# PROPOSED COMMERCIAL DEVELOPMENT

# for

## Mr B and Mrs J White
## Lot 69 (#23) Antlia Way
## AUSTRALIND

ARCHITECTURAL SPECIFICATION

July 2021

CDC / BUILDING PERMIT

D'Agostino + Luff
ARCHITECTS
RESIDENTIAL AND COMMERCIAL ARCHITECTURE
U4/71 KENT STREET, BUSSELTON WA 6280
info@southwestarchitects.com.au
Ph: 97 523 146

**TABLE OF CONTENTS**

# SPEEDSPEC 16

The site is current vacant and fully serviced.  Refer to the existing site survey prepared by SURVCON land surveyors.

**END OF DOCUMENT**

Submit each certificate to the Owner *before commencement of work.*

1. COST OF DEMOLITION AND REMOVAL OF RUBBISH.
2. RESTORATION OF EXISTING OR BUILT STRUCTURES.
3. PERCENTAGE TO COVER FEES OF CONSULTANTS (FOR REBUILD).
4. PUBLIC LIABILITY INSURANCE.
5. WORKERS COMPENSATION AND EMPLOYER'S LIABILITY.
6. PROFESSIONAL INDEMNITY INSURANCE.
7. STATUTORY AND OTHER FEES.

**END OF DOCUMENT**

**1. Information to Subcontractors, Suppliers and Installers**

A. Advise subcontractors and suppliers and installers of material of the requirements of these Supplementary Conditions of Contract.

**2. Interpretation of Drawings**

Check dimensions on site against documentation before proceeding with the work of the contract. Documents to be read concurrently including drawings, specifications, schedules and reports. Builder must notify architect of omission or conflict in drawings and their relation to specifications, schedules and/or reports.
The drawings, specifications, schedules and any reports referred to as part of the complete specification are to be considered as co-operative documents. Any work omitted from the specification and/or reports but inferred or present in the drawings, or vice versa, is to form part of this contract.
Builder to ensure that all subcontractors receive a copy of the complete set of tender documentation.
Careful and thorough consideration of all drawings and notations is to be made at the time of tender to ensure any work required to be done by affected sub-contracting trades is cross-referred in order to ensure details or notations omitted in one document and not in another are included in these works. Refer such instances to the architect for confirmation or correction. Instances discovered post-tender will be considered included in these works.

**3. Indemnity of Proprietor**

A. Indemnify, and keep indemnified the proprietor against claim, demand, action, suit or proceeding that may be brought or made against the proprietor by any other person who has entered into a contract with the proprietor to execute work associated with the project.
B. Submit evidence of such insurance in respect of loss, damage or expense incurred by that other person by reason of an act, default or neglect of the builder in the performance of his obligations under the contract or arising out of or as a consequence of delay by the builder in executing or failing to complete work under the contract and also from costs and expenses that may be incurred by that other person in connection with such claim, demand, action, suit or proceeding.
C. Do not proceed with work under the contract until evidence of Indemnities and Insurances required herein, is submitted in writing to the Owner.

**4. Approvals, Services, Fees and Tax**

A. The following documents have been submitted by the proprietor, via the architect and fees paid for:
- Planning permit and/or D.A.
- Certificate of Design Compliance

B. Be responsible for the disconnection, alteration or connection of services, i.e., water, sewerage, drainage, electricity and gas etc. Apply for such permits, pay for fees and charges levied by relevant bodies for such disconnection, alteration or connections. Issue necessary notices to such bodies. Obtain and pay for scaffolding permit. In later trade sections where permits are required to be issued by local authorities a note to this effect is provided for the subcontractor: “Apply for permits and pay required fees and charges to responsible authorities. Provide permits and approval certificates to builder”.
C. Pay tax on items where such tax is applicable. If tax is not applicable, request from the proprietor, via the architect, a tax exemption certificate for use when ordering specified materials.
D. Pay fees, where applicable, relating to “Workplace Health and Safety” legislation, including Acts regulations, odes of Practice, Australian Standards and including other state or local government statutory or other requirements.

**5. Site Control**

A. Be responsible for activities on the site including providing access for authorised persons and restricting access by unauthorised persons. Take necessary precautions to secure the assets of the proprietor.
B.

SAFETY ANCHORS FOR ROOFS. Install safety anchors suited for construction workers and future maintenance personnel on roofs, in compliance with manufacturer requirements. Ensure installed anchors are tested to manufacturer requirements.

C. Be responsible for providing controls to protect workers, working at height, in confined space, in excavations and trenches, using hazardous substances/chemicals and other tasks and activities identified by legislation or contained in the builder’s hazard and risk register, maintained at the project, that may create a risk to the occupational health and safety of workers and other persons at or near the workplace.
D. Except as otherwise provided in the contract, delivery of materials for the works, space for storage of same and for building sheds, office and workshops will be allowed only as directed by the builder.
E. Do not store waste building materials and flammable liquids in the building.
F. Take proper precautions to keep poisons and other injurious substances in places secured against access by unauthorised persons, properly labelled and not stored in food containers or drinking vessels.

**6. Compliance with Ordinances, etc.**

Whenever work or type of plant or machinery, etc. is required either by the specification or by the relevant statutory authority, provide full details of such work, plant, etc. to the relevant statutory authority and make such applications, etc. as may be required within 2 weeks of receipt of Letter of Acceptance.
In such cases, approval given by the architect to data submitted by the builder will not necessarily imply that such data meet the requirements of the relevant statutory authority.

**7. Site Amenities and Meetings**

A. Provide statutory and necessary amenities and sanitary facilities for site workers where such are not already available in suitable locations. Maintain in working condition and clean daily. Comply with relevant requirements.

**8. Temporary Fire Extinguishers**

Maintain fully charged, and accessible fire extinguishers and other plant and equipment as necessary for the care and safety of the works, as required by local Fire Authority and/or NCC.
Provide temporary fire services as required by conditions of approval.

**9. Light and Power**

Provide temporary electric light and power supply during construction in compliance with AS/NZS 3012 Electrical Installations – Construction and demolition sites, and pay charges connected therewith. Provide sufficient of each as required for execution of work specified. Ensure permanent power is compliant with AS/NZS 3000 Electrical installations (known as the electrical wiring rules).

**10. Water**

Provide potable drinking water and adequate signage if relevant to identify same and maintain a temporary water supply sufficient for executing the work under the contract. Disconnect and clear away same on completion and pay costs and charges in connection therewith. Provide tapping of main supply if required.

**11. Commencement of Work**

Notwithstanding that possession of the site has been given to the builder, the builder will not be permitted to commence work on the site until he has provided:

A. Insurances as required by the Conditions of Contract.
B. Verify the existence of site pegs and check that they are complete. If needed data is missing, advise proprietor to have a licensed surveyor replace them in their correct positions. Maintain site pegs in good condition and ensure their visibility.
C. Ensure the set out of the works is executed by a **licensed land surveyor** and submit documentation to the Owner.

**12. General Attendance on Subcontractors**

General attendance will include taking delivery, assisting to unload, storing and protecting subcontractor's materials and for allowing subcontractors ample working space, free use of water, electricity (unless otherwise described), scaffolding, hoists and ordinary plant, etc., and messing and sanitary accommodation and for cutting away, building in and protecting finished work and making good.

**13. Precautions in Carrying Out Work Under the Contract**

Unless otherwise specified in the contract, observe, in the absence of statutory requirement to the contrary, the relevant current Australian Standard published by Standards Australia relating to storage, transport, use of materials, explosives, fire precautions in arc or flame cutting, flame heating and arc or gas welding operations, plant and equipment, work processes and safety precautions.

**14. Interference with Existing Services**

Prior to commencing construction work on site, the builder is to contact Dial Before You Dig or service provider(s), obtain and distribute to all relevant subcontractors and suppliers, details of existing services and is to ensure all requirements for working on, or near any relevant service provider service(s) are complied with, without exception during the works on the site. Notify the Owner of connection, disconnection or interference with existing services.
Repair, to the satisfaction of the Owner, damage which occurs to services during currency of the contract.

**15. Damaged Services**

Where existing services at or adjacent to the site are in non-optimum condition, arrange for an inspection by the Owner and the Officer-in-charge of the area responsible for such service. At such meeting, record the condition and follow instructions when issued in writing by the Owner.

**16. Solid, Liquid and Gaseous Contaminants**

Be aware of legal and other requirements for the proper storage, decanting, use and/or disposal of solids, liquid and gaseous contaminants and

A. Be responsible for the proper disposal of solids, liquid and gaseous contaminants.
B. Discharge gaseous contaminants in such a manner that they will be sufficiently diluted with fresh air that the toxicity will be reduced to an acceptable level.
C. Subject to statutory and local requirements, liquid contaminant may be diluted with water to a level of quality acceptable in the sewer system or contained in approved vessels for disposal at sites approved by the relevant authority.
D. Dispose of solid contaminants by removal from the site to locations approved by the relevant authority and obtain certificates of disposal for the builder to demonstrate compliance.

**17. Disposal of Refuse**

Remove refuse from construction operation (food scraps and the like, daily) from the site at frequent intervals. Prior to removal, ensure the refuse is contained so as to prevent it being discharged in the air or onto adjoining property.

**18. Explosive Devices**

Do not use free flight explosive power tool(s). Use only piston-driven tools, except as approved by the Owner.
Explosive powered tools that are free flight type may only be used by competent persons authorised by their employer.

**19. Dimensioning**

Do not scale drawings which are clearly diagrammatic and/or marked 'not to scale' or NTS. Ensure scalable drawings are printed on correct sized sheet.

**20. Shop drawings**

Shop drawings mean complete drawings showing details of fabrication, assembly, installation, fixing and waterproofing methods of specific items or components. Include necessary explanatory notes and specifications.

When preparing shop drawings, do the following:

A. Include provision in construction programme for the production and distribution of shop drawings.
B. Refer discrepancies discovered in the contract documents to the architect for direction.
C. Verify relevant dimensions. Dimension drawings so that the items or components fit accurately into the required positions.
D. Ensure that shop drawings conform with the requirements of the contract.
E. Produce drawings of consistent standard size and presentation.
F. Submit copies to the specialist subcontractor, builder, architect, relevant consultant. If amendments are required, 1 copy will be marked and returned to the builder for amendments to the original shop drawings. (This process may be repeated until the architect considers that the shop drawings are satisfactory.) Do not fax shop drawings as they are often illegible on receipt.
G. Acceptance of shop drawings implies only that the builder's interpretations of the relevant requirements of the contract are generally correct, but in no way relieve the builder of his obligations under the contract to construct and complete the works correctly and accurately.
H. Do not order, manufacture, assemble or supply any item or component needed according to requirements of shop drawings until the architect returns the applicable stamped drawings.

NOTE: The builder is to provide as-built drawings and details of all installed in-ground services, including type, location and depth, referenced against known data or reference points so as to prevent unintended contractor damage during future excavation works.

**21. Care of the Works**

A. Delivery, handling and storage: deliver, handle and store products in accordance with manufacturer's recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Control delivery schedules to minimise long-term storage of products at site and over-crowding of construction spaces. In particular, coordinate delivery and/or installation to ensure minimum holding or storage times for products recognised to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other sources of loss.
B. Limiting exposure of work: to the extent possible, through control and protection methods, supervise performance of work in a manner which will ensure that none of the work, whether completed or in progress, will be subjected to harmful, dangerous, or damaging exposures during construction period.
C. Cleaning and protection of finished work: General: during handling and installation of work as project proceeds, clean site and protect work in progress and adjoining work on a basis of perpetual maintenance. Apply suitable protective covering on newly installed work where required to ensure freedom from damage or deterioration at a time of Practical Completion; otherwise, clean and perform maintenance on newly installed work as frequently as necessary throughout remainder of construction period. Adjust and lubricate operable components to ensure equipment operates as intended.

**22. General Product Compliance**

**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

A. Provide products which comply with requirements, and which are undamaged and unused at time of installation, and which are complete with accessories, trim, finish and features required by regulation, and other devices and details needed for a complete installation and for intended use and effect.
B. Standard products: where available, provide standard products of types which have been produced and used previously and successfully on other projects and in similar applications.
C. Continued availability: where additional amounts of a product, by its application, are likely to be needed by proprietor at a later date for maintenance and repair or replacement work, provide a standard, domestically produced product which is likely to be available to proprietor at such later date.
D. Manufacturer's recommendations: where installations include manufactured products, comply with manufacturer's current and applicable recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in contract documents.
   At completion of project, provide to the Owner a copy of each set of manufacturer's recommendations which have been used in the work of each trade.
E. Manufacturer's data sheets: where this specification requires, obtain 2 copies of the current data sheets issued by the manufacturer of specified component. Retain 1 copy for use on site and submit the other to the Owner as a record of instructions followed on the site.

**23. Builder’s Quality Control and Setting Out**

A. Inspect each item of materials or equipment immediately prior to installation and reject damaged or defective items.
B. Provide attachment and connection devices and methods for securing materials properly as they are installed, true to line and level, and within recognised industry tolerances unless otherwise indicated. Allow for expansion and building movements. Provide uniform joint widths in exposed Work, organised for best possible visual effect. Refer questionable visual effect choices to the architect.
C. Re-check measurements and dimensions of the Work as an integral step before starting each installation.

D. Engage a **Licenced Land Surveyor** to set out the works and certify that the set out is as documented in the contract drawings. Builder to notify architect in writing for clarification of any dimensional issues arising and to inspect finished set out before commencing further works. Protect the set out marks from damage during construction. Re-engage surveyor to re-establish any damage or disruption to the set out marks. Builder to rectify any incorrectly built work due to improper set out.
E. Install work during conditions of temperature, humidity, exposure and weather which will ensure the best possible results for each part of the work, or component or treatment as necessary to prevent damage and deterioration.
F. Coordinate enclosure and closing-in of work with required inspections and tests, so as to avoid necessity of uncovering work for that purpose.

**24. Occupational (Workplace) Health, Safety and Environment**

The builder is to prepare an OHS&E Management Plan for the site in compliance with legal or other requirements of the location of the works and include supporting documentation from subcontractors and suppliers undertaking physical activities on the site, so as to ensure the site OHS&E Management Plan is complete, current, compliant, issued and available for inspection.
Be responsible for the maintenance of a satisfactory OHS&E management system on site. It is the responsibility of the builder and subcontractors to implement the workplace OHS&E plan, developed for the site.
Be aware that the owner, designer, builder and each party responsible for contributing to the project has a duty of care for compliance with legal requirements for OHS&E compliance during design, construction and when the building is in use, being serviced, modified, extended, demolished.

**25. Services Connection to The Site**

The relevant trade or contractor installing services is responsible for documenting the type, location and depth/height of all services on a plan, provided to the architect, prior to backfilling over installed services. At practical completion the relevant trade/contractor is to provide a detailed services plan for their works at the site.

**26. Material/Colour Selections**

A. The architect/interior designer will prepare a master colour schedule indicating the required colour, finish, pattern, material, texture and other pertinent information in connection with interior and exterior finishes.

**27. Miscellaneous Completion Procedures**

A. Removal of Protection: except as otherwise indicated or requested by Owner, remove temporary protection devices and facilities installed during course of the work to protect previously-completed work. Where secured to exposed-to-view new work or existing to remain, remove evidence of protection devices. Remove protection within 5 days before Practical Completion.
B. Trade Cleaning: as each trade completes its work in each area of the building, the subcontractor is required to be responsible for "broom clean" standard of cleaning in that area.

**28. Final Cleaning**

Final Cleaning: provide final cleaning of the work of this specification, at time indicated, consisting of cleaning each surface of unit of work to normal 'clean' condition expected for a first class building cleaning and maintenance programme.
Below is not necessarily complete. Examples of required cleaning are:
A. Remove labels which are not required as permanent labels.
B. Clean transparent materials, including mirrors and window/door glass, to a polished condition, removing substances which are noticeable as vision-obscuring materials. Replace broken glass and damaged transparent materials.
C. Clean exposed exterior and interior hard surfaces finished, to a dirt free condition, free of dust, stains, finger marks, films and similar noticeable distracting substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective condition.
D. Wipe clean surface of mechanical and electrical equipment, including lift and similar equipment; remove excess lubrication and other substances.
E. Remove debris and surface dust from limited access spaces.
F. Clean concrete floors broom clean.
G. Vacuum clean carpet and similar soft surfaces.
H. Clean plumbing fixtures to a sanitary and polished condition, free of stains including those resulting from water exposure.
I. Clean light fixtures and lamps so as to function with full efficiency.
J. If permanent lighting fixtures have been used for construction purposes replace globes with new.
K. Clean project site, including planted sections and footpaths, of litter and foreign substances. Sweep paved areas to a broom clean condition; remove stains, petro-chemical spills and other foreign deposits.
L. Label keys for locks accurately and provide in duplicate to the Owner at the completion of the project.

**29. Clean Site and Access Roads**

Be responsible for ensuring environmental requirements, policies and standards are maintained at all times, including maintaining clean roads and access. Remove and clean away mud, building debris from footpaths, gutters, drains, walls etc. when such occurs.

**30. Warranties**

Comply with the statutory requirements applicable in the site location.
Provide written warranties as set out in trade sections in the specification. All warranties are to commence after the date of Practical Completion.

**31. Authority Approvals and Certificates**

A. Builder to submit all documentation to the Shire of Harvey and obtain the Building Permit. The Builder shall pay all fees associated with Building Permit.

B. Builder is to liaise with the nominated Building Surveyor to visit the site prior to practical completion and prepare the certificate of construction compliance. The cost for the preparation of the CCC will be paid by the Owner.

**32. Asbestos**

Use no asbestos products or asbestos based materials in any part or parts of this building or its services and ensure that subcontractors, nominated subcontractors, suppliers and others are advised of this restriction. (Note: pay particular attention to the composition of any proposed imported products).

No compensation will be paid if asbestos in any product form or percentage of concentration is brought on to the site and subsequently discovered and if discovered such removal and consequential making good or costs will be totally at the expense of the builder.

**33. Patent Rights**

Ensure that no patent is infringed and that unless otherwise specified, amounts payable and conditions imposed in respect of the manufacture, use or exercise of patented invention are paid and complied with. Indemnify the proprietor against claims, damages, costs, charges and expenses in any way whatsoever arising out of the manufacture, use or exercise by the builder of patented invention.

**34. Record of Services**

Obtain from the architect, 2 additional copies of the drawings and mark thereon the exact position and route of underground services as actually laid, by dimensions from boundaries, buildings and other fixed points. Dimension and check the position of valves, branches, inspection openings and the like before the work is covered up. Record on the drawings the invert levels of drains and other relevant piped services. Variations in position or size of pipes, valves and the like within the building are to be marked on these sets of drawings and checked by the builder. Provide the dimensioned drawings to the Owner on completion to enable an exact record of the whole installation to be made for use in future maintenance.

**35. Tree Preservation**

Clearly mark and protect all trees and vegetation identified on the site plan.

**36. Disability Access**

Builder is to ensure compliance with requirements of AS 1428.1 2009 General requirements for access – New building work (Amended 2017).

**37. Imported Building Products**

**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

Due to globally varied regulatory restraints on the use of potentially hazardous components in manufactured products and the like, ensure that no such products are incorporated into the construction of these works.

**END OF DOCUMENT**

ARCHITECTURAL

| Number | Name | Revision No. |
|---|---|---|
| A1.00 | COVER SHEET | A – CDC/BP |
| A1.01 | SITE PLAN | A – CDC/BP |
| A2.01 | FLOOR PLAN | A – CDC/BP |
| A2.02 | FLOOR, WALLS AND CEILING FINISHES PLAN | A – CDC/BP |
| A2.03 | ROOF PLAN | A – CDC/BP |
| A3.01 | ELEVATIONS | A – CDC/BP |
| A4.01 | SECTION AA, DOORS | A – CDC/BP |
| A4.02 | SECTION BB, WINDOWS | A – CDC/BP |
| A4.03 | SECTION CC | A – CDC/BP |
| A5.01 | DETAILS | A – CDC/BP |
| A6.01 | INTERNALS | A – CDC/BP |
| | | |

STRUCTURAL

| Number | Name | Revision No. |
|---|---|---|
| 2021-7753-01 | FOOTING PLAN | A |
| 2021-7753-02 | STRUCTURE PLAN | A |
| 2021-7753-03 | STRUCTURAL ELEVATIONS | A |
| 2021-7753-04 | FOOTING DETAILS, CONCRETE TILT PANELS | A |
| 2021-7753-05 | DETAILS | A |
| 2021-7753-06 | TIMBER STRUCTURE FRAME DETAILS AND NOTES | A |
| | | |

HYDRAULICS

| Number | Name | Revision No. |
|---|---|---|
| H00 | LEGENDS AND NOTES | B |
| H01 | STORMWATER, WATER SUPPLY | B |
| H02 | SANITARY PLUMBING AND DRAINAGE | B |
| H03 | STORMWATER DRAINAGE | B |
| H04 | WATER SUPPLY LAYOUT | B |
| H05 | STANDARD DETAILS | B |
| | | |
| | | |

ELECTRICAL

| Number | Name | Revision No. |
|---|---|---|
| E00 | LEGEND AND NOTES (1 of 2) | B |
| E01 | LEGEND AND NOTES (2 of 2) | B |
| E02 | SITE PLAN AND ELECTRICAL SERVICES | B |
| E03 | POWER, COMMUNICATIONS LAYOUT | B |
| E04 | LIGHTING LAYOUT | B |
| E05 | POWER SERVICES SCHEMATICS AND DETAILS (1 of 2) | B |
| E06 | POWER SERVICES SCHEMATICS AND DETAILS (2 of 2) | B |
| | | |

**END OF DOCUMENT**

## PART I MONETARY SCHEDULES

**Provisional Sums**
**Definition: Provisional Sum***
An amount of money included in the contract documents to cover works proposed as part of the contract but for which there is insufficient detail at the time of calling tenders.

Allow the following Provisional Sums:

| Section No. | Section Name | $ Amount (per sq. metre) |
|---|---|---|
| | | |
| | | |

**Prime Cost Item**
**Definition: Prime Cost Item***
An amount included in the contract documents to cover the purchase by the contractor of a specified item, such as a particular fixture or fitting, but excluding any associated labour.

Allow for the following Prime Cost Items:

| Section No. | Section Name | $ Amount (per sq. metre) |
|---|---|---|
| 09300 | Ceramic Tiling | $40/m² + GST (supply cost of wall and floor tiling). Note: Builder to provide all grouts, glues and trims as required to complete the installation |
| | | |

***Definitions are quotes from**
**(Standards Australia "Glossary of Building Terms") HB 50 - 2004**

## PART II BUILDER'S WORK SCHEDULES

IN ALL CASES BELOW, THE LOCATION OF AND SIZE OF OPENINGS IS TO BE DISCUSSED ON SITE WITH THE OWNER BEFORE STARTING WORK.

### SCHEDULE OF BUILDER'S WORK ITEMS - MECHANICAL SERVICES

Provide for the mechanical services contractor:

1. Clear openings through the building structure for passage of ductwork, pipes etc., and openings in doors or walls for the passage of return and relief air.
2. Access openings in ceilings, bulkheads, walls and at other positions as required for adjustment and access by mechanical services subcontractor.
3. Cutting, patching, framing up, furring in and making good associated with the building structure for the passage of pipes, ductwork, grilles, etc. Details will be supplied by the mechanical services subcontractor.
4. Supply and installation of door grilles, as nominated or required by mechanical services subcontractor.
5. Penetrations through roof and walls, including flashings, collars etc.
6. Provision of temporary lighting, 415/240V power, gas, water and other services required for the installation and testing of the mechanical services.
7. Provision of hot water outlets and connection pipe tails to outlets. The mechanical services subcontractor will provide hot water piping terminating in tails adjacent to outlets.

**SCHEDULE OF BUILDER'S WORK - ELECTRICAL SERVICES**

Provide for the electrical services contractor:

1. Provision of temporary lighting, to AS/NZS 3012 Electrical installation – Construction and demolition works, 415/240V power and other services as required for the installation and testing of the electrical services.
2. Slab penetrations for floor-mounted GPOs, telephone outlets, etc.
3. Chasing and making good for conduit access for skirting wiring duct, GPOs, switches etc.
4. Supply and installation of access openings where required.
5. Provision of openings for luminaires to sizes required by the electrician.

**SCHEDULE OF BUILDER'S WORK - HYDRAULIC SERVICES**

Provide for the hydraulics contractor:

1. Clear openings through building structure for passage of piping and fittings.
2. Access openings as required for hydraulic pipes.
3. Trenching and back filling and making good of existing road works, for underground hydraulic works, including gas.
4. Plinth for domestic hot water service.

**END OF DOCUMENT**

**SCOPE**
Scope of work of this specification is the architectural and the services components of the works.
Provide all work as shown on the attached drawings and where scheduled.
The scope and the extent of work are subject to the attached council Conditions of Approval and to specific requirements of the principal certifying authority.
Ensure full compliance with relevant statutory regulations and the supply authorities and to Australian Standards listed in this specification.
Comply with all relevant conditions of the current edition of the NCC.
Ensure full coordination with all services components and provide works to meet listed performance requirements of the following: Section J of the NCC or similar and Section J Reports as applicable.
The specification is to be read in conjunction with signed Conditions of Contract, and any other included documentation as applicable.

**ASSOCIATED DOCUMENTS**
- Read the specification in conjunction with the following:
- Listed associated documents and reports as listed with this specification.
- Structural engineer's documents.
- All services engineers' documents.
- Conditions of Approval and the associated reports.
- Energy Report.

Note that where the information contained in these reports is incorporated into the design, it remains the responsibility of the builder to certify all items listed for compliance to be fully certified as incorporated.

**QUALITY ASSURANCE AND SUBMISSIONS**
Provide all materials and components to required level of finish and performance, all subject to submission of samples, control panels and technical data as applicable.
Submit in timely manner for approval and keep protected for ongoing reference during the construction of the works.
Submit samples, control panel installation and technical data and obtain approval prior to commencing work or ordering the components.

**AUSTRALIAN STANDARDS AND REFERENCES**
Read this section with reference to current Australian Standards as applicable to each trade section. Refer to the product manufacturer's specification where no specific Australian Standards exist.
Refer to WorkCover regulations having jurisdiction over the site.
Read this section in conjunction with the council conditions of approval and other regulation and supply authority regulations.
Confirm compliance with Australian Standards and ensure full approval of the principal authority on completion of the works. Submit to the Owner official documentation of such approvals.

**DEFINITIONS**
Ensure that all definitions listed in signed Conditions of Contract are coordinated with the Preliminaries (where applicable) and are not in conflict with the consultant documentation.
Refer also to definitions within the conditions of approval and coordinate as necessary.
Seek clarification if in doubt.

**SITE MANAGEMENT**
Provide all necessary site management components such as provision of site facilities and temporary works as listed on the council approved conditions or as required by statutory regulations for the works.
Provide all storage and sanitary provisions during the procurement of the works and all structural and non-structural works such as hoardings and dewatering measures.
Refer to full list of temporary provisions and confirm adequacy of all components at the submission stage of the works.

**MATERIALS**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**
Provide all materials necessary for the proper procurement of the works.
Where no specific materials are listed ensure that all are fit for the intended use and provide the necessary information confirming the suitability and chemical compatibility of all components..

**ON-SITE ACTION**
Investigate site conditions and evaluate the site with commencement of work meaning total acceptance of site conditions.

**PERFORMANCE**
Refer to drawings for listed performance of building components and the items of equipment where listed.
Ensure that all listed components are in full compliance with statutory regulations such as fire, hazardous materials and sound rating levels.
Seek clarification and certify for compliance on completion.

**WARRANTIES**
Provide warranties for all components with the required procedures for maintenance of condition included as part of the submission. Refer with specific attention to finishes and equipment items where listed.

**CERTIFICATION**
Certify all items listed for certification on the council approved conditions of approval or where specifically listed on the supply authority requirements.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to*:
Stockpile topsoil for re-use in future landscaping in location as to not affect the construction of the works.
Where appropriate, equalize excavation with suitable fill material in accordance with the structural engineer's requirements.
Protect all trees and vegetation identified for preservation on the site plan.
Prepare site, excavate for roads, paving, drains, pits, foundations, slabs. Remove trees and other vegetation, including roots, where they prevent building work, paving, trenches etc. Allow for installation of material required for termite control system.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Water distribution, sanitary sewerage, storm drainage, pavements, concrete.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | |
|---|---|
| AS 1289 | Methods of testing soils for engineering purposes.<br>*There are many parts, 1995 - 2020; each refers to a specific application*.<br>1289.5.1.1 2017 Soil compaction and density tests. |
| AS 2159 2009 | Piling - Design and installation. *1 Amdt, 2010.* |
| AS 2187.2 2006 | Explosives - Storage, and use – Use of explosives. |
| AS 3660 | Termite management.<br>3660.1 2014 New building work.<br>3660.2 2017 In and around existing buildings and structures.<br>3660.3 2014 Assessment criteria for termite management systems. |
| AS 3798 2007 | Guidelines on earthworks for commercial and residential developments. *1 Amdt 2008.* |
| AS/NZS 4200.1 | Pliable building membranes and underlays. Materials.<br>AS 4200.2 2017 Installation requirements. *1 Amdt 2018.* |
| AS 4654 | Waterproofing membranes for external above-ground use.<br>4654.1 2012 Materials.<br>4654.2 2012 Design and installation. |
| AS 4678 2002 | Earth-retaining structures. |
| AS 4685.0 2017 | Playground equipment and surfacing - Development, installation, inspection, maintenance and operation. *1 Amdt 2019.* |
| AS 4687 2007 | Temporary fencing and hoardings. |
| AS/NZS 4836 2011 | Safe working on or near low-voltage electrical installations and equipment. *1 Amdt 2017.* |
| AS 4970 2009 | Protection of trees on development sites. *There is 1 Amdt, 2010.* |

Comply throughout with the current edition of the NCC.
Comply with particular specifications in building regulations and/or local council publications.
Definitions:
Rock: natural or artificial material encountered in the excavation which cannot be removed until broken up by mechanical means such as rippers, jack-hammers or percussion drills.
Rippable rock: means rock which can be removed by a single tine heavy bulldozer, e.g., "D9" ripper.
Non-rippable rock: means all other rock. Other than rock: other material encountered in excavation.
Sub-grade: the natural ground below the excavations. Filling: a general term for material spread and compacted over the sub-grade to make up levels to the underside of the base. Sub base: select filling spread and complete over sub-grade to compaction to make up levels to the underside of the base. Base: a selected filling layer spread and compacted to form an acceptable working surface directly under the building.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Description | Manufacturer |
|---|---|---|
| Termite control system | Reticulated termite control system to the approval of the Owner, capable of recharge in accordance with all relevant Australian standards and codes. Bifenthrin or equal approved by the Owner. | Altis or equal approved by the owner |
| | | |
| Filling | Hardcore: 15 to 40mm, 100 mm thick<br>Fine crushed rock: 5 to 15mm, 50mm thick<br>Sand: clean, salt free, 50mm thick. | |
| Waterproof membrane | 0.2mm thick plastic film. | |
| Back filling | Approved clean excavated inorganic material. | |

**PREPARATION** *Inspect conditions at site before starting work.*
Review the project OHS&E plan to make sure it is adequate to safely conduct excavation and site works. Obtain and confirm the locations, depths and types of underground and overhead services at the site and develop documentation and procedures to ensure service owner requirements are complied with.
Clear site, for building and paving, of plants, trees and rocks etc. shown on plan.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions.*
Below slabs on ground: Hardcore
Below footings, beams and other structural elements: concrete of strength equal to the structural element, minimum 15MPa.
In service trenches: 1:2:4 concrete/approved compacted pipe bedding material.

Excavation for strip footings and edge beams, paving, water and piped supply and drains, pits. Apply termite control system. Provide fill and compact in 150 mm layers, to 95% of maximum density, by vibrating or watering. Protect excavations and existing underground or overhead services from damage. Maintain excavations free of water. Install waterproof membrane over sand. Seal laps. Take underlay in walls to level of top of slab. Seal, terminate, remove or protect and record location, type and services located at the site as work progresses and provided details to the principal before burying any service in ground, structure etc. Inspect and repair membrane before concrete pour.

**COMPLETION**
Complete work in accordance with instructions and written variation orders.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to*:
Control and/or management of termites on building sites for new buildings.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work.*
Cooperate and coordinate with each trade involved in the construction of the building and in particular 02315 Excavation And Site Works and 03310 Concrete.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | | |
|---|---|---|
| AS 3660 | Termite management. | |
| | 3660.1 2014 | New building work. *1 Amdt 2017.* |
| | 3660.2 2017 | In and around existing buildings and structures. |
| | 3660.3 2014 | Assessment criteria for termite management systems. |
| AS/NZS 4200 | Pliable building membranes and underlays. | |
| | 4200.1 2017 | Materials. |
| | AS 4200.2 2017 | Installation requirements. *1 Amdt 2018.* |
| AS 4349 | Inspection of buildings. | |
| | 4349.3.2010 | Timber pest inspections. *There are 3 other parts, 2007-2018.* |

Comply throughout with the current edition of the NCC.
Comply with requirements of statutory and local authorities having jurisdiction.

**MATERIALS TO BE USED**

**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**
ALL CHEMICALS USED MUST BE INCLUDED ON THE APPROPRIATE AUTHORITY'S PESTICIDES REGISTER.
Contact the Australian Environmental Pest Managers Association via www.aepma.com.au
Obtain a list of approved members who may quote for the work required.
The materials to be used are determined by the method chosen and adopted.
Require the subcontractor to supply a list of materials to be used.
Provide equipment needed to affect a treatment which complies with the Australian Standards.

**PREPARATION** *Inspect conditions at site before starting work*
Visit site and inspect conditions, comparing conditions to the drawings before delivery of materials to site. Rectify any discrepancy or unsuitability of substrata.
Start of work means total acceptance of conditions.
Arrange for cooperation of other trades to ensure effective pest control. Take care of materials. Prevent damage before, during and following installation.
Coordinate with and ensure preparatory work by other trades is done prior to commencement of work and arrange for provision and fixing grounds.
Provide certificates, certifications of materials and chemicals used including quantities, and provide the Owner with all required documentation.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Review service owner requirements for working on, near or over services at the location. Locate and identify existing services before excavation commences
Comply with appropriate Australian Standard.
Protect persons at or near the site and take care of and protect surrounding work, including other finishes, equipment and components, during installation. Provide protective covering where necessary.
Ensure copies of material safety data sheets and the way the chemicals are delivered, stored, decanted, used and disposed of comply in all respects with manufacturer's recommendations contained in technical bulletins. Call for technical advice where necessary.
Protect finished work to prevent penetrations of the membrane up to and including concrete pour. Ensure any damage is rectified substantially with patches fixed smoothly, over cleaned surfaces, with an appropriate tape.
Clean the site where work of this trade is performed before commencing treatment to Owner's approval. Provide photographic evidence that sub-floor areas are clean and free of surface irregularities.
Remove surplus material.
Complete contracted work in accordance with contract documents and written variation orders issued by the Owner.

**COMPLETION**
Complete work in accordance with instructions and written variation orders. Obtain manufacturer certification of the completed system for compliance with statutory regulations and the Council Conditions of Approval.

**SUBMISSION**
Submit to proprietor a statement indicating that the requirements of this trade section have been satisfactorily completed.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and install pipes to distribute water from water main supply to each required outlet.
Supply and install fully thermally insulated pipes and fittings from hot water heater to each required outlet.
Apply for permits and pay required fees and charges to responsible authorities. Provide permits and approval certificates to builder.
Protect pipes from corrosion, or deterioration as a consequence of proximity to harmful natural effects by chemical or other reactions or actions resulting from the installation of, extension to or alterations to existing services.
Lay out service trenches to minimize runs of pipes, drains and cables.

**Refer to the Appendices for the Hydraulic Consultant's drawings and specification.**

On completion of the whole installation, transpose the "As Constructed" information onto USB drive compatible with AutoCAD 2007 by a qualified computer draftsperson and hand with the USB drive to the Owner together with two (2) copies of operating manuals indicating dates of the practical completion and defects liability termination, names and addresses of the head contractor together with telephone numbers and emergency contact person, warranty, operating and maintenance instructions, and names and addresses for suppliers of all, the equipment supplied.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Sanitary sewerage, concrete, carpentry, plumbing fixtures and equipment.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to*:
Supply and install a complete system of sewer drains to discharge sewage waste to the authority's sewer main.
Apply for permits and pay required fees and charges to responsible authorities. Provide permits and approval certificates to builder.

**Refer to the Appendices for the Hydraulic Consultant's drawings and specification.**

On completion of the whole installation, transpose the "As Constructed" information onto USB drive compatible with AutoCAD 2007 by a qualified computer draftsperson and hand with the USB drive to the Owner together with two (2) copies of operating manuals indicating dates of the practical completion and defects liability termination, names and addresses of the head contractor together with telephone numbers and emergency contact person, warranty, operating and maintenance instructions, and names and addresses for suppliers of all, the equipment supplied.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Excavation, water distribution, concrete, floor construction, wall construction.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and lay a complete system of site storm water drainage including agricultural drains, drains below slabs and pavements, retaining wall drains, culverts, pits, frames, manhole covers.
Apply for permits and pay required fees and charges to responsible authorities. Provide permits and approval certificates to builder.

**Refer to the Appendices for the Hydraulic Consultant's drawings and specification.**

On completion of the whole installation, transpose the "As Constructed" information onto USB drive compatible with AutoCAD 2007 by a qualified computer draftsperson and hand with the USB drive to the Owner together with two (2) copies of operating manuals indicating dates of the practical completion and defects liability termination, names and addresses of the head contractor together with telephone numbers and emergency contact person, warranty, operating and maintenance instructions, and names and addresses for suppliers of all, the equipment supplied.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Sanitary sewerage, concrete, concrete pavement, masonry pavers, excavation and fill, bituminous concrete pavement.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Scope of work of this trade section is the provision of in situ concrete, including but not limited to the following:
All reinforced concrete work.
All precast concrete.
Steel reinforcing, formwork and waterproofing measures that may be required for this trade.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Read this trade section in conjunction with the following:
Excavation and site management termite control.
Structural engineer's documentation.
Services engineer's documentation.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | |
|---|---|
| AS 1012 | Methods of testing concrete. *There are numerous parts, 1991- 2020.* |
| AS/NZS 1170 | Structural design actions. |
| | 1170.0 2002 General principles. |
| | 1170.1 2002 *(R2016)* Permanent, imposed and other actions. *2 Amdts 2005, 2009.* |
| | 1170.2 2011 *(R2016)* Wind actions. *5 Amdts 2011-2017.* |
| | 1170.3 2003 *(R2016)*) Snow and ice actions. *2 Amdts 2007, 2017.* |
| | 1170.4 2007 *(R2018)* Earthquake actions in Australia. *2 Amdts 2005, 2018.* |
| AS 1379 2007 *(R2017)* | Specification and supply of concrete. |
| AS 1428 | Design for access and mobility. |
| | 1428.1 2009 General requirements for access – New building work. *2 Amdts 2010, 2017.* |
| | 1428.2 1992 *(R2015)* Enhanced and additional requirements - Buildings and facilities. |
| AS/NZS 1554 | Structural steel welding. |
| | 1554.1 2014 Welding of steel structures. *Amdts 2015, 2017.* |
| AS/NZS 1576 | Scaffolding. |
| | 1576.1 2019 General requirements. |
| | AS 1576.6 2020 Scaffolding Metal tube-and-coupler scaffolding - Deemed to conform to AS/NZS 1576.1 |
| AS 1657 2018 | Fixed platforms, walkways, stairways and ladders - Design, construction and installation. |
| AS 2159 2009 | Piling - Design and installation. *1 Amdt, 2010.* |
| AS 2870 2011 | Residential slabs and footings. |
| AS 3600 2018 | Concrete structures. |
| AS 3610 1995 | Formwork for concrete. *There are 2 Supplements.* |
| | 3610.1 2018 Specifications. AS/NZS 3661 Slip resistance of pedestrian surfaces. |
| | 3661.2 1994 Guide to the reduction of slip hazards. |
| AS 3727.1 2016 | Pavements - Residential. |
| AS 3799 1998 *(R2018)* | Liquid membrane-forming curing compounds for concrete. |
| AS 3972 2010 | General purpose and blended cements. |
| AS/NZS 4200 | Pliable building membranes and underlays. |
| | 4200.1 2017 Materials. |
| | AS 4200.2 2017 Installation. *1 Amdt, 2018.* |
| AS 4576 2020 | Guidelines for scaffolding. |
| AS 4586 2013 | Slip resistance classification of new pedestrian surface materials. *1 Amdt 2017.* |
| AS 4654 | Waterproofing membranes for external above ground use. |
| | 4654.1 2012 Materials. |
| | 4654.2 2012 Design and installation. |
| AS/NZS 4671 2019 | Steel for the reinforcement of concrete. |
| AS/NZS 4858 2004 | Wet area membranes. *Reconfirmed 2020.* |
| AS 5216 2018 | Design of post-installed and cast-in fastenings in concrete. *Amdt 1 2019* |
| AS 6669 2016 | Plywood – Formwork. |
| HB 71 2011 | Re-inforced concrete design in accordance with AS 3600 2009. |
| HB 84 2018 | Guide to concrete repair and protection. |
| HB 197 1999 | An introductory guide to the slip resistance of pedestrian surface materials. |
| HB 198 2014 | Guide to the specification and testing of slip resistance of pedestrian surfaces. |
| CCA T49 2003 | Guide to Residential Floors (Cement Concrete & Aggregates Australia) |
| CCAA T57 | Guide to Off-form Concrete Finishes (Cement Concrete & Aggregates Australia) |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**

| Item | Description | Manufacturer |
|---|---|---|
| Exposed aggregate concrete | Colour: Banksia exposed.<br>To be confirmed by the Owner prior to any order being placed. | Holcim or equal approved by the owner |
| Concrete Sealer | Refer to the Painting section | |

**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**
Read this trade section in conjunction with structural engineer's specification.

