Government of **Western Australia**
Department of **Housing and Works**

Department of Housing and Works

Construction Specification

NATSPEC | BCA Class 1a and 10 buildings

Single and grouped dwellings

Effective 1 July 2025

July 2025

This reference specification has been developed by NATSPEC in conjunction with the Western Australia Housing Authority through the Department of Housing and Works. The requirements in this specification are generic and are to be read in conjunction with project specific documents from the Design consultant, including drawings, schedules and appendices. It does not cover the requirements for every project situation.

The Design consultants' documents take precedence over this reference specification. Check the consultants' documents for any variations to the requirements of this specification.

PREFACE

This reference specification has been developed for use on all housing projects by the Western Australia Department of Housing and Works of BCA Class 1a and 10 buildings. It includes framed construction (steel and timber), masonry veneer and full masonry construction. It may include requirements which are not applicable to the project. Read this specification in conjunction with other project specific documents, including drawings, schedules and appendices, and refer/conform to the applicable requirements.

DOCUMENT REVIEW

Revision date	Comments
27/02/2017	2017 Alignment with the updated brief documents + deletion of the *Wiring* subclause in the 0902 worksection.
07/04/2017	2017 Annual update - NATSPEC update, Preliminaries, Smoke alarms. Demolition worksection separated into a stand-alone specification.
20/07/2017	July 2017 - Residual Current Device (RCD) trip time requirement.
04/12/2017	NATSPEC October 2017 Update incorporated, document title changed, Occupancy permit subclause added, Water Corporation approved sub meter subclause relocated to *0171 General requirements*, Prefabricated walling clause added, *0411 Waterproofing - external and tanking* amended, *0572 Miscellaneous fixtures and appliances* amended, Water meter subclause amended in *0802 Hydraulic design and install*, *0902 Electrical design and install* amended and NBN installation subclause added. *0572 Miscellaneous fixtures and appliances* added to Appendix A and amended in Appendix B.
12/04/2018	NATSPEC April 2018 Update incorporated.
19/12/2019	2019 Annual update - NATSPEC October 2018, April 2019 and October 2019 Updates incorporated.
09/02/2021	2020 Annual update - NATSPEC April 2020 and October 2020 Updates incorporated.
14/02/2022	2021 Annual update - NATSPEC April 2021 and October 2021 Updates incorporated.
15/06/2023	2022 Annual update - NATSPEC April 2022 and October 2022 Updates incorporated.
01/07/2025	2025 Update - NATSPEC April 2023, October 2023, April 2024, October 2024 and April 2025 Updates incorporated. Information from landscape specification and demolition specification added. Updated branding to Department of Housing and Works.

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0131 PRELIMINARIES

1 GENERAL

1.1 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.

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 Housing and Works.

1.2 THE SITE

Project signboards

General: Within 10 working days of commencement of work, provide project specific signboards and as follows:

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

Other signboards: Obtain approval from the principal before display of advertisements or provision of other signboards.

Reinstatement

Accessways and 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. Rectify immediately any obstruction or damage to such services and provide temporary services whilst repairs are carried out.

Trees and properties: Do not interfere with or damage trees and properties that are to remain on or adjacent to the site, including adjoining property encroaching onto the site. Rectify immediately any interference or damage to such trees and properties.

Existing services

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

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

Redundant services: Remove redundant parts and make safe.

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

Changes to existing services: Submit proposals.

- Purpose of submission: For review.
- Timing of submission: Before starting work to existing services.

Location of services: Verify the location of existing services from the appropriate authority and/or BEFORE YOU DIG AUSTRALIA (see www.byda.com.au), as required.

- Verges: Locate services before start of landscaping.

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

Use of existing services

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

Adjoining properties

Notice: At least 10 working days before commencing work, give written notice to owners and occupants of adjoining properties 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 properties onto the site or of existing site structures onto adjoining properties, immediately notify the principal and seek instructions.

Dilapidation report: For each adjoining property to be recorded:

- 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 property, especially structural defects and other damage or defacement.
- Arrange for at least 2 copies of each report, including drawings, written descriptions and photographs, to be 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 report. Keep the other endorsed copy on site.

- Purpose of submission: For information.
- Timing of submission: Before commencement of work.

Parking

Principal's existing parking areas: Use only designated parking areas.

1.3 PROTECTION OF PERSONS AND PROPERTY

General

Temporary works: Provide and maintain required hoardings, barricades, guards, fencing, shoring, temporary roadways, footpaths, signs, lighting and traffic management until practical completion. Provide all measures required to guard against vandalism of works and materials on site.

Vandalism
Requirement: Provide all measures required to guard against vandalism, including graffiti, of works, materials, plant and equipment on site. Do not claim for costs or loss from vandalism of works, materials, plant or equipment on site.

Removal of graffiti: Remove any graffiti applied to buildings, plant and equipment. If graffiti is not removed within the time nominated by the principal, the Department of Housing and Works will remove the graffiti and recover the cost from the contract.

Occupied premises
General: For the parts of the site designated as occupied premises:

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

Proposals: Submit details of proposed methods.

- Purpose of submission: For information.
- Timing of submission: Before commencement of work.

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

- Safety helmets: Type 1 to AS/NZS 1801 (2024).
- High visibility safety vests: To AS 4602.1 (2024).

Certification: Required.

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

Safety
Accidents: Promptly notify the principal of the occurrence of the following:

- Accidents involving death or personal injury.
- Accidents involving loss of time.

Accident reports: Submit reports of accidents.

- Purpose of submission: For information.
- Timing of submission: Within one day after the accident.

Dust, dirt, water and fumes
Protection: Undertake measures to prevent dust, water, and noise from affecting and inconveniencing adjacent properties and the public. Obtain permission from the adjoining property owners/occupants before entering their property.

Dust management plan: Submit details of proposed methods.

- Purpose of submission: For information.
- Timing of submission: Before commencement of work.

1.4 BUILDING THE WORKS

Authority application
Watering exemption: Apply to the WA Water Corporation for a temporary watering roster exemption for new lawns and gardens.

Stormwater drainage
Requirement: Liaise with the local government authority for the preferred method of drainage and other stormwater requirements. Install to the authority's requirements.

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

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

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

Contractor's representative
Contacts: Submit names and telephone numbers of responsible persons who may be contacted after hours during the course of the contract.

- Purpose of submission: For information.
- Timing of submission: At the first site meeting.

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

- Purpose of submission: For information.

Materials
Requirement: Use new materials, unless re-use is documented.

Items supplied by the principal
General: Materials and other items supplied free of charge to the contractor for installation in the execution of the works. Unload and take delivery, inspect for defects and take care of the items. If defects are found, advise. Return unused items to the principal.

Disposal of waste
Site waste (including food waste): Dispose of in compliance with state regulations and local government authority waste management requirements, including the following:

- *Environmental Protection Act 1986 (WA)*.
- *Environmental Protection Regulations 1987 (WA).*
- *Health (Miscellaneous Provisions) Act 1911 (WA).*
- *Local Government Act 1995 (WA).*
- *Waste Avoidance and Resource Recovery Act 2007 (WA)*.
- The recommendations of the Master Builders *Smart Waste Guide (2014).*

Waste containing asbestos: Handle, transport and dispose of in compliance with state regulations including the following:

- *Environmental Protection (Controlled Waste) Regulations 2004 (WA).*
- *Environmental Protection (Rural Landfill) Regulations 2002 (WA).*

- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (WA).*

1.5 COMPLETION OF THE WORKS

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

Occupancy permit
Application: Upon practical completion, apply for Occupancy permit (BA9) or Occupancy permit strata (BA11).

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

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

Reinstatement
Requirement: 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 properties
Evaluation:

- At practical completion, inspect each property with the principal, owner and occupant of the property.
- Compare the current condition with the condition before carrying out the work by comparison to the endorsed dilapidation report.
- Identify damage caused by construction and rectify.

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

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

Handover
Keys: Provide the following:

- Individual dwellings: Two keys for each set of locks keyed alike and two keys for each lock keyed to differ, including keys to windows, sliding doors and store room doors.
- Common areas: One key for each set of locks for common services cupboards.

Key register: Provide a key register with the barrel numbers of the keys provided.

Record submission
Building occupants' guide: Include a concise guide written and illustrated for building occupants with no technical background. Include the following:

- Security provisions.
- Safety and access.
- Environmental features, including energy and water efficiency and waste management.
- Occupant relevant information on design and operation.
- Information for occupants on environmental systems that rely partially or wholly on local controls for heating, lighting, cooling, and ventilation.
- Contact details for faults, maintenance and emergencies.

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

Instruction manuals: Provide the manufacturers' instruction manuals.

Surveyor's certificate: Provide a certificate that confirms that the work, including boundary fences, has been correctly located.

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

Services as-constructed records: At practical completion, submit the services as-constructed drawings to the principal.

- New buildings: Prepare drawings accurately showing the site and the as-constructed location of services including details required for future maintenance.
- Underground services: Provide a plan that shows the location of underground services.

Electrical services and TV installations: Submit records in plastic folders and fix folders inside main switchboard cabinets. Include details of the following:

- Layout of submains.
- Layout of common services circuits.
- Switchboard layouts.
- Line diagrams of installations.
- Route of underground cabling and pit location.

Submission format:

- Electronic: Submit by email or an online file transfer service.
- Hard copy: Submit one hard copy of the building occupants' guide for each dwelling.

Date for submission:

- Draft submission: 4 weeks before the date for practical completion.
- Final submission: Within 2 weeks after practical completion.

1.6 MISCELLANEOUS

Compliance with the law
General: Give notices and obtain the permits, authority approvals and authorisations, including payment of fees, to complete the works, unless noted otherwise.

Maintenance during the defects liability period
Emergency maintenance: Start within 24 hours after instructions issued by the principal, repairs/rectification of the following:

- Failure of the dwelling electrical power and/or lighting.
- Electrical shocks or sparks.
- Stoves which are not operational.
- Gas leaks.
- Burst water pipes.
- Blocked W.C.s and sanitary plumbing, resulting in overflows inside the dwelling.

Priority maintenance: Start within 72 hours after instruction issued by the principal, repairs/rectification of the following:

- Blocked sanitary plumbing overflowing externally.
- No hot water.
- Cracked W.C. pan.
- Faulty external entry door locks.

Emergency outside normal working hours: If the contractor is not contactable, or if priority maintenance does not start 72 hours after issuance of the instructions, then the Department of Housing and Works will complete the work and recover the cost from the contract.

0171 GENERAL REQUIREMENTS

1 GENERAL

1.1 PRECEDENCE

General
Order of precedence: If there is conflict or inconsistency between the worksections of this specification, the requirements of worksections take precedence over *0171 General requirements*.

1.2 STANDARDS

Current editions
General: All referenced documents are the editions, with amendments, current on 1st March 2025.

Exception to current editions: If statutory requirements reference other editions or standards, conform to those other editions or standards. If the NCC (2022) references editions other than the current edition, the same editions cited in the NCC (2022) are referenced in each worksection.

1.3 INTERPRETATION

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

- BCA: National Construction Code series Volume Two: Building Code of Australia Class 1 and Class 10 buildings.
- NCC: National Construction Code.

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

- Documented: Documented, as documented and similar terms mean contained in the contract documents.
- Hot-dip galvanized: Zinc coated to AS/NZS 4680 (2006) after fabrication with coating thickness and mass to AS/NZS 4680 (2006) Table 1.
- Metallic-coated: Steel coated with zinc or aluminium-zinc alloy by a continuous or specialised process.
- Northern areas: Sites located north of 27° latitude.
- Professional engineer: To NCC (2022) Schedule 1.
- Proprietary: Identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Provide: Provide and similar expressions mean supply and install and include development of the design beyond that documented.
- Required: Required by the contract documents, the local or statutory authorities.
- Supply: Supply, furnish and similar expressions mean supply only.

1.4 SUBMISSIONS

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) (2023)*.

2 PERFORMANCE

2.1 BUSHFIRE-PRONE AREAS

General
Conformance: In areas designated as bushfire-prone, conform to statutory and local authority requirements.

Standard: To AS 3959 (2018) and BCA (2022) H7D4.

2.2 ENERGY EFFICIENCY

General
Energy efficiency approval commitments: To BCA (2022) H6 and as documented.

Energy rating: Minimum 7 stars NatHERS rating, as documented.

2.3 WATER EFFICIENCY

General
Design: Incorporate Water Corporation's waterwise practices and products.

2.4 STRUCTURE

Structural design actions
Standard: To the AS/NZS 1170 series and AS 4055 (2021), as appropriate.

3 PRODUCTS AND MATERIALS

3.1 GENERAL

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) Workplace exposure standards.
- Blowing agents:
  - . Materials that use chlorofluorocarbon (CFC) or hydrochlorofluorocarbon (HCFC) in the manufacturing process.
  - . A blowing agent with a global warming potential (GWP) ≥ 700.

3.2 PROPRIETARY ITEMS

Manufacturer's or supplier's recommendations
General: Provide manufactured items to the manufacturer's or supplier's recommendations.

Proprietary items/systems/assemblies: Deliver, handle, store, assemble, install or fix to substrate to the manufacturer's or supplier's recommendations.

Identification of proprietary items
Sealed containers: If items are supplied by the manufacturer in closed or sealed containers or packages, bring them to point of use in the original containers or packages.

3.3 SUBSTITUTIONS

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

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

Non-approved alternatives
Removal: If an alternative material, product or method has been installed/used without the principal's approval and replacement is required, cover all the costs associated with the removal, replacement and rectification of damage resulting from the substitution.

3.4 TIMBER

Timber source certification
Requirement: Use timber products originating from sustainably managed forests to the recommendations of the Forest Products Commission's *Wood Encouragement Policy for Western Australia*.

Certification: Forest management and chain of custody to any of the following:

- Responsible Wood (Australian Forestry Standard (AFS)).
- FSC (Forestry Stewardship Council).

Engineered timber product certification and identification
Certification: To EWPAA Product Certification Scheme for the following:

- Plywood.
- Preservative-treated timber and engineered wood products.
- Solid structural timber.
- Wet process fibreboard, dry process fibreboard and particleboard.
- Wood-plastic composite products.

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

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

Acclimatisation
General: Acclimatise timber products by stacking them in the in-service conditions with air circulation to all surfaces after the following are complete:

- Air conditioning operational.
- Lighting operational.

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

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 timber of equivalent durability.

Natural durability class of heartwood: To AS 5604 (2022).

Preservative treatment: To the AS/NZS 1604 series.

Termite resistance: Provide timbers that are naturally termite-resistant or preservative treated, or protect using physical barriers or coatings, as appropriate.

Minimum requirement: To the **Natural and treated timber durability table**.

Natural and treated timber durability table

Exposure	Natural durability class to AS 5604 (2022)	Preservative-treated hazard class to the AS/NZS 1604 series
Inside, above ground: Completely protected from the weather, well ventilated, and protected from termites		H1
Inside, above ground: Protected from wetting with nil leaching		H2
Outside, above ground: Subject to periodic moderate wetting	Class 2	H3
In-ground	Class 1	H4 (Severe wetting and leaching)
		H5 (Extreme wetting and leaching and/or critical uses)

3.5 CORROSION RESISTANCE

General
Atmospheric corrosivity category: To AS 4312 (2019) and as documented.

Requirement: Conform to the following:

- Built-in products below damp-proof course: Stainless steel Type 316 or engineered polymer.
- Steel lintels: To the ABCB Housing Provisions (2022) Table 5.6.7b.
- Structural steel (other than lintels): To the ABCB Housing Provisions (2022) Tables 6.3.9a, 6.3.9b and 6.3.9c.
- Steel cladding, lining, trims and flashings: To the ABCB Housing Provisions (2022) Table 7.2.2a.

Galvanizing
Requirement: Galvanize mild steel components (including fasteners) to AS/NZS 1214 (2016), AS 1397 (2021) or AS/NZS 4680 (2006) as appropriate, if:

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

3.6 FASTENERS

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

Self-drilling screws
Standard: To AS 3566.1 (2002).

4 EXECUTION

4.1 WALL CHASING

Holes and chases
General: If holes and chases are required in masonry walls, make sure structural integrity of the wall is maintained. Do not chase walls with a fire-resistance level or an acoustic rating.

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

Chasing blockwork: Only chase core-filled hollow blocks or solid blocks that are not structural.

Concrete blockwork chasing table

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

4.2 FIXING

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

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

4.3 FOOTPATH CROSSING

General
Requirement: Provide footpath and kerb crossings to local authority requirements.

4.4 SERVICES CONNECTION

Service cabinets
Requirement: Provide service cabinets as required for the housing of equipment, as documented.

Construction: Aluminium, weatherproof cabinet with dustproof door seals and fitted with keyed alike locks, as documented.

Colour: As documented.

Number of keys: 2 for each cabinet.

General purpose socket outlets: 10 amp, 240 volt socket outlets of sufficient quantity to power the equipment mounted in the cabinet.

Metering
Requirement: Provide meters, including for water, gas and electricity, to the utility service providers' requirements.

- Individual dwellings: One meter for each dwelling.
- Common areas:
  . Water service: Install reticulation valve between master and sub-meters for common landscaped areas.
  . Other services: Common smart meter for each service.

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.
- Submit a completed *Sub-meter Application Form* and *Works Request Form* and pay all application costs. These forms can be obtained from the Water Corporation. See www.watercorporation.com.au/Developing-and-building/Subdividing/Strata-and-green-title-subdivisions/Strata-subdivisions/Metering-options-for-stratas.

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.

0184 TERMITE MANAGEMENT SYSTEMS

1 GENERAL

1.1 TERMITE MANAGEMENT SYSTEMS

System requirements
Standard: To AS 3660.1 (2014).

Termite reticulation systems
System assessment: To AS 3660.3 (2014) Section 5.

1.2 SUBMISSIONS

Certification
Requirement: Submit installation certificate to AS 3660.1 (2014) Appendix A3.

2 EXECUTION

2.1 INSTALLATION

Soil treatments
Restrictions on areas of application: To AS 3660.1 (2014) clause 7.3.

Application areas: Hand spray chemical treatment to the entire dwelling perimeter and subfloor to AS 3660.1 (2014) clause 7.7 including the following:

- Footings.
- Carport subfloors.
- Verandah subfloors.

Soil and environmental condition: Do not treat soil that is water saturated or when it is raining.

Application method
Application: To AS 3660.1 (2014) clause 7.5.

Application timing: To AS 3660.1 (2014) clause 7.6.

Protection: Protect treated area as follows:

- If a treated area is not scheduled to be covered with a vapour barrier on the same day, protect treated area with a waterproof covering such as polyethylene sheeting. Provide protection until the slab is installed.
- Prevent soil disturbance and keep off treated area until the soil is completely dry.

Reapplication: Reapply soil treatment to areas disturbed by subsequent excavation, grading, landscaping and other construction activities following the application.

2.2 COMPLETION

Termite management system notice
Signage: Permanently fix a durable notice in a prominent location to BCA (2022) H1D3(3).

0201 DEMOLITION

1 GENERAL

1.1 STANDARDS

Demolition
Standard: To AS 2601 (2001).

1.2 EXISTING SITE CONDITION

Services
Redundant/disused septic tanks: Locate and allow for decommissioning and removal to **DEMOLITION**, **Existing septic tanks**.

Existing services: Disconnect, cap off and peg. If removal is required, remove to the junction.

Existing vegetation
Approval: Do not remove any existing plants or trees without Principal's approval.

1.3 SUBMISSIONS

Execution details
Requirement: Submit the following, as documented:

- Hazardous Substances Management Plan, including laboratory analysis of hazardous substances.
- Investigation and work plan.
- Safe Work Method Statement.

Notice of Completion Certificate
Submission: Within 5 days of completing the demolition works, submit a Notice of Completion Certificate (BA7) to the Permit Authority with other required documentation.

Records
Dilapidation record:

- Before demolition: Submit to each owner of each adjoining or adjacent property, a copy of the part of the record relating to that property and obtain their written agreement to the contents.
- Rectification work: Submit written acceptance of rectification works from the owner of each adjoining or adjacent property affected.

2 PRODUCTS

2.1 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 and remove them from the site. Do not burn or bury demolished materials on site. Prevent spillage of demolished materials in transit.

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

3 EXECUTION

3.1 PROCEDURAL

Work, health and safety
Requirement: To the *Work Health and Safety Act 2020 (WA)*.

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

Cultural and Aboriginal heritage items
Requirement: Conform to the *Aboriginal Heritage Act 1972 (WA)*. Protect and prevent damage or loss of items of cultural heritage or Aboriginal sites and artefacts.

Notice: If any item is suspected to be an artefact of heritage value, relic or material that is Aboriginal or belonging to early settlement, give notice.

Action: Stop construction work that might affect the item and protect the item from damage or disturbance.

3.2 HAZARDOUS SUBSTANCES

Identified hazardous substances
Register: Prepared by the principal for hazardous substances identified as present on site.

Availability: Contact the principal.

Asbestos in the workplace: To *How to manage and control asbestos in the workplace Code of Practice (2020)* by Safe Work Australia.

Audit
Requirement: Prepare a Hazardous Substances Management Plan to AS 2601 (2001) clause 1.6.1. Include the following:

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

Removal of hazardous substances
Standard: To AS 2601 (2001) clause 1.6.2.

Asbestos removal: To AS 2601 (2001) clause 3.3.2 and *How to safely remove asbestos Code of Practice (2020)* by Safe Work Australia.

3.3 INVESTIGATION AND WORK PLAN

General
Requirement: Before demolition or stripping work, prepare the work plan to AS 2601 (2001) Section 2. Include the checklist items appropriate to the project from AS 2601 (2001) Appendix A, and the following:

- Method of protection and support for adjacent property.
- Locations and details of service deviations and terminations.

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

3.4 PRE-DEMOLITION

Pest management

Survey of infestation: 6 weeks before starting demolition, survey the site and surrounding areas to identify for signs and extent of infestation.

Infestations: If identified, appropriately treat before starting demolition.

Baiting: Minimum 5 days before starting demolition, bait all rooms/sections in the buildings, including concealed spaces such as the roof space and subfloors. Do not use brodifacoum, bromadiolone, difenacoum, difethialone or flocoumafen. If required, continue baiting until all pests have been eradicated.

Redundant drains and sewers: Cap off to isolate redundant sewers and grub out if required.

Waste storage: Store waste in pest resistant, closable containers in suitable locations and remove regularly.

Fencing removal

Adjacent property owner: Before removing boundary fencing, notify adjoining property owners of commencement and anticipated completion date. Obtain consent before undertaking work.

Removal of fences: Remove all wing fences and gates and any fence erected on the lot that will not form, in part or whole, a boundary fence with an existing lot.

3.5 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

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.

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) Notification of Asbestos Removal forms and evidence that all fees have been paid. Forms are available at: wise.commerce.wa.gov.au/wise-online/nar.

3.6 SUPPORT

Temporary support

Existing buildings: Until permanent support is provided, provide temporary support for sections of existing buildings or parts of buildings being retained and which normally rely on support from work to be demolished.

Ground support: Support excavations for demolition of underground structures.

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

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

Permanent supports

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

3.7 PROTECTION

Encroachment

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

Weather protection

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

Dust protection

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

Security

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

Exposed surfaces

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

Existing services

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

Utility services: Contact BEFORE YOU DIG AUSTRALIA to identify location of underground utility services pipes and cables.

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

Recovered items

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

3.8 DEMOLITION

General

Existing utility services: If removal is required, remove to the junction.

Existing septic tanks

Requirement: Conform to the *Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA)*.

Redundant/disused tanks: Decommission tanks as follows:

- Completely empty tanks, 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 tanks, drains and wells as required.
- Fill up excavations, tank, drains and soak wells.

Backfilling to excavation: Place fill in near-horizontal layers of uniform thickness no greater than 150 mm after compaction, deposited systematically across the fill area to achieve minimum relative compaction to AS 3798 (2007) Table 5.1.

Local authority approval: After decommissioning, submit certification and documentation to the local government authority health officer's requirements.

3.9 COMPLETION

Notice of completion

General: Give at least 5 working days' notice of completion of demolition so that adjoining or adjacent structures may be inspected following completion of demolition.

Reinstatement

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

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

Temporary support

General: Remove at completion of demolition.

0221 SITE PREPARATION

1 EXECUTION

1.1 CONTROL AND PROTECTION

Erosion control

General: Plan and carry out the work to protect natural and stormwater drainage systems from sedimentation by minimising soil erosion and sediment transportation.

Dewatering

Requirement: Keep earthworks free of water. Provide and maintain slopes, crowns and drains for excavations and embankments to make sure there is free drainage. Construct, including placing fill, masonry, concrete and services, on ground that is free of water. Prevent water flow over freshly laid work.

Water quality

Washout: Prevent washout from entering waterways and stormwater drains.

Cross connection: Prevent cross connections between stormwater and the public sewerage system.

Backflow prevention: To AS/NZS 3500.1 (2021) and the requirements of the network utility operator.

1.2 TREE PROTECTION

Trees to remain

Extent: Trees not marked for removal.

Tree protection

Tree protection zone (TPZ): To AS 4970 (2009) Section 3.

Tree protection measures: To AS 4970 (2009) Section 4.

Monitoring and certification: To AS 4970 (2009) Section 5.

Work near trees

Material placement: 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: If excavation is required within the dripline, use hand methods so that root systems remain intact and undamaged.

1.3 SITE CLEARING

Extent

Requirement: Clear only areas occupied by works such as structures, paving, excavation, regrading and landscaping or other areas documented for clearing.

Clearing and grubbing

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

Soil: Turn up soil to a minimum depth of 700 mm.

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 as follows:

- Below subgrade under buildings, embankments or paving: 500 mm.
- Below finished surface in unpaved areas: 300 mm.

Backfilling: Fill 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.

0222 EARTHWORK

1 GENERAL

1.1 STANDARDS

General

Earthworks: Conform to the recommendations of those parts of AS 3798 (2007) that are referenced in this worksection.

1.2 INTERPRETATION

Definitions

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

- Bad ground: Ground unsuitable for the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground that is or becomes soft, wet or unstable.
- Rock: Monolithic material with volume greater than 0.3 m^3 that cannot be removed until broken up by rippers or percussion tools.
- Subgrade: The trimmed or prepared earth material on which the pavement, footing or slab is constructed. Generally taken to relate to the upper line of the earth material.
- Zone of influence: A foundation zone bounded by planes extending downward and outward from the bottom edge of a footing, slab or pavement and defining the extent of foundation material having influence on the stability or support of the footings, slab or pavement.

1.3 SUBMISSIONS

Certification

Requirement: Submit engineer's signed compaction certificate before commencing construction.

Products and materials

Pesticides and herbicides: Submit manufacturer’s product data before application.

Binders and wetting agents: Submit manufacturer’s product data before use.

2 PRODUCTS

2.1 GENERAL

Unsuitable materials

Requirement: Do not use fill or imported topsoil containing the following:

- Clay material.
- Refuse or materials toxic to humans, animals or plants.
- Stumps, roots or stones more than 50 mm.

Topsoil

Requirement: Topsoil conforming to the following:

- With an organic content not less than 3% by mass.
- With a pH between 5.5 and 7.5.

- With a soluble salt extent not more than 0.06% by mass.

2.2 FILL MATERIALS

General
Suitable material: To AS 3798 (2007) clause 4.4 including inorganic, non-perishable material suitably graded and capable of compaction to the documented density.

Unsuitable materials: Do not use fill defined as unsuitable by AS 3798 (2007) clause 4.3.

3 EXECUTION

3.1 GEOTECHNICAL

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

- Bad ground.
- Rock.

3.2 REMOVAL OF TOPSOIL

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

Maximum depth: 200 mm.

Topsoil stockpiles
General: Stockpile site topsoil intended for re-use.

Stockpile maximum height: 1.5 m.

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

3.3 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 the site to the levels and profiles required for the documented structures, pavements, filling and landscaping. Make allowance for compaction, settlement or heaving.

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

Crawl space: Provide 400 mm minimum clearance under timber and steel bearers.

Bearing surfaces
Requirement: Provide even plane bearing surfaces for loadbearing elements including footings. Step to accommodate level changes. If supporting masonry, make the steps appropriate to the courses.

Rock
General: Do not use explosives.

Existing footings
Requirement: If excavation is required within the zone of influence of an existing footing, provide supports to the footing sufficient to prevent damage arising from the works. Use methods including temporary shoring or underpinning.

Existing services
Utility services: Contact BEFORE YOU DIG AUSTRALIA to identify location of underground utility services pipes and cables.

Reinstatement of excavation
Requirement: If excavation exceeds the required depths, reinstate to the correct depths, levels and bearing capacity.

Other buildings/adjoining properties
Requirement: Carry out excavation within 3 m of other buildings and boundaries to BCA (2022) H1D3 and the requirements of a structural engineer.

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

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

3.4 PREPARATION FOR FILLING

Preparation
Stripping: Prepare the ground surface before placing fill (including topsoil fill), ground slabs or load bearing elements to AS 3798 (2007) clause 6.1.5. Remove loose material, debris, organic matter and material that inhibits or prevents satisfactory placement of fill layers.

Compaction: Compact the ground exposed after stripping or excavation, to a minimum depth of 150 mm, to the minimum relative compaction in AS 3798 (2007) Table 5.1.

Embankments
Requirement: Grade embankments to an even slope.

Maximum gradient: 1:4.

3.5 PLACING FILL

General
Fill: Conform to BCA (2022) H1D4 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.

Extent: Extend fill 1000 mm past the building perimeter to a maximum slope of 1(V):2(H) to the natural ground.

Placement: To BCA (2022) H1D4.

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: Determine in conformance with AS 1289.5.1.1 (2017) or AS 1289.5.2.1 (2017), as appropriate. Adjust the moisture content of fill to ±2% of the optimum moisture content during

compaction as required to achieve the documented density.

Compaction

General: 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.

Fill: Compact fill 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.

Minimum relative compaction: To AS 3798 (2007) Table 5.1.

3.6 PLACING TOPSOIL

Stockpiled topsoil

Cultivation: Rip subgrade to a depth of 100 mm or to the depth of rippable subgrade if less. Cultivate around services and tree roots by hand. Trim to allow for the required topsoil depth.

Herbicide: Apply before placing topsoil. Use environmentally acceptable methods conforming to the *Health (Pesticides) Regulations 2011 (WA)*, such as a non-residual glyphosate herbicide, at the recommended maximum rate. Leave herbicide undisturbed for a minimum of 2 weeks unless cleared by the principal.

Binders and wetting agents: Apply to manufacturer's recommendations.

Placing: Spread and grade evenly to provide an average compacted thickness of 50 mm and a minimum compacted thickness of 30 mm at any location.

Compaction: Lightly compact topsoil so that the finished surface is smooth, free from lumps of soil, at the required level, ready for cultivation and planting.

Edges: Finish topsoil flush with abutting kerbs, mowing strips and paved surfaces. Feather edges into adjoining undisturbed ground.

Finish level: Conform to the following:

- 30 mm below paths, kerbs or slabs.
- Minimum one brick course below the damp-proof course of buildings.
- Levelled with bitumen or concrete driveways.
- Free of undulations, irregularities and wheel ruts.

Disposal of excess topsoil

On-site: Dispose of surplus topsoil remaining on site by spreading evenly over the areas already placed.

0223 SERVICE TRENCHING

1 PRODUCTS

1.1 FILL MATERIALS

General

Backfill material: To **FILL MATERIALS** in *0222 Earthwork* and as follows:

- Sulfur content: Do not provide fill with sulfur content exceeding 0.5% within 500 mm of concrete and cement bound elements (for example masonry) unless such elements are protected by impermeable membranes or equivalent means.
- In reactive clay: In sites classified M, M-D, H1, H1-D, H2, H2-D, E or E-D to AS 2870 (2011), re-use excavated site material at a moisture content within ±1% of that of the adjoining in situ clay.

2 EXECUTION

2.1 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.

Paving

Removal: Take up paving units both full and cut by hand, between the trench set-out lines. Neatly stack on wooden pallets.

2.2 EXCAVATION

General

Requirement: 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.

2.3 TRENCH BACKFILL

General

Place fill: To **PLACING FILL** in *0222 Earthwork*.

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

2.4 SURFACE RESTORATION

General

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

0241 LANDSCAPE - WALLING AND EDGING

1 GENERAL

1.1 RESPONSIBILITIES

Performance
Requirement:
- Complete for their function.
- Conforming to the detail and locations documented.
- Firmly fixed in position.
- Does not form a safety hazard.

2 PRODUCTS

2.1 TIMBER

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 or LOSP treated timber: If proposed, provide details.

Sleepers
Concrete: Proprietary system of concrete sleepers and concrete or galvanized steel posts.

2.2 DRY STONE WALLS

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

Field stone: Local weathered uncut random sized natural stones.

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

2.3 STONE PITCHING

General
Stones: Clean, hard and durable laterite.

- Size: No less than 150 mm or more than 300 mm.

Mortar mix proportion (cement:lime (hydrated or putty):sand): 1:0.1:3.

Bedding layer: Gravel, 30 mm thick.

2.4 GEOTEXTILES

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

Identification and marking: To AS 3705 (2012).

2.5 EDGING

Sawn timber
Hardwood: To AS 2796.1 (1999) Section 2.

Concrete
Standard: To AS 1379 (2007)

Grade: Minimum N20.

Steel
Finish: Hot-dip galvanized.

Thickness: Minimum 4 mm.

Aluminium
Thickness: Minimum 4 mm.

Brick
Requirement: Provide masonry units.

2.6 STONE BOULDERS

General
Dimension: Not less than 400 mm.

3 EXECUTION

3.1 GENERAL

Set-out
General: Set out the positions of walls and edging.

Clearing
Extent: Except for trees or shrubs to be retained, clear vegetation within 1 m of the landscape walls. Grub out stumps and roots of removed trees or shrubs and trim the grass to ground level, but do not remove the topsoil.

Excavation
Extent: Excavate for foundations and footings.

Backfilling
Requirement: Make sure geotextiles and subsurface drainage have been installed before backfilling.

3.2 DRY STONE WALLS

Construction
Generally: Select the stones for their locations and lay in the wall with minimum stonecutting as follows:
- Each stone is stable, non-rocking and firmly interlocked with adjacent stones without mortar.
- The wall face shows reasonably regular, flat and vertical stone faces.
- Vertical joints or perpends between stones are spanned by the next stone above.
- Stones are laid generally as through stones whenever possible.
- At least 50% of footings, 30% of wall stones and all coping stones are laid as through stones.

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

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

Retaining walls
Construction: If dry stone walls act as retaining walls, construct the stonework to be free draining through the wall. Secure the top course of the wall

with cement mortar bedding. Backfill progressively, with a layer at least 300 mm thick of porous material, such as coarse aggregate or crushed rock in the size range 20 to 40 mm.

Minimum thickness: 300 mm.

Wall face batter: Batter back the wall face 50 to 70 mm for every 300 mm in height.

Rip-rap retaining walls

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

3.3 STONE PITCHING

General

Laying: Lay stones as follows:

- Lay stone in close fitting pattern rammed into position.
- Fill spaces between the stones with mortar to form an even, sealed surface.
- Keep exposed rock surface free from mortar.

Maximum spacing between stones: 10 mm.

3.4 SLEEPER WALLS

Construction

Concrete sleeper wall: To manufacturer's recommendations.

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

3.5 EDGING

Sawn timber

Installation: Set edgings flush with adjoining surfaces. Drive galvanized steel stakes into the ground at 500 mm centres on the planting side of the edging. Fix edging to the stakes with galvanized nails, two per fixing.

Curving: Space the pegs to hold edging to a uniform curve. Reduce edging thickness to 15 mm if required for bending.

Concrete

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

Concrete kerb: Fixed form, extrusion or slip forms.

Steel

Installation: Drive galvanized steel stakes into the ground at 500 mm centres on the planting side of the edging. Butt weld edging to stakes and grind smooth.

Aluminium

Installation: Drive galvanized steel stakes into the ground at 500 mm centres on the planting side of the edging. Butt weld edging to stakes and grind smooth.

Brick

Setting: On a 1:1:6 (cement:lime:sand) mortar haunch.

Laying: Lay edging bricks to the documented bond or coursing pattern.

Joints: 3 mm struck flush.

Alignment: Even and free from dips, humps and bends.

Cleaning: Wash off mortar progressively.

0242 LANDSCAPE - FENCES AND BARRIERS

1 GENERAL

1.1 RESPONSIBILITIES

Performance
Requirements:
- Complete for their function.
- Conforming to the detail and location drawings.
- Firmly fixed in position.

2 PRODUCTS

2.1 TIMBER

Posts and rails
Hardwood: To AS 2082 (2007).

Softwood: To AS 2858 (2023).

Pickets and palings
Hardwood: To AS 2796.1 (1999) Section 8.

Hardwood grade to AS 2796.2 (2006): Select.

Softwood: To AS 4785.1 (2002) Section 7.

Seasoned cypress pine: To AS 1810 (1995) Section 5.

Preservative treatment
Timber type: Provide only timbers with preservative treatment to the documented hazard class.

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

CCA treated timber: If proposed, provide details.

2.2 STEEL

Steel tubes
Posts, rails, stays and pickets: To AS/NZS 1163 (2016).

Grade: C350L0.

Post and rail finish: Hot-dip galvanized.

Steel panels
Zinc-coated or aluminium/zinc alloy coated steel: To AS 1397 (2021).

Sheeting: Prepainted to AS/NZS 2728 (2013).

2.3 CONCRETE

General
Standard: To AS 1379 (2007).

Grade: N20 or proprietary packaged mix.

2.4 COMPONENTS

Gates
General: As documented.

Barriers for swimming pools
Design, construction and performance: To the NCC cited AS 1926.1 (2012).

Location of barriers for private swimming pools: To AS 1926.2 (2007).

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

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

Property boundaries: Confirm by survey.

Excavation
Posts: Excavate post holes so that they have vertical sides and a firm base. Spread surplus material on the principal's side of the fence.

