



HOUSING

PART C: DESIGN AND CONSTRUCT SPECIFICATION

PREFABRICATED HOUSING

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A. GENERAL

1 PROPOSAL REQUIREMENT AND CONDITIONS

1.1 GENERAL DESCRIPTION

Proposal

Requirement: Provide a proposal for the design, fabrication, transportation, handling and installation of modular housing and associated site works. Include in the proposal all works required to fulfil the project program and the following:

- Conditions of contract.
- The Western Australia Department of Communities, Housing *Part A: Qualitative brief – Prefabricated housing.*
- The Western Australia Department of Communities, Housing *Part B: Functional brief – Prefabricated housing.*
- The Western Department of Communities, Housing Addendum to *Part B: Functional brief – Prefabricated housing.*
- The Western Australia Department of Communities, Housing *Part C: Design and construct specification – Landscaping.*
- The National Construction Code (NCC).
- This specification.

Work components: Include all site investigation and design work, labour, material, tools, transportation, equipment, plant, excavation, site modification, shoring, testing, inspection, commissioning and all other general conditions required to satisfy the scope of works.

Definition

Approval: If approval is required, this is required from the principal before works can proceed further.

GROH: Government Regional Officer's Housing.

Northern areas: Project sites located north of 27° latitude.

Prefabricated/modular housing: A dwelling consisting of module units fabricated off-site (in separate box-like modules) in factory conditions, and transported to and assembled (secured) at the project building site.

Prototype: An original, sample or first model of a product/building fabricated, from which other buildings will be copied or developed.

2 SCOPE OF WORKS

2.1 DESCRIPTION OF WORKS

General description

Requirement: Design, fabricate, transport and install modular housing including the connection of electrical, mechanical, communication, security, reticulation and plumbing services.

Project components: The complete project comprises the following components:

- Site works: Modifications to the site, site improvements, and utilities.
- Substructure: Elements below grade and in contact with the ground.
- Building fabric: The exterior enclosure and roofing.
- Interiors: Interior construction, finishes, and fixtures, except fixtures associated with services.
- Services: Mechanical, hydraulic and electrical services and associated fixtures, including communication and security.
- Equipment and furnishings: Fixed and movable elements.

Responsibilities

Requirement: The contractor is responsible for all unknowns and/or varying site conditions, including utilities, subsoil conditions and regulatory authority permits.

Regulatory approvals: Obtain permits or approvals from the regulatory authority as required for the completion of the project.

- Building permits: Obtain from the Department of Communities, Housing Permit Authority.

Site installation works: Perform all works required to verify existing site conditions, including site location and dimension, utility capacities, clearances/restrictions and connection options of external utilities. Carry out works, including compile maps, surveys, traffic and geotechnical data, so that installation meets the requirements of this specification, conditions of contract, other design documents and the construction program.

Errors or omissions in the contract documents: The contractor is responsible for all errors and omissions discovered. Notify the principal of errors and omissions and submit resolution proposals for approval.

2.2 PERMITS, FEES AND CONTRIBUTIONS

Applications and approvals

Contractor's responsibilities: Cover all authority application and approval requirements, including fees and contributions.

Written confirmation of authority approvals: Provide to the principal before installing, including all relevant drawings.

Building applications

Applications: Submit to the Department of Communities, Housing Permit Authority a completed Certified Building Permit Application (BA1) and other documents required, including Certificate of Design Compliance (BA3) and Demolition Permit Application (BA5), if required.

Drawings and specifications submitted with application: Demonstrate compliance with the NCC and provide evidence that other relevant approvals have been obtained, including local government authority approval of public health requirements.

Building and Construction Industry Training Fund (BCITF) levy: Cover all costs and requirements, including additional payments required if the construction costs varies by more than \$25,000.

Submit proof of BCITF Levy payment (receipt) with the Building Permit Application (BA1) submission.

Headworks/infrastructure contribution

Requirement: Cover all contribution fees and services connection/reconnection fees required for the project by the utility authority or service provider. Retain proof of payment for reimbursement by the Department of Communities, Housing.

2.3 DESIGN REQUIREMENTS

Standards, codes and regulations

Requirement: Design the project in compliance with the applicable federal and state codes, rules, regulations, ordinances, and standards, including those referenced in this specification.

Design development

Requirement: Develop and document modular housing design for review and approval before fabrication. Conform to **DESIGN DEVELOPMENT**.

2.4 FABRICATION, ASSEMBLY AND TRANSPORTATION

Fabrication and assembly

Prototype: Fabricate, test, modify and if required, retest building prototype for approval.

Production: Upon acceptance of the prototype, fabricate and roll out module unit production to meet the proposed program.

Production program: Submit for approval, a program for the review and approval of prototype, and production roll out.

Transportation

Requirement: Perform all tasks required for the safe transportation of module units from the fabrication site to the project site, including:

- Mapping transportation route for each installation.
- Obtaining authority approvals and permits.
- Conformance with conditions of contract.
- Traffic management.

2.5 SITE WORKS AND INSTALLATION OF MODULE UNITS

General description of works

Site preparation: Include site establishment and preliminary preparation works ready for the delivery and positioning of housing module units at the project site, including the following:

- Clearing, relocation or transplantation of vegetation.
- Site modification.
- Foundation/footing.
- Driveways and paths.
- Site drainage.
- Septic system or connection to stormwater/wastewater services.
- Connection to water supply.

Installation/button-up work: Include works required to finish the modular house after it is set on the foundation/footing, including:

- Construction of additional structures, including porches, decking and carports to *Part B: Functional brief – Prefabricated housing*.
- Connecting to the plumbing, gas, electrical and communication systems.
- Installation of the HVAC system.
- Completion of exterior fittings, e.g. screens, locks and grilles, including:
 - . Installation of cyclone debris screens if required by the principal.
 - . Installation of solar collector panels if required.
- Completion of interior fittings, e.g. non-fixed items.

Site built structures: Include works additional to the modular house, including:

- Detached storeroom to Part B: Functional brief – Prefabricated housing.
- Letterboxes.
- Clothes hoist.
- Exterior lighting structure.
- Fencing and walls.

Landscaping: Include landscaping works within the project site and that required by the conditions of contract to the Western Australia Department of Communities, Housing *Part C: Design and construct specification – Landscaping*.

B. DESIGN DEVELOPMENT

1 DESIGN REQUIREMENTS

1.1 DESIGN CRITERIA

Compliance

Requirement: Design modular housing to comply with the requirements included in the following documents:

- The Western Australia Department of Communities, Housing *Part A: Qualitative brief – Prefabricated housing.*
- The Western Australia Department of Communities, Housing *Part B: Functional brief – Prefabricated housing.*
- The Western Australia Department of Communities, Housing Addendum to *Part B: Functional brief – Prefabricated housing.*
- The Western Australia Department of Communities, Housing *Part C: Design and construct specification – Landscaping.*
- The National Construction Code (NCC).
- This specification.

National Construction Code requirements

General: Design modular housing to comply with NCC Volume 2, including the following:

- Structural stability: To BCA P2.1.1 and BCA 3.11.
- Roof and external walls: To BCA P2.2.2.
- Fire safety: To BCA P2.3.1, BCA P2.3.2 and BCA P2.3.3.
- Bushfire protection: To BCA P2.3.3, BCA P2.3.4 and BCA 3.7.4.0.
- Waterproofing: To BCA P2.4.1.
- Wet areas and sanitary facilities: To BCA P2.4.3.
- Light provision: To BCA P2.4.4.
- Ventilation: To BCA P2.4.5.
- Sound insulation: To BCA P2.4.6.
- Thermal performance: To BCA P2.6.1.

Hydraulic services: Design modular housing to comply with NCC Volume Three (PCA).

Bushfire attack level (BAL)

Design level: Prepare a Bushfire Attack Level assessment report with details of the design attack level required for the project and the design and installation requirements based on this assessed BAL.

Structural design actions

Wind actions: Conform to the following, including for external fixtures and fencing:

- AS/NZS 1170.2.
- AS/NZS 4055.

Designated design class/category: Wind Regions D and Terrain Category 1 (TC1).

Future module unit relocation

Future dismantling: Design modular housing so that it may be easily disassembled into the original

individual module units for transportation to another site if required.

Site installation works

Footings and foundation: Design footings and foundations for modular housing as required for the site conditions and classification, and to the recommendations of the geotechnical report.

Landscaping works

Landscaping design: To **DESIGN DOCUMENTATION** in the Western Australia Department of Communities, Housing *Part C: Design and construct specification – Landscaping.*

Documentation: To **DESIGN DEVELOPMENT, DESIGN DOCUMENTATION** in the Western Australia Department of Communities, Housing *Part C: Design and construct specification – Landscaping.*

Additional requirements

Sustainability: Conform to the following:

- Building performance: To the Western Australia Department of Communities, Housing *Part A Qualitative Brief – Prefabricated Housing.*
- Material finishes VOC limits: To the **Maximum TVOC limits table.**

Maintenance: Minimise and facilitate maintenance required by providing the following:

- Elements and finishes designed to minimise maintenance.
- Easy access to elements, with the required working clearances for maintenance, and access doors and panels.

Cyclone debris screens: Design prototype to allow screens to be fitted/attached if required by the principal. Assume screens are only required for some site locations/conditions.

Stormwater drainage: Liaise with the local government authority for the preferred method of drainage and other design requirements.

Driveways and pathways: Liaise with the local government authority for the driveways, pathways and crossover requirements to and within the site. Allow for this in the project design.

Maximum TVOC limits table

Product category	Max TVOC content (g/L)
General purpose adhesives and sealants	50
Interior wall and ceiling paint, all sheen levels	16
Trim, varnishes and wood stains	75
Primers, sealers and preparation coats	65
1 and 2 pack coatings for floors	140
Acoustic sealants, architectural sealants, waterproofing membranes, fire retarding sealants and adhesives	250
Timber flooring, laminate adhesives and sealants	100

1.2 AIR CONDITIONING DESIGN

Standards

General: To the recommendations of one or more of the following:

- AIRAH Design Application Manuals.
- ASHRAE Handbook.
- CIBSE Guides.

Method of calculation: Manual or software that uses the data and methods in the above standards.

Design criteria

Outside design conditions: Use outdoor design conditions listed in AIRAH DA09, Table 1 or Table 1A for the following:

- The location geographically closest to the site.
- Comfort (or non-critical process) conditions.

Inside design conditions:

- Summer: 24°C dry bulb, 50% relative humidity.
- Winter: 21°C dry bulb.

Temperature variation: Limit the temperature difference in air conditioned spaces served by the same zone or system to 2°C as follows:

- Between any 2 points in the space from floor level to 1500 mm above floor level.
- More than 2000 mm from cooking equipment and more than 1000 mm from any other appliance.
- When outside conditions are in the range specified above.
- After the plant has been operating for one hour.
- With the temperatures measured in the same 5 minute period.

Zoning: Divide the systems into temperature controlled zones to meet the permissible limits in temperature variation and the system divisions documented.

Fresh air: Supply fresh air to spaces with air conditioning systems via the air handling system.

Heating: Reverse cycle.

Ambient noise emitted: Provide room air conditioning systems conforming to the following, whichever is the lower noise level:

- Lower than the level that can be heard within a habitable room in any neighbouring residential premises, regardless of whether any door or window to that room is open.
- Maximum noise levels in occupied spaces: NR 30.
- Maximum noise level at site boundary: To the Environmental Protection (Noise) Regulation 1997.

System requirements

Paint finish: Paint ductwork, pipework and equipment exposed to view and weather.

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

2 DESIGN DOCUMENTATION

2.1 GENERAL

Prototype development documentation and approval process

Schematic design drawings: Submit drawings and materials boards for approval before producing detailed design drawings. Submit five coloured sets of drawings with the following for review and approval:

- Floor plans.
- Building elevations.
- Building sections.
- Building perspective.
- Building model.
- Exterior and interior colour schemes.

Detailed design drawings: Submit drawings which adequately describes the main design detailing intent for approval including interior and exterior fixtures detailing, e.g. external cladding profiles and fixing, kitchen, bathrooms and lighting.

Construction documentation: Upon approval of the detailed design drawings for the proposed prototype module units, provide construction documentation for approval before fabrication.

General drawing requirements

Requirement: Include the following information on all drawings:

- Date, north point, scale bar.
- Project description and location.
- The principal's name and details.
- The contractor/designer's details.
- Locality plan.
- Issuance details.

2.2 ARCHITECTURAL REQUIREMENTS

Prototype detailed design and construction documentation

Floor/roof plans: Provide drawings of minimum 1:100 scale (minimum 1:200 scale when printed at A3) showing the following:

- Room layout, room/space names, overall room dimensions, sizes (in m²) for all programmed spaces including entrances and corridors, floor finishes.
- Show module units, connections to adjoining unit(s) and unit transportation method.
- Locations and sizes of all doors (showing door swings) and windows.
- Overall dimensions (including height and levels) of the major elements of each building.
- Locations and fire ratings of all fire-resisting elements.
- Location of all plumbing fixtures including floor drains.
- Any built-in fittings such as shelves, benches, and stairs and balustrading for the two storey dwelling prototype.

- Roof plan showing associated equipment, slopes, ridges, drains, and other items.

Elevations and sections: Submit drawings of minimum 1:100 scale showing the following:

- All building elements including entrances, windows, doors, louvres, vents, exhaust and similar items.
- Overall building, floor-to-floor and roof heights.
- Include longitudinal and transverse sections for each major area, indicating floor elevations, ceiling heights and roof lines. Show connections to adjoining module unit(s).
- Reference all sections and elevations on the floor plans.
- In the sections, show provisions for HVAC distribution and hood venting.

Interior details: As appropriate, provide plans, sections/elevations of minimum 1:50 scale showing the following:

- Kitchens and related service areas.
- Toilet and bathrooms.
- Laundry.
- Other joinery or areas of special design.

Schedules: Provide schedules of the following:

- Door schedule indicating door type, size, material and hardware.
- Interior and exterior finishes schedule showing the material, texture, colour and the proposed supplier/manufacturer of each finish material proposed.

Materials boards: Provide samples of all finish materials listed in the materials/colour schedule mounted on presentation boards for review and approval.

Site installation drawings

Detailed site survey: Include the following details on a detailed topographical survey:

- Date, north point, scale bar.
- Project description and location.
- The principal's name and details.
- Street name, lot number.
- Location of existing services and easements.
- All existing site features, including streams, creeks, buildings, retaining wall, structures, adjoining buildings/outdoor living areas and below ground levels.
- Position of existing building(s) and openings.
- Location of individual trees, group of trees and other vegetation, including trees over 3 m high.
- Existing site dimensions, 0.5 m contours, spot levels and tree heights, including levels at boundaries and the base of trees for evaluating changes in soil levels.
- Street verge, including footpaths, street trees, crossovers and power poles.

Site and landscape drawings: Provide drawings of minimum 1:100 (minimum 1:200 scale when printed at A3) scale showing the following:

- Contextual information, including street name, lot numbers and adjacent building locations.
- Overall dimensions of the proposed building. Show benchmark, baseline levels and distances from:
 - . Each proposed new building to existing buildings.
 - . Property lines, setbacks and any easements, including proposed site area boundaries of any strata lots.
 - . Roadways.
- Existing structures and streets.
- Exterior elements including parking areas, paved areas, walkways, steps, ramps, retaining walls, fences, clothes hoist, letterboxes and other equipment.
- Existing and proposed contours, levels, grades and site drainage method.
- Sections through the site, as appropriate, showing floor levels and proposed excavation and fill areas.
- Elevations with existing and natural ground levels, relative wall heights and roof heights.
- Ramps and other provisions for disabled access to AS 1428.1 and AS 1428.2.
- Site demolition plan indicating existing structures, trees and vegetation to be removed.
- Landscaping plans with following details:
 - . Finished grading.
 - . Irrigation.
 - . Planting.
 - . Paving, including vehicular and pedestrian access, and parking spaces.
 - . Area included as Private Open Space.
 - . Water management requirements, e.g. permeable pavers.
 - . Landscape buffer between car parking and dwellings.
- For buildings 2 storeys high, shadows cast by the building onto adjoining properties at 12 noon 21st June.

2.3 STRUCTURAL REQUIREMENTS

Prototype construction documentation

Requirement: Provide construction documentation including the following:

- Structural plans (at the same scale as that used for the architectural plans) and detail drawings of structural elements as appropriate, including columns, loadbearing walls, shear walls and footings.
- Structural performance calculations.
- Cast concrete details: Include details of the following:
 - . Concrete mix and type of cement if special-class concrete.
 - . Concrete cover to reinforcement.
 - . Location, size, details, materials, ductility and stress grades of reinforcement.

- . Cores, fixing and embedded items.
- . Surface finish class and surface treatment, if applicable.
- . Curing and protection methods.
- Precast concrete drawings/documentation of non-proprietary architectural and structural precast concrete elements showing design, manufacturing, assembly, transport and installation details, including the following:
 - . Manufacturer's details: Name, contact details and credentials of proposed manufacturer of precast elements.
 - . Safe work method statement: A safe work method statement specific to the project for the precast erection.
 - . Protective coating: Details of coatings to exposed metallic components to AS/NZS 2312.1 or AS/NZS 2312.2 for the site-specific corrosivity zoning.
 - . Colour: Details of method for the proposed colour, including details of the type and colour of the cement, sand and aggregates, and colouring oxide pigments or stain.
 - . Proprietary inserts: For lifting, bracing or fixing inserts. Include make, type and working load limit.
 - . Non-proprietary inserts: Certificate from a professional engineer certifying the working load limit.
- Samples of surface finish: Showing texture and colour.

Transportation and handling: Include in the structural drawings, lifting points and temporary bracing elements for handling the modules.

Construction documentation: Submit documentation certified by a professional engineer.

Shop drawings: Submit certification by a professional engineer that drawings comply with DESIGN DEVELOPMENT, DESIGN CRITERIA and the CONSTRUCTION SPECIFICATION.

Site installation drawings

Requirement: Provide structural drawings as required for the installation of the housing module units, including module connection points and exterior fixtures for each site.

2.4 PLUMBING REQUIREMENTS

Prototype construction documentation

Floor plans: Provide drawings of minimum 1:100 scale showing the following:

- Locations of piping.
- Locations of main waste lines, stacks and vents, including for water, air and gas.
- Stormwater drainage.
- All equipment including water heater, pumps, tanks, generators and pressure-reducing valves. Show their locations and required piping connections.
- Access requirements for maintenance.

Site installation drawings

Floor plans: Provide drawings of minimum 1:100 scale showing the following:

- Proposed services routing from each building to the point of connection to the network provider's system. Show all service lines that are to be capped off, removed or rerouted.

2.5 HVAC REQUIREMENTS

Prototype construction documentation

Floor plans: Provide drawings of minimum 1:100 scale showing the following:

- Location of all equipment including air handling units, evaporative coolers and other equipment.
- Location of piping and ducts.
- Supply and return air zones.
- Exhaust air duct for each type of application, including rangehoods, toilets, laundries and other rooms as required.