Where off form self-finished concrete is shown, or listed, ensure full compliance with specific requirements for tolerance and colour control measures.
Site mixed concrete is not to be used unless approved by the architect for a specific use. Plant mixed concrete is to be of the specified slump and designed to meet the specified MPa strength at 7, 15 and 28 days. Provide plant batch dockets to the Owner for each delivered batch.

**Formwork**

Provide formwork that is required for the intended level of finish and confirm at submission stage of the works.

**Joints**

Provide construction and expansion joints in approved locations and to specific details listed with the structural engineer's documentation.
Provide to approved submission of samples and shop drawings as applicable.
Coordinate fully with subsequent finishes and other building components.

**PREPARATION** *Inspect conditions at site before starting work*

Review Material Safety Data Sheets for supplied concrete and consider OHS&E requirements.
Refer to structural engineer's documentation and obtain all approvals for this component of the works, fully coordinated with architectural finishes and setdown as applicable.
Coordinate work with hydraulic engineers for provision of waterproofing and drainage components for below the ground locations or where specific waterproofing measures are shown on the drawings.
Prepare surfaces to receive concrete smooth, clean and stable under concrete load.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*

Arrange for installation of pipes, cables, conduits etc.. Over prepared surface, install WP membrane. Place reinforcement, secure in place and prevent movement during pour, maintain required concrete cover.
Comply with structural engineer's requirements for joints, splices etc. of reinforcement.
Finish exposed floor surfaces: steel trowel. Provide set downs for concrete screeds.
Provide fall to outlets.
Cure finished slabs for 5 days with plastic film secured in place or as required by the structural engineer. Keep damp for 5 days.
Slump tests: provide and pay for slump test reports: one on first batch and one for every 15 cubic meters of concrete delivered thereafter. (No site mixed concrete). Tests and rejection criteria in accordance with AS 3600. Vibrate concrete to achieve compaction. Strip formwork in accordance with Table in AS 3610 Minimum stripping times.

**COMPLETION**

Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to*:
Compliance with structural engineer's drawings and instructions and specifications. Complete installation of tilt-up panel work with cast-in fitments, inserts, panel erection, support, joint sealers and accessories.
Provide related services including construction shop drawings, hoisting and supports,

**COOPERATE WITH THESE OTHER TRADES**:
Concrete, structural steel, waterproofing and tanking, painting, cladding.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*

| | |
|---|---|
| AS 1012 | Methods of testing concrete. *There are 27 parts, 1991-2020.* |
| AS/NZS 1170 | Structural design actions. *There are many parts, 2002 – 2011, Supplements and Amdts 2005 – 2018.* |
| AS 1379 2007 *(R2017)* | Specification and supply of concrete. *There are 2 Amdts 2009, 2015 Supplement 2008.* |
| AS 1418 | Cranes, (including hoists and winches).<br>*There are several parts and Amdts, 1991 – 2021. Some R2016.* |
| AS 1478.1 2000 *(R2018)* | Chemical admixtures for concrete, mortar and grout – Admixtures for concrete. |
| AS/NZS 1554 | Structural steel welding*. There are numerous parts, 2003-2014 4 Amdts 2003, 2015, 2017.* |
| AS/NZS 1576 | Scaffolding.<br>1576.1 2019 General requirements.<br>AS 1576.6 2020 Scaffolding Metal tube-and-coupler scaffolding - Deemed to conform to AS/NZS 1576.1 |
| AS 1657 2018 | Fixed platforms, walkways, stairways and ladders - Design, construction and installation. |
| AS 2870 2011 | Residential slabs and footings. |
| AS 3600 2018 | Concrete structures*.* |
| AS 3610 | Formwork for concrete. *There are 2 Supplements.*<br>3610.1 2018 Specifications. |
| AS 3799 1998 *(R2018)* | Liquid membrane–forming curing compounds for concrete. |
| AS 3850 2015 | Prefabricated concrete elements.<br>3850.1 2015 General requirements. *1 Amdt 2019.*<br>3850.2 2015 Building construction. *1 Amdt 2018.* |
| AS 4576 2020 | Guidelines for scaffolding. |
| AS/NZS 4671 2019 | Steel for the reinforcement of concrete. |
| NP 002 2006 | Precast Industrial Buildings Detailing Manual. |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
Connection devices and inserts:
Refer to structural engineer's details and NP002 2006 Precast Industrial Buildings Detailing Manual.
Concrete: refer structural engineer's details of reinforcing and connective strength.
Jointing material: fire rated material determined by the local council engineer, over closed cell backer rod.
External and internal walls: refer engineer.
**PREPARATION** *Inspect conditions at site before starting work to ensure conditions are satisfactory.*
Review construction safety plan to ensure all risks to OHS&E have been considered and implemented. Review and implement procedures for the casting, lifting, moving and placing of tilt-up units, comply with any relevant regulation, achieve, as a minimum, any Code of Practice, Australian Standard or statutory requirements or advice.
Prepare reinforcement as detailed.
Design formwork and construct to provide off-form surfaces of a standard not lower than class 2 as described in AS 3610 Formwork for concrete.
Obtain engineer's approval for methods and systems, finishes, tolerances.
**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*.
Before commencing on site review services owner requirements for working on, near or over services documentation on existing services, locate and identify existing services before excavation commences.
Support formwork during pouring of concrete.
Do not stack cast panels without engineer's approval. Steam curing is not permitted.
Prepare for bracing to be connected immediately after panels are lifted.
Install levelling pads.
Maximum variation from plane is not to exceed 3mm under 3 metre straight edge.
Do not lift panels until engineer instructs.
Ensure all cast-in fittings are correctly placed, and the consulting engineer approve of the completed installation.
**REMOVE AND REPLACE**
Non-conforming installations are to be removed from the site and replaced correctly at no cost to the proprietor.
**JOINT SEALING**
Seal joints after completion of installation of panels by an approved specialist subcontractor.
Protect vulnerable surfaces, edges and corners until completion of the contract. Clean all visible surfaces.
**COMPLETION**
Complete work in accordance with instructions and written variation orders.
**WARRANTY**
Forward to the consulting engineer a statement guaranteeing that the concrete panels are in accordance with the strengths specified before attempt is made to lift the panels.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Structural steel where shown on architectural and structural engineer's drawings
Applied finishes to steel where fire protection or extreme exposure applies. Provide as applicable to specific site conditions.
Supply, fabricate, apply surface treatment, anchor bolts and other attachments, field welding, permanent grouting.
Submit shop drawings to architect and obtain approval.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Concrete, brickwork, blockwork, metal roofing, insulation thermal and acoustic.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition.*

| | |
|---|---|
| AS/NZS 1170 | Structural design actions. *There are many parts, 2002 – 2011, Supplements and Amdts 2005 – 2018.* |
| AS 1397 2011 | Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium. *1 Amdt 2012.* |
| AS/NZS 1554 | Structural steel welding, *There are numerous parts, 2003-2014. 4 Amdts 2003, 2015, 2017.* |
| AS/NZS 1576 | Scaffolding.<br>1576.1 2019 General requirements.<br>AS 1576.6 2020 Scaffolding Metal tube-and-coupler scaffolding - Deemed to conform to AS/NZS 1576.1 |
| AS 1627 *(All R2017)* | Metal Finishing - Preparation and pre-treatment of surfaces. *There are 7 parts, 1997-2005.* |
| AS 1657 2018 | Fixed platforms, walkways, stairways and ladders - Design, construction and installation. |
| AS/NZS 2312.1 2014 | Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings – Paint coatings. *1 Amdt 2017.* |
| AS 4055 2012 | Wind loads for housing. *1 Amdt 2015.* |
| AS 4100 2020 | Steel structures. |
| AS 4576 2020 | Guidelines for scaffolding. |
| AS/NZS 4680 2006 *(R2017)* | Hot-dip galvanised (zinc) coatings on fabricated ferrous articles. |
| AS/NZS 4994.2 2009 | Temporary edge protection - Roof edge protection – Installation and dismantling. |
| AS/NZS 5131 2016 | Structural steelwork – Fabrication and erection. |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**
All structural steel is to be provided to approved submission of samples and technical data and in full compliance with structural engineer's specification.
Submit shop drawings for checking by the structural engineer and ensure compliance.
Refer to exposure category of site and ensure that steel finishes are in full compliance with the corrosive nature of site when applicable.
Ensure that fire and protective coatings are meeting the exposure category of the site and confirm at submission stage of the works.

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| All structural steelwork | See engineer's detail | |

**PREPARATION** *Inspect conditions at site before starting work*
Before commencing on site review services owner requirements for working on, near or over services, documentation on existing services, locate and identify existing services before working over or near them so as not to damage them.
Ensure OHS&E risks and controls have been considered and documented.
All structural work is subject to approved shop drawings and all visible work is subject to approved submission of samples and technical data.
All calculations are to be signed by a qualified structural engineer for compliance.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Provide holding down bolts to concreter for building in. Comply with structural engineer's instructions.
Erect plumb and secure in place. Erect so that components can be fixed without distortion.
Provide temporary bracing against wind and other stresses. Weld in accordance with AS/NZS 1554. Advise engineer when erected steel is ready for inspection. Adjust as required. Grout under base plates in high strength non-shrink mortar. Touch up steel with zinc-rich paint after installation. Ensure statutory hazards and risks have been identified and managed in compliance with statutory requirements.

**Applied finishes**
Where applied finishes are decorative only, provide to the product manufacturer's specifications.
For galvanized and protective coatings applications provide to structural engineer's specifications.
For fire rated protective intumescent coatings ensure full compliance with the required performance levels and show supporting data for this item prior to commencing work.

**COMPLETION**
Complete work in accordance with instructions and written variation orders.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and erect framing both structural and non-structural. Structural particleboard flooring.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Concrete, brickwork, structural steel, wall lining, plumbing, electrical, insulation, painting, fibre cement products.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | | |
|---|---|---|
| AS/NZS 1170 | Structural design actions. *There are many parts, 2002- 2011 ,Supplements and Amdts 2005 - 2018.* | |
| AS 1428 | Design for access and mobility. | |
| | 1428.1 2009 | General requirements for access – New building work. *2 Amdts 2010, 2017.* |
| AS 1530 | Methods for fire tests on building materials, components and structures. | |
| | 1530.1 1994 *(R2016)* | Combustibility test for materials. |
| | AS/NZS 1530.3 1999 *(R2016)* | Simultaneous determination of ignitability, flame propagation, heat release and smoke release. |
| | AS 1530.4 2014 | Fire-resistance tests for elements of construction. |
| | 1530.8.1 2018 | Tests on elements of construction for buildings exposed to simulated bushfire attack - Radiant heat and small flaming sources. |
| | 1530.8.2 2018 | Tests on elements of construction for buildings exposed to simulated bushfire attack - Large flaming sources. |
| AS/NZS 1576 | Scaffolding. | |
| | 1576.1 2019 | General requirements. |
| | AS 1576.6 2020 | Scaffolding Metal tube-and-coupler scaffolding - Deemed to conform to AS/NZS 1576.1 |
| AS 1604 | Specification for preservative treatment. | |
| | 1604.1 2012 | Sawn and round timber. *I Amdt 2017.* |
| | 1604.2 2012 | Reconstituted wood-based products. |
| | 1604.3 2012 | Plywood. |
| | 1604.4 2012 | Laminated veneer lumber (LVL). |
| | 1604.5 2012 | Glued laminated timber products. |
| AS 1657 2018 | Fixed platforms, walkways, stairways and ladders - Design, construction and installation. | |
| AS 1684 | Residential timber-framed construction. | |
| | 1684.2 2010 | Non-cyclonic areas. *Numerous Supplements 2010 Amdts 2012, 2013.* |
| | 1684.3 2010 | Cyclonic areas. *Numerous Supplements 2010. Amdt 2012.* |
| | 1684.4 2010 | Simplified - Non-cyclonic areas, *Amdt 2012*. |
| | *There are many parts, Supplements and Amdts.* | |
| AS 1720 | Timber structures. | |
| | 1720.1 2010 | Design methods. *3 Amdts, 2010 - 2015.* |
| | 1720.2 2006 | Timber properties. *1 Amdt, 2006.* |
| | AS/NZS 1720.4 2019 | Fire-resistance of timber elements. |
| | 1720.5 2015 | Nailplated timber roof trussesAS/NZS 1859 Reconstituted wood-based panels – Specifications. *There is 1 other part, 2018.* |
| | 1859.1 2004 | Particleboard. |
| | 1859.2 2004 | Dry processed fibreboard. |
| | 1859.3 2005 | Decorative overlaid wood panels. |
| AS 1860.2 2006 *(R2016)* | Particleboard flooring – Installation.*1 Amdt, 2010.* | |
| AS/NZS 2269.0 2012 | Plywood – Structural – Specifications. *1 Amdt 2015.* | |
| AS 3959 2018 | Construction of buildings in bushfire-prone areas. *1 Amdt 2019.* | |
| AS 4055 2012 | Wind loads for housing. *1 Amdt 2015.* | |
| AS 4576 2020 | Guidelines for scaffolding. | |
| AS 4786.2 2005 *(R2016)* | Timber flooring - Sanding and finishing. | |
| AS/NZS 4994.2 2009 | Temporary edge protection - Roof edge protection – Installation and dismantling. | |
| AS 5637.1 2015 | Determination of fire hazard properties - Wall and ceiling linings. | |
| AS 6669 2016 | Plywood - Formwork. | |
| HB 44 1993 *(R 2016)* | Understanding the Timber Framing Code – a guide to AS 1684. | |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| Mezzanine flooring | 25mm Aquatite Structaflor – Supply and install in strict accordance with the manufacturer's instructions | To approval |
| Skirtings (refer drawings) | Nom. 70 x 19 hardwood square edge skirting – 5mm pencil round exposed edge – Paint finish as selected | To approval |
| Window sills (refer drawings) | Nom. 90 x 19 hardwood square edge nosing – 5mm pencil round exposed edges – Paint finish as selected | To approval |
| Box gutter support | Nom. 15mm marine ply | To approval |

**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**
Use certified recycled rainforest or recycled old growth forest timbers where feasible. Otherwise use only approved certified rain forest or old growth forest timbers. Preference is to be given to timber supplies from certified plantation sources.
Use only low VOC adhesives and ensure that no phenolic compounds are present.
Use dry, well-seasoned timbers for exposed beams and rafters.

**Structural timber**
Structural timber for the works is to be in strict accordance with structural engineer's design or in accordance with the Timber Structures code.
All structural timber is to be of a treated (to an approved level), timber type. Where specific performance levels are required from specific timber components, confirm at the submission stage of the works.

**Non-structural timber**
Where non-structural timber components are shown ensure that all timber is suitable for the intended use.

**PREPARATION** *Inspect conditions at site before starting work*
Ensure all OHS&E risks have been considered and controls documented. Store timber on site above ground, flat and horizontal. Protect from rain, damage and other material.
Prepare the substrate and provide timber of the type and size as shown on the drawings. Where design and construct components for completion of design apply, ensure approval of each of the design and construct components for approval of the architect.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Review services owner requirements for working on, near or over services at the location, locate and identify existing services before excavation commences. Ensure statutory hazards and risks have been identified and managed in compliance with statutory requirements.
Comply with AS 1684 and select timber species that are appropriate for the intended location of the component within the works.
Review drawings when erecting framing and provide additional framing at every location where extra loads will be applied to finished walls.
Ensure that all timber and wood products are isolated from dampness and potential dampness.
Perform operations including grooving, rebating, framing, housing, beading, mitring, scribing, nailing, screwing and gluing as necessary to carry out the works. Use timber in single lengths whenever possible. If joins are necessary, make them over supports unless otherwise shown or specified.
Arris visible edges in sawn work and in dressed work arris with sandpaper to 1.5mm radius unless otherwise shown or specified.
Back plough boards liable to warping (for example, if exposed on one face). Make the width, depth number and distribution of ploughs appropriate to the dimensions of the board and the degree of its exposure.
Provide necessary templates, linings, blocks, stops, ironwork and hardware, screws, bolts, plugs and fixings generally.
Trim framing where necessary for openings, including those required by other trades.
Construct roof space manhole and locate as shown on drawings. If not nominated on the drawings, discuss with the Owner for best location prior to installation.
Fix vapour pervious sarking to outside face of studs under external cladding.

**SUBMISSION**
Submit samples and technical data for approval prior to commencing work.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and install fibre cement and associated equipment and fixing to:
Wall linings internal, ceiling linings internal, fire-rated walls, external cladding, wet area wall lining, eaves lining, fascias, partitions, wet area flooring, underlays, external decks, lattice, bracing panels, ceramic faced panels, fibre cement pipe columns.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Wall framing, ceiling framing, external decks, plumbing, electrical.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | | |
|---|---|---|
| AS 1530 | Methods for fire tests on building materials, components and structures. | |
| | 1530.1 1994 *(R2016)* | Combustibility test for materials. |
| | AS/NZS 1530.3 1999 *(R2016)* | Simultaneous determination of ignitability, flame propagation, heat release and smoke release. |
| | AS 1530.4 2014 | Fire-resistance tests for elements of construction. |
| | 1530.8.1 2018 | Tests on elements of construction for buildings exposed to simulated bushfire attack - Radiant heat and small flaming sources. |
| | 1530.8.2 2018 | Tests on elements of construction for buildings exposed to simulated bushfire attack - Large flaming sources. |
| AS/NZS 2908 | Cellulose-cement products. | |
| | 2908.2 2000 | Flat sheet. *(Reconfirmed 2020)* |
| AS 3740 2010 | Waterproofing of domestic wet areas. *1 Amdt, 2012.* | |
| AS 5637.1 2015 | Determination of fire hazard properties - Wall and ceiling linings. | |

Comply with relevant Technical Bulletins and published instructions produced by manufacturer.
Comply with requirements of relevant statutory authorities, and NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| **FIBRE CEMENT PRODUCTS** | | |
|---|---|---|
| **Item** | **Description** | **Manufacturer / Supplier** |
| Smooth faced wall / fascia lining | Easylap (8.5mm) – refer drawings for sheet width and jointing locations | Hardies |
| Texture faced wall / fascia lining | Easytex (8.5mm) – refer drawings for sheet width and jointing locations | Hardies |
| Awning soffit | Versilux (9mm) with negative joints | Hardies |
| Wet area wall lining | Villaboard (9mm) flush jointed | Hardies |
| Mezzanine and delivery framed walls | Villaboard (9mm) flush jointed | Hardies |
| | | |

Supply all accessories required for each application.

**PREPARATION** *Inspect conditions at site before starting work*
Ensure Material Safety Data Sheets are reviewed for OHS&E risks and all controls selected are documented.
Tradesmen with wide experience and knowledgeable in this class to undertake the work.
Coordinate with other trades prior to commencement of work and arrange for fixing grounds required for satisfactory execution of the work of this trade including penetrations.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Ensure tasks and activities comply with risk management and protection requirements. Comply with the manufacturer's installation instructions. Take care of and protect surrounding work, including other finishes, equipment and components, during installation. Provide protective covering where necessary.
Finish joints and secure fasteners. Remove surface defects to achieve uniform appearance of each type of installation. Make good damage in every respect at no additional cost to the proprietor.
Clean exposed surfaces including trim, edge mouldings, and comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.
Remove spatterings, droppings and surplus material. Ensure statutory hazards and risks have been identified and managed in compliance with statutory requirements.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to*:
Supply and install plasterboard, water-resistant plasterboard, ceilings.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Wall, frames, thermal/acoustic insulation, carpentry, brickwork, blockwork, suspended ceiling, electrical.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition.*

| | |
|---|---|
| AS/NZS 1576 | Scaffolding. |
| | 1576.1 2019 General requirements. |
| | AS 1576.6 2020 Scaffolding Metal tube-and-coupler scaffolding - Deemed to conform to AS/NZS 1576.1. |
| AS 1657 2018 | Fixed platforms, walkways, stairways and ladders - Design, construction and installation. |
| AS 1684 | Residential timber-framed construction. *There are numerous parts and supplements.* |
| | 1684.2 2010 Non-cyclonic areas. *Numerous supplements, and Amdts.* |
| | 1684.3 2010 Cyclonic areas. *Numerous supplements, Amdt 2012.* |
| | 1684.4 2010 Simplified - Non-cyclonic areas*. Amdt 1 2012.* |
| AS/NZS 2589 2017 | Gypsum linings– Application and finishing*. 1 Amdt, 2018.* |
| AS 3740 2010 | Waterproofing of domestic wet areas. *1 Amdt 2012.* |
| AS 4576 2020 | Guidelines for scaffolding. |
| AS 5637.1 2015 | Determination of fire hazard properties - Wall and ceiling linings. |

Comply throughout with the current edition of the NCC.
Comply with manufacturer's technical bulletins:

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| Plasterboard walls | 13mm flush plasterboard | CSR or equal approved |
| Plasterboard ceilings | 10mm flush plasterboard | CSR or equal approved |
| Plasterboard wet areas | 10mm 'Aquachek' moisture resistant flush plasterboard | CSR or equal approved |
| Cornice | 90mm coved flush plasterboard | |
| Insulated plasterboard | 10mm flush plasterboard / 35mm thick insulation backing to be adhesive fixed to internal face of concrete tilt panel walls – Kooltherm K17 insulated plasterboard – paint finish as selected. Fixed in accordance with the manufacturer's instructions | Kingspan |
| | | |
| | | |

**PREPARATION** *Inspect conditions at site before starting work.*
Consider all OHS&E risks and ensure selected controls are documented.
Ensure fall prevention strategies are in place and workers follow manufacturer OHS&E requirements.
Ensure framing is complete and electrical and other wiring is in place. Ensure thermal/acoustic insulation is correctly installed and is not to be compressed by plasterboard when installed before proceeding.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Comply with plasterboard manufacturer's current written instructions. Form manholes as required. Provide all appropriate trim and angle accessories to protect salient edges etc. from damage, expansion joints, control joints arches etc.
In wet areas ensure compliance with AS 3740 Waterproofing of domestic wet areas. Install cornices.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Metal roofing proprietary type roofing.
Stormwater roof plumbing.
Fall arrest systems and roof access systems as applicable to be in place before work commences.
Roof anchors to be installed before commencement of work.
**Statutory provisions**
Comply with statutory provisions for installation of fall arrest and access walkways to the roof.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work.*
Structural steel, carpentry, insulation thermal and acoustic.
Read this trade section in conjunction with hydraulic engineer's documentation.
**Manufacturer's printed specifications**
Read this trade section in conjunction with printed roofing manufacturer's specifications for installation of roofing components including insulation.
Fully coordinate installation with the fall arrest system with structural components of the roof.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | |
|---|---|
| AS/NZS 1170 | Structural design actions. *There are many parts, 2002 – 2011,Supplements and Amdts 2005 – 2018.* |
| AS 1273 1991 *(R2018)* | Unplasticized PVC (UPVC) downpipe and fittings for rainwater. |
| AS 1530 | Methods for fire tests on building materials, components and structures.<br>1530.1 1994 *(R2016)* Combustibility test for materials.<br>AS/NZS 1530.3 1999 *(R2016)* Simultaneous determination of ignitability, flame propagation, heat release and smoke release. |
| AS 1562 | Design and installation of sheet roof and wall cladding. *There are 3 parts, 1999-2018*. |
| AS/NZS 1576 | Scaffolding.<br>1576.1 2019 General requirements.<br>AS 1576.6 2020 Scaffolding Metal tube-and-coupler scaffolding - Deemed to conform to AS/NZS 1576.1 |
| AS 1657 2018 | Fixed platforms, walkways, stairways and ladders - Design, construction and installation. |
| AS 1684 | Residential timber-framed construction. *There are numerous parts and supplements.*<br>1684.2 2010 Non-cyclonic areas. *Numerous supplements, and Amdts.*<br>1684.3 2010 Cyclonic areas. *Numerous supplements, Amdt 2012.*<br>1684.4 2010 Simplified - Non-cyclonic areas*. Amdt 1 2012.* |
| AS/NZS 2179 | Specifications for rainwater goods, accessories and fasteners.<br>2179.1 2014 Metal shape or sheet rainwater goods, and metal accessories and fasteners. |
| AS/NZS 3500 | Plumbing and drainage. *There are numerous other parts, 1998-2018.*<br>3500.3 2018 Stormwater drainage. |
| AS/NZS 3678 2016 | Structural steel - Hot rolled plates, floorplates and slabs. *1 Amdt 2017.* |
| AS 3959 2018 | Construction of buildings in bushfire-prone areas. *1 Amdt 2019.* |
| AS 3999 2015 | Bulk thermal insulation – Installation. |
| AS 4285 2019 | Rooflights. |
| AS/NZS 4389 2015 | Roof safety mesh. |
| AS 4576 2020 | Guidelines for scaffolding. |
| AS 5113 2016 | Fire propagation testing and classification of external walls of buildings. *1 Amdt 2018.* |
| HB 39 2015 | Installation code for metal roof and wall cladding*.* |

Comply with state requirements and codes of practice in relation to work on roofs.
Refer Fall Arrest Equipment trade section.
Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**
Provide roofing of the type scheduled below and installed to approved submission of samples and shop drawings as applicable to proposed installation.
Ensure compliance with the product manufacturer's specification and for corrosive environment provide suitable materials and finish to ensure warranty. Check with the manufacturer and confirm at submission stage of the works.

| Item | Material Supplier | Trade Name / Description | Finish | Base Metal Thickness |
|---|---|---|---|---|
| Metal roof | Fielders or equal approved | Trimdek | Colorbond – Surfmist | 0.48BMT |
| Insulation (main roof) | Bradford | Anticon 145mm – fixed over 'ashgrid' proprietary stand-off brackets | | |
| Insulation (awning) | Bradford | Anticon 60mm | | |
| Insulation stand-off brackets | Bradford | 120mm 'ashgrid' proprietary stand-off brackets fixed to 'Z' purlins in accordance with the manufacturer's instructions | | |
| Flashing | Fielders or equal approved | As required to match roof sheeting colour | Colorbond - Surfmist | |
| Accessories | To match the roof | | | |

| Item | Material Supplier | Trade Name / Description | Finish | Base Metal Thickness |
|---|---|---|---|---|
| Wire safety mesh | To approval | Galvanised as required to support Anticon. Fixed in location in accordance with the 'ashgrid' proprietary insulation system | | |
| Box gutter support | To approval | Marine ply or equal approved to provide suitable support | | |
| Box gutters and sumps | To approval | Custom made to suit installation | Colorbond - Surfmist | Suitable to application |
| Gutters | To approval | Custom made to suit installation – refer to the drawings for size | Colorbond - Surfmist | Suitable to application |
| Rainwater heads | To approval | Custom made to suit installation | Colorbond - Surfmist | Suitable to application |
| Downpipes | To approval | PVC on stand-off brackets | Painted to match adjacent wall surface | |
| Sealing of penetrations | Dektite | Refer to the manufacturer's installation instruction for sealing on mechanical services penetrations | | |

**Dissimilar metals**
Ensure that galvanic action through contact with dissimilar metals is being resolved prior to commencing work and submit technical information from each of the roofing manufacturer's confirming adequacy of the dissimilar metal installations procedures.
**Fall arrest and walkways**
Provide fall arrest system to meet statutory regulations having jurisdiction over the site. This is a design and construct item and is to be fully coordinated with roof membrane manufacturers for galvanic action as well as the structural provisions.
Hand over design requirements for approval prior to commencing work and coordinate with structural engineer for design adequacy.
**Design**
Ensure that all roof design is to hydraulic engineer's specifications and confirm adequacy of roof drainage design.

**PREPARATION** *Inspect conditions at site before starting work.*
Ensure OHS&E risks for roofing and roof plumbing, including Material Safety Data Sheet review, has been conducted and controls documented. Ensure fall prevention strategies are in place and workers follow statutory and manufacturer OHS&E requirements.
Provide all installations with all accessories to approved submission of samples and shop drawings and with the product manufacturer's specification confirming adequacy of design and detailing.
Hand over structural engineer's certification for framing design and adequacy of support for the fall arrest and walkways systems.
Ensure framing is in place and secure.
Ensure safety equipment is in place.
Install safety mesh in accordance with AS/NZS 4389 Roof safety mesh.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Comply with recommendations in HB 39 (see above), Installation code for metal roof and wall cladding. Install sarking or anti-condensation insulation blanket. Install proprietary steel set-off battens to avoid compression of blanket. Install each item in accordance with manufacturer's current written instructions.
Form penetration flashings neatly with material matching roofing material or install EPDM collars. Provide flashings at all upstands lapped 150mm at junctions. Step flashings evenly. Finish top corners to a line parallel to the roof slope.
Close and seal lower ends of all cut ribs with proprietary closed cell foam profiles or fitted metal closers. Form back gutters not less than 100mm wide with falls towards the sides of the penetration collars. Seal joints with compatible sealant. Secure downpipes through cladding to structure. Seal at stormwater pipe upstands. Remove debris from gutters and downpipes. Test on completion.

**COMPLETION**
Complete work in accordance with instructions and written variation orders.

**WARRANTY**
Provide to the proprietor a warranty covering the roof and the penetrations through the roof and the satisfactory performance of the complete installation.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and install fall arrest equipment in accordance with OHS&E legislation.
Equipment to be provided includes:
Anchor points, static lines, harness gear, eaves platforms and fences and safety signs.
Ensure that every person working above ceiling or eaves level is fully trained in use of the equipment.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Roof framing, roof installation, eaves construction.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | | |
|---|---|---|
| AS/NZS 1170 | Structural design actions. | |
| | 1170.1 2002 *(R2016)* | Permanent, imposed and other actions. *2 Amdts 2005, 2009.* |
| | 1170.2 2011 *(R2016)* | Wind actions. *5 Amdts 2011-2017.* |
| | 1170.3 2003 *(R2016)*) | Snow and ice actions. *2 Amdts 2007, 2017.* |
| | 1170.4 2007 *(R2018)* | Earthquake actions in Australia. *2 Amdts 2005, 2018.* |
| AS 1273 1991 *(R2018)* | Unplasticised PVC (UPVC) downpipe and fittings for rainwater. | |
| AS 1562 | Design and installation of sheet roof and wall cladding. | |
| | 1562.1 2018 | Metal. |
| | AS/NZS 1562.2 1999 | Corrugated fibre-reinforced cement. |
| | AS 1562.3 2006 *(R2018)* | Plastic. |
| AS/NZS 1576 | Scaffolding. | |
| | 1576.1 2019 | General requirements. |
| | AS 1576.6 2020 | Scaffolding Metal tube-and-coupler scaffolding - Deemed to conform to AS/NZS 1576.1. |
| AS1657 2018 | Fixed platforms, walkways, stairways and ladders – Design, construction and installation – Design, construction and installation. | |
| AS/NZS 1891 | Personal equipment for work at height. *There are 2 other parts, 2002* | |
| | 1891.1 2020 | Harnesses and ancillary equipment. |
| | 1891.4 2009 | Industrial fall-arrest systems and devices. Selection, use and maintenance. |
| AS/NZS 2179 | Specifications for rainwater goods, accessories and fasteners. | |
| | 2179.1 2014 | Metal shape or sheet rainwater goods, and metal accessories and fasteners. |
| AS 3959 2018 | Construction of buildings in bushfire-prone areas. *1 Amdt 2019.* | |
| AS 3999 2015 | Bulk thermal insulation - Installation. *1 Amdt 2020.* | |
| AS 4055 2012 | Wind loads for housing. *1 Amdt 2015.* | |
| AS 4256 *(all R2018)* | Plastic roof and wall cladding materials. *There are 5 parts, 2006.* | |
| AS/NZS 4284 2008 | Testing of building facades. | |
| AS/NZS 4389 2015 | Safety mesh. | |
| AS 4576 2020 | Guidelines for scaffolding. | |
| AS/NZS 4801 2018 | Occupational health and safety management systems - Specification with guidance for use. | |
| AS/NZS 4994.2 2009 | Temporary edge protection - Roof edge protection – Installation and dismantling | |
| AS 5113 2016 | Fire propagation testing and classification of external walls of buildings. *1 Amdt 2018.* | |
| HB 39 2015 | Installation code for metal roof and wall cladding. | |

Comply with state requirements and codes of practice in relation to work on roofs.
Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**
Submit relevant drawings to suppliers or manufacturers of suitable equipment.
Obtain suppliers lists of recommended materials and included lists here.

| Item | Description | Manufacturer |
|---|---|---|
| Permanent fall arrest system | Builder to provide design and construct permanent fall arrest system as required to accord with all relevant Australian standards and codes. Provide design drawing to architect for review prior to installation | 316 stainless steel |
| | | |

**PREPARATION** *Inspect conditions at site before starting work*
Ensure Australian Standard certification of all plant and equipment, including test records, are reviewed and relevant controls documented. Ensure any attachment points on a building or structure are engineered and certified, copies maintained at the workplace. Check roof framing and other items to which safety equipment is to be fixed.
Ensure that structures local to the installed items are secure.
**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Secure each item in accordance with Australian Standards.
Arrange with the builder and roofer for penetrations if required through roof materials.
Ensure that penetrations are completely watertight after installation and on completion of the work.
Erect equipment and install eaves platforms and fences.
Check again that each person is fully trained in use of the equipment.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and install windows and, glazed doors, security insect screens, hardware & flashings.
Provide aluminium framed installation types as listed in the Windows and Doors Schedules.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
External cladding, concrete, brickwork and blockwork, insulation, electrical services (where remote operators are required).

**Associated documents**
Read this trade section in conjunction with the following documents:
Energy compliance report for thermal performance of windows and glazed doors.
Windows and Doors Schedules.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition.*

| | |
|---|---|
| AS/NZS 1170 | Structural design actions. *There are many parts, 2002 – 2011,Supplements and Amdts 2005 – 2018.* |
| AS 1288 2006 *(R2016)* | Glass in buildings – Selection and installation. |
| AS/NZS 1554 | Structural steel welding. |
| | 1554.1 2014 Welding of steel structures. *Amdts 2015, 2017.* |
| AS/NZS 1576 | Scaffolding. |
| | 1576.1 2019 General requirements. |
| | AS 1576.6 2020 Scaffolding Metal tube-and-coupler scaffolding - Deemed to conform to AS/NZS 1576.1 |
| AS 1657 2018 | Fixed platforms, walkways, stairways and ladders - Design, construction and installation. |
| AS/NZS 1664 | Aluminium structures. *(Reconfirmed 2020)* |
| | 1664.1 1997 Limit state design. |
| | 1664.2 1997 Allowable stress design. |
| AS 2047 2014 | Windows and external glazed doors in buildings. *2 Amdts 2016, 2017.* |
| AS/NZS 2208 1996 | Safety glazing materials in buildings. *1 Amdt 1999.* |
| AS 3715 2002 *(R2017)* | Metal finishing - Thermoset powder coatings for architectural applications of aluminium and aluminium alloys. |
| AS 3959 2018 | Construction of buildings in bushfire-prone areas. *1 Amdt 2019.* |
| AS 4055 2012 | Wind loads for housing. *1 Amdt 2015.* |
| AS 4145.2 2008 | Locksets and hardware for doors and windows - Mechanical locksets for doors and windows in buildings. *2 Amdts 2009, 2015.* |
| AS 4576 2020 | Guidelines for scaffolding. |
| AS/NZS 4666 2012 | Insulating glass units. |
| AS/NZS 4680 2006 *(R2017)* | Hot-dip galvanised (zinc) coatings on fabricated ferrous articles. |
| HB 125 2007 | The glass and glazing handbook. |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**
Refer to Windows and Door Schedules for project specific requirements including types of installations, thermal and acoustic requirements as well as the configuration of the windows and glazed doors.

**SUBMISSION**
Submit samples, shop drawings and technical data for approval in conjunction with the door schedule as well as door hardware items as applicable.

| Item | Description | Comments |
|---|---|---|
| Aluminium | Extruded aluminium alloy 6063, temper T5 or T6 | |
| **Window / Door frames** | Refer to the Window Schedule. | |
| Finish | Polyester powder coat. Minimum 50 microns | |
| Glazing | Refer to the Window Schedule. | |
| Security insect screens | Refer to the Window Schedule. | |
| Louvre windows: | Refer to the Window Schedule. | |
| Automatic doors<br>(Tenancy 1 Entry door – W3 and internal entry door – W4) | Structural R7000 – Heavy duty automatic sliding door ensemble including:<br>Remote controls – 2 remotes<br>Movement sensors for day mode<br>Key switch internal. Off / Auto / Lock<br>Motor lock Electric lock with battery backup | RUBEK AUTOMATIC DOORS<br>2 / 79 Achievement Way<br>WANGARA WA 6065<br>Ph: (08) 9302 3200<br>Fax: (08) 9302 3400 |

**PREPARATION** *Inspect conditions at site before starting work.*
Ensure all OHS&E risks have been considered and relevant controls documented. Comply with statutory and manufacturer OHS&E requirements.
Prepare for installation of aluminium frames. Isolate aluminium from steel wall frames.
Provide necessary anchors for building into masonry openings.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Ensure frame anchors are already built in. Comply with AS 2047. Install glass to manufacturer's instructions with correct sealants.

Install flyscreens fixed, hinged, or removable, where directed. Install window seals, winders, connect remote winders, catches locks etc.

**COMPLETION**

Complete work in accordance with instructions and written variation orders to satisfactory performance.