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

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

Concrete footings
In ground: Place mass concrete around posts to protect posts from waterlogged conditions and finish the top with a 25 mm fall from the post to the footing edge.

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

3.2 FENCING

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

Picket fence: Nail twice to each rail.

Plain paling fence: Provide 2 rails for fences up to 1800 mm high and locate 200 mm from the tops and bottoms of the palings. Close butt palings and nail twice to each rail.

Lap and cap paling fence: Provide 2 rails for fences up to 1800 mm high and locate 200 mm from the bottoms of the palings and abutting the tops of palings. Close butt larger palings and nail twice to each rail. Fix smaller palings over joints and nail twice to each rail. Nail capping to the top rail.

Steel panel fencing
Protection: Make sure bottom rails have clearance to posts and are at least 50 mm clear of the ground.

3.3 GATES

General
Construction: Construct gates as follows:
- Ledges and braces: Match fence rails.
- Pickets or palings: Match fencing.

Pedestrian entry gates for grouped dwellings
General: Provide the following:
- Lockable gates with 180 degree opening range.
- Hinges with smooth operation and adjustment for future sagging.

Separate courtyard entry gates for individual or grouped dwellings
Hardware: Provide the following:
- Drop bolt and ferrule to each leaf of double gates.

- Latch to one leaf of double gates.
- Provision for locking by padlock.
- Hinges with smooth operation and adjustment for future sagging.

Hand access: If required, provide hand holes to give access from outside to reach locking provision.

0251 LANDSCAPE - SOILS

1 GENERAL

1.1 STANDARDS

Soils
Site and imported topsoil: To AS 4419 (2018).

1.2 INTERPRETATION

Definitions
General: For the purposes of this worksection, the definitions given in AS 4419 (2018) and the following apply:

- Bad ground: Ground unsuitable for the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground that is or becomes soft, wet or unstable.
- Imported topsoil: Similar to local natural soil, suitable for the establishment and ongoing viability of the selected vegetation, free of weed propagules and of contaminants and classified by texture to AS 4419 (2018) Appendix K Table K1, as follows:
  . Fine: Clay loam, fine sandy clay loam, sandy clay loam, silty loam, loam.
  . Medium: Sandy loam, fine sandy loam.
  . Coarse: Sand, loamy sand.
- Site rock: Rocks selected for salvage.
- Site topsoil: Natural soil, excavated from the site, that contains organic matter, supports plant life, conforms generally to the fine-to-medium texture classification to AS 4419 (2018) and is free from the following:
  . Stones more than 25 mm diameter.
  . Clay lumps more than 50 mm diameter.
  . Weeds and tree roots.
  . Sticks and rubbish.
  . Material toxic to plants.
- Soil blend: A landscape soil derived from the blending of two or more of sand, natural soil material or organic materials and with a bulk density and organic matter content to meet site specific requirements.
- Top dressing: A soil that is suitable for surface application to turf and lawns.
- Topsoil: Includes landscape soil, low density soils and soils for turf and lawns.

1.3 SITE INVESTIGATION

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

- Bad ground.
- Discrepancies.
- Rock.

- Springs, seepages.
- Topsoil less than 100 mm deep.

1.4 SUBMISSIONS

Certification
Compost: Submit certification as evidence of compost pH value.

Execution details
Program: Submit a work program in the form of a bar chart, for the landscape works.

Products and materials
Supplier's data: Submit supplier's data including the following:

- Material source of supply.

Type tests: Submit test results for the following:

- Imported topsoil: To PRODUCTS, **TESTING**.

Samples
Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

Subcontractors
General: Submit names and contact details of proposed suppliers and evidence of the following, if appropriate:

- Experience in the required type of work.
- Production capacity for material of the required type, sizes and quantity.
- Lead times for delivery of materials to the site.

Tests
Site tests: Submit test results for the following:

- Site topsoil: To EXECUTION, **TESTING**.

1.5 INSPECTION

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

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

2 PRODUCTS

2.1 GENERAL

Samples
Requirement: Provide representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: At least 5 working days before bulk deliveries, provide a 1 kg sample of each type documented.

2.2 TOPSOIL

General
Properties: Conform to the following:

- Decompacted.
- Aerated.
- Free draining.
- Free of contamination from construction waste.

Deliveries: Documentation to AS 4419 (2018) clauses 6 and 7.

Additives: If using additives to ameliorate topsoil conform to the relevant criteria of AS 4419 (2018).

Compost: Well-rotted vegetative material or animal manure, free from harmful chemicals, grass and weed growth to AS 4454 (2012) and to the organic content by mass, as documented.

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

Mix proportion (loam:sand): 1:1.

Site topsoil
Requirement: Site topsoil, as documented.

Soil blend: If required, stripped natural soil with sand and/or organic matter and recommended ameliorant material.

Imported topsoil
Requirement: Imported topsoil to AS 4419 (2018) Tables 1, 2 and 3 and as documented.

Imported topsoil particle size table (% passing by mass)

Sieve size (mm)	Soil textures		
	Fine	Medium	Coarse
2.36	100	100	100
1.18	90 – 100	90 – 100	90 – 100
0.60	75 – 100	75 – 100	70 – 90
0.30	57 – 90	55 – 85	30 – 46
0.15	45 – 70	38 – 55	10 – 22
0.075	35 – 55	25 – 35	5 – 10
0.002		2 – 15	2 – 8

Imported topsoil nutrient level table

Nutrient	Sufficiency range (mg/kg)
Nitrate-N (NO_3)	> 25
Phosphate-P (PO_4) – P tolerant	43 to 63
Phosphate-P (PO_4) – P sensitive	< 28
Phosphate-P (PO_4) – P very sensitive	< 6
Potassium (K)	178 to 388
Sulfate-S (SO_4)	39 to 68
Calcium (Ca)	1200 to 2400
Magnesium (Mg)	134 to 289
Iron (Fe)	279 to 552
Manganese (Mn)	18 to 44
Zinc (Zn)	2.6 to 5.1
Copper (Cu)	4.5 to 6.3
Boron (B)	1.4 to 2.7
Method References pH in H_2O (1:5), pH in $CaCl_2$ (1:5) and Electrical Conductivity (EC) by Rayment & Higginson (1992) method 4A2, 4B2, 3A1. Soluble Nitrate-N by APHA 4500. Extractable P by Mehlich 3 – ICP. Exchangeable cations – Ca, Mg, K, Na by Mehlich 3 – ICP. Extractable S by Mehlich 3 – ICP.	

Nutrient	Sufficiency range (mg/kg)
Extractable trace elements (Fe, Mn, Zn, Cu, B) by Mehlich 3 - ICP.	

2.3 STRUCTURAL SUPPORT SOIL

General
Requirement: To AS 4419 (2018) Tables 4 and 5, and as documented.

2.4 TESTING

Topsoil tests
Sampling: To the recommendations of AS 4419 (2018) Appendix A.

Method: Test as follows:

- Landscape soils: To AS 4419 (2018) Table 1.
- Low density soils: To AS 4419 (2018) Table 2.
- Soils for turf and lawns: To AS 4419 (2018) Table 3.
- Structural support soils: To AS 4419 (2018) Table 4.

Test report
Requirement: Prepare a test report including the following:

- General:
  . Suitability of the soil for documented use.
  . Suitability for establishment and ongoing viability of the documented site vegetation.
  . Prescence of any weed propagules or contaminants.
- Site topsoil:
  . Contaminant removal.
  . Weed eradication: Species and eradication method.
  . Soil amelioration: If required, the source of ameliorant materials, rates and methods of incorporation and recommendations for use in bushland restoration areas, planting on grade and grass mixes.
- Imported topsoil:
  . Similarity to naturally occurring local soil.
  . Soil amelioration: If required, the source of ameliorant materials, rates and methods of incorporation.

3 EXECUTION

3.1 PREPARATION

Vegetative spoil
Spoil suitable for bushland restoration: Spread freshly harvested native plant biomass, free of weed propagules.

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

Embankment stabilisation
Requirement: If necessary to prevent erosion or soil movement, stabilise embankments with matting.

Matting overlay material: Biodegradable fibre reinforced with lightweight polymer mesh, coir.

- High erosion zones: Flexible carbon black UV stabilised interwoven nylon mesh.

Matting overlay pegs: U-shape galvanized steel, at 1000 x 1000 mm intervals generally, 250 mm at overlaps.

Matting overlay installation:

- If seeding is required, sow before installing lightweight matting.
- If planting is required, plant after installing medium or heavy weight matting.
- Peg the matting into 300 x 300 mm anchor trenches at top and bottom, backfill the trenches with soil and compact.

3.2 ROCK WORK

New rock work
Erosion control: Protect the weathered faces from damage.

Site rock: Stockpile for future placement and accessibility for lifting. Dispose of other rock off site.

Imported rock: Provide rock that has been selected before delivery.

3.3 EARTH MOUNDS

Construction
Placing: Place clean fill in layers approximately 150 mm thick compacted to 85% of the dry density ratio of the surrounding soil tested to AS 1289.5.4.1 (2007). Minimise slumping and further compacting.

Edges: Construct changes in grade over a minimum width of 500 mm to smooth, gradual and rounded profiles with no distinct joint.

Existing trees: Maintain the natural ground level under the canopy.

Pipes, culverts and associated structures: Construct mounding to avoid unbalanced loading.

Drainage: Construct mounds to allow free drainage of surface water and to eliminate ponding.

3.4 SUBSOIL

Ripping
General: Rip parallel to the final contours. Do not rip if the subsoil is wet or plastic. Do not rip within the dripline of trees and shrubs to be retained.

Subsoil: Rip the subsoil to the following typical depths:

- Compacted subsoil: 300 mm.
- Heavily compacted clay subsoil: 450 mm.

Planting beds
Excavated: Excavate to reduce the subsoil level to at least 300 mm below finished design levels. Shape the subsoil to fall to subsoil drains, if required. Break up the subsoil to a further depth of 100 mm.

Unexcavated: Remove weeds, roots, rubbish and other debris. Reduce the planting bed level to 75 mm below finished design levels.

Cultivation
Requirement: As documented.

Minimum depth: 100 mm.

Services and roots: Do not disturb services or tree roots. If required, cultivate these areas by hand.

Cultivation: Cultivate manually within 300 mm of paths or structures. Remove stones exceeding 25 mm, clods of earth exceeding 50 mm and weeds, rubbish or other deleterious material brought to the surface during cultivation. Trim the surface to design levels after cultivation.

Additives

General: Apply additives after ripping or cultivation and incorporate into the upper 100 mm layer of the subsoil as documented.

Gypsum: Incorporate at the rate of 0.25 kg/m^2.

Herbicides

General: Before spreading topsoil apply a herbicide treatment.

3.5 TOPSOIL

Site topsoil preparation

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

Additives: During the screening process add the following:

- 15% by weight coarse sand minimum particle size 0.2 mm.
- Ameliorants materials to the recommendations of the test report.
- Additives program: 8 weeks before stolonising or turfing.

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

Contamination: If diesel oil, cement or other phytotoxic material has been spilt on the site topsoil, excavate the contaminated soil and dispose of the soil off-site.

Placing topsoil

Topsoil: Do not incorporate topsoil into the works until soil testing results have been approved. Remove unauthorised material from the site.

Spreading: Spread the topsoil on the prepared subsoil and grade evenly, making allowances, if appropriate, for the following:

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

Steep batters: If using a chain drag for spreading, make sure there is no danger of batter disturbance.

Finishing: Feather edges into adjoining undisturbed ground.

Consolidation

General: Compact lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface that has the following characteristics:

- Finished to design levels.
- Smooth and free from stones or lumps of soil.
- Graded to drain freely, without ponding, to catchment points.
- Graded evenly into adjoining ground surfaces.
- Ready for planting.

Topsoil depths

General: Spread topsoil to the following typical depths:

- Excavated planting areas:
  - . Organic mulch: 225 mm.
- Irrigated grassed areas generally: 150 mm.
- Irrigated grassed areas, heavy use (e.g. playing fields, playgrounds and public parks): 200 mm.
- Non-irrigated grass areas: 100 mm.
- Earth mounds:
  - . Mass planted surfaces: 300 mm.
  - . Grassed surfaces: 100 mm.
- Top dressing: 10 mm.

Surplus topsoil

General: Spread surplus topsoil on designated areas on-site or dispose off-site.

3.6 STRUCTURAL SUPPORT SOIL

Preparation

Existing soil: Remove.

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

Construction

Spreading: Maintain a self-draining surface.

Compaction: To **PLACING FILL**, **Compaction** in *0222 Earthwork*.

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

Moisture content: Adjust the moisture content at the time of works to 12.5% of the optimum moisture content to AS 1289.5.4.1 (2007).

Contaminated structural soil: If contamination occurs after placing, excavate and dispose off-site.

Surplus structural soil: Remove.

0252 LANDSCAPE - NATURAL GRASS SURFACES

1 GENERAL

1.1 SUBMISSIONS

Certification
Turf: Submit the supplier's certification as evidence that turf is free from diseases, pests and weeds at the time of delivery.

Execution details
Program: Submit a work program for the natural grass surfaces landscape works.

Maintenance program: Submit a proposed maintenance program.

Material storage on site: Submit proposal.

Products and materials
Supplier's data: Submit supplier's data including the following:

- Material source of supply.
- Evidence of experience in supply of the required material.
- Production capacity for material of the required type and quantity.
- Lead times for delivery of material to the site.

Samples
Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

1.2 INSPECTION

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

- Clearing completed.
- Setting out completed.
- Grassing bed prepared before turfing.
- Grassing or turfing completed.

2 PRODUCTS

2.1 GENERAL

Samples
Requirement: Provide representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

2.2 GRASS

Turf
Supplier: A specialist grower of cultivated turf.

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

Turf properties: Provide turf with the following properties:

- Consisting of 25 mm deep, dense, well-rooted, vigorous grass growth in 25 mm deep topsoil.
- Drought tolerant.

Turf dimension:

- Roll width: Minimum 300 mm, in sound unbroken condition.
- Length: Minimum 1.5 m.

Stolons
Description: Well-established fibrous runners 50 to 100 mm in length, with minimum green leaf material.

Supplier: A specialist grower of cultivated turf.

2.3 FERTILISER

General
Description: Proprietary fertilisers, delivered to the site in the manufacturer's labelled and unopened bags or containers.

Labelling
General: To the applicable statutory requirements, including manufacturer or supplier, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

Label type: To withstand transit without erasure or misplacement.

2.4 ACCESSORIES

Grass reinforcement
Description: Lightweight interlocking plastic cellular paving system suitable for pedestrian and occasional vehicular traffic including emergency vehicles.

3 EXECUTION

3.1 PREPARATION

Existing grass removal
Herbicide: Spray existing grass with a non-residual glyphosate herbicide in any registered formulae, at the recommended maximum rate.

Manual removal: Remove existing grass layer a minimum 2 weeks after application of herbicide.

Weed eradication
Herbicide: Conform to the following:

- Method: Eradicate weeds using environmentally acceptable methods conforming to the *Health (Pesticides) Regulations 2011 (WA)*, such as a non-residual glyphosate herbicide, at the recommended maximum application rate.
- Timing: With sufficient timing before establishment of turf and as recommended by the plant supplier.

Manual weeding: Remove weed growth throughout grassed areas.

Vegetative spoil
Disposal: Remove vegetative spoil from site. Do not burn.

Soil preparation
Subsoil: To EXECUTION, **SUBSOIL** in *0251 Landscape - soils*.

Site topsoil or imported topsoil: To EXECUTION, **TOPSOIL** in *0251 Landscape - soils*.

Levelling: Remove any debris. Level and shape the dry soil surface. Allow maximum 30 mm set-down to hard surfaces for turf and stolons.

Fertiliser

Soil improvement: Spread the fertiliser evenly over the cultivated bed a maximum 48 hours before placing grass as follows:

- Turfing and stolonising: Mix the fertiliser thoroughly into the topsoil before placing the turf or stolons.

3.2 TURFING

Preparation for turfing

Requirement: Prepare planting area for turfing as follows:

- Remove any rubbish, rubble, stones and roots.
- Rotary hoe: To a minimum depth of 150 mm. Provide runners with minimum 50 mm soil cover.
- Soil improver: Apply to manufacturer's recommendations.
- Wetting agent: Apply to manufacturer's recommendations.
- Watering: Keep moist to 100 mm deep before planting.
- Light rolling: Lightly roll to form an even, levelled surface without wheel ruts.
- Level: If turfing areas are adjacent to paving, make sure soil level is 50 mm below the top of paving.

Supply

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

Fertilising

Requirement: Mix the fertiliser thoroughly into the topsoil before placing the turf with a slow release fertiliser applied to the manufacturer’s recommendations.

Application

Requirement: Do not install turf on slopes steeper than 1:3.

Method: Lay the turf as follows:

- Stretcher bond pattern with the joints staggered and close butted.
- Parallel with the long sides of level areas and with contours on slopes.
- Finish flush, after tamping or rolling, with adjacent finished surfaces of ground, paving edging areas.

Laying: Close butt the end joints and space the turf strips 300 mm apart. Lay top dressing between the turf strips. Finish with an even surface.

Tamping or rolling: Lightly tamp or use a turf roller to provide to an even surface immediately after laying.

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

Watering

General: Water immediately after laying until the topsoil is moistened to its full depth. Maintain moisture to this depth.

Initial establishment

General: Maintain turfed areas until there is a dense continuous sward of healthy grass over the whole turfed area, evenly green and of a consistent height.

Failed turf: Lift failed turf and replace with new turf.

Levels: If levels have deviated from the design levels after placing and watering, lift turf and regrade topsoil to achieve design levels.

Top dressing: Mow the established turf and remove cuttings. Lightly top dress to a depth of 10 mm. Rub the dressing into the joints and correct any unevenness in the turf surface.

3.3 STOLONISING

Preparation

General: Moisten topsoil to full depth.

Supply

Elapsed time: Deliver stolons to the site within 24 hours of harvesting and plant within 36 hours of arrival on site. Prevent stolons from drying out between harvesting and planting.

Application

General: As documented.

Method: Using a disk sprigger or row planter, mechanically sprig the stolons into the prepared soil to a minimum depth of half the stolon length, at maximum 150 mm centres in both transverse directions over the whole of the planting area and extending 1 m into adjacent grassed areas.

Stimulant: Three days after planting, spray with hormone root growth stimulant.

Erosion areas, slopes and swales: Immediately after planting, spray with binder at the rate of 250 L/ha.

Watering

General: Water thoroughly on completion of planting. Keep the topsoil moist to full depth.

Initial establishment

General: Replant areas that fail to grow.

3.4 TEMPORARY GRASSING

Preparation

General: If a prepared area becomes compacted before sowing begins, rework the ground surface before sowing.

Application

General: As documented.

Method: Evenly distribute the seed using purpose made sowing machinery. Lightly rake the surface to cover the seed.

Cover crop density: Sufficient to hold the soil and prevent erosion.

Minimum coverage: No bare areas greater than 50 mm in diameter to 90% of the documented area and no bare areas greater than 200 mm to 100% of the area.

Reseeding: Reseed areas where the seed fails to germinate within 3 weeks of the date of original sowing and within 3 months where required densities have not been met. Continue to reseed at minimum monthly intervals with an additional soil preparation as required, until required densities are met.

Watering

General: Immediately after sowing, water to a depth of 100 mm. Continue watering until germination and establishment.

After establishment: Water as required to maintain seed material in a healthy condition.

Establishment

General: Maintain temporary grassing areas until no longer required.

Weeding: Remove weeds that emerge in newly established areas.

Reseeding: Reseed over the course of the contract to maintain required densities.

3.5 GRASS REINFORCING

Installation

General: Install to the manufacturer's recommendations and as documented.

Preparation: Excavate to required levels and compact subgrade.

Base course: Place and compact either of the following:

- Non-calcareous, free-draining washed sand, comprising 80% 0.1 to 1.0 mm grading.
- 1.0 to 5.0 mm gravel aggregate.

Base course depth:

- Pedestrian walkways: 100 mm.
- Passenger vehicles: 150 mm.
- Heavy vehicles: 250 mm.

Growing media: 80:20 (sand:organic sandy soil) mix.

Grass reinforcement: Place on base course and interlock. Spread growing media over grass reinforcement to heights as follows:

- Turfed areas: 5 mm.

Protection: Prevent traffic until the root system is established and anchored to the base course.

3.6 COMPLETION

Existing grass

General: Where existing grass is within the landscape contract area, maintain it as for the corresponding species of new grass.

Grassed areas

Maintenance: Start grass maintenance works at the completion of sowing and turfing. Maintain healthy weed-free growth.

Records

Logbook: Keep on site and make available for inspection a logbook, recording the following:

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

0253 LANDSCAPE - PLANTING

1 GENERAL

1.1 SUBMISSIONS

Certification

Plant species: Submit the supplier's certification as evidence that plants are true to the required species and type, and free from diseases, pests and weeds at the time of delivery.

Compost: Submit a certification as evidence of compost pH value.

Execution details

Alternative materials for ground cover: If proposed, submit proposal.

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

Spraying: Submit proposal.

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

Material storage on site: Submit proposal.

Products and materials

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

- Material source of supply.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

1.2 INSPECTION

Notice

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

- Plant holes excavated and prepared for planting.
- Plant material set out before planting.
- Planting, staking and tying completed.
- Completion of plant establishment work.

2 PRODUCTS

2.1 GENERAL

Samples

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

Bulk materials: At least 5 working days before bulk deliveries, provide a 1 kg sample of each type documented with required test results.

2.2 SOIL CONDITIONING COMPOST

Compost

Type: Mature soil conditioning compost free from harmful chemicals, grass and weed growth.

Application rate: Apply at an application rate that accounts for the immediate fertiliser equivalence of the compost as part of the overall fertiliser management schedule.

Particle size as a soil conditioner, pH, physical and chemical contaminants: To AS 4454 (2012) Table 3.1(A).

Mature compost: To AS 4454 (2012) Appendix N Table N3.2.

Soil conditioning properties

Chlorine content: Less than 1000 mg/kg to Rayment and Lyons 2011 test method.

Compost fertiliser equivalence properties values

Requirement: Establish the following values for each type of soil conditioning compost to Rayment and Lyons 2011 test methods:

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

2.3 FERTILISER

General

Description: Proprietary fertilisers, delivered to the site in the manufacturer's labelled and unopened bags or containers, as documented.

Application rate: Vary the application rate to allow for the plant-available immediate fertiliser equivalence value of the soil conditioning compost.

Labelling

General: To the applicable statutory requirements, including manufacturer or supplier, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

2.4 MULCH

General

Type: Composted or pasteurised mulch to AS 4454 (2012). Free of deleterious and extraneous matter including soil, weeds, plastic, metal, paint, rubber and sticks. Do not include fine mulch.

Particle size: ≤ 20 mm.

Physical and chemical contaminants: To AS 4454 (2012) Table 3.1(A).

Organic mulch types

General: Free of stones.

Brush chippings and leaf litter: Vegetative material processed through a chipper as follows:

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

Pine bark: From mature trees, free from wood slivers.

Pine flake: Pinus species sapwood slivers, including fragments of pine bark.

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

Inorganic mulch types

Washed river pebble: Uniform size or graded material in the size range 6 to 10 mm.

Decomposed granite gravel: Uniform size or graded material in the size range 5 to 20 mm, of uniform colour and low plasticity.

Crushed quartz: Uniform size or graded material in the size range 5 to 20 mm, of uniform colour.

Marble chip gravel: Uniform size or graded material in the size range 5 to 20 mm, of uniform colour.

Slate: Plum slate slivers in the size range 5 to 25 mm.

Shale: Uniform size or graded material, no particles smaller than 0.1 mm diameter.

Scoria: Uniform size or graded material.

Binders

General: Materials suitable for cold spray application to stabilise mulched surfaces on banks or high erosion areas.

3 EXECUTION

3.1 PREPARATION

Weed eradication

Herbicide: Eradicate weeds using environmentally acceptable methods conforming to the *Health (Pesticides) Regulations 2011 (WA)*, such as a non-residual glyphosate herbicide in any registered formulae, at the recommended maximum application rate.

Manual weeding: Regularly remove weed growth by hand throughout grassed, planted and mulched areas. Remove weed growth from an area of 750 mm diameter around the base of the trees in grassed areas. Continue weeding throughout the course of the works and during the plant establishment period.

Vegetative spoil

Disposal: Remove vegetative spoil from site. Do not burn.

Fertiliser

Requirement: Fertilise all new planting areas with an organic fertiliser and pelleted fowl manure.

Shrub planting areas

Requirement: Prepare planting areas as follows:

- Remove weeds, rubbish, rubble and other foreign materials.
- Rake the area clean and level, to the following levels:
  - . 100 mm below grassed area.
  - . 50 mm below mowing edges.
  - . Minimum one brick course below the damp-proof course of buildings.
  - . Levelled with bitumen or concrete driveways.

3.2 PLANTING

General

Requirement: Provide plants to *0255 Landscape - plant procurement* and as documented.

Plant location and spacing: Conform to the Water Corporation's requirements. If necessary to vary plant locations and spacings to avoid service lines, cover the area uniformly or for other reasons, give notice.

Planting conditions

Weather: Do not plant in unsuitable weather conditions, including extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation if the soil is wet or during frost periods.

Watering

Timing: Thoroughly water the plants at the following stages:

- Before planting.
- Immediately after planting.
- In the days leading up to the date of practical completion.
- As required to maintain growth rates free of stress.

Preparation

Individual plantings in grassed areas: Prepare for planting as follows:

- Shrubs and groundcover: Provide a hole with 75 to 100 mm clearance around the rootball.
- Trees: Provide a hole twice the diameter of the rootball.
- Break up the base of the hole to a further depth of 100 mm.
- Loosen compacted sides of the hole to prevent confinement of root growth.
- Ripline planting: Prepare for planting as follows:
- Rip the row and excavate a plant hole for each plant large enough to accept the rootball plus 0.1 m³ of backfilling with topsoil.
- Clear weeds and other vegetative material within 300 mm radius of the plants.
- If planting holes are excavated by mechanical means, increase the hole size by 100 mm and loosen compacted sides to prevent confinement of root growth.

Placing

General: Place plants as follows:

- Remove the plant from the container with minimum disturbance to the rootball. Make sure that the rootball is moist.
- If required, root prune to make sure all circling roots have been either severed or aligned radially into the surrounding soil.
- Place the plant in its final position, in the centre of the hole and plumb, and with the topsoil level of the plant rootball 100 to 200 mm below the finished surface of the surrounding soil.

Fertilising

Requirement: Apply fertiliser for each plant at the time of planting.

Backfilling
General: Backfill with topsoil mixture. Lightly tamp and water to eliminate air pockets. Make sure that topsoil is not placed over the top of the rootball, so the plant stem remains the same height above ground as it was in the container. Avoid mixing mulch with topsoil.

Watering basins for plants in grassed areas
Location: To each individual plant not located in irrigated grassed areas or naturally moist areas.

Watering basin: Construct around the base of each individual plant, consisting of a raised ring of soil capable of holding at least 10 L.

3.3 MULCHING

Placing mulch
General: Place mulch to the required depth and clear of plant stems so that after settling it conforms to the following:

- Smooth and evenly graded between design surface levels.
- Flush with the surrounding finished levels.
- Sloped towards the base of plant stems in plantation bed.
- Gravel mulches: Not closer to the stem than 50 mm.

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

Depths:

- Organic mulch: 75 mm.
- Gravel mulch: 50 mm.

Maximum slopes:

- Leaf litter, pine flake and pine bark: 1:3. Provide stabilisation on steeper slopes.
- River pebbles and gravels: 1:6.

Installation:

- Ripline and grassed areas: Place mulch to 750 mm diameter around plants.
- Mass planted areas: Place after the preparation of the planting bed but before planting and other work.
- Smaller areas (e.g. planter boxes): Place after the preparation of the planting bed, planting and other work.

3.4 TREATMENT

General
Pest attack or disease: If evidence of pest attack or disease of plant material is discovered, immediately give notice.

Physical removal
General: Remove pest infestation and diseased plant material by hand if appropriate.

Pesticide
Product: Spray with insecticide, fungicide or both, as required.

3.5 STAKES, TREE GUARDS AND TIES

Stakes
Material: Hardwood, straight, free from knots or twists, pointed at one end.

Installation: Drive stakes into the ground at least one-third of their length, avoiding damage to the root system. Position on the prevailing wind side of each plant.

Stake sizes and quantities:

- 13 L trees: Two 35 x 35 x 1500 mm stakes per tree.
- 45 L trees: Three 50 x 50 x 1800 mm stakes per tree.

Ties
General: Provide durable non-abrasive plastic ties fixed securely to the stakes, one tie at half the height of the main stem, others as necessary to stabilise the plant. Attach ties loosely so as not to restrict plant growth.

Marker stakes
Material: Timber offcuts 25 x 25 x 1200 mm. Dip the top 200 mm in white paint.

Installation: Drive firmly into the ground at least 300 mm from the plant. Do not tie to the plant.

Location of marker stakes:

- Trees in grass: Mark each tree.
- Ripline planting areas: Mark each ripline at every fifth plant along the line.

Protectors
Individual plantings in grassed areas: Fit with plastic stem protectors.

Trunk protection: Fit with collar guards made of 200 mm length of 100 mm diameter agricultural pipe split lengthways.

3.6 COMPLETION

Cleaning
Stakes, tree guards and ties: Remove those no longer required at the end of the plant establishment period.

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

Operation and maintenance manuals
Requirement: Prepare a manual that includes recommendations for maintenance of plants.

0254 IRRIGATION

1 GENERAL

1.1 RESPONSIBILITIES

Performance

Requirements:

- Achieve the documented flow rates over the irrigated area.
- Meet statutory requirements for backflow prevention.

1.2 STANDARDS

Water supply

General: To AS/NZS 3500.1 (2021).

Backflow prevention and water efficiency: To PCA (2022).

Electrical

General: To AS/NZS 3000 (2018).

1.3 INTERPRETATION

Abbreviations

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

- HDPE: High-density polyethylene.
- LDPE: Low-density polyethylene.

Definitions

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

- Emitter: A device used to control the rate at which water is applied to a specific area.

1.4 SUBMISSIONS

Execution details

Irrigation plan: Before installation, submit an irrigation plan in pdf format.

Programmable tap timer: If a programmable tap timer is to be used as an alternative to irrigation controllers in small garden areas, submit proposal.

Shop drawings

General: Submit drawings and schedules showing the layout and details of the system, including the following:

- Micro-irrigation stake layout.
- Irrigation controller cabinets.

Tests

Site tests: Submit results to EXECUTION, **TESTING**.

1.5 INSPECTION

Notice

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

- Excavated surfaces ready for installation.
- Concealed or underground services ready for backfilling.

2 PRODUCTS

2.1 AUTOMATIC CONTROL VALVES

General

Type: 24 V solenoid actuated hydraulic valves with flow control and a maximum operating pressure rating of at least 1 MPa and able to be serviced without removal from the line.

Valve size: Equal to the nominal pipe size, unless a smaller size is necessary for throttling purposes, providing that the water flow restriction does not affect the sprinkler operation.

Materials:

- ≤ DN 50: Dezincification resistant copper alloy body and bonnet, screwed ends. Stainless steel bonnet holding down bolts and internal metal parts.
- ≥ DN 65: Cast iron body and bonnet, flanged ends. Stainless steel bonnet holding down bolts and internal metal parts.

Isolating valve: Provide a ball or gate valve of the same size immediately upstream of each automatic control valve.

Housing: House both valves in the same valve box large enough to permit easy operation and servicing of the valves.

Valve boxes: To PRODUCTS, **VALVE BOXES**.

2.2 FIXED SPRINKLER SYSTEMS

General

Restrictions: Do not use microsprays.

Heads

Performance: Heads conforming to the following:

- Maintain a preset arc of throw.
- Adjustable for radius during watering operations.
- Vandal-resistant.
- Protected from damage in normal operation.

Pop-up type heads:

- Type: Designed to rise at least 50 mm out of the housing under supply pressure and return to flush position on removal of pressure.
- Components: Provide wiper seals, stainless steel return springs and removable internal filters.
- Playing fields: Covers designed and constructed to prevent injury.

Sprinkler heads:

- Type: Gear driven and spray sprinklers with matched precipitation rates for the various areas of throw.
- Flow rate: Adjustable down to zero.

Impact sprinkler heads: Bronze bodies in high impact plastic cases with drainage holes.

Drippers

Requirement: Conform to the following:

- Type: Pressure compensating type with the capacity to apply the required water volume to the shrubs/trees.
- Able to be installed directly online, buried or laid on the surface.

- With provisions for fitting the flexible riser tube to the online dripper and placed at the base of the shrubs/trees.

Valves
Check valves: If a rotating head is more than 300 mm below the highest head on the same automatic valve, fit an internal or external anti-drain check valve to prevent low head drainage.

Pressure regulating valves: Provide pressure regulating valves at off-take points as follows:

- Adjustable between 100 and 700 kPa.
- Complete with 800 µm filter sized to suit the flow and installed immediately upstream from the pressure regulating valve.
- Installed with isolating valves upstream from the filter and downstream from the pressure regulating valve.
- Mount the assembly in a readily accessible position in a valve box, access pit or adjacent building.

Valve boxes: To PRODUCTS, **VALVE BOXES**.

Soil moisture sensors
Type: Fixed ceramic moisture sensors.

Connection: Fit to the irrigation controller via moisture control units.

2.3 MICRO-IRRIGATION SYSTEMS

Tubing
Type: Polyethylene micro-irrigation pipe.

Fittings
Type: Barbed fittings rated for the pressure class of the pipe, fastened with ratchet type clamps.

Valve boxes
Requirement: To PRODUCTS, **VALVE BOXES**. Provide the following in each valve box:

- Automatic control valve.
- Isolating valve.
- Filter: 200 µm.
- Pressure-reducing valve with 170 kPa outlet pressure.

2.4 DRIP IRRIGATION SYSTEMS

Integrated drip line systems
Type: Tubing with integral drippers inserted into the tube during manufacture.

Discrete drip emitter systems
Tubing: Polyethylene micro-irrigation pipe.

Drippers: Turbulent flow types, easily dismantled for cleaning.

Emitters
Type: If the difference in elevation between the control box and all emitters is:

- Less than 1500 mm: Pressure compensated or non-pressure compensated type.
- Not less than 1500 mm: Pressure compensated type only.

Fittings
Type: Barbed fittings rated for the pressure class of the pipe, fastened with ratchet type clamps.

Valve boxes
Requirement: To PRODUCTS, **VALVE BOXES**. Provide the following in each valve box:

- Automatic control valve.
- Isolating valve.
- Filter: 100 µm.
- Pressure-reducing valve with 170 kPa outlet pressure.

2.5 SUBSURFACE DRIP IRRIGATION SYSTEMS

Tubing
Collector and distributor mains: LDPE, HDPE or PVC-U pipe.

Dripline: LDPE pipe.

Components
System requirements:

- Reduced pressure zone (RPZ) backflow prevention device.
- Electric or manual valve.
- Filter: 120 mesh screen or disc.
- Auto pressure regulator: 150 to 200 kPa.
- Air vacuum breaker.
- Automatic line flushing valve.
- Chemical injection system.

Fittings
Type: Barbed fittings rated for the pressure class of the pipe, fastened with ratchet type clamps.

Root-intrusion prevention
Requirement: To prevent root intrusion, provide one of the following:

- Herbicide impregnated emitters or filters.
- Root-intrusion chemical injection system.

Valve boxes
Requirement: Provide valve boxes for system components to PRODUCTS, **VALVE BOXES**.

Low density polyethylene pipes: Minimum 19 mm when used with drippers.

2.6 IRRIGATION CONTROLLERS

General
Type: Automatic controllers that are easily programmed and include the following:

- Solid state dual program.
- Number of stations provided in the controller more than the number required to operate the irrigation system.
- Manual cycle and individual control valve operation.
- Manual on/off operation of irrigation without loss of program.
- ≥ 4 on/off cycles per day.
- Day omit.
- 240 V input and 24 V output capable of operating 2 control valves simultaneously.
- Not less than 24 hour battery program back-up.
- Power surge protection.

- Mounted in a lockable cabinet of minimum IP54 to AS 60529 (2004) in external locations.
- Electrical connection: If connected to wall outlets, provide 3 core 10 A, 240 V flexible cord and plug. Provide an isolating switch at the controller.

Programming: Able to change watering times, start times or days.

Controller cabinet

Construction: Heavy gauge aluminium with lockable hinged doors.

Degree of protection: Minimum IP56 to AS 60529 (2004).

2.7 PIPE AND FITTINGS

Pipe

Materials: To AS/NZS 3500.1 (2021) clauses 2.4 and 2.5, and as documented.

Underground piping and PVC-U fittings

PVC-U pipes: To AS/NZS 1477 (2017).

PVC-U pipe system installation: To AS/NZS 2032 (2006).

Mainline piping: Minimum Class 12 PVC-U.

Lateral piping: Minimum Class 9 PVC-U.

PVC-U fittings: Minimum Class 18 PVC-U. Allow for changes in pipework direction using fittings. Do not install pipes with excessive bending.

Low density polyethylene pipes: Minimum 19 mm when used with drippers.

2.8 VALVE BOXES

General

Construction: UV-resistant high impact plastic with high impact snap lock plastic cover and adequately sized for clear access to components inside the box.

3 EXECUTION

3.1 GENERAL

Authority requirements

General: To the Water Corporation and local water restriction requirements.

Integrated Water Supply Scheme (IWSS): Connect the irrigation system to the existing water supply.

Performance

Performance and efficiency of the system: Conduct a flow and pressure test and rectify system if inadequate.

Reticulation

Extent: To all landscaped areas including common areas.