Detail drawings: Provide large scale drawings showing equipment layout, how the proposed equipment will fit in the designated space and access requirements for maintenance.

2.6 ELECTRICAL REQUIREMENTS

Prototype construction documentation

System layouts: Show the power, signal and communications layouts on one set of drawings, and the lighting layout on a different set of drawings.

Floor plans: Provide drawings of minimum 1:100 scale showing the following:

- Suggested furnishing layout.
- Location and mounting heights of switchboard, power outlets, telephone, television and communication/computer data points.
- Types and locations of lighting fixtures and controls.
- Ceiling fans.
- Fire and smoke alarms.

Site installation drawings

Floor plans: Provide drawings of minimum 1:100 scale showing the following:

- Single-line electrical distribution diagram showing primary service to substations and secondary service to distribution switchboards and panel boards for power and lighting. Include the permanent and temporary points of connection to external utilities such as external lighting, telephone, and all signal systems.

3 DESIGN VERIFICATION

3.1 SUBMISSION

Construction documentation review

Requirement: Submit construction documentation for review and approval upon 50% and 100% completion of documentation. Provide documentation as required to verify that the design complies with DESIGN DEVELOPMENT, DESIGN CRITERIA, the CONSTRUCTION SPECIFICATION and other conditions of contract, including drawings,

certification and calculations for the structural, HVAC, electrical, plumbing, and communications.

100% complete documentation: Incorporate all agreed changes from the 50% complete review.

As-constructed drawings

Electronic copies/format: Provide at minimum files in pdf, dxf and dwg format. Additional file formats can be provided.

Hard copies: Provide drawings in the same size, format and scale to those approved for construction.

Drawing content: Show drawings of the completed installed dwelling, including site installed features, future disassembling instructions, drawings of structural components, and plumbing, electrical and HVAC services.

C. FABRICATION AND ASSEMBLY

1 PROTOTYPE

1.1 BUILDING AND TESTING THE PROTOTYPE

Fabrication of the prototype

Requirement: Upon approval of the construction documentation, build prototype for inspection and testing.

Number of prototypes: Allow for one single storey dwelling prototype and one two storey dwelling prototype.

Building prototype: Construct prototype module units to the approved 100% complete construction documentation and the **CONSTRUCTION SPECIFICATION**.

Inspection of prototype: Before building prototype, propose inspection points for approval. At minimum, include the following inspection points:

- Completion of framing.
- Before covering up or concealing with lining, cladding and roofing.
- Completion of prototype.

Testing and verification: Submit test results and/or certification records, as appropriate, verifying that the prototype complies with DESIGN DEVELOPMENT, **DESIGN CRITERIA** and **CONSTRUCTION SPECIFICATION**.

Prototype approval

Auditing and review: Jointly review with the principal, the completed work or a portion thereof, to evaluate prototype compliance.

Non-compliance and corrective action: Compile and submit a report of non-compliance, including the following details:

- Identifying the non-complying items with details of non-conformity.
- Detailed corrective action plan with planned correction date and milestones.
- Method of rectifying the non-compliance.
- Plans to prevent reoccurrence of the non-compliance.

Refining prototype: If variations are required, implement change and verify compliance with the NCC.

Precast concrete elements

Manufacturing prototype of element: Cast the elements using the formwork, concrete, compaction equipment, form release agents, curing and formwork removal methods which are to be used in the final work.

Element prototype storage: Maintain on fabrication site, undamaged and protected from discolouration for comparison with manufactured precast elements.

1.2 RECORD DOCUMENTS

As-constructed documentation of prototype

Requirement: Upon approval of the completed prototype, prepare/update prototype documentation, include all changes required in the approval process, and submit with testing and verification documents, including those required in the **CONSTRUCTION SPECIFICATION**.

Materials board: Submit updated materials board to match the materials/finished installed in the prototype.

Calculations: Update calculations if affected by any variations to the prototype.

2 FABRICATION OF MODULE UNITS

2.1 FABRICATION

General

Requirement: Fabricate module units to match the approved prototype.

D. TRANSPORTATION

1 TRANSPORTATION ROUTE

1.1 ROUTE CLEARANCE

General

Requirement: Before transporting module units, map out the transportation route. Liaise with Main Roads Western Australia, the local authorities, the police and interstate road authorities, as required for clearances and approval of transportation.

Noise restrictions: Comply with the local authorities' requirements.

Traffic management: Plan, implement and manage traffic to facilitate safe transportation of module units to the project site. Provide work zone traffic control throughout the project site for the duration of the construction/ installation period (for both active and inactive work zones). Make sure there is safe and efficient movement of all traffic, whilst minimising construction impact on the public, cyclists, pedestrians and residents.

2 TRANSPORTATION AND HANDLING

2.1 HANDLING EQUIPMENT

General

Requirement: Provide transportation and handling equipment as required to complete the picking up from the fabrication site, loading, transporting and setting down of module units in their final position at the project site.

Clearances: Make sure handling equipment used is approved by Main Roads Western Australia, the local authorities and interstate road authorities, as appropriate.

2.2 HANDLING

General

Requirement: Load from the fabrication site, transport and position module units into their final position at the project site without damage to the units.

After loading module units onto transportation vehicle: Before leaving the fabrication site, rectify any damage caused to the units during loading which is likely to worsen during transportation.

Protection of module units: Protect the module units so that damage to unit is minimised in the transportation and handling process, including securing components, fixtures and fittings such as windows, glazing, doors, heaters, fans and lighting.

Unloading and placement of module units

Requirement: Off-load module unit and provide temporary supports to the unit in its final location, as required. Connect to other units and carry out works to secure building and ensure watertightness of the building, including installation of flashing and joining up of roof/wall cladding.

Natural vegetation and neighbouring properties

Protection of existing vegetation and properties: Retain existing vegetation and landscaping, as shown in the site installation construction documentation. Minimise wheel ruts to turfed/landscaped areas being retained. Do not cause damage to the neighbouring properties. Where damage occurs, reinstate to its original condition. If a dilapidation report prepared to PRELIMINARY SITE PREPARATION, **THE SITE, Adjoining property** is available, refer to this before reinstatement. Obtain written acceptance from the owner of the affected property after completing reinstatement.

E. PRELIMINARY SITE PREPARATION**1 GENERAL****1.1 BEFORE MODULE UNIT DELIVERY****Project site preparation**

Requirement: Before delivery of module units to site, prepare the site area ready for the final positioning of modules and provide associated facilities, including the following works:

- Pathways.
- Retaining walls.
- Clearing.
- Demolition of redundant works.
- Levelling, filling and cutting.
- Marking out of set-out points of storeroom and attached installations such as carports and decking.

- Protection of vegetation/trees to be retained for the project to SITE PREPARATION, **TREE PROTECTION**.

Access routes: Carry out works, as appropriate, to provide access route(s) for the transportation vehicle and handling equipment from the existing roadway, including trimming/clearing vegetation, providing temporary road base and temporary removal of fences.

Temporary removal of fencing: Obtain consent from the owners and occupants of the adjoining properties to remove the fencing before carrying out. Complete the BA20A form supplied by the Department of Communities, Housing.

Site security

Temporary fencing: Adjust existing fencing or provide fencing as required to securely restrict site access. Make sure vehicle access gates allow sufficient clearances for the module unit transportation vehicle and handling equipment.

1.2 PROTECTION OF PEOPLE AND PROPERTY**General**

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

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

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

Protective clothing

Protective clothing: Make available protective clothing for the use of visitors.

- Safety helmets: To AS/NZS 1801, Type 1.
- Certification: Required.

- . Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

1.3 THE SITE

Project signboards

General: Provide project-specific signboards and conform to the following:

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

Rectification

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

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

Existing services

Requirement: Disconnect and cap off existing services, ready for reconnection where required.

Services location: Before starting site works, locate existing, including contact DIAL BEFORE YOU DIG to identify locations of underground utility services pipes and cables.

Services to be continued: Repair, divert or relocate service as required for the project.

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

Redundant services: Remove redundant parts, and make safe.

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

Easements: Confirm easement required with the relevant utility authority.

Proposals: Submit proposals of action on existing services for review before starting this work.

- Purpose of submission: For review.

Damaged services: Rectify or replace services damaged during construction. If required, obtain permits from the appropriate authority to do so.

Use of existing services

General: Existing services may be used as temporary services for the performance of the contract subject to conditions of use.

Adjoining property

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

Revealed encroachments: If the works reveal unknown encroachments of adjoining property on to the site or of existing site structures on to adjoining

property, immediately seek instructions from the principal.

Records/dilapidation reports: For each property which may be affected adversely by the works, carry out the following:

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

Endorsed copies: Submit one endorsed copy of each record to property owners before commencing demolition. Keep the other endorsed copy on site.

- Purpose of submission: Information only.

1.4 BUILDING THE WORKS

Survey marks

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

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

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

2 DEMOLITION

2.1 STANDARDS

Demolition

Standard: To AS 2601.

2.2 ASBESTOS REMOVAL

Discovery of asbestos

Identification: If suspected asbestos containing material has been identified, conform to the following:

- Isolate the contaminated area and prevent access.
- Do not disturb the material.
- Cease work on site until safe removal can be arranged.

Water supply: Maintain water supply to the contaminated area until all asbestos products have been removed.

Materials containing asbestos

Asbestos in the workplace: To Safe Work Australia's How to manage and control asbestos in the workplace: Code of Practice.

Transport and disposal cost: Pay for all costs of removing the asbestos waste.

Verification: Where asbestos products are found and removal required, submit written evidence of asbestos waste disposal at a waste facility licensed to accept asbestos.

Removal contractor: Carry out removal by a WorkSafe (WA) unrestricted asbestos licence holder listed at www.commerce.wa.gov.au/sites/unrestricted_asbestos_licence.

Asbestos disposal facilities

Metropolitan areas: Use facilities listed by the Waste Authority at www.wasteauthority.wa.gov.au.

Non-metropolitan areas: For facilities outside the Perth metropolitan areas, use facilities recommended by the local government authority.

State regulations

Disposal: To the Environmental Protection (Controlled Waste) Regulations 2004 (WA).

Form submission: Provide copies of submitted WorkSafe (WA) *Asbestos removal forms* and evidence that all fees have been paid. Forms are available at www.commerce.wa.gov.au/worksafe/asbestos-removal.

2.3 DEMOLISHED MATERIALS

General

Removal: Except for items to be recovered for re-use in the works or delivery to the owner, and materials to be recycled in the works, take possession of demolished materials, remove them from the site and dispose at an authorised waste collection facility. Do not burn or bury demolished materials on the site. Prevent spillage of demolished materials in transit.

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

2.4 PROTECTION

Encroachment

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

Unexpected finds

Requirement: If encountered, give notice and close off affected site area with barrier tapes and warning signs to prevent access. Unexpected finds include hazardous or volatile contaminants, archaeological finds and items of heritage value.

Further action:

- Arrange for inspection by an environmental consultant to undertake sampling and analysis.
- Protocols for determining if a substance is considered acceptable or unacceptable to human health.
- Procedures for disposal or removal of find.
- Submission by an environmental consultant for assessment/validation/clearance.

2.5 DEMOLITION WORK

Dilapidation record

Purpose: Use the dilapidation record to assess the damage and rectification work arising from the demolition work.

Hazardous materials removal

Standard: To AS 2601 clause 1.6.2.

Asbestos removal: To AS 2601 clause 3.3.2.

Materials other than asbestos: To AS 2601 clause 3.3.3.

Existing septic tanks

Redundant/disused tanks: Decommission tank, as follows:

- Completely empty tanks to the *Environmental Protection (Liquid Waste) Regulations (WA)*, leach drains and soak wells using a licensed liquid waste contractor.
- After emptying septic tanks, leach drains and soak wells, and fully remove from the project site.
- Hose down and disinfect tank, drains and wells as required.
- Fill up excavations, tank, drains and soak wells with clean fill such as yellow sand and compact.

2.6 COMPLETION

Notice of completion

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

Rectification: Repair any damage arising out of demolition work. Obtain written acceptance from the owner of each adjoining property of the completeness and standard of the rectification work.

Notice of Completion Certificate

Submission: Within 7 days of completing the demolition works, submit a Notice of Completion Certificate (BA7) to the Department of Communities, Housing Permit Authority with other required documentation.

3 SITE PREPARATION

3.1 CONTROL AND PROTECTION

Erosion control

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

Dewatering

Requirement: Keep earthworks free of water. Provide and maintain slopes, crowns and drains for excavations and embankments so there is free drainage. Do not commence construction activities, including placing fill, before removing free water from groundwater seepage or excavation has been removed. Prevent water flowing over freshly laid work.

Water quality

Washout: Prevent washout from entering waterways or stormwater drains.

Cross connection: Make sure there are no cross connections between stormwater and the public sewerage system.

3.2 TREE PROTECTION

Trees to be retained

Extent: All trees NOT marked for removal.

Tree protection

Tree protection zone (TPZ): To AS 4970 Section 3.

Tree protective measures: To AS 4970 Section 4.

Work near trees

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

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

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

3.3 SITE CLEARING**Extent**

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

Clearing and grubbing

Clearing: Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable matter and organic debris, scrub, trees, timber, stumps, boulders and rubble.

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

Grubbing: Grub out stumps and roots over 75 mm diameter to a minimum depth of 500 mm 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.

Disposal

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

4 EARTHWORKS**4.1 STANDARDS****General**

Earthwork: To BCA 3.1.1 and the recommendations of AS 3798.

4.2 FILL MATERIALS**General**

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

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

4.3 GEOTECHNICAL**As found site conditions**

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

- Bad ground.
- Rock.

4.4 REMOVAL OF TOPSOIL**General**

Extent: Areas of cut or fill and areas occupied by structures, pavements and embankments.

Maximum depth: 200 mm.

Topsoil stockpiles

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

Stockpile heights: Establish stockpiles to maximum height of 1.5 m.

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

4.5 EXCAVATION**Extent**

Clearing and excavation: Clear and excavate 1500 mm clear of the building or to the allotment boundaries, whichever is less.

Site surface: Excavate over the site to give correct levels and profiles required as the basis for structures, paving and landscaping. Make allowance for compaction or settlement or heaving.

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

Crawl space: Provide a clear space under steel bearers:

- Minimum clearance: 400 mm.

4.6 PREPARATION FOR FILLING**Preparation**

Stripping: 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.

4.7 PLACING FILL**General**

Fill: Conform to the NCC and the following requirements:

- Sand fill: Not containing gravel sized particles.
- Achieving a blow count of greater than 7/300 mm to the AS 1289 series.

Compacting fill: Compact as follows:

- Controlled fill (up to 800 mm deep): In layers not more than 300 mm deep using a vibrating plate or roller.
- Rolled fill: (up to 800 mm deep): In layers not more than 300 mm deep using an excavator or similar machine.

Extent: Extend fill 1 m past the building perimeter to a maximum slope of 1(V):2(H) to the natural ground.

Certification: Provide an engineer's signed compaction certificate before construction commences.

Placement: To BCA 3.2.2.

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

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

Moisture content: 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, to achieve the required density.

Compaction

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.

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

Minimum relative compaction: To AS 3798 Table 5.1.

5 TERMITE MANAGEMENT

5.1 TERMITE MANAGEMENT SYSTEMS

System requirements

Standard: To AS 3660.1.

Termite management: To BCA 3.1.3.

Termite reticulation systems

Type testing: To AS 3660.3 Section 5.

Termite management system notice

Requirement: Permanently fix a durable notice in a prominent location to BCA 3.1.3.4 Appendix A and as follows:

- Single dwellings: One notice in the main electrical switchboard.
- Grouped and multiple dwellings: One notice to each dwelling, in the electrical meter box.

6 SERVICE TRENCHING

6.1 FILL MATERIALS

General

Backfill material: To SITE PREPARATION, **EARTHWORK, FILL MATERIALS**, free from stones larger than 100 mm maximum dimension and as follows:

- Next to services: Do not place any particles greater in size than 25 mm within 150 mm 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 $\pm 1\%$ of that of the adjoining in situ clay.

6.2 EXISTING SURFACES

Concrete and asphalt pavements

Method: Sawcut trench set-out lines for the full depths of the bound pavement layers except where the set out line is located along expansion joints.

6.3 EXCAVATING

Excavation

General: 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.

Trench widths

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

6.4 TRENCH BACKFILL

General

Place fill: To SITE PREPARATION, **EARTHWORK, PLACING FILL**.

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

Layers: Compact all material in layers not exceeding 150 mm compacted thickness. Compact each layer to the relative compaction required before starting the next layer.

6.5 SURFACE RESTORATION

General

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

F. CONSTRUCTION SPECIFICATION

1 GENERAL REQUIREMENTS

1.1 NATIONAL CONSTRUCTION CODE (NCC) REQUIREMENTS

Bushfire protection

Standard: To BCA 3.7.4.

Services

General: To BCA 3.12.5.

Ventilation: To BCA 3.8.5 and BCA 3.12.4.

Lighting: To BCA 3.8.4.

Heating appliances: To BCA 3.7.3.

Plumbing: To NCC Volume Three (PCA).

Drainage: To BCA 3.1.2.

Sound insulation

Requirement: To BCA 3.8.6.

Building fabric and structure

Buildings in high wind areas: To BCA 3.10.1.

Building fabric: To BCA 3.12.1

Footings and slab: To BCA 3.2.

1.2 PRODUCTS AND MATERIALS

Prohibited materials

General: Do not provide the following:

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

1.3 SUBMISSION

Products and materials

Safety data sheets (SDS): Submit SDS for products and materials conforming to the *Globally Harmonized System of Classification and Labelling of Chemicals (GHS)*.

1.4 TIMBER

Moisture content

General: 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 2 pieces in any one group.

Unseasoned timber

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

Recycled timber

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

Classification: Visually graded.

Durability

General: 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.

Minimum requirement: To the Natural and treated timber durability table

Natural and treated timber durability table

Exposure	Natural timber	Treated timber	Remarks
	Required durability class to AS 5604	Required hazard class to the AS 1604 series	
Inside, above ground. Completely protected from the weather. Well ventilated	Class 4	H1	Treated timber resistant to lyctids. Untreated timber must be protected from termites
Inside, above ground. Protected from wetting with nil leaching. Well ventilated	Class 3	H2	Treated timber resistant to borers and termites. Untreated timber must be protected with a finish
Above ground, exposed to weather. Periodic moderate wetting and leaching	Class 2	H3	Treated timber resistant to borers, termites and moderate decay. Applicable to weatherboards, fascias, pergolas (above ground), window joinery, framing and decking
In-ground	Class 1	H4 (Severe wetting and leaching)	Treated timber resistant to borers, termites and severe decay. Applicable to fence posts, greenhouses, pergolas (in-ground) and landscaping timbers
		H5 (Extreme wetting and leaching and/or critical uses.)	Applicable to retaining walls, piling, house stumps, building poles, cooling tower fill

1.5 STEEL

Durability

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

Internal engineer designed steel members: Remove mill scale, rust, moisture and oil. Coat with a zinc phosphate primer to the manufacturer’s instructions.

