTS GENERALLY

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

Where putties, fillers and sealants are used on substrates, only use those recommended by the paint manufacturer as suitable for the substrate and compatible with the primer.

Deliver paints to the site in the manufacturer's labelled and unopened containers, do not mix on site.

Provide only products which are colour tinted by the manufacturer or supplier, from a recognised colour palette and as per the colour schedule approved for the contract.

2.2 PROTECTIVE COATING TO EXPOSED STEELWORK

Product: Dulux Protective Coatings or acceptable equivalent.

Surfaces:

- Exposed structural steel.

Preparation: Abrasive blast finish to AS 1627.4 Class 2.5.

Coatings:

- Initial coat: Zincanode 402.
- Intermediate coat: Duremax GPE.
- Finishing coat: Weathermax HBR polyurethane.

System DFT: In accordance with AS/NZS 2312.1 and the paint manufacturer's recommendations, to suit the corrosivity category of the Site.

2.3 INTERIOR ACRYLIC PAINT - FLAT

Product: Dulux Wash & Wear Flat or acceptable equivalent.

Surfaces:

- Plasterboard/ fibre cement sheet lined ceilings.

Coatings:

- Primer: Dulux Prepcoat Acrylic Sealer Undercoat.
- Finishing coats: Two coats of Dulux Wash & Wear Flat.

System DFT: 80 microns.

To wet areas, apply Dulux Wash & Wear Kitchen & Bathroom Low Sheen Acrylic in lieu of the Wash & Wear Flat top coats.

2.4 INTERIOR ACRYLIC PAINT - LOW SHEEN

Product: Dulux Wash & Wear Low Sheen or acceptable equivalent.

Surfaces:

- Plasterboard/ fibre cement sheet lined walls.
- Internal hard plasterboard walls.

Coatings:

- Primer: Dulux Prepcoat Acrylic Sealer Undercoat.
- Finishing coats: Two coats of Dulux Wash & Wear Low Sheen.

System DFT: 80 microns.

To wet areas, apply Dulux Wash & Wear Kitchen & Bathroom Low Sheen Acrylic in lieu of the Wash & Wear Low Sheen top coats.

2.5 TIMBER SEALER

Product: Dulux Intergrain UltraClear Interior Gloss or acceptable equivalent.

Surfaces:

- Internal timber handrails.

Coatings: Two coats of UltraClear.

System DFT: 40 microns.

2.6 INTERIOR ACRYLIC ENAMEL PAINT – SEMI GLOSS/ GLOSS

Product: Dulux Aquanamel Gloss or acceptable equivalent.

Surfaces:

- Internal timber doors.
- Internal timber door frames.
- Internal timber trims.

Coatings:

- Primer: Dulux 1 Step Oil Based Primer Sealer Undercoat applied off-site to bare natural timber to prevent tannin leaching.
- Finishing coats: Two coats Dulux Aquanamel Gloss.

System DFT: 90 microns.

2.7 EXTERIOR ACRYLIC PAINT – LOW SHEEN

Product: Dulux Weathershield or acceptable equivalent.

Surfaces:

- External fibre cement sheet cladding, if not prefinished.
- External weatherboard cladding.
- External rendered walls.

Coatings:

- Primer: Dulux Professional Total Prep acrylic primer sealer undercoat.
- Finishing coats: Two coats of Dulux Weathershield Low Sheen.

System DFT: 80 microns.

2.8 EXTERIOR ACRYLIC PAINT – SEMI GLOSS/ GLOSS

Product: Dulux Weathershield Semi Gloss/ Gloss or acceptable equivalent.

Surfaces:

- External timber doors.
- External timber door frames.

Coatings:

- Primer: Dulux 1 Step Oil Based Primer Sealer Undercoat applied off-site to bare natural timber to prevent tannin leaching.
- Finishing coats: Two coats of Dulux Weathershield Semi Gloss/ Gloss.

System DFT: 90 microns.

2.9 ACRYLIC ENAMEL PAINT TO INTERNAL METALWORK – SEMI GLOSS/ GLOSS

Product Dulux Aquanamel Gloss or acceptable equivalent.