Type: Provide as follows:

- Lawn areas: Rotator sprinklers.
- Individual plants: Drippers.
- Reticulation sleeves: Provide as follows:
- 100 mm PVC-U sleeve 300 mm below driveways. Provide sleeve at the junction of driveway and carport floor.
- Provide a 90° elbow to each end, 300 mm out from the ground.
- Fit sleeves in one straight length under the driveway to allow draw wires to be easily drawn through the sleeve.

Solenoid conduit: Provide 15 mm diameter PVC conduit with draw wire from the garden reticulation cabinet, adjacent paths, hardstands and driveways to the nearest garden bed.

Reticulation cabinet

Requirement: Provide lockable aluminium reticulation cabinet next to the meter box. Conform to the following:

- Make sure solenoid wires can be routed from reticulation cabinet to the mains water supply water meter without being obstructed by concrete, paving or walls.
- Supply conduit and draw wire to the reticulation cabinet.
- Install a 10 amp 250 volt socket outlet in the cabinet. Position socket outlet at the bottom right hand corner of cabinet and connect to common services power circuit.
  . Provide label to socket outlet: SUPPLIED BY COMMON SERVICES POWER CIRCUIT.

Connection to services

Connection to main water supply: By a licensed plumber and as follows:

- Connection location: Supply from a separate cut within 2 m of the master mains water meter.
- Connection component: 25 mm tested gate valve fitted with an approved backflow prevention device.

Connection to main electrical supply: By a licensed electrician.

Metering: Provide meters to the utility service provider's requirements and as follows:

- Group dwelling sites with 2 dwellings: One meter for each dwelling. Provide reticulation to common areas from adjacent dwellings.
- Group and multiple dwelling sites with 3 dwellings or more: One meter for each dwelling. Provide common meter for common areas.

Backflow prevention

Requirement: To PCA (2022) and Network Utility Operator requirements.

Piping

Pipe bending: Bend radius not less than 300 times the pipe nominal diameter.

Bend and tee fittings: Provide sweep tees and long radius type bends with centreline radius of bend or tee branch at least 1.5 times the pipe nominal diameter.

3.2 SERVICE TRENCHING

General

Requirement: 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.
- Tree protection: To AS 4970 (2009).

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.

Trench depths

General: As required by the relevant service and its bedding method, and as follows:

- Minimum cover for mainline and PVC pipes in garden beds:
  - . Front area of dwelling: 300 mm.
  - . Rear area of dwelling: 200 mm.

Obstructions

General: Clear trenches of sharp projections. Cut back roots encountered in trenches to at least 600 mm clear of services. Remove other obstructions including stumps and boulders that may interfere with services or bedding.

Pipes and conduits

Pipes and conduits across pavement or paths: If installation across roadways, driveways or paths is required, install under the pavement/path 90° to the road/path alignment using dry trenchless methods. Do not cut sealed surface without the principal's approval.

Subsidence: If subsidence occurs, repair and reinstate pavement or paths.

3.3 AUTOMATIC CONTROL VALVES

Installation

Location: Install in a valve box to **VALVE BOXES**.

Regional areas: Provide flow control valves to each station.

Valve protection: Do not use sand to cover the valves and wire junctions.

Wiring

Requirement: Provide low voltage solenoid wiring as follows:

- Solenoid wiring: Minimum 1 mm multi-strand cable.
  - . Common wire: Black.
- Wiring and piping: Lay wiring in trenches under and attached to piping with insulation tape at maximum 3 m spacing.
- Wiring in areas with no piping: Install in conduits.
- Wiring run: Install in continuous unbroken lengths from the controller to the solenoid valves, with 1.5 m of spare cable coiled at the valve.

Wiring protection: Use multi-core wire protected with PVC sheaths. Protect with electrical conduits or strap beneath PVC piping.

3.4 FIXED SPRINKLER SYSTEMS

Sprinkler application and location

Type: Use sprinkler types as follows:

- Grassed areas (large and small): Gear driven sprinklers.
- Turfed areas: Pop-up sprinklers with minimum rise of 150 mm.
- Garden beds:
  - . Generally: Pop-up sprinklers. Provide 150 mm minimum clearance for rigid risers.
  - . Adjacent to lawn areas, driveways and paths: Pop-up sprinklers with minimum rise of 150 mm. Do not use rigid risers.
  - . Adjacent to driveways and paths, and less than 500 mm wide: Pop-up strip sprays.
- Trees: Bubblers or high flow drippers.

Sprinkler location restrictions: Conform to the following:

- Sprinklers along buildings: Position minimum 60 mm from the building.
- Sprinklers in verge areas: Do not install along kerbs facing back into the development site.

Prevention of overspray: Position sprinklers so that:

- Those in verge areas do not overspray onto roads.
- There is no overspraying onto buildings.
- Those in garden beds do not overspray onto driveways.

Sprinkler spacing: As recommended by the manufacturer for the pressure and water volume.

Control wiring

General: Connect the automatic control valves and soil moisture sensors to the controller as follows:

- Cable type: Double insulated.
- Cable runs: Run cables either in PVC-U conduit to AS/NZS 3000 (2018) laid in trenches or parallel to and under piping attached to the pipe using cable ties at 3 m maximum intervals.
- Connectors: Waterproof.
- Jointing: Loop cables and join only at valves, sensors and controllers.
- Movement provision: Provide expansion loops at changes of direction and at joints.
- Spare cable: Provide 1.5 m spare cable at the control valve. Neatly coil and tie spare cable and stow in the valve box.

Quick coupling valves

General: Provide DN 20 double lugged bronze quick coupling valves with neoprene seats mounted on DN 20 copper risers offset at least 150 mm from the supply pipe. Install in valve boxes.

Heads

Impact sprinkler heads: Provide granular fill for at least 75 mm around the base of the case.

Risers: Mount as follows:

- Above ground heads: Mount on fixed risers.
- Galvanized steel risers: Set in 300 x 300 x 200 mm deep concrete blocks.
- In-ground heads: Mount on reticulated risers.

Piping
Requirement: Provide piping for mainline up to the solenoid valves and the lawn areas.

Mainline and submains: Install 600 mm below the finished surface and lay marker tape along the top of the line.

Lateral piping for roof and planting areas: Install below the topsoil profile and anchor at 1500 mm maximum centres with U-shaped stakes.

Jointing: Join piping and associated fittings using solvent welded pressure type glue.

Sprinkler head protection
Requirement: Provide concrete surrounds for the following:

- Sprinklers along kerbs abutting roads, driveways or parking areas: Minimum 300 mm diameter, 90 mm thick.
- Sprinklers in lawn/grassed area: Minimum 200 mm diameter, 80 mm thick.

North West and Goldfields region
Requirement: Provide plastic surrounds to all sprinklers.

3.5 MICRO-IRRIGATION SYSTEMS

Installation
General: Connect micro-tube laterals with proprietary push in or screw in fittings.

Drippers: Connect directly into piping or provide appropriately sized micro-tubes.

Microsprays: Mount microsprays 300 mm above ground on stakes and connect to the piping with appropriately sized micro-tubes.

Piping: Lay polyethylene micro-irrigation pipe on finished ground surface under planting bed mulch and anchor at 1500 mm maximum intervals with U-shaped stakes.

Air release valves: Provide at the highest point in each section to drain the system when flow stops.

3.6 DRIP IRRIGATION SYSTEMS

Installation
Requirement: Conform to the Water Corporation's recommendations for waterwise garden irrigation.

Discrete drippers: Connect directly into piping or provide appropriately sized micro-tubes.

Piping: Lay polyethylene micro-irrigation pipe on finished ground surface under planting bed mulch and anchor at 1500 mm maximum intervals with U-shaped stakes.

Air release valves: Provide at the highest point in each section to drain the system when flow stops.

3.7 SUBSURFACE DRIP IRRIGATION SYSTEMS

Installation
Piping: Install at least 150 mm below ground.

Automatic line flushing valve:

- Location: At the furthest point from the valve on the collector main.
- Discharge point: Locate in same plane as the pipe leading to it, so water can easily be flushed out.
- Gravel bed: Install a 0.3 m^3 minimum volume gravel bed in valve box. Maintain 50 mm clearance between gravel bed and the lowest discharge point of the valve.

Filter: Install in horizontal plane (or to prevent material entering mainline on cleaning) with 100 mm clearance from soil level.

3.8 UNDERGROUND PIPING AND PVC-U FITTINGS

Installation
PVC-U pipe system: To AS/NZS 2032 (2006).

PVC-U fittings: Allow for changes in pipework direction using fittings. Do not install pipes with excessive bending.

3.9 IRRIGATION CONTROLLERS

General
Requirement: Provide irrigation controllers as follows:

- Individual dwellings: One controller for each dwelling.
- Common areas: One controller.

Location: Locate irrigation controllers and single socket outlet in a readily accessible location.

Power supply: For group or multiple dwelling sites, connect to the common power source.

Number of stations in the controller: ≥ number of stations in the reticulation systems.

Number of controllers: Do not use more than one controller without the approval of the principal.

Controller type/product: Do not install without approval from the principal.

3.10 VALVE BOXES

Installation
Requirement: Install with top of box flush with the surface.

Clearance: Allow 100 mm minimum clearance from filters and 50 mm minimum clearance from valves.

Base: Concrete plinth or crushed rock.

3.11 TESTING

Site tests
Requirement: Test the flow and pressure from the metered supply. If flow and pressure are inadequate, rectify system.

3.12 COMPLETION

General
Requirement: On completion of the irrigation system, carry out the following:

- Flush system thoroughly. Check heads, sprays and drippers and clean if blocked.
- Clean strainers.
- Adjust for even distribution with no dry areas.

Irrigation controllers: Program the controls in conformance with the Water Corporation and the local water restriction requirements, including seasonal variation requirements.

Operation and maintenance manuals
Requirement: Prepare a manual that includes the manufacturer's recommendations for operation, care and maintenance of the irrigation system, including irrigation controllers.

0255 LANDSCAPE - PLANT PROCUREMENT

1 GENERAL

1.1 RESPONSIBILITIES

Performance
Plants: Grown to a standard that allows rapid establishment and growth to maturity.

Maintenance: Encourage and maintain healthy growth for the duration of the contract.

Program: Provide a suitable irrigation, pruning, fertiliser and monitoring program for all plant materials held by the supplier. Take precautions to safeguard the health and well-being of all plant materials before and including their delivery to the project site.

1.2 STANDARD

General
Tree stock supply: Conform to the recommendations of AS 2303 (2018).

1.3 INTERPRETATION

Definitions
General: For the purposes of this worksection, the definitions given in AS 2303 (2018) and the following below apply:

- Destructive inspection (of trees): The washing away of all soil from a rootball to allow inspection of rootball development.
- Investigative inspection: Any method of root inspection that involves the washing away of all or portions of the soil from the rootball to expose a section or all the roots.
- Known history: Supplier documentation, demonstrating and enabling verification that the product was grown by essentially the same processes and under essentially the same system of control.
- Locally sourced: Stock procured from district sources that is best suited to climatic, soil and environmental conditions in the immediate area of site.
- Partial inspection (of trees): A method of exposing a section of a root system to allow inspection of root development by washing the soil away in a wedge-shaped section from the stem to the extremity of the rootball. This soil can be gently replaced so the tree is not damaged.
- Shrub: A woody perennial plant smaller than a tree, usually having permanent stems branching from or near the ground.

1.4 SUBMISSIONS

Certification
Plant species: Submit the supplier's certification as evidence that plants are true to the required species and type, and free from diseases, pests and weeds at the time of delivery.

Source location: Submit the supplier's certification as evidence that plants have been grown from locally sourced stock. If this is not achievable, give notice.

Products and materials

Plants: If non-conforming plants are proposed, submit a proposal. Submit a copy of the written approval of substitution with any non-conforming plants.

Records

Photographic records: Within 14 days of the date of the contract, submit photographic records to EXECUTION, **GENERAL**, **Photographic records**.

Progress reports: Every 3 months, submit a detailed register of the quantities, growth, general health and geographic location of the complete inventory of plant material for the works.

Tests

Requirement: Submit test results to EXECUTION, **TESTING**.

1.5 INSPECTION

Notice

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

- Representative samples of all stock scheduled to establish conformity immediately before the acceptance of tender.
- Plant material after 8 weeks of the growing on period.
- Plant material at 80% completion of stocking of species and numbers.
- Plant material at, as close as practicable, 100% completion of stocking of species and numbers.
- Plant material at the date of commencement of delivery.
- Plant material to assess potting on procedures, if necessary.

2 PRODUCTS

2.1 ASSESSMENT CRITERIA - GENERAL

General

Requirement: Supply plants with the following properties:

- Stress: Free from stress resulting from inadequate watering, excessive shade or excessive sunlight experienced at any time during their development.
- Site environment: Grown and hardened off to suit anticipated site conditions at the time of delivery and prevent dieback.
- Pests and disease: Free from attack by pests or disease, and resistant to polyphagous shot-hole borer (PSHB).
- Native species with a history of attack by native pests: Restrict plant supply to those with evidence of previous attack to less than 15% of the foliage and make sure actively feeding insects are absent.
- Waterwise: If possible, use plants identified as waterwise by Water Corporation for the particular region. (See www.watercorporation.com.au/Waterwise/Waterwise-plants).
- Root system: Not root bound.

Supply and delivery: Supply plants from a nursery with Nursery Industry Accreditation Scheme Australia (NIASA) accreditation and deliver to site with a label displaying the botanical name.

Prohibited species: Do not supply species listed on the Western Australian Organism (WAOL) database declared as ‘Pest, Prohibited (s12)’ or ‘Pest (s22)’ under the *Biosecurity and Agriculture Management Act 2007 (WA)*.

Labelling

General: To the recommendations of the *National Plant Labelling Guidelines (2023)*.

Label type: To withstand transit without erasure or misplacement.

Label frequency: One for each plant.

Indication of north:

- Trees in containers greater than 100 L or of size index greater than 140: Label the northerly aspect during growth in the nursery and maintain during transit.

2.2 ABOVE-GROUND ASSESSMENT CRITERIA

Trees

Requirement: Supply trees to AS 2303 (2018) clause 4.2 and with the following properties:

- Minimum size: 45 L bag.
- Clean stem height: Less than 40% of total tree height.
- Trunk position: Less than 10% variation in distance from centre of the trunk to the extremity of the rootball.

2.3 BELOW-GROUND ASSESSMENT CRITERIA

Trees

Requirement: Supply trees to AS 2303 (2018) clause 4.3 and with the following properties:

- Rootball occupancy:
  - Soil retention: On shaking or handling the unsupported rootball, at least 90% of the soil volume remains intact.
- Rootball diameter:
  - Containers less than or equal to 45 L and ex-ground stock: Not less than rootball depth.
  - Bare-rooted tree stock with size index less than or equal to 57: Not less than 10 x calliper.

Shrubs

Requirement: Supply plant material with a root system as follows:

- Well-proportioned in relation to the size of the plant material.
- Free of any indication of having been restricted or damaged.

Root inspection: If investigative inspection is required, sample as follows:

- Not more than 100 samples: Inspect 1 sample.
- More than 100 samples: Inspect 1%.

Sample plants: Replace plants used in investigative inspection.

2.4 ASSESSMENT CRITERIA - BALANCE

Shrubs

Containers (except tubes or plant cells) or rootballs: To remain flat on the ground when the stem, held at 80% of height above ground, is deflected 30° from the vertical, side to side.

Exempt: Species that naturally produce hard inflexible wood in the early stages of their development.

Small container-grown shrubs table

Container size or minimum rootball diameter	Height range above soil (m)	
	Thin-stemmed species	Thick-stemmed species
Tubes or plant cells	1.5 to 2.5 x the height of the container	
150 mm (1.8 L)	0.4 – 0.6	0.3 – 0.5
170 mm (2.6 L)	0.5 – 0.7	0.4 – 0.6
200 mm pot (4 L)	0.7 – 0.9	0.6 – 0.8
200 mm bag (5 L)	0.8 – 1.0	0.7 – 0.9
250 mm (8 L)	1.0 – 1.2	0.8 – 1.0
300 mm (15 L)	1.2 – 1.5	1.0 – 1.2

Trees

Size index range for trees grown in containers 18 L to 100 L and 100 L to 3000 L: To AS 2303 (2018) Appendix D Table D.1.

Minimum rootball diameter for ex-ground trees: To AS 2303 (2018) Appendix D Table D.2.

3 EXECUTION

3.1 GENERAL

Photographic records

Requirement: Make photographic records as follows:

- Rates:
  - . Not more than 100 plants: Submit 1 sample.
  - . More than 100 plants: Submit 1%.
- Plant species:
  - . All palm species.
  - . 100, 200, 400 L plant species.
  - . Specimen plant species.
- Identification:
  - . In colour.
  - . With a clearly identifiable scale reference located in the same plane as the plant stem or trunk.
  - . Labelled with plant species name and date.
  - . With sufficient clarity to be able to ascertain the species, size and quality of a single specimen of the subject plant.

3.2 TESTING

General

Requirement: To AS 2303 (2018).

Production tests

Sampling: Select sample trees, of known history, at evenly distributed intervals within each batch.

Above ground tree inspection:

- Frequency: Inspect trees at dispatch.
- Sampling strategy: To AS 2303 (2018) Appendix A Table A1.
- Inspector: Supplier.

Investigative tree inspection:

- Frequency: Inspect trees before dispatch.
- Inspector: Qualified person authorised by the principal.
- Destructive inspection: Use for trees with rootballs/containers not more than 200 mm.
- Allowance: Allow for sample trees in addition to quantity ordered.
- Partial inspection: Use for trees with rootballs/containers more than 200 mm.

Non-conformance

Corrective action: Conform to corrective action procedures, as documented.

Rejection: If corrective actions are unsatisfactory, reject the entire batch.

Substitutions: Do not use non-conforming trees unless approved.

Investigative tree inspection sampling table

Number of trees per batch	Number of trees to sample
0 – 20	1
21 – 50	2
51 – 100	4
101 – 500	4 for the first 100 +2% of balance of order
501 – 2000	12 for first 500 +1% of balance of order
2001+	27 for the first 2000 +0.5% of balance of order

3.3 COMPLETION

Warranties

True-to-species: Provide at the time of each delivery as follows:

- Parties: Supplier(s) to the principal.
- Form: All the plants supplied under these works are true-to-species and type, and free of disease, fungal infection and/or any other impediment to their future growth and have been fully acclimatised for the conditions of the site.

Maintenance:

- Parties: Supplier(s) to the principal.
- Form: Maintain all plant materials sourced and secured by the supplier throughout the procurement period.
- Period:
  - . Commencement: The date of contract.

. Completion: To cease in respect of any particular plant material upon issue of a delivery notice issued by the contractor upon delivery to site.

0256 LANDSCAPE - ESTABLISHMENT

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide landscape establishment to common areas and common water metered areas.

1.2 SUBMISSIONS

Certification
Replacement plants species: Submit the supplier's certification as evidence that plants are true to the required species and type, and free from diseases, pests and weeds at the time of delivery.

Execution details
General: Give at least two days' notice of the following operations:

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

Reporting: Submit monthly reports by the last Friday of each month.

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

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

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

Records
Requirement: To **COMPLETION**, **Records**.

Tests
Requirement: Submit soil property test results to **PLANTING WORKS**, **Fertilising** for the following:

- Landscape soils.
- Low density soils.

- Soils for turf and lawns.

1.3 INSPECTION

Notice
Inspection: Give notice so that inspection may be made at the following intervals:

- Date of practical completion.
- Three monthly intervals during the plant establishment period.
- End of defects liability period.

2 EXECUTION

2.1 GENERAL

Special instructions
Requirement: If directed, attend to identified areas and procedures as a priority. Obtain approval for additional costs before starting the works.

Reporting
Monthly report: Provide regular written reports each month on the following:

- General status of works.
- Soil test results as required for the fertilising programs.
- Plant replacement requirements.

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

Disruption of works by others
Requirement: Make arrangements to work around the disturbance caused by other contractors.

Rubbish removal
Rubbish: Remove loose rubbish such as bottles, papers and cigarette butts from the site. Execute this work regularly so that all areas are free from rubbish when observed at fortnightly intervals.

Leaf litter: Remove from all path and lawn areas.

2.2 PLANTING WORKS

Planting
Requirement: Make sure the general appearance and presentation of the landscape and the quality of plant material at the date of practical completion is maintained for the plant establishment period.

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

Plant replacement: Replace failed, dead and/or damaged plants at maximum 3 weekly intervals as necessary throughout the plant establishment period. Provide replacement plants of similar size and quality, and of identical species and variety to the plants being replaced.

Plant pruning
Pruning: To AS 4373 (2007) and as documented.

Fertilising
Soil tests: Take samples from both planting beds and lawn areas and conduct tests, as follows:

- Landscape soils: To AS 4419 (2018) Table 1.
- Low density soils: To AS 4419 (2018) Table 2.
- Soils for turf and lawns: To AS 4419 (2018) Table 3.

Fertilising program: Base the program on soil testing results.

Application of fertiliser: Apply a 12 month slow release fertiliser, in two rows and cultivated into soil to a depth of 100 mm.

- Program: September and March according to seasonal growth requirement.

Sensitive native species: Apply appropriate dosage.

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

Chemical spray: Apply outside of normal working hours.

Stakes, tree guards and ties
Stakes: If stakes are damaged, replace stakes and re-stake the plants as follows:

- Stake sizes and quantities:
  - . Plants more than 2500 mm high: Three 50 x 50 x 2400 mm stakes per plant.
  - . Plants 1000 to 2500 mm high: Two 50 x 50 x 1800 mm stakes per plant.
  - . Plants less than 1000 mm high: One 38 x 38 x 1200 mm stake per plant.
- Drive stakes into the ground at least one-third of their length, avoiding damage to the root system.

Tree guards and ties: Replace damaged or missing tree guards and ties.

Removal: If plants are robust with well-developed systems and no longer require support, remove stakes, tree guards and ties.

2.3 GRASS SURFACES

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

Grass height: Consistent with the growth habit of the grass variety and maintained at 25 to 40 mm throughout the year. Do not remove more than one-third of the grass height at any one time.

Program: Weekly during the mowing season from November to March and at fortnightly intervals from April to October. Do not mow during wet conditions. Carry out last mowing not more than 7 days before end of plant establishment period.

Raking: Once every month before mowing from November to March, rake the grass with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Edge trimming: At the same time as mowing, trim lawn edges to plant beds, pathways, base of trees and other obstacles. Do not damage trees and shrubs.

Top dressing
Top dressing for established lawns: Weed-free imported sandy topsoil to a depth of 5 mm.

- Program: The spring following initial establishment.

Top dressing for remediation of depressions or irregularities: Apply coarse or medium texture soil to AS 4419 (2018), suitable for application to turf areas.

Fertilising

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

2.4 WEEDING

General

Requirement: Remove unwanted broad-leaf plants and grasses considered invasive to the locality.

Program:

- Lawns: Quarterly and as required to maintain the general lawn condition.
- Trees and shrubs: As required for planted, paved and mulched areas to be weed-free when observed at fortnightly intervals.

Vigorous ground covers: Keep 200 mm clear from the base of any shrub or tree. Remove as follows:

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

Herbicide application: Apply to the manufacturer's recommendations.

2.5 MULCHED SURFACES

General

Inspection: Fortnightly to determine mulch requirements.

Requirement: Maintain minimum depth as follows:

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

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

Weed and grass growth in mulch areas: Control with a herbicide, approved by the principal, to the manufacturer's recommendations. Prevent herbicide contacting the new plants.

2.6 WATERING

Establishment

Water quality:

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

Watering program: Minimum 3 complete waterings, soaking to a depth of 150 mm at fortnightly intervals for the first 6 weeks of plant establishment irrespective of natural rainfall. Confirm soaked depth using a soil moisture probe and record in the log book.

Water restrictions: Coordinate the water supply and conform to legislation and restrictions applying at the time.

Hand watering

Requirement: Manually water all lawn and planting areas in absence of an irrigation system or until the proposed irrigation system is fully operational. Avoid frequent dampening of the surface. Allow the surface of the soil to partially dry out between waterings.

Irrigation

Irrigation system program: Adjust to suit the following:

- The precipitation requirements of the individual zones/stations with regard to types of plants.
- The infiltration rate of the soil/medium and associated physical factors, seasons, evaporation, exposure, topography and local authority restrictions.
- Adjustment or shut down during and after periods of prolonged heavy rain.
- Water supply and watering regime of legislation and restrictions applying at the time.

Equipment maintenance:

- Check all components for proper operation.
- Repair or replace damaged components with parts from the same manufacturer.
- Flush any dirt or foreign matter from the system and clear all blockages.

2.7 CONTROL MEASURES

Weed mats

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

Feral animal control

Generally: Implement feral animal control until the completion of the plant establishment period.

Feral animal guards: Maintain feral animal guards in a working upright and taut order with three stakes. Replace missing or damaged guards with materials as documented.

Removal: At the completion of the plant establishment period.

2.8 ROAD VERGES AND FIRE REDUCTION ZONES

Native grass

Generally: Allow native grasses planted within 2 m of road verges or 5 m of property boundaries to grow in a form consistent with the growth habit of the species.

Mowing

Native grasses: Maintain as follows:

- Do not damage regeneration areas, including tree saplings.
- Mow at a minimum of twice a year and at least once at the end of October, before bushfire season, as a fire reduction measure.
- Maintenance mowing: Use a single pass of a mower along medians and verges with maximum width of 1.7 m for a slasher and 1.2 m for a slope mower.

- Fire hazard reduction mowing: Use a double pass of a mower along medians and verges with maximum width of 3.4 m for a slasher and a single 1.2 m pass by a slope mower.

Other types of grass verges: Mow to maintain a maximum 250 mm height.

Pruning

General: Cut back tree and shrub growth to road verges, to on/off ramps and around emergency telephones and signs as required to achieve clear sight distances when viewed from a minimum of 100 m along roadway. Cut back tree and shrub growth within fire reduction zones to minimise risk to adjoining properties.

Pruning: As documented.

2.9 PAVING AND STRUCTURES

Furniture, signage and barriers

Maintenance guidelines:

- Furniture and pots: Keep in a good condition and move as required to carry out maintenance works.
- Directional and building signs: Keep in a good condition and maintain visibility.
- Boundary and car park barriers: Keep in a good condition and maintain visibility.

Drains

Maintenance: Inspect and clean all drainage structures and pit covers and maintain in working order. Remove all organic debris.

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

2.10 COMPLIANCE

Criteria

Generally: Plant establishment is complete, subject to the following:

- Repairs to plant material are complete.
- Ground surfaces are covered with the documented treatment to the documented depths.
- Pests, disease, or nutrient deficiencies or toxicities are not evident.
- Organic and gravel mulched surfaces are in a weed-free and tidy condition and to the documented depth.
- Vegetation is weed-free, established and well formed.
- Plants have healthy root systems that have penetrated into the surrounding, undisturbed ground and are not able to be lifted out of the planting holes.
- Vegetation is not restricting essential sight lines and signage.
- Only frangible species are growing within road side clear zones.
- Specified vegetation setbacks from services and road furniture are evident.
- All hard landscape works are installed and operating as documented.
- Litter collection and removal is complete.
- Mulch is removed from drainage and access areas.
- All non-conformance reports and defects notifications are complete.

Plant establishment compliance table

Plant material	Acceptable failure per area	Acceptable concentration of failure
Tube stock	< 10%	< 15% in any given location
140 mm	< 5%	< 15% in any given location
300 mm or larger	Nil	Nil
Turf	< 5%	Nil
Cells	< 5%	< 15% in any given location
Direct seeded native species and cover crop – including drilled and broadcasted areas	Not less than 3 documented species per 1 m^2 grid (determined on a testing frequency of 20 grid areas per 500 m^2)	Nil grids with less than 3 documented plant species
Direct seeded grass species and cover crop	< 15% (determined by a 1 m^2 grid on a testing frequency of 1 grid area per 500 m^2)	< 10%
Cover crop	< 5%	Nil

2.11 COMPLETION

Records

Logbook: Keep on site and make available for inspection a logbook, recording the following on a weekly basis:

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

0257 LANDSCAPE - VERGES AND STREET TREES

1 GENERAL

1.1 STANDARDS

General
Storage and handling of pesticides: To AS 2507 (1998).

Tree stock: To AS 2303 (2018).

1.2 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given in AS 2303 (2018) and the following apply:

- Ameliorant material: Additives used to make or improve soil.
- Imported topsoil: Similar to local natural soil, suitable for the establishment and ongoing viability of the selected vegetation, free of weed propagules and of contaminants and classified by texture to AS 4419 (2018) Appendix K Table K1, as follows:
  . Fine: Clay loam, fine sandy clay loam, sandy clay loam, silty loam, loam.
  . Medium: Sandy loam, fine sandy loam.
  . Coarse: Sand, loamy sand.
- Top dressing: A soil that is suitable for surface application to turf and lawns.
- Topsoil: Includes landscape soil, low density soils and soils for turf and lawns.

1.3 SUBMISSIONS

Execution details
Soil amelioration recommendations: If required, the source of ameliorant material, rates and methods of incorporation.

Plant material: Submit details of proposed fertiliser to be used.

Soil conditioning: If other than gypsum is proposed, submit details.

Products and materials
Imported topsoil: Submit evidence verifying the following:

- Suitability of each soil type for its documented use.
- Similarity to naturally occurring local soil.
- Suitability for establishment and on-going viability of the site vegetation.
- Absence of any weed propagules or contaminants.

Plant species: Submit the supplier's certification as evidence that plants are true to the required species and type, and free from diseases, pests and weeds at the time of delivery.

Source location: Submit the supplier's certification as evidence that plants have been grown from locally sourced stock. If this is not achievable, give notice.

Trees: Submit evidence of conformity to AS 2303 (2018).

Samples
Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

1.4 INSPECTIONS

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

- Plants on arrival at site.
- Landscape planting: Set out of plants, soil conditioner and fertiliser.

2 PRODUCTS

2.1 GENERAL

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

Bulk materials: Provide a 5 kg sample of each type documented with required test results.

Transportation
Requirement: Transport plants to the site without physical damage or drying out.

2.2 TOPSOIL

General
Requirement: To *0251 Landscape - soils*.

2.3 FERTILISER AND MULCHES

General
Requirement: To *0252 Landscape - natural grass surfaces*.

2.4 PLANT MATERIAL

Turf
Requirement: To *0252 Landscape - natural grass surfaces* and as follows:

- Species: Use a species approved by the local authority for verge treatments.

Plant supply
Requirement: Supply plants to *0255 Landscape - plant procurement* and conforming to the following:

- Species: Use a species approved by the local authority for verge treatments.
- Maximum height: 750 mm.
- Not hazardous (poisonous or an irritant).
- Does not obstruct pedestrians.

2.5 OTHER MATERIALS

Inorganic ground cover
Stone/rock mulch treatments: Conform to the following particle size distribution:

- River washed rounded stone: $D_{50} < 40$ mm.
- Crushed rock: $D_{50} < 40$ mm.
- Crusher dust: $D_{50} < 10$ mm.

Stone aggregates, loose pea gravel or crushed brick: If proposed, obtain approval from the local authority.

Gravel treatments: Do not install if not allowed by the local authority. If allowed, install as follows:

- Depth: 100 mm.
- Edging: Make sure edging depth is sufficient to prevent loose gravel spreading onto roads, footpaths or neighbouring properties.

3 EXECUTION

3.1 GENERAL

Transport and storage

Requirement: Inspect all plants at the time of delivery and reject non-conforming plants.

Preparation

Existing services: Before landscaping the verge, locate existing and position new services in the verge, including contact BEFORE YOU DIG AUSTRALIA to identify locations of underground utility services pipes and cables.

Herbicide treatment: Spray herbicide as follows:

- Type: Glyphosphate.
- Rate: 9 litres/200 litres water/ha.
- Program: Maintain sprayed areas undisturbed for 2 weeks.

Pesticide treatment: In the following form, as documented:

- Liquid:
  - . Application rate: 5 litres/hydromulch/ha.
  - . Powder: 10 kg/ha.

Herbicides and pesticides: To the Australian Pesticides and Veterinary Medicines Authority (APVMA PubCRIS) register.

Soil conditioning: Provide as follows:

- Gypsum application rate: 400 g/m².
- Application: Conform to the following:
  - . Spread evenly over the subsoil by a mechanical spreader and topsoil on the same day.
  - . Thoroughly mix into the topsoil whilst the topsoil is being removed from stockpiles.
  - . Apply conditioners other than gypsum to the supplier's recommendations.

Fertiliser treatment: Provide as follows:

- Application rate: 1000 kg/ha.

Watering

General: Conform to the following:

- Potable or sourced from areas without toxins, pollutants or any substance which may adversely affect plant growth.
- Initial watering: To a uniform moisture condition without run-off.
- After turfing: Re-water to a uniform moisture condition without run-off.
- After sowing: If required, re-water to a uniform moisture condition without causing rills in the surface, daily for 15 days.
- Excessive surface channelling through erosion: If watered areas result in excessive surface channelling rehabilitate by re-preparing and re-sowing the affected area.

3.2 PREPARATION

Dimension and level

Level and grade: Do not alter from existing levels.

Setback: Set verge 1.5 m from the road frontage, including for verges without footpaths.

Surface preparation

Cultivation: Before applying topsoil, tine to a depth of 200 mm to produce a loose surface and remove all large stones, rubbish and other materials that may delay germination.

Cultivation depth: 50 mm for a roughened surface with soil lumps not exceeding 50 mm.

Topsoil

Application: Apply uniformly to an average compacted thickness of 50 mm with a minimum compacted thickness of 30 mm at any location.

Pesticide application

Timing: Immediately before sowing.

Pesticide type: Powder form.

Grassing

Turfing:

- Laying: On the prepared topsoiled surface and perpendicular to the direction of water flow.
- Joints: Butt runs of turf hard against each other and top dress with topsoil.
- Slopes 5:1 to 3:1: Peg turf and remove pegs when established.
- Top dressing:
  - . Timing: 4 to 6 weeks after laying turf.
  - . Requirement: Correct any undulations or unevenness in the established turf.

Maximum slope for areas to be maintained by a ride-on mower with a 2 m wide deck: 4:1.

3.3 LANDSCAPE PLANTING

Conditions

General: Do not carry out landscape planting when temperature is below 10°C or above 35°C.

Preparation

Weed management: Conform to the following:

- Herbicide spray: Conform to EXECUTION, **GENERAL** and the following:
  - . Program: Maintain sprayed areas undisturbed for 2 weeks.
  - . Spray drift: Make sure there is no contact with planted material.
- Weed management by synthetic weed blocking fabric:
  - . Extent: 800 mm surrounding each proposed planting.

Fertilising (N:P:K): Conform to the following:

- Ratio: 63:18:28.
- Application rate: 5 kg/m².

Mass planting in mulched bed

Surface preparation: Rip the surface at 500 mm centres to a depth of 300 mm and break up the top 200 mm of the planting bed by cultivation to a maximum size of 50 mm.

Mulch: Spread 75 mm thick.

Individual planting

Preparation: Loosen a planting area 600 mm diameter to a depth of 400 mm.

Mulch: Spread 75 mm thick to 600 mm radius around the plant.

Planting

Method: Remove the localised mulch. If required, root prune to make sure all circling roots have been either severed or aligned radially into the surrounding soil. Place the plant, backfill the planting hole with topsoil and compact lightly so as to minimise subsidence without compacting the backfill. Avoid mixing mulch with topsoil.

Stakes and ties: Advanced and super advanced stock:

- Drive stakes 300 mm deep and 200 mm clear of the plant.
- Ties: 50 mm wide hessian webbing strips, attached loosely.

Watering: 10 litres of water per hole before the mulch is respread over the disturbed area.

Mulching: Replace, and leave the plant stem clear.

Care of landscape planting

Watering: Water all plants, from the time of planting, every second day for the first twelve weeks at the following rates, per plant:

- Tube stock: 5 L.
- Advanced trees: 10 L.
- Super advanced (25 L): 30 L.
- Semi-mature (75 to 100 L): 50 L.

Replacement: Replace missing plants, dead plants and unhealthy plants with plants of similar size and quality and of identical species and variety to the plant being replaced.

Weed and grass growth in mulched areas: Control with herbicide, in conformance with the manufacturer's recommendations at monthly intervals during the construction period and contract maintenance period. Replace plants damaged by herbicide application.

3.4 STREET TREES

Unpaved areas

Excavation:

- Containers < 75 litre: Twice the diameter of the rootball.
- Containers ≥ 75 litre: Three times the diameter of the rootball.
- Depth: Rootball plus 100 mm. Loosen the compacted sides, and the bottom a further 100 mm.

Soil conditioning: If clay is present, add 1 kg of agricultural gypsum soil conditioning.

Accessories and drainage: Fit trunk collar guard, root barrier and subsoil drainage measures before backfilling.

Backfill: Topsoil.

Mulch: 75 mm thick and 50 mm clear of plant stem.

Initial watering: 50 litres per tree applied in stages during backfilling.

Watering basin: Construct around the base of each individual plant, consisting of a raised ring of soil capable of holding at least 10 L.

Paved areas

Excavation:

- Containers < 75 litre: Twice the diameter of the rootball.
- Containers ≥ 75 litre: Three times the diameter of the rootball.
- Depth: Rootball plus 100 mm. Loosen the compacted sides, and the bottom a further 100 mm.

Accessories and drainage: Fit trunk collar guard, root barrier and subsoil drainage measures before backfilling.

Mulch: 10 mm screenings 75 mm thick.

Initial watering: 50 litres per tree applied gradually.

