Attachment D – Project Specification

1. PRELIMINARY

1.2 GENERAL CONDITIONS

Requirement: To AS 4902 (2000), General conditions of contract for design and construct.

1.3 PROVISIONAL SUM SCHEDULE

Item	Worksection specified	Provisional sum ($)
Western Power Headworks	Electrical Services	$90,000
Site Power Upgrade	Electrical Services	$60,000
Existing hydraulic services relocation, modification	Hydraulic Services	$70,000

1.4 PROTECTION OF PEOPLE AND PROPERTY

Safety

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

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

Accident reports: Submit reports of accidents.

- Purpose of submission: For information.
- Timing of submission: no longer than 3days from the accident

Protective clothing

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

- Safety helmets: Type 1 to AS/NZS 1801 (1997).
- High visibility safety vests: To AS 4602.1 (2024).

1.5 CARE FOR THE WORKS, PEOPLE, AND PROPERTY OUTSIDE THE WORKS

Reinstatement

General: Clean and repair damage caused by installation or use of temporary work and restore existing facilities used during construction to original condition.

Accessways and services: Do not obstruct or damage roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Determine the location of such services. Rectify immediately any obstruction or damage to such services and provide temporary services whilst repairs are carried out.

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

Existing services

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

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

Redundant services: Remove redundant parts and make safe.

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

Changes to existing services: Submit proposals.

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

Adjoining buildings and facilities

Notice: At least 14 days before commencing work, give written notice to the Principal and occupants of the adjoining facility of the intention to commence work and an outline description of the type and extent of work.

Revealed encroachments: If the works reveal unknown encroachments of adjoining properties onto the site or of existing site structures onto adjoining properties, immediately notify the superintendent and seek instruction.

Records: For each property documented in the **Adjoining facilities to be recorded schedule**:

- Inspect the property with the Principal and occupant of the facility, before commencement of work.
- Make detailed records of conditions existing within the facility, especially structural defects and other damage or defacement.
- Arrange for at least 3 copies of each record, including drawings, written descriptions and photographs, to be endorsed by the Principal and occupant of the facility, or their representatives, as evidence of conditions existing before commencement of work.

Endorsed copies: Submit one endorsed copy of each record to the Principal and the Superintendent. Keep the other endorsed copy on site. Digital copy is acceptable.

Timing of submission: Before commencement of work

1.6 SETTING OUT THE WORKS

Setting out: confirm the final building location onsite as per design using a qualified land surveyor.

Cleaning up

Final cleaning

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

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

Pest eradication

Requirement: Employ suitably qualified pest exterminators. At practical completion, verify that completed works are free of pest.

1.7 MATERIAL, LABOUR AND CONSTRUCTION PLANT

General

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

Access roads

Always allow the only access road available for the Shire staff and facility users. The builder site outside of the new building location is to be negotiated with the Shire.

Parking

All parking for Contractor and Subcontractors is to be negotiated with the Shire during the construction period.

Project signboards

General: Provide project-specific signboards and as follows:

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

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

Contractor's representative

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

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

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

The items may be part of existing structures, services and survey marks.

Control of runoff stormwater

Requirement: Ensure storm water is running away from existing nearby and adjacent facilities during construction. Allow for temporary storm water drainage if required.

1.8 WORKING HOURS

General
Working hours: 6am – 4pm

Working days: Monday to Friday

Hours and days outside the general working hours and days to be approved by the Principal.

1.9 PROGRAMMING

Program of work
Construction program: Submit a construction program showing the following:

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

Time scale: Working days.

Updated program: Submit revised construction programs as required by the progress of the work. Identify changes since the previous issue, and show the estimated percentage of completion for each item of work.

Purpose of submission: For information.

Timing of submission: Within 14 days after the date for possession of the site and with each progress claim.

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

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

Frequency: Monthly (for up to 6 months construction period) or every 2 months for construction longer than 8months.

Minutes: Make a record of site meetings. Distribute a copy of the minutes to each party.