Surfaces:

- Internal galvanised steel handrails and balustrades.
- Internal galvanised steel door frames.
- Internal galvanised steel faced doors.

Coatings:

- Primer: One coat of Dulux Professional Galvanised Iron Primer.
- Finishing coats: Two coats of Dulux Aquanamel Semi Gloss/ Gloss.

System DFT: 70 microns.

2.10 ACRYLIC ENAMEL PAINT TO EXTERNAL METALWORK – SEMI GLOSS/ GLOSS

Product: Dulux Weathershield or acceptable equivalent.

Surfaces:

- External galvanised steel handrails and balustrades.
- External galvanised steel door frames.
- External galvanised steel faced doors.

Coatings:

- Primer: One coat of Dulux Professional Galvanised Iron Primer.
- Finishing coat: Two coats of Dulux Weathershield Semi Gloss/ Gloss.

System DFT: 80 microns.

2.11 CONCRETE/ PAVING/ STONE FLOOR SEALER

Product: Dry-Treat Stain-Proof or acceptable equivalent.

Surfaces:

- Exposed concrete floors.
- Concrete pavements.
- Unfinished stone tiling.
- Paving.

Coatings: Two coats.

Sealer shall not alter the natural appearance of the substrate.

3 EXECUTION

3.1 PREPARATION

Before painting, complete the work of other trades as far as practicable within the area to be painted, except for installation of fittings and laying flooring materials.

Complete application of clear finishes before commencing opaque paint finishes in the same area.

Before painting, clean the area and protect it against dust entry. Use drop sheets and masking to protect finished surfaces or other surfaces at risk of damage during painting.

Remove door furniture, switch plates, light fittings and other fixtures before starting to paint, and refix in position on completion of painting.

Protect adjacent finished surfaces liable to damage from painting operations.

Place notices conspicuously and do not remove them until the paint is dry.

Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition. Touch up new damaged decorative paintwork or misses with the paint batch used in the original application.

3.2 SUBSTRATES

Prepare substrates to receive the painting systems.

Clean down the substrate surface. Do not cause undue damage to the substrate or damage to, or contamination of, the surroundings.

Fill cracks and holes with fillers, sealants, putties or grouting cements as appropriate for the finishing system and substrate, and sand smooth.

Where fillers are used to surfaces to receive clear finishes, provide filler tinted to match the substrate.

Prepare timber surfaces to receive clear finishes so that its attributes will show through the clear finish without blemishes, by methods which may involve the following:

- Removal of discolourations, including staining by oil, grease and nailheads.
- Bleaching where necessary to match the timber colour sample.
- Puttying.
- Fine sanding (last abrasive no coarser than 220 grit) to show no scratches across the grain.

Rendered surfaces need to be sanded down and prepared in accordance to AS/NZS 2311.

Previously painted surfaces shall be prepared in accordance with AS/NZS 2311 clause 7.4, AS/NZS 2311 clause 7.5, AS/NZS 2312 Section 10 and AS 1627.1.

3.3 PAINTING

Paint systems are to be a minimum of primer/ undercoat and two coats.

Painting to be applied in accordance with the manufacturers recommendations and to achieve the nominated dry film thickness.

Painting shall be performed under light levels ≥ 400 lux.

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.

3.4 PRIMING TIMBER BEFORE FIXING

Apply one coat of wood primer (two coats to end grain) to the back of the following before fixing in position:

- External fascia boards.
- Timber door and window frames.
- Tops and bottoms of external doors.
- Associated trims and glazing beads.
- Timber board cladding.

3.5 SPRAYING

If the paint application is by spraying, use conventional or airless equipment which does the following:

- Satisfactorily atomises the paint being applied.
- Does not require the 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 will not be permitted on site.

Where paint is applied by spraying, the top coat shall be 'back-rolled'.

3.6 REPAIR OF GALVANIZING

For galvanized surfaces which have been subsequently welded, prime the affected area with an organic zinc rich coating for the protection of steel to AS/NZS 3750.9 Type 2.

3.7 TINTING

Tint each coat of an opaque coating system so that each has a noticeably different tint from the preceding coat, except for top coats in systems with more than one top coat.