**WARRANTIES**

Submit warranties for all components and certify each of the items for compliance with the listed performance levels.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and install door frames and doors for external and internal door openings. Metal frames, doors, solid core, waterproof, s, flush panel - hollow core.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Carpentry, concrete floor contractor, door hardware, wall construction, glass, painting.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition.*
AS 1288 2006 *(R2016)* Glass in buildings - Selection and installation.*3 Amdts 2008-2016*
AS/NZS 1859 Reconstituted wood-based panels – Specifications. *There is 1 other part, 2004.*
1859.1 2017 Particleboard.
1859.2 2017 Dry processed fibreboard.
1859.3 2017 Decorative overlaid wood panels.
AS 2047 2014 Windows and external glazed doors in buildings. *2 Amdts 2016, 2017.*
AS 2688 2017 Timber and composite doors.
AS 4145 Locksets and hardware for doors and windows. *There are 5parts, 2001 - 2011.*
4145.1 2008 Glossary of terms and rating system.
4145.2 2008 Mechanical locksets for doors and windows in buildings.
AS/NZS 4505 2012 *(R2017)* Garage doors and other large access doors. *1 Amdt 2015.*
AS 5007 2007 *(R2018)* Powered doors for pedestrian access and egress.
AS 5039 2008 Security screen doors and security window grilles.
AS 5040 2003 (*R 2016)* Installation of security screen doors and window grilles.
NSW Guide to Standards and Tolerances – Section 9
https://www.fairtrading.nsw.gov.au/__data/assets/pdf_file/0008/369980/NSW_Guide_to_Standards_and_Tolerances_.pdf
Victorian Building Authority Guide to standards and tolerances, Section 8:
https://www.vba.vic.gov.au/__data/assets/pdf_file/0018/111492/Guide-to-Standards-and-Tolerances-2015.pdf
Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Description | Manufacturer |
|---|---|---|
| **Door Frames:** | | |
| Door frames: timber | Thickness: nom. 40mm<br>Material: kiln dried hardwood, | To approval |
| Door frames: steel | Proprietary pressed steel 1.6mm thick single (or double) rebate fully welded frames with floor spreader. Supply steel frames with shop applied rust inhibitive paint. | To approval |
| **External doors** | | |
| Doors solid core | Refer to the door schedule | To approval |
| **Internal doors** | | |
| Flush panel hollow core | Refer to the door schedule | To approval |
| Flush panel solid core | | |
| Timber louvre doors | | |
| Glazed timber doors | | |
| Perimeter door seals | As required to prevent the ingress of water and draftproof | Raven or equal approved |
| Other doors | | |

**PREPARATION** *Inspect conditions at site before starting work*
Ensure all OHS&E risks are considered and selected controls documents. Prepare openings in walls. Install fixing grounds to secure frames.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Erect frames plumb and true. Comply with named standard listed. At head and jambs allow 3mm clearance.
At floor allow 10 mm over floor covering. Install door seals to scheduled doors following painting and installation of furniture. Check all installed doors with direct reference to the appropriate Guide to Standards and Tolerances. Replace doors that exceed the acceptable tolerances cited in the guide.

**CLEANING**
Thoroughly clean areas in which work has been performed and those adjacent to the work area.

**COMPLETION**
Complete work in accordance with instructions and written variation orders.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply, engineer and install roller shutter door(s) including but not limited to:
Drum support, door guides, manual control devices, electric motors and controls, remote control, locking devices, wind locks, weather-strips.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Structural steel, brickwork, blockwork, concrete, electrical, painting.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS.** *Current edition*.

| | |
|---|---|
| AS 1428 | Design for access and mobility. |
| | 1428.1 2009 General requirements for access – New building work. *2 Amdts 2010, 2017.* |
| AS/NZS 1554 | Structural steel welding. |
| | 1554.1 2014 Welding of steel structures. *Amdts 2015, 2017.* |
| AS 1905.2 2005 | Components for the protection of openings in fire-resistant walls - Fire-resistant roller shutters. |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| Delivery roller door | Refer to the drawings for size. Roll-A-Door Series 2 – light industrial automatic rolling door. Remote controlled. With wind-locks. Provide all accessories as required to complete the installation | B&D or equal approved by the Owner |
| Finish | Colorbond – Colour to be selected | |

**PREPARATION** *Inspect conditions at site before starting work*
Ensure all OHS&E risks are considered and selected controls documents. Field measurements: Do not delay job progress. Allow for adjustments and fitting of the work in the field where taking of measurements might cause delay. Ensure sufficient head room is available for the door.
Coordination with work of others. Furnish to each relevant trade foreman anchorages and setting drawings, diagrams, templates and instructions for installation of items having integral anchors which are to be embedded in concrete or masonry construction. coordinate delivery of such items to the project site.
If door is electrically operated, ensure electrical contractor is made aware at time of tender.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Provide anchorage needed in time for building in by other trades.
Fit: during installation and assembly, form tight joints with exposed connections accurately fitted, and reveals uniform. Finish work accurately, plumb, level, square and true in reference to adjacent construction.
Comply with manufacturers' installation instructions throughout.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and install door hardware listed in the Door Hardware Schedule.

**COOPERATE WITH THESE OTHER TRADE** *to resolve possible problems before starting work*
Doors and door frames, windows and glazed doors, electrical services, painting, signage

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition.*

| | | |
|---|---|---|
| AS 1428 | Design for access and mobility. *There are 5 parts. 2002 – 2018.* | |
| AS 2688 2017 | Timber and composite doors. | |
| AS 4145 | Locksets and hardware for doors and windows. | |
| | 4145.1 2008 | Glossary of terms and rating system. |
| | 4145.2 2008 | Mechanical locksets for doors and windows in buildings. |
| | 4145.3 2001 | Mechanical locksets for windows in buildings. |
| | 4145.4 2002 *(R2018)* | Padlocks |
| | 4145.5 2011 *(R2018)* | Controlled door closing devices |

Comply throughout with the current edition of the NCC.

**Manufacturer's specifications**
Refer to the product manufacturers' specifications for provision of all items including all printed technical data, and coordinate with provision of electronic equipment where applicable to hardware items.
Refer to access provision of the NCC for reference.

**MATERIALS TO BE USED**

| Item / Door number | Description | Manufacturer/Supplier |
|---|---|---|
| | Refer to 'Door Hardware Solutions' door hardware schedule at the end of this specification | |

**PREPARATION** *Inspect conditions at site before starting work*
Install a complete set of hardware as scheduled.
Install samples of each type. Stop. When approved by Owner, continue.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Install with accordance with AS 4145 and written instructions of each manufacturer. Check deliveries on arrival. Lock away until needed and assume responsibility for hardware. Fit accurately at correct heights and protect until completion of project. Ensure all electrical connections are provided where required.
Remove furniture prior to painting – refit when complete and install door seals. Lubricate hinges and locks and provide two keys to each lock.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**CERTIFICATION**
Certify all components for compliance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Design, supply and installation of electrical transmission and reticulation materials from mains supply to required electrical power and light outlets, telephone, internal communication system and television antenna, smoke alarms, security. Coordinate with builder to ensure all required connections to hard-wired devices specified elsewhere in this document are provided with power and switching installations.

**Refer to the Appendices for the Electrical Consultant's drawings and specification.**

On completion of the whole installation, transpose the "As Constructed" information onto USB drive compatible with AutoCAD 2007 by a qualified computer draftsperson and hand with the USB drive to the Owner together with two (2) copies of operating manuals indicating dates of the practical completion and defects liability termination, names and addresses of the head contractor together with telephone numbers and emergency contact person, warranty, operating and maintenance instructions, and names and addresses for suppliers of all, the equipment supplied.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Floor construction, wall construction, ceiling construction, carpentry, joinery.
Licensed electrical technicians only may perform work, experienced in the requirements of the project. Licences are those issued by the state authority having direct control or interest in the work.
Perform the entire installation in accordance with the requirements of the statutory authority having jurisdiction.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
The supply and installation of thermal insulation.
Read this trade section in conjunction with the following referenced documents and publications:
Energy compliance report as applicable.
Product manufacturers' publications for provision for specific insulation types.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Carpentry, wall and roof framing, roofing, wall lining, brickwork, and blockwork, suspended ceilings.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition.*

| | |
|---|---|
| AS 1191 2002 *(R2016)* | Acoustics - Method for laboratory measurements of airborne sound transmission insulation of elements. |
| AS 1366 *(R2018)* | Rigid cellular plastic sheets for thermal insulation. *There are 4 parts and 1 Amdt.* |
| AS 1530 | Methods for fire tests on building materials, component and structures.<br>1530.1 1994 *(R2016)* Combustibility test for materials.<br>AS/NZS 1530.3 1999 *(R2016)* Simultaneous determination of ignitability, flame propagation, heat release and smoke release. |
| AS/NZS 2107 2016 | Acoustics - Recommended design sound levels and reverberation times for building interiors. |
| AS/NZS 2499 2000 | Acoustics – Measurement of sound insulation in buildings and of building elements – Laboratory measurement of room-to-room airborne sound insulation of a suspended ceiling with a plenum above it. |
| AS 3671 1989 | Acoustics - Road traffic noise intrusion - Building siting and construction. |
| AS 3999 2015 | Bulk thermal insulation–Installation. |
| AS/NZS 4200 | Pliable building membranes and underlays.<br>4200.1 2017 Materials.<br>AS 4200.2 2017 Installation. *1 Amdt 2018.* |
| AS 4426 1997 | Thermal insulation off pipework, ductwork and equipment – Selection, installation and finish. |
| AS/NZS 4859 2018 | Materials for the thermal insulation of buildings.<br>4859.1 2018 General criteria and technical provisions. |
| AS 5637.1 2015 | Determination of fire hazard properties - Wall and ceiling linings. |
| AS/NZS ISO 717.1 | Acoustics – Rating of sound insulation in buildings and of building elements. Airborne sound insulation. |
| DIN EN 13950 2014 | Gypsum board thermal/acoustic insulation composite panels - Definitions, requirements and test methods. |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED No variations to the selected materials will be accepted without written approval**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**
Note that coordination is required for installation of both the thermal and the acoustic insulation materials and may include use of acoustically rated sealants.

| Item | Description | R-Rating | Location | Manufacturer/ Supplier |
|---|---|---|---|---|
| Floor insulation | Insulation batts | R4.0 | Mezzanine floor and ceiling above tenancy 1 entry and UAT | Fletchers or equal approved |
| Wall insulation – 120 stud | High density insulation batts | R3.0 HD | To all 120mm wide stud framed walls | Fletchers or equal approved |
| Wall insulation – 90 stud | High density insulation batts | R2.7 HD | To all 90mm wide stud framed walls | Fletchers or equal approved |
| Insulated flush plasterboard | Refer to the plasterboard section of this specification | | | |
| Building paper | Vapour permeable building wrap | | To all external framed wall and awnings throughout | Tyvek or equal approved |
| Anticondensation insulation | Refer to the roofing section of this specification | | | |

**Thermal insulation**
Provide thermal insulation to locations shown on the drawings and of R value listed or scheduled in the Energy Report.
Ensure product achieves the nominate R value and not a combined or overall construction R value.
Consider condensation in roof and reduce/step down insulation at external wall/eave area to maintain ventilation.

**PREPARATION** *Inspect conditions at site before starting work*
Consider OHS&E requirements for handling and installation. Ensure manufacturer's OHS&E controls are considered and documented. Prepare surfaces and or framing material and ensure that no obstructions will prevent rapid and effective installation. Install to the product manufacturer's specifications with specific attention to condensation prevention as listed on each of the insulation product specifications.

**Condensation prevention**
Confirm condensation issues prevention methods at the submission stage of the works and hand over confirming data to the architect. Obtain approval prior to commencing work.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions.*
Comply with statutory and manufacturer OHS&E recommendations.
Comply with manufacturer's current written instruction. Install insulation to the following areas and structures:

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to*:
Supply and install certified and plated to comply with the required Fire Rating (FRL) steel fabricated door frames, fire doors, doors, hinges, (refer Door Schedule), all required fastening systems, factory prime painting.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work:*
Masonry, finish hardware (except hinges) including supply of hardware templates, concrete, wall construction, doors and door frames.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*

| | | |
|---|---|---|
| AS 1428.1 2009 | Design for access and mobility General requirements for access – New building work. *2 Amdts 2010, 2017.* | |
| AS 1530 | Methods for fire tests on building materials, components and structures. | |
| | 1530.1 1994 *(R2016)* | Combustibility test for materials. |
| | AS/NZS 1530.3 1999 *(R2016)* | Simultaneous determination of ignitability, flame propagation, heat release and smoke release. |
| | AS 1530.4 2014 | Fire-resistance tests for elements of construction. |
| | 1530.8.1 2018 | Tests on elements of construction for buildings exposed to simulated bushfire attack - Radiant heat and small flaming sources. |
| | 1530.8.2 2018 | Tests on elements of construction for buildings exposed to simulated bushfire attack - Large flaming sources. |
| AS 1905 | Components for the protection of openings in fire-resistant walls. | |
| | 1905.1 2015 | Fire-resistant doorsets. *1 Amdt 2016.* |
| | *There is 1 other part, 2005 (R 2016).* | |
| AS 3959 2018 | Construction of buildings in bushfire-prone areas. *1 Amdt 2019.* | |
| AS 6905 2007 *(R2016)* | Smoke doors. | |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Description | Manufacturer |
|---|---|---|
| Doors | Provide a whole installation design and construct solution for the fire doors to comply to FRL -/90-30 and automatic closing initiated by activation of a smoke detector in accordance with AS1670.1 located each side of the fire wall, not more than 1.5m horizontal distance from the opening.<br><br>Manufacturer's door furniture. Standard hardware to the approval of the owner.<br><br>Refer to the door schedule for sizes. | Australian Fire Door Company Pty Ltd or equal approved<br>Tel: 9370 5200<br>Email: doors@afdc.com.au |

**PREPARATION** *Inspect conditions at site before starting work*
Ensure all OHS&E risks are considered and selected controls documents. Number doors and frames to match Door Schedule. Check and confirm dimensions at the site before starting fabrication. Ensure that installation conditions will permit the specified requirements.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions.*
**Installation of Frames**
Install in strict accordance with the manufacturer's instructions and specifications.

**Installation of Doors**
Install in strict accordance with the manufacturer's instructions and specifications.

**Grouting of Frames**
Grout frames mounted in masonry openings with 1-part Portland cement and three parts sand, with sufficient water for pressure grouting. Provide bracing as required during grouting to maintain frame in true position.
Form face of grout to a nominal 5mm back from the face of the frame. Other wall opening construction: grout frames in accordance with the manufacturer's installation details to ensure integrity of the complete FRL installation is maintained.
**Installation of Hardware**
Finish hardware preparation: prepare doors and frames to receive fire rated finish hardware in accordance with the manufacturer's requirements. Comply with requirements of AS 1905 for door and frame preparation for hardware.

**COMPLETION**
Complete work in accordance with instructions and written variation orders.

**WARRANTY**
Provide to proprietor a warranty covering satisfactory performance of the complete installation.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Provide waterproofing membranes to all wet area locations, fully coordinated with all adjacent floor and wall finishes.
Note that in wet areas required to meet the Access Requirements of the NCC, a level floor finish is required between wet areas and adjacent floor finishes. Ensure that flush floor finishes are coordinated with installation of waterproofing membranes and all associated components.
Typically to floors and walls of wet areas: Including toilets and vanity spaces.
Carry the membrane under fixtures, toilets, vanities, and the like and extend into the full area of shower recess.
Install membrane to a minimum height of 2100mm to walls of shower recess extending 300mm beyond the horizontal extent of the designated tiled wall area or as required by specific provisions of the NCC for the building type.
Install membrane to a height and width not less than 450mm to wall areas immediately adjacent and behind a bath, sink or similar fixture.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work.*
Blockwork and brickwork, concrete, cement render, fibre cement, plasterboard, ceramic tile.
Insulation for provision of sound insulation to locations where tiles are installed over living areas in the floor below, refer to specific provisions of the NCC for this requirement.
Metalwork for selection of gratings to wet areas.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*
AS 3740 2010 Waterproofing of domestic wet areas*. 1 Amdt 2012.*
AS/NZS 4858 2004 Wet area membranes. *Reconfirmed 2020.*
Current written instructions provided by the selected product manufacturer.
Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**
Provide waterproofing membrane to wet areas that meets the listed requirements of the NCC and that is chemically compatible with adjacent building components including the tile adhesive and the insulating material to floor finishes.
Install waterproofing membrane to approved submission of samples and technical data, all confirmed by a written certification from the product manufacturer.
Any proposed alternatives to the system specified below: provide a proprietary liquid applied or sheet membrane system which complies with AS/NZS 4858 and is suitable for use as a waterproofing system in wet areas, balconies, shower recess bases and associated floors and wall/floor junctions which are to be tiled.
Ensure that both the sheet membrane and the applied liquid membrane are installed to the product manufacturer's specifications.

**PREPARATION** *Inspect conditions at site before starting work.*
Review Material Safety Data Sheets and ensure all OHS&E risks are considered and appropriate controls documented.
Prepare the substrate as required by the membrane manufacturer and ensure that all falls where required are to the required project specific levels.
Curing: allow concrete to cure for a minimum of 28 days prior to the application of the membrane or as required by the selected membrane manufacturer.
Cleaning: clean down the substrate surface to remove all curing agents, wax, grease, oil, dirt, dust and other foreign material and leave it clean, dry, dust free, smooth and free of undulations.
Voids: patch with a non-shrinking quick setting grout and allow to cure for a minimum of 7 days prior to applying the membrane.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions.*
Fillet: wherever a vertical penetration or upstand occurs install a 12mm x 12mm fillet at the intersection of the vertical and horizontal surfaces, or similar approved method.
Primer: prime porous substrate (concrete/cement) typically with approved system.
Prime non-porous materials (metals/plastics) typically with approved system.
Joints and penetrations: on the same day of priming, seal joints and penetrations with approved sealant.
First coat: on the same day as priming, apply a coat of approved sealant to a minimum wet film thickness of 1.5mm to floors and walls in a single operation. If delayed beyond that day reprime-prime in accordance with manufacturer's instructions.

**SUBMISSION**
Submit detailing and samples for approval as well as confirmation that the proposed preparation work is completed and is in accordance with the product manufacturer's specifications.
Submit shop drawing showing the proposed detailing for approval, all confirmed by the product manufacturer.

**Detailing:**
Detail the membrane in accordance with the manufacturer's recommendations, as shown on the drawings and as follows:
Turn the membrane down into the puddle flange of outlets.
Turn the membrane up at and seal to all penetrations, pipes, waste outlets, etc.
Turn the membrane up for 100mm at all walls, plinths, and other upstands.
Dress the membrane over the horizontal leg of angle tile trims at doorways and turn up the vertical face of the angle to terminate level with the bottom of the floor tiles.
Similarly dress the membrane up the face of door jambs to terminate at the underside of the floor tiles.
The membrane turn up is to create a complete waterproof envelope to the floor area of the space being treated.
Detail the membrane at movement joints in the substrate as detailed on the drawings.
Membrane curing: allow 72 hrs for the membrane to cure prior to carrying out water tests or applying finishes, toppings etc.

**COMPLETION**
Complete work in accordance with instructions and written variation orders.

**WARRANTY**
Provide a warranty for materials and application of the membrane for a period of 10 years from the date of Practical Completion.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and installation of manufactured casework items, including but not limited to:
kitchen cabinets & vanity cabinets. Refer to the drawings for detail.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Carpentry, wall finishes, floor finishes, ceiling finishes, water distribution, electrical installation.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | |
|---|---|
| AS/NZS 1859 | Reconstituted wood-based panels – Specifications. *There are 2 other parts.* |
| | 1859.1 2004 Particleboard. |
| | 1859.2 2004 Dry-processed fibreboard. |
| AS/NZS 2924 1998 | High pressure decorative laminates - Sheets made from thermosetting resins. *There are 2 parts, 1998*. |
| AS/NZS 4364 2010 | Timber – Bond performance of structural adhesives. |
| AS 4386 2018 | Cabinetry in the built environment – Commercial and domestic. |
| AS 4785 *(All R2016)* | Timber – Softwood - Sawn and milled products. |
| | 4785.1 2002 Product specification. |
| | 4785.2 2002 Grade description. |
| | 4785.3 2002 Timber for furniture components. |
| AS 4786.2 2005 *(2016)* | Timber flooring - Sanding and finishing. |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED** ***No variations to the selected materials will be accepted without written approval***

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| Carcass units (Melamine faced): | MDF thickness | |
| Vertical components | 16mm | |
| Floors | 16mm | |
| Shelves | 16mm | |
| Doors | 16mm | |
| Base (below floor) | 32mm | |
| Bulkheads | 16mm | |
| Back | 3mm | |
| Edge strips | 32mm | |
| Laminates: | | |
| Bench tops | 1mm thick – to be selected | |
| Doors, carcass drawers | 0.8mm thick – Prefaced as selected | |
| Drawer runners | Soft closed | Blum or equal approved |
| Hardware | | |
| Hinges | | |
| Catches | | |
| Drawer handles | 100mm satin stainless steel ‘D’ handles | To approval |
| | | |

**PREPARATION** *Inspect conditions at site before starting work*
Consider all OHS&E risks and document selected controls.
Construct by screwing and gluing or other approved method. A dry stapled assembly will not be approved. Fabricate bench tops as recommended by the materials’ manufacturer. Locate openings accurately using templates or roughing-in diagrams for proper size and shape. Where located in bench tops, seal edges of cut-outs with a water-resistant coating. Back prime concealed solid timber surfaces prior to installation. Install fasteners hinges etc. in accordance with manufacturer’s instructions.

**ON-SITE ACTIONS** *Start of work means total acceptance of condition*
Use concealed shims as required to install the work plumb, level, straight and distortion free within the following tolerances: 1mm in 800mm for plumb and level (including bench tops), 0.5mm maximum offsets in flush adjoining surfaces, 2mm maximum offsets in revealed adjoining surfaces. Scribe and cut to fit adjoining work; refinish cut surfaces or repair damaged finishes at cuts. Secure joinery with anchors to substrates, or secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing. Install casework without distortion so that doors will fit openings properly and be accurately aligned. Install door and joinery hardware as scheduled.
Adjust joinery to achieve a uniform appearance. Lubricate and clean hardware making final adjustments needed for proper operation. Remove handling marks from visible joinery surfaces.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Provide external and internal wall and floor tiling.
Provide waterproofing to wet areas.
Prepare surfaces to be tiled. Supply and install bedding as required. Wall tile, floor tiles, paving tiles. Cleaning of finished work.
**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Concrete and concrete screeds for provision of falls where required, carpentry, plasterboard, hydraulic service for provision of surface gratings.
**Chemical compatibility**
Ensure that all components are fully compatible, and this includes but is not limited to waterproofing membrane, adhesive and the grout.
**Efflorescence control**
Ensure that the efflorescence controls are in place as required by the tile manufacturer and confirm this at the submission stage of the works.
**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | |
|---|---|
| AS 1428 | Design for access and mobility. |
| | 1428.1 2009 General requirements for access – New building work. *2 Amdts 2010, 2017.* |
| AS/NZS 3661.2 1994 | Slip resistance of pedestrian surface – Guide to the reduction of slip hazards. |
| AS 3740 2010 | Waterproofing of domestic wet areas. *1 Amdt 2012.* |
| AS 3958 | Ceramic Tiles. *There are 2 parts, 1992 - 2007.* |
| AS 3972 2010 | General purpose and blended cements. |
| AS 4586 2013 | Slip resistance classification of new pedestrian surface materials. *1 Amdt 2017.* |
| AS 4663 2013 | Slip resistance measurement of existing pedestrian surfaces. |
| AS/NZS 4858 2004 | Wet area membranes. *Reconfirmed 2020.* |
| HB 197 1999 | An introductory guide to the slip resistance of pedestrian surface materials. |

Comply throughout with the current edition of the NCC.
Comply with material manufacturer's current written instructions.
**Industry standards**
Comply with industry standards for provision of all tiling components. Where manufacturers or suppliers require registered tradesmen to provide specific work, ensure compliance with warranty conditions.
Confirm full compliance at the submissions stage.

**MATERIALS AND COMPONENTS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Name | Colour | Size | Texture | Manufacturer/ Supplier |
|---|---|---|---|---|---|
| Floor tiles | Refer PC sums | | | | |
| Wall tiles | Refer PC sums | | | | |
| | | | | | |

**Tiles**
Bond and seal all tiles with low or zero VOC sealants.
Provide tiles of the type listed on the Finishes Schedule and install to approved submission of samples. For floor tiles include information on the non-slip data.
**Spare tiles**
Supply matching spare tiles equivalent to 5% of the total area of ceramic tiles laid.
**Waterproofing**
Provide waterproofing membrane to floor and wall surfaces to extent required by the NCC or as shown on the drawings and fully compatible with all adjacent building components.
**Adhesive and grout**
Provide adhesive and grout suitable for the purpose and compatible with all adjacent components.
**SUBMISSIONS**
Submit for approval by the Owner the following samples of all tiles showing the proposed range in colour variation. Provide also details in writing of the approved installation instructions from the tile manufacturer.
Technical data from the waterproofing and the adhesive manufacturers' confirming chemical compatibility and the efflorescent control.
Obtain approval prior to commencing work.
**PREPARATION** *Inspect conditions at site before starting work*
Consider all OHS&E risks and document selected controls.
Ensure surfaces are clean and dry and no variation on walls greater than 5mm under a 2000 long straight edge.
**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Form expansion joints no more than 2500mm apart. Comply with adhesive manufacturer's instructions. Install wall tiles with expansions joints not more than 2500mm apart and at floor level and at corners of walls, and at change of background material.
Form junctions of different materials (e.g., tiles to carpet) so that they occur under the centre line of doors.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.
Provide certification that all non-slip performance requirements are met.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and install vinyl flooring and corner wall protectors.
Only manufacturer approved installers are to lay flooring – provide accreditation document to Owner.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Concrete, carpentry, floor construction.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition.*

| | |
|---|---|
| AS 1860.2 2006 *(R2016)* | Particleboard flooring – Installation.*1 Amdt, 2010.* |
| AS 1884 2012 | Floor coverings – Resilient sheet and tiles – Installation practices. |
| AS/NZS 3661.2 1994 | Slip resistance of pedestrian surfaces – Guide to the reduction of slip hazards. |
| AS 4586 2013 | Slip resistance classification of new pedestrian surface materials. *1 Amdt 2017.* |
| AS 4663 2013 | Slip resistance measurement of existing pedestrian surfaces. |
| HB 197 1999 | An introductory guide to the slip resistance of pedestrian surface materials. |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Material | Thickness | Name | Colour | Manufacturer/Supplier |
|---|---|---|---|---|---|
| Vinyl flooring<br>Refer to Architectural drawing for location and extent | Sheet vinyl | 2mm | Surestep – Star – R10 | To be selected | Forbo or equal approved by the Owner |
| Vinyl corner protectors | Vinyl | Nom. 1mm | CS - Acrovyn | To be selected | Acrovyn or equal approved by the Owner |

Obtain written statement from supplier that material complies with AS/NZS 3661.2.
Use Low VOC adhesives.

**PREPARATION** *Inspect conditions at site before starting work*
Consider all OHS&E risks and document selected controls.
Prepare concrete floor. Fill cracks and irregularities with self-levelling compound. Remove lumps. Produce dead flat surface. Test for moisture content and ensure this is in accordance with the manufacturer's recommendations.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Install to manufacturer's instructions. Weld joints in sheet vinyl with appropriate matching rod material. Clean thoroughly, allow to dry. Cover completed floors until completion of project.
Form junctions of different materials (e.g., tiles to carpet) so that they occur under the centre line of doors.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and apply paints and other finish coatings.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Each trade as listed to be painted.
Refer Finishes Schedule.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition.*

| | |
|---|---|
| AS/NZS 1576 | Scaffolding. *There are 5 parts 2013– 2020.* |
| AS/NZS 2311 2017 | Guide to the painting of buildings. |
| AS/NZS 2312.1 2014 | Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings – Paint coatings. *1 Amdt 2017.* |
| AS/NZS 4361.2 2017 | Guide to hazardous paint management - Lead paint in residential, public and commercial buildings. |
| AS 4576 2020 | Guidelines for scaffolding. |
| | 1576.1 2019 General requirements. |
| | AS 1576.6 2020 Scaffolding Metal tube-and-coupler scaffolding - Deemed to conform to AS/NZS 1576.1. |
| AS 5637.1 2015 | Determination of fire hazard properties - Wall and ceiling linings. |

Comply throughout with the current edition of the NCC.

**Industry standards**
Comply with industry standards as applicable to proposed installations and refer to manufacturer's specifications for list of Australian Standards as applicable to specific project requirements.

**Manufacturer's specifications**
Comply with the manufacturer's specifications for preparation of the substrate and application of paint finishes. Note that specialist coatings such as intumescent fire-resistant coatings and corrosive environment coatings are specified in separate trade sections of this specification.
Only decorative coatings are listed in this trade section.

**MATERIALS TO BE USED.**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

**Painting systems shall be appropriate to the surface to which they are applied and their relevant exposure.**

**Final paint finish must include all preparation, undercoat systems / pre-treatment and finishing coats in accordance with the manufacturer's specifications.**

**Provide the Owner with at least 14 days' notice to submit final colour selections to the Builder.**

| Surface or Item | Catalogue/Product No. | Manufacturer/Supplier |
|---|---|---|
| **Internal** | | Dulux or equal approved by the Owner |
| Internal (generally) | Washable acrylic – low sheen | |
| Walls: dry areas | Washable acrylic – low sheen | |
| Walls: wet/other areas | Washable acrylic – low sheen suitable for use in wet areas | |
| Ceilings: dry areas | Acrylic - Flat | |
| Ceilings: wet areas | Acrylic - Flat suitable for use in wet areas | |
| Joinery: trim | Washable acrylic – Satin finish | |
| Joinery: timber trim | Gloss enamel | |
| Steel | External enamel - Gloss | |
| Concrete Floors (internally) | Luxafloor ACS | Dulux Protective Coatings or equal approved by the Owner |
| | | |
| **External** | | |
| Concrete tilt panel | External acrylic – Semi gloss | Dulux Weathershield or equal approved by the Owner |
| Concrete tilt panel – Anti graffiti coating | Precision Anti-graffiti coating | Dulux or equal approved by the owner |
| Fibre cement: Walls | External acrylic – low sheen | |
| Fibre cement: Soffit | External acrylic – low sheen | |
| FRC trims | External enamel – Gloss | |
| Timber | External enamel – Gloss | |
| Steel | External enamel – Gloss<br>Refer to the structural engineer's notes for the complete finishing systems for exposed steelwork | |
| Exposed aggregate pathway | Non-yellowing clear penetrating sealer suitable for external use | To the approval of the Owner |

All internal paints are to be low VOC or environmental paints.
Add clear, washable sealant on surfaces indicated on drawings.

**PREPARATION** *Inspect conditions at site before starting work.*
Consider all OHS&E risks and ensure all selected controls are documented.
Ensure fall prevention strategies are in place and workers follow statutory and manufacturer OHS&E requirements.
Prepare each surface to be painted in accordance with AS/NZS 2311 and the paint manufacturer's instructions.
**Control panel**
Prepare a control panel of 2 square metres of each paint type. Stop. When approved by Owner, continue.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Owner will check each prepared surface. Do not proceed with painting until check completed. Apply scheduled coats and paint types to manufacturer's instructions, and AS/NZS 2311.
Delivery storage and handling:
A. Store materials in designated spaces in a manner which meets the requirements of applicable codes and fire regulations. When not in use, keep such spaces locked and inaccessible to those not employed under this section.
B. Provide each space with a fire extinguisher of carbon dioxide or dry chemical type bearing a tag of recent inspection.
C. Bring materials to the building and store in manufacturer's original sealed containers, bearing the manufacturer's standard label, indicating type and colour. Deliver materials in sufficient quantities in advance of the time needed in order that work will not be delayed in any way.
D. Contractor to leave adequate left-over paint in marked containers for touching up and maintenance.
.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and installation of underlay, carpet and accessories. Provide spare carpet.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Concrete, carpentry.
Installation of floors, joinery, preparation of surfaces under and adjacent to floors to receive carpet.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition.*
AS/NZS 1385 2007 *(R2016)* Textile floor coverings - Metric units and commercial tolerances for measurement.
AS 1530 Methods for fire tests on building materials, components and structures.
1530.1 1994 *(R2016)* Combustibility test for materials.
AS/NZS 1530.3 1999 *(R2016)* Simultaneous determination of ignitability, flame propagation, heat release and smoke release.
AS 1860.2 2006 *(R2016)* Particleboard flooring – Installation.*1 Amdt, 2010.*
AS/NZS 2270 2006 *(R2016)* Plywood and blockboard for interior use. *1 Amdt 2007.*
AS/NZS 2455 Textile floor coverings - Installation practice.
2455.1 2019 General.
*This standard provides full instructions of pre-installation requirements and installation methods.*
2455.2 2019 Carpet tiles.
AS 4288 2003 *(R2016)* Soft underlays for textile floor coverings.

Comply throughout with the current edition of the NCC.
**Industry standards**
Comply with industry standards as applicable to the proposed installation and refer to manufacturer's specifications for Australian Standards as applicable to project requirements.
Coordinate fully with access requirements as may be applicable to this trade section.
**Manufacturer's specifications**
Comply with the manufacturer's specifications for the installation and the structural components of this trade.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| Modular commercial carpet tiles: Refer to the architectural drawings for extent | Cubic collection– Carpet tiles Colour to be selected | Interface FLOR or equal approved by the Owner |

**Associated documents**
Read this trade section in conjunction with the following:
NCC requirements for materials as applicable to the project type.
**Spare carpet tiles**
Provide spare carpet of each type laid, 5% of area laid. Store where instructed.

**PREPARATION** *Inspect conditions at site before starting work*
Consider all OHS&E risks and document selected controls.
Refer to manufacturer's specifications for preparation of the substrate and provide the necessary remedial action for the substrate as may be necessary to ensure full compliance.
Ensure floors are dry, clean with no hills or valleys. Apply self-levelling compounds to achieve a flat surface where surface level tolerances (10mm in any room or area or 4mm in any 2m length) are exceeded. Comply with AS/NZS 2455.1.
Comply to ensure moisture content of concrete does not exceed the stated limit. Repair imperfection of the floor surface which might impair the finished carpeted surfaces. Broom clean or vacuum clean surfaces upon which carpet is to be laid.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Test concrete for moisture content to AS/NZS 2455. Secure carpet fixings to manufacturer's instructions.
Lay underlay. Stretch carpet and secure to fixings.
On completion of laying each section of carpet, vacuum the surface clean.
Form junctions of different materials (e.g., tiles to carpet) so that they occur under the centre line of doors.

**COMPLETION**
Complete work in accordance with instructions and written variation orders satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and install floor mat and frame recessed into concrete floor slab at Tenancy 1 entry to building.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Concrete, floor coverings.

**COMPLY WITH APPLICABLE CLAUSES OF THE NCC** *Current edition*.

| | |
|---|---|
| AS 1397 2011 | Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium. *1 Amdt 2012.* |
| AS/NZS 1554 | Structural steel welding. |
| | 1554.1 2014 Welding of steel structures. *Amdts 2015, 2017.* |
| AS 4586 2013 | Slip resistance classification of new pedestrian surface materials. *1 Amdt 2017.* |

**MATERIALS TO BE USED** *No variations to the selected materials will be accepted without written approval*
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Description | | Manufacturer/Supplier |
|---|---|---|---|
| | | | |
| Mat | Size | 1500 x 900 | Birrus or equal approved by the Superintendent |
| | Type | Delux Rib | |
| | Colour | Charcoal to approval | |
| | Location | Front entry door – Tenancy 1 – refer to the drawings | |
| | | | |

**PREPARATION** *Inspect conditions at site before starting work*
Consider all OHS&E risks and document selected controls, including public.
Inspect conditions at site before starting work. Provide plywood or solid timber slab to concreter for placement in position of future floor mat before concrete is poured.
Allow for depth of screed and timber slab.