- Purpose of submission: For review.
- Timing of submission: Within 5 working days after each meeting.

Progress photographs
General: Take colour progress photographs within 7 days before each site meeting. Submit 2 sets of prints and the digital files. Identify the project, date, time, location and orientation.

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

1.10 PAYMENT

Progress claims

Progress claim breakdown: Submit a statement of amounts claimed in respect of each worksection or trade heading designated in the specification, together with variations included in the claim.

- Purpose of submission: For review.
- Timing of submission: With each progress claim.

Method of measurement

General: In conformance with the principles of the
Australian and New Zealand standard method of measurement of building works (ANZSMM) (20 22).

2. GENERAL REQUIREMENT

2.1 GENERAL BUILDING COMPLIANCE

Building to meet all NCC 2022 requirements and current relevant Australian Standards, durable and suitable for building use.

2.2 PERFORMANCE

Corrosion resistant

Atmospheric corrosivity category

Determine the Atmospheric corrosivity category for internal and external of the building as defined in AS 4312 (2019) during the Concept design stage. Submit the result to the Superintendent.

Galvanizing

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

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

Structure

Requirement: provide structural design, installations and components as follows:

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

2.3 DESIGN

General

Requirement: Complete the design of the work, including development of the design beyond that documented.

Certification of the design

Requirement: Submit certification verifying conformance of the design to the documented and statutory requirements.

Safety in design

Requirement: Provide a design that allows for safe construction, operation and maintenance, and demolition in conformance with statutory requirements.

Designer

Design by contractor: Use only appropriately qualified and registered persons for each discipline.

2.4 PRODUCTS AND MATERIALS

Consistency

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

Low VOC emitting paints

Paint types: To the recommendations of AS/NZS 2311 (2017) Table 4.2.

Prohibited materials

General: Do not provide the following:

- Materials exceeding the limits of those listed in the Safe Work Australia *Hazardous Chemical Information System* (HCIS) Workplace exposure standards.
- See hcis.safeworkaustralia.gov.au/ExposureStandards to search for exposure standards for hazardous substances under the Safe Work Australia HCIS.
- See also www.industrialchemicals.gov.au for the Australian Industrial Chemicals Introduction Scheme.
- Blowing agents:
    - Materials that use chlorofluorocarbon (CFC) or hydrochlorofluorocarbon (HCFC) in the manufacturing process.
    - A blowing agent with a global warming potential (GWP) not less than 700.

Proprietary items

Manufacturer's or supplier's recommendations

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

Proprietary items/systems/assemblies: Assemble, install or fix to substrate to the manufacturer's or supplier's recommendations.

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

Identification of proprietary items

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

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

- Manufacturer’s identification.
- Brand name.
- Product type.
- Quantity.
- Reference code and batch number.
- Date of manufacture.

2.5 SUBMISSIONS AND INSPECTIONS

SUBMISSIONS

General

Requirement:

- Concept Design Package at the end of Concept design stage
    - Architectural floor plans, elevations and sections
    - Preliminary material selection schedules
    - Preliminary structural design drawings
    - Preliminary electrical design drawings
    - Preliminary hydraulic design drawings
    - Preliminary mechanical design drawings
    - Preliminary fire Safety Strategy Report
    - Preliminary cost report
    - Preliminary NCC compliance report

- Construction Document Packages at the end of Documentation stage
    - Complete architectural floor plans, elevations and sections details
    - Material, wall systems, roof/ceiling system, finishes and fixtures schedules
    - Complete technical specification
    - Complete structural design drawings and specification
    - Complete electrical design drawings and specification
    - Complete hydraulic design drawings and specification
    - Complete mechanical design drawings and specification
    - Shop drawings of all components.
    - Final cost report
    - Certificate of Design Compliance

- Before the end of the Construction stage
    - Defect inspection report with photo evidence.
    - As constructed drawings and data
    - Operating and maintenance manuals
    - Inspection and test plans and report
    - Product and system warranties
    - Certificate of Construction Compliance

Submit to: The Superintendent and Principal

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

Identification

Requirement: Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include relevant contract document references. If the submission covers more than one item, identify the item in the contract documents the submitted items relate to.