Structural soil table

Type	Description	Fertiliser	Depth	Location
Structural soil 20 mm	75% 20 mm crushed river gravel 25% filler soil of 1 part screeded dolomite to 1 part screeded sandy loam	Trace element mix: 300 g/m^3 Potassium nitrate: 500 g/m^3 Ammonium nitrate: 500 g/m^3 Superphosphate: 500 g/m^3 Ion sulfate: 1.5 kg/m^3 8/9 month Controlled release: 2 kg/m^3 Gypsum: 500 g/m^3 Magnesium sulfate: 400 g/m^3 Magrilime: 600 g/m^3	100 mm	If pavements are installed around existing trees, replace 20 mm roadbase when the total soil depth available is 100 mm or less.
Structural soil 40 mm	80% 40 mm basalt aggregate 20% filler soil of 1 part screeded dolomite to 1 part screeded sandy loam	Trace element mix: 300 g/m^3 Potassium nitrate: 500 g/m^3 Ammonium nitrate: 500 g/m^3 Superphosphate: 500 g/m^3 Ion sulfate: 1.5 kg/m^3 8/9 month Controlled Release: 2 kg/m^3	Varies	Tree plantings in pavements, courtyards, carparks and kerbsides.

Type	Description	Fertiliser	Depth	Location
		Gypsum: 500 g/m^3 Magnesium sulfate: 400 g/m^3 Magrilime: 600 g/m^3		

Porous bonded gravel

Backfill: Allow for base aggregate and gravel.

Filter fabric: Lay over growing medium and pre-cut to size.

Base aggregate: 5 to 7 mm crushed blue metal, laid 70 mm deep and hand consolidated.

Porous paving: Mix and place to the manufacturer's recommendations.

3.5 LOCATION OF PLANTING

General

Requirement: Do not obstruct access to services or sightlines to signage. Do not obstruct pedestrian or vehicular traffic.

Street trees

Ground clearance:

- Clearance height at maturity: 2.4 m.
- Clearance height at time of planting: 1.5 m.

Setbacks: Locate trees to achieve mature canopy clearances from the following:

- Electricity or telecommunications poles or pillars: > 4 m.
- Streetlights: > 7.5 m.
- High voltage transmission lines: > 4 m radius.
- Stormwater drainage pits: > 2 m.
- Kerbs measured to the back of the kerb: 750 mm to 1000 mm.
- Driveways: > 3 m.
- Intersections measured from the face of the kerb of the adjoining street: > 10 m.
- Existing trees: The combined mature canopy width.

3.6 IRRIGATION

Installation

Requirement: Conform to *0254 Irrigation* and as follows:

- Location: Make sure the sprinkler system is installed in a readily accessible location.
- Water source: Supply from a point beyond the water meter and inside the site boundary, passing through a backflow prevention device.
- Reticulation pipes: Provide piping installed at minimum 300 mm below the surface ground level and pop-up sprinkler system with conduits installed under footpaths.

0271 PAVEMENT BASE AND SUBBASE

1 PRODUCTS

1.1 BASE AND SUBBASE MATERIAL

Granular material

Requirement: Provide unbound granular materials, including blends of two or more different materials, which when compacted develop structural stability and are uniform in grading and physical characteristics.

Crushed rock

Requirement: Provide crushed rock as follows:

- Base: 20 mm nominal.
- Subbase: 40 mm nominal.

Natural gravel

Requirement: Provide unbound natural gravel materials as follows:

- Base: 20 mm nominal.
- Subbase: 40 mm nominal.

Base and subbase material properties and test methods

Unconfined compressive strength to AS 5101.4 (2008): Maximum 1.0 MPa.

2 EXECUTION

2.1 SUBGRADE PREPARATION

General

Requirement: Prepare the subgrade to *0222 Earthwork*.

2.2 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.

Surface level

General: Provide a finished surface level that is free draining and evenly graded between level points.

2.3 BASE AND SUBBASE COMPACTION

General

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

Minimum relative compaction table

Item description	Minimum dry density ratio (modified compaction) to AS 1289.5.2.1 (2017)
Subbase	95%
Base	98%

Compaction requirements

General: Apply uniform compactive effort, over the whole area to be compacted, until the required density is achieved or until failure is acknowledged.

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

0274 CONCRETE PAVEMENT

1 GENERAL

1.1 STANDARDS

Concrete

Specification and supply: To AS 1379 (2007).

Materials and construction: To AS 3600 (2018).

Residential pavements: To AS 3727.1 (2016).

Vapour barrier

Requirement: To AS 2870 (2011) clause 5.3.3.

2 EXECUTION

2.1 GENERAL

Preparation

General: Trim the ground to suit the required thickness of concrete and compact to a firm, even surface.

Prepared subgrade: Blind with sufficient sand to create a smooth surface free from hard projections. Wet the sand just before laying the underlay.

Paving

General: Place and compact concrete paving over a vapour barrier placed over the prepared ground surface.

Grading

Requirement: Grade to fall away from buildings and towards drainage outlets without ponding, minimum 1:100.

Thickness

Minimum:

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

Condenser plinths

Requirement: If 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: If possible, mount condensers on the concrete verandah slab.

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

Curing

General: Protect fresh concrete from premature drying and from excessively hot or cold weather. Maintain the concrete at a reasonably constant temperature with minimum moisture loss for the curing period of 7 days.

2.2 JOINTS

Non-dowelled contraction joints

General: Construct transverse and longitudinal contraction joints by early power sawing at an

appropriate time, tooling or by placing an insert in the fresh concrete.

Spacing:

- Unreinforced pavement: Maximum 1500 mm.
- Reinforced pavement: Maximum 2000 mm.

Expansion joints
General: Cast in 10 mm thick compressible filler material at maximum 6 m spacing.

Abutment with building
General: Where concrete paving more than 1500 mm wide abuts the wall of a building, cast in 10 mm thick compressible filler material between the paving and the wall.

2.3 SURFACE FINISHES

Unformed surfaces
General: Strike off, screed and level slab surfaces to finished levels and documented finish.

Finishing
Commencement: Immediately after placement, spreading and compaction of the concrete, start initial finishing procedures to achieve the documented finish.

Final finishing: Do not commence final finishing until all bleed water has evaporated from the surface after initial finishing procedures.

Surface sealer
Application: Apply surface sealer after the curing period to the manufacturer's recommendations.

2.4 DRIVEWAY, GARAGE OR CARPORT FLOORS

General
Compact base: To AS 1289.5.2.1 (2017).

Finish: Granolithic finish.

0276 PAVING - SAND BED

1 GENERAL

1.1 STANDARDS

General
Concrete and clay pavers: To AS/NZS 4455.2 (2010).

1.2 PAVER THICKNESS

General
Requirement: Minimum thickness:

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

2 PRODUCTS

2.1 MATERIALS

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

Cement
Standard: To AS 3972 (2010), type GP.

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

2.2 COMPONENTS

Pavers
General: Provide pavers of clay, stone or concrete, purpose-made for use as paving.

3 EXECUTION

3.1 GENERAL

Preparation
General: Trim the subgrade to the required profile and to suit the thickness of pavers and sand bed. Compact to a firm, even surface.

Base course
General: Conform to *0271 Pavement base and subbase*.

Edge restraint
Perimeter: If not provided by other structures, provide edge restraints to bedding and units.

Type: Bed units in mortar at least 40 mm thick.

Drainage: Position edge restraint and pavers so that the tops of the pavers are slightly above the front edge of the edge restraint.

Bedding course
Preparation: Remove all loose material from the prepared base.

Geotextile: Place fabric between the base course and the bedding sand and lap 150 mm at joints.

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
Requirement: Grade to fall away from buildings and towards drainage outlets without ponding, minimum 1:100.

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

Laying
General: Lay pavers on the screeded sand bedding to the documented set-out and pattern.

Joints: 2 to 5 mm in width.

Cut courses: 50 mm minimum plan dimension. On footpaths and other linear elements, use at least two cut courses and maintain symmetry.

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

Joint filling: Spread dry sand over the paving 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.

0277 PAVEMENT ANCILLARIES

1 GENERAL

1.1 INTERPRETATION

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

- Absolute level tolerance: Maximum deviation from design levels.
- Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface.

1.2 TOLERANCES

Channels and kerbs
Absolute level tolerance: ±10 mm at any point on the finished surface.

Relative level tolerance: 5 mm to the top or face of kerbs and to the surface of channels.

Plan position deviation: 25 mm.

Exception: Kerb laybacks, grade changes or curves, or at gully pits requiring channel depression.

Linemarking
Longitudinal line lengths: ±20 mm from the lengths documented in AS 1742.2 (2022).

Longitudinal line widths: ±10 mm from the widths documented in AS 1742.2 (2022).

Transverse line lengths and widths: ±10 mm from the lengths and widths documented in AS 1742.2 (2022).

Other markings: ±50 mm from the dimensions documented or in AS 1742.2 (2022) for arrows, chevrons, painted medians, painted left turn islands and speed markings. Place arrows and speed markings square with the centreline of the traffic lane.

Vehicle barriers
Plan position deviation: 50 mm.

Length: ±20 mm.

Bollard plumb: H/100.

2 PRODUCTS

2.1 KERB AND CHANNEL (GUTTER)

Concrete
Precast: Proprietary precast units as documented.

In situ: To AS 1379 (2007).

Stone
Kerb: To EN 1343 (2012).

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

2.2 LINEMARKING

Pavement marking paint
Requirement: Conform to the following:

- Solvent-borne paint: To AS 4049.1 (2005).

- Waterborne paint: To AS 4049.3 (2005).
- High performance: To AS 4049.4 (2006).

2.3 VEHICLE BARRIERS

Timber log barriers

Hardwood: To AS 2082 (2007).

Softwood: To AS 2858 (2023) and AS 1720.2 (2006).

Timber preservative for softwood: Minimum hazard class H4 to AS/NZS 1604.1 (2021).

Precast concrete wheel stops

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

Plastic/rubber wheel stops

Material: Proprietary plastic or rubber wheel stops with black and yellow chevron markings.

Steel tube bollards

Type: Bollards fabricated from heavy steel tube, to AS 1074 (1989).

Minimum nominal size: DN 100.

Finish: Galvanized after fabrication.

2.4 OTHER MATERIALS

Mortar materials

Cement: To AS 3972 (2010).

Sand: Fine aggregate free from deleterious matter.

Water: Clean and free from any deleterious matter.

3 EXECUTION

3.1 KERB AND CHANNEL (GUTTER)

General

Precast concrete: Install to manufacturer's recommendations.

In situ concrete: Construct kerbs and/or channels in fixed forms, by extrusion or by slip forming.

Stone: Lay butt jointed.

Preparation

Subgrade or subbase material: Compact to form a firm base extending at least 150 mm beyond the proposed alignment of the back of the kerb. Match the adjoining pavement subgrade/subbase compaction or compact to 95% standard maximum dry density to AS 1289.5.1.1 (2017), as appropriate.

Concrete base: Provide a concrete base and mortar bed for stone and kerb channels above the compacted subgrade or subbase, as documented.

Setting out

General: Set out the work so that all channels and kerbs are placed with tolerances, as documented.

Joints

Joint type and location: As documented.

Contraction joint: Provide as follows:

- Extruded kerb: Cut a minimum of 50% of the cross-sectional area. Do not distort the kerb or adjacent surfaces. Tool the top of the joint to create a groove minimum 20 mm deep and 5 mm wide.
- Formed kerb: Form joint at the documented locations.

Construction joint in concrete kerb and channel: Roughen the surface of the set concrete at the location of the joint. Remove loose or soft material, foreign matter and laitance. Dampen the surface just before placing the fresh concrete and coat with a neat cement slurry.

Expansion joint: Form joint, as documented.

Concrete pavement: If channels and/or kerbs are cast adjacent to a concrete pavement, continue the same joint type, as documented for the concrete pavement, across the channels and/or kerbs.

Backfill

Timing: Not earlier than three days after placing channels and/or kerbs, backfill and reinstate the spaces on both sides of the channels and/or kerbs.

Material: Granular, free of organic material, clay and rock in excess of 50 mm diameter.

Compaction: Compact backfill in maximum 150 mm thick layers, to a relative compaction of 95% tested to AS 1289.5.4.1 (2007), for standard compactive effort.

Pavement: Backfill pavement material adjacent to new channels and/or kerbs to the documented requirements of the pavement material.

3.2 LINEMARKING

Preparation

Surface: Clean, dry and free of any deposit that may impair adhesion of the linemarking.

Wet weather: Do not apply linemarking during wet weather or if rain is likely to fall during application or paint drying time.

Provision for traffic: Allow for traffic during application and protect linemarkings until the material has dried sufficiently to carry traffic without being damaged.

Mixing of paint: Before use, mix all paint in its original container to produce a smooth uniform product consistent with the freshly manufactured product.

Removal of existing pavement markings

General: Remove existing linemarking, as documented, from the wearing surface of pavements without causing significant damage to the surface.

Application of linemarking

Requirement: Spray or brush lines, symbols, letters, arrows and chevrons using templates.

Paint thickness: Uniform wet film thickness: 0.35 to 0.40 mm.

Linemarking alignment: Straight or with smooth, even curves as documented.

Edges: Form clean, sharp edges. Remove any paint applied beyond the defined edge of the linemarking and leave a neat and smooth marking on the wearing surface of the pavement.

Painting over existing linemarking: Use paint matching the pavement surface.

3.3 VEHICLE BARRIERS

Timber log barriers
Installation: Check out the posts to receive the rails. Set each post 600 mm below the finished surface level and surround with compacted fine crushed rock, gravel or cement stabilised rammed earth. Bolt rails to posts with M12 diameter galvanized bolts and washers, with bolt heads and nuts recessed.

Precast concrete wheel stops
Installation: Drive 12 mm diameter galvanized steel rods a minimum of 600 mm below finished surface level and stop the top of the rod 25 mm below the top of the wheel stop.

Concrete pavement/slab: Bolt the wheel stop to the pavement using galvanized steel masonry anchors, installed to manufacturer's recommendations. Top of bolt to stop 25 mm below the top of the wheel stop.

Completion: Grout fill the holes flush to match the concrete finish.

Steel tube bollards
Installation: Encase buried end of bollard in concrete footing, minimum 600 mm deep x 250 mm diameter. Finish top of footing minimum 100 mm below finished surface level.

On concrete slabs: Weld on a 10 mm thick base plate drilled for 4 bolts, and bolt to concrete slab using galvanized steel masonry anchors installed to manufacturer's recommendations.

Filling: Fill the tube with 15 MPa concrete.

Open ends: Seal with matching fabricated end caps, spot welded and ground smooth.

0310 CONCRETE

1 GENERAL

1.1 STANDARDS

General
Formwork design and construction: To AS 3610.1 (2018) and AS 3610.2 (Int) (2023).

Plywood formwork: To AS 6669 (2016).

Reinforced concrete construction: To AS 3600 (2018).

Specification and supply of concrete: To AS 1379 (2007).

Residential ground slabs and footings: To AS 2870 (2011).

1.2 INTERPRETATION

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

- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Average ambient temperature: Average value of the daily maximum and minimum ambient temperatures over the defined period at a site.
- Weather – cold: Ambient shade temperature less than 10°C.
- Weather – hot: Ambient shade temperature greater than 30°C.

1.3 TOLERANCES

Formed surfaces
Form face deflections: To AS 3610.1 (2018) Table 3.3.4.1.

Straight elements: To AS 3610.1 (2018) Table 3.3.5.1.

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

Flatness tolerance class table

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

2 PRODUCTS

2.1 FORMWORK

General
Lost formwork: Free of timber or chlorides and not to impair the structural performance of the concrete members.

Design
Formwork: The design of the formwork is the contractor's responsibility.

Plywood forms
Material: To AS 6669 (2016).

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

Joints: Seal the joints consistent with the documented surface finish class.

Tolerances: To AS 3610.1 (2018) Section 3.

2.2 MATERIALS

Polymeric film underlay
Vapour barriers and damp-proofing membranes: To AS 2870 (2011) clause 5.3.3.

Minimum thickness: 0.2 mm.

Reinforcement
Standard: To AS/NZS 4671 (2019).

Storage: Store reinforcement above the surface of the ground and protect from damage and from deterioration by exposure.

Cement
Standard: To AS 3972 (2010).

Age: Less than 6 months old.

Storage: Store cement bags in a dry under cover and above ground environment.

Pre-mixed concrete supply
Standard: To AS 1379 (2007) by the batch production process.

Maximum slump: 100 mm.

Curing compounds
Liquid membrane-forming compounds: To AS 3799 (1998).

3 EXECUTION

3.1 POLYMERIC FILM UNDERLAY

Location
Vapour barrier: Under slabs on ground, including integral ground beams and footings.

Damp-proofing membrane: Areas prone to rising damp or salt attack.

3.2 FORMWORK

Corners
Work above ground: Bevel with a chamfer at re-entrant angles, and fillet at corners.

Face of bevel: 25 mm.

Void formers
Protection: Keep void formers dry until use, install on a firm level surface and place reinforcement and concrete with minimum delay.

3.3 REINFORCEMENT

Supports
Concrete, metal or plastic supports: Provide as follows:

- Able to withstand construction and traffic loads.
- With a protective coating if they are ferrous metal, located within the concrete cover zone, or are used with galvanized or zinc-coated reinforcement.

Spacing:

- Bars: ≤ 60 diameters.
- Mesh: ≤ 600 mm.

Supports over membranes: Prevent damage to waterproofing membranes or vapour barriers. If appropriate, place a metal or plastic plate under each support.

Projecting reinforcement
Protection: If starter or other bars extend beyond reinforcement mats or cages, through formwork or from cast concrete, provide a plastic protective cap to each bar until it is cast into later work.

Bending
Restriction: Use only bars with bends as documented.

Site bending: If required to bend or straighten bars on site, conform to AS 3600 (2018) clause 17.2.3.2. Do not use heat, and only use methods that will not damage the steel and its structural properties.

Tying
Requirement: Secure the reinforcement against displacement at intersections with wire ties or clips. Bend the ends of wire ties to prevent the ties projecting into the concrete cover.

Bar lapping
Requirement: Minimum lap as follows:

- Square and rectangular mesh: Overlap the two outermost transverse wires of one sheet with the two outermost transverse wires of the other sheet.
- Trench mesh: 500 mm.
- Bars:
  - Bar diameter ≤ 12 mm: 500 mm.
  - 12 mm < Bar diameter ≤ 16 mm: 700 mm.
- Strip footing intersections and corners:
  - Trench mesh: Full width across the intersection.
  - Bars: Typically full width across the intersection. At corners ('L' intersections), bend and continue the outer bar 500 mm minimum around the corner.

3.4 CONCRETE

Preparation
Cleaning: Before placing concrete, remove free water, dust, debris and stains from the form face and the formed space.

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

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

Vertical elements: Limit the free fall of concrete to maximum of 2 m.

Reinforcement: Maintain the documented concrete cover to reinforcement.

Compaction

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

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

Rain

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

Placing in cold weather

Temperature limits: Maintain the following:

- Freshly mixed concrete: ≥ 5°C.
- Forms and reinforcement before and during placing: ≥ 5°C.
- Water: Maximum 60°C when placed in the mixer.

Temperature control: Heat the concrete materials, other than cement, to the minimum temperature necessary so that the temperature of the placed concrete is ≥ 5°C.

Placing in hot weather

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

Temperature control: Select one or more of the following methods to make sure the temperature of the concrete mix does not exceed 35°C:

- Cool the concrete using liquid nitrogen injection before placing.
- Cover horizontal transport containers.
- Forms and reinforcement before and during placing: ≤ 35°C.
- Spray the coarse aggregate using cold water prior to mixing.
- Use chilled mixing water.

3.5 JOINTS

Construction joints

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

Joint preparation: Scabble hardened concrete joint surface to a minimum 3 mm amplitude. Do not damage projecting reinforcing steel. Remove loose or soft material, foreign matter and laitance. Dampen the surface just before placing the fresh concrete and coat with a neat cement slurry.

Slip joints

Requirement: If concrete slabs are supported on masonry, provide proprietary slip joints.

Slab-on-grade control joints

General: Provide control joints, as documented.

Tooled and sawn joints: Form joints within the concrete surface with either a grooving tool or a mechanical circular saw.

Timing: Form joints as early as possible after placement of concrete. Make sure the concrete has hardened sufficiently to prevent dislodging aggregate.

Joint width: 3 to 5 mm wide.

Joint depth: A minimum of (0.25 - 0.33) x depth of the concrete.

3.6 FORMED SURFACES

General

Formed surface finish quality: To AS 3610.1 (2018) Table 3.3.3.1 and the following:

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

Damage: Do not strip formwork prematurely if damage to the concrete may be caused.

Curing

General: If formwork is stripped before the minimum curing period for the concrete has elapsed, continue curing the exposed faces as soon as the stripping is completed, and within an hour of exposure.

Surface repairs

Method: If surface repairs are required, submit proposals.

3.7 UNFORMED SURFACES

Surface finishes

General: As documented.

Surface repairs

Method: If surface repairs are required, submit proposals.

3.8 CURING

General

Requirements: Take into account the average ambient temperature at site over the relevant period affecting the curing and 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.
- Minimum curing period: 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 AS 3600 (2018) clause 17.1.5 and 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.
- Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.

Curing compounds

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

Substrates: Do not use wax-based or chlorinated rubber-based curing compounds on surfaces

forming substrates to applied finishes, concrete toppings and cement-based render.

Water curing
Method: Select a method of ponding or continuous sprinkling that does not damage the concrete surface during the required curing period.

Cold weather curing
Temperature: Maintain concrete surface temperature above 5°C for the duration of the curing period.

Hot weather curing
Requirement: If the concrete temperature exceeds 25°C, or the ambient shade temperature exceeds 30°C, protect from drying winds and sun by using an evaporative retarder until curing has commenced.

3.9 COMPLETION

Formwork removal
Extent: Remove formwork, other than permanent forms and trapped forms, including formwork in concealed locations.

Timing: Do not disturb formwork until concrete has reached sufficient hardness to withstand formwork movements and removal without damage.

Stripping:

- General: To AS 3600 (2018) where it is more stringent than AS 3610.1 (2018) and AS 3610.2 (Int) (2023).
- Vertical formwork: To AS 3610.1 (2018) Appendix C Table C2.

Protection
General: Protect the concrete from damage due to construction loads, physical and thermal shock, and excessive vibration, particularly during the curing period.

Surface protection: Protect finished concrete surfaces and applied finishes from damage.

0331 BRICK AND BLOCK CONSTRUCTION

1 GENERAL

1.1 STANDARDS

General
Materials and construction: To the AS 4773 series.

2 PRODUCTS

2.1 DURABILITY

General
Exposure environment: To AS 4773.1 (2015) clause 4.3.

Exposure locations: To AS 4773.1 (2015) clause 4.4.

2.2 MATERIALS

Masonry units
Standard: To AS/NZS 4455.1 (2008) and AS/NZS 4455.3 (2008).

Minimum age of clay bricks: 7 days.

Salt attack resistance grade: To AS 4773.2 (2015) Table 2.1.

Mortar materials
Mortar class: To AS 4773.1 (2015) Table 3.1.

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

Grout
Standard: To AS 4773.2 (2015) clause 4.2.

2.3 BUILT-IN COMPONENTS

General
Durability class of built-in components: To AS 4773.1 (2015) Table 4.1.

Steel lintels
Angles and flats: Sizes to AS 4773.1 (2015) Table 12.2.

Cold-formed proprietary lintels: Designed to AS/NZS 4600 (2018).

Corrosion protection: To AS 2699.3 (2020).

Cutting: Do not cut after galvanizing.

Reinforcement
Standard: To AS/NZS 4671 (2019).

Wall ties
Standard: To AS 2699.1 (2020).

Type: A.

Corrosion protection: To AS 2699.1 (2020).

Connectors and accessories
Standard: To AS 2699.2 (2020).

Corrosion protection: To AS 2699.2 (2020).

Flashings and damp-proof courses
Standard: To AS/NZS 2904 (1995).

Weepholes
Type: Moulded plastic weephole formers with a vermin proof grate.

3 EXECUTION

3.1 GENERAL

Mortar mixing
General: Measure volumes accurately to the documented proportions. Machine mix for at least six minutes. If the initial set of the cement has taken place, discard the mortar. Do not retemper.

Storage and handling
Masonry units: Store above the surface of the ground and cover to prevent entry of rainwater and contaminants. Locate away from surface and ground water runoff.

Mortar materials: Protect from contamination and as follows:

- Sand: Store away from surface and ground water runoff and allow for free drainage of rainwater.
- Cement and lime: Store bags in a dry, under cover and above ground environment.

Bond
Type: Stretcher bond.

Building in
Air vents: Install with insect mesh and fit flush to internal walls.

Embedded items: Build in wall ties and accessories as the construction proceeds. If not practicable to obtain the required embedment within the mortar joint in cored or hollow masonry units, fill appropriate cores with grout or mortar.

Minimum clearance for timber frame shrinkage
General: In timber framed masonry veneer construction, provide clearances to allow for long-term shrinkage of timber including at windows, doors, thresholds, at the underside of eaves where the masonry and soffit meet and as follows:

- Single storey (slab on ground): 10 mm.
- Two storey (slab at ground floor): 32 mm.
- Additional clearance: Accommodate additional shrinkage of unseasoned floor timbers.

Joining to existing
General: Provide a control joint where joining to existing structures. Do not tooth new masonry into existing work unless approved by a professional engineer.

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

Solid and cored units: Lay on a full bed of mortar. Fill perpends solid. Cut mortar flush.

Hollow units: Face-shell bedded. Fill perpends solid. Cut mortar flush.

Joint thickness: 10 mm.

Finish: Conform to the following:

- Externally: Tool to give a dense water-shedding finish.
- Internally: If wall is to be plastered, do not rake more than 10 mm to give a key.

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

Rods
Set-out: Construct masonry to the following rods:

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

Piers
Isolated piers in carport, veranda or similar:
Construct as follows:

- Size: Not less than 290 x 290 mm and not more than 2.7 m high.
- Spacing: Not more than 3.0 m centres.
- Reinforced to BCA (2022) H1D5(4) or a professional engineer's requirements.

Meter box
Location: As documented.

Storerooms
Requirement: Apply 3 coats of waterproofing clear or transparent sealer to the external walls of storerooms.

3.2 FACEWORK

Cleaning
General: To the manufacturer's recommendations and the following:

- Clean progressively as the work proceeds to remove mortar smears, stains and discolouration.
- Do not erode joints if using pressure spraying.

Acid solution: Do not use.

Colour mixing
Distribution: In facework, distribute the colour range of units evenly to prevent colour concentrations and banding.

Sills and thresholds
General: Solidly bed sills and thresholds and lay them with the top surfaces draining away from the building.

Minimum size of unit: Three quarters full width.

3.3 SUBFLOOR WORK

Bearer piers
Provide engaged or free standing unreinforced masonry piers to support bearers at 1800 mm maximum centres and to the **Bearer pier table**.

Bearer pier table

Type	Minimum size (mm)
Engaged up to 1200 mm high	230 x 110 bonded or tied to walls
Freestanding up to 1500 mm high	230 x 230
Freestanding 1500 to 2400 mm high	350 x 350

Access openings
General: In internal walls, provide door-width openings beneath doorways to give access to underfloor areas.

Air vents
General: Provide air vents to give adequate cross ventilation to the space under suspended ground floors.

Cavity walls: Provide matching vents in the internal leaves located as near as practicable to the vents in the external leaves.

Location: Below damp-proof course to internal and external walls.

Minimum provision: 6000 mm^2 net ventilation area per linear metre of wall.

Underpinning
Requirement: Install underpinning without causing damage to the building.

Grouting: Pack dry mix M4 mortar between the top of the underpinning and the underside of the existing structure at the completion of each panel of underpinning.

3.4 CAVITY WORK

Cavity clearance
General: Keep cavities clear at all times.

Cavity fill
General: Fill the cavity with mortar to one course above the adjacent finished (ground) level. Fall the top surface towards the outer leaf.

Cavity width
General: Construct minimum cavity widths in conformance with the following:

- Masonry veneer walls: 25 mm between the masonry leaf and any insulation or services placed within the cavity.
- Cavity masonry walls: 35 mm between the masonry leaf and any insulation or services placed within the cavity.

Openings
Jambs of external openings: Do not close the cavity.

Wall ties, connectors and accessories
Protection: Install to prevent water passing across the cavity.

3.5 DAMP-PROOF COURSES

Location
General: Locate damp-proof courses as follows:

- Timber floors: In the first course below the level of the underside of ground floor timbers in internal walls and inner leaves of cavity walls.
- Cavity walls built off slabs on ground: In the bottom course of the outer leaf, continuous horizontally across the cavity and up the inner face bedded in mortar, turned 30 mm into the inner leaf one course above. Project 10 mm beyond the external slab edge and turn down 45°.
- Masonry veneer construction built off slabs on ground: In the bottom course of the outer leaf, continuous horizontally across the cavity. Fastened to the inner frame 75 mm above floor level.
- Internal walls built off slabs on ground: In the first course above floor level.
- Walls adjoining infill floor slabs on membranes: In the course above the underside of the slab in internal walls and inner leaves of cavity walls. Project 40 mm and dress down over the membrane turned up against the wall.

Height: Not less than:

- 150 mm above the adjacent finished ground level.
- 75 mm above the finished paved or concrete areas that slope away from the wall.
- 50 mm above the finished paved or concreted areas that slope away from the wall and are protected from the direct effect of the weather.

Installation
General: Lay in long lengths. Sandwich damp-proof courses between mortar.

Joints: Locate away from weepholes.

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

Laps: Lap the full width at corners and intersections and 150 mm at joints.

Steps: Step as necessary, but not more than two courses per step for brickwork and one course per step for blockwork.

3.6 FLASHINGS

General
Requirement: To AS 4773.2 (2015) clauses 9.6 and 10.5, and the following:

- Sandwich flashings between mortar except where on lintels.
- Point up joints around flashings, filling voids.

Weepholes
Standard: To AS 3700 (2018).

Requirement: Locate weepholes to external leaves of cavity walls as follows:

- Generally:
  . Spacing: 1200 mm maximum.
  . In the course above damp-proof courses, flashing and cavity fill.
  . At the bottom of unfilled cavities.
- Openings exceeding 1200 mm: Provide weepholes above the opening at maximum 1200 mm centres and at both ends of the opening in the following situations:
  . If there is no roof overhang directly above the opening.
  . If the roof overhang does not extend more than three times the distance between the top of the opening and the roof soffit.

3.7 WALL TIES

Location
Spacing: To AS 4773.2 (2015) clause 5.3.

Installation
Embedment: At least 50 mm into mortar. Provide at least 15 mm of mortar cover to any exposed surface.

Flexible ties
General: Install stabilising ties at control joints and abutting structural elements, including columns, beams and slab soffits.

3.8 CONTROL JOINTS

General
Location and spacing: Provide control joints to AS 4773.2 (2015) Section 7.

Control joint filling
Installation: Clean the joints thoroughly and insert an easily compressible backing material before filling with a gun-applied flexible sealant.

Sealant joint depth to width ratio (depth:width): 1:2.

Minimum sealant depth: 6 mm.

Sealant type: External: UV stable.

3.9 REINFORCED AND GROUTED BLOCKWORK

Reinforcement
Cover: Maintain cover to vertical and horizontal steel reinforcement using plastic clips or wheels, as appropriate.

Cleaning core holes
General: Provide purpose-made cleanout blocks or machine cut a cleaning hole at the base of each grouted core.

Location: Locate on the side of the wall that is to be rendered or otherwise concealed.

Cleaning: Rod cores to dislodge mortar fins protruding from the blocks and mortar droppings from reinforcement. Remove through the cleanout blocks.

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

Height of lift: Limit the height of individual lifts in any pour to make sure that the grout can be thoroughly compacted to fill all voids.

Compaction: Compact by vibration or by rodding.

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

3.10 LINTELS

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

Standard: To AS 4773.1 (2015) Section 12.

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

Propping: Provide temporary props to lintels for a minimum of 7 days to prevent deflection or rotation.

Concrete beam lintels
Requirement: To AS 3600 (2018) or a professional engineer's requirements.

3.11 BUILT-IN COMPONENTS

Wall ties fixing straps and tie-down systems
Installation: To AS 3700 (2018) or the AS 4773 series.

Corrosion protection: To AS 3700 (2018) clause 5.7 for coastal and industrial areas.

Tie-down straps
Type and size: 32 x 0.8 mm or 25 x 1.0 mm galvanized straps.

Spacing: Not more than 1.2 m centres, corresponding with truss/rafter positions to AS 1684.2 (2021) and AS 2699.2 (2020) or to the engineer's requirements.

3.12 BAGGING

Preparation
General: Cut joints flush before bagging.

Dry bagging
Application: Apply laying mortar to the surface using a hessian bag or similar. Flush up irregularities, but leave a minimum amount of mortar on the surface.

0342 LIGHT STEEL FRAMING

1 GENERAL

1.1 STANDARDS

General

Design, materials and protection: To AS/NZS 4600 (2018).

Residential and low-rise steel framing: To NASH-1 (2005) (National Association of Steel Housing) and NASH-2 (2014) Standard.

1.2 TOLERANCES

General

Manufacturing, assembly and installation tolerances: To NASH-1 (2005) Appendix D and NASH-2 (2014) Appendix A.

1.3 SUBMISSIONS

Design documentation

General: If the structural documentation defines performance criteria, submit as follows:

- Design to AS/NZS 4600 (2018) or NASH-1 (2005): Independent design, documentation and certification from a professional engineer.
- To NASH-2 (2014): Certification of conformance to the requirements of NASH-2 (2014) from a professional engineer.

Reactions: Submit the location and magnitude of reactions that are to be accommodated by the support structure.

Design compliance: Submit evidence that the framing design conforms to the following:

- Wind Regions C or D to AS/NZS 1170.2 (2021) as documented.
- Terrain Category 2 to AS/NZS 1170.2 (2021) unless otherwise documented.
- Maximum truss spacing: 1200 mm.
- Dead and live loads to AS/NZS 1170.1 (2002).
- Wall and roof framing connections: Certification from a professional engineer that it complies with the wind ratings for the site location for both welded and screw fixed connections.

Shop drawings

General: Submit shop drawings, to a scale that best describes the detail, requirements for the documented configurations and loadings.

Prefabricated roof trusses: Include the following:

- Plan: Truss layout.
- Elevations: Arrangement of members, allowing for the accommodation of in-roof services and the size and section type of each member.
- Holding down and bracing: Details demonstrating capability to resist lateral and uplift forces.
- Method of assembly and connection details.

Prefabricated wall frames: Include the following:

- Plan: Wall layout.
- Elevation: Arrangement of members, and size and section type of each member.
- Method of assembly, connection, holding down and bracing.

Prefabricated floor frames/cassettes: Include the following:

- Plan: Level of installation, arrangement of members, and size and section type of each member, including prefabricated floor joists.
- Method of assembly, connection, holding down and bracing.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Requirement: Transport all components to site and store, if required, so that components and their coating are not damaged or distorted.

2.2 COMPONENTS

Damp-proof course

Membrane: To the membrane requirements of AS 2870 (2011) or AS/NZS 2904 (1995).

Cold-formed steel framing

General: Cold-formed sections from steel, metallic-coated to AS 1397 (2021).

Corrosion protection: To NASH-2 (2014) Section 8.

Framing members

Cold-formed steel framing for proprietary systems: To NASH-1 (2005) or NASH-2 (2014).

3 EXECUTION

3.1 GENERAL

Frame fabrication

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

Service holes: If not pre-punched, form holes by drilling or punching, conforming to the requirements of NASH-2 (2014).

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

Connections

Prefabricated framing: Fix framing elements to the fabricator's requirements.

Framing built in situ: Fix framing elements, as documented.

Fasteners: Compatible with steel frame to prevent galvanic corrosion of dissimilar metals.

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.

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

Earthing
Requirement: To AS/NZS 3000 (2018). Provide temporary earthing during erection until the permanent earthing is installed.

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

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

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

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

3.2 FLOOR FRAMING

General
Protection: If floor framing is for ground floor construction, make sure that it is protected from moisture.

Construction loads: If construction loading exceeds design loading, provide additional support so as to avoid overstressing of members.

Decks and balconies
Attachment to external walls: To BCA (2022) H1D11.

3.3 WALL FRAMING

Wall studs
General: Provide studs in single lengths without splices. Place a stud and a stiffened top plate under each structural load point from the roof or ceiling (except at openings). Provide multiple studs at points of concentrated load.

Maximum stud spacing: 600 mm.

Heads to openings
Requirement: Provide lintels appropriate to load and span.

Additional support
General: Provide additional support in the form of noggings, trimmers and studs for support and fixing of lining, cladding, hardware, accessories, fixtures and fittings.

Grabrails: Provide additional support by fixing 18 mm plywood sheets, flush with the face of studs, to noggings at 450 mm centres.

Vermin barriers
Brick veneer barrier: Nail 10 mm galvanized steel wire mesh to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork.

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

- External walls (not masonry veneer): Turn up a minimum of 75 mm on the inside and tack to stud. 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 corners and intersections and at least 150 mm at joints.

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

Prefabricated walling
Assembly: Factory assemble wall frames.

Bracing: Provide details of bracing.

Certification: Obtain certification from a professional engineer for the erected frames.

3.4 ROOF AND CEILING FRAMING

Beam framing
General: Construct framing for flat or pitched roofs where the ceiling follows the roof line, consisting of prefabricated roof beams, rafters or purlins supporting both ceiling and roof covering.

Additional support
Requirement: Provide additional frame members at the following locations:

- Hanging light fittings.
- Ceiling fans.
- Access panels.
- Any other hanging services or fixtures and fittings.

Water tank or heater in roof space: Provide a support platform to AS/NZS 3500.4 (2021) clause 5.5.1.

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

Anti-ponding boards
Standard: To AS 4200.2 (2017).

3.5 TRUSSES

Fabrication
Assembly: Factory assemble trusses.

Marking
General: Permanently mark each truss to show:

- Project identification.
- Manufacturer.
- Tag or number.
- Location.
- Support points.

Installation
Support: Support and fix trusses to the truss fabricator's recommendations.

Vertical movement: Over internal walls not providing support to trusses, provide at least 10 mm vertical clearance and use wall bracing methods that allow for vertical movements, to the truss fabricator's recommendations.