3.8 SERVICES

If not embedded, paint new services and equipment, except chromium, anodised aluminium, GRP, UPVC, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Repaint proprietary items only if damaged.

3.9 TOUCHING UP

Where paint finishes are required to be touched up, the touched up area shall not be visible under natural reflective light.

0673 POWDER COATINGS

1 GENERAL

1.1 SELECTION CRITERIA

The Contractor shall determine the following, to select the correct materials and components appropriate for use on the site:

- The climate zone, for the site, shall be determined in accordance with the BCA.
- The atmospheric corrosivity category, for the site, shall be determined in accordance with AS/NZS 2312.1.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*

1.3 STANDARDS

Application to aluminium and aluminium alloy substrates for architectural applications: To AS 3715.

Application to metal substrates other than aluminium for architectural applications: To AS 4506.

1.4 SAMPLES

In accordance with Section 0171, provide samples of the following:

- 300mm x 300mm sample of each powder coat type and colour on a representative substrate.

2 PRODUCTS

2.1 POWDER COATING GENERALLY

Powder coating systems shall be to accepted samples.

3 EXECUTION

3.1 PREPARATION

Power coating to aluminium: To AS 3715 Appendix G.

Power coating to metals, other than aluminium: To AS 4506 Appendix I.

3.2 CLEANING

Completed assembly: Clean to AS 3715 Appendix C.

3.3 WARRANTY

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

Form: Against failure of materials and execution under the normal environment and use conditions anticipated for the site.

- Period: Minimum 15 years or to suit the corrosivity category for the site.

APPENDIX

Inspection Test and Conformity Plans

Inspection Test & Conformity Plan
Concrete

ITP Title	**Concrete** **Specification Reference: Section 0310**			**Date**	
UPRN Code		**Project Name**		**Project Location**	
Lot Number					
Contractor				**Subcontractor**	
Principle Authority	**Defence Housing Australia**				
CONCRETOR	**Strength of Concrete and slump to inserted (include any additives)**			**Areas Being Warranted:**	

All work is to be carried out in accordance with the Specification and the requirements set out below.

Item	Inspection & Test Activity	Verification Method	Inspection / Test Completed By	Acceptance Criteria	Date	Signature
	PRIOR TO ANY WORK COMMENCING					
1.	The Concretor has accepted the work areas. The work area is clean, steel reinforcement is in place, formwork is secure, and all required service penetrations are located and have been installed. All termite collars (where appropriate) are installed.	Visual	Engineer, Contractor and Subcontractor	Engineers Certificates and Contractors agreement for pouring the concrete.		
2.	The correct concrete strength and slump has been used.	Concrete Docket for Concrete used.	Contractor and Subcontractor	AS3600 Section 17.1.6		
	DURING THE CONCRETE POUR					
3.	Confirmation is given that during the concrete pour: • No concrete segregated; • Concrete was laid in layers no greater than 300mm; • Concrete was appropriately vibrated; • Reinforcement, sleeves and other items were not disturbed pour; • The vibrator did not touch any formwork; • The concrete was not over vibrated.	Visual	Engineer, Contractor and Subcontractor	Confirmation by the Contractor; AS3600 – Section 17.1.3 and 17.1.4		
4.	The appropriate surface finish to the concrete was applied.	Visual	Contractor and Subcontractor	Refer to the Specification requirements.		
	AFTER THE CONCRETE POUR					
5.	The correct method of curing has been applied.	Visual	Contractor and Subcontractor	AS3600 – Section 17.1.5.1		
6.	The concrete slab and or area meets the contract requirements for dimensions, grade and or size/location.	**Attach Survey demonstrating slab is level and meets dimensional requirements.**	Contractor and Subcontractor	AS3600 – Section 17.5, in particular 17.5.2.3 and 17.5.2.4		
7.	The concrete test results after 28 days have been provided.	**Test Results Certification**	Contractor and Subcontractor	AS3600 Section 17.1.6		

The Contractor warrants that the matters listed above have been carried out and checked for conformity with the specification and the relevant Australian Standards.

Warranted By	*Name*	*Position*	*Date*

The Survey and Certificates are attached to this Inspection Test & Conformity Plan.