**ON-SITE ACTIONS** *Start of work means total acceptance of condition*
Secure the brass angle frame to concrete with galvanised masonry anchors. Place concrete screed so that top of screed is level with top of horizontal leg of the brass angle.
When screed is dry, clean the material in the recess and place mat in recess.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Design engineer supply and install metal stairs and handrails including stringers, treads, risers, handrails and balustrades, landings, finishing.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Floor and wall framing, masonry, concrete, metalwork, painting, floor finishes.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | |
|---|---|
| AS 1397 2011 | Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium. *1 Amdt 2012.* |
| AS 1428 | Design for access and mobility. |
| | 1428.1 2009 General requirements for access – New building work. *2 Amdts 2010, 2017* |
| AS/NZS 1554 | Structural steel welding. *There are numerous parts, 2003-2014. 4 Amdts 2003, 2015, 2017.* |
| AS/NZS 1576 | Scaffolding. |
| | 1576.1 2019 General requirements.AS 1576.6 2020 Scaffolding Metal tube-and-coupler scaffolding - Deemed to conform to AS/NZS 1576.1. |
| AS 1657 2018 | Fixed platforms, walkways, stairways and ladders- Design, construction and installation. |
| | 1627.1 2007 *(2017)* Removal of oil, grease and related contamination. |
| | 1627.4 2005 *(2017)* Abrasive blast cleaning of steel. |
| AS/NZS 1664 1997 *(2020)* | Aluminium structures |
| | 1664.1 1997 *(2020)* Limit state design. |
| | 1664.2 1997 *(2020)* Allowable stress design. |
| AS/NZS 1665 2004 *(R2016)* | Welding of aluminium structures. |
| AS 3715 2002 *(R2017)* | Metal finishing - Thermoset powder coatings for architectural applications of aluminium and aluminium alloys. |
| AS 4576 2020 | Guidelines for scaffolding. |
| AS 4586 2013 | Slip resistance classification of new pedestrian surface materials. *1 Amdt 2017.* |
| AS/NZS 4680 2006 *(R2017)* | Hot-dip galvanised (zinc) coatings on fabricated ferrous articles. |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| Steel | Hot dipped galvanised | |
| Stringers | Steel plate | |
| Treads | Steel checker plate | |
| Landings | 25mm structaflor | |
| Handrail | Galvanised steel – circular to code | |
| | | |
| | | |
| Finish | Hot-dip galvanised. | |

**PREPARATION** *Inspect conditions at site before starting work*
Before commencing on site, review services owner requirements for working on, near or over services, documentation on existing services, locate and identify existing services before working over or near them so as not to damage them.
Ensure OHS&E risks and controls have been considered and documented.
Prepare surfaces to which stairs are to be fixed. Install anchor or holding down bolts. Weld steel items and grind smooth. Provide smooth finishes to exposed surfaces with sharp well-defined lines and arrises. Mill machined joints to a close fit. Design necessary lugs, brackets and similar items so that work can be assembled and installed in a neat, substantial manner. Provide holes and connections as required to accommodate the work of other trades and for site assembly of metalwork. Drill or punch and ream in the shop.
Fasteners: provide required bolts, screws, inserts, fasteners, templates and other accessories required for a complete installation. Coordinate with other trades as to the proper fastening systems suitable for the substrates to which the item is to be secured. Refer to architect if in doubt. Fasten galvanised items with galvanised fasteners.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Measure at site before manufacture. Fixing: base plates to concrete with expanding masonry anchorage fixings. Base plates to timber with coach screws. Tubular handrails: provide to situations shown on detail drawings, tubular handrails of the sections indicated, neatly stop ended, fixed to handrail posts by retractable pins. Installation: assemble treads, handrail and stair components in the position indicated or the stairwell provided. Join mechanically on site without site welding. Adjust to suit floor to floor heights with factory cut spacers only. Ensure every surface is smooth with no fixings which could damage hands.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and install metalwork items shown on the Architectural Metalgoods and Whitegoods Schedule.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Electrical installation, gas installation.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.
AS/NZS 1554 Structural steel welding. *There are numerous parts, 2003-2014. 4 Amdts 2003, 2015, 2017.*
AS 1627 Metal finishing – Preparation and pretreatment of surfaces. *There are 6 other parts, 1997-2005.*
1627.5 2003 *(R2017)* Pickling.
AS/NZS 1664 Aluminium structures. *There are 2 parts and 2 Supplements., 1997. (Reconfirmed 2020)*
AS/NZS 1665 2004 *(R2016)* Welding of aluminium structures.
AS/NZS 1841 Portable fire extinguishers *There are 8 parts referring to different fire extinguishers.*
AS/NZS 4353 1995 Portable fire extinguishers - Aerosol type.
AS/NZS 4680 2006 *(R2017)* Hot-dip galvanised (zinc) coatings on fabricated ferrous articles.
Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| | Refer to 'Door Hardware Solutions' metalwork schedule at the end of this specification | |
| | | |

**PREPARATION** *Inspect conditions at site before starting work*
Ensure OHS&E risks have been considered and documented.
Field measurements: do not delay job progress. Allow for adjustments and fitting of the work in the field where taking of measurements might cause delay. Ensure statutory hazards and risks have been identified and managed in compliance with statutory requirements.
Provide smooth finishes to exposed surfaces with sharp well-defined lines and arrises. Mill to a close fit machined joint. Design necessary lugs, brackets and similar items so that work can be assembled and installed in a neat, substantial manner.
Provide holes and connections as required to accommodate the work of other trades and for site assembly of metalwork. Drill or punch and ream in the shop.
Fasteners: provide required bolts, screws, inserts, fasteners, templates and other accessories required for a complete installation. Coordinate with other trades as to the proper fastening systems suitable for the substrates to which the item is to be secured. Refer to architect if in doubt.
Fasten galvanised items with galvanised fasteners.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Inspect fabrication on arrival at site. Do not repair on site. Replace damaged items. Install each item by bolting or screwing to structural elements of building. Locate anchorages accurately and ensure secure installation. Do not cut metal on site. Remove weld spatter and touch up with zinc rich paint immediately. Protect work until project completion.
Install whitegoods and similar items in accordance with manufacturer's instructions.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to*
Supply and install a complete range of plumbing fixtures and fittings including hardware and accessories.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Floor construction, wall construction, ceiling construction, water distribution, sanitary sewerage, ceramic tile.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition:*

| | | |
|---|---|---|
| AS 1172 2014 | Sanitary plumbing products. Personal hygiene fixtures and appliances. | |
| | 1172.1 2014 | Water closets (WCs) Pans. *1 Amdt 2018.* |
| | 1172.2 2014 | Flushing devices and cistern inlet and outlet valves. |
| | 1172.3 2019 | Bidets and bidettes. |
| | 1172.4 2019 | Washbasins. |
| | 1172.5 2019 | Baths for ablutionary purposes. |
| AS/NZS 1229 2002 (*R2017)* | Laundry troughs and tubs. | |
| AS 1428 | Design for access and mobility. | |
| | 1428.1 2009 | General requirements for access – New building work. |
| AS/NZS 1546 | On-site domestic wastewater treatment units. | |
| | 1546.1 2008 | Septic tanks. |
| | 1546.2 2008 | Waterless composting toilets. |
| | 1546.4 2016 | Domestic greywater treatment systems. |
| AS 3861 1991 | Spa baths. | |
| AS/NZS 3982 1996 | Urinals. | |

Comply with current printed instructions supplied by manufacturer.
Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Description | Model No. | Manufacturer/Supplier |
|---|---|---|---|
| Refer to the sanitaryware and tapware fixtures schedule as the end of this specification | | | |

**PREPARATION** *Inspect conditions at site before starting work*
Consider all OHS&E risks and document selected controls.
Obtain approval to disturb floor and wall tiles before securing pedestals and wall fixings where required.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Secure or hang components straight and plumb according to manufacturer's instructions. Install hardware and accessories. Ensure all components work as manufacturer intends. Clean all surfaces on completion.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Design, supply and install required items including but not limited to: signs for the universal access.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work.*
Wall framing, wall cladding, masonry, external doors, fibre cement, floor construction, finishes.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current Edition*
Comply with applicable portions of the following Australian Standards:

| | |
|---|---|
| AS 1319 1994 *(R2018)* | Safety signs for the occupational environment. |
| AS 1397 2011 | Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium. *1 Amdt 2012.* |
| AS 1428 | Design for access and mobility. |
| | 1428.1 2009 General requirements for access – New building work. |
| | 1428.2 1992 *(R015)* Enhanced and additional requirements – Buildings and facilities. |
| | 1428.4.2 2018 – Means to assist the orientation of people with vision impairment – Wayfinding signs. |
| AS/NZS 1554 | Structural steel welding. |
| | 1554.1 2014 Welding of steel structures. *Amdts 2015, 2017.* |
| AS 1742.1 2014 | Manual of uniform traffic control devices – General introduction and index of signs. |
| AS/NZS 2293 | Emergency lighting and exit signs for buildings. |
| | 2293.1 2018 System design, installation and operation. |
| | 2293.2 2019 Routine service and maintenance. |
| | 2283.3 2018 Emergency luminaires and exit signs. |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| | Refer to 'Door Hardware Solutions' sign schedule at the end of this specification | |
| | | |

**PREPARATION** *Inspect conditions at site before starting work.*
Consider all OHS&E risks and document selected controls.
Ensure fall prevention strategies are in place.
Prepare areas and surfaces affected by the installation in accordance with manufacturers and/or Owner's written instructions so that best conditions exist. Clean surfaces to receive installations and ensure substrates are suitable for connection and support of attached devices.
Clean surfaces to receive silicone sealants.
Where necessary, ensure that lighting cable is in place and concealed ready for connection to light fittings within illuminated items.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions.*
Visit site and inspect conditions, comparing conditions to drawings before delivery of materials to site.
Rectify discrepancy or unsuitability of substrate.
Space enclosure: do not install materials until space is enclosed and weatherproof, and until wet-work in space is completed and nominally dry.
Prepare areas and surfaces before installation, so that best conditions exist. Where necessary, ensure that lighting cable is in place and concealed ready for connection to light fittings within illuminated items.
Comply with manufacturers' written instructions. Provide appropriate anchoring devices, concrete pads for external signs. Fit: finish work accurately, plumb, level, square and true in reference to adjacent construction.
Protection of work:
Take care of and protect adjacent surfaces and materials. Provide protective cover to adjacent finishes where necessary.
Cover work immediately following installation, wrap or cover signage to avoid wear and tear of finish during subsequent construction. Replace or make good work found damaged at the time of Practical Completion.

**CLEANING**
Clean materials installed and surrounding areas to the satisfaction of the Owner. Thoroughly clean areas in which work has been performed and those adjacent to the work area.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to*:
Excavation, preparation of sub-grade, base courses, laying and compaction, bituminous concrete surfacing, lane marking.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work:*
Excavation and fill, sanitary sewerage, storm drainage, concrete pavement, kerbs and gutters.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*

| | |
|---|---|
| AS 2008 2013 | Bitumen for pavements. |
| AS 2150 2020 | Asphalt – A guide to good practice. |
| AS 2758 | Aggregates and rock for engineering purposes. *There are 7 parts, 2008-2019.* |
| AS/NZS 2890 | Parking facilities. |
| | 2890.1 2004 Off street parking. |
| | 2890.6 2009 Off-street parking for people with disabilities. |
| AS 4049 | Paints and related materials - Pavement marking materials. |
| | 4049.1 2005 *(R2016)* Solvent-borne paint. For use with surface applied glass beads. |
| | 4049.2 2005 *(R2016)* Thermoplastic pavement marking materials. For use with surface applied glass beads. |
| | 4049.3 2005 *(R2016)* Waterborne paint. For use with surface applied glass beads*. 1 Amdt 2006.* |
| 4049.4 2006 *(R2016)* | High performance pavement marking systems. AUSTROADS supplies a range of technical bulletins. |

Where relevant, comply with standards of pavement construction as available from state road construction authority.
Comply throughout with the current edition of the NCC.

**MATERIALSTO BE USED**
Comply with the material specification of the appropriate state road construction authority. Such specifications define materials required for various classes of load capacity.

Refer to the drawings for extent**. Refer to the structural engineer's drawings for additional information**

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| Wheelstops | 1650mm long x 100mm high x 135mm wide<br>Colour: Grey | Replas or similar approved by the owner<br>1800 737 527 |
| Bollards | Hot dipped galvanised protection bollards with paint finish and concrete footing in accordance with the structural engineer's drawings. | To approval |
| Lane marking (general parking) | Nom. 75mm wide lines<br>Colour: white | To approval |
| Lane marking (universal access bay) | Nom. 75mm wide lines<br>All marking to be in accordance with Australian standards and codes.<br>Colour: yellow | To approval |

**Lane Marking**
Local council will provide specification.
**Equipment**
Provide and employ equipment required for satisfactory completion of the work.

**PREPARATION** *Inspect conditions at site before starting the work.*
Review services owner requirements for working on, near or over services at the location. Locate and identify existing services before excavation commences. Review controls on site to contain and manage spills.
Ensure that suitable conditions exist at the time of start of work. Prevent delay in job schedule. Remove surface material to required depth. Test compaction capacity of natural material. Fill soft spots with crushed rock to required compaction. Shape to specified falls. Allow for installation by other trades of drainage and other items.
Comply with civil engineer's instructions.

**ON SITE ACTIONS** *Start of work means total acceptance of conditions.*
**Installation of Base Course**
Comply with state road construction authority. See above or spread base course material in layers between 100 and 150mm thick. Compact to 100% of standard maximum dry density with minimum 10 tonne roller. Employ a vibrating roller as necessary. Maintain damp condition of material until seal is applied. Employ 15 tonne roller for final compaction.
**Testing**
Allow for 3 separate compaction density tests to be conducted in random locations by a NATA approved testing organisation. Should tests prove unsatisfactory, repair the work and repeat tests to a satisfactory result without cost to the proprietor.
**Pavement Courses**
Finish pavement courses consisting of layers of wet-mix crushed rock to smooth and uniform surfaces and conform to the lines, grades and cross sections shown on the drawings, within the following limits:
A. Level: the top of each pavement course: within 10 mm of level shown on drawing.

B. Thickness: of the top course of the Wet Mix pavement: within the tolerance of +5, -10mm.

C. Shape: finished surface of the pavement course: within 10mm either way from a 3 metre straight-edge laid parallel to the centre line of the pavement or from a template placed at right angles to the centre-line.

**Prime Coat**

Prime with cut back bitumen suitable for the surface of base material and prevailing weather conditions. Apply in compliance with state authority specification.

**Tack Coat**

If required, apply tack coat to clean dry surface. Consulting engineer will determine necessity for this item. Apply in compliance with state authority specification.

**Bituminous Concrete**

Prepare adjacent surfaces such as longitudinal joints, kerbs, channels, headers, manholes, etc. with a thin uniform tack coat. Install bituminous concrete with approved equipment in suitable climatic conditions. Form straight and waterproof joints with even texture and density.

Compact without delay, and finish smooth and true to established grades.

Thoroughly compact areas around kerbs, channels, manholes to same density as other surfaces.

Thickness of bituminous concrete is not to vary more than 7mm from that indicated on drawings.

Replace low or defective areas immediately by cutting out and replacing with fresh hot mix and compacting to conform to surrounding areas. Entire area is to be free draining on completion.

The finished work is not to be less than 97% of laboratory tested specified density.

**Lane Marking**

Comply with local authority requirements regarding sizes of parking bays and traffic control.

Mark pavement surface as instructed. Comply with AS 4049.

**COMPLETION**

Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and install tactile warning surface material.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Concrete, floor finishes, tiles.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | |
|---|---|
| AS 1428 | Design for access and mobility. *There are 5 other parts, 1992-2018.* AS/NZS 1428.4.1 2009 Means to assist the orientation of people with vision impairment – Tactile ground surface indicators. *2 Amdts 2010, 2014.* |
| AS 1884 2012 | Floor coverings - Resilient sheet and tiles - Installation practices. |
| AS/NZS 3661.2 1994 | Slip resistance of pedestrian surfaces - Guide to the reduction of slip hazards. |
| AS/NZS 3662 2013 | Performance of showers for bathing. *1 Amdt 2017.* |
| AS 4586 2013 | Slip resistance classification of new pedestrian surface materials. *1 Amdt 2017.* |
| AS 4663 2013 | Slip resistance measurement of existing pedestrian surfaces. |
| HB 197 1999 | An introductory guide to the slip resistance of pedestrian surface materials. |

Comply also with instructions of manufacturers of materials to be installed.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| Tactile Ground Surface Indicators (TGSI's) | 300 x 300 'Ultimat' Tactile - Injection moulded TPU integrated TGSI – Direct stick<br>Colour- Yellow<br>Product code: DWU0011 | DTAC |

**PREPARATION** *Inspect conditions at site before starting work*
Review services owner requirements for working on, near or over services at the location, locate and identify existing services before excavation commences.
Provide a description of the layout pattern and number of indicators per square metre.
Examine the surfaces to be treated. Ensure that flooring material is secure and clear.
Test the dryness of concrete.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Comply throughout with manufacturer's current written instructions, including the health, safety and environmental recommendations for storage, decanting, use and disposal of unwanted product. Contain and control all dusts created during installation of tactile warning surfaces, indicators etc. Review Material Safety Data Sheets of any chemicals to be used to install tactile warning surfaces, indicators etc.
Remove excess adhesive and guide lines from completed areas, disposing as per manufacturer recommendations.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and installation of boundary, site fences.

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Carpentry, metalwork, concrete, painting.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | |
|---|---|
| AS 1379 2007 *(R2017)* | Specification and supply of concrete. *There are 2 Amdts 2009, 2015 Supplement 2008.* |
| AS 1725.1 2010 | Chain-link fabric security fencing and gates – Security fences and gates – General requirements. |
| AS 1926 | Swimming pool safety. *There is 1 more part.* |
| | 1926.1 2012 Safety barriers for swimming pools. |
| | 1926.2 2007 *(R2016)* Location of safety barriers for swimming pools. |
| AS 2820 1993 | Gate units for private swimming pools. *1 Amdt 2000.* |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**
**NOTE: ENSURE THAT IMPORTED PRODUCTS HAVE WRITTEN TEST EVIDENCE OF COMPLIANCE WITH THE REQUIREMENTS OF RELEVANT AUSTRALIAN STANDARDS AND NCC PERFORMANCE GUIDELINES.**

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| Carparking balustrade | Proprietary powdercoated aluminium fixed to face of reconstituted limestone retaining wall.<br>Settler or similar approved by the Owner<br>Refer to the stie plan for extent. | Southwest fencing and Balustrades |
| Bin enclosure Fence | 1800 high colorbond 'neetascreen' – colour to be selected | To approval |
| Bin enclosure Gates | 2no. 1500 wide x 1800 high colorbond 'neetascreen' – colour to be selected. Frame and fix as required to provide secure and stable installation. Provide all support post and concrete footings. Provide strap bolts to each gate. Provide 'D' latch with locking capability using padlock (padlock provided by Owner) | To approval |

**PREPARATION** *Inspect conditions at site before starting work*
Prepare footings for posts of concrete or timber. Consider adjoining property owners, tenants and public during installation of fences and gates.

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Place concrete or timber bracing for footings. Construct fence vertical, straight and brace at corners. Construct to manufacturer's instructions, and according to manufacturer's detail drawing. Protect public and other persons when installing on site boundaries.

**COMPLETION**
Complete work in accordance with instructions and written variation orders to satisfactory performance.

**END OF SECTION**

**SCOPE OF WORK** *Perform work described here and shown on drawings including but not limited to:*
Supply and installation of landscape works including as required, reconstituted limestone retaining walls, 90mm PVC sleeves for reticulation pipework and cabling. Refer to the drawings (Reticulation, landscaping, and planting by the Owner)

**COOPERATE WITH THESE OTHER TRADES** *to resolve possible problems before starting work*
Site preparation, drainage, water reticulation, electrical installation, masonry construction.

**COMPLY WITH APPLICABLE CLAUSES OF THESE AUSTRALIAN STANDARDS** *Current edition*.

| | |
|---|---|
| AS 2303 2018 | Tree stock for landscape use. |
| AS 2698 | Plastic pipes and fittings for irrigation and rural applications. |
| | 2698.2 2000 *(R2017)* Polyethylene rural pipe. |
| | 2698.3 1996 *(R2017)* Mechanical joint fittings for use with polyethylene micro-irrigation pipes. |
| AS 2758.1 | Aggregates and rock for engineering purposes – Concrete aggregates. |
| AS 3600 2018 | Concrete structures. |
| AS/NZS 3660 2014 | Termite Management Set. |
| AS 3735 2001 | Concrete structures retaining liquids. |
| AS 4419 2018 | Soils for landscaping and garden use. |
| AS 4454 2012 | Composts, soil conditioners and mulches. *2 Amdts 2012, 2018.* |
| ASTM D 1241 2015 | Specification for Materials for soil-aggregate subbase, base and surface courses. |
| ASTM D 5268 2019 ed1 | Standard specification for Topsoil used for Landscaping and Construction Purposes. |
| ICC 802 2014 | Landscape Irrigation Sprinkler and Emitter Standard. |

Comply throughout with the current edition of the NCC.

**MATERIALS TO BE USED**

| Item | Description | Manufacturer/Supplier |
|---|---|---|
| Retaining (wall) systems | Reconstituted limestone block<br>Colour 'Cream'<br>Nom. 500L x 350W x 350H<br>Refer to the structural engineer's drawings for detail | To approval |

**PREPARATION** *Inspect conditions at site before starting work*

**ON-SITE ACTIONS** *Start of work means total acceptance of conditions*
Install all systems according to the drawings and construct retention structures. Protect public and other persons when installing on site boundaries.

**COMPLETION**
Complete work in accordance with instructions and written variation orders.

**END OF SECTION**

# APPENDIX 1 – Electrical Consultant Specification

ENQUIRIES: Lee Shippin
PROJECT NO: 21013

7 July 2021

D`Agostino + Luff Architects

Attention: Stuart Luff

Dear Sir,

**Proposed commercial development - Lot 69 (#23) Antlia Way, Australind- Electrical Services, Compliance Letter for Building Design & Specification**

We confirm the *Electrical Services* design and specification is compliant with the National Construction Code 2016, Volume 1, Amendment 1 (Building Code of Australia Class 2 to Class 9 Buildings). The building services that form part of the Electrical Services installation and; Australian Standards that have been relied upon and used for certification of the building services are listed below;

| Building Service | Australian Standard |
|---|---|
| Wiring Rules | AS/NZS 3000:2018 |
| Emergency escape lighting and exit signs for buildings | AS/NZS 2293.1-2005 |
| Interior and workplace lighting | AS/NZS 1680.1:2006 |
| Smoke detection | AS/NZS 3786:2014 |
| | |
| Compliance with NCC Part J6 as applicable | |

## Reference Documentation

Refer to the document transmittal attached for a list of the Electrical Services drawings and specification.

| Competent Person | |
|---|---|
| Name of Competent Person | Lee Shippin |
| Company Name | BSDS Consultants |
| Contact Number (business hours) | 0417 056 405 |
| Email address | lee@bsdsconsultants.com.au |
| Postal Address | PO Box 1214, Bunbury WA 6230 |
| Date | 7 July 2021 |
| Signature of Competent Person | Lee Shippin |

# SPECIFICATION

## ELECTRICAL SERVICES

CDC ISSUE

LOT 69 #23 ANTLIA WAY AUSTRALIND

BSDS CONSULTANTS PTY LTD

# Document Control Record

Specification prepared by:

**BSDS CONSULTANTS PTY LTD**
ABN 89 625 303 960

www.bsdsconsultants.com.au

PO Box 1214, Bunbury WA 6231

**E** info@bsdsconsultants.com.au



| Document control | | | | |
|---|---|---|---|---|
| Project Name | LOT 69 #23 ANTLIA WAY | | Project Number | 21013 |
| Specification Title | Electrical Services Specification | | Revision Number | B |
| Document ID | SP21013-E | Reason for Issue | DRAFT | |

| Rev | Date | Description / Status | Author | Approved |
|---|---|---|---|---|
| A | 30-Jun-21 | draft | Mark Malekin | Lee Shippin |
| B | 7-July-21 | CDC Issue | Mark Malekin | Lee Shippin |
| | | | | |
| | | | | |
| | | | | |

| Approval | |
|---|---|
| Approver Signature: | Lee Shippin |
| Name: | Lee Shippin |
| Position: | Company Director |

# 1. ELECTRICAL SERVICES

## 1.1 The Project

The proposed commercial development at lot 69 (#23) Antlia Way, Australind. The project comprises the build of a commercial showroom/office.

D`Agostino + Luff Architects in conjunction with BSDS CONSULTANTS PTY LTD and other specialist consultants has been awarded the building design work on behalf of the client.

## 1.2 Contract Documents

The Electrical Services Contract drawings supplied with this specification are diagrammatic and approximate only and indicate the proposed and or general alignment of the Electrical services however, these services may be offset or relocated to suit actual on-site conditions, structural elements and order of work determined by the Head Contractor.

Liaise and co-ordinate with the Head Contractor and other service Sub-Contractors as is necessary to ensure any change will not affect or impede the installation of any other building services or necessitate a variation to the Contract sum.

The Electrical Services Sub-Contractor is to provide as part of the awarded sub-contract, all minor parts and items of equipment, which are clearly inferred and or required under the relevant Australian Standards which are necessary for the completion of the work and the complete integration with other building services trades without extra charge.

This Specification forms the Electrical Services Trade Package Section of the whole specification and is to be read as part of and in conjunction with the whole specification in particular, the General Conditions of the Head Contract and Contract Preliminaries, which will govern the Contract.

## 1.3 Responsibility Matrix

Refer to the Head Contract specification.

## 1.4 Contractual Relationships

Responsibilities and duties of the principal, Contractor and the Superintendent as defined in the Head Contract are not altered by this specification.

## 1.5 Building Codes, Standards & Controlling Authorities Requirements

The Electrical Services are to be installed in accordance with the National Construction Code 2019 amendment 1 and referenced Australian Standards therein as are relevant and applicable to the installation of the Electrical Services. Australian Standards, codes of practice and similar recognised standard references are to be of the latest revision.

The following take precedence over the service requirements shown on the Contract drawings and this specification: Legislative Federal, State and Local Authority Requirements.

## 1.6 SCOPE OF WORK

The work described by this section of the specification comprises the supply, delivery, installation, testing, commissioning, maintenance and defects fault rectifications of electrical services and associated equipment. The work includes the detail design of various components such as switchboards, control circuits, low voltage systems, etc. Refer elsewhere in the specification for specialist mechanical and hydraulic electrical services, controls and the like required to be installed in accordance with this section of the specification.

This specification indicates the required methods of installation of the various electrical services. However, where full details are not given in this specification, include everything necessary for the convenient, safe, efficient and correct operation of such services.

Examine all building and trade specifications and drawings so as to be fully informed of the intent, extent and nature of the works. This includes the connection and/or control, of various items of electrical equipment supplied and to be connected/controlled in accordance with other sections of the specification.

Coordinate and liaise with other trades to reduce any conflict between trade information shown on electrical services documentation and the associated trade without cost variation.
All Drawings and Specifications shall be considered as co-operative and any work omitted from one but inferred or present in the other shall form part of the Contract.

Detailed Clauses herein provide a more detailed description of various elements of the services to be provided. The work includes but is not restricted to the detailed design, manufacture, supply, installation, testing and maintenance of electrical and associated services including but not limited to:-

- Power Supply and Distribution
- Surge diversion/surge arrest
- Conduit
- Earthing
- Switchboards
- Cabling
- Fittings and Accessories
- Power
- Connection of hot water units
- Lighting
- Exhaust fans cabling and control

## 1.7 ASSIGNMENT/SUB-CONTRACTING

Nominate with tenders, proposed companies for which the work described within this section of the specification, will be assigned or subcontracted.

Do not further assign or sub-contract any part of the works described in this section of the specification to another party without the express written approval of the Superintendent. Refer to preliminaries.

## 1.8 PROGRAMMING OF WORK

Submit to the Superintendent within thirty (30) days of awarding of contract a program/flow chart of works described in this section of the specification. Prepare the programme/flow chart in liaison with other trades and reflecting critical activities identified on the approved construction programme. Illustrate timing of installation on the programme/chart including approval periods, ordering dates, delivery and installation times for electrical

materials and equipment. Also identify major activities to be carried out during electrical services commissioning (i.e. Thermographic survey, phase balancing and the like).

## 1.9 QUALITY CONTROL AND QUALITY ASSURANCE

Prepare and implement a quality control and assurance program for the whole of the works described in this section of the specification and submit a copy to the Superintendent within fourteen (14) days of award of contract.

Maintain effective control of the quality of the equipment and materials, provide test facilities and perform all examinations and tests to demonstrate conformance of the equipment and materials to the technical requirements of the specification.

Provide objective evidence to prove that controls and inspections are effective. For this purpose objective evidence means any statement of fact, quantitative or qualitative, pertaining to the quality of the supplies based on observations, measurements or tests which can be verified.
The Superintendent reserves the right to perform any examination or tests to ensure that the equipment or services provided conforms to the technical requirements of the specification and to reject any equipment/service which does not conform.

The inspection of the quality assurance program or the marking of a component, shop drawing, assembly or inspection document by the Superintendent shall not be construed as an act of acceptance nor shall it relieve any obligation under the Contract.

Amend any element of the program deemed ineffective by the Superintendent to conform to the Superintendent requirements.
The program shall include but not be limited to the following checklists:

- job safety / risk analysis / JSA's in accordance with National OHS Strategy Guidelines
- supply and approval of pamphlets or samples and colour selection for all equipment
- depth of underground conduits
- testing and commissioning of equipment, materials and installation
- authority approvals and applications
- testing of luminaires requiring 'night test'
- confirmation that each luminaire has the correct lamp type, size and colour temperature
- confirmation of equipment loads and locations prior to installation
- confirmation of switchboard sizes and spaces allocated or cupboard sizes prior to submission of workshop drawings
- submission of shop drawings
- 'As constructed' drawings – recording of information Give adequate written notice to the Superintendent to inspect the work.

## 1.10 VARIATION PRICING

Submit variations costs and/or extensions of time claims associated with proposed variations within time period as set out in conditions of contract or where not indicated within two (2) weeks of receiving documentation instructions of the relevant change. Where such notice is not submitted, the instruction is deemed to have no cost or time implications to the Contract.

Unless previously agreed that unit rates can be applied to variations, all prices shall be broken down into material quantities, material costs, labour (hours) and cost of labour.

All variation requests received shall be listed separately on monthly progress claims with date received, date

submitted, amount and date of approval.

## 1.11 SUPERVISION AND COORDINATION

Employ during hours when work is being carried out until the Date of Practical Completion a competent Supervisor who shall have sufficient command of the English language and of Australian construction and technical terminology, to be able to read, converse and receive instructions in English. The Supervisor shall be empowered to make decisions on behalf of the Contractor / Subcontractor as appropriate.

Employ on the site of works an Electrical Services Supervisor or other suitably qualified and experienced person to manage and coordinate the installation of all electrical services and associated works as detailed in this specification. The responsibilities of the Electrical Services Supervisor include but are not limited to the following:

- Check and coordinate all works against shop drawings of other trades and notify Superintendent of any discrepancies between the electrical services drawings and other trade drawings;
- Check, coordinate, integrate, accept and endorse shop drawings and submit same to the Superintendent for review as required;
- Brief, coordinate and liaise with the Contractor, all subcontractors, Consultants and Authorities to ensure the supply, installation and commissioning and resultant data provided for Superintendent's approval is consistent with the requirements of the Contract;
- Prepare detailed progress reports on testing and commissioning;
- Detailed programming and interfacing of commissioning activities for all services as detailed in this specification;
- Arranging meetings with interested parties, including Consultants and Authorities as appropriate, to deal with commissioning and testing and to chair and minute such meetings. Minutes are to be issued within three (3) days to all attendees and the Consulting Engineer;
- Compilation, checking and endorsement of operation and maintenance documents, warranties, and 'As Constructed' drawings;
- Attend meetings, assist Principal's staff and prepare status reports on defects during the Defects Liability period, and submit these reports regularly to the Consulting Engineer.

The Electrical Services Supervisor is also responsible for fully briefing and coordinating the participation of the Principal's staff during the testing, commissioning, and handover phases of all services detailed in this specification to the Superintendent's satisfaction.

The Electrical Services Supervisor's participation in the Contract shall commence from the earliest required time and his Site presence, shall, from that time, be sufficient to inspect all electrical work, and liaise with Superintendent, Consultants and Authorities and to attend to other duties as required.

During the latter period of the Contract, and for at least the commissioning period of the Contract, the Electrical Services Supervisor shall be located full time on Site to manage the commissioning process.

## 1.12 RISK MANAGEMENT / OHS

Risks / hazards associated with the construction, commissioning and maintenance of this project shall be managed to contain the risks within defined objectives.

Objectives shall be set to comply with Australian Safety and Compensation Council (ASCC) directives and the Contractors and Subcontractors duty of care responsibilities.

Risk analysis decisions shall be recorded and responsibility for risk containment formally assigned (JSA's, MSDS, etc).

Risk decisions shall be reviewed at site meetings and at time intervals recorded in the original risk analysis and whenever a function is altered or governing legislation or standards are changed.

Risk management and rating shall comply with Australia / New Zealand Standard AS/NZS 4360 Risk Management. Safety analysis shall also be in compliance with ASCC "Guidance on the Principles of Safe Design at Work".
Risk to be managed include but are not limited to:

| Electrical Risks | General Risks |
|---|---|
| Fall arrest systems / ladder access systems. | Construction, operation and maintenance safety / job risks. |
| Work near power aerials. | Normal and emergency modes of operation. |
| Excavation near underground services. | Uninsured deliberate and accidental damage. |
| Safe clearance in front of switchboards. | Probity and integrity. |
| Pit levels / trip hazards. | Shut down of facility or services. |
| Floodlights / lighting access methods. | Failure of critical facilities. |
| Pit proximity to roads / car parks, safe work | Avoiding incurring unplanned costs. practices. |
| Rotating machinery. | Avoiding incurring unnecessary costs. |
| Pit depths – over 1200mm deep, confined space work practice. | Risks of storm, flood, fire, intrusion, duress, hazard, industrial relations. |
| Ceiling access / safety. | Avoiding environmental contamination. |
| Pole setbacks from roads. | Ensuring competency of service providers and subcontractors. |

| Electrical Risks | General Risks |
|---|---|
| Safe lamp disposal. | Warranty, defects liability and ongoing maintenance. |
| EMC / RF radiation | Cost control and life cycle cost. |
| | Security and integrity of facilities, services and information. |
| | Contract management. |
| | Compliance with regulations, policies and guidelines. |

The aim of Risk Management and Job Safety Analysis is to integrate hazard identification into the construction and maintenance process early to eliminate or minimise the risks of injury throughout the life of the project. It encompasses components of the process including facilities, hardware, systems, equipment, products, tooling, materials, controls, layout and configuration.

The Operation and Maintenance handbook specified herein is to include copies of all residual OHS risk information / JSA's associated with the construction and maintenance of the project, along with specific instructions in the safe maintenance and monitoring of all services and products supplied and installed.

## 1.13 DESIGN AND CERTIFICATION

All design undertaken by the Contractor as part of this contract works shall be certified as being fully compliant with the contract documentation, component manufacturer's installation recommendation and all relevant Australian Standard codes, regulations and as further specified within this specification.

## 1.14 "AS NEW" CONDITION ON COMPLETION DATE

Each item of equipment or cabling which is to form part of the permanent installation shall be new, clean and shall not be used for construction purposes. Equipment shall be energised only for necessary testing and

commissioning.

## 1.15 ALTERNATIVE EQUIPMENT

The specification of a proprietary item does not necessarily imply exclusive preference for that item but shall be deemed to indicate required properties of the item such as type, quality, appearance, finish, method of construction, performance and the like.

Alternative proposals that will reduce the cost but not quality or performance of materials, or equipment may be submitted for review with tenders. Preferences shall be given to Australian Manufactured goods.

**A fully complying tender price based on all equipment specified must be submitted with separate attached alternative tenders before alternative tenders are considered.**

The Superintendent may in its absolute discretion adopt or reject any or all alternatives. No claim shall arise from any rejection nor, unless otherwise agreed, shall adoption of an alternative be grounds for any claim for extension of time.

When offering an alternative for approval, provide all available technical information, details of benefits to the Principal, test reports carried out by approved independent testing Authorities, any associated works required by other trades and any other relevant information requested by the Superintendent. Technical information shall include manufacturer, supplier, catalogue reference number, product brochure and comparison sheet of technical performance between specified and alternative offered.

Where alternative luminaires are offered luminaire technical information shall also include lighting calculations for all associated areas indicating illumination and glare levels in accordance with AS 1680. All lighting calculations must be certified by an independent qualified Engineer.

Alternate tender prices submitted shall include the clause numbers of the specification to which the alternatives apply.

No substitution will be authorised through failure of the Contractor to place orders in sufficient time to avoid delays to the Works other than in circumstances where the Contractor can demonstrate that delay in material supply is or was beyond the Contractor's control. No claim shall arise from any refusal of the Superintendent to approve a substitution.

Where specified materials are unobtainable, notify the Superintendent in time to avoid delays to the works. Obtain written instructions from the Superintendent before commencing any work associated therewith.
Generally alternatives will not be considered after the tender closing date.

All alternative proposals offered after closing of tender date must include a benefit to the Principal in the form of reduction in cost, improvement in quality or improvement in performance. Proposals shall also include for the Superintendent/Consulting Engineers costs borne in carrying out a review of the proposed alternatives. These costs shall be charged at commercial rates and shall include for all time, travel and redesign required to ensure alternatives are suitable for use. Confirm costs with Superintendent/Consulting Engineer prior to submission of alternative.

## 1.16 DISCREPANCIES AND QUERIES

Immediately notify the Superintendent of any discrepancy discovered in the documents and obtain instruction as to how the discrepancy is to be resolved before submitting tenders.
Where discrepancies occur during construction notify the Superintendent and obtain instruction as to how the discrepancies are to be resolved before proceeding.

## 1.17 LABOUR

All workmanship shall be of a high standard and only carried out by suitably trained and qualified labour.
Where necessary, employ specialist tradespersons/service providers to carry out work covered by the specification.

## 1.18 SCOPE OF GENERAL CLAUSES

The General Clauses herein apply throughout the electrical installation described in this section of the specification unless varied by detailed clauses and drawings.

## 1.19 REGULATIONS

Materials and workmanship shall comply with all relevant current Australian Standards, Codes and Regulations and also reference codes and Standards listed in the prefaces to those standards and codes. **All installations must comply with AS/NZS 3000: 2018 Wiring Rules.**

Where Australian Standards and Codes do not exist the appropriate International Standard or Codes shall apply. Request an instruction from the Superintendent for amendments to Standards, Codes or Regulations that come into effect during the works and affect the works of the contract.

All work shall comply with the Electricity Supply Authority Regulations, Building Code of Australia, Health Department Regulations, Australian Communications Authority, Local Building Authority, WorkSafe, Western Australia and FESA WA requirements and guidelines.

If any discrepancy exists between the requirements of the specification and the requirements of Standards or authority regulations, the more stringent requirement shall apply. In each case however, request an instruction from the Superintendent.

## 1.20 DRAWINGS

### 1.20.1 CONTRACT DRAWINGS

Confirm the location, electrical ratings and connection details of all electrical equipment and switchboards furnished by all trades, prior to commencement of installation. Immediately before installation of cabling or conduiting, re-confirm the location of equipment and connection details. Refer to Clause - Discrepancies and Queries.

All drawings are diagrammatic. Check all relevant dimensions on site before proceeding with the work. **Do not scale dimensions from the drawings.**

Include in tender price for any accessory or appliance to be relocated up to 1 metre in any direction by the Superintendent, prior to any associated works being undertaken on site, at no additional cost adjustment to contract.

### 1.20.2 SHOP DRAWINGS

Prepare shop drawings as further specified, in digital (CADD) format.

Submit shop drawings (one (1) N$^{o}$ print copy of each drawing for Electrical Consultant's review plus additional copies as requested by Contract Preliminaries) to the Superintendent for examination.

**Shop drawings are to be reviewed and certified correct by a senior representative of the Electrical Services Company with a signature on each drawing prior to being submitted for examination. Unsigned drawings will be rejected.**

Obtain examined drawings from the Superintendent before manufacture or installation commences for all fabricated equipment poles, switchboards, fire alarm, security, EWIS, control systems, and the like. Submit shop drawings in a timely manner, allowing a minimum of twenty one (21) days for examination prior to return.
Provide shop and detailed design drawings for all specialty services including, but not limited to:-

- Switchboards
- Luminaires

Electrical Services contract drawings shall not be used as the basis to provide specialty services shop drawings. Request from the Superintendent and issue architectural backgrounds to specialty services Subcontractors for

production of shop drawings, include all associated costs in tender price. Specialty services shop drawings shall be upgraded to 'As Constructed' status, at the completion of the project, as defined herein.

Shop drawings shall contain reference to all work required by all trades.

Comments on "examined" shop drawings will apply to general principles of design only. Examination of the drawings by the Superintendent or Consulting Engineers will in no way relieve the Contractor's responsibility for any errors, omissions or necessity of furnishing such workmanship or materials as may be required for the completion of these works in accordance with the contract documents.

Show on drawings single line schematics, control diagrams, floor plans, elevations, dimensions, equipment, panel layouts, labelling and the like detail, as required to fully describe the system/equipment to be supplied, installed and/or commissioned.

### 1.20.3 AS CONSTRUCTED DRAWINGS

Prepare comprehensive 'As Constructed' drawings, detailing all equipment and services installed within the scope of work defined within the contract documents. As Constructed drawings shall show location of all equipment, circuit details, detection, speaker and alarm zone configuration, single line diagrams, switchboard layouts, equipment rack layouts, system schematic diagrams and details of special items of equipment.

As Constructed drawings shall show the exact depth and location (±300mm) of all in-ground services excluding final circuit conduits. Such services shall be dimensioned off actual building lines or surveyors datums.

Drawings shall not make reference to construction notes or information relevant only to the construction process. All information associated with specialty systems shall not appear on general electrical services drawings.

As Constructed drawings shall be prepared in CADD format. All CADD drafting shall be to Australian Standards unless otherwise specified. Confirm exact requirements with the Superintendent in each case, prior to submission.

All 'As Constructed' drawings shall incorporate the supplier's and/or supplier's company title block. A statement shall be provided on each drawing, to read: 'As Constructed by (company name and telephone number)' and signed and dated by a senior representative of the company. The signatory's name and position within company shall also be provided in block capitals. Title block shall clearly incorporate BSDS Consultants Engineers.

Preliminary 'As Constructed' drawings shall be prepared and submitted for the Superintendent's review, before completion of commissioning. Preliminary drawings shall be examined by the Electrical Services Company or Installer and signed to confirm the preliminary drawings are representative of the equipment and systems installed.

Where a total electrical services drawing or parts of a drawing are superseded by a shop drawing / as built drawing the original drawing shall be clearly notated as cross referenced to new drawing.

Upon completion of commissioning and in no case more than two weeks following practical completion, submit final approved drawings. Each drawing shall be signed and verified correct by the Electrical Services Company, or Installer. Unsigned drawings will be rejected without further review.

Supply one (1) set of CADD disk(s), electronic copy of 'As Constructed' drawings in .pdf format and one (1) set of full size drawing prints, for each maintenance manual. In addition provide one (1) No. set of CADD disk(s) and electronic copy of 'As Constructed' drawings in AutoCAD 2010 format to Engineering Technology Consultants.

## 1.21 EXISTING SITE CONDITIONS

Inspect existing site conditions and services prior to submission of Tenders. No variation will be considered for additional works which could have been ascertained at a thorough site inspection and is required for the convenient, safe, efficient and correct operation of specified services.
Locate and protect existing services prior to any works commencing that may damage or interrupt the service. Use all reasonable endeavours to locate services. (Site inspection, "Dial Before You Dig", 'As Built' drawings etc.). Where existing services are suspected, hand expose or utilise ground/slab scanning to identify exact locations.

## 1.22 SAMPLES

Submit samples and colour range of each type of light fitting, switch and outlet to be used prior to ordering and delivery to site, for approval. Catalogue pamphlets may be accepted in lieu of samples as agreed by the Superintendent. Verify requirements with Superintendent in each case. Where night testing is required for specific luminaires orders are not to be placed until night testing approval and luminaire approval has been obtained.

Obtain approval for all samples in a timely manner to ensure that the item of equipment can be supplied and installed without impact on the construction programme.

## 1.23 ELECTRO MAGNETIC COMPLIANCE

All electrically operated equipment shall comply with Australian electromagnetic emission standards, EMC framework and have radio communications and telecommunications compliance labelling notices.
All cables shall be installed and routed to minimise EMI to adjacent spaces.

## 1.24 CHASING AND OPENINGS

Chase surfaces as required and make good to original condition. Grout all conduits/services installed in chases over the whole length of the chase.