3.6 ROOF TRIM

Fascia, valley and barge boards
Requirement: Fix fascia, valley gutter boards and barge boards in conformance with the manufacturer's recommendations.

3.7 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.

0382 LIGHT TIMBER FRAMING

1 GENERAL

1.1 STANDARDS

General
Framing: To AS 1684.2 (2021), AS 1684.3 (2021) or the NCC cited AS 1684.4 (2010), as appropriate.

Design: To AS 1720.3 (2016).

Mechanically graded timber: To AS/NZS 1748.1 (2011).

Glulam beams: To AS/NZS 1328.1 (1998).

Nailplated roof trusses: To AS 1720.5 (2015).

1.2 SUBMISSIONS

Certification
Requirement: Submit certification by an appropriately qualified person of the design, documentation and erected work to the AS 1684 series and/or by a professional engineer to AS 1720.3 (2016). Include the following:

- Reactions: Provide location and magnitude of reactions to be accommodated by the support structure. If part of the structure is manufactured by a prefabricator (e.g. roof trusses), provide location and magnitude of reactions and tie down forces.
- Floor, wall and roof frame member sizes: A schedule of proposed member sizes, certified as meeting stated project requirements for spans, spacings, loadings and deflections.

Products and materials
CCA treated timber: If proposed to be used, submit details.

Shop drawings
General: Submit shop drawings, to a scale that best describes the detail, certified by an appropriately qualified person stating that the design has been carried out to the requirements of the AS 1684 series and/or by a professional engineer to AS 1720.3 (2016) for the documented configurations and loadings.

Prefabricated roof trusses: Include the following:

- Marking plans.
- Truss plan layout.
- Elevations, showing the arrangement of members, allowing for the accommodation of in-roof services, and the size and section type of each member.
- Camber of all elements.
- Method of assembly, connection and lifting.
- Location and details of tie down and bracing.

Prefabricated wall frames: Include the following:

- Wall plan, showing all wall layouts.
- Elevations, showing the arrangement of members, and the size and section type of each member.
- Method of assembly, connection and lifting.

- Location and details of tie down and bracing.

2 PRODUCTS

2.1 GENERAL

Identification
Trusses: Permanently label each truss to show:

- Manufacturer.
- Tag or number with reference to location.
- Support and tie down points.
- Labelling in coordination with installation documentation.

2.2 TIMBER

Fascias and barge boards
Hardwood: To AS 2796.1 (1999).

Softwood: To AS 4785.1 (2002).

Laminated veneer lumber
Standard: To AS/NZS 4357.0 (2022).

Formaldehyde emission class to AS/NZS 4357.0 (2022): E_1.

2.3 SHEET PRODUCTS

Structural plywood
Standard: To AS/NZS 2269.0 (2012).

Bond: Type A to AS/NZS 2754.1 (2016).

Wet process fibreboard (including hardboard)
Standard: To AS/NZS 1859.4 (2018).

2.4 COMPONENTS

Mild steel post bases
Minimum dimensions:

- Stirrup: 75 mm wide x 6 mm thick.
- Dowel: 20 mm diameter heavy tube.

Location: To timber posts supported off concrete slabs or footings.

Finish: Galvanized.

Fasteners
Installation: Do not split or otherwise damage the timber.

CCA treated timber: If in contact with CCA treated timber, provide hot-dip galvanized bolts with plastic sheaths, or bituminous or epoxy coatings to manufacturer's recommendations.

Damp-proof course
Material: To AS/NZS 2904 (1995) or suitable alternative material conforming to NCC (2022) A5G3.

Flashings
Material: To AS/NZS 2904 (1995) or suitable alternative material conforming to NCC (2022) A5G3.

3 EXECUTION

3.1 GENERAL

Storage and handling
Handling: Do not distort or damage timber or timber products.

Storage: To manufacturer's recommendations.

Moisture content of seasoned timber: Provide protection throughout handling and storage to maintain a moisture content within the targets for seasoned timber (15% maximum) and ideally near the equilibrium moisture content anticipated in service.

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

3.2 FLOOR FRAMING

Bearers and joists
Levelling: Level bearers and joists by checking or by packing for the full width of the member with dense corrosion-resistant material that is secured in place.

Maximum thickness of packing: 3 mm.

Spring: Lay bearers and joists to allow for straightening under loading.

Joints
Requirement: Locate joints only over supports:

- Minimum bearing of bearers: 50 mm.
- Minimum bearing of joists: 30 mm.

Fixing and restraint
Fixing: Secure bearers and joists to supports to provide restraint against lateral movement.

Deep joists: To AS 1684.2 (2021) clause 4.2.2.3 or AS 1684.3 (2021) clause 4.2.2.3, as appropriate.

Trimmers or blocking dimensions:

- Depth: Joist depth less 25 mm.
- Minimum thickness: 25 mm.

Engineered timber joists: Provide lateral restraint to the manufacturer's recommendations.

Decks and balconies
Attachment to external walls: To BCA (2022) H1D11.

3.3 WALL FRAMING

Additional support
Requirement: Provide additional support in the form of noggings, trimmers and studs for fixing lining, cladding, hardware, accessories, fixtures and fittings as required.

Spacing of noggings: Maximum 1350 mm centres.

Grabrails: Provide additional support by fixing 18 mm plywood sheets, flush with the face of studs, to noggings at 450 mm centres.

Vermin barriers
Brick veneer barrier: Nail 10 mm galvanized steel wire mesh to the underside of the bottom plate of

external stud walls, extending across the cavity for building into brickwork.

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

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

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

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

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

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

Prefabricated walling
Assembly: Factory assemble wall frames.

Bracing: Provide details of bracing.

Certification: Obtain certification from a professional engineer for the erected frames.

3.4 ROOF AND CEILING FRAMING

Wall plates
Fixing: Fix timber wall plates to masonry, with straps, bolts or both.

Fixing plates
General: Provide 35 mm minimum thick timber fixing plates to transfer the design loads where timber joists, rafters or purlins bear on or into steel members. Bolt to the steel member at maximum 500 mm centres and a maximum 100 mm from the end of the fixing plate.

Beam framing
Ridge straps: Butt ends of rafters together at ridge. Strap each pair together with 900 mm long steel strap passing over the ridge, triple nailed to each rafter.

Additional support
Requirement: Provide additional frame members at the following locations:

- Hanging light fittings.
- Ceiling fans
- Access panels.
- Any other hanging services or fixtures and fittings.

Water tank or heater in roof space: Provide a support platform to AS/NZS 3500.4 (2021) clause 5.5.1.

Anti-ponding boards
Standard: To AS 4200.2 (2017).

3.5 TRUSSES

Installation
Nailplated prefabricated roof trusses: To AS 4440 (2004).

Support: Support trusses on bottom chord at two points only, unless designed for additional support.

Plumb: The lesser of H/50 or 50 mm, where H is the height of the truss at the point where plumb is being measured.

Vertical movement: Provide minimum vertical clearance of 10 mm plus ceiling batten depth over internal non-load bearing walls. Use bracing methods that accommodate the design vertical movements.

3.6 ROOF TRIM

Fascia, valley and barge boards
Requirement: Fix fascia, valley gutter boards and barge boards.

3.7 COMPLETION

Protection
Protection from weather: Provide temporary protection for members until permanent covering is in place.

Tightening
Requirement: Retighten bolts, screws and other fasteners so that all joints and anchorages are secure at the date of practical completion.

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

0383 DECKING, SHEET AND PANEL FLOORING

1 GENERAL

1.1 STANDARDS

General
Timber flooring and decking: To AS 1684.2 (2021), AS 1684.3 (2021) or the NCC cited AS 1684.4 (2010), as appropriate.

1.2 TOLERANCES

Decking
Maximum vertical deviation for adjacent boards: 3 mm.

Minimum gap between edges of seasoned boards: 4 mm.

Maximum gap between boards:

- Boards not more than 150 mm wide: 6 mm.
- Boards more than 150 mm wide: 10 mm.

Sheet flooring
Maximum deviation from a 3 m straightedge laid in any direction on the floor surface: 3 mm.

AAC panel flooring
Maximum gap between adjoining panels, excluding control and articulation joints: 5 mm.

2 PRODUCTS

2.1 GENERAL

Storage and handling
Timber decking: Deliver to site and store on dry ground on level bearers 150 mm high, block stacked, banded and protected against the weather.

Plywood and particleboard sheet flooring: Deliver to site and store on dry ground on level bearers 150 mm high, laid flat and protected against the weather.

2.2 DECKING

Recycled timber decking
Standard: To FWPA PN06.1039 (2008).

New timber decking
Standard:

- Preservative-treated softwood to AS 4785.1 (2002) Section 4.
- Hardwood to AS 2796.1 (1999) Section 4.

Composite decking
General: Proprietary composite decking boards, as documented.

Slip resistance
Classification: To AS 4586 (2013).

2.3 SHEET FLOORING

Plywood
Standard: To AS/NZS 2269.0 (2012).

Formaldehyde emission class to AS/NZS 2269.0 (2012): Class E1.

Surface grade: CD.

Bond: Type A to AS/NZS 2754.1 (2016).

Durability: Preservative treatment to AS/NZS 1604.1 (2021) Table F.1.

Particleboard
Particleboard: To AS/NZS 1860.1 (2017), Class 1.

Formaldehyde emission class to AS/NZS 1860.1 (2017): Class E_1.

Compressed fibre cement sheet
Standard: To AS/NZS 2908.2 (2000).

Category: Minimum 4.

Classification:

- External: Type A.
- Internal: Type B.

2.4 AUTOCLAVED AERATED CONCRETE (AAC) PANELS

General
Requirement: Lightweight concrete floor panels manufactured from a proprietary mixture of sand, lime and cement with a gas-forming additive, and with internal welded steel reinforcing mesh, cured in an autoclave.

Standard: To AS 5146.1 (2015).

Accessories
Requirement: Accessories to the manufacturer's recommendations for the AAC panel system including the following:

- Construction adhesive.
- AAC thin bed adhesive for panel joints.
- MP bugle head and hex head screws. Conform to AS 5146.3 (2018) Table 2.13.3.
- Fire-resisting and acoustic rated sealants.

3 EXECUTION

3.1 PREPARATION

Subfloors
General: Make sure support members are in full lengths without splicing.

Flatness: Less than 3 mm deviation of the substrate under a 3 m straightedge laid in any direction with no abrupt variations greater than 1 mm over 250 mm.

Timber decking on steel joists
General: Screw fix seasoned battens to the steel joists so that their top surfaces are aligned.

- Batten size: Minimum 35 mm thick.
- Spacing of fasteners: Less than 600 mm.

3.2 FIXING DECKING

Timber decking
Standard: To AS 1684.2 (2021), AS 1684.3 (2021) or the NCC cited AS 1684.4 (2010) as appropriate.

Installation:

- Lay in long lengths with the ends of each board firmly butted to the next and firmly in contact with the joists.

- Stagger the end joints and locate them centrally over joists.

Minimum number of spans across supports: 3.

Nailing:

- General: Make sure the boards are in contact with the joists at the time of nailing, particularly where boards are machine nailed. If nails are to be less than 10 mm from ends of boards, predrill nail holes 0 to 1 mm undersize.
- Top nailing: Double nail at each bearing with hot-dip galvanized or stainless steel nails driven flush. Offset nails at intermediate fixings or skew nail 10° in opposite directions.

Sealing: Apply one coat of water repellent preservative and one coat of finish coat to top surface of joists and all surfaces of boards before fixing.

Composite decking

Installation: To manufacturer's recommendations.

3.3 FIXING SHEET FLOORING

Particleboard flooring

Installation: To AS 1860.2 (2006).

Plywood flooring

Installation: To AS 1684.2 (2021), AS 1684.3 (2021) or the NCC cited AS 1684.4 (2010), as appropriate.

Compressed fibre cement flooring

General: To manufacturer’s recommendations.

Installation: Lay the length of sheets at right angles to the joists. Stagger the end joints and locate centrally over joists. Apply adhesive to edges of sheets and firmly butt join together.

Minimum number of spans across supports: 2.

Fixing: Predrill screw holes with 1 mm clearance over screw diameter and countersink. Fix with corrosion-resistant countersunk screws.

Fasteners:

- Sheet edge and intermediate: Equally spaced at maximum 450 mm centres.
- Corners and sheet edges: Locate at least 12 mm from sheet edges and 50 mm from corners.

Wet area flooring: Stop screw heads with sealant.

3.4 AAC PANEL FLOORING

Standard

General: To AS 5146.3 (2018).

Subfloor

Requirement: Conform to AS 5146.3 (2018) Table 3.4 for maximum joist spacing.

Cutting

General: Do not cut panels, except in documented locations.

Cut edges: Protect exposed reinforcing with anti-corrosion agent to manufacturer’s recommendations.

AAC panel installation

Requirement: Install panels to manufacturer’s recommendations and as follows:

- Minimum end bearing length: Greater of 60 mm or span/80.
- Minimum edge bearing length: 60 mm.
- Apply construction adhesive between the panels and the joists and screw fix the panels to the joists. Conform to AS 5146.3 (2018) Section 6.
- Progressively apply AAC adhesive to joints between adjacent panels.
- Fit panels snugly together to fully bed adhesive.

Control joints

Requirement: Provide minimum 10 mm wide control joints as follows:

- Spaced at maximum 8 m centres in floors up to 100 mm thick.
- Where AAC panels abut adjacent building elements.

Slip joints

General: Provide slip joints to allow for differential movement as documented.

Sealant

Locations: Install fire-resisting and acoustic sealant as documented and as follows:

- At all control joints.
- At services penetrations.

0411 WATERPROOFING - EXTERNAL AND TANKING

1 GENERAL

1.1 STANDARDS

Below ground waterproofing
Membrane design and installation: To BS 8102 (2022).

External waterproofing
Membrane materials: To AS 4654.1 (2012).

Membrane design and installation: To AS 4654.2 (2012).

1.2 INSPECTION

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

- Substrate prepared and ready for installation of the waterproofing and tanking systems.
- Secondary layers prepared and ready for subsequent layers.
- Membranes after installation and before concealment.
- Underflashings after installation and prior to installation of overflashings.
- Flood tests, if applicable.
- After flood testing, if applicable.

2 PRODUCTS

2.1 MEMBRANES

Membrane systems
Requirement: Proprietary membrane system suitable for the intended external waterproofing.

Tanking system
Requirement: Proprietary membrane system suitable for the intended below ground tanking.

2.2 ACCESSORIES

Internal roof outlets
General: Proprietary funnel shaped sump cast into the roof slab, set flush with membrane, with a removable grating and provision for sealing the membrane into the base of the outlet.

Flashings
Requirement: Flexible waterproof flashings compatible with the waterproof membrane system.

2.3 THERMAL INSULATION

Insulation boards
General: Proprietary insulation boards.

2.4 PROTECTION

Protection board
General: Proprietary rigid or semi-rigid protection board.

2.5 SLIP SHEETS

Sheet material
General: A sheet to isolate the membrane system from the supporting substrate or from the topping or mortar bed.

2.6 DRAINAGE CELL PANELS

Walls and planter bases
General: Lightweight, high strength modular drainage cell for below ground or subsoil drainage.

Filter fabric: An open weave geotextile fabric to reduce soil and fines ingress into drainage system.

3 EXECUTION

3.1 PREPARATION

Substrates
General: Prepare substrates as follows:

- Clean and remove any deposit or finish that may impair adhesion of membranes.
- Remove excessive projections.
- Fill voids and hollows in concrete substrates with a concrete mix not stronger than the substrate.
- Fill cracks in substrates wider than 1.5 mm with a filler compatible with the membrane system.
- Remove all traces of a concrete curing compound if used.

Concrete substrates: Cure for more than 28 days.

Moisture content
Requirement: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing. Test substrate in-slab relative humidity to ASTM F2170 (2019). Perform three tests for the first 100 m^2 of subfloor area and an additional test for each additional 100 m^2.

Falls
General: Verify that falls in substrates are greater than 1:100.

Joints and fillets
Internal corners:

- Liquid applied membranes: Provide 15 x 15 mm 45° fillets.
- Sheet membranes: Provide 40 x 40 mm 45° fillets.

Fillet material: Cement or plastic.

External corners: Round or arris edges.

Control joints: Prepare all substrate joints to suit the membrane system.

Priming
Compatibility: If required, prime the substrates with compatible primers for adhesion of the membrane system.

3.2 INSTALLATION

Ambient conditions
Requirement: Do not install in conditions outside the manufacturer's recommendations.

Protection
Damage: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage.

Drains
General: Prevent moisture from tracking under the membranes at drainage locations.

Drains and cages: Provide removable grates or cages to prevent blockage from debris. If the finished surface is above the level of the membrane, provide a slotted extension piece to bring the grate up to the level of the finished surface.

Overflows: Apply a bond breaker to the perimeter of the overflow outlet at its junction with the surface to which the membrane will be fixed. Turn the membranes into the overflow to prevent moisture from tracking behind the membrane.

Sheet membrane joints
Orientation of laps: Lap sheets on the upslope side of the roof fall over sheets on the downslope side.

End laps generally: Stagger end lap joints.

Bituminous sheet membranes:

- Side laps: ≥ 75 mm.
- End laps: ≥ 150 mm.
- Method: Heat welded.

Synthetic rubber membranes:

- Factory-vulcanized laps: ≥ 40 mm.
- Field side laps: ≥ 50 mm.
- Field end laps: ≥ 100 mm.

PVC (Polyvinyl chloride) membranes:

- Factory-welded laps: ≥ 40 mm.
- Field-welded laps:
  . If used over insulation boards: ≥ 100 mm.
  . Other instances: ≥ 75 mm.

Movement and control joints
General: Install membranes to accommodate control joints in the substructure.

Bond breakers: Size to allow the membrane to accommodate movement.

Membrane terminations
Membrane upturns: Provide upturns above the maximum water level expected from the exposure conditions of rainfall intensity and wind, as follows:

- Height: To AS 4654.2 (2012) Table A1.
- Anchoring: Secure sheet membranes along the top edge.
- Edge protection: Protect edges of the membrane.

Vertical upward terminations: As documented.

Waterproofing above vertical upward terminations: Waterproof the structure above the termination to prevent moisture entry behind the membrane using cavity flashings, capping, waterproof membranes or waterproof coatings.

Horizontal terminations: Do not provide. Use vertical terminations.

Membrane penetrations
Vertical penetrations: Provide overflashing fixed to the substrate for vertical penetrations including pipes, ducts and vents.

Horizontal penetrations: Provide styrene butadiene styrene (SBS) bitumen flange to seal the membrane to rigid PVC-U conduits and pipes without burning the PVC-U. Do not use high density polyethylene (HDPE), polypropylene (PP) pipes or flexible PVC conduit.

Membrane at balcony doors and windows
Requirement: Install membrane before fixing door or window frames.

Hobless and flush thresholds: Install membrane before fixing door or window frames. Provide a continuous grated drain abutting the external face of the door or window sill.

Membrane around skylights and hatches
Requirement: Install membranes to upstands prior to the installation of the skylight or hatch.

Membrane to below ground structures
Membrane: Externally apply membrane to all walls and return to horizontal surfaces to prevent water tracking around structure at joints and corners.

Reinforcement: Provide reinforcement to the membrane at junctions, corners and over joints to the manufacturer’s recommendations.

Protection board: Provide protection board to the full extent of the membrane.

Drainage cell: Provide geo-filter fabric wrapped drainage cell to vertical surfaces of the structure.

Curing of liquid membrane systems
General: To the manufacturer's recommendations.

Overlaying finishes on membranes
Compatibility: If a membrane is to be overlaid with another system such as tiles, pavers, ballast, insulation or soil, provide an overlaying system that is compatible with and will not cause damage to the membrane.

Bonded or partially bonded membranes: If the topping or bedding mortar is to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

Slip sheet: If the topping or bedding mortar is structurally sufficient to not require bonding to the substrate, lay a double slip sheet over the membrane to separate it from the topping or bedding mortar.

Paint coatings: If maintenance pathways are indicated by a paving paint, use a paving paint that is compatible with the membrane.

Membrane protection boards: If the membrane is overlaid, topped or backfilled against, provide a protection board to protect the membrane from hydrostatic pressure, wear and puncture.

3.3 COMPLETION

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

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

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

0420 ROOFING

1 PRODUCTS

1.1 COMPONENTS

Fasteners
Requirement: Starter clips, fixing clips and fastenings to the roofing system supplier's recommendations.

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

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

Sealants
Requirement: 100% neutral cure non-acid based silicone rubber to match roofing.

1.2 MATERIALS

Profiled sheet metal roofing
Material: Prefinished/coated steel sheeting.

Standard: To AS 1562.1 (2018).

Corrosion protection: To BCA (2022) H1D7(2).

Prepainted and organic film/metal laminate finish: To AS/NZS 2728 (2013).

Tile roofing
Standard: To AS 2049 (2002).

Battens: To AS 2050 (2018).

Ancillaries: Provide accessories compatible with the tiles, necessary to complete the tiling.

Glazed roofing
Description: Sloped overhead glazing fixed to glazing bars or directly to the roof framing with the necessary supports, trim, flashings and sealants.

Glazing materials:

- Requirement: To AS 1288 (2021) Section 6.
- Marking: To AS 1288 (2021) clause 5.23.

Plastic sheet materials:

- Unplasticised polyvinyl chloride (PVC-U) sheet: To AS 4256.2 (2006).
- Glass fibre reinforced polyester (GRP) sheet: To AS 4256.3 (2006).
- Polycarbonate: To AS 4256.5 (2006).

Skylights
Standard: To AS 4285 (2019).

Skylights (roof lights) in bushfire-prone areas: To AS 3959 (2018).

Roof ventilators
Description: A proprietary roof ventilator system, including framing, fixing, trim, seals, accessories and flashings.

Finish: Match adjacent roofing.

1.3 ROOF PLUMBING

General
Description: Flashings, cappings, gutters, rainheads, outlets, external downpipes and accessories necessary to complete the roofing system.

Flashing and capping: Notched to match profile of roofing.

Gutters and fascias: Prefinished/coated steel sheeting.

Downpipes: Prefinished or painted zincalume.

Standards
Roof drainage: To AS/NZS 3500.3 (2021).

Metal rainwater goods: To AS/NZS 2179.1 (2014).

Flashings and cappings: To AS/NZS 2904 (1995).

2 EXECUTION

2.1 INSTALLATION

Protection
General: Keep the roofing and rainwater system free of debris and loose material during construction.

Thermal movement
Requirement: Allow for thermal movement in the roof installation and the structure, including movement in joints and fastenings.

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

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

2.2 PROFILED SHEET METAL ROOFING

Installation
Metal sheet roofing: To AS 1562.1 (2018) and BCA (2022) H1D7(2).

Ridges and eaves: Treat sheet ends as follows:

- Project sheets 50 mm into gutters.
- Close off ribs at bottom of sheets using mechanical means or with purpose-made fillers or end caps.
- Turn pans of sheets up at tops and down into gutters by mechanical means.
- Provide pre-cut notched eaves flashing and birdproofing if required.
- Close off ridges with purpose-made ridge fillers of closed cell polyethylene foam.

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

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

2.3 TILE ROOFING

Installation
Roof tiling: To AS 2050 (2018) and BCA (2022) H1D7(4).

Setting out: Set out the roof to give an even tile gauge in each course, with full or saw cut tiles at verges.

Bedding and pointing: Bed and point ancillary tiles, including ridges, hips and verges, in coloured cement mortar to match the tiles.

Pointed verge: Bed and point tiles on 100 x 5 mm fibre cement pointing strip.

2.4 GLAZED ROOFING

Glass roofing
Standard: To AS 1288 (2021) Section 8.

Plastic sheet roofing
Standard: To AS 1562.3 (2006).

2.5 ROOF PLUMBING

Jointing sheet metal rainwater goods
Sealing: Seal fasteners and mechanically fastened joints. Fill the holes of blind rivets with silicone sealant.

Flashings
Upstands: Flash projections above or through the roof with two part flashings consisting of a base flashing and a cover flashing, with at least 100 mm vertical overlap. Provide for independent movement between the roof and the projection.

Wall abutments: If a roof abuts a wall, provide overflashing as follows:

- In masonry, planked cladding or concrete: Step in courses to the roof slope. Interleave with damp-proof course, if any.
- Raking in masonry: Build into the full width of the outer leaf. Turn up across the cavity and fix to or build into the inner leaf at least 75 mm above the roofing line.

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 (2022) H2D6.

External downpipes
General: Prefabricate downpipes to the required section and shape. 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.

2.6 COMPLETION

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

Cleaning
General: Remove debris, metal swarf, solder, sealant and unused materials. Clean out gutters and downpipes.

0430 CLADDING

1 PRODUCTS

1.1 MATERIALS

Autoclaved aerated concrete (AAC) panels
Requirement: Proprietary AAC panels.

Standard: To AS 5146.1 (2015).

Joint adhesive: Proprietary adhesive to manufacturer's recommendations.

Sealant: Flexible sealant to the manufacturer’s recommendations.

Control joints: At all external and internal corners, adjacent to all openings and at maximum 6 m centres.

Exterior insulation and finish system (EIFS)
Requirement: Proprietary system comprising rigid insulation panels, fixed to a subframe and finished on one or both sides with a cementitious base coat and finish coat.

Standard: To AS 5346 (2023).

Insulation: To AS/NZS 4859.1 (2018):

- Rigid cellular foam insulation (EPS and XPS): To AS/NZS 4859.1 (2018) Section 8.

Fibre cement (FC) planks
Requirement: Proprietary single faced fibre cement building planks.

Standard: To AS/NZS 2908.2 (2000). Type A Category 3.

Plank thickness: 7.5 mm.

Joints and edges: PVC-U extrusion.

Corners: Preformed metal joining pieces.

Fibre cement (FC) sheets
Standard: To AS/NZS 2908.2 (2000).

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:

- Sheet thickness: 4.5 mm.
- Joints: PVC-U extrusion.

Profiled sheet metal
Standard: To AS 1562.1 (2018).

Timber weatherboards
Hardwood: To AS 2796.1 (1999).

Softwood: To AS 4785.1 (2002).

1.2 COMPONENTS

Fasteners
General: Type, size, corrosion resistance class and spacing to the cladding manufacturer's recommendations.

Flashings
Standard: To AS/NZS 2904 (1995).

2 EXECUTION

2.1 GENERAL

Preparation
Substrates or framing: Before fixing cladding, check the alignment of substrates or framing and adjust if required.

Fixing
Method: Fix sheeting firmly against framing to the manufacturer's recommendations.

Accessories and trim
Requirement: Provide accessories and trim required to complete the installation.

Proprietary systems or products
Requirement: Use panels and components from a single proprietary system and install to the manufacturer's recommendations.

Fixing eaves and soffit lining
Requirement: Conform to the following:

- Maximum fixing spacing: 150 mm centres.
- Maximum soffit bearer spacing: 450 mm centres.

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

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

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

Incompatible metal fixings: Do not use.

Joints
Compressed fibre cement sheets: Expressed joints.

2.2 AAC PANELS

Installation
Standard: To AS 5146.3 (2018).

2.3 PROFILED SHEET METAL

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

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

Installation
Standard: To AS 1562.1 (2018).

2.4 TIMBER WEATHERBOARDS

Preparation
Preservative treatment: For cladding with a natural or stained finish, prefinish the boards by dipping or brushing with water repellent preservative.

Compatibility: Make sure preservative is compatible with a documented pigmented stain finish.

Cut surfaces: Treat freshly cut surfaces with water repellent preservative before fixing.

Installation
Fixing: To BCA (2022) H1D7(7).

Single lengths: If installed vertically, use single lengths. If installed horizontally, use single lengths whenever possible.

Fixings at supports:

- Seasoned milled weatherboards: 2.
- Unseasoned hardwood, sawn weatherboards, or secret nailed profiles: 1.

Nailheads: Treat visible nailheads as follows:

- Stained or clear finishes: Drive flush with weatherboard surface.
- Opaque finishes: Punch below the weatherboard surface and fill flush with putty after the surface has been primed.

Joints
End grain joints: Install boards so that butt joints are in compression. Fix all board ends to support framing. Stagger joints vertically.

Internal and external corners: Butt against a stop bead that projects at least the thickness of the cladding.

0451 WINDOWS AND GLAZED DOORS

1 GENERAL

1.1 STANDARDS

General
Selection and installation: To AS 2047 (2014).

Glazing
Glass type and thickness: To AS 1288 (2021), if no glass type or thickness is nominated.

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667 (2000).

2 PRODUCTS

2.1 GENERAL

Safety glazing materials
Standard: To AS 2208 (2023).

Aluminium frames
Standard: To AS 2047 (2014) clause 3.1.

Powder coating: To AS 3715 (2025).

Anodising: To AS 1231 (2000):

- Thickness:
  . Internal: 15 µm.
  . External: 20 µm.

Construction: Assembled from aluminium sections, including accessories such as pile strips, fixing ties or brackets and cavity flashings, with provision for fixing documented hardware and seals.

Timber frames
Standard: To AS 2047 (2014) clause 3.2.

Hardwood: To AS 2796.1 (1999):

- Grade: Select.

Softwood: To AS 4785.1 (2002):

- Grade: Select.

Construction: Assembled from timber sections, with provision for fixing documented hardware including rebates for seals.

PVC-U frames
Standard: To AS 2047 (2014) clause 3.3.

Flashings
Standard: To AS/NZS 2904 (1995).

Window labelling and certification
Requirement: To AS 2047 (2014) Section 8.

Protection of openable windows
Fall prevention: To BCA (2022) H5D3.

Testing: To AS 5203 (2016).

2.2 COMPONENTS

Louvre window assemblies
Requirement: Louvre blades, mounted in a frame or subframe, able to withstand the ultimate limit state wind pressures for that location, without failure or permanent distortion of members, and without louvre blade flutter.

Adjustable louvres: Louvre blades, clipped into blade holders pivoted to stiles or coupling mullions, linked together in banks, with 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 operable windows that cannot be accessed without the use of a ladder.

Fixed screens: Fixed screens fitted to the window frames with a clipping device that allows removal for cleaning.

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

Retractable screens: Proprietary retractable screens, comprising aluminium frames and fibreglass mesh, fitted between guide channels incorporated in the frames, and a retraction system including tension spring, bearings, positive self-locking device and elastomeric sealing strip at sill.

Sliding screens:

- Screens that are part of the window frame, with matching aluminium head guide, sill runner, and frame stile sections.
- Hardware: Nylon slide runners and finger pull handle. Provide pile strip closers against sash if necessary to close gaps.

Aluminium framed screens:

- Aluminium extruded or folded box frame sections with mesh fixing channel, mitred, staked and screwed at corners. If necessary to adapt to window opening gear, provide an extended frame section.
- Mesh: Bead the mesh into the frame channel with a continuous resilient gasket, so that the mesh is taut and free of distortion.

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

Standard: To AS 3959 (2018).

Security screens
Requirement: Provide security barrier screens to sliding doors, and operable and accessible windows.

Standard: To AS 5039.1 (2023).

Screen infill material: Type III to AS 5039.1 (2023).

2.3 HARDWARE

Hardware documented generically
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.

Window restrictors
Requirement: Provide window restrictors that limit the window opening.

- Opening limit: < 110 mm and > 125 mm.

3 EXECUTION

3.1 INSTALLATION

General
Requirement: Install windows and glazed doors 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.

Preglazing
Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

Weatherproofing
Flashings and weatherings: Install flashings, weather bars, threshold plates, drips, storm moulds, joint sealant and pointing to prevent water penetrating the building between the window frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

Fixing
Packing: Pack behind fixing points with durable full width packing.

Prepared masonry openings: If fixing of timber windows to prepared anchorages needs fastening from the frame face, sink the fastener heads below the surface and fill the depression flush with a material compatible with the surface finish.

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.

Security screens
Installation: To AS 5039.2 (2024) by a Police Licensed security installer.

0453 DOORS AND ACCESS PANELS

1 GENERAL

1.1 STANDARDS

General
Timber and composite doors: To AS 2688 (2017).

2 PRODUCTS

2.1 FRAMES

External doors
Requirement: Double rebated with weather gaskets and seals.

Aluminium frames
Construction: Assembled from aluminium sections, including accessories such as buffers, pile strips, strike plates, fixing ties or brackets and cavity flashing, with provision for fixing documented hardware and seals.

Timber frames
Hardwood: To AS 2796.1 (1999).

- Grade: Select.

Softwood: To AS 4785.1 (2002).

- Grade: Select.

Joints:

- Morticed head and through tenons.
- Trenched head:
  - . Bare faced tenons on jambs.
  - . Full let-in jambs.

Construction: Assembled from timber sections, with provision for fixing documented hardware including rebates for door seals.

2.2 DOORS

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

Flush panel doors
General: Provide flush panel doors of balanced construction.

Construction
General: To AS 2688 (2017).

Door thickness:

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

Door width: Minimum 870 mm.

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.

Door edges: Painted, including top and bottom edges.

Security screen doorsets
Standard: To AS 5039.1 (2023).

Screen infill material: Type III to AS 5039.1 (2023).

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 do 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: To AS 3959 (2018).

2.3 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.

2.4 ANCILLARY MATERIALS

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

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

- Rubber products: Neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber.

Flexible polyvinyl chloride (PVC): E type compounds, colour fastness grade B.

Flashings
Standard: To AS/NZS 2904 (1995).

Weather bars
General: Provide corrosion-resistant weather bars or threshold plates under hinged external doors, located under the centres of closed doors or to manufacturer's recommendations.

3 EXECUTION

3.1 GENERAL

Security screen doorsets
Installation: To AS 5039.2 (2024) 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.

Ceiling access
General: Trim an opening and provide a loose access panel of minimum size 600 x 400 mm.

Under floor access
Requirements: Provide a frame and a door, minimum size 620 mm wide x 600 mm high, complete with padbolt.

Priming
General: Prime timber door leaves on top and bottom edges before installation.

3.2 FRAMES

General
Frames: Install the frames as follows:

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

Aluminium frames
Building into masonry: Screw galvanized steel brackets twice to jambs and build in.

Fixing to masonry openings: Use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Screw once to studs at each fixing.

Timber frames
Building into masonry: Screw galvanized steel brackets twice to jambs and build in.

Fixing to masonry openings: Use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Back screw twice to jambs at each fixing.

Heads of fasteners: Conceal if possible, otherwise sink the head below the surface and fill the depression flush with a material compatible with the surface finish.

Finishing

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

Weatherproofing

Flashings and weatherings: Install flashings, weather bars, threshold plates, 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.

0454 OVERHEAD DOORS

1 GENERAL

1.1 STANDARDS

General

Garage doors: To AS/NZS 4505 (2012).

2 EXECUTION

2.1 INSTALLATION

Frames, guides and tracks

Requirement: Install 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.

0455 DOOR HARDWARE

1 PRODUCTS

1.1 COMPONENTS

Hinges

Number of hinges: Conform to the **Hinges table**.

Minimum size: 100 x 75 x 2.5 mm.

Hinges table

Nominal door leaf size (H x W x T) (mm)	Minimum number of hinges (per door leaf)
2040 x 600 x 35	2
2040 x 720 x 40	3
2040 x 820 x 40	3
2040 x 920 x 40	3
2040 x 1020 x 40	4
2400 x 1020 x 40	4

Locksets

Standard: To AS 4145.2 (2008).

External hinged doors: Provide single cylinder with release snib deadlocks.

External sliding doors: Provide standard secure door lock.

Internal doors:

- Generally: Passage sets. Provide lever passage sets to internal swing doors.
- Bathrooms, showers and toilets: Privacy sets.

Keying

Each dwelling: Key doors, including external security screen doors and excluding garage doors, alike and key windows alike.

Multiple dwellings: Key external door keys of each dwelling unit to differ for the site.

2 EXECUTION

2.1 INSTALLATION

Supply

Delivery: Deliver door hardware items, ready for installation, in individual complete sets for each door, as follows:

- Clearly labelled to show the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, accessories, fixings and fixing instructions.

Mounting height

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

Locks

Cylinders: Fix vertically and with consistent key alignment.

Door buffers

Fixing: Screw fix door buffers to the floor or skirting, as appropriate, to prevent the door or door furniture striking the wall or other surfaces.

Fasteners

Materials: Provide materials compatible with the item being fixed, and of sufficient strength, size and quality to perform their function, and as follows:

- Concealed fasteners: Provide a corrosion-resistant finish to concealed fasteners.
- Exposed fasteners: Match exposed fasteners to the material being fixed.

Security: Locate exposed fasteners to lock furniture on the inside faces of external doors and on the inside faces of internal doors to lockable rooms.

Support: Provide appropriate back support, such as lock stiles, blocking, wall noggings and backing plates for hardware fasteners.

Hinges

Metal frames: Fix hinges using metal thread screws. Do not weld hinges to frames.

Timber doorsets: Install butt hinges in housings equal in depth to the thickness of the hinge leaf (except for hinges designed for mounting without housing), and fix with countersunk screws.

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.

Locksets and furniture: Provide as follows:

- Latch set with lever handles.
- Minimum 37 x 6 mm thick aluminium push bar, installed at 800 mm above the finished floor level.
- A triple action cylinder deadbolt mortice fitting lock with 2 keys.
- Restraining chain.

Closers: Provide heavy duty pneumatic door closers.

Keying: Locks keyed alike where multiple doors are fitted.

Seals: Mohair door seal to the bottom of the doors.

Marking: Mark the manufacturer’s name to the top of the door, on the inside face.

0457 EXTERNAL SCREENS

1 GENERAL

1.1 RESPONSIBILITIES

Performance
Requirement: Conform to the following:

- Plumb, level, straight and true within the building tolerances of the structural system.
- Undamaged and free of surface defects or distortions.
- Fixed or fastened to the building structure.
- Able to resist wind and other actions without vibration or permanent distortion.