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

Corrosion resistance

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

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

Corrosion resistance table

Atmospheric corrosivity category to AS 4312	Threaded fasteners and anchors		Powder actuated fasteners
	Material	Minimum local metallic coating thickness (µm)	Material
C1 and C2	Electroplated zinc or Hot-dip galvanized	30	Stainless steel 316
C3	Hot-dip galvanized	50	Stainless steel 316
C4 and T	Stainless steel 316	-	Stainless steel 316

Preparation and pre-treatment

Standard: To the AS 1627 series.

Galvanizing

General: Galvanize mild steel components (including fasteners) to AS/NZS 1214, AS 1397 or AS/NZS 4680, as appropriate, and in the following conditions:

- Exposed to weather.
- Embedded in masonry.
- Exposed to or in air spaces behind external leaves of masonry walls.
- In contact with chemically treated timber.

1.6 PROTECTIVE COATINGS

General

Environment: To AS/NZS 2312.1 clause 2.3.

Coating designation: To AS/NZS 2312.1 Table 6.3.

1.7 FASTENERS

Self-drilling screws

Standard: To AS 3566.1.

2 CONCRETE

2.1 REQUIREMENTS

Performance

Requirement: Provide cast concrete as follows:

- Conforming to the performance criteria.
- Satisfying quality requirements.
- Compatible with finishes.

Design

Structural design: To AS 2870 and AS 3600.

2.2 STANDARDS

General

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

Specification and supply of concrete: To AS 1379.

Reinforced concrete construction: To AS 3600.

Residential ground slabs and footings: To AS 2870.

2.3 INTERPRETATION

Definitions

General: 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 < 10°C.
 - . Hot: Ambient shade temperature > 30°C.

2.4 TOLERANCES

Position

Requirement: To AS 3600 clause 17.5.

Finishes

Formed surface finish quality: To AS 3610.1 Table 3.3.2 and the following:

- Visible: Class 3.
- Not visible: Class 5.

Unformed surfaces flatness: To the **Flatness tolerance class table**, for the required class of finish, using a straightedge placed anywhere on the surface in any direction.

Flatness tolerance class table

Class	Measurement	Maximum deviation (mm)
A	2 m straightedge	4
B	3 m straightedge	6
C	600 mm straightedge	6

2.5 SUBMISSIONS

Certification

Conformance: Provide independent certification by a professional engineer of conformance to the project criteria, of both the design and the completed works.

2.6 MATERIALS

Cement

Standard: To AS 3972.

Age: Less than 6 months old.

Pre-mixed concrete supply

Standard: To AS 1379 by the batch production process.

Maximum slump: 100 mm.

Reinforcement

Standard: To AS/NZS 4671.

Surface condition: Free of loose mill scale, rust, oil, grease, mud or other material which may reduce the bond between the reinforcement and concrete.

Corrosion: Protect from corrosion in conformance with AS 3600 clause 17.2.1.2.

Plywood formwork

Standard: To AS 6669.

Polymeric film underlay

Vapour barriers and damp-proofing membranes: To AS 2870 clause 5.3.3.

Minimum thickness: 0.2 mm.

Curing compounds

Standard: To AS 3799.

Fixings and embedded items

Compatibility: Provide inserts, fixings and embedded items that are compatible with each other, with the reinforcement and with the required concrete finish.

Corrosion: In external or exposed locations, galvanize anchor bolts and embedded fixings.

2.7 POLYMERIC FILM UNDERLAY

Location

General: 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.

2.8 CONCRETE

Placing in cold weather

Temperature limits: Maintain the following:

- Freshly mixed concrete: $\geq 5^{\circ}\text{C}$.
- Formwork and reinforcement before and during placing: $\geq 5^{\circ}\text{C}$.
- Water: Maximum 60°C when placed in mixer.

Placing in hot weather

Temperature limits: Maintain the following:

- Freshly mixed concrete at $\leq 35^{\circ}\text{C}$.
- Formwork and reinforcement before and during placing: $\leq 35^{\circ}\text{C}$.

2.9 CURING

General

Requirements: Taking into account the average ambient temperature at site over the relevant period affecting the curing, adopt procedures to make sure of the following:

- Curing: Cure continuously from completion of finishing, when the concrete has set sufficiently not to be damaged by the curing process, 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.
- End of curing period: Prevent rapid drying out at the end of the curing period.

2.10 COMPLETION

Compliance

Tolerances: Check tolerances in conformance with AS 3610.1 Section 5.

3 PRECAST CONCRETE

3.1 REQUIREMENTS

Performance

Requirement: Provide pre-cast concrete as follows:

- Designed and certified after erection by a professional engineer.
- Designed for handling, transport and erection.
- Undamaged by handling and installation.

Design

Structural design: To AS 3600 and BCA B1.1.

3.2 STANDARDS

General

Precast elements: Conform to the recommendations of *NP PCH (Precast concrete handbook)*.

Materials, components and equipment for manufacture: To AS 3850.1.

Planning, design, construction, casting, transportation, erection and installation: To AS 3850.2.

Precast flooring systems: To AS 3600.

Design, installation and testing of post-installed and cast-in fastenings: To SA TS 101.

3.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given in AS 3850.1 clause 1.4 and the following apply:

- Precast concrete: Concrete building elements, cast in moulds and cured away from the final structural position, and then transported, lifted and fixed into position.

3.4 TOLERANCES

General

Manufacturing, installation, fixings and embedded items tolerance for precast elements: To AS 3610.1 Table 3.3.3 and AS 3850.2 clause 2.11.

3.5 SUBMISSIONS

Certification

Conformance: Provide independent certification by a professional engineer of conformance to the project criteria, of both the design and the completed works.

3.6 MATERIALS

General

Standard: To AS 3850.1.

Aggregates

Standard: To AS 2758.1.

Cement

Standard: To AS 3972.

Age: Less than 6 months old.

Type: Do not use high alumina cement.

Water

Standard: To AS 1379 clause 2.4.

Requirement: Clean, free from oil, acid, alkali, organic or vegetable matter and including not more than 500 mg/l of chloride ions.

Other

Curing compounds: To AS 3799.

Chemical admixtures: To AS 1478.1.

Pigments: As follows:

- Chemically inert.
- Alkaline resistant.
- Insoluble.
- Lightfast.

Reinforcement

Standard: To AS/NZS 4671.

Surface condition: Free of loose mill scale, rust, oil, grease, mud or other material which may reduce the bond between the reinforcement and concrete.

Corrosion: Protect from corrosion in conformance with AS 3600 clause 17.2.1.2.

Prestressing tendons

Standard: To AS/NZS 4672.1.

Type: 7 wire, stress relieved, high tensile steel and strand.

Prestressing hardware: To AS 3600.

Welding tendons: Do not weld prestressing tendons.

3.7 PRECAST CONCRETE

General

Concrete: To AS 3600 and AS 1379.

Concrete cover: To AS 3600 clause 4.10.

3.8 CAST-IN ITEMS

Fixings and embedded items

Compatibility: Provide inserts, fixings and embedded items that are compatible with each other, with the reinforcement and with the documented concrete finish.

Corrosion: In external or exposed locations, galvanize anchor bolts and embedded fixings.

3.9 MISCELLANEOUS

Bearing pads

Selections and testing: To AS 5100.4.

Flashings

Standard: To AS/NZS 2904.

3.10 INSTALLATION

Proprietary precast elements

Requirement: Install to the manufacturer's recommendations.

Lifting and handling

Requirement: Conform to the ASCC National code of practice for precast, tilt-up and concrete elements in building construction and AS 3850.2.

Temporary bracing and propping: To AS 3850.2 Section 5.

Flooring systems

Shear keys: Grout with mix proportion (cement:sand) 3:1.

Preparation: Immediately before in situ topping, wet surface of plank without pooling.

Waterproofing: Provide waterproofing to exposed precast floors.

Topping: Properties as follows:

- Grade: Minimum N32 to AS 1379.

3.11 COMPLETION

Compliance

Tolerances: Check element compliance in conformance with AS 3610.1 Section 5.

Rejection: Reject any precast elements not conforming to the documented tolerances.

4 LIGHT STEEL FRAMING

4.1 STANDARDS

General

Design, materials and protection: To AS/NZS 4600.

Residential and low-rise steel framing: To NASH-1 (National Association of Steel Housing) Standard.

Beams and lintels: To BCA 3.4.4, AS 4100 and AS/NZS 4600.

Corrosion protection: To BCA 3.4.4.4 based on steel member exposure.

- Lintels and masonry accessories: Provide protection to AS/NZS 2699.1, AS/NZS 2699.3 and AS 3700 clause 5.7 as appropriate for the environment classification.

Steel framing design and construction: To BCA 3.4.2.

4.2 TOLERANCES

General

Manufacturing, assembly and installation tolerances: To NASH-1 Appendix D and NASH-2 Appendix A.

4.3 COMPONENTS

Cold-formed steel framing

Metallic coating: To AS 1397.

Minimum coating class: To BCA 3.4.2.2.

Framing members

Cold-formed steel framing for proprietary systems: To NASH-1 and NASH-2.

4.4 INSTALLATION

Fabrication

Length: Cut members accurately to length so that they fit firmly against abutting members.

Service holes: Form holes by drilling or punching.

Bushes: Provide plastic bushes or grommets to site cut holes.

Swarf: Immediately remove swarf and other debris from cold-formed steel framing.

Fastening

Type: Select from the following:

- Bolting.
- Self-drilling, self-tapping screws.
- Blind rivets.
- Proprietary clinching system.
- Structural adhesives.
- Welding. On-site welded connections are not permitted.

Welding

Burning: Avoid procedures that result in greater than localised burning of the sheets or framing members.

Prefabricated frames

General: Protect frames from damage or distortion during erection. Provide temporary protection for members until permanent covering is in place.

Metal separation

General: Install lagging to separate non-ferrous service pipes and accessories from the framing.

Unseasoned or CCA treated timber

General: Do not fix in contact with framing without fully painting the timber and/or the steel.

Earthing

Permanent earthing: Required.

Temporary earthing: Provide temporary earthing during erection until the permanent earthing is installed.

Protection

General: Restore coatings which have been damaged by welding or other causes. Thoroughly clean affected areas back to base metal and coat with a zinc rich organic primer.

Grommets: Provide grommets to isolate piping and wiring from cold-formed steel framing.

Cyclone debris screens

Noggings: Provide as required to support screen fixings.

Roof battens: Provide as required to support screens under verandahs and eaves when in the fully open position.

4.5 WALL FRAMING**Damp-proof course**

Requirement: Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, as documented or as follows:

- External walls (not masonry veneer): Turn up a minimum of 75 mm on the inside and tack to studs. Project 10 mm beyond the external slab edge or dwarf wall and turn down at 45°.
- Walls of bathrooms, shower rooms and laundries: Turn up a minimum of 150 mm on the wet side and tack to studs.

Installation: Lay in long lengths. Lap full width at angles and intersections and at least 150 mm at joints.

Junctions: Preserve continuity of damp-proofing at junctions of damp-proof courses, sarking and waterproof membranes.

Flashings

Location: Provide flashings to external openings sufficient to prevent the entry of moisture. Form trays at the ends of sill flashings.

Masonry veneer construction: Extend across cavities and build into brickwork.

4.6 ROOF FRAMING**Additional support**

General: Provide additional frame members at fibre cement or plasterboard sheeting or lining joint locations.

Battens

Requirement: Supply and fix battens suitable for span, spacing and proposed roofing material.

Anti-ponding boards

Standard: To AS 4200.2.

4.7 ROOF TRIM**Fascia, valley gutter and barge boards**

Requirement: Provide fascia, valley gutter boards and barge boards in conformance with the manufacturer's requirements.

4.8 COMPLETION**Cleaning**

General: On completion of framing remove debris from any gaps between members and make sure void between bottom chord of roof trusses and top of any non-supporting internal wall is clear.

5 WATERPROOFING - EXTERNAL AND TANKING**5.1 STANDARDS****Membrane materials**

Standard: To AS 4654.1.

Membrane design and installation

Standard: To AS 4654.2.

NCC compliance

Requirements: To BCA 3.8.1.

6 ROOFING**6.1 STANDARDS****General**

Roof cladding: To BCA 3.5.1.

Gutters and downpipes: To BCA 3.5.2.

6.2 COMPONENTS**Fasteners**

Finish: Prefinish exposed fasteners with an oven baked polymer coating to match the roofing material.

Insulation spacer

Description: Proprietary spacer system to prevent excessive compression of insulation between roof sheeting and purlins.

6.3 MATERIALS**Sheet metal roofing**

Material: Prefinished/coated steel sheeting.

Standard: To AS 1562.1.

Corrosion protection: To BCA Table 3.5.1.1a.

Prepainted and organic film/metal laminate finish:
To AS/NZS 2728.

Plastic sheet roofing

Unplasticised polyvinyl chloride (PVC-U) sheet: To AS 4256.2.

Glass fibre reinforced polyester (GRP) sheet: To AS 4256.3.

Polycarbonate: To AS 4256.5.

6.4 ROOF PLUMBING

General

Description: Flashings, cappings, gutters, rainwater heads, outlets downpipes and accessories necessary to complete the roof system.

Flashing and capping: Notched to match profile of roof sheeting.

Standards

Roof drainage: To AS/NZS 3500.3.

Metal rainwater goods: To AS/NZS 2179.1.

PVC-U rainwater goods and accessories: To AS/NZS 3500.3.

Flashings and cappings: To AS/NZS 2904.

Gutters and fascias

Material: Prefinished/coated steel sheeting.

6.5 SHEET METAL ROOFING

Installation

Metal sheet roofing: To AS 1562.1 and BCA 3.5.1.3.

Cyclonic fasteners and washers: Provide galvanized steel cyclonic fasteners and EPDM bonded cyclonic washers to the manufacturer's recommendations for the appropriate substrate.

Swarf: Remove swarf and other debris as soon as it is deposited.

Accessories: Provide material with the same finish as roofing sheets to complete the installation.

6.6 PLASTIC SHEET ROOFING

Installation

Standard: To AS 1562.3.

6.7 ROOF PLUMBING INSTALLATION

Gutters

Fastening: Fix gutters with galvanized straps to rafters or fascia.

Minimum slope of eaves gutters: 1:200.

Minimum width overall of valley gutters: 400 mm.

Eaves gutter overflow measures: To BCA 3.5.2.4.

Downpipes

General: Prefabricate downpipes to the required section and shape where possible. Connect heads to gutter outlets and, if applicable, connect feet to rainwater drains.

Downpipe support: Provide supports and fixings for downpipes.

Strapping: Secure downpipes to walls with not less than two metal straps.

- Strap material and finish: Prefinished/coated steel.

7 CLADDING

7.1 STANDARDS

General

Wall cladding: To BCA 3.5.3.

7.2 MATERIALS

Debris protection

Impact resistance: Provide cladding with improved debris resistance for cyclonic conditions, such as incorporating plywood and/or sheet metal in the walls and ceiling linings to designated rooms to strengthen them for impact, uplift and racking.

Fibre cement planks

Requirement: Proprietary system of single faced fibre cement building planks.

Standard: To AS/NZS 2908.2 Type A Category 3.

Plank thickness: 7.5 mm.

Joints and edges: PVC-U extrusion.

Corners: Preformed metal joining pieces.

Profiled sheet metal

Standard: To AS 1562.1.

Fibre cement sheet

Standard: To AS/NZS 2908.2.

Cladding, eaves and soffit linings: Type A Category 3.

Compressed cladding: Type A Category 5.

Sheet cladding: A proprietary system of single faced fibre cement sheets:

- Arrangement: Set out in even panels with joints coinciding with framing.
- Sheet thickness: 6 mm.
- Joints, corners and edges: PVC-U extrusion.

Eaves lining: Single faced fibre cement:

- Material and fixing: To BCA 3.5.3.5.
- Minimum sheet thickness: 6 mm.
- Joints: PVC-U extrusion.

7.3 COMPONENTS

Flashing material

Standard: To AS/NZS 2904.

7.4 CONSTRUCTION GENERALLY

Metal separation

Requirement: Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by either of the following methods:

- Applying an anti-corrosion, low moisture transmission coating to contact surfaces.
- Inserting a separation layer.

Incompatible metal fixings: Do not use.

Fixing for cyclonic conditions

Requirement: Provide galvanized steel cyclonic fasteners and EPDM bonded cyclonic washers to the manufacturer's recommendations for the appropriate substrate.

7.5 PROPRIETARY SYSTEMS OR PRODUCTS**Fixing**

Product fixing: Fix the following proprietary systems to manufacturer's recommendations.

7.6 PROFILED SHEET METAL CLADDING**Installation**

Swarf: Remove swarf and other debris as soon as it is deposited.

Accessories: Provide material with the same finish as cladding sheets.

Corner flashing

Requirement: Finish off at corners with purpose-made folded flashing strips.

8 WINDOWS AND GLAZED DOORS**8.1 WINDOW SIZES****General**

Requirement: Use the manufacturer's standard sizes.

8.2 STANDARDS**General**

Selection and installation: To AS 2047 for the following:

- Serviceability design wind pressure: To AS 2047 Table 2.1 in conformance with DESIGN DEVELOPMENT, **DESIGN CRITERIA**.
- Ultimate strength test pressure: To AS 2047 Table 2.5 in conformance with DESIGN DEVELOPMENT, **DESIGN CRITERIA**.

Glazing: To BCA 3.6.

External glazing: To BCA 3.12.2.

Glazing

Glass type and thickness: To AS 1288, if no glass type or thickness is nominated.

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

Testing

Debris impact resistance for glazed sidelights and sliding doors: Tested for loading to AS/NZS 1170.2 clause 2.5.8.

8.3 PRODUCTS AND MATERIALS**Protection of openable windows**

Fall prevention: To BCA D2.24 and BCA 3.9.2.5.

Testing: To AS 5203.

Glass

Safety glasses: To AS/NZS 2208.

Aluminium frame finishes

Powder coating: To AS 3715:

- Grade: Architectural coating.

Anodising: To AS 1231:

- Thickness: ≥ 15 to 20 microns.

Bathroom windows

Obscure glazing: To WC, bathroom and ensuite windows.

Flashings

Standard: To AS/NZS 2904.

Window labelling and certification

Requirement: To AS 2047 Section 8.

8.4 COMPONENTS**Louvre window assemblies**

Requirement: Provide louvre blades mounted in a metal surround frame or subframe and able to withstand the permissible-stress-design wind pressure for that location without failure or permanent distortion of members, and without blade flutter.