At single leaf double sided face brick walls build in conduits by slotting bricks and concealing conduits without disturbing the usual pattern of the face brickwork.

Obtain Superintendent's approval before chasing concrete or load bearing brickwork.

Drill or cut openings as required. Form up any necessary openings before concrete is poured. Size and fire rate all penetrations in accordance with Building Code of Australia and Authority requirements.

Obtain structural engineers written approval for any penetrations in floors or structural walls.

Chase conduits or otherwise conceal conduits in masonry to be rendered. All chases and openings shall be in accordance with Australian Standards and suitable for the application of specified finishes.

Fire and smoke stop openings in fire and smoke rated walls, floors or ceilings to approval with a material which meets current Building Code of Australia, FESA WA and Worksafe Requirements.

## 1.25 FIXING OF EQUIPMENT

Fix all equipment rigidly, neatly, and symmetrically to rigid supports.

Fixings shall be in accordance with good engineering practice, be in accordance with AS 1170.4 'Minimum Design Loads on Structures - Earthquake Loads' and meet with the approval of the Superintendent.

On request supply to the Superintendent certification from a structural engineer verifying compliance of nominated components, parts and fixings with AS 1170.4.

## 1.26 FABRICATED EQUIPMENT

Fabricated equipment shall be of robust, symmetrical and unwarped construction and all such equipment shall be approved before being installed. Metalwork shall be neatly and accurately cut and free from undulations or any other distortions.

Bends and folds in sheet metalwork shall be made in a suitable bending machine. All joints and folds shall be seam or spot welded.

Welding shall be neatly executed and any ragged spots filed smooth.

## 1.27 CORROSION

Take all necessary precautions with the selection, supply and installation of all materials, accessories, fittings and equipment specified to prevent corrosion. Make good or replace any component or accessory showing signs of rust or corrosion during the maintenance period in an approved manner without additional cost to the Principal.

All materials and combination of materials shall be selected and/or treated to prevent corrosion in accordance with AS1874 recommendations. Material selection must take into account atmosphere and micro climate conditions of the site. Dissimilar metals shall be avoided or adequately separated using insulating materials (such as nylon washers, protective coatings, sleeves etc) to prevent galvanic corrosion. No dissimilar metals shall not be used where they can be exposed to frequent contact with an electrolyte such as water from irrigation systems, rain, sea spray etc which could lead to galvanic corrosion.

## 1.28 PAINTING

### 1.28.1 GENERAL

Remove or otherwise protect flush plates, luminaires and all similar equipment that could be disfigured during painting. Correctly and permanently re-install or remove protection on all equipment after completion of painting.

Paint all equipment including cable supports, cable trays and ducts, conduit luminaire supports, Unistrut framework and all fabricated equipment unless otherwise specified or where concealed from view in ceiling spaces. Finished surfaces of all paintwork shall be free from bubbles, runs or any other imperfections. All galvanised surfaces shall be suitably heated and degassed prior to painting to prevent air pin holes in paint finish.

All surfaces to be painted shall be free of rust, scale, oil and other foreign matter, and then painted with one coat of Compatible etching primer, zinc primer or similar corrosion resistant barrier to suit the material being painted and the finishing coats to be applied. This shall be followed by two coats of approved wet spray coloured acrylic, Polyurethane or powdercoat paint in accordance with AS/NZS4506. All external metal work shall be aluminium, hot dip galvanised or stainless steel. Paint finish to external metalwork shall be finished with two coats of approved colour Dulux or equal two pack Polyurethane epoxy paint unless otherwise specified as powdercoat where it shall be in accordance with AS/NZS4506 Cat 5.

Carry out all Surface preparation, painting and curing in accordance with the paint manufacturers recommendations and data sheets.

Hot dip Galvanise metal surfaces not requiring painting (i.e. where concealed in ceiling spaces) or protect against corrosion by application of an approved corrosion inhibitor suitable for the installed location. Hot dip galvanising shall be to AS46880 unless otherwise specified.

### 1.28.2 SURFACE PREPARATION

Prior to any painting the surfaces to be painted shall be prepared as follows:

- All sharp edges and points must be rounded and smoothed using a suitable grinder then sanded.
- Any porosity, holes, flat spots, indentations or the like in the material surface shall be filled with weld or approved filling compound. The surface is to then be smoothed using a suitable grinder then sanded.
- Where porosity is detected after paint is applied, the paint is to be removed and the porosity filled then smoothed as above.
- All weld splatter is to be removed using a scraper, wire brush or sander.
- Ensure close fitting surfaces such as light pole access doors have adequate clearance gap all round after painting to accommodate the Dry film paint thickness (DFT) on both surfaces.

## 1.29 PHASE BALANCING

During commissioning, arrange circuits such that the load on all sub-mains and mains is evenly balanced over the three phases and record the final arrangement on 'As constructed' drawings and circuit schedules.

## 1.30 TESTING, COMMISSIONING AND TUITION

Test and commission the installation in accordance with Australian Standards and the recommendations contained within the Appendices of those Standards where applicable. Prior to permanent power being connected, submit via the Contractor a detailed program of testing activities, commissioning dates, and the training of Principals Representatives in correct operation of services. The program shall indicate the numbers of commissioning staff on site at any time during the testing and commissioning period and the anticipated duration of the various activities on a system by system basis.

Submit details of the proposed commissioning procedures and methods of measurement. Commissioning procedures and measurement methods, which are not approved or not in accordance with methods detailed in this specification, will not be accepted as evidence that the systems have been correctly commissioned.

Start up, commission and test the systems in accordance with the approved program. A representative, who is qualified to commission the installation, shall remain on site until the system is operating to the satisfaction of the Superintendent.

Arrange for the setting up of major equipment provided under this subcontract to be supervised by the manufacturer's representative, who shall remain on site until the equipment is operating satisfactorily. Coordinate manufacturer's representative so that testing is carried out according to the approved program. Testing and commissioning is to include but not be limited to the following:-

Maximum Load Test - for all mains and submains.

Insulation Test - for all mains, sub-mains and final sub-circuits. Test between each live conductor (including neutral) and earth and individually between conductors of a circuit.

Neutral Connection Test - for compliance of circuit identification and segregation from other services.

Earthing Test - for compliance of resistance and impedance values on each circuit, switchboard and earth stake.

Socket Outlets - test for correct connection, polarity, circuiting, identification and earth impedance at each outlet including tripping times for each circuit.

Circuit Schedules - test for compliance of each circuit.

RCD's - test for sensitivity / operation / clearance time.

Labelling - Check all engraving to ensure correct description. Check all socket outlets to ensure those protected with RCD's are engraved 'RCD Protected' and those not protected by RCD's are engraved as such. Labels on non RCD protected outlets shall also detail the specific use the outlet was installed for.

Earth Fault Loop Impedance - Test for compliance in accordance with Clause 8.3.9 of AS/NZS 3000:2007.

All systems/services shall be tested and operational to specification prior to commissioning tests being carried out in the presence of the Consulting Engineer. Provide signed test Sheets to the Consulting Engineer before confirmation of commissioning dates. Formats for test check sheets can be obtained from the Consulting Engineer on request in writing and shall be included in the Operating & Maintenance Handbook. The Consulting Engineer will attend selected commissioning activities and provide a list of any rectification works required. These will be checked at a second commissioning if required, however, only after Subcontractor and Contractor certification. If the Consulting Engineer is required to attend any further tests to prove the safe and correct operation of any system, hours of attendance will be charged to the Contractor at ACEA recommended hourly rates.

Upon completion of successful testing certify all test results, as detailed herein.

Three copies of all test results and certifications shall be neatly bound in folders and submitted to the Superintendent for approval Prior to Application for Practical Completion.

Certifications and testing and commissioning results shall include, but is not limited to:

| Description | By |
|---|---|
| Switchboards and switchgear discrimination | Switchgear Supplier/Switchboard Manufacturer/Protection Engineer |
| Power supply and distribution | Electrical Installer or Protection Engineer |
| General electrical installation, cables, submains and fault loop impedance | Electrical Installer |
| Power outlets and wiring/RCD test results | Electrical Installer |
| Emergency lighting and exit signage | Electrical Installer |
| Fire stopping and sealing of smoke walls | Electrical Installer and/or Building Installer |
| | |
| | |

Certifications shall follow the format detailed below.

“We certify that the Emergency Lighting System was installed in compliance with AS2293, AS/NZS 3000:2018, the design specification and drawings and all statutory requirements”.

The certification is to be made on company letterhead stationary and is to include ACN/ABN and licence numbers.

Upon acceptance of Practical Completion, train Principal’s representatives in the correct operation and maintenance of all electrical services equipment and systems.

## 1.31 THERMOGRAPHIC SURVEY

Prior to Practical Completion and again just prior to expiry of the Defects Liability Period, carry out a thermographic survey of all busbar, equipment, cable joints and connections within all switchboards supplied and installed under this section of the works. Conduct survey under maximum load conditions. Rectify all hotspots/defects indicated and re-survey those particular areas to approval.

Engage an independent specialist to carry out the Thermographic surveys in accordance with Australian Standards requirements.

Submit test results to the Superintendent with all applicable photographs and data. Include a copy of these results / photographs in Operating and Maintenance Handbook.

## 1.32 OPERATING AND MAINTENANCE HANDBOOK

Provide one (1) approved hard bound copies and one digital copy on USB storage device complete with embossed lettering of the Operating and Maintenance Handbook to the Superintendent. A draft copy of the Operating and Maintenance Handbook complete with all draft 'As Constructed' drawings must be submitted for approval before application for practical completion. A written statement shall be issued by the Contractor, verifying the accuracy of the information contained within the manuals.

Bind literature and drawings in hard bound A4 size, ring binder(s) handbooks. Neatly label all covers to approval with Project name.

Full size drawings shall be folded and individually inserted in protective removable covers within the handbooks and include as a minimum:

- One (1) copy of all "As-Constructed" electrical drawings.
- One (1) copy of all "As-Constructed" shop drawings, wiring diagrams etc.
- One (1) copy of all "As-Constructed" specialty systems drawings. The literature shall contain:
- Separately identified sections with index.
- Brief description of each system at start of each section.
- Copies of Job Safety Analysis sheets for all maintenance items.
- "As-Constructed" circuit schedules.
- Copies of all equipment guarantees suitably completed and dated.
- "As-Constructed" Luminaire schedule with illustrations of luminaires, name of luminaire supplies and details of the actual lamp first installed.
- Copies of all literature elsewhere required by the Specification.
- Specific operating and maintenance instructions for all equipment and systems, with programmed maintenance schedules and safe work practices action sheets (JSA's).
- Copy of all test results and reports specified.
- Contact list of all companies supplying and/or installing works under this contract.
- Contact list of all maintenance companies, which carry out maintenance of the specified works.
- One (1) No. CADD USB storage device(s) of 'As Constructed' drawing files

The following components shall be included in the relevant sections of the manuals and shall be regarded as the minimum requirement:

### 1.32.1 SWITCHBOARDS

- Description of site power distribution.
- Schedule of all switchboards – manufacturer's name and contact number.
- Schedule of all circuit breaker types installed, including manufactured part numbers. Copy of all circuit schedules.
- Maintenance requirements RCD test, injection testing, risk analysis, JSA's, etc.

### 1.32.2 LIGHTING

- Schedule of all light fittings.
- Description of fitting (as per legend sheet). Manufacturers catalogue number.
- Lamp type – rating, colour temp, beam angle. Suppliers name and addresses.
- Photocopy of brochure page showing luminaire.
- Maintenance requirements for emergency light testing.
- Maintenance requirements for light fittings: i.e. cleaning materials, relamping strategy, maintenance risks / JSA's, etc.
- Schedule of drawing number to be referenced for luminaire positions.
- Details and operation of light time delay units – supplier's details.
- Details of dimming equipment – part numbers, supplier's details.
- Details of photocell controls – description of operation, part numbers, supplier's details.

### 1.32.3 CABLE RETICULATION

- Schedule of all floor boxes including manufacturer's details.
- Schedule of all cable duct systems.

### 1.32.4 TEST AND INSPECTION CERTIFICATES MAIN EARTHING POINT – RESISTANCE TESTS TO EARTH.

- Thermographic survey results for all switchboards.
- Emergency lighting commissioning certificate.
- RCD test certificates.
- Copy of Electrical Contractor's installation statement.
- Earth Loop impedance test results.

## 1.33 MAINTENANCE & DEFECTS LIABILITY

During the Maintenance and Defects Liability Period repair all defects without delay and carry out all maintenance necessary to keep the installation in first class operating condition. Carry out maintenance work in accordance with the Operating and Maintenance Manual, Australian Standards, Authority Regulations and as recommended by equipment suppliers. **All lamps failing during the maintenance and defects liability period must be replaced within 72 hours of reporting, at no additional charge to the Principal. The Contractor must include all costs associated with lamp replacement in tender sum.**

At 3 monthly intervals after practical completion carry out all tests required, and submit results to Consulting Engineer for approval prior to insertion into maintenance manuals. Testing required includes, but not limited to three (3) monthly testing of all RCD's, 6 monthly testing of emergency lighting, testing and adjustment of equipment as recommended by manufacturers and testing of specialist systems as specified elsewhere.

If reported defects are not rectified within an acceptable period, or maintenance is not carried out, the Superintendent shall issue two (2) weeks written notice to complete the work. If works are not completed within an approved timeframe, suitably qualified companies, selected by the Superintendent, will be authorised to carry out the work and associated costs will be deducted from retention monies.

## 1.34 KEYS

Three (3) sets of keys shall be provided to the Superintendent at Practical Completion for all lockable devices and enclosures. Where site standard key system exists, all locks shall be keyed alike to match the master key system. Confirmation required for keying prior to manufacture.

# 2. POWER SUPPLY AND DISTRIBUTION

## 2.1 GENERAL

Design all equipment to operate on the Supply Authority power supply.

Make all necessary arrangements with the Supply Authority and furnish all necessary provisions for service.

Where works include new or modifications to existing incoming service, on commencement of works on site issue the service provider (Western Power unless otherwise specified) with the “Preliminary Form” and “request For Network Service” forms, and a copy of the site drawing and building programme. Copy of advice to be forwarded to the Consulting Engineer. Western Power headworks costs are subject of provisional sum amount.

## 2.2 SUB-MAINS TO PANELS PROVIDED BY OTHER TRADES

Install and connect sub-mains to panels shown on drawings and as otherwise required by the specification.
Verify exact connection location and details with panel suppliers before proceeding.

## 2.3 METERING

Where metering is shown on the drawings, submit meter applications and Supply Authority Certificates as required for completed portions of the installation and commission supplies for each plug in , CT or direct connected metered supply, in accordance with Electricity Retailer and Supply Authority guidelines. Obtain meters from the Electricity Retailer and install in accordance with authority requirements.

Prepare documentation as required to obtain an account number for each metered installation. This account number shall be used on electrical tickets and requests for connection. Upon completion of testing, close or transfer accounts as required.

## 2.4 POINT OF ATTACHMENT

### 2.4.1 PILLAR

Verify the exact location of point of attachment with Supply Authority before proceeding.
Provide cable tails, suitable cable lugs and crimping equipment as set out in Supply Authority Guidelines.

## 2.5 SERVICE PROTECTION DEVICE (SPD)

Provide supply Authority with Service Protection Device/Main Switch protection settings including time current curves.

The rated short circuit breaking capacity of the SPD circuit breaker shall be fault rated to Supply Authority requirements. Confirm fault level with Supply Authority.

Where the SPD or Main Switch is a circuit breaker provide the Supply Authority Design Project Manager with the following information at least four weeks prior to commissioning:

- Main circuit breaker type and rating
- Protective device types and setting ranges
- Current transformer class and tapping ratios
- Proposed protection device settings
- Time current curves showing protection grading with Supply Authorities upstream protection device to a fault level determined by the Supply Authority.

# 3. CONDUIT - GENERAL

## 3.1 GENERAL

Conduit shall be circular rigid PVC generally. Use galvanised steel or HFT UV stabilised conduit where exposed to mechanical damage or sunlight.

Enclose tails to fixed connections in PVC sheathed steel flexible conduit. Where a flexible connection is mechanically protected PVC heavy gauge sheathed corrugated conduit will be accepted.
Minimum size shall be 20mm.

All conduits are to be concealed from view within or by building structure work including draw-in boxes. Surface conduits inside buildings will not be accepted unless approval has been given.

Provide saddles so that conduits are held firmly in place yet allow for movement due to linear expansion and contraction of the conduits. Generally use only double sided clips or saddles. Half saddles are not acceptable.

At all outlets and devices use wall boxes and/or conduit boxes. Conduits are to be bent without deformation. Approved bending machine/device is to be used. Otherwise apply heat and set.

Completed conduit installations shall enable wiring to be drawn in or out at any time without damage to cable or the building. Keep conduits and boxes free of moisture and rubble.

All conduit joint are to be glued. External blue glue is not acceptable for internal usage. All electrical conduits shall be installed by a licensed electrical installer.

## 3.2 CONDUITS IN CONCRETE

Attend all concrete pours involving conduits. Repair any damage during pouring. Provide an approved flexible joint at all concrete expansion joints and in every 12 metres of conduit.

Refer to structural drawings for expansion/construction joints.

Review large concentrations of conduits in suspended slabs with the Superintendent before proceeding.
Obtain an instruction from the Superintendent concerning the positioning of any conduit larger than 32mm.

## 3.3 EMPTY CONDUITS

Install all conduits as shown. Provide a 2.5mm$^2$ PVC insulated copper draw wire in each empty conduit and in all underground conduits.

## 3.4 UNDERGROUND CONDUITS AND PITS

Generally all underground conduits shall be approved heavy duty Category A electric orange rigid P.V.C. conduit for low, medium and high voltage services and white PVC (ACMA approved) for Data/Communications services. Unless otherwise shown all conduits shall be installed in straight lines between pits, etc.

Telstra conduits and pits are to be installed by licensed Telstra contractors.

Coordinate the underground installation with other trades to avoid clashes with footings, piling and other underground services installations. Advise Superintendent of any clashes and modify route as instructed by the Superintendent.

Cable pits shall be used at changes of direction and at intervals not exceeding 50 metres or as further shown on drawings.

When underground conduit bends cannot be avoided and permission is given for pits not to be installed then changes of direction shall be large radius bends to approval.

There shall be not more than two large radius bends in any conduit run.

Minimum depth to top of conduit shall be 500mm for LV Power and Communications, and 750mm for medium voltage/high voltage.

Install cable pits where shown. Additional pits may be installed but written approval must be obtained from the Superintendent for localities prior to installation. All pit lids shall be as specified, engraved "ELECTRIC", "TELSTRA" or "COMMUNICATIONS" as applicable or fitted with permanently fixed approved labels engraved as specified. Pits shall be sized as shown on the drawings. Where sizes are not shown, they shall be of a size suitable for pulling through of cables specified in the conduits shown, along with all accessories/junctions and/or equipment specified.

Drill 4 x 50mm holes in the bottom of all cable pits for drainage purposes. Install all cable pits level and with the lids flush with final finished ground level.

Where conduits are installed into pits, they must neatly penetrate the pit wall, otherwise completely seal around conduits where they enter. Where necessary, as determined by pit manufacturer, install a concrete haunching around conduits to manufacturer's recommendations in order to spread loads transmitted through the pit structure thereby preventing the pit wall from deflecting or collapsing.

All Electrical and Communication Service cable pits on corners are to be offset so that their respective conduits do not pass through any other system of pits (eg. Electrical Services conduits through Communications Services cable pits, or the opposite).

**Plastic pits are not acceptable for B, C, D or E Class lids. Plastic Class "A" lids/pits must be installed with a supporting reinforced concrete edge beam surround and haunching to prevent pit wall distortion.**

Place "DANGER ELECTRIC CABLE BELOW" PVC tape or polymer cover strip 200mm below ground along all cable routes including telephone.
Where conduits enter building, slope conduits away from buildings and provide brass plates approximately 75 x 150mm labelled "Electrical conduits under" securely fixed to wall directly above entry point.

Record As Built locations of all underground cabling routes and include a copy of drawing in appropriate switchboards in accordance with AS/NZS 3000:2007-3.11.4.6.

Where external conduits are entering or leaving cable pits, poles, switchboards or buildings, seal conduits internally with an expanding foam on completion of works to prevent water and insect/rodent ingress. Foam/compound to fill up minimum 150mm of conduit end being sealed.

Lay conduits on compacted soil and cover by at least 200mm of clean filling sand. Backfill trenches and compact backfill to same condition as adjacent soil. Where installed under roadway and the like, compacted soil and backfill shall be in not more than 300mm layers to a compaction equal to that specified for road works.

Before trenching, make thorough enquiries and take every reasonable precaution to locate and avoid damage to existing services. Replace all damage to existing services caused by failure to comply with this specification.

On completion of contract works mark 'As Constructed' drawings indicating unused conduits and dimension location of spare conduits that do not terminate in a pit.

# 4. EARTHING

## 4.1 MAIN EARTH

Provide a M.E.N. main earth and connect to an earth stake and water service pipe. Permanently label the connection to approval. Where main earth connections are made below ground level an earth pit shall be provided with concrete lid marked "MAIN EARTH".

Securely fix a brass label reading "danger main earth do no disconnect" to the earth connection. The label shall be minimum 1.2mm thick and approximately 65 x 35mm with machine engraved 5mm high red filled upper case lettering.

Connections shall be treated to prevent corrosion.

## 4.2 EARTHING AND BONDING

Provide equipotential bonding installation in accordance with AS/NZS 3000:2007, the supply authority, regulatory authorities and equipment suppliers recommendations.

Directly earth all light fittings, socket outlets and appliances to the respective supply switchboard earth bar. Bond any water, waste, or down pipes within a distance of 2.40m of one another. Refer Clause "Testing".

# 5. SWITCHBOARDS

## 5.1 MANUFACTURER

Engage an experienced switchboard manufacturer to design, construct, test and commission the switchboards:

## 5.2 GENERAL

Switchboards shall be complete with all necessary components, comply with AS 3439 and be designed and constructed in accordance with this specification and contract drawings.

### 5.2.1 GENERAL REQUIREMENTS

All switchboards shall have a minimum of 25% spare spaces for additional circuit protection and control devices. Spare spaces shall include busbars, mountings and individually blanked openings, i.e. spare poles on MCCB chassis shall have insert-type pole fillers.

All switchboards shall have metal enclosures and all metalwork shall conform to General Clause ‘Fabricated Equipment’. Finish switchboards inside and out in accordance with General Clause ‘Painting’.

Paint all switchboards white internally or in an otherwise approved colour.

Paint all switchboards externally in an approved colour.

Provide anti-graffiti treatment to all external switchboards unless otherwise approved. Switchboards shall be the front access type with escutcheons unless otherwise shown. Unless otherwise specified, the top of the switchboards shall be 2000mm above floor level.

Miniature MCB's and fuses are to be mounted on proprietary brand mounting chassis complete with busbars unless approved otherwise. Cover spare busbar arrangements and tags for future MCCB’s with either heat shrink sleeving or proprietary insulating shrouds. Split or cut chassis will not be accepted where separate chassis’ have been identified on the drawings.

Neutral links shall have at least as many terminals as to suit full incoming and outgoing active cable capacity (including spare spaces). The terminals shall be numbered and connected to correspond with the fuse or circuit breaker numbers.

Plate all hardware to prevent corrosion.

Unless otherwise specified, key all locks alike to Electricity Supply Authority standard. Refer to clause “KEYS” herein for key details.

Self-tapping screws shall not be used anywhere in the construction of switchboards.
Unless otherwise specified use a single brand throughout for each type of equipment i.e. MCB's, contactors, fuses, switches etc. All switchboard protective devices and equipment shall be of a manufacturer with locally available spare parts / replacements and regional technical support.

### 5.2.2 IDENTIFICATION

Mark all fuses and miniature MCCB's with numbered phase markers secured to panels or escutcheon plates in line and centred directly adjacent the related items (e.g. red markers - 1, 2, 3 etc., blue markers - 1, 2, 3 etc).

Multi-module devices on chassis shall be identified by a single marker only to ensure accurate identification and the chassis poles increased as required to achieve the nominated spare spaces required.

Identify Multiple Master Meters with numbered markers.

For all switchboards containing RCD units, either integral or within the field wiring, install a label to the chassis escutcheon plate to read 'Warning: RCD's installed on this switchboard and in the field, do not megger. Refer to circuit schedule'. Label to be green on white.

Clearly label all other devices on switchboards stating their function. Labels shall be of black anodised screw fixed aluminium having 5mm minimum size engraved lettering.

Clearly label all contactors, controls and the like installed behind escutcheon stating their functions using labels as specified above.

### 5.2.3 SWITCHBOARD IDENTIFICATION

Provide a label fixed to the front elevation of the switchboard to detail manufacturer, fault rating, form construction, submain cable type and size and source of supply.

### 5.2.4 LEGEND AND DRAWING HOLDER

Provide a circuit schedule and holder for each chassis for each switchboard and secure it inside the switchboard doors. All circuit details shall be typewritten on a circuit schedule card and placed into the schedule holder. Circuit details shall include circuit description, rating of protection device and size of cable for each circuit.

Provide a separate drawing holder. Holder shall contain switchboard As Built drawings and shall also contain site plans in accordance with AS/NZS 3000:2007-3.11.4.6.

Provide in the circuit schedule holder a typed schedule of initial circuit breaker adjustable trip settings.

All circuit schedule/drawing holders are to be of metal construction, no plastic variety or type will be accepted. Where the switchboard itself does not have immediate doors, affix in vertically formation on the inside of the switchboard cupboard all schedule holders.

### 5.2.5 BUS BARS

Busbars shall be completely insulated with colour coded heat shrunk sleeving, or otherwise protected by clear polycarbonate barriers to IP2X, in accordance with AS3439.

Busbars shall be design and brace for the fault current shown on the drawings or available at the point of installation applied for one second.

### 5.2.6 ENCLOSURES

Enclosures generally shall be steel unless exposed to weather where they shall be aluminium. Where aluminium it shall be marine grade with brushed external finish unless otherwise indicated. Isolate aluminium from dissimilar metals, masonry and concrete. All switchboards exposed to the weather shall be minimum IP54 rated to AS60529 and fitted with weatherproof and insect proof ventilation. All fixings into aluminium shall be 316 stainless steel.

External switchboards shall be constructed with a sun shield to the top section of the board. The shield shall be welded to the panel roof, open at both ends and provide for sufficient slope to disperse any water to the rear of the panel. Provide details for comment with shop drawings. Ground mounted external
enclosures shall be fixed to an inground concrete foundation suitably sized to retain the switchboard. Foundation to extend 150mm above ground level.

External switchboards shall be provided with a Anti-Graffiti treatment applied after surface finishing in accordance with system manufacturers application instructions, relevant clauses of AS/NZS 2311, and this

specification “Painting”. Submit proposed “Anti-Graffiti System” for approval prior to application.

Select equipment and size enclosures to suit cupboards / ducts / spaces provided. Confirm exact dimensions of areas available and clear opening dimensions in the case of door frames with Architect prior to preparation of shop drawings to ensure boards can be installed and removed through final finished clear openings.

Switchboard enclosures shall be complete with suitable gland plates for bottom and/or top entry as required to suit cable entries. Where the switchboard is constructed from steel the gland plates or plate shall be manufactured from aluminium to ensure circulating eddy currents do not generate.

Switchboard enclosures shall be complete with door(s) and escutcheons unless otherwise specified. Doors shall be hinged, lockable and secured shut in three locations, top, middle and bottom. Door locking devices shall be “Lock Focus” A/HSA stainless steel swing handles or equal approved, complete with padlocks keyed to approval. During design of all switchboards, particular attention must be paid to the prevention of inadvertent contact with live parts during inspection of equipment, by use of insulation or barriers in accordance with AS3439.

Doors shall open through 100° and when installed externally be complete with captive stays to hold open against wind.
Doors shall be earthed by means of 4 sq mm copper braid.

## 5.3 CIRCUIT BREAKERS

### 5.3.1 GENERAL

Generally, circuit breakers are to be utilised for all transformer, submains and subcircuit protection, unless otherwise shown on the drawings or specified herein.

Circuit breakers shall be rated for the prospective fault current available at the point of installation, or the fault current nominated on the drawings, whichever is the greater.

All trip units shall be suitable for continuous full load enclosed operation with such trip rating nominated on the drawings or as specified herein. Commission all trip units to meet authority requirements and discrimination co-ordination requirements specified herein.

Transformer isolating switches for Supply Authority Transformers or for transformers of 500KVA rating and greater shall be Withdrawable Air Circuit Breakers (Withdrawable ACB’s).

Moulded Case Circuit Breakers shall be used for protection of all circuits of 100A rating or greater and whenever such protective device is utilised for submains protection and / or isolation. MCCB’s may only be used as transformer isolating switches for transformers rated at less than 500KVA and used in combination with line-side transformer isolating links sized to suit 110% of transformer capacity.

For all adjustable circuit breakers, detail frame size and settings on the submitted shop drawings. In some instances electronic trip units must be used to ensure compliance with earth fault loop impedance. Obtain earth cable sizes prior to final selection of trip units.

Miniature Circuit Breakers (MCB’s) shall be utilised for the protection and control of all subcircuits rated at less than 100 Amps, unless otherwise specified.

### 5.3.2 WITHDRAWABLE AIR CIRCUIT BREAKERS (WITHDRAWABLE ACB’S)

Withdrawable air circuit breakers shall have full segregation of live parts and positive indication of open, closed, tripped and ‘test’ position of contacts. Adjustable overload pickup and time delay, adjustable short circuit pickup and time delay trip units shall be fitted to all withdrawable ACB’s. All withdrawable ACB assemblies shall be Type tested to Australian or IEC Standards.

Where used as transformer isolators, withdrawable circuit breaker trip units shall also be fitted with adjustable earth fault pick up and time delay. All withdrawable circuit breakers shall be equipped to immediately trip the ACB if draw-out is attempted whilst the ACB is closed. All ACB’s shall be equipped with a “test position”, allowing testing whilst the tripping and auxiliary functions are active and the contacts are disconnected.

### 5.3.3 MOULDED CASE CIRCUIT BREAKERS (MCCB'S)

Moulded Case Circuit Breakers shall be constructed of a non-conducting low hydroscopic case that will not fail under the maximum electrical, thermal or mechanical conditions possible at the point of installation.
All moulded case circuit breakers of 250A trip rating or greater shall be fitted with adjustable electromagnetic and thermal trip units.

All moulded case circuit breakers shall be fitted with positive "flag" identification of open or closed positions, or shall otherwise be clearly labelled for rapid identification of switch position.
Where used as transformer isolating switches in accordance with this specification, MCCB's shall be fitted with fully adjustable short time and long time overcurrent and earth fault trip units as specified for withdrawable ACB's.

### 5.3.4 MINIATURE CIRCUIT BREAKERS (MCB'S)

Miniature circuit breakers shall have a minimum fault interrupting capacity of 9000 Amps at 240 VAC for single pole and 10000 Amps at 415 VAC for multiple units. All MCB's shall have 'C' curve tripping characteristics unless otherwise specified. Where cascading is employed by an upstream device, ensuring prospective fault downstream cannot exceed 5.5KA. Use of 10KA (AS3947.2)/6KA (AS4898) min ACB's (Merlin Gerin C-60-N or equal) miniature circuit breakers will be approved. It is the responsibility of the switchgear manufacturer to certify acceptability prior to submission of shop drawings.

MCB's shall be installed on proprietary, fully insulated and colour coded MCB chassis. MCB's shall be of a readily and locally available manufacture. Non Auto MCB's shall not be used as isolators.

MCB's shall not be utilised for submain protection unless otherwise approved or specified herein or on the drawings.

MCB/RCD devices shall be of 30 MA / Sensitivity and of a single module width unless otherwise approved, and shall be installed on all light and power circuits required by AS/NZS 3000:2007.

In areas of increased risk MCB/RCD devices shall be of 10MA/sensitivity and of a single module width unless otherwise approved.

## 5.4 FUSES

### 5.4.1 H.R.C. FUSE UNITS

Fuses shall only be used where shown on drawings or where prior written approval is given. HRC fuse units shall comply with AS.2005 parts 1 and 2 and all subsequent amendments. The fuse fittings shall have fully shrouded bases and carriers. H.R.C. fuse cartridges shall be GEC or approved equal standard T type, Class Q1.

All fuses shall be the HRC type unless otherwise shown.

### 5.4.2 SPARE FUSES

Provide one set of three (3) spare HRC fuse cartridges for each rating and type of fuse incorporated on each switchboard. Mount these fuse cartridges neatly on racks located in a section of the switchboard front zone.

## 5.5 ESCUTCHEONS

Escutcheons shall have turned edges, chrome lift off handles, locating pins and chrome captive thumb screws with screw slot. Provide locating pins at a rate of one pair for each 450mm length of escutcheon or part thereof.

All operating devices including reset buttons shall protrude through escutcheons.

All fixings for escutcheons shall be complete with internal star metal captive washers. Paint all escutcheons in approved colour.

All escutcheons shall be designed to prevent inadvertent contact of the escutcheon with live parts during removal

and installation by means of insulation or barriers to AS3439.

Escutcheon plates equal to or greater than 900mm high shall be installed with lift off hinges in addition to chrome captive thumb turn screws and lift off handles.

## 5.6 CONTACTORS AND MOTOR STARTERS

Contactors and motor starters shall be of Sprecher and Schuh, minimum Type 1 coordination, or approved equal manufacture suitable for the required duty, AC3 for motor loads and AC5(a) for lighting loads. Coils, unless otherwise specified, shall be 250 volt.

Where extra low voltage coils are required, size control transformers for the maximum in rush current of all coils plus 20% spare capacity.

Starters shall have thermal overload in all three phases and single phasing protection. Size overloads to suit motor nameplate data and in accordance with manufacturer's recommendation.

Install contactors and motor starters with adequate clearances from other equipment as recommended by the specific equipment manufacturers.

## 5.7 FUSE COMBINATION UNITS (FCU UNITS)

Fuse combination units shall only be used where shown on the drawings and shall be of the double air break, quick make-and-break type in which the moving contacts are driven by springs ensuring that opening and closing is independent of the operating handle. All terminals shall have insulating shrouds to prevent accidental contact with live metal whilst fuses are being installed or replaced when the switchboard is energised. Fuse switches shall be rated for load make, load break, uninterrupted full load duty.

Incorporate on and off position indicators in the operating mechanism, driven from the moving contacts, mechanism or contact operating linkage. Dust proof and mechanically interlock the front door of each unit to prevent opening of door while the unit is energised, or closure of the unit whilst the door is open.

All handles shall be pad lockable in the ‘off’ position.

## 5.8 ISOLATORS & SWITCHES

Isolators and switches shall be either Merlin Gerin INS, Eaton FMLB, ABB Switchline or equal and have load break contacts and be capable of being switched onto the maximum fault current available at the point of installation. Where non Auto MCCB's are used as isolators they shall be rated at not less than 150% of the current rating of the upstream protective device.

All isolators shall be complete with insulating shrouds over terminals.

Override switches shall be Cam Switches similar to NHP BIN Series complete with engraved plate indicating function i.e. - "OFF-ON", "MAN-AUTO", etc.

## 5.9 TIME SWITCHES

Time switches shall be Legrand Alpha Rex Astro range or approved equal. Time settings to be set to approval. Obtain advice on required settings from the Superintendent.

## 5.10 WIRING

Wiring shall be neatly run, generally contained in slotted PVC cable duct or harnessed in an approved manner such that any cable can be readily traced.

Use compression type lugs to properly terminate all cables where suitable tunnel terminals are not provided.

Label active neutral, and earth conductors using numbered and phase coloured printed type coded ferrule type

proprietary brand cable markers at protection device, earth bar and neutral bar. Neutral labels shall be black with white lettering R1, R2, etc. Tape markers are not acceptable.

Each active, neutral, and earth cable is to be identified with its corresponding I.P.A. marked fuse/MACB. Mark control cables to correspond with terminal numbers on control diagrams.

## 5.11 SHOP DRAWINGS

Submit shop drawings detailing the switchboard design as previously specified for all switchboards. Obtain Western Power approval for main switchboards and switchboards containing Western Power

metering equipment, before drawings are submitted for Superintendents review. All switchboard designs shall be endorsed by the switchboard manufacturer.

Show all label wording, positions, details, and clearly indicate the fault ratings of all protective devices and busbar assemblies on shop drawings. Submit detailed control diagrams for all control circuits, complete with termination and cable schedules.

Shop drawings shall comprise of the following:

- Minimum A3 drawing sheet size;
- Produced using Autocad or equivalent electronic drafting package;
- Manufacturer's drawing sheet title block identifying the project name, project number, drawing number;
- Minimum scale of 1:10;
- Include equipment materials list with part numbers;
- Labelling schedule noting size and colour of lettering and background;
- Switchboard general arrangements; front elevations with escutcheons fitted and without escutcheons, minimum one section both vertically and horizontal;
- Confirm form construction;
- Confirm fault rating;
- Diagrams for all control equipment, (eg, lighting controls, meters, relays) complete with terminal strip numbers;
- Schedule of construction details confirming as a minimum material type and sizes used, colour, handle types, locks and all hardware, etc;
- Simplified single line diagram clearly showing all principle equipment, busbar and internal wiring, fault rating of equipment and protective devices. The diagram must identify proposed detailed design and construction and therefore shall not utilise consultant's drawings.
- Where protective devices are fitted with adjustable settings, confirm settings on the drawings.
- Provide Manufacturers pamphlet details of any proprietary equipment used as part of the switchboard construction, i.e. meters, relays, contactors, time clocks, and push buttons.

All switchboard designs and shop drawings must be checked and endorsed by the Contractor for correctness prior to submission to Superintendent. The Superintendent will reject shop drawings that have not been so endorsed.

## 5.12 FORM OF SEGREGATION

Switchboards shall be constructed to meet the segregation requirements detailed in AS/NZS 3000:2007, clause 2.5.5 or where a higher level is shown on the drawing. As a minimum switchboards shall be constructed to the

following criteria:

- Heavy current site main switchboards and main distribution switchboards serviced by a protective device/s with frame ratings the summation of which exceeds that detailed in AS/NZS 3000:2007 shall have a form 3b segregation as a minimum.
- Site main switchboards and main distribution boards serviced by circuit protective devices with a frame size less than that detailed in AS/NZS 3000:2007 for heavy current switchboards shall have Form 2b segregation.
- Distribution boards shall have Form 1 segregation with additional insulation or barriers segregating the incoming functional unit from all outgoing functional units or where installed in restricted locations, as identified in AS/NZS 3000:2007 clause 2.9.2.5.

### 5.13 DISCRIMINATION

Prior to submission of tenders and again prior to selection of switchgear supplier, the switchboard manufacturer must ensure discrimination can be achieved as follows. The switchboard manufacturer must obtain submain cable details from the design drawings to ensure discrimination and earth fault loop impedance requirements are met.

Co-ordinate the protection equipment on all main and distribution switchboards such that in the event of any condition of over-current or short circuit occurring at the load side of terminals of any submain protective device or final sub-circuit equipment isolator/connection device to the full prospective fault level of the installation;

- Submains protection effectively discriminates (enhanced selectivity);

Short circuit calculations shall be for all faults up to and equal to the prospective fault current at each distribution switchboard. The manufacturer may use cascading if the manufacturer can prove by test results that discrimination is ensured to the full prospective fault level of the system.

Switchgear manufacturer or Switchboard manufacturer must certify compliance with the above in writing to the Principal, including fault and discrimination test results/tables for switchgear used prior to submission of switchboard shop drawings for examination. Time current curves cannot be used to prove discrimination in the short circuit region of circuit breakers.

Submission of equipment list and manufacturer's discrimination and enhanced selectivity charts are acceptable in lieu of individual test results, where these are available.

Note that use of some brands of switchgear may require upgrading of circuit cabling, the cost of which shall be borne by the manufacturer.

### 5.14 CIRCUITS AND TEST FACILITIES FOR EMERGENCY LIGHTING

Provide phase failure relays, timers and reset devices for emergency and exit lighting circuits. Refer clause "Emergency & Exit Lighting".

Label each circuit supplying emergency lights in accordance with AS2293.