1.2 STANDARDS

General
Aluminium framed sunscreens, awnings and shutters:

- Stress analysis of members: To AS/NZS 1664.1 (1997) or AS/NZS 1664.2 (1997).

1.3 SUBMISSIONS

Certification
Sealant compatibility: Submit statements from all parties to the installation that certify the compatibility of sealants with screen components, finishes and all substrates.

1.4 INSPECTION

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

- Commencement of installation of screen assemblies.
- Completion of installation.

2 PRODUCTS

2.1 GENERAL

Marking
Requirement: Before the separate parts of the screens are delivered to the site, provide suitable and sufficient marks or other means for identifying each part, and for showing its correct location and orientation, when installed.

2.2 MATERIALS GENERALLY

Structural steel
Design and materials: To AS 4100 (2020).

Welding: To the AS/NZS 1554 series.

Galvanizing: To AS/NZS 4680 (2006).

Fabric
Supply: Supply fabric by a single manufacturer as part of a single batch.

Inspection: Check each roll of material for flatness, faults in the fabric and the coatings, by visual inspection in directional sunlight at a distance of 4 m and by passing the membrane over a uniformly illuminated surface.

Stitching: Use UV stabilised HDPE thread with a minimum tensile strength of 180 N. Incorporate lock type stitching with a twin needle machine.

2.3 METAL FINISHES

Anodising
Standard: To AS 1231 (2000).

Thickness: 15 to 20 µm.

Hot-dip galvanizing
Minimum coating mass/thickness: To AS/NZS 4680 (2006).

Powder coating
Application to aluminium and aluminium alloy substrates for architectural applications: To AAMA 2603 (2022), AAMA 2604 (2022) and AAMA 2605 (2022), as appropriate, and AS 3715 (2025).

Application to metal substrates other than aluminium for architectural applications: To AS 4506 (2024).

2.4 FIXED AND ADJUSTABLE AWNINGS

Fixed metal awnings
Requirement: Fixed awnings including folded metal slats or cladding panels supported on a metal subframe and fixed to the wall adjacent to the windows.

Fixed fabric awnings
Requirement: Fixed awnings including weatherproof fabric supported on a metal subframe and fixed to the wall adjacent to the windows.

Adjustable metal awnings
Requirement: Adjustable awnings including metal interlocking slats attached to a roller at the top and rail at the bottom, and guided throughout its range of movement by guide rails mounted on each side.

Pelmet: Fit a pelmet over the roller to cover the slats when retracted.

Operation: Retraction of the awnings by a cord, tape, crank or electric motor.

Adjustable fabric awnings
Requirement: Adjustable awnings including weatherproof fabric attached to a roller at the top and rail at the bottom, and guided throughout its range of movement by guide rails mounted on each side.

Pelmet: Fit a pelmet over the roller to cover the awning when raised.

Operation: Retraction of the awnings by a cord, tape, crank or electric motor.

3 EXECUTION

3.1 FABRICATION

Fasteners
Requirement: Provide fasteners of sufficient strength and quality to perform their required function.

Joints
Requirement: Make accurately fitted tight joints so that neither fasteners nor fixing devices create pressure indentations that are visible on exposed faces. If heads of fasteners are unavoidably visible, finish them to match the adjacent surface.

Protection
Corrosion protection: Provide protection against corrosion that may be caused in metals by products or processes normally employed on a building site or by normal atmospheric or other ambient conditions and by-products including rainwater, drinking and non-drinking water, airborne salt and airborne pollution.

Durability: Provide materials resistant to exposure to weather and UV radiation so that their colour, surface finish, flexibility and water resistance are maintained.

Temporary measures: Do not use adhesive tape, film or paper, or applied coatings liable to bond to the substrate when exposed to sunlight or weather as temporary measures to protect screen components during the course of the works. If temporary measures are used, remove all traces, particularly from contact mating surfaces before joining up.

Operation
Requirement: Provide moving parts that operate freely and smoothly, without vibration, rattling, binding or sticking, and at correct tensions or operating forces. Lubricate if appropriate.

3.2 EMBEDDED FIXINGS

General
Fixing: Fix screens to the building structure by one of the following methods:

- Fasteners cast into the concrete of the building structure. Do not displace reinforcement, when locating embedded items.
- Chemical fixings, expanding bolt sockets.
- Bolting or welding to brackets or structural framing.

Embedment
Concrete: To AS 3600 (2018).

Masonry: To AS 3700 (2018).

Fixing brackets
Requirement: Provide fasteners and other methods of attachment of the screens to the structure with the following characteristics:

- Three-way adjustment to accommodate fabrication and construction tolerances.
- Provision for building movements while fixing the screens in their correct positions.
- Adequacy for structural design actions.

Protection
Cast-in items: Prevent the entry of concrete slurry into bolt holes, channels, and other openings for the fasteners. Fill the openings using an easily removed water repellent material before casting in.

Placement
Tolerance:

- Maximum deviation from correct position: 10 mm.

Fastener channels embedded parallel or perpendicular to the edge of a concrete structural member:

- Minimum distance from the concrete edge to the nearest part of the anchor: 100 mm.

3.3 INSTALLATION

Installation tolerance
Alignment:

- Maximum deviation of any member from its true alignment (plumb, level, or line of slope): 1:1000, up to a maximum of 10 mm in a continuous run of members in one direction.
- Maximum misalignment between adjoining members: 1 mm.

Position:

- Maximum deviation of any part from its true position: 10 mm.

Reference lines and marks
Requirement: Set out on each floor, in agreed locations, accurate perimeter offset reference lines, plumb with corresponding lines on other floors, and height benchmarks.

3.4 COMPLETION

Cleaning
Method: Clean all visible surfaces with soft clean cloths and clean water or approved cleanser, finishing with a clean cloth. Do not use abrasive, acidic or alkaline materials.

0467 GLASS COMPONENTS

1 GENERAL

1.1 STANDARDS

General

Materials and installation: To AS 1288 (2021).

Safety glass: To AS 2208 (2023).

1.2 SUBMISSIONS

Certification

Barrier design: Submit a professional engineer's certificate confirming conformance with AS/NZS 1170.1 (2002) clause 3.6, AS/NZS 1170.2 (2021) and AS 1288 (2021) Section 7.

Sealant compatibility: Submit statements from all parties to the installation certifying the compatibility of sealants and glazing systems to all substrates.

2 PRODUCTS

2.1 MIRRORS

Reflective surface

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

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

Safety glass mirrors

Standard: To AS 2208 (2023).

Type: Grade A safety glass.

Solid backed annealed glass mirrors

Type: Annealed glass mirror with backing.

Backing: 9 mm waterproof plywood.

2.2 GLASS SHOWER SCREENS

General

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

Glass: To AS 1288 (2021) clause 5.8 and Appendix D.

2.3 GLASS BARRIERS

Glass barrier systems

Requirement: To AS 1288 (2021) Section 7 and as documented.

Glass: Grade A safety glass.

3 EXECUTION

3.1 FIXING MIRRORS

General

Adhesive fixing: Clean surfaces to be bonded. Apply non-acidic silicone adhesive to the manufacturer's recommendations. Secure the rear of the mirror to the substrate with double-sided adhesive tape until the adhesive cures.

Screw fixing: Fix direct to wall plugs with dome-headed chromium-plated screws in each corner and at 900 mm maximum centres around perimeter. Provide polyethylene sleeves and washers or prevent contract between screw and glass. Do not over-tension the screws.

Frame fixing: Proprietary aluminium frames to mirror perimeter, corners mitred. If unbacked, bed glass edges in a continuous resilient gasket. Attach the frame to the substrate with concealed screw fixings. Seal the frame to the substrate with paintable sealant that will not react with the mirror coating. Do not allow the sealant to contact the mirror back.

Bead fixing: Rebated timber beads to mirror perimeter, corners mitred. If unbacked, bed glass edges in a continuous resilient gasket. Screw fix the beads to the substrate.

Clip fixing: Fix direct to wall plugs with chromium-plated fixed clip and spring clip fixings at 900 mm maximum centres around perimeter. If unbacked, provide polyethylene or cork washers to prevent contact between clips and mirror back.

3.2 GLASS SHOWER SCREENS

Water shedding

Requirement: Provide an assembly that 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.

Sliding assemblies

Hanging: Hang the sliding sash on stainless steel or nylon sheaves on overhead channel track formed in the frame head, and fit nylon or equivalent bottom guides.

Hardware: Pull handles on both sides of sash, or of leading sash in multiple sash arrangements.

Fixing

Proprietary shower screens: To the manufacturer’s recommendations.

3.3 GLASS BARRIERS

Installation

General: Install proprietary glass barrier systems to the manufacturer's recommendations.

0471 INSULATION AND PLIABLE MEMBRANES

1 GENERAL

1.1 INTERPRETATION

Definitions
General: For the purposes of this worksection, the definitions given in AS/NZS 4859.1 (2018) and the following apply:

- Pliable building membrane: To AS 4200.1 (2017) and equivalent to sarking-type materials as defined in the NCC.

2 PRODUCTS

2.1 MATERIALS

Acoustic insulation
Bulk insulation:

- Mineral fibre blankets and batts: Glass wool or rock wool bonded with thermosetting resin.
- Polyester blankets and batts: Thermally bonded polyester fibres.

Board insulation:

- Mineral fibre panels: High density glass wool or rock wool bonded with thermosetting resin.

Thermal insulation
Standard: To AS/NZS 4859.1 (2018).

Pliable building membrane
Standard: To AS 4200.1 (2017) and BCA (2022) H6D2(1)(b)(i).

Thermal break strips
Product type: Proprietary item.

R-Value (m^2.K/W): ≥ 0.2.

3 EXECUTION

3.1 GENERAL

Bulk insulation
General: Firmly butt together with no gaps except as follows:

- Access openings and vents: Do not obstruct.
- Light fittings: To AS/NZS 3000 (2018) clause 4.5.
- Electrical cables: To AS 3999 (2015) clause 2.6.

Thermal insulation
Standard: To AS 3999 (2015) and BCA (2022) H6D2(1)(b)(i).

Installation: Firmly butt together, with no gaps except as follows:

- Access openings and vents: Do not obstruct.
- Light fittings: To AS/NZS 3000 (2018) clause 4.5.
- Electrical cables: To AS 3999 (2015) clause 2.6.

Pliable building membrane
Standard: To AS 4200.2 (2017) and BCA (2022) H6D2(1)(b)(i).

3.2 FLOORS

Under suspended framed floors
Fibre batts: Fit tightly between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Below concrete slab on ground
Rigid cellular insulation boards:

- Laying pattern: Stretcher bond, with edges tightly butted.
- Damp-proof membrane: Lay over insulation.

3.3 WALLS

Framed walls
Fibre batts: Friction fit between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Mineral fibre panels: Fix to face of studs with adhesive and temporarily fasten with single screw until plasterboard installed.

Thermal break strips: If lightweight external cladding is supported by steel framing, provide thermal break strips fixed as follows:

- Screw fixing: Button head screws at 1 m centres.
- Adhesive fixing: Wallboard adhesive walnuts at 1 m centres.

Masonry veneer cavity walls
Rigid cellular insulation boards:

- Installation: Fix boards horizontally with the tongue to the top edge, pushed over prefixed wall ties and held firmly against the wall frame. Keep boards clean, dry and free from mortar and grout. Do not bridge the cavity.
- Fixing: Hex head screws at 450 mm centres.

Flashings: Install flashings before installing insulation. Prevent entry of water behind the insulation boards.

Full masonry cavity walls
Mineral fibre panels:

- Installation: Fix panels firmly against the inner masonry skin. Keep boards clean, dry and free from mortar and grout. Do not bridge the cavity.
- Fixing: Proprietary plastic clips on pre-installed wall ties.

Rigid cellular insulation boards:

- Installation: Fix boards horizontally with the tongue to the top edge and firmly against the inner masonry skin. Keep boards clean, dry and free from mortar and grout. Do not bridge the cavity.
- Fixing: Proprietary plastic clips on pre-installed wall ties.

Flashings: Install flashings before installing insulation. Prevent entry of water behind the insulation boards.

Vapour permeable (breathable) membrane
Requirement: Provide a vapour permeable membrane behind external facing material that does not provide permanent weatherproofing or that may be subject to condensation forming on the internal face, including the following:

- Boards or planks fixed vertically or diagonally.

- Boards or planks fixed in exposed locations if wind driven rain can penetrate the joints.
- Unpainted or unsealed cladding.
- Masonry veneer.

Installation: Run the vapour permeable membrane horizontally on the outer face of external wall framing, over the flashing, from the bottom plate up. Pull taut over the framing and fix to framing members. Seal across the wall cavity at the top.

Horizontal laps: At least 150 mm wide, lapped to make sure water is shed to the outer face of the membrane.

3.4 CEILINGS

Framed ceilings
Fibre batts: Fit tightly between framing members.

3.5 ROOFS

Metal roofs
Fibre batts: Fit tightly between framing members.

Fibre blanket for sound insulation: Install over the roof framing, reflective thermal insulation (if any), and mesh support, so that the blanket is in continuous contact with the underside of the metal roofing sheets.

Combined fibre blanket and reflective insulation: Lay facing reflective insulation face downwards over safety mesh.

Thermal break strips: If metal sheet roofing is supported by steel framing, provide thermal break strips fixed as follows:

- Screw fixing: Button head screws at 1 m centres.
- Adhesive fixing: Wallboard adhesive walnuts at 1 m centres.

Pliable building membranes
Vapour barrier: Lay over the roof framing with sufficient sag to allow the bulk insulation to achieve its full thickness. Overlap all edges 150 mm and seal all joints with pressure sensitive adhesive tape.

Water control (sarking) membrane: Provide sarking under tile and shingle roofing.

0511 LINING

1 PRODUCTS

1.1 MATERIALS AND COMPONENTS

Plasterboard
Standard: To AS/NZS 2588 (2018).

Minimum thickness: Conform to the following:

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

Fibre cement
Standard: To AS/NZS 2908.2 (2000).

Wall and ceiling linings: Type B, Category 2.

Minimum thickness: Conform to the following:

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

Access panels
Internal ceilings, except garages: Provide insulated access panels.

Finish: Match the access panels to the ceiling in appearance and performance.

Minimum size: 600 x 400 mm.

2 EXECUTION

2.1 CONSTRUCTION GENERALLY

Preparation
Substrate: Before fixing linings, make sure substrates are plumb, level, in true alignment and conform to the lining manufacturer's recommendations.

Timber, steel framing and battened masonry: To AS/NZS 2589 (2017) clause 4.2.

Ceiling linings
General: Do not install until the timber roof structure has been fully loaded for at least 14 days.

Accessories and trim
General: Provide accessories and trim necessary to complete the installation.

2.2 PLASTERBOARD

Installation
Gypsum plasterboard: To AS/NZS 2589 (2017).

Supports
General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- If framing member spacing exceeds the recommended spacing.
- If direct fixing of the plasterboard is not possible due to the arrangement or alignment of the framing or substrate.
- If the lining is the substrate for tiled finishes.

- If required to support fixtures.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over metallic-coated steel corner beads.

Control joints: Provide purpose-made metallic-coated control joint beads at not more than 12 m centres in walls and ceilings and to coincide with structural control joints.

Wet areas: Install additional supports, flashings, trim and sealants as required.

Joints in tiled areas: Do not apply a topping coat after bedding perforated paper tape in bedding compound.

Plasterboard cornices

Fixing: Mitre at corners and adhesive fix with cornice cement. Pin in place at cornice edges until adhesive sets, remove pins and fill holes.

2.3 FIBRE CEMENT

Installation

Joints and layout: Run sheets perpendicular to the framing members. In flush jointed applications, stagger end joints in a brick pattern and locate them on framing members, away from the corners of large openings. Provide supports at edges and joints.

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- If framing member spacing exceeds the recommended spacing.
- If direct fixing of the fibre cement is not possible due to the arrangement or alignment of the framing or substrate.
- If the lining is the substrate for tiled finishes.
- If required to support fixtures.

Fixing

Timber framed construction: Nail only or combined with adhesive to manufacturer's recommendations.

Steel framed construction: Screw only or combined with adhesive to manufacturer's recommendations.

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 directly to the bottom chords of trusses.

Wet areas: Do not use adhesive fixing alone.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a PVC-U joining section.

Control joints: Provide control joints to coincide with structural control joints and as follows:

- Walls:
  - Timber framing: ≤ 7.2 m centres.
  - Steel framing 0.55 to 0.75 mm BMT: ≤ 9 m centres.
  - Steel framing 0.8 to 1.6 mm BMT: ≤ 6 m centres.
- Ceilings: To divide into bays not larger than 10.8 x 7.2 m.
- Control joint beads: Purpose-made metallic-coated.

Wet areas: Provide additional supports, flashings, trim and sealants as required.

Joints in tiled areas:

- Perforated paper tape: Bed in bedding compound. Do not apply a topping coat.
- Control joints:
  - Timber framing: Not more than 4.2 m centres and space to suit joints required in tiling.
  - Steel framing: Not more than 4.8 m centres and space to suit joints required in tiling.
- Internal corners: Reinforce with preformed angles to manufacturer's recommendations.

0551 JOINERY

1 PRODUCTS

1.1 JOINERY MATERIALS AND COMPONENTS

Certification
Timber based products: Label panels under the authority of a recognised certification scheme applicable to the product. Locate the brand on faces or edges that will be concealed in the works.

Joinery timber
Hardwood for trim: To AS 2796.1 (1999).

Hardwood for furniture: To AS 2796.3 (1999).

Seasoned cypress pine: To AS 1810 (1995).

Softwood for trim: To AS 4785.1 (2002).

Softwood for furniture: To AS 4785.3 (2002).

Finished sizes for milled timber: Not less than the documented dimension unless qualified by a term such as nominal, out of or ex, to which industry standards for finished sizes apply.

Plywood
Interior use generally: To AS/NZS 2270 (2006).

Interior use, exposed to moisture: To AS/NZS 2271 (2004).

Formaldehyde emission class to AS/NZS 2270 (2006) and AS/NZS 2271 (2004): E_1.

Wet process fibreboard (including hardboard)
Standard: To AS/NZS 1859.4 (2018).

Particleboard
Standard: To AS 1859.1 (2017).

Formaldehyde emission class to AS 1859.1 (2017): E1.

Dry process fibreboard (including medium density fibreboard)
Standard: To AS/NZS 1859.2 (2017).

Formaldehyde emission class to AS/NZS 1859.2 (2017): E1.

Decorative overlaid wood panels
Standard: To AS/NZS 1859.3 (2017).

High pressure decorative laminate (HPDL)
Standard: To AS/NZS 2924.1 (2024).

Minimum thickness: Conform to the following:

- Horizontal surfaces fixed to a continuous substrate: 1.2 mm.
- Vertical surfaces fixed to a continuous substrate: 0.8 mm.
- Post formed laminate fixed to a continuous substrate: 0.8 mm.
- Vertical surfaces fixed intermittently, including to studs: 3.0 mm.
- Edge strips: 0.4 mm.

Splashbacks
Ceramic tiles: Glazed ceramic tiles to AS 13006 (2020).

Edging
Cupboards and drawers: 2 mm ABS.

1.2 JOINERY ASSEMBLIES

General
Standard: To AS 4386 (2018).

1.3 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.

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

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

Adjustable shelves: Support on proprietary pins in holes bored at equal 32 mm centres vertically.

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:

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

Number of hinges for each door:

- Doors ≤ 1200 mm high: Minimum 2 hinges.
- Doors > 1200 mm high: Minimum 3 hinges.

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

- 30 kg loading capacity.
- Integrated soft and self-closing action.
- Closure retention.
- White thermoset powder coating or nickel-plated.

1.4 WORKING SURFACES

Laminated benchtops
Material: High moisture resistant particleboard or medium density fibreboard.

Finish: High pressure decorative laminate.

Minimum thickness: 32 mm.

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

Porcelain or stone benchtops

General: Provide benchtops within the visual range of the approved samples.

Minimum thickness: 20 mm.

2 EXECUTION

2.1 JOINERY

General

Joints: Provide materials in single lengths if possible. If joints are necessary, locate over supports.

Framing: Frame and trim where necessary for openings, including those required by other trades.

Accessories and trim

General: Provide accessories and trim necessary to complete the installation.

Fasteners

Installation: Secure plinths and carcasses to floors, walls, or both at not more than 600 mm centres.

Visibility: Do not provide visible fasteners except in the following locations:

- Inside cupboards and drawer units.
- Inside open units, in which case provide proprietary caps to conceal fasteners.

Fixing to substrate: Fix joinery units to substrate as follows:

- Floor mounted units: 600 mm centres maximum.
- Wall mounted units: To each nogging and/or stud stiffener.

Fasteners: Screws with washers into timber or steel framing, or masonry anchors.

Adhesives

General: Provide adhesives to transmit the loads imposed and for the rigidity of the assembly, without causing discolouration of finished surfaces.

Finishing

Junctions with structure: Scribe plinths, benchtops, splashbacks, ends of cupboards, kickboards and returns to follow the line of structure.

Edge strips: Finish exposed edges of sheets with edge strips that match sheet faces.

Benchtops

Installation: Fix to carcass or substrate at least twice per 600 mm length of benchtop.

Joint sealing: Fill joints with sealant matching the finish colour and clamp with proprietary mechanical connectors.

Edge sealing: Seal to walls and carcasses with a sealant that matches the finish colour.

Stone or porcelain benchtops: Avoid on-site cutting and mechanical processing of panels, if possible.

Glass splashbacks

Adhesive: Fix with non-acidic silicone adhesive. Apply at the rate recommended by the manufacturer.

Installation: Clean the back of the glass panel and apply walnuts of adhesive together with double-sided adhesive tape for temporary support, and affix directly to the substrate.

2.2 TIMBER STAIRS

Set-out

General: Set out stair rod so risers and treads in each flight are uniformly sized and spaced.

Fabrication

Closed strings: Trench for treads and risers.

Cut strings: Profile for treads and risers. Mitre riser ends.

Treads: Arris nosings to a pencil round. Return nosings at cut strings. Groove for riser tongue in closed riser stair. Set riser 19 mm back from nosing.

Top tread: Flush with finished floor, otherwise to match stair treads. Provide similar tread section as nosing to floor edges around stairwell.

Risers: Tongue to tread. Mitre to string in cut string stairs.

Installation

General: Glue joints in internal work. In closed riser stairs, wedge treads and risers to strings. Plant 2 glue blocks behind each tread to riser junction. Trim floors to carry ends of stairs and around stairwell.

Stair bolts to open riser closed string stairs: Provide 8 mm diameter mild steel stair bolts, one at each end and one at centre of flight, transversely between strings. Draw strings tight against ends of treads.

Fascia: Provide fascia of depth sufficient to overlap 19 mm below ceiling, fixed to floor joists hard up under nosing.

Trim: Provide beads and mouldings as necessary, including a scotia or similar planted under the tread nosing against the risers and cut strings, a bead between wall strings and wall, and a bead behind the fascia over the ceiling finish.

Soffit lining: Fix to 38 x 38 mm nailing battens notched and nailed to the underside of treads and risers of closed riser stairs at the centre of flights and at each side.

2.3 TIMBER BALUSTRADES

General

Requirement: Provide balustrading to stair and landing, consisting of newels, handrail, balusters and associated mouldings.

Newels

General: Halve and bolt to strings. Turn tops to detail.

Handrails

Installation: Install handrails on edge, stubbing tenon to newels.

Bullnose arrises: 13 mm radius.

Balusters
Installation: Stub tenon to handrail at top and to tread or floor at bottom.

Spacing: Evenly spaced at maximum 100 mm centres.

2.4 TRIM

General
Requirement: Provide trim, such as architraves, beads, mouldings, stops and skirtings, to make neat junctions to openings and between lining components, finishes and adjacent surfaces. Provide paint finish to skirtings.

Proprietary items: Provide complete with installation accessories.

Fixing
Masonry walls: Screw with wall plugs at 600 mm centres maximum.

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

0572 MISCELLANEOUS FIXTURES AND APPLIANCES

1 PRODUCTS

1.1 GENERAL

Waste bins
Type: Prefinished proprietary products manufactured from metals or plastics in standard sizes and colours.

1.2 APPLIANCES

Cooking appliances
Oven: Stainless steel, electric, fan-forced, under bench or wall oven, as documented.

- Dimension: Minimum 600 mm wide.

Cooktop: Minimum 4 zone electric cooktop.

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

Exhaust fans
Kitchen, bathroom and laundry: 250 mm diameter.

1.3 PROPRIETARY STAIR SYSTEM

General
Materials, design and construction: To BCA (2022) H5D2.

Balustrades: To BCA (2022) H5D3.

Straight flight stair
Requirement: Provide a proprietary system, pre-assembled and fixed in place, comprising the following:

- Stair flights with treads and risers.
- Landings.
- Balustrade and handrail to stair flight and landing.

1.4 EXTERNAL FIXTURES

Clothes drying facilities
Single dwellings: Provide individual clothesline for each dwelling.

- Type: Height adjustable fold down wall mounted 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
Type: Steel, masonry or precast letterboxes, as required.

Standard: To AS 4253 (2019).

2 EXECUTION

2.1 APPLIANCES

Rangehood and exhaust fan
Requirement: Provide as follows:

- Habitable rooms: Fit with self-closing damper or filter to BCA (2022) H6D2(1)(b)(iii).
- Exhaust fans: Operated by a separate wall switch.
- Ducting to outside: Conform to the following:
  . Northern areas: Side exhaust with PVC-U cover painted to match exterior colour scheme. Ducting not permitted through roof.
  . Southern areas: Steel ducting projecting through the roof. Provide roof cowl to pipe as documented.

Installation: To the manufacturer's recommendations.

Letterboxes

Requirement: Where Australia Post provides a postal service, provide letterboxes conforming to the requirements of Australia Post, and as follows:

- One numbered and lockable letterbox each.

Keys: Upon completion, provide 2 sets of keys per letterbox.

0574 WINDOW COVERINGS

1 GENERAL

1.1 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformity to **FIRE PERFORMANCE**, **Fire hazard properties**.

1.2 INSPECTION

Notice

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

- Building locations or substrates prepared to receive window coverings before installation.

2 PRODUCTS

2.1 FIRE PERFORMANCE

Fire hazard properties

Windows coverings: Tested to AS/NZS 1530.3 (1999).

2.2 MATERIALS

Fire hazard properties

General: Do not provide materials which, when subject to fire conditions, will emit excessive smoke or toxic fumes.

Fabrics

Uncoated woven and knitted fabrics:

- Standard: To AS 2663.1 (1997).
- Performance classification (minimum): 2.

Coated woven and knitted fabrics:

- Standard: To AS 2663.2 (1999).
- Performance classification (minimum): 2.

Holland blind fabrics: To AS 2663.3 (1999).

2.3 COVERING TYPES

Holland blinds

Requirement: Vertical blinds provided as complete proprietary systems fabricated by one manufacturer. Do not provide horizontal blinds.

3 EXECUTION

3.1 INSTALLATION

General

Requirement: Install window coverings using the manufacturer's fabricated mounting brackets, clips or tracks and other hardware. Install window coverings to hang plumb and level, and true to line.

Fixing: Match exposed mounting hardware to the finish and colour of adjacent track and/or wall architrave finish.

Adjustment: Adjust all operating hardware for smooth operation free from binding and to provide

even, accurate alignment of window covering in open and closed positions.

Safety: Install child safety devices on all control cords. Install all control cords in conformance with *Competition and Consumer (Corded Internal Window Coverings) Safety Standard (2014)*.

Clearance

General: Provide 5 mm horizontal clearance at each side of blinds for recessed applications.

0611 RENDERING AND PLASTERING

1 GENERAL

1.1 INTERPRETATION

Abbreviations

General: For the purpose to this worksection the following abbreviations apply:

- CRF: Cement render - finish.
- CRM: Cement render - medium.
- CRS: Cement render - stronger.
- CRW: Cement render - weaker.
- GPF: Gypsum plaster - finish.

2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

Admixtures

Plasticisers or workability agents: Do not use.

Aggregates

Sand: Fine, sharp, well-graded sand with a clay content between 1% and 5% and free from efflorescing salts.

Render and plaster for autoclaved aerated concrete

General: Provide a proprietary product manufactured for use with the wall system.

Bonding agents

General: Proprietary products manufactured for bonding cement-based render or plaster to solid substrates.

Cement

Standard: To AS 3972 (2010).

Type: GP.

Colouring products

General: Provide proprietary products manufactured for colouring cement plaster.

Integral pigment proportion: 5% maximum weight of cement.

Cornice cement

General: Provide a proprietary product manufactured for use with the cornice.

Cornices

Cast plaster: Proprietary item.

Gypsum plaster

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

Lime

Limes for building: To AS 1672.1 (1997).

Lime putty

General: Prepare lime putty as follows:

- Stand dry hydrated lime to AS 1672.1 (1997) and water for 24 hours or more without drying out.
- Stand quicklime and water for 14 days or more without drying out.

Lath

General: Provide a proprietary product for use with plaster.

Internal: Expanded metal to AS 1397 (2021) 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.

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 – Cement render

Mix type		Substrate	Upper and lower limits of proportions by volume		
			Cement	Lime	Sand
Single or multi-coat systems with integral finishing treatments Base coats in multi-coat systems with cement or gypsum finishes	CRS	Dense and smooth concrete and masonry	1 1	0 0.5	3 4.5
	CRM	Regular clay or concrete masonry	1 1	0.5 1	4.5 6
	CRW	Lightweight concrete masonry and other weak substrates	1 1	1 2	6 9
Second coat - Internal	CRF	Cement render base coats	1 1	1 2	6 9
Second coat - External	CRF	Cement render base coats	1 1	1 2	5 6

Mix proportion table – Gypsum finish coat

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	- -

Control joint products

General: Provide proprietary products manufactured for use with the plastering system and to accommodate the anticipated movement of the substrates and/or the plaster.

Water

General: Clean and free from any deleterious matter.

3 EXECUTION

3.1 PREPARATION

Substrates

General: Prepare substrates as follows:

- Clean and free from any deposit or finish that may impair adhesion of render or plaster.
- If framed or discontinuous, support members in full lengths without splicing.
- If solid or continuous, remove excessive projections and fill voids and hollows with render or plaster stronger than the first coat and not weaker than the substrate.

Absorbent substrates: If suction is excessive, control it by dampening without over-wetting. Do not render or plaster substrates showing surface moisture.

Painted surfaces: Remove paint and hack the surface at close intervals.

Untrue substrates: If the substrate is not sufficiently true for conformity with the thickness limits for the render or plaster system, or has excessively uneven suction resulting from variations in the composition of the substrate, apply additional coats without exceeding the thickness limits for the substrate or system.

Beads

Location: Fix beads as follows:

- Angle beads: At all external corners.
- Drip beads: At all lower terminations of external render.
- Beads for control of movement: At all control joints.
- Stop beads: At all terminations of render or plaster and junctions with other materials and render or plaster systems.

Joints in beads: Provide dowels to maintain alignment.

Mechanical fixing to substrate: ≤ 300 mm centres.

Bonding treatment

General: If bonding treatment is required to the substrate, throw a wet mix onto the substrate. Mix proportions to the following:

- Cement render (cement:sand): 1:2.
- Gypsum plaster (gypsum:sand): 1:2.

Curing: Cure as follows:

- Keep continuously moist for 5 days or more and allow to dry before applying render or plaster coats.
- Protect cement render from direct sun and drying winds for at least 16 hours after application.

Thickness: ≥ 3 and < 6 mm.

Embedded items
General: If there are water pipes and other embedded items, sheath them to allow for thermal movement.

Lath
Location: Provide lath as follows:

- Chases: If chases or recesses are 50 mm wide or greater, fix lath extending 75 mm or more beyond each side of the chase or recess.
- Masonry and concrete substrates: Fix lath if scabbling and bonding will not develop a sufficient mechanical key.
- Metal and other non-porous substrates: Fix lath to provide a key.

Weepholes
Requirement: Keep opening free of render. Maintain consistent opening size.

3.2 APPLICATION

Rendering and plastering
Base coats: Scratch-comb each base coat in two directions when it has stiffened.

Lath: Press the render or plaster through the apertures of lath and wings of beads.

Incidental work
General: Return render or plaster into reveals, beads, sills, recesses and niches. Render or plaster faces, ends and soffits of projections in the substrate, such as string courses, sills, pilasters and corbels. Run neatly finished throating on soffits of external projections. Trim around openings. Plaster exposed internal surfaces of built-in joinery.

Joining up
General: Join up on internal corners only. If joining up is required, make sure joints are imperceptible in the finished work after decoration.

Control joints
General: Provide joints in the finish to coincide with control joints in the substrate. Make sure the joint in the substrate is not bridged during rendering or plastering.

Size:

- Depth: Extend the joint right through the render or plaster and reinforcement to the substrate.
- Width: 3 mm, or the same width as the substrate joint, whichever is greater.

Damp-proof courses: Do not continue render or plaster across damp-proof courses.

Rendering or plastering on lath: Provide control joints to divide the rendering or plastering area into rectangular panels of 10 m^2 or less.

V-joints: Provide V-joints, cut right through the render or plaster to the substrate, at the following locations:

- Abutments with metal door frames.
- Abutments with other finishes.
- Junctions between different substrates.

Cornices
General: Accurately cut and mitre corners. Match and align ornament. Do not make butt joints in the length of a cornice.

Installation: Butter edges, mitres and joins for full length of the cornice with adhesive.

Mechanical fixing: If cornice projects 400 mm or more across a ceiling, provide additional mechanical fixing at maximum 600 mm centres.

Decorative joints
General: Apply decorative joints in the second coat of two-coat work as required.

Render and plaster thickness table

Substrate	Render and plaster, total thickness of single or multi-coat work (mm)
Brickwork and blockwork	12 min
Lightweight concrete and blocks	12 min
Metal lath measured from the face of the lath	18 min

Temperature
General: If the ambient temperature is less than 10°C or more than 30°C, make sure the temperature of mixes, substrates and reinforcement at the time of application is between 5°C and 35°C.

Unused mixes
General: Do not use render or plaster unused after 90 minutes from the time of mixing.

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.

3.3 FINISHES

Finishing treatments
Plain even surfaces: Work the hardening plaster as follows:

- Bag: Rub the finish coat when set firm with a hessian pad or similar.
- Carborundum stone: Rub the finish coat when set hard with a carborundum stone to achieve a finish free from sand.
- Foam float: Float the finish coat on application with a wood or plastic float to an even surface and finish with a foam float to achieve a fine sand textured finish.
- Steel trowel: Steel trowel the finish coat to a smooth dense surface which is not glass-like and is free from shrinkage cracks and crazing.
- Wood or plastic float: Float the finish coat on application with a wood or plastic float to an even surface.

Specialist plaster finishes
Polymer modified render:

- Base coat render: Proprietary polymer modified cementitious render supplied as a complete plastering system.

- Finish coats: Proprietary coloured and textured polymer modified finish coats.

3.4 COMPLETION

Curing
General: Prevent premature or uneven drying out and protect from the sun and wind.

Keeping moist: If a proprietary curing agent is not used, keep the render or plaster moist as follows:

- Base coats and single coat systems: Keep continuously moist for 2 days and allow to dry for 5 days before applying further render or plaster coats.
- Finish coats: Keep continuously moist for 2 days.

Multiple coats: Cure and dry each successive coat in multiple coat systems.

0612 CEMENTITIOUS TOPPINGS

1 PRODUCTS

1.1 MATERIALS

Admixtures
Standard: To AS 1478.1 (2000).

Aggregates
Standard: To AS 2758.1 (2014).

Coarse aggregate: Nominal single size not more than 1/3 topping thickness.

Fine aggregate: Fine, sharp, well-graded sand with a low clay content and free from efflorescing salts. Nominal single size not more than 1/4 topping thickness for toppings less than 40 mm thick.

Bonding products
General: Proprietary products manufactured for bonding cement-based toppings to concrete substrates.

Cement
Standard: To AS 3972 (2010).

Type: GP.

Reinforcement
Standard: To AS/NZS 4671 (2019).

Mesh: SL 62.

Maximum joint spacing: 6 m internal, 4 m external.

Water
General: Clean and free from any deleterious matter.

2 EXECUTION

2.1 PREPARATION

Substrates
General: Prepare substrates as follows:

- Clean and remove any deposit that may impair adhesion of monolithic or bonded toppings.
- Remove excessive projections.
- Voids and hollows: Fill with a sand/cement mix as follows:
  - . Greater than or equal in strength to the topping.
  - . Less than or equal in strength to the substrate.

Substrates for bonded toppings
Hardened concrete: Roughen by scabbling to remove 2 mm of the surface and expose the aggregate.

2.2 APPLICATION

Installation
General: Spread the mix and compact. Strike off, consolidate and level surfaces to finished levels.

Bonding product: Before laying topping, wash the substrate with water and provide a bonding product or treat as follows:

- Keep wet for 2 hours or more.

- Remove surplus water and brush on neat cement or a clean slurry of cement and water.
- Place the topping while the slurry is wet.

Monolithic toppings: Lay while concrete subfloor is plastic and the surface water is no longer visible.

Toppings 50 to 75 mm thick:

- Lay in two layers of equal thickness.
- Place a layer of reinforcement between the topping layers. Lap reinforcement 200 mm and tie. Do not create four way laps.

Temperature control

General: Make sure that the temperature of mixes, substrates and reinforcement are not less than 5°C or greater than 35°C at the time of application.

Severe temperature: If the ambient shade temperature is greater than 38°C, do not mix topping.

Curing

General: Prevent premature or uneven drying out and protect from the sun and wind.

Keeping moist: If a proprietary curing agent is not used, as soon as toppings have set sufficiently, keep them moist by water spraying or covering with polyethylene film for 7 days.

2.3 SURFACE FINISHES

Unformed surfaces

General: Strike off, screed and level topping surfaces to finished levels, flatness tolerance class and documented finish.