Adjustable louvres: Provide louvre blades clipped into blade holders pivoted to stiles or coupling mullions, linked together in banks, each bank operated by an operating handle incorporating a latching device, or by a locking bar.

Insect screens

Requirement: Provide insect mesh screens to all opening window sashes, short glazed windows and sliding doors.

Fixed screens: Provide fixed screens to the window frames with a clipping device which permits removal for cleaning.

Hinged screens: Hinge at the top to give access to opening sash.

Roll up screens: Provide a proprietary retractable insect screen comprising aluminium frame with baked enamel finish, fibreglass mesh beaded into the frame, and a retraction system including tension spring, nylon bearings, positive self-locking device, and plastic sealing strip at sill.

Sliding screens: Provide a matching aluminium head guide, sill runner, and frame stile sections for screens not part of the window frame.

- Hardware: Nylon slide runners and finger pull handle. Provide pile strip closers against sash where necessary to close gaps.

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.

- Mesh: Bead the mesh into the frame channel with a continuous resilient gasket, so that the mesh is taut and without distortion.

Bushfire screens and seals

Protection: Protect glazed windows and doors from the ingress of embers.

Standard: AS 3959.

Security screens

Security grilles and screen doors: To AS 5039.

Screen infill material: Type III to AS 5039.

Installation: To AS 5040 by a Police Licensed Security installer.

Cyclone debris screens

Location: If required for the project, provide to all windows.

Screens and fixing to frame: Powder coat finished stainless steel screw clamped 0.9 mm strand type 304 stainless steel wire mesh screens.

Testing: Provide certification confirming the screen has been tested to withstand impact loading from windborne debris to AS/NZS 1170.2 clause 2.5.8.

8.5 HARDWARE

Requirement

General: 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.

8.6 INSTALLATION

Windows and glazed doors

General: Install windows and glazed doors frames as follows:

- Plumb, level, straight and true within building tolerances.
- Fixed or anchored to the building structure in conformance with the wind action loading requirements.
- Isolated from any building loads, including loads caused by structural deflection or shortening.
- Allow for thermal movement.

Weatherproofing

Flashing and weatherings: Install flashings, weather bars, drips, storm moulds, caulking and pointing so that water is prevented from penetrating the building between the window frame and the building structure under prevailing service conditions, including normal structural movement of the building.

Trim

General: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the window frames. Install to make neat and clean junctions between frames and the adjoining building surfaces.

Cyclone debris screens

Mounting: Top hung, fully framed, mitred and staked to protect from side impact and insects.

- Hinge: Minimum three 70 mm fixed pin hinges for each screen.
- Hinge position: 170 to 180 mm from outer edge of screen at 500 mm centres.

Screen (surround) frame: 70 x 20 mm.

Base frame:

- Fixing: Screw fixed to the building structure, through cladding into wall framing, with 10g tamper resistant screws at 100 mm from the corners and 300 mm centres.
- Drainage points: Minimum two 20 x 5 mm (elongated) holes to prevent water pooling.
- Wire surface clearance: Provide projection so that wire clearance from glazing is not less than the rate of instantaneous deflection measured during testing, 105 mm optimum.

Screen configuration: Align with window configuration.

- Maximum panel dimension: 1200 x 1500 mm.

Gravity self-centring hook: Provide hook to hang screen from rafter or eaves when in the fully open position.

- Hook material: 6 mm galvanized steel rod.

Screen finish:

- Mesh: Black powder coat.
- Frame: Powder coat.

Marking: Provide the manufacturer's name in 3 mm high letters on the internal face of the frame, using one of the following methods:

- Embossing the frame.
- Adhesive, transparent acrylic, untearable polyester film label.

9 DOORS AND ACCESS PANELS

9.1 DOOR FRAMES

External doors

Requirement: Double rebated with weather gaskets and seals.

Aluminium frames

General: Assembled from aluminium sections, including accessories such as buffers, pile strips, strike plates, fixing ties or brackets and cavity flashing, with provision for fixing the required hardware.

9.2 DOORS

General

Doors: Proprietary products manufactured for interior or exterior applications and for the finish required.

Door frames: As documented on the drawings..

Flush doors

General: Provide flush doors of balanced construction.

Construction

Door thickness:

- General: 35 mm.
- External doors and doors over 900 mm wide: 40 mm.

Door width: 870 mm, unless documented otherwise.

Edge strips: Minimum thickness 10 mm. Increase overall thickness to greater than 15 mm to accommodate the full depth of the rebate in rebated doors. Apply to the external edges of door after the facings are bonded to the door framing/core and finish flush with outside surface of the facings.

Door facing:

- Internal doors: Standard Redicote finish.
- External doors: Solid core, Duracote finish.
- Doors to wet areas (internal): Duracote finish.

Extruded gaskets and seals

General: Provide weather seals and gaskets to all external doors.

Materials: Non-cellular (solid) elastopressive seals as follows:

- Flexible polyvinyl chloride (PVC): To BS 2571, 100% solids with high consistency, ultraviolet stabilised.
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.

Tolerance

Squareness: The difference between the lengths of diagonals of a door:

- Maximum 3 mm.

Twist: The difference between perpendicular measurements taken from diagonal corners:

- Maximum 3 mm.

Door leaf clearances:

- Between other leaves and leaf and frame: 2 to 5 mm.
- Between door and floor finish: ± 20 mm after floor finish installation, except for removable toilet doors.

Security screen doors

Standard: To AS 5039.

Screen infill material: Type III to AS 5039.

Mesh type: Type 304 stainless steel mesh with minimum 0.9 mm diameter wires.

Screen construction: Provide screens conforming to the following:

- Framing: Extruded aluminium frame.
- Mesh attachment: Fix mesh to frame with screw-clamps and anti-tamper screws. Provide screw-clamps which transfers forces around the frame so that the mesh remains intact after heavy impact.
- Finish: Powder coated. Colour of screen frame to match adjoining door frame colour.

Screen arrangement: Hinged or sliding conforming to the following:

- Allow cleaning of any fixed lights from the outside.
- Allow egress from the inside.
- Held open position: Allow for mechanisms for holding in position.
- Make sure screens are compatible with door/window system and does not interfere with its operation.

Operation and latching: From the inside with a keyless one touch locking system.

Bushfire screens and seals

Protection: Protect glazed windows and doors from the ingress of embers.

Standard: AS 3959.

9.3 INSTALLATION**Security screen door**

Installation: To AS 5040 by a Police Licensed security installer.

Door type and location: Provide hinged and sliding security screen doors to the external face of entry door to each dwelling as follows:

- Hinged security screen doors: To the external face of each entry door to the dwelling, excluding store room.

- Sliding security screen: To glazed sliding doors.

9.4 FRAMING**General**

Frames: Install the frames as follows:

- Plumb, level, straight and true.
- Fixed or anchored to the building structure.
- Isolated from any building loads, including loads caused by structural deflection or shortening.

Finishing

Trim: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the door frames to make neat and clean junctions between the frame and the adjoining building surfaces.

Weatherproofing

Flashings and weatherings: Install flashings, weather bars, drips, storm moulds, caulking and pointing to prevent water from penetrating the building between the door frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

9.5 SLIDING INTERNAL DOORS**Face mounted**

General: 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: Fully adjustable precision ball race type providing smooth, quiet operation.

Cavity sliding

Door assemblies: Proprietary product 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.

10 OVERHEAD DOORS**10.1 STANDARD****General**

Garage doors: To AS/NZS 4505.

10.2 SUBMISSION**Certification**

Requirement: Submit manufacturer's data verifying the following:

- Materials, products and installation: The door is able to withstand wind pressure to AS/NZS 4505 Table 5.2 in conformance with DESIGN DEVELOPMENT, **DESIGN CRITERIA**.
- Testing: In conformance with AS/NZS 4505 Appendix A for cyclonic regions.

10.3 INSTALLATION**Frames**

Requirement: Install 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.

11 DOOR HARDWARE

11.1 COMPONENTS

Hinges table

Size of door (mm x mm)	Number of hinges (per door leaf)	Size of hinges (steel)
2040 x 920	3	100 x 75 x 2.5 mm
2040 / 2400 x 1020	4	100 x 100 x 2.5 mm

Locksets

External doors: Fit standard range door locks, lever handles and latches with entrance sets to front and other external timber doors. Provide deadlocks with inside snib.

Internal doors:

- Generally: Passage sets.
- Bathrooms, showers and toilets: Privacy sets.
- Sliding patio doors and windows: Key-lockable surface mounted bolts.

Keying

Requirement: Key doors (excluding garage doors) alike and key windows alike.

Door buffers and stops

Location and type: Provide floor mounted door buffers to all internal doors.

Security doors

Hinges: 3 hinges with anti-tamper or steel fixed pin hinges.

- Fixing to door frame: Welded to the frame or provide hinges concealed when the door is closed.

Keying: Locks keyed alike where multiple doors are fitted.

11.2 INSTALLATION

Mounting height

Door lockset mounting heights: 1000 mm above finished floor to centreline of spindle.

Locks

Cylinders: Install so that keyhole is vertical and consistent for all doors.

Door buffers and stops

Fixing: Fix buffer/stop on the floor so that the door or door furniture does not strike the wall or other surface.

12 GLASS COMPONENTS

12.1 STANDARDS

General

Materials and installation: To AS 1288.

Safety glasses: To AS/NZS 2208.

12.2 MIRRORS

Reflective surface

Type: Silver layer deposited on the glass or glazing plastic.

Protective coatings: Electrolytic copper coating at least 5 microns thick, and 2 coats of mirror backing and edge sealing paint having a total dry film thickness of at least 50 microns.

Safety mirror

Type: Vinyl backed Grade A safety mirror.

Safety compliance: To AS/NZS 2208.

Solid backed annealed glass mirrors

Backing: 9 mm moisture resistant plywood.

Adhesive fixing to backing: Non-acidic silicone adhesive at the rate recommended by the manufacturer.

Installation to backing: 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.

Edge processing: If exposed, polished pencil edge.

12.3 SHOWER SCREENS

Type

General: Proprietary system comprising frames of extruded aluminium, stainless steel, or PVC-U, assembled around safety glass to form fixed panels and sliding, hinged or pivoted doors.

Water shedding

Requirement: 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.

Fixing

Proprietary shower screens: To the manufacturer's recommendations.

13 THERMAL INSULATION AND PLIABLE MEMBRANES

13.1 MATERIALS

Fire hazard properties

Cavity insulation material: Conform to the following tested to AS/NZS 1530.3:

- Spread-of-Flame Index: ≤ 9 .
- Smoke-Developed Index: ≤ 8 if Spread-of-Flame Index > 5 .

Materials with reflective facing: Test to AS/NZS 1530.3 and the recommendations of Appendix A6.

Pliable membranes Flammability Index tested to AS 1530.2: ≤ 5 .

Insulation

Cellulosic fibre (loose fill): To AS/NZS 4859.1 Section 5.

Mineral wool blankets and cut pieces: To AS/NZS 4859.1, Section 8.

Polyester: To AS/NZS 4859.1 Section 7.

Polysocyanurate (rigid cellular RC/PIR): To AS 1366.2.
 Polystyrene (extruded rigid cellular RC/PS-E): To AS 1366.4.
 Polystyrene (moulded rigid cellular RC/PS-M): To AS 1366.3.
 Polyurethane (rigid cellular RC/PUR): To AS 1366.1.
 Reflective thermal insulation: To AS/NZS 4859.1, Section 9.
 Wool: To AS/NZS 4859.1, Section 6.

Pliable membrane

Standard: To AS/NZS 4200.1.

13.2 INSTALLATION**Bulk insulation**

Standard: To AS 3999.

Requirement: Firmly butt together fibre batts or blankets, 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.

Pliable membrane

Standard: To AS 4200.2 and BCA 3.12.1.1.

14 LINING**14.1 MATERIALS AND COMPONENTS****Plasterboard**

Standard: To AS/NZS 2588.

Minimum thickness: Conform to the following:

- Generally: 10 mm.
- Improved impact resistance: 13 mm, where required by the principal.

Fibre cement

Standard: To AS/NZS 2908.2.

Wall and ceiling linings: Type B, Category 2.

Minimum thickness: Conform to the following:

- Wall:
 - . Generally: 9 mm.
 - . Improved impact resistance: 12 mm, where required by the principal.
- Ceiling: 6 mm.

14.2 CONSTRUCTION GENERALLY**Ceiling linings**

General: Install minimum 14 days after the timber roof structure is fully loaded.

14.3 PLASTERBOARD LINING**Installation**

Gypsum plasterboard: To AS/NZS 2589.

14.4 FIBRE CEMENT LINING**Installation**

General: 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.

Support spacing: To the lining manufacturer's recommendations.

Timber framed construction: Nail only or combined with adhesive.

Steel framed construction: Screw only or combined with adhesive.

- Wall framing: Conform to the following:
 - Do not fix to top and bottom plates or noggings.
 - In tiled areas: Provide an extra row of noggings immediately above wall-to-floor flashings. Fix sheet at 150 mm centres to each stud and around the perimeter of the sheet.

Ceilings: Fix using screws and/or adhesive to ceiling furring members. Do not fix sheets to the bottom chords of trusses.

Wet areas: Do not use adhesive fixing alone.

15 JOINERY**15.1 JOINERY MATERIALS AND COMPONENTS****Joinery timber**

Hardwood for trim: To AS 2796.1.

Hardwood for furniture: To AS 2796.3.

Seasoned cypress pine: To AS 1810.

Softwood for trim: To AS 4785.1.

Softwood for furniture: To AS 4785.3.

Finished sizes of milled timbers: 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

Interior use generally: To AS/NZS 2270.

Interior use, exposed to moisture: To AS/NZS 2271.

Wet processed fibreboard (including hardboard)

Standard: To AS/NZS 1859.4.

Particleboard

Standard: To AS/NZS 1859.1.

Dry processed fibreboard (including medium density fibreboard)

Standard: To AS/NZS 1859.2.

Decorative overlaid wood panels

Standard: To AS/NZS 1859.3.

Certification

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

High-pressure decorative laminate (HPDL) sheets

Standard: To AS/NZS 2924.1.

Minimum thickness: Conform to the following:

- For horizontal surfaces fixed to a continuous substrate: 1.2 mm.
- For vertical surfaces fixed to a continuous substrate: 0.8 mm.

- For post formed laminate fixed to a continuous substrate: 0.8 mm.
- For vertical surfaces fixed intermittently (e.g. to studs): 3.0 mm.
- For edge strips: 0.4 mm.

High-pressure decorative laminate sheet application table

Class to AS/NZS 2924.1	Application
HGS or HGP	Kitchen work-tops
VGS or VGP	Kitchen front panels
VLS	Other vertical locations

15.2 KITCHEN ASSEMBLIES

Standard

General: To AS/NZS 4386.1.

15.3 WARDROBE, CUPBOARD AND DRAWER UNITS

Plinths, carcasses, drawer fronts, shelves and doors

Material: Select from the following:

- Overlaid high moisture resistant particleboard.
- Overlaid high moisture resistant medium density fibreboard.

Thickness: 16 mm.

Wardrobe doors and frames: Provide aluminium framed, anodised, powder coated, sliding or hinged.

Wardrobe door panels: Provide mirrors, paint, melamine surfaced, vinyl or stain clear.

Adjustable shelves: Support on proprietary pins in holes bored at equal centres vertically.

- Spacing: 32 mm.

Fasteners: Conceal with finish.

Drawer fronts: Rout for drawer bottoms.

Drawer backs and sides:

- Material: PVC film wrapped particleboard.
- Thickness: 12 mm.
- Installation: 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:

- Material: PVC film laminated hardboard.
- Thickness: 3 mm.

Drawer and door hardware

Hinge types: Concealed metal hinges with the following features:

- Adjustable for height, side and depth location of door.
- Self-closing action.
- Hold-open function.
- Nickel plated.

Slides: Metal runners and plastic rollers with the following features:

- 30 kg loading capacity.
- Closure retention.
- White thermoset powder coating or nickel plated.

15.4 WORKING SURFACES

Laminated benchtops

Material: High moisture resistant particleboard or medium density fibreboard.

Finish: High pressure decorative laminate sheet.

Exposed edges: Extend laminate over shaped nosing, finishing more than 50 mm back on underside. Splay outside corners at 45°.

Minimum thickness: 32 mm.

Balance underside: Extend laminate to the undersides of benchtops if subject to excessive moisture from equipment such as dishwashers.

15.5 TIMBER STAIRS AND BALUSTRADING

Configuration and installation

Requirement: Allow for timber stairs, balustrading, nosings and mouldings (including at landings) to the following:

- Stairs: BCA 3.9.1.
- Barriers and handrails: BCA 3.9.2.

15.6 TRIM

General

Requirement: Provide timber or medium density fibreboard trim, such as beads, skirtings, architraves, mouldings and stops to make neat junctions between components, finishes and adjacent surfaces.

Proprietary items: Provide complete with installation accessories.

Fixing

To masonry walls: Wall plugs at 600 mm centres maximum.

To stud walls: Nail to plate or framing at 600 mm centres maximum.

16 MISCELLANEOUS FIXTURES AND APPLIANCES

16.1 EXTERNAL FIXTURES

Clothes drying facilities

Single dwellings: Provide individual clothesline for each dwelling.

- Type: Height adjustable fold down rotary clothes hoist.

Grouped and multiple dwellings: Provide a wall or post mounted fold down framed clothesline or wall mounted extendable clothesline to private external areas.

Letterboxes

Requirement: Provide letterboxes only where postal deliveries are made by Australia Post.

Generally: Provide one numbered and lockable letterbox for each dwelling unit in conformance with Australia Post requirements.

Grouped and multiple dwellings: Provide a bank or banks of letterboxes located in conformance with the requirements of Australia Post.

16.2 APPLIANCES

Cooking appliances

Oven: Stainless steel, fan-forced, under bench or wall oven, as documented on drawings.

- Dimension: 600 mm wide.

Cooktop: Provide one of the following:

- Gas cooktop: Where reticulated gas is available, provide minimum 4 burners, stainless steel, gas cooktop.
- Electric cooktop: Where reticulated gas is not available, provide minimum 4 zone, ceramic glass, electric cooktop.

Rangehoods: Provide fixed rangehood, flued to the outside, and with removable filters.

- GROH projects: Stainless steel 900 mm wide with dual fan.

Exhaust fan

Kitchen and bathroom: 200 mm diameter.

Rangehood and exhaust fans

Requirement: Provide as follows:

- Habitable rooms: Fit with self-closing damper or filter to BCA 3.12.3.4.
- Exhaust fans: Operated by a separate wall switch.
- Ducting to the outside as follows:
 - . Northern areas: Side exhaust with PVC-U cover painted to match exterior colour scheme. Do not penetrate the roof.
 - . Southern areas: Steel ducting projecting through the roof. Provide roof cowl to pipe as documented.

Installation: To the manufacturer's recommendations.