## 6. CABLING

### 6.1 GENERAL

Wiring shall be carried out with stranded copper conductor, Class V-75/V-90, PVC insulated, 400/750V grade or XLPE cable, with X-90, X-HF-90 or X-HF-110 insulation.

Cables with elastomer insulation used in accordance with AS/NZS 3000:2007 and AS3008, with higher current ratings and volt drop performance than the specified cable, may be used in lieu of PVC insulated cables.

Minimum conductor size for a given circuit rating shall ensure protective device disconnection time within the limits of AS/NZS 3000:2007 Clause 1.5.5 and limit temperature rise to that of the insulation. Size all cables in accordance with AS/NZS 3000:2007 and AS3008.

RCD protected circuits will generally ensure disconnection times under earth fault are achieved. Enclose unsheathed cable in conduit.

Underground cabling shall be sheathed circular in conduit unless otherwise specified.

Install and conceal all wiring, including sheathed cable, within or by the building structure in a manner that can be easily replaced without damage to the completed building finishes. All cabling installed in stud walls shall be enclosed in conduits where not easily withdrawable for refurbishment.

Horizontal cabling in cavities and stud walls is not permitted unless cables are enclosed in conduit. Drop vertically down walls from ceiling spaces to accessories.

Suspend/secure cabling within ceiling spaces over removable tile ceilings in such a manner and spaced above ceiling to ensure cables do not interfere with the removal and reinstallation of tiles, or the maintenance of in ceiling equipment.

Loop cables from point to point with joints and connections only at switches or outlets.

Seal cabling passing through a roof with a mechanical screw-up gland and apply an approved non hardening UV resistant sealant.

Cables shall not be installed in any area until all construction work which is likely to damage cable is completed.

Group and install all cabling in straight runs parallel with line of building. Refer to AS3008 wiring rules regarding derating factors for cables. Cable sizes specified have not been derated for grouping of multiple circuits unless otherwise noted. Where derating is necessary due to installation method/grouping, increase cable sizes as specified in AS 3008.1. Where cables are installed in walls filled with thermal insulation, increase cable size or separately enclose cables in individual conduits to ensure ventilation around cable. Refer to derating tables of AS3008.

Cable sizes specified for connection to equipment supplied by other trades are based on design information and are for tender purposes only. Check to be installed information with equipment suppliers. Submit schedules and cost adjustment for any proposed changes to contract documentation for approval prior to installation.

Cables shall be installed so as not to penetrate damp proof courses nor bridge the cavity in external masonry cavity walls.

All cables shall be new and delivered on site in unbroken reels with maker labels attached. Unconditionally guarantee all cables during the maintenance period.

Where more than 5 cables are in close proximity, they shall be installed on catenary wire, on trays or in ducts with segregated sections and removable lids. Securely fix all cables direct to the structure (not to ceiling hangers, pipes, ducts, etc). All wiring enclosures in walls shall extend up to easily accessible location in ceiling space, cable tray, catenary wire or other permanent support structure to produce a neat appearance and suitably protect the cable from disturbance.

Install, group and fix all cables in a tradesman like manner.

Notify the Superintendent, prior to installation of ceilings, that the above ceiling cable installation is ready for inspection. Carry out any remedial works necessary prior to installation of ceilings.

## 6.2 FIRE RATED CABLES

Where fire rated cabling is required by AS/NZS 3000:2007, this specification or the drawings, cabling shall be supplied and installed in accordance with AS/NZS 3013 to a WS rating of no less than WS52W. All cabling shall be sized in accordance with AS3008 and this specification.

Note: Some cable manufacturers cannot achieve WS52W rating for cable sizes less than 25 sq mm. Where use of these cables are proposed, they shall be mechanically protected in accordance with AS3013 to achieve WS52W rating when installed.

In areas where direct mechanical damage is likely (carparks, driveways, warehouses and the like), fire rated

cables shall be installed in enclosures providing increased mechanical protection as required by AS/NZS 3013 – G4.2.

All fire rated cabling shall be HF-110 insulated and HF-110 sheathed.

All fire rated cables shall be installed and fixed in accordance with the cable manufacturers test certificates, utilising proprietary galvanised steel clips/saddles, stainless steel wire ties, etc or installed on tray. Use of "PVC Plugs" in concrete soffits or masonry walls is not permitted as they may fail in a fire condition. Cable supports/fixings are to be spaced no greater than 350mm centres for cables up to and including 15mm overall diameter, and no greater than 400mm centres for cables exceeding 15mm overall diameter.

Certify compliance with manufacturer's recommendations and AS/NZS 3013 upon completion of installation.

# 7. POWER

## 7.1 GENERAL

Supply and install power outlets, cabling enclosures and cabling to all appliances and equipment as shown on the drawings. All cabling to equipment, appliances and socket outlets shall include suitably sized neutral and earth.

Connections are only mentioned in the Specification where additional detail is necessary.

Make final connections to all appliances and equipment. Provide suitable isolating switches where necessary.
Note: Where equipment is furnished by other trades check wiring details and locations with equipment suppliers before beginning any installation.

# 8. LIGHTING

## 8.1 GENERAL

Supply and install the complete lighting installation as specified, scheduled and shown on the Drawings. All lighting circuits shall be protected by RCDs in accordance with AS/NZS 3000:2007. All fittings shall be clean and all lamps shall be new at Practical Completion.

All components forming the luminaire shall be compatible to achieve the performance nominated in manufacturer's published data.

Luminaire manufacturer certified IP Ratings to AS60529 shall not be compromised or reduced due to incorrect or poor installation.

Guarantee all luminaires against faulty design workmanship, materials and components for the defects liability period. The guarantee shall include for labour, transport and materials to rectify any such faults on site.

The lighting installation shall be complete with luminaires, lamps and all necessary accessories and all control gear.

Verify the exact location of all luminaires with the Architect before proceeding with any installation. Coordinate final location of luminaires with other services and structures.

All luminaires shall be securely fixed, supported, and provided with suitable trimmers where necessary.
Internal wiring shall be securely fixed throughout the luminaire and comprise minimum 105$^{o}$C insulated copper cable selected to suit the operating temperature within the luminaire.

A terminal block with tunnel terminals shall be provided to all luminaires to allow connection of at least 3 x 2.5mm$^{2}$ conductors in each.

The IP rating specified for luminaires shall be maintained through installation of fixings, supports and wiring.

## 8.2 LED LUMINAIRES

Unless otherwise specified, all dimmable electronic ballasts shall comprise Tridonic ATCO PCA ECO or equal with DSI control interface. Addressable dimmable electronic ballasts shall comprise Tridonic ATCO PCA EXCEL One 4 All or equal with DALI control interface.

Noisy or otherwise defective luminaires will not be accepted.

Provide a separate ballast for each LED lamp. Alternatively, ballast for multilamped fixtures shall isolate defective lamp only allowing remaining lamps to operate.

Power factor shall be not less than 0.9 lagging.

All components, including ballasts, shall not be fixed by means of riveting, spot-welding or similar. All components shall be removable and serviceable.

All LED lamps throughout any one installation shall be of the same manufacture. The lamps shall be 20,000 hour average lamp life.

## 8.3 DISCHARGE LUMINAIRES

All discharge lamps shall be matched to control gear. All discharge lamps shall have a minimum average rated lamp life of 11,000 hours for wattages less than 250W, and 20,000 hours for lamp wattages 250W and greater. All lamps shall be of an approved colour temperature. Confirm lamp colours with the Superintendent prior to ordering.

Power factor shall be not less than 0.9 lagging.

Control gear for low wattage Metal Halide and High Pressure Sodium lamps (30, 35, 70, 100 and 150W) shall comprise electronic Tridonic ATCO Power Control PCI or equal. Thermal testing shall be undertaken to ensure the control gear case temperature does not exceed manufacturer's recommendations under normal operating conditions.

All control gear shall be suitable for the lamps utilised in accordance with lamp manufacturer's recommendations and shall sustain lamp strike and run condition at voltages within Authority Supply Guidelines (nominal 240V ±6%).

Igniters shall be provided to all discharge lamps as required by the lamp manufacturer and be complete with in-built automatic cut out timers to suit the lamp.

Provide integral HRC fuses for high intensity discharge lamp ballasts rated in accordance with equipment manufacturer's requirements.

## 8.4 RECESSED LUMINAIRES

Connect all luminaires installed in suspended ceilings via a lighting socket installed in the ceiling space adjacent the opening.

Provide each luminaire with minimum 1.5m long flexible cable and plug top to suit.

Ensure adequate clearance is provided around recessed luminaires and separation from combustible materials is maintained in accordance with luminaire manufacturers recommendations.

Provide openings for recessed light fittings as required.

## 8.5 SAMPLES

Submit samples as specified under "Samples".

## 8.6 PHOTO-CELL CONTROLS

Supply and install external lighting controls as specified and as required by BCA Part J6.

Where these are required they shall be Bell MEM SELC 841 range or equal, with inbuilt time lag and 6 year replacement guarantee.

Unless otherwise shown install the Photo cell switch above the roof, and as close as practical to the switchboard containing lighting controls. Install the Photo cell switch in accordance with manufacturer's

recommendations and ensure that its operation remains unaffected by shadows and artificial light.

Switch contacts shall be sized to load and where necessary provide contactor to carry load current.

Photocells mounted onto free standing switchboards externally shall be mounted under a protective cover on top of the Switchboard similar to a sloped rain hood to minimise physical damage and deterioration from sun exposure.

Provide an override switch on the appropriate switchboard.

## 8.7 EXTERIOR LUMINAIRES

Provide neat 3mm thick neoprene insertion gasket with approved non-hardening waterproof sealing compound between walls and flanges of wall mounted luminaires.

Moulded plastic diffusers and bodies shall be manufactured from high impact resistant UV stabilised material.

All external exposed fixings for luminaires shall be Torox snake eye or Torox tamperproof 316 grade stainless steel security screws or equal approved. Provide three (3) keys to suit screws installed to the Superintendent on completion of works.

## 8.8 SUPPORTS AND MOUNTING ACCESSORIES

Provide all necessary supports, suspension and mounting accessories to suit the actual location in which luminaires are to be installed. These accessories shall be in addition to standard equipment provided with the luminaire, if required to suit the installation.

Where specified suspension devices shall be rigid and comprise suitably sized steel rods to carry luminaire weight and enclose cabling from the structure above. The final length of the suspension shall be determined on site to suit approved mounting height and location.

Where the rigid suspension attaches to the structure and luminaire, provide threaded connection devices. Secure suspensions to the structure with adjustable support brackets. Brackets shall be adjusted so the suspension is in the vertical plane. Provide locking nuts above and below the brackets to avoid loosing of due to vibration.
All suspension rods shall be painted with colour and finish to match structure or luminaire as directed on site.

Where specified suspension shall comprise multi strand stainless steel wires, with proprietary attachment accessories at both ends.

Conceal penetrations in ceilings with a removable cover flange attached to the suspension rod or ceiling. The colour of the flange shall be to approval.

Where there is inadequate or no structure to accommodate the luminaire, provide all necessary equipment, braces, supports, fixed onto the main building structure.

## 8.9 ELECTROMAGNETIC INTERFERENCE (EMI) AND ELECTROMAGNETIC COMPATIBILITY (EMC

Provide EMI suppression filters to satisfy compliance with Australian EMC standards.

All luminaries shall pass EMC testing and be provided with "C-Tick" labels. EMC compliance certificates shall be

provided as requested by the Superintendent.

### 8.10 EMERGENCY AND EXIT LIGHTING

Emergency and exit lighting installations shall comprise self contained, single point luminaires comply with AS/NZS 2293, with a minimum 2 hour emergency backup supply using Nickel Cadmium batteries.

Identify, label and number each emergency luminaire in accordance with AS2293. Labels/identification to be on or near as practical to the fitting and visible without removal of diffusers. Emergency light operation must be automatically activated by the failure of local lighting circuit in which the emergency light or exit sign is installed.

Arrange wiring and controls to emergency and exit lighting to enable battery discharge and general testing either manually or automatically without disconnecting supply to normal lighting. Unless an automatic computer testing facility is specified, a manual testing facility to AS2293, shall be provided to all emergency and exit lighting installations.

Locate the manual testing facility on each switchboard supplying the emergency and exit lighting, consisting of:-

- 1-3 hour adjustable timer pushbutton test switch which automatically reverts to normal operation after the required test duration (duration to be preset to approval). A manual interrupt/reset function shall be provided to the timer function.

- The test switch facility shall be clearly labelled 'Emergency Lighting Test Switch' and 'Emergency Lighting Test Reset'.

Supply a hard bound emergency lighting maintenance logbook and manual complying with AS/NZS 2293 for all installations with emergency and exit lighting.

The manual shall be completed and a full inspection and discharge test carried out in accordance with AS/NZS 2293.2 at practical completion.

Following entry of the test results into the manual, submit the original manual to the Superintendent for examination.

### 8.11 COMMISSIONING

Provide all necessary personnel and equipment to commission the complete lighting installation to the satisfaction of the Superintendent.

Supply all necessary meters, instruments, temporary wiring, electrical supply, scaffolding and labour to perform all required tests and adjustment of equipment and wiring installed and connected under this specification.

## 9. FITTINGS AND ACCESSORIES

### 9.1 GENERAL

Flush mount all fittings on flush set wall boxes as recommended by the switchgear/accessory manufacturer. All adjacent flush wall fittings shall be in a ganged wall box under a common flush plate. Provide fire rated wall boxes in all fire rated walls. Provide acoustically rated wall boxes in all acoustic walls.

All switches, and GPO's shall be standard colour finished to Architectural requirements. Use Clipsal 2000 series flushplates, or approved equivalent, throughout.

"C" clips for plasterboard type walls may be used in non-fire or acoustic stud plaster walls. All such mounting clips must be securely retained in place such that clip does not fall into stud wall cavity upon removal of accessory.

Where 2 or more phases occur behind a common plate, provide adequate barriers or separation.
Request the Superintendent to select accessory colours from standard ranges not less than two (2) weeks before a critical date.

Where flush plates, light switch panels and other items of equipment are to be labelled or engraved, they shall be machine engraved in upper case lettering filled with black pigments to approval.

Unless otherwise specified a single brand of fittings and accessories shall be used throughout these works.

## 9.2 POSITIONING OF FITTINGS

Heights shown on plans or specified shall be the height from finished floor level to the centre of the equipment. The height and exact position of fittings in all tiled walls shall be as indicated on detailed drawings or as directed by the Superintendent. However, cover plates for switches and other fittings shall line up with the tile coursing and be located centrally at the junction of four tiles.

All fittings shall be aligned plumb and in line.

## 9.3 LIGHT SWITCHES

The height of lighting switches shall normally be 1000mm from finished floor level to the centre of the switches or as near to this height as possible if required to line up with tile courses, or courses in finished face brickwork.

Check light switch locations in relation to door swings prior to installation to ensure switches are on opening side of door.

Supply and install all lighting controls/switches in accordance with BCA Part J6.

Generally light switches shall be flush-mounted Clipsal Series 2000 30FLM10 AC5 rated 10 Amp curved rocker miniature mechanisms or approved equal on flush set vertical wall boxes. Flush miniature plates shall be used in partition mullions and architraves.

Switches controlling 10 or more lights shall have 15 amp Clipsal 30 FLM15 AC5 mechanisms.

Unless otherwise permitted all lighting circuits shall be protected by devices incorporating 30mA RCD protection.

Where 5 or more light switches are in a single location, or where light switch panels (L.S.P) are shown, they shall be machine engraved Clipsal Stainless Steel B Series Multi-gang switch assembly or equal.

Equivalent devices by HPM or Wilco will be accepted.

External/Weatherproof light switches shall be Clipsal WSF226 or approved equal hose proof type. Where internal/weatherproof light switch is shown or where switches are installed in Restricted Zones to AS/NZS 3000:2007 IP66 Clipsal 2000 series 2031V66 or approved equal shall be used.

## 9.4 SWITCHED SOCKET OUTLETS

GPO's shall be fixed socket outlets in accordance with *AS/NZS 3000:2007.*
Socket outlets shall have 10 Amp 250 Volt rating. Heavy duty socket outlets shall have 15 Amp 250 Volt rating and built-in neon indicators.

Generally socket outlets shall be Clipsal Series 2000 No. 2015 or approved equal on flush set horizontal wall boxes 800mm above finished floor level to underside unless otherwise specified. Double socket outlets shall be No. 2025. Outlets on skirtings shall be miniature type. Fire rated wallboxes shall be used in all fire rated walls in accordance with Building Code of Australia.

Equivalent devices by HPM or Wilco will be accepted. Refer to Detailed Clauses or Drawings for deviations from this general Specification.

Unless otherwise permitted all socket outlet circuits shall be protected by devices incorporating 30mA RCD Protection.

All socket outlets protected by RCD's shall be engraved in 3mm high green filled lettering "RCD PROTECTED".

All socket outlets not protected by RCD's shall be engraved in 3mm high red filled lettering "Not RCD protected" with the name of device under, and in each case confirm that RCD protection is not required.

Engraving of removable surrounds is not acceptable.

## 9.5 CIRCUIT IDENTIFICATION ON FLUSH PLATES

Fit coloured circuit identification studs to flush plates of lighting switches, socket outlets and isolating switches by cementing with Araldite to the plates fitted centrally between the top of the switch toggles and the top of the plates, or where otherwise approved.

## 9.6 DIMMERS

Where necessary fit dimmers with suppressors and / or filters to prevent noise interference with audio, video and communication systems.

Wall mounted local dimmers shall be Clipsal or HPM unless otherwise specified.
Unless otherwise nominated dimmers shall be of type and sized to suit circuit load plus 20% as recommended by manufacturer.

Dimmers for extra low voltage lamps shall be matched to suit the electronic transformers used.

## 9.7 HEAVY DUTY AND WEATHERPROOF ACCESSORIES

Where documented, these shall be Clipsal IP56 type or approved equal and comply with the requirements of socket outlets and 3 phase socket outlets.

## 9.8 ISOLATORS

Install isolators wherever required by the authorities or these documents. Isolators shall have Fault Make, Load Break contacts at prospective fault level rated at not less than 125% of circuit cable ratings. Rate motor isolators to Fault Make, Locked Rotor Current Break.

Enclosures shall be dustproof internally and weatherproof externally. Label all switches appropriately. Isolators must accept a padlock in the on and off position.

## 9.9 CABLE TRAYS

Cable trays shall comply with the following. They shall:

- be of width as specified, or if not specified, as required to accommodate the cables specified and 50% additional future cables allowing for AS/NZS 3000:2007 space factors;
- be manufactured from minimum 1.25mm mild steel sheet with ‘Galvabond’ protection, or 2mm marine grade aluminium;
- Be perforated with slotted holes over the entire tray area. The perforations shall be suitable for metal thread studs and nuts or nylon ‘tray nuts’;
- have sides of depth and shape to provide rigidity;
- not deflect more than 6mm at any point when loaded with cables as specified;
- Be complete with matching splice plates, tees, bends, transitions, etc as required. All changes of direction shall be suitable radiused.

Provide sample of cable tray for approval prior to placing orders
.
Fixing shall be rigid hot dipped galvanised metal brackets or ‘Unistrut’ channels (and accessories) as appropriate.

Continuous threaded galvanised rod shall be used for suspended trays. Cable ladder shall be specified for cable trays above.

# 10. DETAILED CLAUSES

## 10.1.1 SECURITY LIGHTING

The general external and security lighting shall be controlled by the security photo electric cell together with an additional time clock set to approval.

## 10.2 SUB-CIRCUIT CABLING

All sub circuit wiring shall be concealed within the fabric of the building or above the false ceilings. Where ceilings are not installed sub circuit wiring shall be enclosed within surface mounted PVC conduits fixed to the structure.

## 10.3 POWER

### 10.3.1 TOILET LIGHTING AND EXHAUST CONTROLS

The toilet lighting and exhaust systems are to be controlled via a combination of Motion Sensor (PIR) and Run on Timer such that on entry to the area the lighting energises and the exhaust system starts. On exiting the area the lighting will turn off after a pre determined time (no greater than 15 minutes) and the exhaust system will continue to run for a period of at least 2 hours.

The controls shall be installed in a proprietary weatherproof enclosure located in the duct in general toilet areas and at high level in the accessible toilet area.

The Motion Sensor (PIR) shall be Clipsal Infrascan 751R or similar product equivalent in function to the approval of the Superintendent - refer clause 'Alternative Equipment'

The Run on Timer shall be a Clipsal Multifunction digital timer 4 TD Series or similar product equivalent in function to the approval of the Superintendent - refer clause 'Alternative Equipment'

## 10.4 SWITCHBOARD KEY ALLOCATIONS

Two weeks prior to practical completion the contractor shall provide 5 sets of the following keys:

- Site Main Switchboard and Building Distribution Boards.

# 11. VOICE/DATA COMMUNICATIONS – CLASS E (CATEGORY 6)

Provide a voice and data cabling and outlet system to comply with Category 6 - Class E Applications - Structured Cabling System to AS3080.

All components in the installation shall be warranted from defect for a minimum of fifteen-(15) year's post the end of the project contract defects period. The system guarantee must apply to any protocol sanctioned by standards bodies for use with the category of cable installed in the system.

The communications system is summarized as follows: -

- Communications outlets and cabling within **Tenancy** (refer detail).
- TRC system earthing.
- Testing and Commissioning.
- As constructed documentation.

## 11.1 Standards – Communications and LV cabling

### TENANCY COMMUNICATIONS INFRASTRUCTURE

#### GENERAL

Provide Category 6 cable system from the tenancy communications outlets to the respective tenancy communications hub, as shown on the drawings.

The system shall consist of RJ45 sockets mounted within wall plates matching the adjacent socket outlet wall plate style and finish, and Category 6 UTP communications cabling.

#### STANDARDS

Comply with the following standards and regulations:

- TSB40
- TSB36
- AS 3000
- AS 3080
- AUSTEL
- IEEE 802.3 10BASET

#### UTP CAT 6 CABLING

All cabling shall be level 6 enhanced (EIA/TIA 568, Level 6) 4 pair unshielded twisted pair cable from the RJ45 outlet on the communications hub to each RJ45 outlet.

#### UTP CONNECTORS

Horizontal cabling shall be terminated with an RJ45 connector using an Insulation Displacement Contact (IDC). RJ45 connectors are to be rated at 100 MHz and conform to the specifications for UTP Connecting Hardware (Category 6 (2003) – Class D Applications) as detailed in AS/NZS 3080:2003

RJ45 connectors shall be configured with a pin/pair assignment in accordance with T568A as detailed in AS/NZS 3080:2003

#### TESTING AND COMMISSIONING

#### GENERAL

All components comprising the structured cabling system must be recognised as a Certified System.

Individual cable runs, terminations, and other system components are to be tested at the time of installation, and the complete system tested in its entirety prior to handover.

- Test procedures must be designed to verify 100% end-to-end operation of the system, accordance with AS/NZS 3080:2003.

#### UTP CABLING TESTING

- UTP Cable testing shall be carried out using a level III tester as defined by AS/NZ3087.1.2003
- Category 5e cabling and associated components shall be tested using Permanent Link configuration to Class D requirements as specified by AS/NS3080.2003 for compliance testing and the electronic test results shall include full plot data. The test results shall be submitted in soft copy in the tester manufacturers' native format. Test reports are not acceptable in TXT,CSV and PDF formats
- Any cable and system components found to be damaged or identified as not meeting specifications or test requirements are to be verified and replaced in their entirety at the installer's expense.
- All horizontal data cables are to be tested for termination and pair integrity (continuity, polarity, pin-assignment and colour code).

- In addition to any electronic testing, all UTP cables are to be visually inspected to ensure that each pair has retained the required twist rate up to the point of termination – maximum amount of untwisting in a pair as a result of termination to connecting hardware shall be no greater than 13mm.
- In addition to any other test considered necessary by the installer, the following end-to-end tests are to be carried out on the horizontal and vertical UTP cabling using the appropriate test set-up and apparatus and undertaken in accordance to compliance testing requirements of AS/NZS 3080:2003 and As/NZS3087:2003, including:-
  - Insertion Loss
  - NEXT,
  - PSNEXT,
  - ACR,
  - PSACR,
  - ELFEXT,
  - PSELFEXT,
  - DC Loop Resistance,
  - Skew,
  - Length,
  - Wiremap,
  - Continuity of conductors,
  - Return Loss;

CERTIFICATION

Certify the cable network as compliant to Category 5e requirements of EIA/TIA 568, Level 5.

# 12. NBNCO COMMUNICATIONS CONDUIT INFRASTRUCTURE

## GENERAL

Provide the building with cable pathways to facilitate the installation of fibre optic cabling to each tenancy by NBNCo's registered contractor. Provide equipment space and cable access to comply with the NBNCo SDU Building Design Guide, including, but not limited to;

- Conduit for the lead in cable from NBNCo network pit to the CTL, located externally near SMSB.
- Conduits from the CTL to Network Termination Units.
- Blockouts or conduit sleeves in slabs between floors including fire stopping.
- Supply and installation of all socket outlets, conduit, draw wires, cabling ducting, boxes and outlets as required to complete the works.
- As Built documentation detailing the cable access provisions.

## STANDARDS

The complete installation shall comply with all relevant regulations, by-laws and requirements, including but not limited to:-

- NBNCo SDU Building Design Guide
- AS/NZS 3000 Wiring Rules
- AS 3084: Telecommunications installations - Telecommunications pathways and spaces for commercial buildings
    - HB 243 Communications Cabling Manual, Module 1: Australian regulatory arrangements
    - AS/CA S009 Installation Requirements for Customer Cabling (Wiring Rules)
    - AS/CA S008 Requirements for Authorised Cabling Products
    - AS/CA Regulations and Standards
    - HB 29 Communications Cabling Manual (CCM).

## CABLE PATHWAYS

Conduits from the major cable pathways shall not have more than 3 x 900 bends. Conduits shall be equal to the Telstra standard P20, P50 or P100 and stamped "NBN".

Cabling is not to be embedded in plaster, concrete or similar materials. Where cable has to be routed through these materials, the cable is to be contained in conduit, or similar, which allows for easy reticulation of cables. Cable and horizontal pathways are to be routed to avoid ceiling space services such as light fittings and air-conditioning ducting.

Provide one Telstra P20 conduit from each tenancy NTD to the CTL.

## DOCUMENTATION

Provide a complete set of 'As Built' drawings detailing all conduit and cable tray access. The drawings shall be dedicated to NBNCo service provisions and shall be prepared in accordance with NBNCo drafting standards and drawing protocol, to the approval of NBNCo.

# APPENDIX A – SCHEDULE OF UNIT RATES

The electrical services tender prices shall be submitted in the following breakdown format and delete as required;

**ELECTRICAL SERVICES**

I/We_____ hereby tender for the supply, installation, testing and maintenance of all work in accordance with the tender documents.

| **Item** | **Tender Amount** |
|---|---|
| Liaison with Western Power and NBNCo to provide headworks and incoming services | $ |
| NBNCo Pathway Design and Documentation | $ |
| LV switchboards | $ |
| LV consumer mains and submain cabling | $ |
| Cables trays and other cable support systems | $ |
| Earthing systems | $ |
| Transient protection equipment | $ |
| Power to Mechanical services & switchboards | $ |
| Power to Hydraulic services & switchboards | $ |
| Provision of conduit access to enable installation of services by NBNco | $ |
| Lighting Package (Supply light fittings, lamps and control gear) | $ |
| Lighting installation | $ |
| Emergency lighting | $ |
| Voice and data communications infrastructure Cat 6 | $ |
| Commissioning | $ |
| As Built drawings and maintenance handbooks | $ |
| Maintenance during the defects period | $ |
| | |
| Sub Total | $ |
| Goods & Services Tax (GST) | $ |
| **TOTAL** | **$** |

## APPENDIX B – SCHEDULE OF LABOUR RATES

Our charge out rates including all allowances for supervision, overheads and profit, etc for additional works that may be requested by the Engineer are:

| **Unit Rates** | | **Normal Time** |
|---|---|---|
| **After Hours** | | |
| Charge per hour per tradesman | $ | $ |
| Charge per hour per assistant | $ | $ |
| Charge per hour per apprentice | $ | $ |

Mark up on actual cost (including normal trading discounts) to the contractor of materials %

**SCHEDULE OF COMPLIANCE**
(Initial relevant paragraph below and strike out the other.)

(i) We confirm that the tender submission fully complies with the tender documentation.

(ii) We confirm that the tender submission is not fully compliant with the tender documentation and varies from the requirements of the documentation as detailed upon the attached schedule:

Dated this ……..…….. Day of …….. 2021

Name of Contractor: ……

Signed: ……..…….Print Name: ……..

# APPENDIX 1 – Hydraulic Consultant Specification

ENQUIRIES: Adam Byrnes
PROJECT NO: H.21.009

29 June 2021

D'Agostino & Luff Architects
Unit 4/71 Kent Street
BUSSELTON WA 6280

Attention: Stuart Luff

Dear Sir,

**COMMERCIAL DEVELOPMENT on LOT 69 (HN23) Antlia Way, Australind WA**
**Hydraulic Services, Compliance Letter for Building Design & Specification**

We confirm the *Hydraulic Services* design and specification is compliant with the National Construction Code 2019, Volume 1, amendment 1 (Building Code of Australia Class 2 to Class 9 Buildings). The building services that form part of the Hydraulic Services installation and; Australian Standards that have been relied upon and used for certification of the building services are listed below;

| Building Service | Australian Standard |
|---|---|
| Water Services | AS/NZS3500 Part 1 |
| Sanitary Plumbing and Drainage | AS/NZS3500 Part 2 |
| Stormwater Drainage | AS/NZS3500 Part 3 |
| Heated Water Services | AS/NZS3500 Part 4 |
| Water Corporation Industrial Waste | AS/NZS3500 Part 2 & Industrial Waste Guidelines |

## Reference Documentation

Refer to the Hydraulic Services drawings and specification.

| Competent Person | |
|---|---|
| Name of Competent Person | Adam Byrnes |
| Company Name | HEMS Consulting |
| Contact Number (business hours) | 0412 313 983 |
| Email address | adamb@hemsconsult.com.au |
| Postal Address | PO Box 381, Subiaco WA 6904 |
| Date | 29 June 2021 |
| Signature of Competent Person |  |

# SPECIFICATION

## HYDRAULIC SERVICES

CDC ISSUE

COMMERCIAL DEVELOPMENT on LOT 69 (HN23) Antlia Way, Australind WA

D'Agostino & Luff Architects

HEMS CONSULTING

# Document Control Record

Specification prepared by:

**HEMS Consulting**
ABN 89 625 303 960

www.hemsconsult.com.au

Suite 3, 27 Hood Street, Subiaco WA 6008
PO Box 381, Subiaco WA 6904

**T** +61 8 9285 9385
**E** adamb@hemsconsulting.com.au



| Document control | | | | |
|---|---|---|---|---|
| Project Name | LOT 69 (HN23) Antlia Way | | Project Number | H.21.009 |
| Specification Title | Hydraulic Services Specification | | Revision Number | A |
| Document ID | SP21.009 | Reason for Issue | CDC | |

| Rev | Date | Description / Status | Author | Approved |
|---|---|---|---|---|
| A | 29-JUNE-21 | CDC Issue | Mark Malekin | Adam Byrnes |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| Approval | |
|---|---|
| Approver Signature: |  |
| Name: | Adam Byrnes |
| Position: | Company Director |

# 1. HYDRAULIC SERVICES

## 1.1 The Project

The proposed commercial development is located on LOT 69 (HN23) Antlia Way in Australind, Western Australia. The project comprises the construction of a conventional single storey commercial building with off-street carpark.

D'Agostino & Luff Architects in conjunction with HEMS Consulting and other specialist consultants has been awarded the building design work on behalf of the developer.

## 1.2 Contract Documents

The Hydraulic Services Contract drawings supplied with this specification are diagrammatic and approximate only and indicate the proposed and or general alignment of the Hydraulic services however, these services may be offset or relocated to suit actual on-site conditions, structural elements and order of work determined by the Head Contractor.

Liaise and co-ordinate with the Head Contractor and other service Sub-Contractors as is necessary to ensure any change will not affect or impede the installation of any other building services or necessitate a variation to the Contract sum.

The Hydraulic Services Sub-Contractor is to provide as part of the awarded sub-contract, all minor parts and items of equipment, which are clearly inferred and or required under the relevant Australian Standards which are necessary for the completion of the work and the complete integration with other building services trades without extra charge.

This Specification forms the Hydraulic Services Trade Package Section of the whole specification and is to be read as part of and in conjunction with the whole specification in particular, the General Conditions of the Head Contract and Contract Preliminaries, which will govern the Contract.

## 1.3 Responsibility Matrix

Refer to the Head Contract specification.

## 1.4 Contractual Relationships

Responsibilities and duties of the principal, Contractor and the Superintendent as defined in the Head Contract are not altered by this specification.

## 1.5 Building Codes, Standards & Controlling Authorities Requirements

The Hydraulic Services are to be installed in accordance with the National Construction Code 2019, amendment-1 and referenced Australian Standards therein as are relevant and applicable to the installation of the Hydraulic Services. Australian Standards, codes of practice and similar recognised standard references are to be of the latest revision.

The following take precedence over the service requirements shown on the Contract drawings and this specification: Legislative Federal, State and Local Authority Requirements.

# 2.0 SCOPE OF WORKS

## 2.1 General

Examine the Architectural, structural and other building services Contract drawings to establish the extent of the works. The Hydraulic Services Sub-Contractor is to liaise with the Head Contractor for staging and programming of the works. The Hydraulic Services Sub-Contractor is to do all things that are necessary to supply, install, put into service and complete the Hydraulic Services.

The Hydraulic services scope of work includes the supply, delivery to site, installation, and modification to existing, commissioning and subsequent maintenance for the stipulated period, for all works indicated

or implied and installed. Liaise with the Head Contractor to achieve uniformity of appearance and the location of the sanitary fixtures, tapware, appliances, plant and equipment.

This specification is to be read in conjunction with the Contract drawings and aforementioned Australian Standards. Work called for by one and not the other is to be fully executed.

The tender drawings are diagrammatic only and do not necessarily indicate the exact location of the services. All services installed prior to shop drawing submission and approval are to be relocated at no cost as is required. Where required by existing agreements, utilise incumbent sub-trades to complete all necessary elements of the work.

## 2.2 Inspect the Site

Tenderers are to inspect the site and make due allowance for existing site physical encumbrances and soil conditions (rock) prior to submitting a tender.

## 2.3 Applications to the Supply Authorities

Prior to commencing any work on site, complete and submit to the Contractor, all the applications that are necessary for the Hydraulic Services installation for each of the utility services listed below;

| Authority (supply utility) | Application for service |
|---|---|
| Water Corporation | Domestic water supply & meter |
| Water Corporation | Property service sewage connection |
| Water Corporation (Industrial Waste) | Industrial waste |
| Stormwater Drainage | Local Consent Authority |

Provide to the Contractor, all the Contract drawings that are necessary for the applications listed above. Include dimensional drawings for the Water Corporation and; other drawings that are necessary to facilitate the application and approval process.

Liaise with and notify the Contractor of any potential delays. Keep the Contractor informed and give no less than 48-hours' notice of any works required outside of the construction / property site boundary.

## 2.4 Authorities Headworks Fees & Charges

All Headworks fees & charges are to be paid by the Head Contractor. ***Allow for in the tender submission, the following provision sum;***

- Water Corporation: $20,000.00

## 2.5 External Services

Liaise with the supply Authorities to determine the alignment, depth and general location of all the external services located adjacent to and within the construction site boundary. Submit to the Contactor, all the details as supplied by the various supply Authorities including plans, maps and survey data.

### 2.5.1 Advise Other Trades

Notify the Contractor and all other building trades of the alignment, depth and general location of all the external services located adjacent to and within the construction site boundary.

### 2.5.2 Protective Measures (Sewage, Water, Gas)

Liaise with the supply Authorities to determine if any protective measures are required to protect the existing sewage, water & gas services serving and located adjacent to the proposed building. Where

required by the supply Authority, arrange for and provide protective measures to the Authorities asset for the duration of the construction period or as directed by the supply Authority.

## 2.6 Property Service Sewage Connection

Prior to installing any inground sewage drainage systems on-site, excavate, search for and locate the existing property service sewage connection. Verify by survey, the existing connection 'invert level' and report any discrepancy between the Water Corporation's mapping data and the surveyed connection point to the Contractor, within 24-hours of the survey.

## 2.7 Plumbing Licensing Board (Building Commission - Department of Commerce)

Within 14-days of award of the Hydraulic Services Sub-Contract, liaise with and notify the Plumbing Licensing Board (PLB) of the intended works. Arrange for and meet with the PLB to examine the extent and scope of work and; the contract drawings prior to the installation of any Hydraulic Services on-site.

## 2.8 Pre-Construction Submissions

Submit to the Contractor within 21-days of award of the Hydraulic Services Sub-Contract, the following list of items for consideration and approval by the Consultant:

| Item | To Submit |
|---|---|
| Property Service Sewage Connection | Surveyed invert level(s) |

### 2.8.1 Manufacturers Product Technical Data

Submit the manufacturers product technical data for all materials, parts, plant and equipment and those items listed in the following schedule. Product technical data submissions are to include the following as are applicable to each item:

- Technical specification(s)
- Material designation
- Standard dimensional drawings
- Electrical rating (including full start-up load AMPS for motors)

| Item | For Service |
|---|---|
| Materials (pipes & fittings) | Sewage, stormwater, water |
| Bracketing, fixings & supports | Sewage, stormwater, water |
| Thermal insulation | Hot water distribution |
| Heating Water Plant | Hot water distribution |
| Backflow Prevention | Water |
| Valves | Water |

## 2.9 Installation & Construction Services

- Provide all labour, materials, setting out, installation, cutting of concrete slabs, chasing of walls, building into structures, testing, placing in service, rubble removal and maintenance of the plumbing service works indicated on drawings and/or specified.

- Testing and commissioning of all Hydraulic systems required by the controlling Authority.

- Provide 12 months warranty on all materials and labour for work covered by this specification.

- All disused property service drains, waste and water supply to be removed under this Contract.

- Final design, supply and install the complete sanitary plumbing & drainage system in accordance with AS3500. Provide all plumbing fixtures with associated services as indicated on drawings. Install new drains, waste and vents complete with junctions, inspection points, material connectors, changes of direction, offsets, branches, all ventilation systems that are required and where indicated on the Contract drawings.

- Supply and installation of discharge points for Mechanical Services equipment as noted on the ***Mechanical services*** and Hydraulic Services Drawings. All condensate drains from Mechanical Services equipment to the discharge points (TD's) are to be supplied and installed by the Mechanical Services Contractor.

- Supply and install storm water drainage including downpipes, grated trafficable covers, grated trenches, rainwater outlets, paver drains and sumps as shown on the Contract drawings.

- Supply and installation of all hot and cold water supply piping including all associated valves, fixings and the like required for the complete operation of the installed piping systems. Make final connection to all fixtures and appliances where scheduled and or shown on the Contract drawings.

- Supply and install fire stop collars in accordance with the relevant Australian standards, BCA and Council Requirements.

- Installation of disabled toilet fixtures and tap ware are to be in strict compliance with relevant standards including the Building code of Australia and AS1428-1&2.

- Installation of the water supply sub-metering where shown on the Contract drawings and that are scheduled hereafter.

- Provide 'As-Constructed' drawings for the complete installation. All 'As-Constructed' drawings are to be submitted on compact disk in AutoCAD© 2021 and DXF format complete with three (3) hard copy (prints) of same for distribution purposes. Make allowance for all drafting, printing and electronic storage media to complete this work.

- Maintain and provide a 24-hour emergency service and call out facility for the duration of the defects liability period set out under this Contract.

- Submit written performance guarantees and other warranties where specified hereafter.

### 2.9.1 Work by Other Building Trades

Other building trades will carry out the following work. Liaise with other Contractors to ensure that the correct requirements are provided:

### 2.9.2 Head Contractors Work

- Pay all applicable fees and charges including all area contribution and or headworks for plumbing work in accordance with controlling Authorities current fee scales as required.