Slip-resistant treatment

Surface treatment: Apply silicon carbide granules after floating and before the topping surface has set, and trowel into the surface so that the granules remain exposed.

Application rate: 1 kg/m^2 evenly distributed.

Surface colouring

General: After machine floating, apply a proprietary liquid or dry shake material to the manufacturer's recommendations and trowel to achieve the required appearance.

Surface treatment

General: Apply the surface treatment after floating and before the topping surface has set.

2.4 CONTROL OF MOVEMENT

General

Location: Provide control joints as documented and as follows:

- Over structural control joints.
- To divide complex room plans into rectangles.
- Around the perimeter of the floor.
- At junctions between different substrates.
- To divide large topping finished areas into bays.

Sealant width: 6 to 25 mm.

Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

2.5 JOINT ACCESSORIES

Floor finish dividers

General: Provide a corrosion-resistant metal dividing strip suitably fixed to the substrate, at junctions with differing floor finishes, with top edge flush to the finished floor. If changes of floor finish occur at doorways, make the junction directly below the centre of the closed door.

0621 WATERPROOFING - WET AREAS

1 GENERAL

1.1 STANDARDS

Waterproofing wet areas
Standard: To AS 3740 (2021).

2 PRODUCTS

2.1 MEMBRANES

General
Standard: To AS/NZS 4858 (2004).

Membrane system
Requirement: Proprietary membrane system suitable for the intended internal wet area waterproofing.

2.2 ACCESSORIES

Waterstop angles
Material: Rigid, corrosion-resistant angles compatible with the waterproof membrane system.

Bond breakers
Requirement: Compatible with the extensibility class of the membrane to be used.

Material: Purpose-made bond breakers tapes or fillets of sealant.

Sealants
Requirement: Waterproof or water resistant, flexible, mould-resistant and compatible with the waterproofing system and to the manufacturer's recommendations.

3 EXECUTION

3.1 PREPARATION

Substrates
General: Prepare substrates as follows:

- Clean and remove any deposit or finish that may impair adhesion of membranes.
- If walls are plastered, remove loose sand.
- If walls or floors are framed or discontinuous, make sure support members in full lengths without splicing.
- If floors are solid or continuous:
  . Remove excessive projections.
  . Fill voids and hollows greater than 10 mm with abrupt edges with a cement:sand mix not stronger than the substrate nor weaker than the bedding.
  . Fill depressions less than 10 mm with a latex modified cementitious product with feathering eliminated by scabbling the edges.
  . Fill cracks in substrates wider than 1.5 mm with a filler compatible with the membrane system.

Concrete substrates: Cure for more than 28 days.

External corners: Round or arris edges.

Moisture content
Requirement: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to the recommendations of AS 3740 (2021) Appendix F.

Falls
Membrane applied to substrate: Make sure the fall in the substrate conforms to the fall documented for the finish.

Waterstop angles
Requirement: Provide waterstop angles at door thresholds and shower enclosures to support the waterproof membrane at junctions between waterproofed and non-waterproofed areas.

Sizing: Size the vertical leg of the waterstop angle to conform to the requirements of AS 3740 (2021).

Corners: Cut the horizontal leg and bend the vertical leg at corners instead of forming vertical joints between separate lengths of angle.

Fixing: Fix waterstop angles to the substrate with compatible sealant or adhesive and corrosion-resistant countersunk or wafer head screws.

Bond breakers
Requirement: After the priming of surfaces, provide bond breakers at wall/floor junctions and at control joints where the membrane is bonded to the substrate.

Sealant fillet bond breakers:

- Application: Form a triangular fillet or cove of sealant to internal corners within the period recommended by the membrane manufacturer after the application of the primer.
- Width: Conform to AS 3740 (2021) Table 4.10.

3.2 INSTALLATION

Ambient conditions
Requirement: Do not install in conditions outside the manufacturer's recommendations.

Protection
Damage: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage and an overlaying finish is installed.

Extent of waterproofing
Requirement: Conform to AS 3740 (2021) and BCA (2022) H4D2. Provide waterproofing, including to the following areas:

- Floors in bathrooms and other wet areas: To full extent of floor area.
- Walls in bathrooms:
  . All tiled wall surfaces.
  . Minimum 150 mm above finished floor level.
- Walls in shower areas: Minimum 1800 mm above finished floor level.
- Wall/floor and wall/wall junctions and joints.
- Penetrations.

Drainage connections
Floor wastes: Turn membrane down 50 mm minimum into the floor waste leak control flanges and adhere to form a waterproof connection.

Vertical membrane terminations
Upstands:

- Minimum 150 mm above the highest finished tile level of the floor within the shower area.

Anchoring: Secure sheet membranes along the top edge.

Edge protection: Protect edges of the membrane.

Unenclosed showers
Requirement: Extend membrane at least 1500 mm into the room from the shower rose outlet on the walls and floor.

Curing of liquid membrane systems
General: To the manufacturer's recommendations.

Curing: Allow membrane to fully cure before tiling.

Overlaying finishes on membranes
Requirement: Protect waterproof membranes with compatible water resistant surface materials that do not cause damage to the membrane.

Bonded or partially bonded membranes: If the topping or bedding mortar is to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

3.3 COMPLETION

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

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

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

0631 CERAMIC TILING

1 GENERAL

1.1 STANDARDS

Tiling
General: Conform to the recommendations of AS 3958 (2023).

2 PRODUCTS

2.1 TILES

Ceramic tiles
Standard: To AS 13006 (2020).

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

Exposed edges: Provide 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 or use proprietary trim.

Slip resistance
Stair treads, ramps and landings: Classification to AS 4586 (2013).

2.2 MATERIALS

Adhesives
Standard: To AS ISO 13007.1 (2020).

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

Mortar materials
Cement type to AS 3972 (2010): GP.

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

Bedding mortar
Mix proportion (cement:sand), by volume: Select proportions from the range 1:3 to 1:4 for satisfactory adhesion. Provide minimum water.

Water
General: Clean and free from any deleterious matter.

Grout
Standard: To AS ISO 13007.3 (2013).

Cement-based proprietary grout: Mix with water. Fine sand may be added as a filler in wider joints.

Terracotta tiles: Use proprietary polymer modified grout.

General purpose cement based grout: Mix with fine sand. Provide minimum water consistent with workability.

Pigments for coloured grout: Colourfast fillers compatible with the grout material. For cement-based grouts, provide lime-proof natural or synthetic metallic oxides compatible with cement.

2.3 ACCESSORIES

General
Requirement: Provide tile accessories that match the composition, colour and finish of the surrounding tiles, as documented.

Tile trim: Provide proprietary trim for wall tiles and floor tiles, as documented.

3 EXECUTION

3.1 SUBSTRATES

Drying and shrinkage
General: Before tiling, allow at least the following times to elapse (for initial drying out and shrinkage) for these substrates:

- Concrete slabs: 42 days.
- Concrete blockwork: 28 days.
- Toppings on slabs and rendering on brick or blockwork: A further 21 days.
- Rendered swimming pool shells: A further 21 days minimum.

3.2 PREPARATION

Substrates without wet area membranes
General: Make sure substrates are as follows:

- Clean and free of any deposit or finish that may impair adhesion or location of tiles.
- If framed or discontinuous, support members are in full lengths without splicing.
- If solid or continuous:
  . Remove excessive projections.
  . Fill voids and hollows greater than 10 mm with abrupt edges with a cement:sand mix not stronger than the substrate or weaker than the bedding.
  . Fill depressions less than 10 mm with a latex modified cementitious product and eliminate feathering by scabbling the edges.

Absorbent substrates: If suction is excessive, control it by dampening but avoid over-wetting and do not apply mortar bedding to substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen by scabbling to remove 3 mm of the surface and expose the aggregate; then apply a bonding treatment.

Substrates with wet area membranes
General: Make sure substrates are as follows:

- Clean and free of any deposit or finish that may impair adhesion or location of tiles.
- Compatible with all components of the floor system.

3.3 TILING GENERALLY

Cutting and laying
Cutting: Cut tiles neatly to fit around fixtures and at margins where necessary. Drill holes without damaging tile faces. Cut recesses for fixtures such as soap holders. Rub edges smooth without chipping.

Laying: Return tiles into sills, reveals and openings. Butt up to returns, frames, fixtures and other finishes. Strike and point up beds if exposed. Remove tile spacers before grouting.

Variations
General: Distribute variations in hue, colour, or pattern uniformly, by mixing tiles or tile batches before laying.

Protection
Floor tiles: Keep traffic off floors until the bedding has set and attained its working strength.

Floor finish dividers
General: Finish tiled floors at junctions with differing floor finishes with a corrosion-resistant metal dividing strip fixed to the substrate using mechanical fasteners, with top edge flush with the finished floor. If changes of floor finish occur at doorways, make the junction directly below the closed door.

Bath ventilation
General: If required, ventilate the space below fully enclosed baths with at least 2 vermin-proof ventilating tiles.

3.4 SETTING OUT

Tile layout
Requirement: Provide whole or purpose-made tiles at margins if practicable, otherwise, set out to give equal margins of cut tiles. Align floor and wall tile joints, if possible.

Tile joints
Joint widths: Set out tiles to give uniform joint widths within the following limits:

- Floors:
  . Dry pressed tiles: 3 mm.
  . Extruded tiles: 6 mm.
  . Vitrified: 3 to 5 mm.
  . Quarry tiles: 6 to 12 mm.
- Mounted mosaics: To match mounting pattern.
- Walls:
  . Dry pressed tile: 1.5 mm.
  . Extruded tile: 6 mm.

Joint alignment: Set out tiling with joints accurately aligned in both directions and wall tiling joints level and plumb.

Fixtures
General: If possible, position tiles so that holes for fixtures and other penetrations occur at the intersection of horizontal and vertical joints or on the centrelines of tiles.

Falls and levels
Requirement: Grade floor tiling to even and correct falls to floor wastes and elsewhere as required. Make level junctions with walls. If falls are not required, lay level.

Fall: Conform to falls as documented and the following:

- Falls to floor wastes: 1:80 minimum.
- Continuous fall of floor plane to floor waste: 1:50 maximum.

Change of finish: Maintain finished floor level across changes of floor finish including carpet.

3.5 BEDDING

Preparation of tiles

Adhesive bedding: Fix tiles dry; do not soak.

Mortar bedding: Soak porous tiles in water for half an hour and then drain until the surface water has disappeared.

Terracotta tiles: Use pre-sealed tiles or apply a breathable sealer and lay dry. If a final sealed finish is selected, use a compatible laying sealer.

Bedding

General: Use bedding methods and materials that are appropriate to the tile, the substrate and the conditions of service, and which leave the tile firmly and solidly bedded in the bedding material and adhered to the substrate. Form falls integral with the substrate.

3.6 GROUTED AND SEALANT JOINTS

Grouted joints

General: Commence grouting as soon as practicable after bedding has set. Clean out joints as necessary and remove any tile spacers before grouting.

Face grouting: Fill the joints solid and tool flush. Clean off surplus grout. Wash down when the grout has set. When grout is dry, polish the tiled surface with a grout film remover and a clean cloth.

Sealant joints

General: Provide joints filled with sealant and finished flush with the tile surface as follows:

- Where tiling is cut around sanitary fixtures.
- At internal corners of walls.
- Around fixtures interrupting the tile surface, for example pipes, brackets, bolts and nibs.
- At junctions with elements such as window and door frames and built-in cupboards.

Material: Anti-fungal modified silicone.

Width: 5 mm.

Depth: Equal to the tile thickness.

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 coded flexible filler in lieu of grout at cabinet/tile interfacing and bath/tile interfacing.

0651 RESILIENT FINISHES

1 GENERAL

1.1 STANDARDS

General

Installation: To AS 1884 (2021).

2 PRODUCTS

2.1 MATERIALS

Wet process fibreboard underlay

Standard: To AS/NZS 1859.4 (2018).

Classification: General purpose (GP) medium board, manufactured specifically as flooring underlay.

Thickness: 5.5 mm.

Vinyl planks

Type: Loose laid wood design vinyl planks.

Total thickness: Minimum 2 mm.

Wear layer thickness: Minimum 0.55 mm.

Surface treatment: PUR treatment.

Warranty: Minimum 15 years.

Slip resistance

Classification: To AS 4586 (2013).

3 EXECUTION

3.1 PREPARATION

Substrates

General: To AS 1884 (2021) Section 3.

Concrete substrates

Requirement: Do not start installation of the resilient finishes until the concrete substrate conforms to AS 1884 (2021) clause 3.1 and the adhesive and resilient finish manufacturer's recommendations.

Substrate rectification: Conform to the following:

- Surface treatments: Mechanically remove any incompatible surface treatments, including the following:
  - Sealers and hardeners.
  - Curing compounds.
  - Waterproofing additives.
  - Surface coatings and contamination.
- Surface quality: Remove projections and fill voids and hollows with a smoothing self-levelling compound compatible with the adhesive. Allow filling or levelling compound to dry to manufacturer's recommendations.

Cleaning: Remove loose materials or dust.

Timber, plywood and particleboard substrates

Requirement: Do not start installation of the resilient finishes until the timber, plywood or particleboard substrate conforms to AS 1884 (2021) clause 3.6.

Substrate rectification: Remove projections. If conformance to a planeness tolerance of 4 mm in 2 m determined using a 2 m straightedge cannot be achieved, provide an underlay in brick pattern with joints avoiding substrate joints.

Working environment
General: Do not start work before the building is enclosed, wet work is complete and dry, overhead work is complete and good lighting is available. Protect adjoining surfaces.

Acclimatisation
Before installation: Remove flooring from the packaging and store not more than 5 boxes high in the laying area for at least 24 hours.

3.2 INSTALLATION

General
Requirement: Install to the manufacturer's recommendations.

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.

Junctions
General: Scribe neatly up to returns, edges, fixtures and fittings. Finish flush with adjoining surfaces.

Vinyl planks
Installation: Install using pressure sensitive adhesive to the manufacturer's recommendations. Set out planks from centre of room. Align patterns, texture and grain in one direction.

3.3 COMPLETION

Protection
Finished floor surface: Keep traffic off floors for a minimum of 24 hours after laying or until bonding has set, whichever period is longer. Avoid contact with water for minimum 7 days after laying.

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.

0652 CARPETS

1 PRODUCTS

1.1 MATERIALS

Carpet
Minimum grade: Residential Medium Duty under the Australian Carpet Classification Scheme.

Total VOC emission tested to ISO 10580 (2010): < 0.5 mg/m^2/h.

Wet process fibreboard underlay
Standard: To AS/NZS 1859.4 (2018).

Classification: General purpose (GP) medium board, manufactured specifically as flooring underlay.

Thickness: 5.5 mm.

Soft underlay
Standard: To AS 4288 (2003).

Hot-melt adhesive tapes
General: Glass fibre and cotton thermoplastic adhesive-coated tape 60 mm wide on a 90 mm wide metal foil base and backed with silicone-coated release paper.

Preformed carpet grippers
General: Architectural plywood carpet grippers with 3 rows of corrosion-resistant angled pins of length appropriate to the carpet type to AS 2455.1 (2019) clause 1.5.4.

Edge strips and threshold strips
General: Heavy duty metal moulding or extruded edge strip appropriate to the floor covering type and capable of accommodating varying levels of adjacent floor finishes, if necessary.

Slip resistance
Classification: To AS 4586 (2013).

2 EXECUTION

2.1 PREPARATION

Application
Floor coverings: As documented.

Substrate
General: Conform to AS 2455.1 (2019) and the following:

- Clean and free of any deposit or finish that may impair adhesion or location and functioning of control joints.
- Free of any imperfections, including ridges, indentations and projections that may adversely affect the installed carpet.

Concrete substrate rectification: Remove projections and fill voids and hollows with a levelling compound compatible with the adhesive.

Timber substrate rectification: Remove projections. If conformance to a planeness tolerance of 4 mm in 2 m, determined using a 2 m straightedge placed anywhere in any direction cannot be achieved, fix a

hard underlay in brick pattern. Make sure joints do not coincide with substrate joints.

Fixtures: Remove door stops and other fixtures. Refix in position undamaged on completion of the installation.

Moisture content
Moisture content and alkalinity of concrete substrate: Do not start installation until the moisture content and alkalinity of the concrete substrate has been tested and conforms to the values in AS 2455.1 (2019) Appendix B.

Moisture content of timber, plywood or particleboard substrate: Do not start installation until the moisture content of the substrate has been tested to AS/NZS 1080.1 (2012) for timber and particleboard or AS/NZS 2098.1 (2006) for plywood, and conforms to the values as follows:

- Air conditioned buildings: 8 to 10%.
- Intermittently heated buildings: 10 to 12.5%.
- Unheated buildings: 12 to 15%.

2.2 INSTALLATION

Standard
General: To AS 2455.1 (2019) Section 3 and the manufacturer's recommendations.

Setting out
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: Seam with hot-melt adhesive tape.

Edge strips and threshold strips
Location: At exposed edges of the carpet, and at junctions with different floor finishes or finishes of a different thickness. If edge strips occur at doorways, locate the junctions directly below the closed door.

0671 PAINTING

1 GENERAL

1.1 STANDARDS

Painting
General: To the recommendations of those parts of AS/NZS 2311 (2017) referenced in this worksection.

2 PRODUCTS

2.1 PAINTING MATERIALS

Paint brand
Quality: If the product is offered in a number of levels of quality, provide premium quality lines.

Handling
Delivery: Deliver paints to the site in the manufacturer's labelled and unopened containers.

Low VOC emitting paints
VOC limits for low odour/low environmental impact paint types:

- Primers, sealers and undercoats: < 65 g/L.
- Interior wall and ceiling paint, all sheen levels: < 16 g/L.
- Varnishes and wood stains: < 75 g/L.

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

Clear timber finish systems: Provide only the combinations of putty, stain and sealer recommended by the manufacturer of the topcoat.

Putty and fillers
Material: To the recommendation of the paint system manufacturer, suitable for the substrate and compatible with the primer.

Tinting
General: Provide only products that are colour tinted by the manufacturer or supplier.

3 EXECUTION

3.1 PREPARATION

Order of work
Other trades: Complete the work of other trades as far as practicable within the area to be painted, except for the installation of fittings, floor sanding and laying flooring materials.

Clear finishes: Complete clear timber finishes before applying opaque paint finishes in the same area.

Protection
General: Clean the area and protect from dust contamination. Use drop sheets and masking agents to protect surfaces, including finished surfaces and adjacent finishes during painting.

Fittings and furniture: Remove door furniture, switch plates, light fittings and other fittings. Store and

protect against damage. Refix in position on completion of painting.

Substrates

General: Prepare substrates to receive the documented painting systems to the manufacturer's recommendations and as follows:

- Generally: Clean the substrate surface without damaging the substrate or the surroundings.
- Timber surfaces where clear finishes will be applied: Prepare the surface so that its attributes will show through the clear finish without blemishes, including the following:
  - . Remove bruises.
  - . Remove discolourations, including staining by oil, grease and nailheads.
  - . Bleach if necessary to match the timber colour sample.
  - . Fine sanding, with the last abrasive no coarser than 220 grit, so that there are no scratches across the grain.
- Sound external surfaces other than timber: Prepare the surface as follows:
  - . Remove dirt, grease, loose and foreign matter, efflorescence and mould by water blasting or steam cleaning without damaging the surface.
  - . Remove remaining loose material with hand tools.
  - . Use sanding blocks to preserve the arrises of masonry and stone details.

Filling: Conform to the following:

- Generally: Fill cracks and holes with fillers, sealants, putties or grouting cements as appropriate for the finishing system and substrate, and sand smooth.
- Timber surfaces where clear finishes will be applied: Provide filler or putty tinted to match the surface.

Exposed steel in coastal areas

Requirement: Before painting, including before applying primers and sealers, clean exposed surfaces to the recommendations of AS 2312.1 (2014) Section 4.

Unpainted surfaces

Standard: To AS/NZS 2311 (2017) Section 3.

Previously painted surfaces

Preparation of a substrate in good condition: To AS/NZS 2311 (2017) clause 7.4.

Preparation of a substrate in poor condition: To AS/NZS 2311 (2017) clause 7.5.

Preparation of steel substrates with protective coatings: To AS 2312.1 (2014) Section 8 and AS 1627.1 (2003).

3.2 APPLICATION

General

Standard: To AS/NZS 2311 (2017) 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.

Exposed steel in coastal areas

Requirement: Immediately before application of each subsequent paint coat, clean painting surface to remove any soluble salts and contamination which are likely to affect the performance of subsequent paint coatings.

Paint application: To the recommendations of AS 2312.1 (2014) Section 5 and the paint manufacturer.

Paint coating systems: To the recommendations of AS 2312.1 (2014) Section 6.

Light levels

General: ≥ 400 lux.

Priming timber before fixing

General: Before fixing in position, apply 1 coat of wood primer and 2 coats to end grain to the back of the following:

- External fascia boards.
- Timber door and window frames.
- Tops and bottoms of external doors.
- Associated trim and glazing beads.
- Timber board cladding.

Spraying

General: If the application is by spraying, use conventional or airless equipment that conforms to the following:

- Satisfactorily atomises coating being applied.
- Does not require coating to be thinned beyond the maximum amount recommended by the manufacturer.
- Does not introduce oil, water or other contaminants into the applied coating.

Coatings with known health hazards: Not permitted on site.

Sanding

Clear finishes: Sand the sealer, using abrasives no coarser than 320 grit, without cutting through the colour. Take special care with round surfaces and edges.

Repair

Requirement: Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition. Touch up new damaged decorative paintwork or misses with the paint batch used in the original application.

Repair of galvanizing

Cleaning: For galvanized surfaces that have been subsequently welded, power tool grind to remove all surface contaminants, including rust and weld splatter. Prime affected area immediately after cleaning.

Primer: Type 2 organic zinc rich coating for the protection of steel to AS/NZS 3750.9 (2009).

Services

General: Paint new services and equipment if not embedded, except chromium, anodised aluminium, GRP, PVC-U, stainless steel, non-metallic flexible materials and normally lubricated machined

surfaces. Repaint proprietary items only if damaged.

Wet paint warning
Notice: Place notices in a conspicuous location and do not remove until the paint is dry.

3.3 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 conform to the **Paint final coat table**.

Paint systems for interior surfaces: Provide paint system conforming to AS/NZS 2311 (2017) 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 (2006)
Floor varnish - moisture cured	AS 3730.27 (2006)
Floor varnish - two pack isocyanate cured	AS 3730.27 (2006)
Low gloss latex	AS 3730.3 (2006)
Semi-gloss latex	AS 3730.2 (2006)
Gloss latex	AS 3730.12 (2006)
Exterior	
Full gloss solvent-borne	AS 3730.6 (2006)
Flat latex	AS 3730.7 (2006)
Low gloss latex	AS 3730.8 (2006)
Semi-gloss latex	AS 3730.9 (2006)
Gloss latex	AS 3730.10 (2006)
Stain, lightly pigmented	AS 3730.28 (2006)
Latex stain, opaque	AS 3730.16 (2006)
Paving	
Paving paint, semi-gloss	AS 3730.29 (2006)
Paving paint, gloss	AS 3730.29 (2006)

0702 MECHANICAL

1 GENERAL

1.1 RESPONSIBILITIES

Mechanical systems
Requirement: Provide mechanical system, as documented.

Performance
Requirement: Provide room air conditioning systems conforming to the following:

- Maximum noise levels in occupied spaces: NR 30.
- Maximum noise level at site boundary: To the *Environmental Protection (Noise) Regulations 1997 (WA)*.
- Factory assembled, pre-piped internally, pre-wired and tested ready for installation on site.

1.2 DESIGN

Design, application and calculations
Standards: Conform to the recommendations of one or more of the following:

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

Methods of calculation: Manual or software that employs the data and methods in the above standards.

Air conditioning system design
Requirement: Provide engineering design that:

- Maximises the functionality, performance, safety, flexibility and reliability of the mechanical services.
- Is technically sound.
- Can be constructed using methods that are good practice and in common use.
- Provides the lowest combined owning and operating cost over the design life of the systems.

Energy efficiency: To BCA (2022) H6D2(2).

Outdoor design conditions: Use outdoor design conditions listed in AIRAH DA09 (2022) or ASHRAE Handbook - Fundamentals (2021) for the following:

- The design conditions location selected to the recommendations of AIRAH DA09 (2022) clause 3.4.2.
- Cooling design: Annual cooling, dehumidification and enthalpy design conditions, 1% DB (dry bulb) and MCWB (mean coincident wet bulb) for the selected location.
- Heating design: Annual heating and humidification design conditions, 99% Heating DB (dry bulb) for the selected location.

Indoor design conditions:

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

Cooling performance: Maintain the air conditioned spaces, as measured at the points of control, within

the documented cooling indoor design conditions at the highest cooling load due to the combination of the following:

- Cooling loads imposed by the outdoor design conditions.
- Other cooling loads when they are at their maximum.
- Full solar load.
- Loads due to system and other losses.

Heating performance: Maintain the air conditioned spaces, as measured at the points of control, within the documented heating indoor design conditions at the highest heating load due to the combination of the following:

- Heating loads imposed by the outdoor design conditions.
- Other documented cooling loads are zero.
- Solar cooling load is zero.
- Loads due to system and other losses.

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 design conditions are not exceeded.
- 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 specified 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.

Building fabric loads: Allow for loads from the construction documented.

Internal window shading: As documented.

Lighting loads: Allow for heat loads from the lighting as documented but not less than 5 W/m^2.

Internal equipment loads: Allow for loads from the equipment as documented but not less than 5 W/m^2.

Ambient noise emitted: Lower than the level that can be heard within a habitable room in any neighbouring premises, regardless of whether any door or window to that room is open.

1.3 STANDARDS

General

Mechanical ventilation and air conditioning: To AS 1668.1 (2015) and the NCC cited AS 1668.2 (2012).

Refrigeration systems: To AS/NZS 5149.1 (2016), AS/NZS 5149.2 (2016), AS/NZS 5149.3 (2016) and AS/NZS 5149.4 (2016).

Heating and cooling systems: To AS/NZS 5141 (2018) and the recommendations of HB 276 (2004).

2 PRODUCTS

2.1 AIR CONDITIONING SYSTEMS

General

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

- System type: Inverter.
- Air conditioning equipment: Before supply, verify that all system equipment and components will operate together to meet the equipment manufacturer's documented performance and component requirements. Install as documented to meet the documented performance .

2.2 AIR CONDITIONING EQUIPMENT

Standards

Ducted air conditioners: To AS/NZS 3823.1.2 (2012).

Non-ducted air conditioners: To AS/NZS ISO 5151 (2023).

Equipment

Performance: Supply equipment as follows:

- Made by a manufacturer with a demonstrated ability to provide spare parts and service promptly to the site.
- Labelled to AS/NZS 3823.2 (2013): Minimum 5 star energy rating.

Refrigerant: Provide refrigerant listed as Safety Group A1 or A2L in AS/NZS ISO 817 (2016) and having an Ozone Depletion Potential of 0 and a maximum Global Warming Potential of 700.

Reverse cycle units: Provide refrigerant reversing valve and an effective outdoor coil defrost facility that prevents room temperature dropping more than 2 K during defrost.

Split systems: Supply indoor and outdoor condensing units designed and rated by the manufacturer to operate together.

- Capacity: Minimum 3.5 kW.

Equipment enclosures: Provide enclosures, materials and finishes that are corrosion-resistant, assembled and reinforced to prevent flexing and drumming.

External equipment enclosures: Weatherproof.

Equipment enclosure insulation: Insulate enclosures to prevent external surface condensation under all operating conditions. Fix insulation to panels with adhesive applied to at least 50% of the panel area.

Supply fan: Centrifugal with multi-speed or variable speed motor.

Condenser fans: Low speed propeller or axial.

Filter performance: Provide dry media filters with performance to one of the following:

- AS 1324.1 (2001): ≥ G4.
- AS 16890.1 (2024): ≥ Coarse 90%.
- ASHRAE 52.2 (2017): ≥ MERV 6.

Drain trays: Aluminium, stainless steel or plastic trays to collect all moisture generated inside unit.

Coils: Copper tube, aluminium plate fin type with no moisture carry over.

Indoor unit

Requirement: Provide multi-directional discharge grilles, multi or variable speed supply fan and access panels.

Marine environment

Outdoor coil: If located less than 5 km from salt water, provide factory applied coating resistant to dilute acids, dilute alkalis, solvents, inorganic salts and salt laden air which, when tested to ASTM B117 (2019), shows no sign of attack after 3000 hours in salt spray.

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 at least 6 temperature programs per day, separate programs for each day of the week, manual set point override and vacation temperature set back.

Type: Electric/electronic type supplied by the manufacturer of the air conditioning equipment. Provide an infrared controller.

Temperature settings: Set to maintain the following space temperatures:

- Cooling mode: 24°C (dry bulb) ±1.5°C.

2.3 DUCTWORK

Design

Flexible ductwork: Conform to the following:

- Velocity: ≤ 4.0 m/s.
- Length: No more than 6 m total flexible duct length in the air path between the fan and furthest outlet or grille served. Provide rigid duct for the remainder of the air path between the fan and furthest outlet or grille served.

Rigid ductwork: Size ductwork as follows:

- Velocity: ≤ 6 m/s.
- Pressure loss: ≤ 1.2 Pa/m.

Standards

Flexible ductwork: To AS 4254.1 (2021).

Rigid ductwork: To AS 4254.2 (2012).

Materials

Ductwork fittings: Provide fittings, including fittings between flexible duct, fabricated from sheet metal.

Insulation fire hazard properties: To AS 4254.1 (2021) and AS 4254.2 (2012).

2.4 AIR GRILLES

General

Supply air: Provide supply air grilles, diffusers, registers or unducted room air conditioners to evenly distribute supply air within the space. Provide at least one air grille, diffuser, register or unducted room air conditioner in each room or space served.

Return air: Provide air grilles that return air to the air conditioning plant in an energy efficient manner.

Air grilles: Provide proprietary air grilles:

- Free from distortion, bends, surface defects and irregular joints.
- With flange corners neatly mitred, butted and buffed, with no joint gaps.
- Free from vibration or rattling in operation.
- Material: Steel or aluminium.
- Finish to exposed surfaces: Powder coated to the nominated colour.

3 EXECUTION

3.1 UNIT INSTALLATION

General

Requirement: Supply all necessary components, including the following:

- Means of attachment to the structure.
- Anti-vibration mounting.
- Appropriate flexible connections.
- Trim and weather sealing around openings.
- Electrical connections.
- Drainage connections.
- Field connection of refrigerant lines in split systems.

Alignment: Install units level, plumb and to manufacturer’s recommendations.

Fixing: Bolt units in place with minimum 4 anchors or suspension rods.

Outdoor equipment

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

Plinths: If located on grassed or similar permeable surfaces, provide concrete plinths under outdoor equipment.

Support

Wall mounted equipment: Fix to manufacturer's recommendations. Make sure the wall structure is able to support the mechanical equipment when operating. Strengthen walls if necessary.

Rack mounted equipment: Provide 50 mm angle hot-dip galvanized support racks supported off a plinth and braced to the wall.

3.2 DUCTWORK INSTALLATION

Flexible duct

Layout: Install flexible duct as straight as possible with minimum number of bends. Maximise bend radius but not less than required by AS 4254.1 (2021).

Cutting to length: Make sure the inner core is fully extended before cutting. Cut to this length. Do not leave excess lengths of flexible duct for possible future relocation of air terminal devices.

Joints: Securely fix flexible duct to rigid spigots and sleeves using draw bands. Provide spigots with a bead.

Draw bands: Stainless steel or non-metallic with a tensile strength of ≥ 670 N.

Sealing: Seal the joint between the flexible duct and rigid duct using one of the following methods:

- Duct tape as detailed in AS 4254.1 (2021).
- Mastic sealant placed between the flexible duct core and rigid duct. Do not apply mastic sealant as a fillet.

Support: To AS 4254.1 (2021). Limit sag to less than 120 mm between supports.

Maximum length of flexible duct sections: 6 m including the length of any rigid duct or sleeves used to join lengths of flexible duct.

Substitution: If rigid duct is shown on the drawings do not substitute flexible duct.

Constriction: If flexible duct is compressed or deformed by a building element or other component, conform to the following:

- Extent of constriction: Smallest dimension perpendicular to air flow not less than 80% of the original duct diameter.
- Length of constriction: Less than 300 mm.
- Number:
  . Not more than 2 in an individual run of flexible duct.
  . Not more than 20% of all flexible duct runs with constrictions.

Cleaning

General: Clean interior of ductwork progressively during installation.

3.3 AIR GRILLE INSTALLATION

General

Mounting: Provide a matching escutcheon to close gaps between the air grille and its surrounds. Provide air grilles with flanges to cover penetrations and irregularities in surrounds.

Appearance: Install square.

Fixing accessibility: Provide fastenings that allow removal of the air grille without damage to surrounds or air grille.

Gaskets: Provide foam type gaskets under air grille flanges or flanged supports.

Plenum and cushion head boxes: Provide side entry plenum or cushion head boxes to air grilles connected to flexible ductwork.

3.4 REFRIGERATION PIPEWORK

General

Copper pipe: To AS 1571 (2020).

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

3.5 CONDENSATE DRAINS

General

Requirement: Provide trapped, at least DN 20 condensate drains to AS/NZS 3666.1 (2011) 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.

3.6 ANCILLARY WORKS

Painting

Paint finish: Paint all items exposed to view and/or weather including ductwork, pipework and equipment. Submit proposed colours and locations.

Structural

Equipment weight: Submit weight of each major item of equipment.

Concrete work

Requirement: Provide concrete plinths as documented.

Plumbing

Requirement: Provide external floor wastes and drain points as documented.

Electrical

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 manufacturer throughout the installation, where possible.

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

3.7 COMPLETION

Incidental repairs

General: Repair any surfaces that were damaged during the installation, including roofing, gutters, flooring, and ceilings.

Commissioning

Requirement: Commission mechanical services when:

- The respective systems or parts of systems are at a stage of static completion.
- The building work on which commissioning depends is complete.

Adjustments: Make the adjustments necessary to achieve the documented performance under continuous operating service conditions, including balancing, setting the controls, checking the operation of overload and safety devices, and correcting malfunctions.

Automatic controls: Test controls hardware and software for correct operation.

Sensors for automatic controls:

- Calibration: Calibrate sensors to within the documented accuracy of the sensor.
- Set points: Adjust sensors to documented values.

Safety controls: Test each safety control and facility by simulating the unsafe condition that the control is intended to protect against. Make sure that monitoring and safety measures are in place for the test to protect personnel from injury and the building and equipment from damage.

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

Operation and maintenance instructions
Requirement: Provide written operation and maintenance instructions containing the following:

- Contractor's contact details for service calls.
- Manufacturers' operation and maintenance 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.

3.8 MAINTENANCE

General
Requirement: Provide all labour and material necessary to maintain the mechanical installation including filter media, belts, refrigerants, lubricants and all items commonly referred to as consumable.

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.

Preventive maintenance: Provide preventive maintenance recommended by the equipment manufacturer.

Minimum level: Carry out maintenance at no lower frequency than the intervals recommended in AIRAH DA19 (2019) for Maintenance Level A and the operation and maintenance manual.

Service records: Record maintenance undertaken in the schedules in the operation and maintenance manuals.

0802 HYDRAULIC

1 GENERAL

1.1 DESIGN

Energy efficiency
Minimum: To the PCA (2022).

Water efficiency
Minimum: To the PCA (2022).

Hydraulic system design
Capacity: Size water heaters to adequately and efficiently serve the functions documented.

1.2 STANDARDS

General
Plumbing and drainage: To the AS/NZS 3500 series and the PCA (2022).

1.3 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 Local Government, Industry Regulation and Safety or Plumbers Licensing Board. Include all required documentation.

2 PRODUCTS

2.1 GENERAL

Authorised products
Requirement: Listed in the WaterMark Product Database, unless otherwise required by the Network Utility Operator.

Labelling
Water efficiency labelling: Provide products conforming to and labelled to the Water Efficiency Labelling Scheme (WELS) or the Waterwise Products Program.

Bushfire-prone areas
Site with Bushfire Attack Level (BAL) 12.5, 19, 29, 40 or FZ to AS 3959 (2018): If external and above ground, provide metal pipes and fittings to AS 3959 (2018).

2.2 FIXTURES

Toilet suites
Rating: Minimum 4 stars WELS rated dual flush.

Shower heads
Rating: Minimum 3 stars WELS rated.

Baths
Type: Bath with soap holder, waste outlet, bar grate and plug.

- Dwellings with 3 or more bedrooms: Minimum 1675 mm length.
- Other dwellings: Minimum 1500 mm length.

Basins
Type: White, vitreous china vanity basin with overflow.

Properties: Size, configuration and tap hole configuration, as documented.

Towel rails
Type: Chromium-plated brass or stainless steel rail, as documented.

Hanging space: Minimum 1200 mm.

Robe hooks
Type: Chromium-plated brass or stainless steel hook, as documented.

Toilet roll holders
Type: Chromium-plated brass or stainless steel single roll holder, as documented.

Soap dish
Type: Chromium-plated brass or stainless steel dish, as documented.

Laundry tub and cabinet
Standard: To AS/NZS 1229 (2002) Section 5.

Type: Provide one of the following:

- 42 L tub and prefinished steel cabinet with side entry for concealed washing machine taps.
- Tub integrated into joinery.

Material: Type 304 stainless steel.

Bowl capacity: Minimum 42 litres.

Internal tap fittings
Rating: Minimum 4 stars WELS rated.

Type: Chromium-plated lever handled mixer tap (hot and cold) with 150 mm swivel arm with aerator outlet.

Kitchen sink
Type: Sink with drainer on each side and single tap hole. Bowl type as documented.

Size: As documented.

2.3 WATER HEATERS

General
Requirement: Provide water heaters compatible with low flow fixtures and fittings.