17 WINDOW COVERINGS

17.1 MATERIALS

Fire hazard properties

Fire hazard indices for all materials: Conform to the following tested to AS/NZS 1530.3:

- Spread-of-Flame Index: ≤ 9 .
- Smoke-Developed Index: ≤ 8 if Spread-of-Flame Index > 5 .

Fabrics

Uncoated woven and knitted fabrics: To AS 2663.1.

Coated woven and knitted fabrics: To AS 2663.2.

- Performance classification (minimum): 2.

Vertical blind fabrics: To AS 2663.3.

17.2 COVERING TYPES

Vertical blinds

Requirement: Provide chainless weighted vertical blinds to all windows except in wet areas.

Type: 5 inch slats (127 mm), sunblock grade with fire retardant.

Warranty: Submit warranty for materials and mechanical components.

17.3 INSTALLATION

General

Safety: Install child safety devices on all control cords and chains in conformance with the *Competition and Consumer (Corded Internal Window Coverings) Safety Standard*.

18 RENDERING AND PLASTERING

18.1 MATERIALS AND COMPONENTS

Gypsum plaster

General: Provide a proprietary product containing calcium sulfate hemihydrate with additives to modify setting.

Laths

General: Provide a proprietary product for use with plaster.

Internal: Expanded metal to AS 1397 coating class Z350, minimum.

External: Stainless steel or PVC-U.

Beads

General: Provide a proprietary product for use with plaster.

Internal: Metallic-coated sheet AZ 150, minimum.

External: Stainless steel or PVC-U.

Mixes

General: Select a mix proportion to suit the conditions of application.

Measurement: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

Plaster mixing: Machine mix for 3 to 6 minutes.

Strength of successive coats: Make sure successive coats are no richer in binder than the coat to which they are applied.

Mix proportion table – Gypsum finish coat, by volume

Mix type	Substrate	Upper and lower limits of proportions by volume				
		Gypsum	Cement	Lime putty	Sand	
Gypsum finish coats	GPF	Cement render base coats	1 1	- -	1.5 2	- -

Water

General: Clean and free from any deleterious matter.

18.2 APPLICATION

Tolerances

General: Finish plane surfaces within a tolerance of 6 mm in 2400 mm, determined using a 2400 mm straightedge placed anywhere in any direction. Finish corners, angles, edges and curved surfaces within equivalent tolerances.

19 CEMENTITIOUS TOPPING**19.1 MATERIALS****Admixtures**

Standard: To AS 1478.1.

Aggregates

Coarse aggregate: Nominal single size less than or equal to 1/3 topping thickness.

Fine aggregate: Fine, sharp, well-graded sand with a low clay content and free from efflorescing salts.

Bonding products

General: Provide proprietary products manufactured for bonding cement-based toppings to concrete substrates.

Cement

Standard: To AS 3972.

- Type: GP.

Water

General: Clean and free from any deleterious matter.

20 WATERPROOFING - WET AREAS**20.1 STANDARDS****Waterproofing wet areas**

Standard: To AS 3740.

NCC compliance: To BCA 3.8.1.

20.2 MEMBRANES**Standards Membranes**

Standard: To AS/NZS 4858.

Membrane systems

Requirement: Provide a proprietary membrane system suitable for the intended internal area waterproofing.

Shower tray

General: Purpose-made jointless shower tray, with wall upstands at least 50 mm higher than the hob upstands. Set hob masonry on the inside of the tray upstands.

Sealants

Requirement: Waterproof, flexible, mould-resistant and compatible with host materials.

20.3 COMPLETION**Warranty**

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

- Form: Against failure of materials and execution under normal environment and use conditions.

- Period: As offered by the supplier.

21 CERAMIC TILING**21.1 STANDARDS****Tiling**

General: Comply with the recommendations of AS 3958.1.

Slip resistance

Classification: To AS 4586.

21.2 TILES AND ACCESSORIES**Tiles**

Standard: To AS ISO 13006.

Coves, nosings and skirtings: Provide matching stop-end and internal and external angle tiles moulded for that purpose.

Exposed edges: Purpose-made border tiles with the exposed edge (whether round, square or cushion) glazed to match the tile face. If such tiles are not available, mitre tiles on external corners.

Accessories

General: If available, provide tile accessories such as round edge ceramic tiles, cove tiles, step treads and nosings to stairs, landings, and thresholds, skirtings, sills, copings and bath vents, which match the surrounding tiles, composition, colour and finish.

21.3 MATERIALS**Adhesives**

Standard: To AS ISO 13007.1.

PVA (polyvinyl acetate)-based adhesives: Do not use in wet areas or externally.

Mortar materials

Cement type to AS 3972: GP.

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

21.4 SEALANT JOINTS**General**

Cupboards and fixtures: Seal gap between wall surface and top of cupboards of sanitary fixtures with silicone sealant. Make sure fixture is watertight before commencing wall tiling.

- Interfaces: Use a colour matched flexible filler in lieu of grout at cabinet/tile interfaces and bath/tile interfaces.

22 RESILIENT FINISHES**22.1 STANDARDS****General**

Installation: To AS 1884.

22.2 PREPARATION**Substrates**

General: To AS 1884 Section 3.

22.3 MATERIALS**Luxury vinyl tiles (LVT)**

Type: Loose laid wood design vinyl planks.

Total thickness: Minimum 5 mm.

Wear layer thickness: Minimum 0.55 mm.

Surface treatment: PUR treatment.

22.4 SHEET AND TILE INSTALLATION**Sheet set-out**

General: Set out sheets to give the minimum number of joints. Position joints away from areas of

high stress. Run sheet joints parallel with the long sides of floor areas, vertically on non-horizontal surfaces.

Tile set-out

General: Set out tiles from centre of room. If possible cut tiles at margins only, to give a cut dimension of at least 100 mm x full tile width. Match edges and align patterns. Arrange the tiles so that any variation in appearance is minimised.

Joints

Non-welded: Butt edges together to form tight neat joints showing no visible open seams.

Chemical welding: Apply seaming compound 100 mm wide to the substrate centrally under the seam. Roll the seam until the compound is forced up into the joint. Clean off flush using a damp cloth.

Luxury vinyl tiles (LVT)

Installation: Install using pressure sensitive adhesive to the manufacturer’s recommendations. Make sure tiles are fully tacked up in a 1000 mm grid in both directions and the perimeter, or reinforced with double sided acrylic reinforced tape.

22.5 COMPLETION

Reinstatement

Extent: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Cleaning

General: Clean the finished surface. Buff and polish. Before the date for practical completion, mop and leave the finished surface clean and undamaged on completion.

23 CARPETS

23.1 MATERIALS

Carpet

Minimum class: Residential Medium use under the Australian Carpet Classification Scheme.

Total VOC limit:

- Generally: 0.5 mg/m²/h.
- Compliance: To the Environmental Classification Scheme operated by the Carpet Institute of Australia Limited (CIAL).

23.2 LAYING CARPET

Standard

General: To AS/NZS 2455.1.

Setting out

General: Lay the carpet in continuous lengths without cross joins in the body of the area. If unavoidable cross joins at doorways, create the joins directly below the closed doors.

Joints in underlay: Make sure 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.

24 ENGINEERED PANEL FLOORS

24.1 MATERIALS

Floating floor underlay

General: Proprietary closed cell foam sheeting, integral to the flooring system.

Acoustic underlay

General: Resilient underlay fixed with compatible adhesive.

Moisture content alignment of flooring and subfloor

Concrete subfloor: Do not start installation of the flooring until the moisture content of the concrete subfloor conforms to AS 1884 clause 3.1.

Timber, plywood and particleboard subfloors: Do not start installation of the flooring until the moisture content of the subfloor conforms to the following:

- Dry in-service environment (air conditioned buildings): 8 to 10%.
- Normal in-service environment (intermittently heated buildings): To 12.5%.
- Moist in-service environment (unheated buildings): 12.5 to 15%.

25 TIMBER FLOORING

25.1 STRIP FLOORING

Recycled timber

Standard: To FWPA PN06.1039.

- Grading: To Section 5.1.

Grading table

Product	Standard	Grade
Hardwood	AS 2796.2	High Feature Grade if available for the species selected, otherwise Select Grade
Seasoned cypress pine	AS 1810	1
Softwood - pinus ssp	AS 4785.2	Appearance
Softwood - other	AS 4785.2	Select

26 FLOOR SANDING AND FINISHING

26.1 STANDARDS

Floor sanding and finishing

General: To AS 4786.2.

26.2 FINISH

Filler

General: Non-oil based and compatible with the coating system.

Coating system

Quality: Provide premium quality lines.

Combinations:

- Do not combine clear finishes from different manufacturers in a coating system.

- Provide only the combinations of filler, stain and sealer recommended by the manufacturer of the top coats.

Delivery: Deliver all products to the site in the manufacturer's labelled and unopened containers.

26.3 COATING SYSTEM

General

Finish: Provide coating system as follows:

- Consistent film thickness.
- Consistent level of gloss.

Application

General: Apply the coating system in conformance with the manufacturer's recommendations. Maintain a wet edge throughout the whole area.

Timber floor coating system

Coating: If edge bonding of strip flooring is known to occur, apply a sealer compatible with the final coat.

Final coats: 2 coats of water-based polyurethane applied with a continuous wet edge and to the manufacturer's recommendations.

26.4 COMPLETION

Cleaning

General: Vacuum clean the area and protect with fabric drop sheets. Do not use plastic sheeting.

27 PAINTING

27.1 STANDARDS

Painting

General: To the recommendations of AS/NZS 2311.

27.2 PAINTING MATERIALS

Low VOC emitting paints

VOC limits for low odour/low environmental impact paint types:

- Primers and undercoats: < 65 g/litre.
- Low gloss white or light coloured latex paints for wall areas: < 16 g/litre.
- Coloured low gloss latex paints: < 16 g/litre.
- Gloss latex paints for timber doors and trims: < 75 g/litre.

27.3 PREPARATION

Exposed steelwork

Requirement: Before painting, including before applying primers and sealers, clean exposed steel surfaces to the recommendations of AS/NZS 2312.1 Section 4.

27.4 PAINTING

Exposed steelwork

Paint application: To the recommendations of AS/NZS 2312.1 Section 5 and the paint manufacturer.

Paint coating systems: To the recommendations of AS/NZS 2312.1 Section 6.

Paint application

Standard: To AS/NZS 2311 Section 6.

Timing: 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.

27.5 PAINT SYSTEMS

Paint system description

Generally: The paint system is referred to by its final coat.

Primers and undercoats: Provide primers and undercoats recommended by the manufacturer of the selected final coat as suitable for the substrate and the final coat.

Number of coats: Unless specified as one or two coat systems, each paint system consists of at least 3 coats.

Selection: Provide paint systems that conforms to the **Paint final coat table**.

Paint systems for interior surfaces: Provide paint system conforming to AS/NZS 2311 Tables 4.2 and 5.1, the manufacturer's recommendations and the following:

- Ceilings: Two coats of white paint.
- Walls: Two coats of low-gloss latex paint.
- Wet areas: Two coats of semi-gloss (anti-mould) latex paint.

Paint final coat table

Final coat	Applicable Australian Standard
Interior	
Flat latex	AS 3730.1
Floor varnish - moisture cured	AS 3730.27
Floor varnish - two pack isocyanate cured	AS 3730.27
Low gloss latex	AS 3730.3
Semi-gloss latex	AS 3730.2
Gloss latex	AS 3730.12
Exterior	
Full gloss solvent-borne	AS 3730.6
Flat latex	AS 3730.7
Low gloss latex	AS 3730.8
Gloss latex	AS 3730.10
Stain, lightly pigmented	AS 3730.28
Latex stain, opaque	AS 3730.16
Semi-gloss latex	AS 3730.9
Paving	
Paving paint, semi-gloss	AS 3730.29
Paving paint, gloss	AS 3730.29

28 MECHANICAL SERVICES

28.1 STANDARDS

General

Mechanical ventilation: To AS/NZS 1668.1 and AS 1668.2, as required by the BCA.

Refrigeration systems: To AS/NZS 5149.1, AS/NZS 5149.2, AS/NZS 5149.3 and AS/NZS 5149.4.

Mechanical systems: Conform to the recommendations of SAA HB 276.

28.2 AIR CONDITIONING SYSTEMS

General

Requirement: Where air conditioning systems are required, conform to the following:

- Unit type: All ceiling and wall-mounted air conditioning to be inverter type units.
- Air conditioning equipment: Install as documented on contract drawings and to be capable of meeting the documented performance standards.

Performance: Air conditioning equipment to be checked by the contractor to make sure performance criteria for all equipment components can meet the requirements of the manufacturer's specifications.

Standards

Ducted air conditioners: To AS/NZS 3823.1.2.

Non-ducted air conditioners: To AS/NZS 3823.1.1.

Concrete work

Requirement: Provide concrete plinths to suit the equipment.

Plumbing

Requirement: Provide external floor wastes and drain points to suit the equipment and the Western Australian Housing's *Part B: Functional brief – Prefabricated housing*.

Equipment

Performance: Supply equipment as follows:

- Made by a manufacturer with a demonstrated ability to provide spare parts and service promptly to the site.
- Operational within the documented range of outdoor design conditions under the calculated loads without excessive head pressure or icing.
- Labelled to AS/NZS 3823.2.

Reverse cycle units: Provide effective outdoor coil defrost facility that prevents room temperature dropping more than 2°C during defrost.

Cabinet: Aluminium, powder coated steel or moulded ABS plastic with metallic-coated steel or stainless steel fasteners. Insulate and vapour seal cabinet and drain trays to prevent external condensation under all operating conditions.

Drain trays: Aluminium, stainless steel or plastic to collect all moisture inside indoor and outdoor units.

Filters: Washable panel type with at least 85% of arrestance when tested to AS 1324.2, Test Dust No.4.

Coils: Copper tube with aluminium plate fins.

Wall and ceiling mounted split system units – for GROH projects

Requirement: Provide units conforming to the following:

- Refrigerant: R407C or R410A.
- Factory assembled, pre-piped, pre-wired and tested ready for installation on site.

- Providing not less than the required capacities.
- AS/NZS 3823.1.1.

Cabinets: Aluminium, powder coated steel or moulded ABS plastic with metallic-coated steel or stainless steel fasteners. Insulate and vapour seal cabinet and drain trays to prevent external condensation under all operating conditions. Provide drain holes to prevent moisture accumulation within the unit.

Discharge air grilles: Plastic grilles and side panels or moulded PVC-U/fibreglass/plastic fascia with multi-directional grilles.

Coils: Copper tube with aluminium plate fins.

Outdoor coils within 5 km of marine environment: Provide proprietary coil corrosion protection coating.

Reverse cycle units: Provide effective outdoor coil defrost facility that prevents room temperature dropping more than 2°C during defrost.

Refrigeration system: Provide compressor overload or over current relays, high pressure safety switches, discharge gas thermostat, crankcase heater and built-in thermostat.

Condenser fan: Plastic or aluminium, propeller or axial flow, dynamically balanced, with a direct drive IP55 rated electric motor.

Service access panels: Provide easily accessed panels for servicing of all electrical components, compressor, outdoor fans and condenser coil.

Electrical – for GROH projects

Power supply: Provide power supply, complete with individual circuit breakers for each unit, terminating in coiled cables adjacent to each indoor unit. Make sure there is sufficient power for testing and commissioning of equipment.

Conduits and cabling: Provide cabling in conduits or cable ducts between refrigeration and associated equipment, including thermostats and control switches.

Supply source: All electrical equipment, wiring and fittings to be from the same manufacture throughout the installation.

Electromagnetic compatibility: Prevent electromagnetic interference. Conform to the AS/NZS 61000 series.

Controls

General: Provide the following functions:

- Temperature control for each zone located to accurately sense zone temperature.
- Fan speed selection for multi and variable speed fans.
- Day/night zone changeover if scheduled.
- Time switch for each system with ≥ 6 temperature programs per day, separate programs for each day of the week, manual set point over ride and Vacation temperature set back.

Warranty

Requirement: Provide warranty for replacement of equipment and components, including electrical items, for a period of 12 months after practical completion.

28.3 DUCTWORK

Standard

Flexible duct: To AS 4254.1.

Rigid ductwork: To AS 4254.2.

Flexible duct

Material: Aluminised fabric clamped on formed metal helix with insulation blanket wrapped around duct and covered with an outer vapour barrier.

Installation: Install flexible duct as straight as possible with minimum number of bends. Maximise bend radius but not less than required by AS 4254.1 clause 2.5.3(i). Check for and rectify any crushed flexible duct.

Support: To AS 4254.1. Limit sag to less than 40 mm/m.

Duct insulation

General: Insulate ducts to reduce heat gain and prevent condensation. Provide continuous vapour barrier around ducts carrying conditioned air. Insulate flexible connections on ducts carrying air below ambient temperature.

Cleaning

General: Clean interior of ductwork progressively during installation.

28.4 REFRIGERATION PIPEWORK

General

Pipes: To AS/NZS 1571.

Deemed to comply: Split system manufacturer's standard pre-charged piping kit standard.

Pipe insulation

General: Insulate all refrigerant and drain piping that may sweat with chemically blown closed cell nitrile rubber in tubular form to ASTM C534. Protect insulation from sunlight and mechanical damage.

Insulation thickness: 13 mm for pipes less than DN 20, 19 mm otherwise.

Condensate drains

Requirement: Provide trapped, at least DN 20 condensate drains to AS/NZS 3666.1 from each indoor coil and safety tray. Provide drains from each reverse cycle outdoor coil unless casing freely drains to a roof or other location where condensate will not cause damage or pond.

28.5 UNIT INSTALLATION

General

Outdoor equipment: Provide clearance around units for condenser air flow and maintenance access. Make sure discharge air does not short-circuit to condenser intake.

Equipment at ground level: Mount on 100 mm level concrete plinth or equivalent impervious material.

Duct connections: Provide internal or external flexible duct connections at indoor unit.

GROH projects

Outdoor units: Provide 50 mm hot-dip galvanized steel support frames, securely fixed to the wall.

Drains: Provide insulated and trapped condensate drains to AS/NZS 3666.1, at least DN 20 Class 9 PVC-U, from each indoor coil and safety tray and from each reverse cycle outdoor coil unless casing

freely drains to a roof or other location where condensate will not cause damage or pond.

Vibration isolation

Suspended units: Provide at least 4 metal spring or rubber-in-shear isolation mountings with at least 25 mm static deflection and 98% isolation efficiency.

Floor mounted units: Provide neoprene waffle pads. Bolt in place.

Safety trays

General: If leaks or condensation from equipment could cause nuisance or damage to the building or its contents, provide a galvanized steel safety tray under the equipment.

28.6 COMPLETION

Commissioning

General: Commission the systems to manufacturer's recommendations using instruments calibrated within the past 12 months.

Checklist: Submit signed commissioning checklist before the date for practical completion.