Inspection Test & Conformity Plan

Masonry Construction

ITP Title	Masonry Construction Specification Reference: Section 0331				Date	
UPRN Code		**Project Name**		**Project Location**		
Lot Number						
Contractor				**Subcontractor**		
Principle Authority	**Defence Housing Australia**					
BRICKLAYER	**Types of bricks to be used**			**Areas Being Warranted:**		

All work is to be carried out in accordance with the Specification set out below.

Item	Inspection & Test Activity	Verification Method	Inspection / Test Completed By	Acceptance Criteria	Date	Signage
	PRIOR TO ANY WORK COMMENCING					
1.	The sample panels for brickwork have been constructed and approved.	Visual	Contractor, Subcontractor and DHA	AS3700 – Section 12.5 Tolerances in Masonry		
2.	The Bricklayer has accepted the work areas.	Visual	Contractor and Subcontractor	AS3700 – Section 12.4.1		
	DURING THE BRICKLAYING PROCESS					
3.	The brickwork has been set out correctly.	Visual/ Measurement	Contractor and Subcontractor	Contract Plan dimensions; and AS3700 – Section 12.5 Tolerances in Masonry.		
4.	The appropriate flashings/DPC has been inserted and installed.	Visual	Contractor and Subcontractor	AS3700 – Section 12.4.16 BCA – Volume 2 - Part 3.3		
5.	The appropriate wall ties have been installed.	Visual	Contractor and Subcontractor	AS3700 – Section 12.4.7 BCA – Volume 2 - Part 3.3		
6.	The correct metal lintels have been installed.	Visual	Contractor and Subcontractor	AS3700 – Section 12.4.7 and 12.4.17 BCA – Volume 2 - Part 3.3		
7.	All weep holes have been installed as required and are clean.	Visual	Contractor and Subcontractor	AS3700 – Section 12.4.14 BCA – Volume 2 - Part 3.3		
8.	All vertical masonry control joints have been installed as required.	Visual	Contractor and Subcontractor	AS3700 – Section 12.4.3 Contract Plans BCA – Volume 2 - Part 3.3		
9.	Clean out bricks have been accommodated to allow daily cleaning of the masonry cavity.	Visual	Contractor and Subcontractor	AS3700 – Section 12.4.13		
10.	The mortar has been tested to determine the mortar composition	Testing Certificate	Contractor and Subcontractor	AS3700 – Section 12.6.4		
11.	The brickwork has been installed within tolerances and in accordance with the sample panels erected.	Visual/ Measurement	Contractor and Subcontractor	AS3700 – Section 12.5 BCA – Volume 2 - Part 3.3		
	AFTER THE BRICKLAYING PROCESS					
12.	All Face bricks have been cleaned appropriately ensuring that no mortar joints are “blown”.	Visual	Contractor and Subcontractor	Specification 0331, Section X.XX AS3700 – Section 12.10 BCA – Volume 2 – Part 3.3		

The Contractor warrants that the matters listed above have been carried out and checked for conformity with the specification, the relevant Australian Standards and the Building Code of Australia.

Warranted By	*Name*	*Position*	*Date*

The required Certificate is attached to this Inspection Test & Conformity Plan.

Inspection Test & Conformity Plan
Waterproofing

ITP Title	**Waterproofing** **Specification Reference: Section 0411**			**Date**	
UPRN Code		**Project Name**		**Project Location**	
Lot Number					
Contractor				**Subcontractor**	
Principle Authority	**Defence Housing Australia**				
MEMBRANE	**Insert Membrane System Selected/Manufacturer**			**Area Being Warranted:**	

All work is to be carried out in accordance with the Specification and the requirements set out below.