Types
Electric water heaters: To the NCC cited AS 1056.1 (1991).

- Energy performance: To AS/NZS 4692.2 (2005).

Solar water heaters: To AS/NZS 2712 (2007).

Heat pump water heaters: To AS/NZS 2712 (2007).

Heaters installed in Northern areas
Installations with hard water source: Provide heaters with bobbin elements to the manufacturer's recommendations.

3 EXECUTION

3.1 INSTALLATION

Connections to mains
General: Excavate to locate and expose the connection points and connect to the Network Utility Operator and gas Network Operator mains. On completion, backfill and compact the excavation and reinstate surfaces and elements that have been disturbed, such as roads, pavements, kerbs, footpaths and nature strips to *0223 Service trenching*.

Metering: Provide metering, valves and fittings to Network Utility Operator requirements.

Water meters
Sub-meters: Provide Water Corporation approved meters for multi-unit residential developments of three (3) or more units.

Installation: In conformance with the *Sub-meter Application Form* and *Guide to Sub-meter Options for Multi-residential Developments*. (See www.watercorporation.com.au/Developing-and-building/Subdividing/Strata-and-green-title-subdivisions/Strata-subdivisions/Metering-options-for-stratas.)

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

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.

Fixtures
Baths: Chase into masonry wall to accommodate edge of bath or provide wall sealing strip during bath tiling.

3.2 FINISHES

General
Exposed piping: Finish exposed piping, including fittings and supports as follows:

- Internal locations such as toilet and kitchen areas: Chromium-plated copper piping to AS 1192 (2004) service condition 2, bright. Stainless steel braided hose for flexible applications.
- External locations: Paint.
- Concealed but accessible spaces including cupboards and non-habitable enclosed spaces: Unpainted and with identification marking.

Valves: Finish valves to match connected piping.

3.3 COLD AND HEATED WATER

Standards
General: To AS/NZS 3500.1 (2021) and AS/NZS 3500.4 (2021).

Copper pipe: To AS 1432 (2004) and AS 4809 (2017).

Piping
Pipe materials:

- Between water main and the building: Copper.
- Other locations: To the PCA (2022).

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 (2021) and the requirements of the network utility operator.

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

Fittings and accessories
General: Provide the fittings required for the proper functioning of the water supply system, including taps, valves, backflow prevention devices, pressure and temperature control devices, strainers, gauges and automatic controls and alarms.

Water heaters
Location: Locate water heaters where they can be maintained or replaced without damaging adjacent structures, fixtures or finishes.

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

Isolating valves: Provide isolation valves to water heaters.

Heated water temperature
Standard: To AS/NZS 3500.4 (2021).

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 (2007).

Stand pipes
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 (2021).

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

3.4 STORMWATER

Standards
General: To AS/NZS 3500.3 (2021).

Location
General: Provide stormwater drains to connect downpipes, surface drains, subsoil drains and drainage pits to the outlet point or point of connection. Make sure location of piping will not interfere with other services and building elements not yet installed or built. Subject to the preceding and documented layouts, follow the most direct route.

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

Laying
Installation: Lay in straight lines between changes in direction or grade. If other pipes are adjacent, set each pipe true to line and complete each joint before laying the next pipe. If work is not continuous, cap open ends to prevent entry of foreign matter.

Pipe underlay
General: Bed piping on a continuous underlay of bedding material, minimum 75 mm compacted thickness. Grade the underlay evenly to the gradient of the pipeline.

Chases: If required, form chases to prevent projections such as sockets and flanges from bearing on the trench bottom or underlay.

Downpipe connections
General: Turn up branch pipelines with bends to meet the downpipe, finishing horizontally 50 mm (nominal) above finished ground or pavement level.

Subsoil drains
Requirement: Provide subsoil drains to intercept groundwater seepage and prevent water build-up behind walls and under pavements. Connect subsoil drains to surface drains or to the stormwater drainage system as applicable.

Trench width: Minimum 450 mm.

Piping: Provide proprietary perforated plastic pipe.

Geotextiles: UV stabilised, permeable, polymeric, woven or non-woven textile material used in contact with soil/rock material.

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

Pits

Metal access covers and grates: To AS 3996 (2019).

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: Locate to receive the runoff without ponding.

3.5 WASTEWATER

Standards

General: To AS/NZS 3500.2 (2021).

Waterless composting toilets: To AS/NZS 1546.2 (2008).

On-site domestic wastewater treatment units: To AS 1546.3 (2017).

Cleaning

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

Floor wastes

Requirement: Provide each floor waste with a trap constructed of the material specified for the sanitary plumbing system. Fit off each riser with a minimum 80 mm diameter, chromium-plated brass grating finished flush with the surrounding floor finish.

Waterproofing: Make sure all penetrations through floors and finishes up to the edge of grates are fully waterproof.

Septic tanks and interceptor tanks

Requirement: Provide septic tanks and associated fittings to AS/NZS 1546.1 (2008) and the *Code of Practice for Product Approval of Onsite Wastewater Systems (2013)*.

Effluent disposal: To AS/NZS 1547 (2012).

Tank requirements and size: 1 x 1200 mm diameter and 1 x 1500 mm diameter concrete septic tanks.

Lid type: Trafficable.

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

Drains from floor level to septic tanks: Run in 100 mm sewer pipe.

I/O junctions: Bury connectors and junction boxes.

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

Vent pipes

Requirement: Provide upstream and downstream vents to AS/NZS 3500.2 (2021).

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

Terminations: Provide vent cowls of the same material as the vent pipe.

Leach drains

Length and type: To *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).

3.6 RAINWATER STORAGE SYSTEMS

Standards

Metal tanks and rainwater goods: To AS/NZS 2179.1 (2014).

Design and installation: To the recommendations of HB 230 (2008) except if they conflict with the requirements of AS/NZS 3500.1 (2021) and AS/NZS 3500.3 (2021).

Products in contact with drinking water: Tested to AS/NZS 4020 (2018).

Rotationally moulded tanks: To AS/NZS 4766 (2020).

Coated steel tanks: Metallic-coated steel with polymer film to AS/NZS 4020 (2018) on the inside and prepainted on the outside.

Bladder tanks: Proprietary plastic bladder type constructed from reinforced polymer conforming to AS/NZS 4020 (2018), 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 screens with maximum 1 mm mesh at all openings.
- Flap valves at every opening to the tank.
- Calmed inlet to the tank to prevent stirring sediment.
- 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 dry systems with a first flush diverter. Arrange to drain completely.

Sizing: Select for at least 20 L/100 m^2 rainwater catchment area.

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

Discharge: Discharge wastewater 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.

Water pumps

Requirement: Provide pumps to fulfill the functions of the system.

Selection: To the recommendations of HB 230 (2008).

Water filters for drinking water

Requirement: If rainwater is used for drinking water, conform to AS 3497 (2021) and the requirements of the statutory authorities having jurisdiction.

Tank 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 caused by wind and other loads when empty. Provide a level base with gaps not exceeding 10 mm, free of sharp projections and extending beyond the edge of the tank at all points.

Interior access: Arrange tanks so the interior is accessible for inspection and cleaning. Arrange internal features to permit effective cleaning.

Rotationally moulded 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. After drilling or cutting ferrous metal, remove swarf with a magnet. Recoat or seal new openings to restore original corrosion resistance.

Bladder tanks: Locate on a 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.

3.7 GREYWATER SYSTEMS

Standards

Design and installation: To AS 1546.4 (2016).

Greywater diversion devices

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 PCA (2022), AS/NZS 3500.1 (2021) and the requirements of the Network Utility Operator.

3.8 FUEL GAS

Standard

Reticulated gas systems: To AS/NZS 5601.1 (2022).

Buried pipes

Requirement: During backfilling, lay plastic warning tape 300 mm above buried piping, for the full length of the piping.

Warning tape: 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 system.

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 (2014).

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

0902 ELECTRICAL

1 GENERAL

1.1 DESIGN

Maximum demand and spare capacity
Maximum demand: Calculation method to AS/NZS 3000 (2018) Appendix C. Submit 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.

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

Protection
Fault protection: Automatic disconnection to AS/NZS 3000 (2018) clause 2.4.

Energy efficiency
Requirement: To BCA (2022) H6D2(2).

Power supply
General: Underground, 415/240 V, single-phase, 50 Hertz a.c., unless otherwise documented.

Electrical services installation: Concealed.

1.2 STANDARDS

General
Electrical installation: To AS/NZS 3000 (2018).

Selection of cables: To AS/NZS 3008.1.1 (2017).

Communications cable systems: To AS/CA S008 (2020), AS/CA S009 (2020) and AS 11801.1 (2019).

Grid connected photovoltaic systems: To AS/NZS 4509.1 (2009), AS/NZS 4509.2 (2010), AS/NZS 4777.1 (2024) and AS/NZS 4777.2 (2020).

1.3 INTERPRETATION

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

- WAER: WA Electrical Requirements.
- RCD: Residual Current Device.

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

- Telephony: Speech and low band frequencies (= 100 kHz).

2 PRODUCTS

2.1 GENERAL

Earth electrodes and earth conductors
Earthing system: A Multiple Earth Neutral (MEN) system conforming to AS/NZS 3000 (2018), 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.

Smoke detection
Standard: To the NCC cited AS 3786 (2014).

Smoke alarms: Photoelectric smoke alarms that are mains powered with a non-removable rechargeable battery, and that have an anti-tamper device requiring a tool to remove from the ceiling. Select from the following:

- Brooks EIB3016.
- PSA LIF6000RL.

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

- Brooks EIB3016: EIB100MRF.
- PSA LIF6000RL: LIF6000WB.

Alternatives: If alternatives are proposed, conform to **SUBSTITUTIONS** in *0171 General requirements*.

2.2 CEILING FANS

General
Controls: Hardwired adjustable speed control switch. Do not provide remotes.

Internal ceiling sweep fans - Northern areas
Type: White fans with 1400 mm diameter metal blades and sealed bearings.

Mounting: Flush.

Controls: Supplied by the manufacturer with variable speed, summer/winter switch and off control.

- Mounting height: 1500 mm above finished floor level.

External ceiling sweep fans - Northern areas
Type: Brown or black fans with 1400 mm diameter metal blades and sealed bearings.

Design and installation: To AS/NZS 3000 (2018) clause 1.5.14.

Mounting: Flush.

Switches and socket outlets: With an Ingress Protection (IP) Rating, to AS/NZS 3000 (2018), if installed in a location where water ingress is possible, including where exposed to cyclonic conditions.

Controls: Supplied by the manufacturer with variable speed, summer/winter switch and off control.

- Mounting height: 1500 mm above finished floor level.

3 EXECUTION

3.1 GENERAL

Applications and compliance
General: Submit all necessary applications for electricity supply. Liaise with the electricity distributor and conform to the WAER (2023).

3.2 CONNECTION OF MAINS POWER SUPPLY

Network cable and point of attachment

Connection to network supply: Run aerial network operator's service cable to the private pole or as documented, to the WAER (2023).

Point of attachment for service cable: Provide private pole or as documented, to the WAER (2023).

Pole mounted point of attachment: Provide 12 mm galvanized round steel hook assembly welded to a steel private pole for supporting and connecting aerial network cable at the site boundary to the WAER (2023).

Power run-in

Supply to dwelling for multiple dwellings projects: Provide cabling to switchboard and underground run-in power from the main switchboard to each dwelling.

Maximum cable span:

- Standard service bracket: 30 m.
- Long span raiser bracket: 30 m.

Private poles

General: Conform to WAER (2023) and the electricity distributor's requirements for the following:

- Weld on 12 mm round steel hooks.
- Construction, height and position of power pole.
- Points of attachment of aerial distribution such as brackets and anchor blocks.

Private pole location: As documented.

Pole: 125 (internal diameter) x 4.8 mm (thick) galvanized steel.

Pole footing: 450 x 450 x 1200 mm (deep) mass concrete.

Pole height: 6 m above finished ground level with bottom end protruding minimum 100 mm through the bottom of the footing.

Consumers mains and metering

General: Provide consumers mains and automatic meter reading in conformance with the WAER (2023).

Private poles: If required, mount pole on concrete bases to the WAER (2023) and install electrical mains at the centre of the pole and in underground conduits.

- 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.

3.3 LOW VOLTAGE POWER SYSTEMS

Switchboards

Standard: To AS/NZS 61439.1 (2016) and AS/NZS 61439.3 (2016).

Construction: Enclosed type with a hinged lid.

Protective devices: Provide circuit breakers and residual current devices.

Enclosure material: Metallic-coated sheet steel.

Location: Verify the location conforms to AS/NZS 3000 (2018), the electricity distributor's standards and the WAER (2023) before proceeding.

Power circuit breakers: Conform to the following:

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

Accessories

General: Provide accessories required for a complete installation including switches, dimmers, socket outlets, and telecommunications outlets. Provide accessories of the same style and from the same manufacturer.

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

Default mounting heights from finished floor level to centre of accessory plate:

- Outlets: Minimum 300 mm.
- Switches and controls: 900 to 1100 mm and horizontally aligned with the door handle.

Wet areas: In locations containing baths, showers or other fixed water containers, conform to AS/NZS 3000 (2018).

Ceiling mounted accessories: Fix luminaires, appliances and ceiling fans heavier than 2 kg to the ceiling structure or structurally adequate bridging.

Provisions for air conditioning: If air conditioning is required, provide for a wall mounted future split system to the areas required. Allow for an external waterproofed power isolator mounted 500 mm above the condenser plinth.

Power isolators: Install on a separate circuit, with a circuit breaker mounted in the load centre or meter box to AS/NZS 3000 (2018).

Power requirements: Provide as follows:

- Bedrooms: 15 A single phase.
- Kitchen/dining: 25 A single phase.
- Lounge: 25 A single phase.

Electrical accessories (including switches and socket outlets): With an Ingress Protection (IP) Rating, to AS/NZS 3000 (2018), if installed in a location where water ingress is possible, including where exposed to cyclonic conditions.

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. Run wiring in cavity tied against inner brick surface.

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 strength greater than 100 kg.

Earthing systems

Protective earthing system with a multiple earth neutral (MEN) connection: To AS/NZS 3000 (2018) Section 5.

Electric vehicle charging systems

Installation: To AS/NZS 3000 (2018) Appendix P.

Photovoltaic systems

Location, orientation and tilt of photovoltaic array: As documented.

Installation: To AS/NZS 5033 (2021).

Battery system: To AS/NZS 5139 (2019).

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.

3.4 LIGHTING

Luminaires

Standard: To AS/NZS 60598.1 (2017).

Luminaire type: Provide the following, as documented:

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

Luminaire colour rendering: Cool white.

Communal areas: Provide LED lighting as follows:

- Type: One of the following:
  - . Wall mounted.
  - . Ceiling mounted.
  - . In-ground fixed bollard.
  - . Light pole style.
- Solar powered.
- Vandal resistant with tamper proof fixings.
- Minimum IP rating: IP68.
- 360 degree lighting output.
- Warranty: Minimum 10 years.

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

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.

3.5 TELECOMMUNICATIONS

Services and cabling

Requirement: Conform to the Australian Government's policy document *Telecommunications in new developments policy (2024)*.

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 conform to the standards and requirements of the carrier.

Data cabling: Conform to the requirements of the utility service provider.

Installations requiring telephony only: To AS/CA S009 (2020).

Communications cable systems for small office/home office: Category 6_A, to AS/CA S009 (2020), the AS 11801 series and AS/NZS 14763.2 (2020).

Telecommunication/telephone outlets: Provide RJ45 8 modular jacks as documented.

- Location: Where the room in which the telephone outlet is to be installed 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 11801.1 (2019).

Telecommunications cables: Provide as follows:

- Type: Copper.
- Standard: To AS/CA S009 (2020) and AS 11801.4 (2019).
- Voice cabling: Multicore CAT 6 UTP cable as documented.

NBN installation: Conform to the *NBN Guideline 11 (2024)*, including the following:

- New buildings: To the *NBN Guideline 11 (2024)* Section 3.
- Location type: Open enclosures to the *NBN Guideline 11 (2024)* clause 7.2.

Television systems

General: Provide an analog and digital television distribution system to AS 1367 (2023) and conforming to the recommendations of Australian Communications and Media Authority (ACMA).

System requirements: 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.

Antennas: Provide and locate antennas to receive all locally available free-to-air television stations.

- Antenna system: To AS 1417 (2023).

External network: Liaise with each external communications carrier and determine the services and site access requirements for each network carrier's connection.

3.6 ELECTRONIC SECURITY AND ACCESS CONTROL

Intruder alarm system

General: Provide intruder alarm system to AS/NZS 2201.1 (2007).

Access control processors or panels

Capacity: Provide separate entry/exit control modules for each designated access point.

Users: Program the system to match the number of authorised users with unique access codes.

Door control devices

Requirement: Provide electric strikes, electric locks, drop bolts, or similar devices, as documented, to suit door construction and hardware.

Vehicle control

Vehicle access control: Provide vehicle access control system combining connection to vehicular doors and boom gates, and interconnection to the main access control system.

Push-buttons and readers: Provide direct wall mounting for push-buttons or readers, or provide a robust mounting bollard and extension arm.

- Mounting height: 1000 mm from floor level.

Intercom

Base station: Provide intercom base station, interconnected with the individual local stations. Include speakers and microphones.

Entry station construction: Wall mounted flush stainless steel panel.

Weatherproofing: IP56.

Dial: Digital push-button type.

Schedule: Provide a weatherproof (IP56) schedule holder and card identifying individual local stations. Locate next to the base station intercom panel.

Local station: Provide wall mounted intercom local stations, interconnected with the base stations and external entry points.

Internal station type: Surface mounted, removable handset type.

Operation: Provide an audible tone device to indicate that the individual station is being called, and a press-to-talk switch so that the entry station can communicate with the internal station only when the switch is held down.

Door control: Provide integral momentary action door release switches to operate the door release or opening mechanisms at each external entry point.

3.7 FIRE DETECTION AND ALARMS

Smoke detection

General: Provide smoke detectors to BCA (2022) H3D6. Connect smoke alarms to mains power.

Smoke alarms: Install hardwired smoke alarms to BCA (2022) H3D6 and the manufacturer's recommendations.

Marking: To the NCC cited AS 3786 (2014) clause 4.22.1.

3.8 CABLE 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 11801.1 (2019).

Label colours: 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.

3.9 COMPLETION

Testing and certification

Electrical installations: Test and verify the installation to AS/NZS 3000 (2018) Section 8 using the methods outlined in AS/NZS 3017 (2022). Submit test results and certification of conformity to AS/NZS 3000 (2018).

Photovoltaic systems: Test to AS/NZS 4509.1 (2009), AS/NZS 5033 (2021) and the manufacturer's recommendations. Obtain test reports from manufacturers or suppliers verifying the performance of safety and control functions of each system.

Telecommunications cabling: Test the cable link performance to AS 11801.4 (2019) at the maximum

frequency and data rate for the cable class, and the cable category. Submit a certificate showing test results and certifying compliance with AS 11801.4 (2019). Submit an ACMA Telecommunications Cabling Advice (TCA1) form.

Television and audio systems: Test the complete television and audio system to AS 1367 (2023). Submit certification of conformance of product installation to AS 1367 (2023).

REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS/CA S008	2020	Requirements for customer cabling products
AS/CA S009	2020	Installation requirements for customer cabling (Wiring Rules)
AS/NZS ISO 817	2016	Refrigerants - Designation and safety classification
AS 1056		Storage water heaters
AS 1056.1	1991	General requirements
AS 1074	1989	Steel tubes and tubulars for ordinary service
AS/NZS 1080		Timber - Methods of test
AS/NZS 1080.1	2012	Moisture content
AS/NZS 1163	2016	Cold-formed structural steel hollow sections
AS/NZS 1170		Structural design actions
AS/NZS 1170.1	2002	Permanent, imposed and other actions
AS/NZS 1170.2	2021	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) (ISO 10684:2004, MOD)
AS/NZS 1229	2002	Laundry troughs and tubs
AS 1231	2000	Aluminium and aluminium alloys - Anodic oxidation coatings
AS 1288	2021	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 the 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 1289.5.4.1	2007	Soil compaction and density tests - Compaction control test - Dry density ratio, moisture variation and moisture ratio
AS 1324		Air filters for use in general ventilation and airconditioning
AS 1324.1	2001	Application, performance and construction
AS/NZS 1328		Glued laminated structural timber
AS/NZS 1328.1	1998	Performance requirements and minimum production requirements
AS 1367	2023	Coaxial cable and optical fibre systems for the RF distribution of digital television, radio and in-house analogue television signals in single and multiple dwelling installations
AS 1379	2007	Specification and supply of concrete
AS 1397	2021	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 1417	2023	Receiving antennas for radio and television in the VHF and UHF broadcast bands - Design, manufacture and performance of outdoor terrestrial television antennas
AS 1432	2004	Copper tubes for plumbing, gasfitting and drainage applications
AS/NZS 1477	2017	PVC pipes and fittings for pressure applications
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/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 1546.3	2017	Secondary treatment systems
AS 1546.4	2016	Domestic greywater treatment systems
AS/NZS 1547	2012	On-site domestic wastewater management
AS/NZS 1554		Structural steel welding
AS 1562		Design and installation of sheet roof and wall cladding
AS 1562.1	2018	Metal
AS 1562.3	2006	Plastic
AS 1571	2020	Copper - Seamless tubes for air-conditioning and refrigeration
AS/NZS 1596	2014	The storage and handling of LP Gas
AS/NZS 1604		Preservative-treated wood-based products
AS/NZS 1604.1	2021	Products and treatment
AS 1627		Metal finishing - Preparation and pretreatment of surfaces
AS 1627.1	2003	Removal of oil, grease and related contamination
AS/NZS 1664		Aluminium structures
AS/NZS 1664.1	1997	Limit state design
AS/NZS 1664.2	1997	Allowable stress design
AS 1668		The use of ventilation and air conditioning in buildings
AS 1668.1	2015	Fire and smoke control in buildings
AS 1668.2	2012	Mechanical ventilation in buildings
AS 1672		Limes and limestones
AS 1672.1	1997	Limes for building
AS 1684		Residential timber-framed construction
AS 1684.2	2021	Non-cyclonic areas
AS 1684.3	2021	Cyclonic areas

AS 1684.4	2010	Simplified - Non-cyclonic areas
AS 1720		Timber structures
AS 1720.2	2006	Timber properties
AS 1720.3	2016	Design criteria for timber-framed residential buildings
AS 1720.5	2015	Nailplated timber roof trusses
AS 1742		Manual of uniform traffic control devices
AS 1742.2	2022	Traffic control devices for general use
AS/NZS 1748		Timber - Solid - Stress-graded for structural purposes
AS/NZS 1748.1	2011	General requirements
AS/NZS 1801	2024	Occupational protective helmets
AS 1810	1995	Timber - Seasoned cypress pine - Milled products
AS/NZS 1859		Reconstituted wood-based panels - Specifications
AS 1859.1	2017	Particleboard
AS/NZS 1859.2	2017	Dry process fibreboard
AS/NZS 1859.3	2017	Decorative overlaid wood panels
AS/NZS 1859.4	2018	Wet process fibreboard
AS 1860		Particleboard flooring
AS/NZS 1860.1	2017	Specifications
AS 1860.2	2006	Installation
AS 1884	2021	Floor coverings - Resilient sheet and tiles - Installation practices
AS 1926		Swimming pool safety
AS 1926.1	2012	Safety barriers for swimming pools
AS 1926.2	2007	Location of safety barriers for swimming pools
AS/NZS 2032	2006	Installation of PVC pipe systems
AS 2047	2014	Windows and external glazed doors in buildings
AS 2049	2002	Roof tiles
AS 2050	2018	Installation of roof tiles
AS 2082	2007	Timber - Hardwood - Visually stress-graded for structural purposes
AS/NZS 2098		Methods of test for veneer and plywood
AS/NZS 2098.1	2006	Moisture content of veneer and plywood
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		Alarm and electronic security systems
AS/NZS 2201.1	2007	Client's premises - Design, installation, commissioning and maintenance
AS 2208	2023	Safety glazing materials in buildings
AS/NZS 2269		Plywood - Structural
AS/NZS 2269.0	2012	Specifications
AS/NZS 2270	2006	Plywood and blockboard for interior use
AS/NZS 2271	2004	Plywood and blockboard for exterior use
AS 2303	2018	Tree stock for landscape 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 2312.1	2014	Paint coatings
AS 2455		Textile floor coverings - Installation practice
AS 2455.1	2019	General
AS 2507	1998	The storage and handling of agricultural and veterinary chemicals
AS/NZS 2588	2018	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 2688	2017	Timber and composite doors
AS 2699		Built-in components for masonry construction
AS 2699.1	2020	Wall ties
AS 2699.2	2020	Connectors and accessories
AS 2699.3	2020	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/NZS 2754		Adhesives for timber and timber products
AS/NZS 2754.1	2016	Adhesives for manufacture of plywood and laminated veneer lumber (LVL)
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	2023	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 (HPL, HPDL) - Sheets based on thermosetting resins (usually called laminates)
AS/NZS 2924.1	2024	Introduction and general information (ISO 4586-1:2018, IDT)
AS/NZS 3000	2018	Electrical installations (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	2022	Electrical installations - Verification by inspection and testing
AS 3497	2021	Drinking water treatment systems - Design and performance requirements
AS/NZS 3500		Plumbing and drainage
AS/NZS 3500.1	2021	Water services
AS/NZS 3500.2	2021	Sanitary plumbing and drainage
AS/NZS 3500.3	2021	Stormwater drainage
AS/NZS 3500.4	2021	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	2018	Concrete structures
AS 3610		Formwork for concrete
AS 3610.1	2018	Specifications
AS 3610.2 (Int)	2023	Design and construction
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	2018	Masonry structures
AS 3705	2012	Geotextiles - Identification, marking, and general data
AS 3715	2025	Metal finishing - Thermoset powder coatings for architectural applications of aluminium and aluminium alloys
AS 3727		Pavements
AS 3727.1	2016	Residential
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	2021	Waterproofing of domestic wet areas
AS/NZS 3750		Paints for steel structures
AS/NZS 3750.9	2009	Organic zinc-rich primer
AS 3786	2014	Smoke alarms using scattered light, transmitted light or ionization
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 - Airconditioners and heat pumps
AS/NZS 3823.1.2	2012	Ducted airconditioners and air-to-air heat pumps - Testing and rating for performance (ISO 13253:2011, MOD)
AS/NZS 3823.2	2013	Energy labelling and minimum energy performance standards (MEPS) requirements
AS 3958	2023	Installation of ceramic and stone tiles
AS 3959	2018	Construction of buildings in bushfire-prone areas
AS 3972	2010	General purpose and blended cements
AS 3996	2019	Access covers and grates
AS 3999	2015	Bulk thermal insulation - Installation
AS/NZS 4020	2018	Testing of products for use in contact with drinking water
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 4055	2021	Wind loads for housing
AS 4100	2020	Steel structures
AS 4145		Locksets and hardware for doors and windows
AS 4145.2	2008	Mechanical locksets for doors and windows in buildings
AS 4200		Pliable building membranes and underlays
AS 4200.1	2017	Materials
AS 4200.2	2017	Installation
AS 4253	2019	Mailboxes
AS 4254		Ductwork for air-handling systems in buildings
AS 4254.1	2021	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 4285	2019	Rooflights
AS 4288	2003	Soft underlays for textile floor coverings
AS 4312	2019	Atmospheric corrosivity zones in Australia
AS/NZS 4357		Structural laminated veneer lumber
AS/NZS 4357.0	2022	Specifications
AS 4373	2007	Pruning of amenity trees
AS 4386	2018	Cabinetry in the built-in environment - Commercial and domestic
AS 4419	2018	Soils for landscaping and garden use
AS 4440	2004	Installation of nailplated timber roof trusses
AS 4454	2012	Composts, soil conditioners and mulches
AS/NZS 4455		Masonry units, pavers, flags and segmental retaining wall units
AS/NZS 4455.1	2008	Masonry units
AS/NZS 4455.2	2010	Pavers and flags
AS/NZS 4455.3	2008	Segmental retaining wall units
AS/NZS 4505	2012	Garage doors and other large access doors
AS 4506	2024	Metal finishing - Thermoset powder coatings
AS/NZS 4509		Stand-alone power systems
AS/NZS 4509.1	2009	Safety and installation
AS/NZS 4509.2	2010	System design
AS 4586	2013	Slip resistance classification of new pedestrian surface materials
AS/NZS 4600	2018	Cold-formed steel structures
AS 4602		High visibility safety garments
AS 4602.1	2024	Garments for high risk applications
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	2019	Steel for the reinforcement of concrete
AS/NZS 4680	2006	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 4692		Electric water heaters
AS/NZS 4692.2	2005	Minimum Energy Performance Standard (MEPS) requirements and energy labelling
AS/NZS 4766	2020	Rotationally moulded buried, partially buried and non-buried storage tanks for water and chemicals
AS 4773		Masonry in small buildings
AS 4773.1	2015	Design
AS 4773.2	2015	Construction
AS/NZS 4777		Grid connection of energy systems via inverters
AS/NZS 4777.1	2024	Installation requirements
AS/NZS 4777.2	2020	Inverter requirements
AS 4785		Timber - Softwood - Sawn and milled products
AS 4785.1	2002	Product specification
AS 4785.3	2002	Timber for furniture components
AS 4809	2017	Copper pipe and fittings - Installation and commissioning
AS/NZS 4858	2004	Wet area membranes
AS/NZS 4859		Thermal insulation materials for buildings
AS/NZS 4859.1	2018	General criteria and technical provisions
AS 4970	2009	Protection of trees on development sites
AS/NZS 5033	2021	Installation and safety requirements for photovoltaic (PV) arrays
AS 5039		Security door and window screens
AS 5039.1	2023	Classification and performance
AS 5039.2	2024	Installation
AS 5101		Methods for preparation and testing of stabilized materials
AS 5101.4	2008	Unconfined compressive strength of compacted materials
AS/NZS 5139	2019	Electrical installations - Safety of battery systems for use with power conversion equipment
AS/NZS 5141	2018	Residential heating and cooling systems - Minimum applications and requirements for energy efficiency, performance and comfort criteria
AS 5146		Reinforced autoclaved aerated concrete
AS 5146.1	2015	Structures
AS 5146.3	2018	Construction
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, MOD)
AS/NZS 5149.4	2016	Operations, maintenance, repair and recovery (ISO 5149-4:2014, MOD)
AS/NZS ISO 5151	2023	Non-ducted air conditioners and heat pumps - Testing and rating for performance
AS 5203	2016	Protection of openable windows/ fall prevention - Test sequence and compliance method
AS 5346	2023	Exterior insulation and finish cladding systems
AS/NZS 5601		Gas installations
AS/NZS 5601.1	2022	General installations
AS 5604	2022	Timber - Natural durability ratings

AS 6669	2016	Plywood - Formwork
AS 11801		Information technology - Generic cabling for customer premises
AS 11801.1	2019	General requirements (ISO/IEC 11801-1:2017, MOD)
AS 11801.4	2019	Single-tenant homes (ISO/IEC 11801-4:2017, MOD)
AS 13006	2020	Ceramic tiles - Definitions, classification, characteristics and marking (ISO 13006:2018 (ED.3.0) MOD)
AS ISO 13007		Ceramic tiles - Grouts and adhesives
AS ISO 13007.1	2020	Terms, definitions and specifications for adhesives
AS ISO 13007.3	2013	Terms, definitions and specifications for grouts
AS/NZS 14763		Information Technology - Implementation and operation of customer premises cabling
AS/NZS 14763.2	2020	Planning and installation (ISO/IEC 14763-2 (ED. 2.0) MOD)
AS 16890		Air filters for general ventilation
AS 16890.1	2024	Technical specifications, requirements and classification system based upon particulate matter efficiency (ePM) (ISO 16890-1:2016, MOD)
AS 60529	2004	Degrees of protection provided by enclosures (IP Code)
AS/NZS 60598		Luminaires
AS/NZS 60598.1	2017	General requirements and tests (IEC 60598-1, Ed. 8.0 (2014) MOD)
AS/NZS 61000		Electromagnetic compatibility (EMC)
AS/NZS 61439		Low-voltage switchgear and controlgear assemblies
AS/NZS 61439.1	2016	General rules (IEC 61439-1, Ed. 2.0 (2011), MOD)
AS/NZS 61439.3	2016	Distribution boards intended to be operated by ordinary persons (DBO) (IEC 61439-3, Ed 1.0 (2012), MOD)
HB 230	2008	Rainwater tank design and installation handbook
HB 276	2004	A guide to good practice for energy efficient installation of residential heating, cooling and air conditioning plant and equipment
BCA H1D3	2022	Class 1 and 10 buildings - Structure - Site preparation
BCA H1D4	2022	Class 1 and 10 buildings - Structure - Footings and slabs
BCA H1D5	2022	Class 1 and 10 buildings - Structure - Masonry
BCA H1D7	2022	Class 1 and 10 buildings - Structure - Roof and wall cladding
BCA H1D11	2022	Class 1 and 10 buildings - Structure - Attachment of framed decks and balconies to external walls of buildings using a waling plate
BCA H2D6	2022	Class 1 and 10 buildings - Damp and weatherproofing - Roof and wall cladding
BCA H3D6	2022	Class 1 and 10 buildings - Fire safety - Smoke alarms and evacuation lighting
BCA H4D2	2022	Class 1 and 10 buildings - Health and amenity - Wet areas
BCA H5D2	2022	Class 1 and 10 buildings - Safe movement and access - Stairway and ramp construction
BCA H5D3	2022	Class 1 and 10 buildings - Safe movement and access - Barriers and handrails
BCA H6	2022	Class 1 and 10 buildings - Energy efficiency
BCA H6D2	2022	Class 1 and 10 buildings - Energy efficiency - Application of Part H6
BCA H7D4	2022	Class 1 and 10 buildings - Ancillary provisions and additional construction requirements - Construction in bushfire prone areas
NCC	2022	National Construction Code
NCC A5G3	2022	Governing requirements - Documentation of design and construction - Evidence of suitability - Volumes One and Two (BCA)
NCC Schedule 1	2022	Schedule 1 Definitions
PCA	2022	National Construction Code Series Volume 3 - Plumbing Code of Australia
ABCB HP	2022	ABCB Housing Provisions
ACCC SS	2014	Competition and Consumer (Corded Internal Window Coverings) Safety Standard
AIRAH DA09	2022	Air conditioning load estimation and psychrometrics
AIRAH DA19	2019	HVAC&R maintenance
APVMA PubCRIS		Public Chemical Registration Information System (PubCRIS) database for registered agricultural and veterinary chemical products and approved actives
AUS Gov Telecom	2024	Telecommunications in new developments policy
FWPA PN06.1039	2008	Interim industry standard - Recycled timber - Visually graded recycled decorative products
MBA Smart Waste	2014	Smart Waste Guide
NASH		NASH Standard residential and low-rise steel framing
NASH-1	2005	Design criteria
NASH-2	2014	Design solutions
NBN Guideline 11	2024	Residential preparation and installation guide - SDUs and MDUs
NGIA Guidelines	2023	National plant labelling guidelines
SWA Asbestos	2020	How to manage and control asbestos in the workplace Code of Practice
SWA Asbestos removal	2020	How to safely remove asbestos Code of Practice
SWA HCIS		Hazardous chemical information system
WAER	2023	WA Electrical Requirements (WAER)
WA Gov Act No. 023	2007	Biosecurity and Agriculture Management Act 2007
WA Gov Act No. 034	1911	Health (Miscellaneous Provisions) Act 1911
WA Gov Act No. 036	2007	Waste Avoidance and Resource Recovery Act 2007
WA Gov Act No. 36	2020	Work Health and Safety Act 2020
WA Gov Act No. 53	1972	Aboriginal Heritage Act 1972
WA Gov Act No. 074	1995	Local Government Act 1995
WA Gov Act No. 087	1986	Environmental Protection Act 1986
WA Gov CoP Wastewater		2013 Code of practice for product approval of onsite wastewater systems (Department of Health)
WA Gov R Clearing	2004	Environmental Protection (Clearing of Native Vegetation) Regulations 2004
WA Gov R Environ	1987	Environmental Protection Regulations 1987

WA Gov R Health	1974	Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974
WA Gov R Landfill	2002	Environmental Protection (Rural Landfill) Regulations 2002
WA Gov R Noise	1997	Environmental Protection (Noise) Regulations 1997
WA Gov R Pesticides	2011	Health (Pesticides) Regulations 2011
WA Gov R UD	2004	Environmental Protection (Unauthorised Discharges) Regulations 2004
WA Gov R Waste	2004	Environmental Protection (Controlled Waste) Regulations 2004
BS 8102	2022	Protection of below ground structures against water ingress. Code of practice.
AAMA 2603	2022	Voluntary specification, performance requirements and test procedures for pigmented organic coatings on aluminum extrusions and panels (with coil coating appendix)
AAMA 2604	2022	Voluntary specification, performance requirements and test procedures for high performance organic coatings on aluminum extrusions and panels (with coil coating appendix)
AAMA 2605	2022	Voluntary specification, performance requirements and test procedures for superior performing organic coatings on aluminum extrusions and panels (with coil coating appendix)
ASHRAE 52.2	2017	Method of testing general ventilation air-cleaning devices for removal efficiency by particle size
ASHRAE Handbook F	2021	ASHRAE Handbook - Fundamentals
ASTM B117	2019	Standard practice for operating salt spray (fog) apparatus
ASTM F2170	2019	Standard test method for determining relative humidity in concrete floor slabs using in situ probes
EN 1343	2012	Kerbs of natural stone for external paving - Requirements and test methods
ISO 10580	2010	Resilient, textile and laminate floor coverings - Test method for volatile organic compound (VOC) emissions
UN GHS	2023	Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

Government of **Western Australia**
Department of **Housing and Works**

Construction Specification
BCA Class 1a and 10 buildings

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