Cleaning

General: Clean filters, outdoor coils, grilles and diffusers before the date for practical completion.

Operating and maintenance instructions

Requirement: Provide written operating and maintenance instructions containing the following:

- Contractor's contact details for service calls.
- Manufacturers' maintenance and operation literature.
- Manufacturers' warranty certificates if the manufacturers' warranty period is greater than the defects liability period.
- Description of day to day operation.
- Setting of time switches.
- Schedule of recommended maintenance.

Record drawing: Provide a drawing of the system as installed.

28.7 MAINTENANCE

General

Maintenance period: The greater of 12 months from the date of completion of commissioning of the systems and the duration of the Defects Liability Period.

Corrective maintenance: Attend site and undertake corrective maintenance within 24 hours of receipt of verbal or written advice.

Preventative maintenance: Provide preventative maintenance recommended by the equipment manufacturer. Provide all materials including consumable items and refrigerant.

Summer preventative maintenance visit: Provide at least one preventative maintenance visit during the months of December, January or February. Carry out preventative maintenance and provide electronic data logger or thermohydrograph to record temperatures at one location in each zone over a period of 7 days. Submit results. If the temperature recorded is outside the specified tolerance identify and correct the cause and repeat the test.

Maintenance reports: Submit a signed maintenance report setting out the work done and any measured values after each visit.

29 HYDRAULIC SERVICES

29.1 STANDARDS

General

Plumbing and drainage: To the AS/NZS 3500 series.

Authorised products: Listed in the WaterMark Product Database, unless otherwise required by the network utility operator.

29.2 SUBMISSIONS

Records

Certificate of compliance: Within 5 working days of completing the plumbing works, including gas, lodge a Certificate of compliance with the Department of Commerce or Plumbers Licensing Board. Include all required documentation.

29.3 FIXTURES

Sanitary fixtures

Toilet suites: Minimum 4 stars WELS rated dual flush.

Shower heads: Minimum 3 stars WELS rated.

Bath: 1500 mm nominal length with soap holder, waste outlet, bar grate and plug.

Basin: White, vitreous china basin with overflow.

- Properties: Size, configuration and tap hole configuration, as documented on drawings.

Towel rail and robe hooks: Chrome plated brass or stainless steel rail, as documented on drawings.

Toilet roll holder: Chrome plated brass or stainless steel single roll holder, as documented on drawings.

Soap dish: Chrome plated brass or stainless steel dish, as documented on drawings.

Laundry tub: 42 litres tub and prefinished steel cabinet with side entry for concealed washing machine taps

- Tub material: Type 304 stainless steel.

Internal tap fittings

Rating: Minimum 4 stars WELS rated.

Type: All fittings other than bath outlets and showers to be chrome plated lever handled mixer tap (hot and cold) with 150 mm swivel arm with aerator outlet.

Kitchen fixtures

Sink type: One and a half or double bowl with drainer on each side and single tap hole, as documented on drawings.

Sink size: As documented on drawings.

29.4 WATER HEATERS

Heaters installed in Northern areas

Installations with hard water source: Provide heaters with bobbin elements to the manufacturer's recommendations.

29.5 INSTALLATION

Connections to Network Utility Operator mains

General: Excavate to locate and expose the connection points and connect to the Network Utility Operator mains. On completion, backfill and compact the excavation and reinstate surfaces and elements which have been disturbed such as roads, pavements, kerbs, footpaths and nature strips.

Water meters

Sub-meters: Provide Water Corporation approved meters for multi-unit residential developments of three or more units including:

- Separate meters for individual dwellings.
- Common meter for common landscaped areas.

Installation: In conformance with the *Water Corporations Application and Agreement Form and Water Corporation 20 mm and 25 mm meter – Requirements/layout*. (See www.watercorporation.com.au)

Piping

Requirement: Install piping in straight lines and to uniform grades. Arrange and support the piping so that it remains free from vibration and water hammer, while permitting thermal movement. Keep the number of joints to a minimum. Prevent direct contact between incompatible metals.

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

Concealment: If practicable, conceal piping and fittings requiring maintenance or servicing so that they are accessible within non-habitable enclosed spaces such as roof spaces, subfloor spaces and ducts. Keep pipelines in subfloor spaces at least 150 mm above ground and make sure access can be provided throughout for inspection. Provide at least 25 mm clearance between adjacent pipelines (measured from the piping insulation where applicable).

Building penetrations: If piping or conduit penetrates building elements, provide metal or PVC-U sleeves formed from oversized pipe sections.

Cover plates: If exposed piping emerges from wall, floor or ceiling finishes, provide cover plates of non-ferrous metal, finished to match the piping, or of stainless steel.

Pipe support materials: The same as the piping, or galvanized or non-ferrous metals, with bonded PVC-U or glass fibre woven tape sleeves where needed to separate dissimilar metals.

29.6 FINISHES

General

Requirement: Finish exposed piping, including fittings and supports as follows:

- In internal locations such as toilet and kitchen areas: Chrome plate copper piping to AS 1192 service condition 2, bright.
- External above ground piping, steel piping, exposed iron fittings: Paint.
- In concealed but accessible spaces (including cupboards and non-habitable enclosed spaces): Leave copper and plastic unpainted except for

required identification marking. Prime steel piping and iron fittings.

- Valves: Finish valves to match connected piping.

29.7 COLD AND HEATED WATER

Standards

General: To AS/NZS 3500.1 and AS/NZS 3500.4.

Copper pipe: To AS 4809.

Piping

Pipe materials:

- Between water main and the building: Copper.
- Other locations: To the PCA.

Pipe joints:

- Copper pipes: Silver brazed capillary joints or screwed brass unions silver brazed to pipe.
- Other materials: Proprietary crimped fittings supplied by the pipe manufacturer and crimped, using tools and methods recommended by the manufacturer.

Backflow prevention

Standard: To AS/NZS 3500.1 and the requirements of the network utility operator.

Tap positions

Requirement: Locate hot tap to the left of, or above, the cold water tap.

Fittings and accessories

General: Provide the accessories and fittings necessary for the proper functioning of the plumbing systems, including taps, valves, outlets, pressure and temperature control devices, strainers, gauges and pumps.

Water heaters

Location: Locate water heaters in an easily accessible area where they can be maintained or replaced without damaging adjacent structures, fixtures or finishes.

5 star natural gas hot water units: Connect hot water service to points as required.

- Hot water system: Design and install to AS/NZS 3500.4.

Types:

- Electric water heaters: To AS/NZS 4692.1.
 - . Energy performance: To AS/NZS 4692.2.
- Gas hot water heaters: To AS/NZS 5263.1.2. If a flue damper is available for the water heater supplied, provide one.
 - . Energy performance: To AS/NZS 4552.2.
- Solar water heaters: To AS/NZS 2712.
- Heat pump water heaters: To AS/NZS 2712.

Tariff: Install so that the heating system qualifies for the tariff concession or subsidy offered by the statutory authority.

Isolating valves: Provide isolation valves to water heaters.

Labelling for GROH projects: Engrave 'GOVERNMENT REGIONAL OFFICERS' HOUSING' in 12 mm high lettering, at the top right hand side of the rear panel.

Heated water temperature

Standard: To AS/NZS 3500.4.

Maximum temperature at ablution outlets: 50°C.

Maximum recommended temperature at kitchen sinks and laundry tubs: 60°C.

Solar and heat pump systems

General: Provide a proprietary automatic water heater comprising solar collector and storage container, with or without supplementary heating unit and including connections, controls and necessary fittings.

Standard: To AS/NZS 2712.

Solar and heat pump systems for GROH projects

Solar water heater booster switch, electrical booster element: Single phase with thermostatic and manual control, one shot booster switch as recommended by the water heater manufacturer.

- Switch location: Adjacent to the load centre. Provide flush plate permanently marked 'WATER HEATER'.

Photovoltaic panels in Northern areas

Roof mounted collectors: Install using cyclone mounts or frame to the manufacturer's recommendations.

Photovoltaic panel mounting frame: Galvanized steel frame and fixings able to withstand wind classification as defined in AS/NZS 4505 appropriate to the project site.

Collector panel stone guards: Provide powder coat finished galvanized steel framed welded mesh (stone guard) enclosure, to all roof mounted collector panels, to the solar heater manufacturer's recommendations. Colour to match roof finish.

Cleaning

General: On completion, flush the pipelines using water and leave pipelines clean.

29.8 STORMWATER

Standards

General: To AS/NZS 3500.3.

Cleaning

General: During construction, use temporary covers to openings and keep the system free of debris. On completion, clean and flush the system.

Pipe laying

General: Lay pipelines with the spigot ends in the direction of flow.

Downpipe connections

General: Turn up drain branch pipelines to finish 50 mm above finished ground or pavement level.

Subsoil drains

Connection: Connect subsoil drains to the stormwater drainage system.

Trench width: Minimum 450 mm.

Subsoil drains: Provide proprietary perforated plastic pipe.

Filter fabric: Provide a polymeric fabric formed from a plastic yarn containing stabilisers or inhibitors to make the filaments resistant to deterioration due to ultraviolet light.

Filter sock: Provide a polyester permeable sock capable of retaining particles of 0.25 mm size. Securely fit or join the sock at each joint.

Pits

Cover levels: Locate the top of covers or gratings, including frames as follows:

- In paved areas: Flush with the paving surface.
- In landscaped areas: 25 mm above finished surface.
- Gratings taking surface water runoff: Set to receive the runoff without ponding.

29.9 WASTEWATER

Standards

General: To AS/NZS 3500.2.

Waterless composting toilets: To AS/NZS 1546.2.

On-site domestic wastewater treatment units: To AS/NZS 1546.3.

Cleaning

During construction: Use temporary covers to openings and keep the system free of debris.

On completion: Clean and flush the system.

Septic tanks

Standard: To AS/NZS 1546.1.

Effluent disposal: To AS 1547.

Vent pipes

Staying to roof: If fixings for stays penetrate the roof covering, seal the penetrations and make watertight.

Terminations: Provide bird-proof vent cowls made of the same material and colour as the vent pipe.

29.10 SEPTIC TANKS AND INTERCEPTOR TANKS

Septic tanks

Requirement: Provide the design and installation of septic tank and associated fittings to AS/NZS 1546.1 and the *Code of Practice for Product Approval of Onsite Wastewater Systems (Department of Health) 2013 (WA)*.

Installation of apparatus for sewage treatment: To the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974.

Compliance and approval: To the Health Department and local government authority's requirements.

Leach drains

Length and type: To the Department of Health, *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974 (WA)* and local government authority's requirements.

Installation: Construct with brickwork, concrete segments, or lightweight polypropylene modular tank system (for underground water storage).

29.11 STAND PIPES

General

Requirement: Provide two external stand pipes (one at front and one at rear) to each dwelling fixed against the building, complete with 12 mm brass hose cocks.

Hose tap connection: Provide threaded connection (not welded) to cold water service.

- Fix hose tap to wall 600 mm above the finished ground level with backflow prevention devices to AS/NZS 3500.1.

29.12 RAINWATER TANKS

Standards

Metal tanks and rainwater goods: To AS/NZS 2179.1.

Design and installation: To the recommendations of SAA HB 230.

Polyethylene tanks: To AS/NZS 4766.

Coated steel tanks: Metallic-coated steel with polymer film to AS 2070 on the inside and prepainted on the outside.

Bladder tanks: Proprietary plastic bladder type constructed from polymer conforming to AS 2070, resistant to puncture and microbial attack.

Rainwater tanks

Accessories: Provide accessories needed to complete the installation and constructed from corrosion resistant material compatible with the tank material. Include 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, childproof access opening.
- Easily cleanable filter before the entry to the tank with maximum 1 mm mesh size.

First flush diverter

General: Provide a first flush diverter. Arrange to drain completely.

Sizing: Select for at least 20 L/100 m² rainwater catchment area.

Construction: Corrosion resistant and compatible with the rainwater plumbing and tank.

Discharge: 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.

Installation

Requirement: 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 300 mm 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 10 mm, 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 50 mm thick.

Coated steel tanks: Fully support the tank on a self-draining timber or concrete base. Prevent contact with dissimilar metals. Arrange so that no part of the tank is below ground level and so that adjacent ground surfaces fall away from the tank. Do not use sharp objects inside the tank. Remove swarf with a magnet if drilling or cutting.

Bladder tanks: Locate on level base free from sharp objects. Install with manufacturer's supporting frame. Provide over-pressurising relief and air vent.

Cleaning: Flush the rainwater system. Wash and flush tanks to remove manufacturing and other contaminants.

29.13 GREYWATER SYSTEMS

Standards

Design and installation: To AS 1546.4.

Greywater diversion devices

Standard: To ATS 5200.460.

WaterMark: Required.

Access: Locate to facilitate access for inspection and maintenance.

Tanks

General: Provide an appropriately sized surge tanks.

Overflow: Pipe to sewer.

Arrangement: Prevent the entry of sunlight to the interior of the tank.

Backflow prevention

Standard: To AS/NZS 3500.1 and the requirements of the network utility operator.

29.14 GAS

Standard

Reticulated gas systems: To AS/NZS 5601.1.

Buried pipes

Warning tape: During backfilling, lay plastic warning tape 300 mm above and for the full length of buried gas pipes.

- Type: Minimum 100 mm wide, with GAS PIPE UNDER marked continuously.

Commissioning

General: On completion of installation and testing, turn on isolating and control valves and purge and charge the installation.

Gas room heater and outlet - GROH projects

Heater connection: Flexible hose connection to a gas bayonet fitting. Gas outlet location to suit reticulation and wall and ceiling vent requirements.

Convection room heater capacity: Minimum 21 MJ.

Labelling: Engrave 'GOVERNMENT REGIONAL OFFICERS' HOUSING' in 12 mm high lettering, at the top right hand side of the rear panel.

Controls: Top mounted with piezo or electronic ignition.

Gas outlets: Provide as follows:

- Type: Recessed, flush fitting, wall mounted, and chromium plated bayonet outlets.

- Gas flued heater: Where required, provide a gas point inside a No. 1 valve box, in the ground, outside the building, adjacent to the heater.

- Valve: Quarter turn valve capped to the network utility operator's requirement at the outlet for future connection.

Valve box lid: To AS/NZS 5601.1, finished flush with ground level or the top of concrete or paving.

Above ground gas points: To be 130 mm above floor level and 100 mm (centreline) to the right of flued heater.

Recessing of gas points: Install in an electrical plaster wall box with a blank plate. Blanket off, back plate and elbow fix gas supply in the recess.

Gas lines chased into walls: Vertical and within 1 m from the floor.

Bottle LP gas

Type: Provide spring-loaded safety relief valve where bottled LP gas is documented.

Installer: WA licensing board approved plumber.

Installation: To the AS/NZS 3500 series.

Location: Locate bottles as documented or as directed by the principal. Point relief valve away from building.

Cylinder storage and handling: Conform to AS/NZS 1596.

Labour and material: Supply labour and material required to complete the gas supply system, including manual changeover gas regulator and metal hood.

30 ELECTRICAL SERVICES

30.1 STANDARDS

General

Electrical installation: To AS/NZS 3000 and SAA HB 301.

Electrical cable selection: To AS/NZS 3008.1.1.

Telecommunications cabling: To AS/CA S008, AS/CA S009, AS/NZS 3080, and SA/SNZ HB 252.

30.2 POWER SUPPLY

General

Connection to network supply: To the private pole or as shown on drawings, to the *WA Electrical Regulations (WAER)*.

Power supply to be underground: 415/240 V, single-phase, 50 Hertz a.c., unless required otherwise.

Electrical services installation: Concealed.

30.3 CEILING FANS - NORTHERN AREAS

Internal ceiling sweep fans

Type: White fans with 1400 mm diameter metal blades and sealed bearings.

Mounting: Flush.

Controls: Supplied by the manufacturer with variable speed and off control.

- Mounting height: 1500 mm above finished floor level.

External ceiling sweep fans

Type: Brown or black fans with 1400 mm diameter metal blades and sealed bearings.

Design and installation: To AS/NZS 3000 clause 1.5.14.

Mounting: Flush.

Switches and socket outlets: With an International Protection (IP) Rating, to AS/NZS 3000, if installed in a location where water ingress is possible, including where exposed to cyclonic conditions.

Controls: Supplied by the manufacturer with variable speed and off control.

- Mounting height: 1500 mm above finished floor level.

30.4 PRODUCTS

Earth electrodes and earth conductors

Earthing system: A Multiple Earth Neutral (MEN) system conforming to AS/NZS 3000, and the requirements of the supply authority and the Australian Communications Authority (ACA).

Labelling: Main earth electrode, earth bar provided with an engraved label and red filled letter inscribed: MAIN EARTH – DO NOT DETACH.

Authorised products - fire detection and alarms

Equipment: Provide equipment listed in the ActivFire Register of Fire Protection Equipment.

Smoke detection

Smoke alarms: To AS 3786.

Approved smoke alarms: Photoelectric, non-removable battery (with 10 years battery life) smoke alarms. Select from the following:

- Brooks EIB166e.
- Brooks EIB650IC.

Interconnection devices: Wireless smoke alarms. Select from the following:

- Brooks EIB166e: For EIB100.
- Brooks EIB650IC: For EIB600.

30.5 INSTALLATION

Applications and compliance

General: Submit all necessary applications for electricity supply. Liaise with the electricity distributor and comply with the WAER.

Consumers mains and metering

General: Provide consumers mains and automatic meter reading in conformance with the WAER.

- Electrical mains: Provide in underground conduits from the private pole or service pillar to meter panels.

Electrical/gas meter box: Standard metal single or combined cabinet.

Meter installation: Install to the electricity distributor's requirements, including for meter type.

Earth electrodes and earth conductors

Multiple or distributed master metering: Where documented, install earth electrode in cable pit near switchboard and connect earth electrode to switchboard with earth conductor.

Earth cable pit: Provide concrete lid marked MAIN EARTH and install with lid flush with surrounding finished surface.

Earth electrodes: Install so they cannot be removed from ground by hand. Do not use star pickets or galvanized iron water pipe electrodes.

30.6 LOW VOLTAGE POWER SYSTEM

Switchboards

Standard: To AS/NZS 3439.3.

Construction: Enclosed type with a hinged lid. Provide circuit breakers and RCDs.

Location: Verify that the location selected is compliant before proceeding.

Power circuit breakers: Conform to the following:

- Provide RCD/MCB's on every circuit.
- Individually protect lighting circuits and power (GPOs) circuits by combined Residual Current Device **compliant with the Department of Communities, Housing <40 ms trip time** and Miniature Circuit Breakers (RCD/MCBs).
- Where 15A socket outlets are required, install on a separate RCD/MCB circuit.
- Where ceiling sweep fans are required, install on a separate RCD/MCB circuit.
- Label circuits with permanently marked labels.