Item	Inspection & Test Activity	Verification Method	Inspection / Test Completed By	Acceptance Criteria	Date	Signature
	PRIOR TO ANY WORK COMMENCING					
1.	The waterproofer has accepted the work area substrate and surfaces and ensured it is clean and free of deposit.	Visual	Contractor and Subcontractor	Clean surface free from deposit as per Manufacturer's requirements		
	PRIOR TO APPLICATION OF THE MEMBRANE					
2.	The appropriate waterproofing flanges have been used for all services penetrations.	Visual	Contractor and Subcontractor	BCA Volume 2; Part 3.8.1.2 and AS3740, Section 3.10, 3.14		
3.	The surface has been primed in accordance with the manufacturers recommendation.	Visual	Contractor and Subcontractor	As per Manufactures recommendation and requirements		
4.	The surfaces have been primed, bond breakers provided at all wall and floor, hob and wall junctions and at control joints where the membrane is bonded to the substrate.	Visual	Contractor and Subcontractor	As per the manufacturers recommendation. AS3740, Sections 3.12, 3.13, 3.15 BCA Volume 2 Part 3.8.1.2		
5	All metal water stop angles have been installed at doorways and shower recesses and properly secured.	Visual	Contractor and Subcontractor	AS3740, Sections 3.12, 3.13, 3.17, 3.18 BCA Volume 2 Part 3.8.1.2		
6	All wall and floor junctions have been waterproofed as required.	Visual	Contractor and Subcontractor	As per the manufacturers recommendation. AS3740, Section 3.9 BCA 3.8.1.2		
7	The floor has been fully membraned as required.	Visual	Contractor and Subcontractor	As per the manufacturers recommendation. AS3740, Section 3 BCA 3.8.1.2		
	AFTER LAYING OF THE MEMBRANE					
8.	Recorded DFT thickness of membrane after application.	**INSERT DFT in mm**	Contractor and Subcontractor	As per Manufactures recommendation and requirements		
9.	The waterproofing membrane has been fully cured as per the manufacturers installation requirements.	Visual	Contractor and Subcontractor	As per Manufacturers recommendation and requirements		
10.	The waterproofing membrane has been turned down into the floor waste drainage flanges and adhered to form a waterproofing connection.	Visual	Contractor and Subcontractor	As per Manufacturers recommendation and requirements BCA Volume 2; Part 3.8.1.2 and AS3740, Section 3.10, 3.14		
11.	All metal angles at the doorways and at the shower recesses have been appropriately waterproofed.	Visual	Contractor	AS3740, Sections 3.12, 3.13, 3.17, 3.18 BCA Volume 2 Part 3.8.1.2		
12.	A water test for the wet areas has been conducted.	Visual **HOLD POINT**	Contractor and Subcontractor (DHA may attend the test at their discretion)	Retain water for 24hrs and then conduct a visual inspection of the wet area and adjoining areas to identify any leaks/failures in the membrane.		

The Contractor warrants that the matters listed above have been carried out and checked for conformity with the specification, manufacturers installation requirements, the relevant Australian Standards and the Building Code of Australia.

The Manufacturers brochures are attached to this Inspection Test & Conformity Plan.

Warranted By	*Name*	*Position*	*Date*

Inspection Test & Conformity Plan

Tiling

ITP Title	**Tiling** **Specification Reference: Section 0631**			**Date**	
UPRN Code		**Project Name**		**Project Location**	
Lot Number					
Contractor				**Subcontractor**	
Principle Authority	**Defence Housing Australia**				
TILES & ADHESIVES	**Insert tiles selected and adhesive system. Include manufacturers material on adhesives.**			**Area Being Warranted:**	

All work is to be carried out in accordance with the specification and the requirements set out below.