- Supply and installation of access panels for water supply and sanitary plumbing systems.

- All cutting, patching, framing up and making good associated with Hydraulic Services works.

- Where required access panels are to be constructed from fire rated materials to maintain the integrity of the wall, floor or ceiling structure.

- Supply and installation of metal roofing, roof decking and gutters, sumps and overflow pops.

- Supply and installation of protection (pipe guards) for pipes liable to be damaged by vehicles.

- Make good and reinstate all existing surface areas disturbed or removed during the installation of the Hydraulic Services.

### 2.9.3 Mechanical Services

- Supply and installation of all condensate drains from Mechanical Services equipment (to discharge over nominated points (TD's), provided by the Contractor).

### 2.9.4 Electrical Installation Works

Provide for power wiring and make final connections to the following:

- Localized hot water units.

# 3 CONTRACT REQUIREMENTS

## 3.1 Contract Drawings

The Hydraulic services Contract drawings do not purport to show all architectural, structural or other services details. The Hydraulic services sub-Contractor is to obtain a complete set of contract drawings that include the following services:

- Architectural plans, elevations, sections and details.
- Structural plans showing beams, footing details, retaining walls and piling.
- Mechanical Services.
- Electrical Services.
- Civil Works / Earth Works.
- Landscaping.
- Other drawings that form part of the 'Contract' set.
- Geo-Technical & Soil Report(s).

The Hydraulic services drawings indicate the proposed and general alignment of the various services however these services may be offset or relocated to suit actual on-site conditions, structural elements and order of works established by the Head Contractor.

Liaise and co-ordinate with the Head Contractor and other service Contractors as necessary to ensure any change will not affect or impede the installation of any other service or necessitate a variation to the Contract sum.

Where such an offset or deviation requires the re-design of all or any part of the services, the Hydraulic Services sub-Contractor shall submit a clean, scaled part plan, showing the proposed redirection in accordance with industry codes of practice and relevant Australian Standards.

Submit all sketch plans to the Head Contractor for consideration and approval in such time so as no delay is caused to the building program or three (3) working days. The plumbing Consultant will review same and provide written acceptance for the modifications so far as they meet the requirements set out in this specification.

Any submission by the Hydraulic Services sub Contractor requesting an alternative material or item of equipment must include the necessary fees and charges for redesign where such is deemed necessary or not to be an equivalent product to that specified herein.

## 3.2 Obvious Minor Work

The Contractor must provide minor parts, which are clearly inferred, required under the relevant Australian Standards i.e.: tempering and thermostatic mixing valves, air admittance valves or other minor parts, which are necessary for the completion of the work without extra charge.

## 3.3 Work Safe

The Contractor is to refer to the Occupational Safety and Health Act to comply with an approved or recommended code of practice. Codes of practice are to be followed in strict accordance with the Act.

Where work is carried out in a roadway, footpath or site access area, the Hydraulic Services sub-Contractor shall provide and erect where necessary all required lighting barriers and crossings to ensure the safety of work personnel and general public.

## 3.4 Permits and Fees

Liaise with the Head Contractor and make all applications required by the controlling Authorities. Prepare and submit to the Head Contractor applications including those, which are required to be signed by the Superintendent.

## 3.5 Proprietary Brand Name References

Any reference in this Specification to proprietary brand names or to a particular manufactured product without the use of "or approved equal" is to be interpreted to mean that the particular article or product is the only one to be supplied or used.

## 3.6 Workmanship

The sub-contractor must provide an experienced and qualified technical trades person(s) on site at all times who has the necessary level of competency and technical knowledge for the installation on site and demonstrate to his nominated employees, the standards required and method for installation.

Any installation or fabrication on site deemed to be untidy or not fit for purpose will be rejected and replaced to the satisfaction of the Head Contractor and Plumbing Consultant.

## 3.7 The Contractor must

Provide all materials, new, clean and free from corrosion unless otherwise specified; and select and install material to prevent corrosion of the material or any other proximal material through galvanic action.

Application of approved coatings suitable for the installation conditions may be used to prevent corrosion or galvanic interaction where material selection is not a practical means of achieving this objective; and

Ensure that materials subject to exposure to the elements are suitable for long term (20 year minimum) exposure without degradation of performance.

## 3.8 Manufactures Directions

Apply, install, connect, erect, adjust, use, clean and condition, manufactured articles, materials and equipment in strict conformity with manufacturers' printed directions. Retain manufacturers' directions for such articles on site for future reference and notify where there is conflict between the manufacturer's printed directions and the Specification.

## 3.9 Existing Site Services

Liaise with the Head Contractor and obtain all existing site services information to ascertain the approximate location of all existing services in the vicinity of the works. Advise other building trades as necessary and arrange for protective measures where the works occur near or adjacent to the services. Allow to excavate and locate by hand, all existing inground services where such services fall within a 3-meter radius.

Peg all services prior to commencing any works. Where damaged, make good those services to the satisfaction of the Authority having jurisdiction over the services.
The Hydraulic Services Contractor is not responsible for utility services other than water mains, sewer mains and stormwater drainage systems.

## 3.10 Equipment Layout

Set out the equipment in accordance with the general arrangement shown on the drawings with adjustments, to accommodate the actual equipment being supplied, to ensure easy access for operation, maintenance and removal of components for external servicing of the equipment.

Co-ordinate with all other trades to ensure equipment being installed by that trade does not restrict operation, or maintenance, or service access to equipment installed under these works.

## 3.11 Setting Out

The Contractor must set out all work from datum lines established on site and report, immediately any errors that become apparent so that they can be rectified.

## 3.12 Fixings & Supports

Provide fixings for equipment and or wiring for securing to walls, ceilings, floors or structure as applicable. All fixings adopted are to be of an approved type and pattern.

All fixings holes in concrete or brickwork are to be neatly drilled to a depth equal to the length of plug to be used, excluding plaster or other soft cladding finish. Fixings shall not be into mortar joints between brick and or block work.

All load-bearing fixings are to be of appropriate size for the anticipated load plus a 50% safety factor. All fixings are to be corrosive resistance and are to be the same or of more noble material so that they will not be preferentially corroded.

## 3.13 Dissimilar Metals

Ensure all pipe clips, brackets and supports are of similar or compatible metals. Where same is manufactured using dissimilar metals to that of the piping, install suitable purpose made insulation at all fixing points to prohibit direct contact with the pipe wall.

## 3.14 Inspection Testing and Commissioning of Hydraulic Services

The Contractor is to arrange and by responsible for the provision of supervision for the positioning, testing and the initial start of all various equipment systems by a factory trained representative of the equipment manufacturer who has had extensive experience with the particular type of equipment/system being installed.

The Contractor shall give 48 hours notice, prior to the commissioning of the equipment/system so that the Head Contractor and the plumbing Consultant can be present to witness this work. Provide copies of all on-site test results prior to practical completion.

## 3.15 Penetrations

All penetrations in concrete floors are to be 10mm larger than pipe work in diameter with the area around pipe being made good with approved epoxy concrete grout. All penetrations through brickwork, walls, etc are to be neatly cut and resealed with 2 in 1 cement grout. All penetrations through studwork and cupboards are to be neatly scribed and cut and resealed with an approved paintable silicone sealant.

## 3.16 Fire Stop Collars

All pipe penetrations in concrete floors and or between ‘fire compartments’ must incorporate approved purpose made fire stop collars in accordance with the BCA. Supply and install all fire stop collars throughout the buildings to approval.

All fire stop collars are to be cast-into each concrete floor slab or fire rated shaft wall. "Retro' fit style collars may be installed in plant rooms and others service areas only unless otherwise approved by the Plumbing Consultant.

Fire stop collars are to be manufactured by Pyropanel or equal approved bearing the manufactures and Standards Australia test marking.

## 3.17 Fire Precautions

Provide protective measures and observe those precautions in accordance with AS1674 to protect equipment, structure and materials against fire and damage due to sparks and falling hot metal from welding operations.

At each location where welding is to be carried out, surrounding areas are to be properly supervised and inspected to guard against possibility of fire starting from sparks, from welding operations, and at least two portable carbon extinguishers are to be kept on hand at all times.

## 3.18 Earthquake Protection

The Hydraulic Services sub-Contractor is to allow for seismic activity and movement between concrete structures and all inground services. Make allowance for suitable pipe clips in accordance with AS1170 Part 4.

## 3.19 Conceal

Conceal water, wastes and stacks into ducts, cupboards, cavities or built into walls including access panels as required. Where pipes are cut through cupboards, holes are to be neatly scribed and cut. Damaged cupboards are to be made good.

## 3.20 Chrome Plating

All service piping where exposed (not concealed) internally is to be chrome plated complete with matching escutcheon plates. Unless otherwise approved, braided flexible connections are not to be installed. Install chrome plated copper connecting nut & tubes throughout the buildings.

## 3.21 Escutcheon / Wall Plates

All wall face flanges, plates and escutcheons are to be chrome plated unless otherwise approved or directed by the Architect. All flanges, plates and escutcheons are to be installed a neat and level manner after painting and patching of wall penetrations.

## 3.22 Corrosive Protection

All inground copper piping, fittings, valves, mechanical joints and the like are to be wrapped with Denso 500 primer / mastic / tape unless otherwise directed on site.

All copper piping buried (chased) in walls is to be wrapped with 6mm thick purpose made foam insulation lapped no less than 15mm. The cavity (chase) is to be filled using purpose made 'Plum-Lag' filler to approval.

## 3.23 Volatile Organic Compounds (VOC's)

This clause applies to all site applied paints, adhesives and sealants. All site applied paints, adhesives and sealants used and applied inside the building shall be of the low Volatile Organic Compound (VOC) type.

## 3.24 Certification

The Hydraulic Services sub-Contractor is to provide written certification to the superintendent that same has supplied, installed and tested the all of the works described herein in accordance with the Building

Code of Australia, relevant Australian Standards and the Controlling Authorities requirements. Supply to the superintendent, a copy of the following items:

- Plumbing Licensing Board 'Certificate of Compliance'

### 3.25 On Completion

On Completion, clean all pipe work of any foreign material. Flush and clean out all pipework including rainwater pipes, stormwater drains, grated channels and property sewers as necessary to ensure the correct operation of the drainage system.

Check and secure all inspection openings and clean out points throughout the piping systems. Check all pipe clips and fasteners where accessible. All taps, valves and the like are to be tested and adjusted and or replaced as necessary. All cisterns are to be flushed and adjusted where required.

Sanitary fixtures, tapware and chrome plated pipe work are to be uncovered, cleaned and left in as new condition. Any tap, fixture or appliance scratched, stained or damaged by any means must be replaced at no additional cost to the developer.

### 3.26 AS-Constructed Drawings

Provide 'As-Constructed' drawings for the complete installation. All 'As-Constructed' drawings are to be submitted on compact disk in AutoCAD© 2021 and or DXF format complete with three (3) hard copy (prints) of same for distribution purposes.

The Plumbing Consultant will not provide electronic media including design drawings for As-Constructed purposes. Make allowance for all drafting, printing and electronic storage media required to complete this work.

The Plumbing Consultant disclaims any responsibility for the accuracy or content of As Constructed drawings produced by the Hydraulic Services sub-Contractor. The onus is on the Hydraulic Services sub-Contractor to ensure that the drawings reflect what was actually constructed.

Any queries regarding the location of the Hydraulic Services will be directed to the Hydraulic Services sub-Contractor and not the plumbing Consultant. The Hydraulic Services sub-Contractor is to submit As-Constructed drawings prior to practical completion.

## 4 MATERIALS

All materials shall conform to the relevant Australian Standards and are to be tested, stamped and passed by the relevant Authorities. All materials associated with this work are to be new, first quality, free of defects and of approved manufacture.

### 4.1 Copper Tube for Hot & Cold Water Supply (Building Infrastructure Networks Only)

All copper tubes used throughout are to be in accordance with AS1432 and conform to gauges as indicated under Type "B" as nominated or otherwise noted. All tubing to be Australian manufacture and chrome plated where exposed.

All hot water supply piping is to be insulated using "Armaflex" or equal approved insulation. Joints between sections are to be cut square and secured with approved adhesive.

All pipe sizes shown on the Contract drawings refer to mean internal bore sizes in accordance with AS3500.

### 4.2 Cross-Linked Polyethylene Pipes for Hot & Cold Water Supply (Internal Amenities)

Pipe materials are to be PN20, PE-XA / PE construction, consisting of PE-XA inner layer and a PE outer marking layer, certified to AS/NZS 2492 for water service applications with a 25-year warranty from the date of completion of the whole system(s) testing.

All PE-XA pipes used throughout are to be Rehau 'RAUTITAN platinum'. The Rehau 'RAUTITAN platinum system is to be installed by suitably qualified members of the REHAU Authorised Installer Network (RAIN).

The REHAU RAUTITAN platinum plumbing system consists of the following items;

- RAUTITAN platinum pipe
- PX fittings and sleeves
- MX fittings and sleeves

All PE-XA piping systems are to be installed in accordance with the following standards and the manufacturers Technical Information including;

- AS/NZS 2492 Cross-linked polyethylene (PE-X) pipes for pressure applications
- AS/NZS 2537 Mechanical jointing fittings for use with cross-linked polyethylene (PE-X) pipe for hot and cold water applications.
- AS/NZS 4020 Testing of products for use in contact with drinking water

Manufacturer's documentation;

- REHAU RAUTITAN Water, Gas & Heating Product book.
- REHAU Piping, Connection and System Guidelines.
- RAUTITAN Water Service Technical Information.

Pipe hot water pipes (16mm - 20mm) are to be supplied 'pre-insulated' R=0.3 with an outer PE insulation foam with tear-resistant and moisture-blocking outer layer for protection against heat loss in hot water pipes, condensation and heating of cold water pipes and as a sound insulation when installed in concealed location.

Pipe connections shall be axial compression sleeve mechanism. Fittings and sleeves shall be REHAU RAUTITAN PX or MX, Watermark approved and certified to AS/NZS 2537.

RAUTITAN PX Polymer fittings made of PPSU (colour: black) with tool tabs for precise attachment of the assembly tool RAUTOOL shall be used for threadless connections from 16-40mm.

RAUTITAN PX multi directional polymer sleeves made of PVDF (colour: black) with laser engraved production date shall be used for all connections from 16-40mm.

RAUTITAN MX DZR Brass fittings made of special dezincification-resistant brass, manufactured in accordance with AS2345, DIN EN 12164, DIN EN 12165 and DIN EN 12168 grade A (equivalent to highest requirement category), shall be used for all 16-63mm threaded connections and 50-63mm threadless connections.

RAUTITAN MX sleeves made of thermally annealed brass, manufactured in accordance with DIN EN 12164, DIN EN 12165 and DIN EN 12168, shall be used for connections 50-63mm.

## 4.3 uPVC (Un-plasticised Polyvinyl Chloride)

uPVC are to be sewer grade pipe work in accordance with AS1260 & DWV in accordance with AS1415 or as directed by the Authorized officer (Water Corporation).

## 4.4 Epoxy Cement

Epoxy cement are to be an approved low viscosity, non-shrink, self-levelling, solvent less epoxy cement grout suitable for placement as sealant around pipe work penetrating concrete floor slabs.

## 4.5 Adhesives & Sealants

All chemical fixings used and applied on site are to have a VOC level no greater than 70 grams/litre. Recommended products that meet the minimum requirement are Power Fasteners AC1000e and AC100Pro injection systems.

All sealants and mastics used and applied on site are to have a VOC level no greater than 250 grams/litre. All site applied fire rated sealants are to have a VOC level no greater than 250 grams/litre. Recommended products that meet the minimum requirement are Sika Firerate and Sikaflex Firerate PU.

Alternative systems will be considered. Data sheets are be submitted complete with the VOC content of the product by the manufacturer's / supplier's representative.

## 4.6 Insulants

All thermal insulants used in this project must avoid the use of ozone depleting substances in both manufacture and composition.

Compliance requires the submission of the manufacturer(s) statements regarding the zero ODP gas content and use during the manufacturing process to the superintendent.

The following Hydraulic services requiring insulation;

- Hot water piping networks

# 5 SITE WORKS

## 5.1 Ground Excavation

The Hydraulic Services sub-Contractor is to carry out all excavations necessary for the installation of Hydraulic services. All ground excavations are to be straight in line and constructed in a safe working manner in accordance with the requirements Work Safe WA and dressed to fall as required.

The Hydraulic Services sub-Contractor is to examine the site to establish all existing ground conditions prior to tender submission. Refer to the Geo-Technical & Soil Report for information specific to the extent and level of ground water, limestone, ***rock***, clay and the like that may be encountered during excavation. Make allowance for all existing ground conditions including de-watering, rock breaking and the like required to install the Hydraulic services.

Excavations are not to encroach on or within the angle of repose of any newly formed or existing structural footings, walls and the like. Any excavation required within the angle of repose must be approved by the Head Contractor and Structural Engineer prior to commencing any works. All excavation works within the angle of repose must be carried out under the supervision of the Head Contractor.

The base of each trench is to be prepared and left in a manner that allows the piping to be supported on a solid, compacted bed of earth. The minimum compaction level required are ten blows per 300mm using a penetrometer to a depth of 900mm unless otherwise approved by the Plumbing Consultant.

Allow to excavate and locate by hand, all other inground services where such services are traversed or within a 3-meter radius. Liaise with the Head Contractor and other building trades to ensure that all inground services are installed in sequence and to the correct alignment so as to avoid future modification and or damage. Upon completion of the ground excavations, remove and dispose of all excess excavated material from the site.

## 5.2 Ground Dewatering

Dewatering shall include ground water and any other source of water ingress to the excavations. The Hydraulic Services sub-Contractor is to dewater all excavations required for the installation of the various Hydraulic services to the satisfaction of the controlling Authority having jurisdiction over the works and or the Superintendent.

All ground water discharge is to be stored, tanked and disposed of in accordance with the controlling Authority having jurisdiction over the works and the Superintendent.

### 5.3 Pipe Bedding & Materials

Install to a depth of 200mm below the invert of the pipe being laid a blue metal (8mm aggregate) base within the trench to a depth equal to half the pipe diameter where pipes are laid in areas of water charged ground. The blue metal bed is to be thoroughly sanded prior to pipe installation.

Pipe work must not be installed until the base of each trench is levelled and compacted to approval.

### 5.4 Backfilling of Excavations

Prior to backfilling over and above half the depth of the pipe being laid, the Hydraulic Services sub-contractor is to check the alignment, grade and joint. Each pipe must be sighted and approved by the Water Corporation's plumbing inspector and the Superintendent. Where heavy compactors have been used during backfilling, make allowance for the re-testing of each service.

Provide only selected clean backfill material that is free of building rubble, clay, stone and other debris. The existing ground and condition of excavated material shall dictate the requirement for additional clean backfill material. Supply where necessary, additional backfill material to complete the works.

Backfill all ground excavations in 300mm increments. All backfilling up to a depth of 600mm above the overt of the pipe is to be compacted by hand tamper prior to the use of vibrating or other heavy type compactors. Compact with purpose made hand tampers or other approved mechanical devices.

### 5.5 Surface Reinstatement

The Head Contractor is to reinstate all existing surface treatments including paving, concrete, bitumen, kerb and channels and the like that been removed or disturbed as a result of the installation of the various Hydraulic Services.

All surface areas are to be reinstated to a standard commensurate with the existing conditions sighted before the commencement of work and approval of the Superintendent.

## 6 SEWER & SANITARY PLUMBING

### 6.1 General

Install to approval, property service sewers to the sizes, approved depth, levels and alignments indicated on the drawings. The sewer drainage system shall consist of one or more connections to the property service sewage connection points and septic tank–leech drain system where shown on the Contract drawings.

All new inground property service sewers are to be DWV grade uPVC with matching fittings suitable for solvent welded joints. All new drains are to be laid in straight lines to an approved gradient and with the invert of the pipe firmly bedded down into the bottom of the trench.

All piping systems are to be complete with all necessary bends, junctions, cleaning and inspection openings as required by the Water Corporation and relevant Australian Standards.

### 6.2 Overflow Relief Gully (ORG)

Install an approved 'overflow relief gully' in the vicinity of the property service sewer connection or 'downstream' of the sewer drainage network. The exact location is to be determined on site in accordance with the Controlling Authorities requirements.

Install a purpose made precast concrete DG mound with PVC grate set 25mm above the finished surface level and a minimum of 150mm below the lowest fixture connection to the drainage system. An overflow relief gully not serving or receiving waste discharge from a fixture is to be primed via a 20mm hose tap located 450mm above the concrete mound described here before.

## 6.3 Disconnector Gully (DG)

Install disconnector gullies in the locations shown on the Contract drawings. Install a purpose made precast concrete DG mound with PVC grate set a minimum of 25mm above the finished surface levels. Any disconnector gullies not serving or receiving waste discharge from a fixture is to be primed via a 20mm hose tap located 450mm above the concrete mound described here before.

## 6.4 Description of Materials

Materials are to conform to the following descriptions as applicable:

| Pipe Designation | Location | Material (type) | Acoustic Wrap (Y/N) |
|---|---|---|---|
| Sewer Drainage | Inground | DWV PVC | N/A |
| Waste Piping | Above & below ground | DWV PVC | NO |
| Sewer Ventilation Piping | Above & below ground | DWV PVC | NO |
| Industrial Waste Piping | Above & below ground | DWV PVC | N/A |

## 6.5 Sewer Drainage & Waste Piping

Sewer and waste pipes are to be sewer grade with matching fittings and adaptors in accordance with the description of materials described here before. Liaise and co-ordinate with the Head Contractor to determine the exact size and location of access panels throughout the building prior to commencement any works.

Install 100mm (minimum) cleaning gates to each branch or entry to a fixture (junction) where shown. Install puddle flanges to individual pipes and waste connections when penetrating a floor slabs in wet areas. Install and make final connection to individual fixtures with purpose made adapters where necessary.

## 6.6 Sewage System Ventilation (Vents)

Install all vent pipes including drainage vents, relief vents, group vents (AAV's) and terminal vents generally where shown on the contract drawings and that are required under AS3500, in particular Part 2 – Sanitary Plumbing & Drainage. Allow for and do all things necessary to complete the whole sewage drainage system(s).

Liaise with the Plumbing Licensing Board (PLB) prior to commencing any works on site to determine the 'preferred' location of 'group vents' throughout the building.

Extend all terminal vent piping to atmosphere and above roof level complete with a primary roof flashing and purpose made vent cowl as required to approval.

## 6.7 Air Admittance Valves (AAV)

Install purpose made air admittance valves generally where shown on the contract drawings and that are required under AS3500, in particular Part 2 – Sanitary Plumbing & Drainage. Air admittance valves are to be manufactured by Studor or equal approved by the controlling Authority.

Install air admittance valves strictly in accordance with AS3500, in particular Part 2 – Sanitary Plumbing & Drainage. All air admittance valves are to be positioned to allow for ease of replacement and inspection after installation.

Each air admittance valve shall have a minimum capacity equal to 60 fixture units (F.U.) or 7.5 litres per second @ -250 Pascals. All air admittance valves are to be installed in a vertical position unless otherwise approved by the manufacturer. All air admittance valves are to be screw fixed in purpose made 40-50mm BSP pattern sockets or adaptors as necessary.

## 6.8 Floor Waste Gullies (FWG)

Liaise with head Contractor to ensure all floor grates are at a correct level for graded falls. Install purpose made puddle flanges to all floor waste gully risers.

Any floor waste gully not serving or receiving waste discharge is to be primed via a 6mm type B copper pipe from an adjacent flush pipe, tundish connection or purpose made trap primer as manufactured by Zip connected to a tap assembly breach.

## 6.9 Cleanout Points & Inspection Openings

Clean out points and inspection openings shall incorporate a rising shaft with a diameter of no less than the pipe being served. Terminate internal rising shafts with a purpose made Galvin Engineering, chrome plated brass shaft access cover finished flush with finished floor level. Install purpose made puddle flanges on all rising shafts where located internally.

Terminate external rising shafts with a screwed PVC cap set below a 250mm square hinged cast iron cover and concrete surround set flush with finished surface levels. All external cast iron covers are to be labelled 'Sewer'.

## 6.10 Tundishes

Install purpose made tundishes throughout the building where shown on the Contract drawings. All tundishes are to be sized to suit the flow and rate of discharge from the appliance or service discharging there to. The minimum size of tundish permitted is 65x40mm unless otherwise approved by the plumbing Consultant. Tundishes are to be securely fixed and protected to prevent movement or damage by appliances, doors and the like.

Liaise with the Plumbing Licensing Board (PLB) prior to submitting a tender and commencing any works on site to determine the required connection principles for tundishes throughout the building. Refer also to the PLB's TECHNICAL NOTE – 'Connection of Condensate Waste to Sanitary Plumbing & Drainage'.

# 7 Industrial Waste

The Hydraulic Services sub-Contractor is to assist with the preparation of all industrial waste application forms required for the project. Provide the necessary quantities, chemical composition and approximate volumetric discharge data to the Head Contractor so as no delay is caused to the building program.

## 7.1 Industrial Floor Waste (IFW)

Install in each bin store and where shown on the Contract drawings, industrial floor drains complete with a 100mm diameter industrial waste trap and Galvin Engineering 200mm x 100mm diameter nickel bronze grate and coupling.

## 7.2 Industrial Waste Sampling Point (IWSP)

Where required by the Controlling Authority and or shown on the Contract drawings, install an approved Industrial Waste Sampling Point in accordance with the Authority. Make allowance for and install 'deep' traps, risers, covers and signage to approval.

# 8 SCHEDULED FIXTURES & TAPWARE

Sanitary fixtures, taps, outlets and valves are to be first quality as scheduled and in compliance with Supply Authority and manufacturer's instructions.

All sanitary fixtures are to white, high density vitreous china, tested and Water Marked complete with all necessary support brackets, fixing screws, bolts, chrome plated waste outlets where required and be connected to all services. Fixtures are to be set plumb and level and set at heights to suit Architectural and 'Interior Design' drawing details.

Co-ordinate tap holes as required for selected tap ware into stainless steel sink units. Finish spindles 90 degrees to wall face and of equal and correct length. All anchorages and fixings are to be solid grouted to prevent movement or water hammer.

Provide additional protective measures during the procurement and construction phase to prevent damage by other building trades.

Submit samples of all fixtures, tapware & appliances for approval, prior to ordering and or purchase.

# 9 STORMWATER DRAINAGE

## 9.1 Stormwater Drainage

Install to approval, all stormwater drains to the sizes, approved depth, levels and alignments indicated on the drawings. The stormwater drainage system shall discharge on site to stormwater sumps and outfall points where shown on the Contract drawings.

All new inground stormwater drains are to be DWV grade uPVC with matching fittings suitable for solvent welded joints. All new drains are to be laid in straight lines to an approved gradient and with the invert of the pipe firmly bedded down into the bottom of the trench.

All piping systems are to be complete with all necessary bends, junctions, cleaning and inspection openings as required under the relevant Australian Standards.

## 9.2 Description of Materials

Materials are to conform to the following descriptions as applicable:

- Stormwater drainage Inground DWV grade uPVC
- Stormwater downpipes Above Ground DWV grade uPVC

UPVC pipes and fittings are to be sewer grade in accordance with AS1260 & AS1415.

## 9.3 Cleanout Points & Inspection Openings

Clean out points and inspection openings shall incorporate a rising shaft with a diameter of no less than the drain connected there to. Terminate external rising shafts with a screwed PVC cap set below a 250mm square hinged cast iron cover and concrete surround set flush with finished surface levels. All external cast iron covers are to be labelled 'SW'.

## 9.4 Carpark Drainage Channels

Where indicated on the Architectural & Hydraulic Services drawings, install MEA AC/AS 1500 constant depth grated channels complete with a standard edge profile and ductile iron Hi-flow grate (C Series). Nominal dimensions 150mm wide x 150mm deep.

# 10 WATER SERVICE

## 10.1 Water Supply Connection

The site water supply shall consist of one (1) mains connection where shown on the Contract drawings and reticulate throughout the buildings as shown.

## 10.2 Description of Materials

Refer to section 5.1 of this specification for details of hot & cold water piping. All pipe sizes shown on the Contract drawings refer to mean internal bore sizes in accordance with AS3500. Generally, all hot and cold water piping is to be installed using PE-XA pipes and fittings throughout.

## 10.3 General

Any water service pipe installed inground shall have a minimum effective cover on no less than 600mm unless otherwise approved by the Plumbing Consultant. Provide a suitable number of anchorage points where pipes terminate in walls, taps and outlets.

Extend and connect to all fixtures, fittings, appliances and outlets throughout the building and where shown on the Contract drawings. Copper pipes and fittings are to be joined using flare type unions. Conetite fittings and or cast brass tees and elbows are not to be used.

All water service piping where concealed in walls or buried below ground is to be protected using a purpose made wrapping specified here before. All water service pipework is to be installed and fixed correctly to eliminate water hammer and any other form of vibration throughout the building.

Polypropylene pipes and fittings are to be installed in strict accordance with the manufacturers written instructions and AS3500.1.2 & 4.2 and controlling authority requirements. All hot water service pipes are to have a minimum of 100mm clearance from cold water service pipes and other services throughout the building.

Upon completion and installation of each section of piping, isolate the service and conduct hydrostatic tests to the satisfaction of the Head Contractor and Superintendent.

## 10.4 Insulation

Insulate all hot water service copper pipes and fittings with 15mm thick preformed 'Aeroflex' insulation complete with butt joints glued with purpose made 'Aeroseal' adhesive. Insulation is to be installed on each pipe prior to installation where practical.

## 10.5 Hot Water Piping – Important Note

All hot water service pipework and fittings shown to be 'heat traced' is to be constructed using Type A copper tube & fittings throughout the building unless otherwise approved by the Plumbing Consultant.

## 10.6 Performance

The domestic hot & cold water system has been designed as a 'mains pressure' and 'pumped pressure' system. Velocities in all piping networks are not to exceed 1.3 m/sec unless the plumbing Consultant gives approval in advance. Where installed on a pressure set and operating during normal conditions, the mains cold water bypass shall remain closed.

## 10.7 Pipe Sizes

All pipe sizing is to be calculated in accordance with the requirements of AS3500 table 1.3. Where polypropylene pipes and fittings are installed, the following table should be used as a guide for comparative purposes.

| Type B copper tube – Cu (B) | PE-XA Pipes & Fittings |
|---|---|
| 15mm | 20mm |
| 20mm | 25mm |
| 25mm | 32mm |
| 32mm | 40mm |
| 40mm | 50mm |
| 50mm | 63mm |
| **Important Note** | |

The minimum internal bore size for all branch connections to fixtures, tapware, appliances and hose cocks is to be no less than 13.2mm. The minimum bore size must be maintained throughout the entire length of the piping system and ancillary items including isolation valves, fittings, tees, elbows and the like.

### 10.8 Water Service Sub-metering

Install water service sub-meters for potable water as shown on the contract drawings and in the locations scheduled below;

| Major Water Use – Designated (ALL) Areas | Metered Y/N |
|---|---|
| For each commercial tenancy – see plan | Y |

### 10.9 Water Hammer

The sub-contractor is to ensure that water service pipes and fittings are installed as to prevent water hammer occurring during normal operation. Should water hammer be detected, the sub-contractor shall at his expense take all necessary steps to correct the problem to the satisfaction of the Head Contractor and Plumbing Consultant.

## 11 VALVES, TAPS & FITTINGS

### 11.1 Generally

Supply and install scheduled and approved valves, taps and fittings to the size and where located on the Contract drawings. All valves and taps are to be manufactured in accordance with the requirements of Australian Standard AS3500 and referenced standards therein including AS1589. All components are to be dezincification resistant.

All exposed taps and fittings are to be chrome plated with approved, fitted escutcheon plates. Set all taps and outlets level with the fixture and on tile joints where practical. Refer to Architectural detail drawings and room elevations depicting the exact location of all taps and outlets prior to rough-in and or chasing of masonry walls.

### 11.2 Isolation Valves

Water service valves ≤50mm diameter are to be manufactured by Johns, series-59 type bronze gate valves with disconnecting unions comprising a tube bush on the inlet and flared type boiler union on outlet.

### 11.3 Non Return & Check Valves

All water service non-return and check valves shall be manufactured by John or equal approved with integral spring loaded bronze gate and disconnection unions incorporating a tube bush inlet and flared type boiler union on the outlet side of the valve.

### 11.4 Tempering & Thermostatic Valves

Tempering Valves are to be RMC (or equal) and be adjustable from 35 to 55 Degrees Centigrade, and be fully operational in dynamic water supply pressures from 30kPa to 1000kPa. Valves are to be able to function where the hot and cold differential in pressure is up to 10 to 1.

Tempering Valves are to be suitable for either horizontal or vertical installation and shall deliver a minimum flow rate of 15 L/min at 30kPa. Tempering Valves shall incorporate a locking device whereby the adjusting knob is fixed firmly into position using system locking splines built into the knob. In line strainers are to be installed on the hot and cold feed lines to the valve.

### 11.5 Double Check Valve, RPZD's

All backflow prevention valves are to be manufactured by FEBCO or equal and be fitted with stainless steel replaceable check valve seats. Check valves shall be removable, module type which can be disassembled and serviced. Mechanisms are to be retained in the valve body in such a manner that threads and or fasteners do not come in contact with the fluid being conveyed.

### 11.6 Hose Cocks (HC)

All hose cocks are to be 20mm chrome plated brass complete with an RMC anti-siphon vacuum breaker and chrome plated escutcheon. Locate all hose cocks 450mm (nominal) above the finished floor level unless otherwise shown on the Architectural drawings.

Hose bib taps, where required indicated on Hydraulic Services Drawings, in carparks and similar areas shall be 20mm anti-vandal (loose key) type.

### 11.7 Cisterns

Connect to all concealed cisterns using 15mm purpose made braided flexible hoses. Connect to all exposed cisterns using a chrome plated mini stop cock complete with connecting nut and tube. Refer to the manufacturers written instructions to determine the exact height and method of connection required prior to rough-in and chasing of masonry walls.

## 12 IDENTIFICATION AND LABELS

### 12.1 Identification

Provide brass or approved plastic labels on all isolation valves, controls, etc., to indicate the manner and function of controls.

### 12.2 Above Ground

Provide Brady or equal approved colour coded, self-adhesive labels with the name of the service or fluid being conveyed and direction of flow for all soil, waste and vent, rainwater, hot and cold water service pipe work where installed in ceiling spaces and other service areas. Labels are to be fixed to each pipe at 3-meter intervals in accordance with AS1345 or as directed by the Plumbing Consultant.

### 12.3 Below Ground

Provide Calpic YDET or equal approved 100m wide colour coded warning tape over each service inground including sewer and water service pipe work where installed below ground level. All warning tape is to be installed at a minimum distance of 350mm above the service pipe.

### 12.4 Valves

Provide and secure to each isolation valve handle, Brady or equal approved custom made plastic valve tags with embossed white letters 18mm high, indicating the area being served.

Provide and secure to each control or isolating valve, Brady or equal approved colour coded plastic or brass nameplates with embossed white letters 18mm high, indicating the service of fluid being conveyed.

### 15.5 Valves and Meters

Provide and secure to each water service sub-meter isolation valve handle, Brady or equal approved custom made plastic valve tags with embossed white letters 18mm high, indicating the Unit number to that being served.

Provide and secure to each control or isolating valve, Brady or equal approved colour coded plastic or brass nameplates with embossed white letters 18mm high, indicating the service of fluid being conveyed.

# End of Specification

Government of Western Australia
Department of Mines, Industry Regulation and Safety
Plumbers Licensing Board

Technical Note

Technical Advice Line 1300 360 897 www.dmirs.wa.gov.au/building-and-energy

# Evaporative air-conditioners

This technical note has been issued to alert the plumbing industry and stakeholders to acceptable methods for the termination of the overflow pipe from evaporative air-conditioners. This note should be read in conjunction with the Plumbers Licensing and Plumbing Standards Regulations 2000 (the Regulations).

## Licensed plumbing work

Construction industry operatives, especially the ones in the air-conditioning/mechanical services area are reminded that under the definition of water supply and sanitary plumbing work in the Regulations, the water supply pipework up to and the pipework draining the evaporative air-conditioning unit is plumbing work. This work shall be carried out by a suitably qualified person licensed by the Plumbers Licensing Board.

**Photo 1:** Typical evaporative air-conditioner

To help control microbial contamination and reduce the effects of water impurities, salts or total dissolved solids, evaporative air-conditioners discharge an amount of water to waste.

For safe control of this waste water to an approved point of discharge the following applies:

The configuration of the water reservoir and water supply effectively places regulation of these air-conditioners under storage tanks as stated in AS/NZS 3500.1:2018, clause 8.2.1(d). Therefore the discharge water shall be controlled as per the overflow requirements under AS/NZS 3500.1:2018, clause 8.4.4, tank overflow.

## Discharge of the overflow

As evaporative air-conditioners do not have a safe tray and the volume of discharge means the waste is not suitable for discharge inside a building. Therefore, only the requirements of AS/NZS 3500.1:2018, clauses 8.4.4.1(a) and 8.4.4.2(d) apply as follows:

- Overflow from tanks shall be not smaller than DN 40, as per clause 8.4.4.1(a).
- In order not to cause damage or nuisance, the tank overflow shall discharge where it is readily visible outside the building, clear of doors, windows or other opening, and within the property boundaries as per clause 8.4.4.2(d).

## Discharge of waste

Due to the corrosive nature of the waste water it must not discharge onto roofs or into gutters and downpipes. Licensed plumbing contractors are reminded that readily visible means the termination of the overflow should be at or near finished surface level.

As a guide any tundish exceeding 1.8 m vertically from finished surface level would not be considered readily visible. There is no maximum length of these wastes although they shall fall continuously in the direction of flow. Some examples of acceptable methods for termination are shown on page 2.

## Water supply isolation valve

The location of the isolating valve for the water supply serving evaporative air-conditioners shall comply with AS/NZS 3500:2018, part 4, clause 5.9.4(a). The isolating valve must be in a position readily accessible from finished surface level. If the evaporative air-conditioner is discharging water, this enables home owners or occupiers to isolate the unit, preventing water wastage, until a service person can attend.

Version 2 - May 2019

Level 1, Mason Bird Building, 303 Sevenoaks Street (entrance Grose Avenue), Cannington WA 6107
Postal: Locked Bag 100 East Perth WA 6892
Plumbers Service Line (08) 6251 1377 | Facsimile: 1300 449 185 | plumbers.admin@dmirs.wa.gov.au

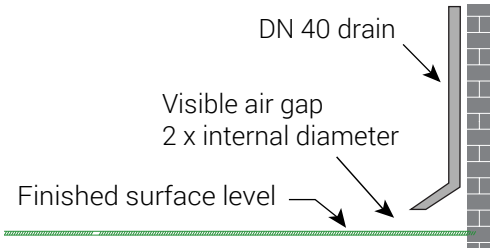



**Diagram 1:** To finished surface level with a visible gap provided the surface is graded away from the building, ponding does not occur, and the discharge does not present a safety risk to pedestrians.