Maximum demand and spare capacity

General: Calculate the maximum demand of the installation in accordance with AS/NZS 3000 and provide a copy of the calculations.

Spare capacity: Provide the following:

- > 10% spare capacity in mains and submains.
- > 25% spare capacity in final subcircuits.

Load balancing: Spread electrical load equally across circuits to prevent overloading and inadvertent circuit breaker operation.

Fixed and stationary appliances: Treat socket outlets supplying fixed or stationary appliances likely to cause an RCD to trip due to earth leakage currents in accordance with AS/NZS 3000. Do not connect to circuits that supply socket outlets intended for hand held or portable appliances.

Spare spaces: Provide switchboards with $\geq 25\%$ spare positions for future single phase circuit breakers.

Accessories

General: Provide accessories necessary for a complete installation including but not limited to switches, dimmers, socket outlets, and telecommunications outlets. Provide accessories located in close proximity of the same size and material and from the same manufacture.

Mounting: Flush mount accessories to the wall (or ceiling) unless noted otherwise. Provide proprietary wall boxes in masonry and wall brackets in stud walls.

Wet areas: Position accessories in locations containing baths showers or other fixed water containers to comply with the requirements of AS/NZS 3000.

Appliances

General: Provide final subcircuits and terminate at fixed appliances, hot water units, packaged air conditioning and other plant and equipment.

Isolation switch: Provide isolating switch adjacent to equipment.

Wiring

Concealed cables and conduits: Provide conduits as necessary to allow wiring replacement without structural work or the removal of cladding, lining, plaster or cement rendering.

Sequence of work: Install conduits and cables before the installation of wall and ceiling linings, and before any external landscaping works.

Installation: Do not penetrate damp-proof courses. Arrange wiring such that it does not bridge the cavity in external masonry.

Conduit sizes: Provide conduits of sufficient internal diameter and arranged so that cables are not subject to undue mechanical stress during installation.

Minimum conduit diameter: 20 mm.

Conduits for future use: Provide a non-metallic drawstring having a breaking strain >100 kg.

30.7 LIGHTING**Luminaires**

Standard: to AS/NZS 60598.1.

Luminaire type: Provide the following and/or as documented on drawings:

- Oyster light fittings: 32W, 350 mm diameter (nominal) fluorescent fittings and acrylic diffuser.
- LED recessed downlights: 15W fittings spaced at maximum 1.5 m spacing.
- Fluorescent tube fittings: Twin 18W T8 fluorescent tube, battens and clear prismatic diffuser or vandal resistant cover.

Luminaire colour rendering: Cool white.

Non-specified luminaires: Provide a bayonet cap batten holder and lamp at each lighting point location where no luminaire is required.

Minimum energy performance standards:

- General: To AS/NZS 4783.2 and AS/NZS 4782.2.
- Self-ballasted lamps: To AS/NZS 4847.2.

Lighting control systems

General: Locate grouped dimmers and control devices for future access. Provide ventilation and acoustic treatment to suit the device characteristics.

Motion sensor controls: Provide to external light fittings at the front and rear of dwelling.

30.8 TELECOMMUNICATIONS**Services and cabling**

Requirement: Conform to the Australian Government's policy document *Telecommunications infrastructure in new developments*.

Submissions: Submit required applications for telecommunications services to the telecommunications services carrier and liaise with the carrier.

Communication carrier: Liaise with the telecommunication services carrier and comply with all standards and requirements of the carrier.

Data cabling: Conform to the requirements of the NBN company.

Installations requiring telephony only: To AS/CA S009.

Small office/home office installations: Category 6, to AS/CA S009 and AS/NZS ISO/IEC 15018.

Telecommunication/telephone outlets: Provide RJ45 8 modular jacks.

- Location: Where the room in which the telephone outlet is to be installed in does not have a roof space, provide a concealed conduit from the telephone outlet wall box to the internal wall in an accessible location.

- Quantity: Provide minimum two telephone outlets per dwelling.

- Pinouts: T568A to AS/NZS 3080.

Telecommunications cables: Provide as follows:

- Type: Copper.

- Standard: To AS/CA S009 and AS/NZS ISO/IEC 15018.

- Voice cabling: Multicore CAT 6 UTP cable.

Television systems

General: Provide an analog and digital television distribution system to AS/NZS 1367 and conforming to the recommendations of Broadcasting Australia and ACMA.

System requirement: Provide the following:

- Outlet assembly to each dwelling, including antenna, cable and television outlet.
- TV outlet and co-axial: Provide to living rooms, 500 mm above the finished floor level.
- An external TV aerial.
- MATV system: For developments with group dwellings serviced by a main electrical switchboard.

Antennae: Provide and locate antennae to receive all locally available free-to-air television stations.

- Antenna system: To AS 1417.

Network systems

General: Provide a coaxial cabling system suitable for satellite or cable network operator's services.

Conduits for future cabling: ≥ 25 mm diameter with drawstrings.

NBN installation

Requirement: To the *NBN Guideline*.

New buildings: To the *NBN Guideline* clause 3.5.

Location type: Open enclosure to the *NBN Guideline* clause 4.4.3.

30.9 ELECTRONIC SECURITY**Intruder alarm system**

General: Provide intruder alarm system.

Standard: To AS/NZS 2201.1.

30.10 FIRE DETECTION AND ALARMS

Smoke detection

General: Provide smoke detectors to BCA 3.7.2. Connect smoke alarms to mains power.

Smoke alarms: Install hardwired smoke alarms to BCA 3.7.2 and the manufacturer’s recommendations.

- Where there is more than one alarm: Interconnect alarms in conformance with BCA 3.7.2.2(d).

30.11 CABLES LABELLING

Labelling

General: Provide labels including control and circuit equipment ratings, functional units, notices for operational and maintenance personnel, incoming and outgoing circuit rating, sizes and origin of supply.

Telecommunications cables: Label telecommunications cables, cross connects and outlets in accordance with the requirements of AS/NZS 3080.

Label colours

Generally: Black lettering on white background except as follows:

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

30.12 COMPLETION

Testing and certification

Electrical installations: Test to AS/NZS 3017. Provide a certificate showing test results, certifying compliance with AS/NZS 3000.

Telecommunications cabling: To AS/NZS ISO/IEC 15018. Test the cable link performance at the maximum frequency and data rate for the cable class, and the cable category. Provide a certificate showing test results and certifying compliance with AS/NZS ISO/IEC 15018.

Submission: Provide ACMA Telecommunications Cabling Advice (TCA1) form.

Television and audio systems: To AS/NZS 1367. Test the complete television and audio system. Provide a certificate showing test results and certifying compliance.

G. LANDSCAPING

1 LANDSCAPE - FENCES AND BARRIERS

1.1 REQUIREMENTS

General

Requirement: Provide fences and barrier systems to the Landscaping Plan as follows:

- Complete for their function.
- Conforming to the detail and location drawings.
- Firmly fixed in place.

1.2 TIMBER

Posts and rails

Hardwood: To AS 2082.

Softwood: To AS 2858.

Pickets and palings

Hardwood: To AS 2796.1, Section 8.

- Grade to AS 2796.2: Select.

Softwood: To AS 4785.1, Section 7.

Seasoned cypress pine: To AS 1810, Section 5.

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.

1.3 STEEL

Steel tubes

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

- Grade: C350L0.

Post and rail finish: Hot-dip galvanized.

1.4 CONCRETE

General

Standard: To AS 1379 – N20 or proprietary packaged mix.

1.5 COMPONENTS

Steel panel fencing

Steel framing: Zinc-coated or aluminium/zinc alloy coated steel to AS 1397.

Steel sheeting: Prepainted to AS/NZS 2728.

Steel posts

Finish: Galvanized.

Timber fencing sizes table

Member	Preservative treated soft wood picket (mm)	Preservative treated soft wood paling/lap and cap (mm)	Hardwood or cypress pine paling/lap and cap (mm)
Maximum height	1200	1800	1800
End/corner gate posts	90 x 90	100 x 100	125 x 125 or 100 x 100
Intermediate	90 x 90	140 x 45 or	125 x 50 or

Member	Preservative treated soft wood picket (mm)	Preservative treated soft wood paling/lap and cap (mm)	Hardwood or cypress pine paling/lap and cap (mm)
posts		100 x 75	100 x 75
Maximum post spacing	2400	2400/2700*	2700*
Rails	70 x 40	75 x 50 or 100x 38	75 x 50 or 100x 38
Picket/paling size	70 x 19	75, 100 or 150* x 15	100 or 150* x 13
Capping	-	125 x 35	100 x 50
Footing type	Earth	Earth	Earth
Footing size (diameter x depth)	200 x 600	250 x 600	250 x 600

* Three rail fences only

2 LANDSCAPE - SOFTSCAPE

2.1 INSTALLATION

Softscape and irrigation

Requirement: To **CONSTRUCTION SPECIFICATION** in the Western Australia Department of Communities, Housing *Part C: Design and construct specification – Landscaping* and requirements for GROH projects in this clause.

After site clearing - for GROH projects

Relief gullies: Provide overflow and disconnected gullies, in locations other than paved areas. Install grating at a level which allows for the placing of 100 mm thick garden soil over the existing soil level.

After site cleanup: Remove undulations and fill depressions to form even grades in areas to be covered by garden soil.

Reticulation - for GROH projects

Garden reticulation cabinet: Top hinged door and the Department of Communities, Housing E key lock.

Services requirements for cabinets: Provide the following:

- A single GPO.
- Conduit with draw wire, extending from the cabinet to the nearest garden bed. If required, run under paths.
- Isolating valve to the PCA.

3 PAVEMENT BASE AND SUBBASE

3.1 GENERAL

Subgrade evaluation

Requirement: Install subbase as required by the subgrade evaluation by a professional engineer.

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.

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

Minimum relative compaction table

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

4 CONCRETE PAVEMENT

4.1 STANDARDS

General

Specification and supply: To AS 1379.

Materials and construction: To AS 3600.

Residential pavements: To AS 3727.1.

Vapour barrier

Requirement: To AS 2870 clause 5.3.3.

4.2 PAVEMENT

Grading

General: Grade paving to even falls to drain away from buildings to drainage outlets without ponding. Minimum fall for drainage: 1:100.

Thickness

Minimum:

- Foot and bicycle traffic: 75 mm.
- Light domestic traffic occasionally up to 3 tonne gross: 100 mm.

Condenser plinths

Requirement: Where future split air conditioning systems are required for bedrooms and dining/living areas, provide 1200 x 1000 (wide) x 100 mm (thick) concrete plinths for air conditioning condensers at each isolator location.

Locations where plinths are not required: Where possible, mount condensers on the concrete verandah slab.

Plinths located in pathways: Increase pathway width to maintain the required uninterrupted pathway width.

4.3 FINISHING METHODS

Finishes

Broom finishing: Wood float and broom to an even textured transverse scored surface with steel tooled margins. On gradients steeper than 10%, roughen the surface by scoring using a stiff brush or rake.

4.4 DRIVEWAY, GARAGE OR CARPORT FLOORS

General

Compact base: To AS 1289.5.2.1.

Finish: Granolithic finish.

5 PAVING - SAND BED

5.1 STANDARDS

General

Concrete and clay pavers: To AS/NZS 4455.2.

5.2 PAVER THICKNESS

General

Requirement: Minimum thickness:

- Foot and bicycle traffic: 40 mm.
- Light domestic traffic occasionally up to 3 tonne gross: 50 mm.

5.3 MATERIALS

Sand

Bedding and joint filling: Well-graded and free of deleterious materials such as soluble salts which may cause efflorescence.

Cement

Standard: To AS 3972, type GP.

Mortar

Mix proportions (cement:sand): 1:3.

5.4 INSTALLATION

Bedding course

Preparation: Remove all loose material from the prepared base.

Geotextile: Place fabric between the base course and the bedding sand.

Bedding sand: Screed uncompacted sand over prepared base uniformly to achieve a 30 mm thick layer. Maintain sand at a uniform loose density and moisture content.

Grading

General: Grade paving to even falls to drain away from buildings to drainage outlets without ponding.

Minimum fall for drainage: 1:100.

Cutting

Cutting units: Cut paving units to maintain sharp edges and accurate joints and margins.

Laying

General: Lay paving units on the screeded sand bedding to the nominated pattern shown on the drawings.

Compaction: Compact the sand bedding after laying paving units using a vibrating plate compactor and appropriate hand methods, and continue until lipping between adjoining units is eliminated.

Joint 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.

6 PAVEMENT ANCILLARIES

6.1 CHANNELS AND KERBS

Concrete

Standard: To AS 1379.

Grade: N20.

6.2 LINEMARKING

Pavement marking paint

Standard: Conform to the following:

- Solvent-borne paint: To AS 4049.1.
- Waterborne paint: To AS 4049.3.
- High performance: To AS 4049.4.

6.3 VEHICLE BARRIERS

Log barriers

Hardwood: To AS 2082.

Softwood: To AS 2858 and AS 1720.2, Grade 5.

Timber preservative for softwood: Minimum hazard class H4 to AS 1604.1.

Size: Diameter range 125 to 150 mm for both posts and rails.

Precast concrete wheel stops

Material: Precast concrete units with pre-drilled holes located 300 mm from each end for fixing to ground surface.

Size: 2000 x 150 x 100 mm high.

H. FINISHING**1 COMPLETION OF THE WORKS****1.1 PRACTICAL COMPLETION****Final cleaning and testing**

General: Before the date for practical completion, clean throughout, including interior and exterior surfaces exposed to view. Cleaning works include the following, as appropriate:

- Vacuum carpeted and soft surfaces.
- Wash tiled floors.
- Wash windows, inside and outside.
- Clean and disinfect toilet pans, basins and sinks.
- Clean ceiling fans and light fittings.
- Clean and disinfect evaporative cooler water chamber and air conditioning air filters.
- Clean shelving and cupboards.
- Clean skirtings.
- Clean debris from the site, roofs, gutters, downpipes and drainage systems.
- Remove waste and surplus materials.

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

Operation: Make sure moving parts operate safely and smoothly.

Reinstatement

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

Adjoining property

Evaluation: At practical completion, inspect the property, originally identified as possibly adversely affected by the works, with the principal, owner and occupant of the property, recording any damage that has occurred since the pre-commencement inspection.

Pest eradication

General: Employ suitably qualified pest exterminators. At practical completion, verify that completed works are free of pest types as documented.

Removal of temporary works and plant

General: Within 10 working days after practical completion, remove temporary works, services and construction plant.

Water Corporation approved sub-meter

Inspection: Once water meter is installed, conform to the following:

- Arrange for inspection by the Water Corporation to verify compliance and acceptance of payment for takeover.
- Complete the *Water Corporation Application and Agreement Form*, selecting Option 1 (3 or more dwelling units) for water meters to each individual unit and a separate water meter for common area landscaping, and pay all application costs. These

forms can be obtained from the Water Corporation.

Verification: Submit a copy of the payment receipt for the application and registration of the meters as confirmation that sub-meters have been accepted by the Water Corporation. The fees will be reimbursed to the contractor on receipt of proof of payment.

Certificates

Certificate of occupation: Liaise with the authorities and carry out all works as required to obtain certificate.

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

Construction records and handover

Handover meeting: Arrange a meeting with the principal for handing over the record documents and explaining any required maintenance and operation actions.

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

Instruction manuals: Provide the manufacturers' instruction manuals, including operations and maintenance manuals, and product and material technical data sheets.

As-constructed drawings: At practical completion, submit 4 sets of hard copies and electronic files (on CDs or DVDs) of drawings, specifications and other documents of the constructed building, include revisions or changes made during the construction period. Include the following in the submission:

- Manufacturer's instruction manuals.
- List of suppliers of all equipment and major materials.
- Copies of certification documents, including local government authority approvals.
- Warranties.

Drawing format: To DESIGN DEVELOPMENT, DESIGN VERIFICATION, As-constructed drawings.

CDs and DVDs: Submit in durable plastic covers with printed labels.

Services layout: Provide a plan which shows the location of underground services.

Keys: Provide two keys for each set of locks keyed alike and two keys for each lock keyed to differ.

REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS/CA S008	2010	Requirements for customer cabling products
AS/CA S009	2013	Installation requirements for customer cabling (Wiring Rules)
AS/NZS 1163	2016	Cold-formed structural steel hollow sections
AS 1170		Structural design actions
AS/NZS 1170.2	2011	Wind actions
AS 1192	2004	Electroplated coatings - Nickel and chromium
AS/NZS 1214	2016	Hot-dip galvanized coatings on threaded fasteners (ISO metric coarse thread series)
AS 1231	2000	Aluminium and aluminium alloys - Anodic oxidation coatings
AS 1288	2006	Glass in buildings - Selection and installation
AS 1289		Methods of testing soils for engineering purposes
AS 1289.5.1.1	2017	Soil compaction and density tests- Determination of dry density/moisture content relation of a soil using standard compactive effort
AS 1289.5.2.1	2017	Soil compaction and density tests - Determination of the dry density/moisture content relation of a soil using modified compactive effort
AS 1324		Air filters for use in general ventilation and airconditioning
AS 1324.2	2003	Methods of test
AS 1366		Rigid cellular plastics sheets for thermal insulation
AS 1366.2	1992	Rigid cellular polyisocyanurate (RC/PIR)
AS 1366.3	1992	Rigid cellular polystyrene - Moulded (RC/PS - M)
AS 1366.4	1989	Rigid cellular polystyrene - Extruded (RC/PS-E)
AS/NZS 1367	2016	Coaxial cable and optical fibre systems for the RF distribution of digital television, radio and in-house analog signals in single and multiple dwelling installations
AS 1379	2007	Specification and supply of concrete
AS 1397	2011	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 1417	2015	Receiving antennas for radio and television in the VHF and UHF broadcast bands - Design, manufacture and performance of outdoor terrestrial television antennas
AS 1428		Design for access and mobility
AS 1428.1	2009	General requirements for access - New building work
AS 1428.2	1992	Enhanced and additional requirements - Buildings and facilities
AS 1478		Chemical admixtures for concrete, mortar and grout
AS 1478.1	2000	Admixtures for concrete
AS 1530		Methods for fire tests on building materials, components and structures
AS 1530.2	1993	Test for flammability of materials
AS/NZS 1530.3	1999	Simultaneous determination of ignitability, flame propagation, heat release and smoke release
AS/NZS 1546		On-site domestic wastewater treatment units
AS/NZS 1546.1	2008	Septic tanks
AS/NZS 1546.2	2008	Waterless composting toilets
AS/NZS 1546.3	2017	Aerated wastewater treatment systems
AS 1546.4	2016	Domestic greywater treatment systems
AS/NZS 1547	2012	On-site domestic wastewater management
AS 1562		Design and installation of sheet roof and wall cladding
AS 1562.1	1992	Metal
AS 1562.3	2006	Plastics
AS/NZS 1571	1995	Copper - Seamless tubes for airconditioning and refrigeration
AS/NZS 1596	2014	The storage and handling of LP Gas
AS 1604		Specification for preservative treatment
AS 1604.1	2012	Sawn and round timber
AS 1627		Metal finishing - Preparation and pretreatment of surfaces
AS 1668		The use of ventilation and air conditioning in buildings
AS/NZS 1668.1	2015	Fire and smoke control in multi-compartment buildings
AS 1668.2	2012	Mechanical ventilation in buildings
AS 1720		Timber structures
AS 1720.2	2006	Timber properties
AS/NZS 1801	1997	Occupational protective helmets
AS 1810	1995	Timber - Seasoned cypress pine - Milled products
AS/NZS 1859		Reconstituted wood-based panels - Specifications
AS/NZS 1859.1	2004	Particleboard
AS/NZS 1859.2	2004	Dry-processed fibreboard
AS/NZS 1859.3	2005	Decorative overlaid wood panels
AS/NZS 1859.4	2004	Wet-processed fibreboard
AS 1884	2012	Floor coverings - Resilient sheet and tiles - Installation practices
AS 2047	2014	Windows and external glazed doors in buildings
AS 2050	2002	Installation of roof tiles
AS 2070	1999	Plastics materials for food contact use
AS 2082	2007	Timber - Hardwood - Visually stress-graded for structural purposes
AS/NZS 2179		Specifications for rainwater goods, accessories and fasteners
AS/NZS 2179.1	2014	Metal shape or sheet rainwater goods, and metal accessories and fasteners
AS 2201		Intruder alarm systems
AS/NZS 2201.1	2007	Client's premises - Design, installation, commissioning and maintenance
AS/NZS 2208	1996	Safety glazing materials in buildings
AS/NZS 2270	2006	Plywood and blockboard for interior use