Item	Inspection & Test Activity	Verification Method	Inspection / Test Completed By	Acceptance Criteria	Date	Signed
	PRIOR TO ANY WORK COMMENCING					
1.	The tiler has accepted that the work area substrate and its surfaces. It was clean and free of any deposit.	Visual	Contractor and Subcontractor	Clean surface free from deposit as per Manufacturer requirements		
	PRIOR TO APPLICATION OF THE LAYING OF TILES					
2.	The substrate was checked as to its cleanliness, evenness and being level.	Visual/measurement	Contractor and Subcontractor	AS3958.1, Section 5.4.1		
3.	The set out of the tiles was established to locate and determine the correct falls, joint locations and the minimisation of any cut tiles.	Visual/measurement	Contractor and Subcontractor	AS3958.1 Section 5.4.2, 5.4.3 and 5.4.5		
4.	The mortar screed has been laid to correct levels.	Visual/measurement	Contractor and Subcontractor	AS3958.1 Appendix A – Non-Proprietary Screeds		
5	The tiles are to be installed have been checked for dimensional acceptance.	Visual/measurement	Contractor and Subcontractor	AS3958.1 Section 2.2; AS4662;		
6	The appropriate metal angles have been installed	Visual	Contractor and Subcontractor	AS3958.1 Section 5		
	AFTER LAYING OF THE TILES					
7	A manufacturer approved tile adhesive, compatible with the waterproof membrane laid, has been used to secure the tiles. The adhesive manufacturers procedures have been adopted and implemented.	Visual	Contractor and Subcontractor	As per Manufacturers recommendations and requirements.		
8.	The tiles have been laid to the appropriate falls.	Measurement	Contractor and Subcontractor	Refer to the Specification section on Tiling.		
9.	The tiles have been laid to the tolerances specified for lipping, out of level and joint thickness.	Measurement	Contractor and Subcontractor	AS3985.1 Section 5.4.6		
10.	The tiles have been laid with sufficient bonding to eliminate any drumminess.	Tap testing	Contractor and Subcontractor	AS3985.1 Section 5.4.7 (Generally) AS3958.1 Section 5.6.4 for Adhesive Coverage and Distribution		
11.	A water test has been conducted for all wet area tiling, including balconies on completion.	Visual **HOLD POINT**	Contractor and Subcontractor (DHA may attend the test at their discretion)	Pour sufficient water on the tiled surface to demonstrate that water grades to the floor waste as required and to ensure that no water remains causing unacceptable ponding (refer AS3985.1 Appendix D – Fall in Floor Finishes, Item D1).		

The Contractor warrants that the matters listed above have been carried out and checked for conformity with the specification, manufacturers installation requirements, the relevant Australian Standards.

Warranted By	*Name*	*Position*	*Date*

The Manufacturers brochure is to this Inspection Test & Conformity Plan.

Inspection Test & Conformity Plan

Painting

ITP Title	**Painting** **Specification Reference: Section 0671**			**Date**	
UPRN Code		**Project Name**		**Project Location**	
Lot Number					
Contractor				**Subcontractor**	
Principle Authority	**Defence Housing Australia**				
PAINTING	**Insert Paint used and the Manufacturers brochures relating to the painting system.**			**Areas Being Warranted:**	

All work is to be carried out in accordance with the Specification and the requirements set out below.

Item	Inspection & Test Activity	Verification Method	Inspection / Test Completed By	Acceptance Criteria	Date	Signature
	PRIOR TO ANY WORK COMMENCING					
1.	The Painter has accepted the work areas substrate and surface. It is clean and free of any deposit.	Visual	Contractor and Subcontractor	AS2311 – Section 3 – Preparation of Unpainted Surface; and As per Manufacturer requirements.		
	PRIOR TO APPLICATION OF THE PAINT					
2.	The substrate has been checked as to its cleanliness, evenness and being level.	Visual	Contractor and Subcontractor	AS2311, Section 3 - Preparation of Unpainted Surface and Section 7 for Painted Surfaces; and As per Manufacturers requirements.		
3.	The substrate has been prepared in the appropriate manner.	Visual	Contractor and Subcontractor	AS2311, Section 3 - Preparation of Unpainted Surface and Section 7 for Painted Surfaces; and As per Manufacturers requirements.		
	AFTER THE APPLICATION OF THE PAINT					
4.	The correct paint system has been applied.	Visual	Contractor and Subcontractor	AS2311 – Section 5		
5.	The appropriate number of coats and finish has been applied.	Visual and **insert DFT in mm.**	Contractor and Subcontractor	As per the specifications requirements Painting and the Manufacturers recommendations and requirements.		
6	The painting been carried out with straight and clean lines, even coverage and without blemishes.	Visual	Contractor and Subcontractor	AS2311 – Sections, 6.6, 6.8; and As per the manufacturers requirements.		

The Contractor warrants that the matters listed above have been carried out and checked for conformity with the specification, manufacturers installation requirements, the relevant Australian Standards.

Warranted By	*Name*	*Position*	*Date*

The Manufacturers brochure is attached to this Inspection Test & Conformity Plan.