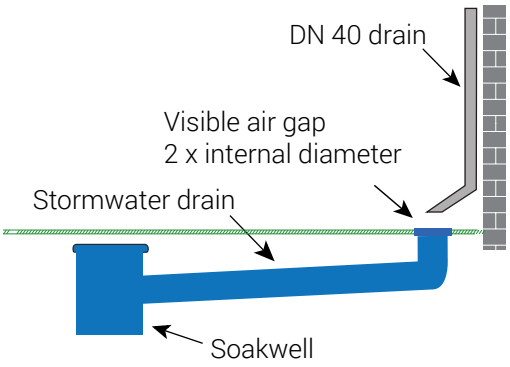



**Diagram 2:** Through a visible gap to a stormwater drain.

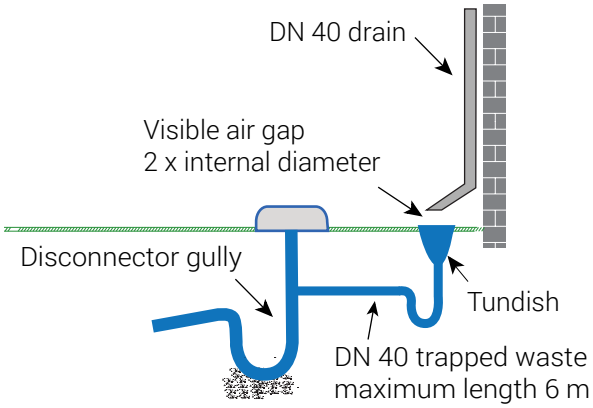



**Diagram 3:** To a disconnector gully via a tundish.

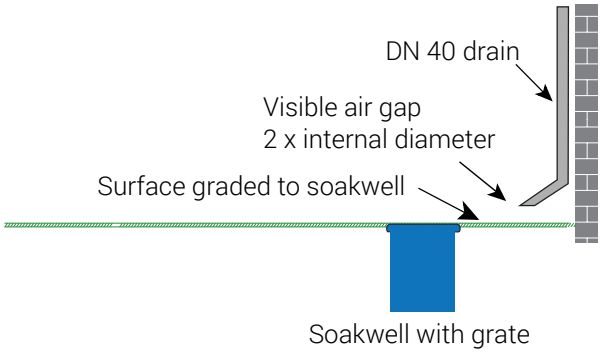



**Diagram 4:** To a surface stormwater drainage system provided the surface is graded away from the building, ponding does not occur, and the discharge does not present a safety risk to pedestrians for example draining across a footpath.

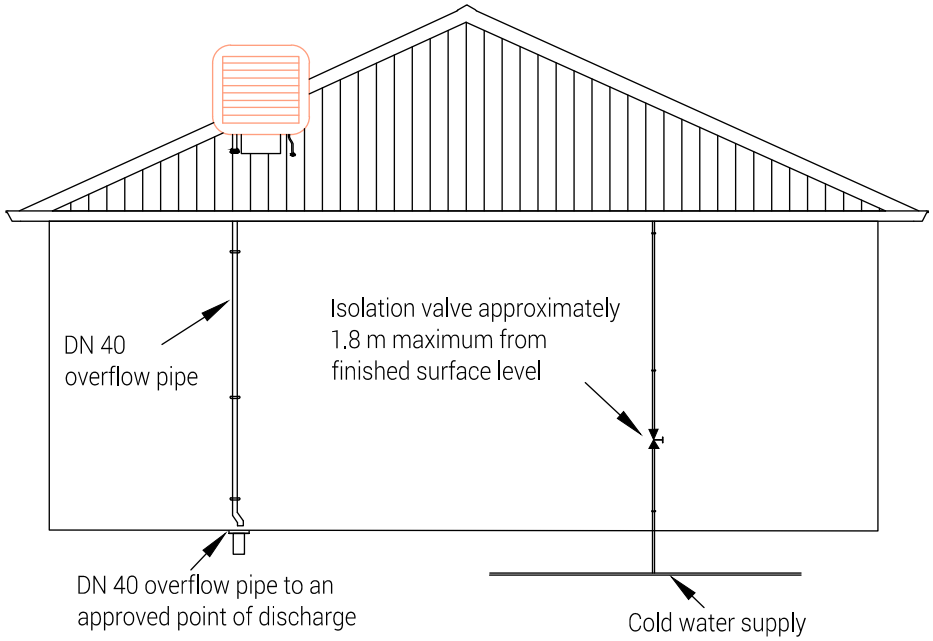



**Diagram 5:** Typical evaporative air conditioner installation showing compliant water supply and overflow pipe.

**Notes:**

1. Licensed plumbing contractors are advised to check with the relevant water services provider, for example the Water Corporation and their conditions of connection in relation to water used for cooling purposes.
2. Some water services providers do not allow evaporative air-conditioner waste to discharge to the main sewer due to the volume of waste water involved.
3. Water services providers' have conditions listed in the Water Services Regulations 2013.

## Notes

The technical note series is issued by the Plumbers Licensing Board to assist the plumbing industry to comply with the Plumbers Licensing and Plumbing Standards Regulations 2000 (the Regulations) applicable to plumbing work in Western Australia.

Each technical note is to be read in conjunction with Part 6 of the Regulations that currently adopt the Plumbing Code of Australia (PCA) and the deemed to satisfy provisions of AS/NZS 3500:2018, parts 0, 1, 2 and 4 but modified in certain matters to suit the State's building approach and other local conditions.

## Feedback

The Plumbers Licensing Board welcomes your feedback. If you have any questions on this technical note or any suggestions on any areas of plumbing work that the technical notes should cover, please contact the Board's Senior Technical Officer on (08) 6251 1377.

## Copies

Technical notes are published at www.dmirs.wa.gov.au/building-and-energy Printed copies may be made available on request by telephone (08) 6251 1377 or email plumbers.admin@dmirs.wa.gov.au

## Disclaimer

# APPENDIX 3 – Energy Compliance Report

THESTUDY
ENERGY
Design Matters Member
www.thestudy.com.au
PO Box 365
South Fremantle WA 6162
Parry Street Fremantle

# **Section J** Energy Efficiency
## Compliance Report

| | |
|---|---|
| Project Type | Proposed Commercial Building |
| BCA Classification | 2, 5, 6, 7, 8, 9a (excl ward areas) or 9b |
| Address | Lot 69 Antlia Way, Australind |
| Climate Zone | 5 |
| Owner | Whitey's Tackle |
| Designer | D'Agostino + Luff Architects |

I have assessed the proposed building at the above address and provide my certification that these works will be in accordance with Section J of BCA2019 when designed and built in accordance with this report, and the drawings provided to The Study.

I declare that the details provided on these verification sheets (and any supporting documentation accompanying them), are true and correctly reflect the plans and specifications of the proposed building that have been submitted to The Study for assessment for the certificate of design compliance / building permit. These are summarised requirements, please refer to the BCA for full compliance requirements. This document is aimed to demonstrate how compliance can be achieved but is not intended to substitute Section J of the BCA. The permit holder is responsible for achieving as-built compliance with the nominated provisions and calculated values.

| | |
|---|---|
| Assessor | Tristan Stanley-Cary |
| Qualifications | Accredited NatHERS Assessor (DMN/13/1539)<br>Cert IV NatHERS Assessment<br>Architect WA #2499 |
| Phone | 0419 00 66 10 |
| Email | tristan@thestudy.com.au |
| Signed |  |
| Date | 30/06/2021 |
| Revision | A |

| Part J1 | Building Fabric |
|---|---|
| **Part J1.2** | **Thermal Construction - General** |
| Part J1.2 (a) | Required insulation is to be installed in accordance with AS/NZS 4859.1 and BCA J1.2 – including requirements related to overlapping and abutting of insulation, providing air space for reflective membranes, and no compression of bulk insulation. Insulation to create a continuous barrier at the thermal envelope. |
| **Part J1.3** | **Roof and Ceiling construction** |
| Part J1.3 (a) | Total required R-Value of R3.7 (summer / downwards) calculated to AS/NZS 4859.2 including allowances for thermal bridging.<br><br>Calculated total R-Value of roof ceiling construction is **R4.24** based on anticon 145 on the ashgrid spacer system, which is above minimum performance requirements. |
| Part J1.3 (b) | Solar absorptance of roof to be maximum 0.45<br><br>Roof colour is to be surfmist, classic cream, paperbark, shale grey or evening haze. |
| **Part J1.4** | **Roof Lights** |
| Part J1.4 (a) | Not Applicable - No roof lights proposed |
| Part J1.4 (b) | Not Applicable - No roof lights proposed |
| **Part J1.5** | **Walls and Glazing (Facades)** |
| Part J1.5 (a) | Total System U-Value of wall-glazing construction not to exceed U2.0 calculated to AS/NZS 4859.2 including allowances for thermal bridging.<br><br>Wall glazing performance has been calculated in accordance with Method 2 (Multiple Aspects) in Spec J1.5a at **U0.87 –** which is within allowable performance requirements. Calculated performance based on wall insulation as noted below |
| Part J1.5 (b) | Not Applicable - No display glazing proposed |
| Part J1.5 (d) | Wall components of a wall-glazing construction must achieve a minimum Total R-Value of R1.4 (wall area is higher than 80% of façade area) calculated to AS/NZS 4859.2 including allowances for thermal bridging.<br><br>Wall total R-Values are calculated as follows, which are all above minimum performance requirements.<br><br>Tilt Panel – 35mm Kooltherm K12 insulated plasterboard = R1.40 total<br>Timber Framed – R3.0 Batts = R2.84 total |
| Part J1.5 (e) | The solar admittance of externally facing wall-glazing construction must not be greater than 0.13 calculated to Spec J1.5a under Method 1 (single aspect)<br><br>The solar admittance of the elevations with external glazing are under the 0.13 allowable limit as calculated under method 1 of Spec J1.5a<br><br>Compliance based on single clear glazing with an SHGC of 0.65 |
| Part J1.5 (g) | Not Applicable - No display glazing proposed |

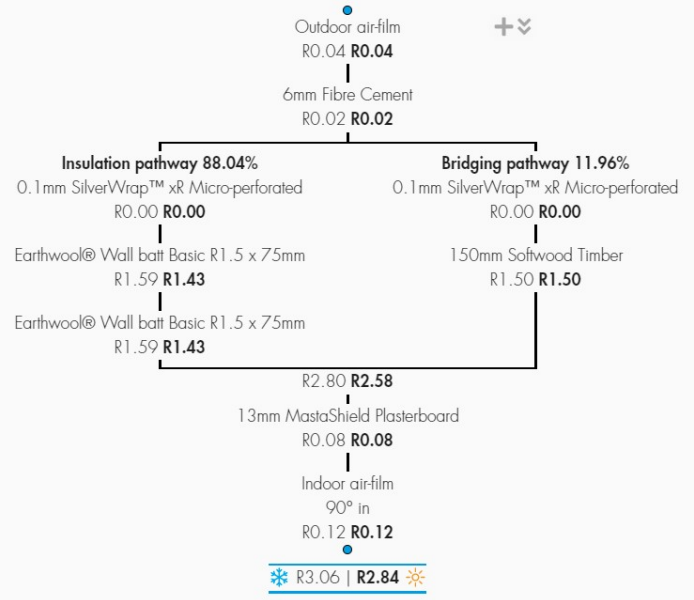
| | |
|---|---|
| **Part J1.6** | **Floors** |
| Part J1.6 (a) | Total required R-Value of R2.0 (winter / downwards) calculated to Specification J1.6.<br><br>Calculated total R-Value of floor construction is **R2.64** based on concrete slab construction over soil (with a calculated R-Value of R2.4 from Spec J1.6), which is above minimum performance requirements. |
| Part J1.6 (b) (c) | Not Applicable – No in-floor heating or cooling is proposed |
| **Part J3** | **Building Sealing** |
| **Part J3.2** | **Chimneys & Flues** |
| Part J3.2 | Not Applicable – Evaporative Cooling proposed |
| **Part J3.3** | **Roof Lights** |
| Part J3.3 (a) (b) | Not Applicable – Evaporative Cooling proposed |
| **Part J3.4** | **Windows and Doors** |
| Part J3.4 (a) (b) | Not Applicable – Evaporative Cooling proposed |
| Part J3.4 (c) | Not Applicable – Evaporative Cooling proposed |
| Part J3.4 (d) | Not Applicable – Evaporative Cooling proposed |
| Part J3.4 (e) | Not Applicable – Evaporative Cooling proposed |
| **Part J5** | **Air Conditioning and Ventilation systems** |
| | Please refer to mechanical consultant documentation |
| **Part J6** | **Artificial Lighting & Power** |
| | Please refer to electrical consultant documentation |
| **Part J7** | **Heated Water Supply & Swimming Pool/Spa Plant** |
| Part J7.2<br><br>Part J7.3 | Heated water supply for food preparation and sanitary purposes to comply with NCC Volume 3 (Plumbing Code)<br><br>Not Applicable - There is no swimming pool or spa proposed as part of this project |
| **Part J8** | **Energy Monitoring** |
| Part J8.3 | Building floor area is between 500 and 2,500m². Energy meter is shown to be configured to record time of use consumption of gas and electricity. |

Roof/Ceiling and Wall Total R-Value Calculations to AS/NZS 4859.2 calculated by Kompli online tool

## Roofs


## Tilt Panel Walls


## Timber Framed Wall



## Part J1.5 (a) & (d) Façade Performance Calculations

| Façade Calculator | Climate Zone 5 | Project Ref 2883 | Building Class 2, 5, 6, 7, 8, 9a* & 9b |
|---|---|---|---|

| | | | Façade | | Total Building | | Average Performance | |
|---|---|---|---|---|---|---|---|---|
| | R-Value | U-Value | Area ($m^2$) | Percent | Percent | Area | R-Value | U-Value |
| **Northern Aspect** | | | **178.39** | 100.0% | 27.4% | | | |
| 1 Glazing | 0.15 | 6.60 | 0.00 | 0.0% | 0.0% | | | |
| 2 Tilt Panel | 1.40 | 0.71 | 178.39 | 100.0% | 27.4% | | | |
| 3 Framed | 2.84 | 0.35 | 0.00 | 0.0% | 0.0% | | | |
| 4 Tilt Panel - Clad | 1.58 | 0.63 | 0.00 | 0.0% | 0.0% | | | |
| 5 | | | 0.00 | 0.0% | 0.0% | | | |
| **Eastern Aspect** | | | **154.64** | 100.0% | 23.7% | | | |
| 1 Glazing | 0.15 | 6.60 | 0.00 | 0.0% | 0.0% | | | |
| 2 Tilt Panel | 1.40 | 0.71 | 138.26 | 89.4% | 21.2% | | | |
| 3 Framed | 2.84 | 0.35 | 0.00 | 0.0% | 0.0% | | | |
| 4 Tilt Panel - Clad | 1.58 | 0.63 | 16.37 | 10.6% | 2.5% | | | |
| 5 | | | 0.00 | 0.0% | 0.0% | | | |
| **Southern Aspect** | | | **181.23** | 100.0% | 27.8% | 651.39 | 1.15 | **0.87** |
| 1 Glazing | 0.15 | 6.60 | 26.55 | 14.6% | 4.1% | | | |
| 2 Tilt Panel | 1.40 | 0.71 | 0.00 | 0.0% | 0.0% | | | |
| 3 Framed | 2.84 | 0.35 | 154.68 | 85.4% | 23.7% | | | |
| 4 Tilt Panel - Clad | 1.58 | 0.63 | 0.00 | 0.0% | 0.0% | | | |
| 5 | | | 0.00 | 0.0% | 0.0% | | | |
| **Western Aspect** | | | **137.13** | 100.0% | 21.1% | | | |
| 1 Glazing | 0.15 | 6.60 | 0.00 | 0.0% | 0.0% | | | |
| 2 Tilt Panel | 1.40 | 0.71 | 137.13 | 100.0% | 21.1% | | | |
| 3 Framed | 2.84 | 0.35 | 0.00 | 0.0% | 0.0% | | | |
| 4 Tilt Panel - Clad | 1.58 | 0.63 | 0.00 | 0.0% | 0.0% | | | |
| 5 | | | 0.00 | 0.0% | 0.0% | | | |

**Minimum Wall Performance Caulcations**

| | | | | | | |
|---|---|---|---|---|---|---|
| Wall area >=80% façade area | **R1.4** | Wall Area | 624.84 | **95.9%** | Applicable Value | **1.40** |
| Wall area <80% of fadace area | **R1.0** | Façade Area | 651.39 | | | |

## Part J1.5 (e) Solar Admittance Calculations

| Glazing Calculations Method 1 | Climate Zone 5 | Project Ref 2883 | Building Class 2, 5, 6, 7, 8, 9a* & 9b |
|---|---|---|---|

| | | Opening | | | | Shading (mm) | | | | | | | Solar Admittance | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wall Type | Height (mm) | Width (mm) | Area ($m^2$) | SHGC | Projection (or Device) P | Height from sill H | Height from head G | G/H | P/H | Multiplier | AxSxSHGC | /AREA | Compliance |
| **Northern Aspect** | | | | | | | | | | | | 0.00 | 0.00 | 0% |
| 1 | | | | | | | | | 0.0 | 0.0 | 1.00 | 0.00 | 0.00 | 0.0% |
| 2 | | | | | | | | | 0.0 | 0.0 | 1.00 | 0.00 | 0.00 | 0.0% |
| **Eastern Aspect** | | Height (mm) | Width (mm) | Area ($m^2$) | SHGC | P | H | G | G/H | P/H | Multiplier | 0.00 | 0.00 | 0% |
| 1 | | | | | | | | | 0.0 | 0.0 | 1.00 | 0.00 | 0.00 | 0.0% |
| 2 | | | | | | | | | 0.0 | 0.0 | 1.00 | 0.00 | 0.00 | 0.0% |
| **Southern Aspect** | | Height (mm) | Width (mm) | Area ($m^2$) | SHGC | P | H | G | G/H | P/H | Multiplier | 11.74 | 0.06 | 50% |
| 1 W1 Office | Framed | 1800 | 2400 | 4.32 | 0.65 | 1500 | 1800 | 0 | 0.0 | 0.8 | 0.62 | 1.74 | 0.01 | 7.4% |
| 2 W2 Meeting | Framed | 1800 | 2400 | 4.32 | 0.65 | 1500 | 1800 | 0 | 0.0 | 0.8 | 0.62 | 1.74 | 0.01 | 7.4% |
| 3 W3 Entry | Framed | 2400 | 2400 | 5.76 | 0.65 | 1500 | 2700 | 300 | 0.1 | 0.6 | 0.75 | 2.81 | 0.02 | 11.9% |
| 4 W5 Tenancy 1 | Framed | 2700 | 900 | 2.43 | 0.65 | 1500 | 2700 | 0 | 0.0 | 0.6 | 0.69 | 1.09 | 0.01 | 4.6% |
| 5 W6 Tenancy 1 | Framed | 2700 | 900 | 2.43 | 0.65 | 1500 | 2700 | 0 | 0.0 | 0.6 | 0.69 | 1.09 | 0.01 | 4.6% |
| 6 W7 Tenancy 1 | Framed | 2700 | 900 | 2.43 | 0.65 | 1500 | 2700 | 0 | 0.0 | 0.6 | 0.69 | 1.09 | 0.01 | 4.6% |
| 7 W8 Tenancy 2 | Framed | 2700 | 900 | 2.43 | 0.65 | 1500 | 2700 | 0 | 0.0 | 0.6 | 0.69 | 1.09 | 0.01 | 4.6% |
| 8 W9 Tenancy 2 | Framed | 2700 | 900 | 2.43 | 0.65 | 1500 | 2700 | 0 | 0.0 | 0.6 | 0.69 | 1.09 | 0.01 | 4.6% |
| 9 | | | | | | | | | 0.0 | 0.0 | 1.00 | 0.00 | 0.00 | 0.0% |
| **Western Aspect** | | Height (mm) | Width (mm) | Area ($m^2$) | SHGC | P | H | G | G/H | P/H | Multiplier | 0.00 | 0.00 | 0% |
| 1 | | | | | | | | | 0.0 | 0.0 | 1.00 | 0.00 | 0.00 | 0.0% |
| 2 | | | | | | | | | 0.0 | 0.0 | 1.00 | 0.00 | 0.00 | 0.0% |

# APPENDIX 4 - Door Hardware & Metlam Metalwork Schedules

| | | |
|---|---|---|
| . | . | |
| **Notes** | . | |

# Door Hardware Solutions

Unit E3 Home Depot, Strelly Street, Busselton WA 6280
PO Box 1134, Busselton WA 6280
Phone: 08 9751 3177 Fax: 08 9751 3166
email:chad@doorhardwaresolutions.com.au

**Notes:**
Door signs and colours to be confirmed.
D-8 & D-9 rooms to be masterkeyed.
D-1 staff keyed.

| **D-1** | **Commercial** | **LH OO** |
|---|---|---|
| **Entry/Delivery** | **Ground** | **SF/SCD** |

| REF NO | DESCRIPTION | QTY |
|---|---|---|
| DHS 570 CYL SC | 570 Oval cylinder Keyed to system | 1 |
| LW 3572X SCP | Storeroom escape lock scp | 1 |
| LW 1226 SCP | Cylinder Escutcheon | 1 |
| MC S224 SB10075 | 100 x 75 x 2.5 BB FP bearing commercial hinges SSS | 4 |
| TS92 -93 GN H/O | Hold-open stop for TS92/93 door closer | 1 |
| TS92-93 GN | Limiting stop for TS92/93 door closer | 1 |
| TS92/93 G-N | Angle bracket for TS 92/93 Door closer | 1 |
| TS93G N 1-5 SIL | Push side delayed action slidearm closer | 1 |
| IS 3070 X 1000 | Bottom door seal x 1000mm | 1 |
| IS4015 X 1000 | 6mm High threshold plate x 1000mm C/A | 1 |
| LW 1220/1221/14 | 144 lever set on round rose SCP | 1 |

| **D-2** | **Commercial** | **LH** |
|---|---|---|
| **Tenancy 2 / delivery** | **Ground** | **SF/FSC** |

Door closer to active leaf.
Strap bolts non active leaf.

| REF NO | DESCRIPTION | QTY |
|---|---|---|
| LW 5260/1SFTSC | Tubular latch with T strike SCP | 1 |
| MC S224 SB10075 | 100 x 75 x 2.5 BB FP bearing commercial hinges SSS | 8 |
| TS92-93 GN | Limiting stop for TS92/93 door closer | 1 |
| TS92B N 2-4 SIL | Pull side slide arm door closer silver | 1 |
| GA 300MM O/S SC | Off set strap bolt WFP | 1 |
| GA 300MM STRAP | Strap bolt | 1 |
| LW 1220/1221/14 | 144 lever set on round rose SCP | 1 |

| **D-3** | **Commercial** | **RH SLIDE** |
|---|---|---|
| **Staff** | **Ground** | **SF/FHC** |

| REF NO | DESCRIPTION | QTY |
|---|---|---|
| BRO 63-20PWT | Fascia powdercoated white 2000mm with end caps | 1 |
| BRO SR 60-30/1 | 60 kg sliding track kit 915mm-1525mm door | 1 |
| NOV 6205 SCP | Flush door pull 150 x 45 Satin Chrome | 2 |

| **D-4** | **Commercial** | **RH** |
|---|---|---|
| **Staff / UAT Shower** | **Ground** | **SF/SCD** |

| REF NO | DESCRIPTION | QTY |
|---|---|---|
| LW 5260/1SFTSC | Tubular latch with T strike SCP | 1 |
| MC S224 SB10075 | 100 x 75 x 2.5 BB FP bearing commercial hinges SSS | 4 |
| TS92 -93 GN H/O | Hold-open stop for TS92/93 door closer | 1 |
| TS92-93 GN | Limiting stop for TS92/93 door closer | 1 |
| TS92B N 2-4 SIL | Pull side slide arm door closer silver | 1 |
| MIB/DP-2 SSS | Mortice indicator bolt with long disable turn | 1 |
| ML 22_6566MKII | 32mm grab rail shower kit | 1 |
| ML 214S | Hat And coat hook consealed fix | 2 |
| ML 230 SS | Soap dish with drain hole SSS | 1 |
| ML 269_TRH_SS | Double toilet roll holder with shelf top | 1 |
| ML 327 X 300 | 300 x 32mm C/F SSS Grab Rail to Aust. standards | 1 |
| ML 994_CL | Accessible folding shower seat Compact Laminate | 1 |
| ML 6204 | 700mm Lachlan single towel bar | 1 |
| ML SCT 1616 CA | 1600 x 1600 Micro curtain track and fittings C/A | 1 |
| ML SC_WNT 3020 | Polyester taffeta shower curtian 3000x2000mm | 1 |
| MLR 103X-LH | 950 x 600 x 32mm SSS LH disable grab rail | 1 |
| MLR 119MKII | Straight rail padded back rest | 1 |
| LW 1220/1221/14 | 144 lever set on round rose SCP | 1 |
| ML 16297 SIL | Unisex accessible toilets left hand and shower | 1 |

| **D-5** | **Commercial** | **RH OO** |
|---|---|---|
| **Vanity** | **Ground** | **SF/FHC** |

| REF NO | DESCRIPTION | QTY |
|---|---|---|
| LW 5260/1SFTSC | Tubular latch with T strike SCP | 1 |
| MC S224 SB10075 | 100 x 75 x 2.5 BB FP bearing commercial hinges SSS | 4 |
| TS92-93 GN | Limiting stop for TS92/93 door closer | 1 |
| TS92G N 2-4 SIL | Push side slide arm closer | 1 |
| ML 602AR | Ellipse soap dispenser | 1 |
| ML 771-6 | 600 x 1000 Mirror to Aust. Standard | 1 |
| ML 6204 | 700mm Lachlan single towel bar | 1 |
| LW 1220/1221/14 | 144 lever set on round rose SCP | 1 |

| **D-6** | **Commercial** | **LH** |
|---|---|---|
| **Vanity** | **Ground** | **SF/FHC** |

| REF NO | DESCRIPTION | QTY |
|---|---|---|
| LW 5260/1SFTSC | Tubular latch with T strike SCP | 1 |
| MC S224 SB10075 | 100 x 75 x 2.5 BB FP bearing commercial hinges SSS | 3 |
| TS92-93 GN | Limiting stop for TS92/93 door closer | 1 |
| TS92B N 2-4 SIL | Pull side slide arm door closer silver | 1 |
| ML 602AR | Ellipse soap dispenser | 1 |
| ML 6204 | 700mm Lachlan single towel bar | 1 |
| LW 1220/1221/14 | 144 lever set on round rose SCP | 1 |

| **D-7** | **Commercial** | **RH** |
|---|---|---|
| **WC** | **Ground** | **SF/FHC** |

| REF NO | DESCRIPTION | QTY |
|---|---|---|
| LW 5260/1SFTSC | Tubular latch with T strike SCP | 1 |
| MC S224 SB10075 | 100 x 75 x 2.5 BB FP bearing commercial hinges SSS | 3 |
| TS92-93 GN | Limiting stop for TS92/93 door closer | 1 |
| TS92B N 2-4 SIL | Pull side slide arm door closer silver | 1 |
| MIB/DP-2 SSS | Mortice indicator bolt with long disable turn | 1 |
| ML 16304 SIL | Unisex Ambulant toilet Sil/Black | 1 |
| ML 269_TRH_SS | Double toilet roll holder with shelf top | 1 |
| ML 771-5 SS | 450 x 1000 Mirror with SSS frame to Aust. Standard | 1 |
| MLR 112 | 450 x 450 Ambulant grab rail SS | 2 |
| LW 1220/1221/14 | 144 lever set on round rose SCP | 1 |

| **D-8** | **Commercial** | **LH** |
|---|---|---|
| **Office/Meeting** | **Ground** | **SF/FSC** |

| REF NO | DESCRIPTION | QTY |
|---|---|---|
| DHS 570 CYL SC | 570 Oval cylinder Keyed to system | 1 |
| LW 3574WT SCP | Mortice entry lock | 1 |
| LW 1226 SCP | Cylinder Escutcheon | 1 |
| LW 1227 SCP | Turn Snib | 1 |
| MC S224 SB10075 | 100 x 75 x 2.5 BB FP bearing commercial hinges SSS | 4 |
| IS7010SI SDS | Single frame door seal | 1 |
| IS8010SI X 920 | 920mm Drop door seal C/A | 1 |
| LW A250 SCP | Heavy duty door stop | 1 |
| LW 1220/1221/14 | 144 lever set on round rose SCP | 1 |

| **D-9** | **Commercial** | **LH** |
|---|---|---|
| **Meeting** | **Ground** | **SF/FSC** |

| REF NO | DESCRIPTION | QTY |
|---|---|---|
| DHS 570 CYL SC | 570 Oval cylinder Keyed to system | 1 |
| LW 3574WT SCP | Mortice entry lock | 1 |
| LW 1226 SCP | Cylinder Escutcheon | 1 |
| LW 1227 SCP | Turn Snib | 1 |
| MC S224 SB10075 | 100 x 75 x 2.5 BB FP bearing commercial hinges SSS | 4 |
| IS7010SI SDS | Single frame door seal | 1 |
| IS8010SI X 920 | 920mm Drop door seal C/A | 1 |
| LW A250 SCP | Heavy duty door stop | 1 |
| LW 1220/1221/14 | 144 lever set on round rose SCP | 1 |

| **D-10** | **Commercial** | **RH** |
|---|---|---|
| **Public UAT** | **Ground** | **SF/FHC** |

| REF NO | DESCRIPTION | QTY |
|---|---|---|
| LW 5260/1SFTSC | Tubular latch with T strike SCP | 1 |
| MC S224 SB10075 | 100 x 75 x 2.5 BB FP bearing commercial hinges SSS | 4 |
| TS92 -93 GN H/O | Hold-open stop for TS92/93 door closer | 1 |
| TS92-93 GN | Limiting stop for TS92/93 door closer | 1 |
| TS92B N 2-4 SIL | Pull side slide arm door closer silver | 1 |
| MIB/DP-2 SSS | Mortice indicator bolt with long disable turn | 1 |
| ML 16223 SIL | Unisex RH braille toilet door sign Sil/ Black | 1 |
| ML 214S | Hat And coat hook consealed fix | 1 |
| ML 269_TRH_SS | Double toilet roll holder with shelf top | 1 |
| ML 327 X 300 | 300 x 32mm C/F SSS Grab Rail to Aust. standards | 1 |
| ML 602AR | Ellipse soap dispenser | 1 |
| MLR 104X -RH | 950 x 600 x 32mm SSS RH disable grab rail set | 1 |
| MLR 119MKII | Straight rail padded back rest | 1 |
| LW 1220/1221/14 | 144 lever set on round rose SCP | 1 |

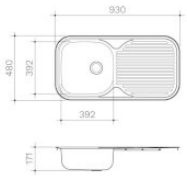
# APPENDIX 5 - Sanitaryware and Tapware Schedule

## CAROMA SPECIFICATION

VISIT SPECIFY.CAROMA.COM.AU

The below products have been shared with you via the Caroma Specify website.

Visit **specify.caroma.com.au** to find more inspirational and innovative bathroom products.

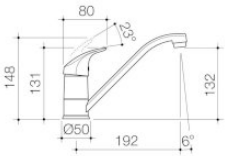



CLARK

### ADVANCE SINGLE REVERSIBLE END BOWL (NO TAP HOLE)

| code | rrp inc.gst |
|---|---|
| 1503 | $653.00* |

Some sinks are made for a simple purpose. An Advance sink puts practical design and classical lines within everyone's reach. It's affordable quality for your home.

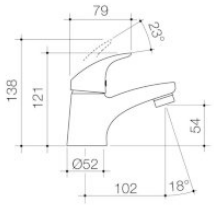



dorf

### FLICKMIXER SINK MIXER

| code | rrp inc.gst |
|---|---|
| 3497.044A | $234.00* |

Dorf's first and favourite mixer now comes in a wider range. Beautifully designed and thoughtfully engineered the subtle lines and fingertip control of Flickmixer will see it take prime position in bathrooms, kitchens and laundries.

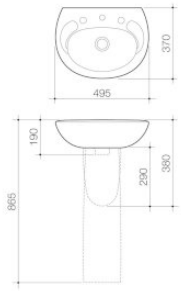



dorf

### FLICKMIXER BASIN MIXER

| code | rrp inc.gst |
|---|---|
| 5215.045A | $205.00* |

Dorf's first and favourite mixer now comes in a wider range. Beautifully designed and thoughtfully engineered the subtle lines and fingertip control of Flickmixer will see it take prime position in bathrooms, kitchens and laundries.

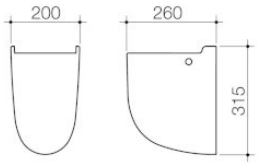



CAROMA

## CONCORDE WALL BASIN 1TH

| code | rrp inc.gst |
|---|---|
| 631010W | $490.00* |

Universal, easy clean wall basin of compact size suitable for general-purpose applications. The Concorde 500 basin will accommodate a range of tapware configurations and offers an optional pedestal or shroud to conceal plumbing fittings. This basin is suitable for domestic and commercial applications. The basin can be installed to comply to AS1428.1 2009 Amd.1 Access and Mobility requirements

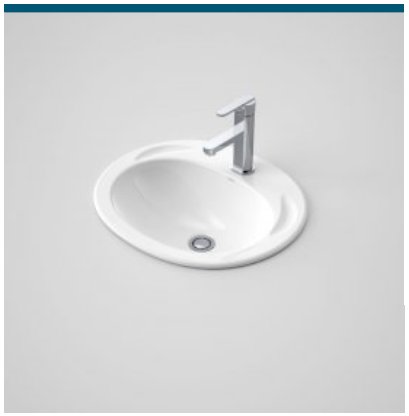


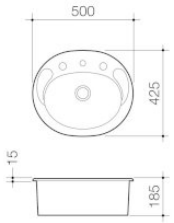

CAROMA

## CAROMA WALL BASIN SHROUD

| code | rrp inc.gst |
|---|---|
| 639950W | $298.00* |

Completely conceals P-trap waste pipe fittings, to suit the Caroma wall basin. This shroud gives a modern, streamlined look that is sure to be a success in any bathroom renovation.



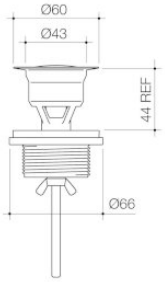



CAROMA

## CONCORDE VANITY BASIN

| code | rrp inc.gst |
|---|---|
| 654110W | $390.00* |

Universal, easy clean basin of compact size suitable for general purpose applications. The Concorde 500 basin has two soap holders.

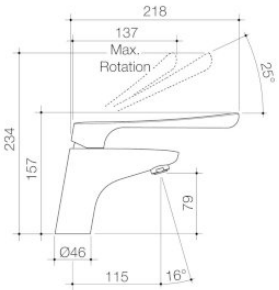



CAROMA

## CHROME POP-UP PLUG AND WASTE

| code | rrp inc.gst |
|---|---|
| 687329C | $30.00* |

Caroma Genuine Parts for basins include a range of plug & wastes and components to suit the extensive collection of Caroma basins.

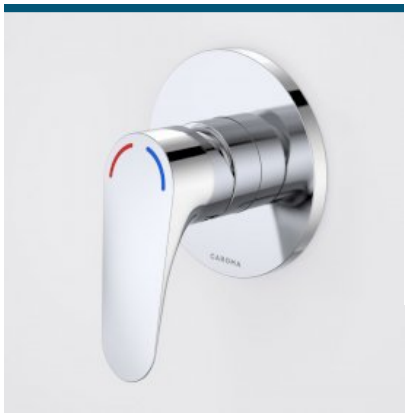


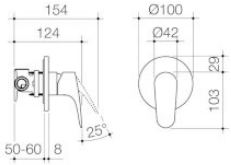

CAROMA

## CARE PLUS BASIN MIXER CARE HANDLE H/C

| code | rrp inc.gst |
|---|---|
| 91106C6A | $360.00* |

The Care Plus Mixer range is ideal for commercial care requirements, with the versatility of adaptable standard and extended lever care handles, in hot/cold or warm/cold combinations; and increased indicator size across all handle options. The ranges features laminar flow as standard for added infection control against legionella and bacteria in hospitals and aged care facilities.



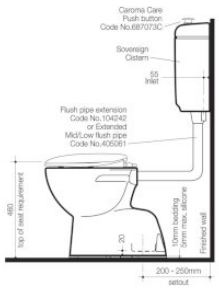



CAROMA

## CARE PLUS SHOWER MIXER STANDARD HANDLE H/C

| code | rrp inc.gst |
|---|---|
| 91107C | $302.00* |

The Care Plus Mixer range is ideal for commercial care requirements, with the versatility of adaptable standard and extended lever care handles, in hot/cold or warm/cold combinations; and increased indicator size across all handle options. The ranges features laminar flow as standard for added infection control against legionella and bacteria in hospitals and aged care facilities.



CAROMA

## CARE 400 CONNECTOR (S TRAP) SUITE WITH CARAVELLE CARE SINGLE FLAP SEAT - WHITE

| code | rrp inc.gst |
|---|---|
| 987900W | $1,436.00* |

This versatile pedestal type 4.5/3L dual flush Care 400 toilet suite features a vitreous china care cistern with raised push buttons and a concealed trap care pan to facilitate easy cleaning. The Care 400 suite is designed to provide extra support for people with ambulant disabilities with a raised seat height of between 460-480mm and chrome raised height buttons. Ideal for use by those with ambulant disabilities, restricted movement and wheel-chair users including wheeled commode chairs.



*All price are recommended retail inclusive of GST in AUD. To be used as a guide only, prices may vary between model variations, and are subject to change without notice.
A number of brands and products on this page are the subject of registered trade marks, register designs and/or registered patents. View full disclaimer on specify.caroma.com.au

# APPENDIX 6 - Existing Site Survey - SURVCON Land Surveyors

PHOTO TAKEN FROM 'A'

## LEGEND

- SIDE ENTRY PIT
- RETIC CONTROLLER
- WATER TAP
- SEWER MARKER
- SEWER CONNECTION
- SEWER MANHOLE
- TELSTRA MARKER
- TELSTRA PIT
- POWER DOME
- 12.76 EXISTING SURFACE HEIGHT
- FOOTPATH
- ROAD CENTRELINE
- KERB FACE
- KERB TOP
- ROCK PITCH
- EASEMENT
- FENCE
- CONCRETE EDGE
- BOTTOM OF BANK
- TOP OF BANK
- RETAINING WALL
- S SEWER MAIN

TOP OF CANAL
LOT 73
DP402349
R 52252
PEG FOUND
94°23'4"
27.84m
LOT 70
DP402349
36.58m
121°3'8"
LOT 69
1573m²
DP402349
POWER DOME & WATER CONNECTION
TELSTRA MARKER
SEWER EASEMENT SEE DP402349
90°
SEWER MARKER
PEG FOUND
NBN PIT
TBM SHN IN BIT RL 12.98
SEWER MAIN
RAIN GARDEN
SIDE ENTRY PIT
ROCK PITCH
FOOTPATH
50.01m
ANTLIA
WAY
ROAD CENTRELINE
MOUNTABLE KERB
GRASS
45.18m
2.6m HIGH SECURITY FENCE
LOT 73
DP402349
R 52252
TOP OF CANAL
LIMESTONE RETAINING WALL
RESTRICTIVE COVENANT SEE DP 402349
80°12'53"
154°20'55"
4.38m
PEG FOUND
TRANSFORMERS x 2

NOTES:
1. Limited boundary marks found. Boundary resurvey recommended if building on or close to boundary.
2. Datum is AHD established from Sewer MH AD9801 Lid Level 13.09m.
3. Above ground services located by survey. Underground services plotted from plans supplied by the relevant authorities. No liability is accepted for errors in underground service locations. All services to be located on site prior to any work being done.
4. No boundary marks found unless otherwise noted.
5. Contour interval is 0.25m.
6. PDF to be used in conjunction with DWG file supplied. Some point heights may have been omitted for clarity; see DWG file.

| Rev. | Description | Drawn | Date | Checked |
|---|---|---|---|---|
| A | INITIAL ISSUE | TJ | 4/3/21 | CM |

Scale: 1:250 A2 ORIG
0 5 10 15

Surveyor: CW
Survey date: 3/3/2021
Precal/Cad: N/A

The contents of this plan are date stated within the revision panel. All consultants and persons wishing to utilise this data should satisfy themselves of this plan's currency by contacting Survcon.

The boundaries depicted on this plan were not re-established as part of this survey, therefore this plan does not guarantee their accuracy. Re-establishment of the cadastral boundaries is recommended for any proposed works on or near existing boundaries.

N

# FEATURE AND CONTOUR SURVEY
# LOT 69 ON DP402349,
# 23 ANTLIA WAY, AUSTRALIND

Client: **B.G. GRIEVE BUILDER**

Survcon SURVEYING SERVICES
PO Box 365
Dunsborough
WA 6261
Australia
Tel: (08) 9754 1188
Fax: (08) 9756 8000
mail@survcon.com.au
www.survcon.com.au

| PROJ MNGR. | Michael Riddle | DATUM | PCG94 AHD |
|---|---|---|---|

8447_SS_A
JOB NUMBER TYPE REVISION