AS/NZS 2271	2004	Plywood and blockboard for exterior use
AS/NZS 2311	2017	Guide to the painting of buildings
AS/NZS 2312		Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings
AS/NZS 2312.1	2014	Paint coatings
AS/NZS 2312.2	2014	Hot dip galvanizing
AS/NZS 2455		Textile floor coverings - Installation practice
AS/NZS 2455.1	2007	General
AS/NZS 2588	1998	Gypsum plasterboard
AS/NZS 2589	2017	Gypsum linings - Application and finishing
AS 2601	2001	The demolition of structures
AS 2663		Textiles - Fabrics for window furnishings
AS 2663.1	1997	Uncoated fabrics
AS 2663.2	1999	Coated curtain fabrics
AS 2663.3	1999	Vertical and holland blinds
AS/NZS 2699		Built-in components for masonry construction
AS/NZS 2699.1	2000	Wall ties
AS/NZS 2699.3	2002	Lintels and shelf angles (durability requirements)
AS/NZS 2712	2007	Solar and heat pump water heaters - Design and construction
AS/NZS 2728	2013	Prefinished/prepainted sheet metal products for interior/exterior building applications - Performance requirements
AS 2758		Aggregates and rock for engineering purposes
AS 2758.1	2014	Concrete aggregates
AS 2796		Timber - Hardwood - Sawn and milled products
AS 2796.1	1999	Product specification
AS 2796.2	2006	Grade description
AS 2796.3	1999	Timber for furniture components
AS 2858	2008	Timber - Softwood - Visually stress-graded for structural purposes
AS 2870	2011	Residential slabs and footings
AS/NZS 2904	1995	Damp-proof courses and flashings
AS/NZS 2908		Cellulose-cement products
AS/NZS 2908.2	2000	Flat sheets
AS/NZS 2924		High pressure decorative laminates - Sheets made from thermosetting resins
AS/NZS 2924.1	1998	Classification and specifications
AS/NZS 3000	2007	Electrical installations - Verification guidelines (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3008		Electrical installations - Selection of cables
AS/NZS 3008.1.1	2017	Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation conditions
AS/NZS 3017	2007	Electrical installations - Verification guidelines
AS/NZS 3080	2013	Information technology - Generic cabling for customer premises (ISO/IEC 11801:2011, MOD)
AS/NZS 3439		Low-voltage switchgear and controlgear assemblies
AS/NZS 3439.3	2002	Particular requirements for low-voltage switchgear and controlgear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards
AS/NZS 3500		Plumbing and drainage
AS/NZS 3500.1	2015	Water services
AS/NZS 3500.2	2015	Sanitary plumbing and drainage
AS/NZS 3500.3	2015	Stormwater drainage
AS/NZS 3500.4	2015	Heated water services
AS 3566		Self-drilling screws for the building and construction industries
AS 3566.1	2002	General requirements and mechanical properties
AS 3600	2009	Concrete structures
AS 3610	1995	Formwork for concrete
AS 3610.1	2010	Documentation and surface finish
AS 3660		Termite management
AS 3660.1	2014	New building work
AS 3660.3	2014	Assessment criteria for termite management systems
AS/NZS 3666		Air-handling and water systems of buildings - Microbial control
AS/NZS 3666.1	2011	Design, installation and commissioning
AS 3700	2011	Masonry structures
AS 3715	2002	Metal finishing - Thermoset powder coating for architectural applications of aluminium and aluminium alloys
AS 3727	2016	Pavements
AS 3730		Guide to the properties of paints for buildings
AS 3730.1	2006	Latex - Interior - Flat
AS 3730.2	2006	Latex - Interior - Semi-gloss
AS 3730.3	2006	Latex - Interior - Low-gloss
AS 3730.6	2006	Solvent-borne - Interior/exterior - Full gloss enamel
AS 3730.7	2006	Latex - Exterior - Flat
AS 3730.8	2006	Latex - Exterior - Low gloss
AS 3730.9	2006	Latex - Exterior - Semi-gloss
AS 3730.10	2006	Latex - Exterior - Gloss
AS 3730.12	2006	Latex - Interior - Gloss
AS 3730.16	2006	Latex - Self-priming timber finish - Exterior
AS 3730.27	2006	Clear coatings for interior timber floors

AS 3730.28	2006	Wood stain - Solvent-borne - Exterior
AS 3730.29	2006	Solvent-borne - Exterior/interior - Paving paint
AS 3740	2010	Waterproofing of domestic wet areas
AS 3786	1993	Smoke alarms
AS 3798	2007	Guidelines on earthworks for commercial and residential developments
AS 3799	1998	Liquid membrane-forming curing compounds for concrete
AS/NZS 3823		Performance of electrical appliances - Air conditioners and heat pumps
AS/NZS 3823.1.1	2012	Non-ducted airconditioners and heat pumps - Testing and rating for performance (ISO 5151:2010, MOD)
AS/NZS 3823.1.2	2012	Ducted airconditioners and air-to-air heat pumps - Testing and rating for performance (ISO 13253:2010, MOD)
AS/NZS 3823.2	2013	Energy labelling and minimum energy performance standards (MEPS) requirements
AS 3850		Prefabricated concrete elements
AS 3850.1	2015	General requirements
AS 3850.2	2015	Building construction
AS 3958		Ceramic tiles
AS 3958.1	2007	Guide to the installation of ceramic tiles
AS 3959	2009	Construction of buildings in bushfire prone areas
AS 3972	2010	General purpose and blended cements
AS 3999	2015	Bulk thermal insulation - Installation
AS 4049		Paints and related materials - Pavement marking materials
AS 4049.1	2005	Solvent-borne paint - For use with surface applied glass beads
AS 4049.3	2005	Waterborne paint - For use with surface applied glass beads
AS 4049.4	2006	High performance pavement marking systems
AS/NZS 4055	2012	Wind loads for housing
AS 4100	1998	Steel structures
AS/NZS 4200		Pliable building membranes and underlays
AS/NZS 4200.1	2017	Materials
AS 4200.2	2017	Installation requirements
AS 4254		Ductwork for air-handling systems in buildings
AS 4254.1	2012	Flexible duct
AS 4254.2	2012	Rigid duct
AS 4256		Plastic roof and wall cladding materials
AS 4256.2	2006	Unplasticized polyvinyl chloride (uPVC) building sheets
AS 4256.3	2006	Glass fibre reinforced polyester (GRP)
AS 4256.5	2006	Polycarbonate
AS 4312	2008	Atmospheric corrosivity zones in Australia
AS/NZS 4386		Domestic kitchen assemblies
AS/NZS 4386.1	1996	Kitchen units
AS/NZS 4455		Masonry units, pavers, flags and segmental retaining wall units
AS/NZS 4455.2	2010	Pavers and flags
AS/NZS 4505	2012	Garage doors and other large access doors
AS 4552	2005	Gas fired water heaters for hot water supply and/or central heating
AS/NZS 4552.2	2010	Minimum energy performance standards for gas water heaters
AS 4586	2013	Slip resistance classification of new pedestrian surface materials
AS/NZS 4600	2005	Cold-formed steel structures
AS 4654		Waterproofing membranes for external above-ground use
AS 4654.1	2012	Materials
AS 4654.2	2012	Design and installation
AS/NZS 4667	2000	Quality requirements for cut-to-size and processed glass
AS/NZS 4671	2001	Steel reinforcing materials
AS/NZS 4672		Steel prestressing materials
AS/NZS 4672.1	2007	General requirements
AS/NZS 4680	2006	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 4692		Electric water heaters
AS/NZS 4692.1	2005	Energy consumption, performance and general requirements
AS/NZS 4692.2	2005	Minimum Energy Performance Standard (MEPS) requirements and energy labelling
AS/NZS 4766	2006	Polyethylene storage tanks for water and chemicals
AS/NZS 4782		Double-capped fluorescent lamps - Performance specifications
AS/NZS 4782.2	2004	Minimum Energy Performance Standard (MEPS)
AS/NZS 4783		Performance of electrical lighting equipment - Ballasts for fluorescent lamps
AS/NZS 4783.2	2002	Energy labelling and minimum energy performance standards requirements
AS 4785		Timber - Softwood - Sawn and milled products
AS 4785.1	2002	Product specification
AS 4785.2	2002	Grade description
AS 4785.3	2002	Timber for furniture components
AS 4786		Timber flooring
AS 4786.2	2005	Sanding and finishing
AS 4809	2017	Copper pipe and fittings - Installation and commissioning
AS/NZS 4847		Self-ballasted lamps for general lighting services
AS/NZS 4847.2	2010	Minimum Energy Performance Standards (MEPS) requirements
AS/NZS 4858	2004	Wet area membranes
AS/NZS 4859		Materials for the thermal insulation of buildings
AS/NZS 4859.1	2002	General criteria and technical provisions
AS 4970	2009	Protection of trees on development sites
AS 5039	2008	Security screen doors and security window grilles

AS 5040	2003	Installation of security screen doors and window grilles
AS 5100		Bridge design
AS 5100.4	2017	Bearings and deck joints
AS/NZS 5149		Refrigerating systems and heat pumps – Safety and environmental requirements.
AS/NZS 5149.1	2016	Definitions, classification and selection criteria (ISO 5149-1:2014, MOD)
AS/NZS 5149.2	2016	Design, construction, testing, marking and documentation (ISO 5149-2:2014, MOD)
AS/NZS 5149.3	2016	Installation site (ISO 5149-3:2014)
AS/NZS 5149.4	2016	Operations, maintenance, repair and recovery (ISO 5149-4:2014, MOD)
AS 5203	2016	Protection of openable windows/ fall prevention – Test sequence and compliance method
AS/NZS 5263		Gas appliances
AS/NZS 5263.1.2	2016	Gas fired water heaters for hot water supply and/or central heating
AS/NZS 5601		Gas installations
AS/NZS 5601.1	2013	General installations
AS 5604	2005	Timber - Natural durability ratings
AS 6669	2016	Plywood - Formwork
AS ISO 13006	2013	Ceramic tiles - Definitions, classification, characteristics and marking (ISO 13006:1998)
AS ISO 13007		Ceramic tiles
AS ISO 13007.1	2013	Grouts and adhesives - Terms, definitions and specifications for adhesives
AS/NZS ISO/IEC 15018:2005		Information technology - Generic cabling for homes
AS/NZS 60598		Luminaires
AS/NZS 60598.1	2013	General requirements and tests (IEC 60598-1, Ed. 7.0 (2008) MOD)
AS/NZS 61000		Electromagnetic compatibility (EMC)
ATS 5200		Technical Specification for plumbing and drainage products
ATS 5200.460	2005	Grey water diversion device (GWDD)
SAA HB 230	2008	Rainwater tank design and installation handbook
SA/SNZ HB 252	2014	Communications Cabling Manual - Module 3: Residential communications cabling handbook
SAA HB 276	2004	A guide to good practice for energy efficient installation of residential heating, cooling & air conditioning plant & equipment
SAA HB 301	2001	Electrical installations - Designing to the Wiring Rules
ACCC SS	2014	Competition and Consumer (Corded Internal Window Coverings) Safety Standard
AIRAH DA09	1998	Air conditioning load estimation and psychrometrics
ASCC	2008	National Code of Practice for Precast, Tilt-up and Concrete Elements in Building Construction
Aus Gov Telecom	2015	Telecommunications infrastructure in new developments - A new approach to competition
BCA 3.1.1	2016	Acceptable construction - Site preparation - Earthworks
BCA 3.1.2	2016	Acceptable construction - Site preparation - Drainage
BCA 3.1.3	2016	Acceptable construction - Site preparation - Termite risk management
BCA 3.1.3.4	2016	Acceptable construction - Site preparation - Termite risk management - Durable notices
BCA 3.2	2016	Acceptable construction - Footings and slabs
BCA 3.2.2	2016	Acceptable construction - Footings and slabs - Preparation
BCA 3.4.2	2016	Acceptable construction - Framing - Steel framing
BCA 3.4.2.2	2016	Acceptable construction - Framing - Steel framing - General
BCA 3.4.4	2016	Acceptable construction - Framing - Structural steel members
BCA 3.4.4.4	2016	Acceptable construction - Framing - Structural steel members - Corrosion protection
BCA 3.5.1	2016	Acceptable construction - Roof and wall cladding - Roof cladding
BCA Table 3.5.1.1a	2016	Acceptable construction - Roof and wall cladding - Roof cladding - Metal sheet roofing - Acceptable corrosion protection for sheet roofing
BCA 3.5.1.2	2016	Acceptable construction - Roof and wall cladding - Roof cladding - Roof tiling
BCA 3.5.1.3	2016	Acceptable construction - Roof and wall cladding - Roof cladding - Metal sheet roofing
BCA 3.5.2	2016	Acceptable construction - Roof and wall cladding - Gutters and downpipes
BCA 3.5.2.4	2016	Acceptable construction - Roof and wall cladding - Gutters and downpipes - Installation of gutters
BCA 3.5.3	2016	Acceptable construction - Roof and wall cladding - Wall cladding
BCA 3.5.3.5	2016	Acceptable construction - Roof and wall cladding - Wall cladding - Eaves and soffit linings
BCA 3.6	2016	Acceptable construction - Glazing
BCA 3.7.2	2016	Acceptable construction - Fire safety - Smoke alarms
BCA 3.7.3	2016	Acceptable construction - Fire safety - Heating appliances
BCA 3.7.4	2016	Acceptable construction – Fire safety – Bushfire areas
BCA 3.7.4.0	2016	Acceptable construction – Fire safety – Bushfire areas - Acceptable construction manuals
BCA 3.8.1	2016	Acceptable construction - Health and amenity - Wet areas and external waterproofing
BCA 3.8.4	2016	Acceptable construction - Health and amenity - Light
BCA 3.8.5	2016	Acceptable construction - Health and amenity – Ventilation - Sound insulation
BCA 3.9.1	2016	Acceptable construction - Safe movement and access - Stair construction
BCA 3.9.2	2016	Acceptable construction - Safe movement and access - Barriers and handrails
BCA 3.9.2.5	2016	Acceptable construction - Safe movement and access - Barriers and handrails - Protection of openable windows
BCA 3.10.1	2016	Additional construction requirements - High wind areas
BCA 3.11	2016	Acceptable construction - Structural design manuals
BCA 3.12.1	2016	Acceptable construction - Energy efficiency - Building fabric
BCA 3.12.4	2016	Acceptable construction - Energy Efficiency - Air movement
BCA 3.12.5	2016	Acceptable construction - Energy Efficiency - Services - Application

BCA 3.12.2	2016	Acceptable construction - Energy efficiency - External glazing
BCA 3.12.1.1	2016	Acceptable construction - Energy efficiency - Building fabric - Building fabric thermal insulation
BCA 3.12.3	2016	Acceptable construction - Energy efficiency - Building sealing
BCA D2.24	2016	Access and egress - Construction of exits - Protection of openable windows
BCA P2.1.1	2016	Performance provisions - Structure - Structural stability and resistance to actions
BCA P2.2.2	2016	Performance provisions - Damp and weatherproofing - Weatherproofing and dampness
BCA P2.3.1	2016	Performance provisions - Fire safety - Protection from the spread of fire
BCA P2.3.2	2016	Performance provisions - Fire safety - Fire detection and early warning
BCA P2.3.3	2016	Performance provisions - Fire safety - Heating appliances
BCA P2.3.4	2016	Performance provisions - Fire safety - Bushfire areas
BCA P2.4.1	2016	Performance provisions - Health and amenity - Wet areas
BCA P2.4.3	2016	Performance provisions - Health and amenity - Facilities
BCA P2.4.4	2016	Performance provisions - Health and amenity - Light
BCA P2.4.5	2016	Performance provisions - Health and amenity - Ventilation
BCA P2.4.6	2016	Performance provisions - Health and amenity - Sound insulation
BCA P2.6.1	2016	Performance provisions - Energy efficiency - Building
FWPA PN06.1039	2008	Interim industry standard – Recycled timber – Visually graded recycled decorative
NASH		NASH Standard Residential and Low-rise Steel Framing
NASH-1	2005	Design criteria
NASH-2	2014	Design solutions
NP PCH	2009	Precast concrete handbook
PCA	2016	National Construction Code Series Volume 3 Plumbing Code of Australia
Safe Work Australia	2016	Hazardous chemical information system
SA TS 101	2015	Design of post-installed and cast-in fastenings for use in concrete
WA Gov S.R. Health	1974	Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations
WA Gov S.R. Liquid waste		1996 Environmental Protection (Liquid Waste) Regulations
WA Gov S.R. Waste	2004	Environmental Protection (Controlled Waste) Regulations
WA Gov S.R. Wastewater		2013 Code of Practice for Product Approval of Onsite Wastewater Systems (Department of Health)
WAER	2014	WA Electrical Regulations (WAER) (Energy Safety Division (Energy Safety), Department of Commerce
ASTM C534	2016	Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
BS 2571	1990	Specification for general-purpose flexible PVC compounds for moulding and extrusion
BS 4255		Rubber used in preformed gaskets for weather exclusion from buildings
BS 4255-1	1986	Specification for non-cellular gaskets
UN GHS	2017	Globally Harmonized System of Classification and Labelling of Chemicals (GHS)