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

Errors

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

Electronic submissions

Electronic copies file format: PDF

CAD file format: VW or DWG, DXF or any format can be imported to Vectorworks

Transmission medium: PDF

Project requirements

General: Submit the following, as documented:

- Authority approvals: Notes of meetings with regulatory authorities and utility service providers whose requirements apply to the work and evidence that notices, fees and permits have been sought and paid, that utility service provider connections are complete and that statutory approvals by the authorities whose requirements apply to the work have been received.
- Baseline data: To **BASELINE DATA**.
- Building penetrations: Details of the methods to maintain the required structural, fire and other properties to **BUILDING PENETRATIONS**.
- Certification: Certificates of conformance to documented and statutory requirements.
- Commissioning plan: For the whole of the work to **COMMISSIONING**.
- Commissioning program: For the whole of the work to **COMMISSIONING**.
- Design documentation: Drawings, calculations and specifications as documented.
- Electronic facility and asset management information: For the whole of the work to **ELECTRONIC FACILITY AND ASSET MANAGEMENT INFORMATION**.
- Execution details: Execution programs, schedules and details of proposed methods and equipment. For building services include the following:
  - Embedded services: Proposed method for embedding services in concrete walls or floors or chasing into concrete or masonry walls.
  - Fixing of services: Typical details of locations, types and methods of fixing services to the building structure.
  - Inaccessible services: If services will be enclosed and not accessible after completion, submit proposals for location of service runs and fittings.
- Fire performance: Evidence of conformity to requirement for combustibility, fire hazard properties and fire-resistance of building elements.
- Marking and labelling: Samples and schedules of proposed marking and labels to **MARKING AND LABELLING**.
- Operation and maintenance manuals: For the whole of the work to **OPERATION AND MAINTENANCE MANUALS**.
- Products and materials: Products and materials data, including manufacturer's technical specifications and drawings, product data sheets, type tests results, evidence of conformity to documented requirements, product certification, performance and rating tables, service connection requirements and installation and maintenance recommendations.
- Prototypes: Prototypes of components, systems or elements.
- Records: As-built documents, photographs, system diagrams, schedules and logbooks to **RECORD DRAWINGS**.
- Safe Work Method Statement: For high risk construction works.
- Safety in design report: For the proposed work to **DESIGN DEVELOPMENT**, **Safety in design**.
- Samples: Representative of proposed products and materials and including proposals to incorporate samples into the works, if any to **SAMPLES AND PROTOTYPES**.
- Shop drawings: To **SHOP DRAWINGS**.
- Substitutions: To **SUBSTITUTIONS**.
- Tests: Test reports for testing performed under the contract.
- Warranties: To **WARRANTIES**.

INSPECTION

Notice

Concealment: If notice of inspection is required for parts of the works that are to be concealed, give notice to the Superintendent when the inspection can be made before concealment, including but not limited to:

- Underground services
- Concrete reinforcement, waterproofing
- Floor wall and roof and internal structure
- Wall stud framing
- Wall and ceiling insulation
- Concrete floor
- Any structural walls

Notification times

Minimum notice: 14 days

Light levels

Lighting levels for inspection: To AS/NZS 1680.2.4 (2017).

Attendance

General: Provide attendance for documented inspections and tests.

2.6 ANCILLARY BUILDING WORK

WALL CHASING

Holes and chases

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

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

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

Concrete blockwork chasing table

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

FIXING

General

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

Fasteners

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

BUILDING PENETRATIONS

Penetrations

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

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

Sealing

Fire-resisting building elements: Seal penetrations with a system conforming to AS 4072.1 (2005).

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

Sleeves

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

- Movement: Arrange to permit normal pipe or conduit movement.
- Diameter (for non fire-resisting building elements): Sufficient to provide a ring shaped space around the pipe or pipe insulation of at least 12 mm.
- Ferrous surfaces: Prime paint.
- Sealing: Seal between pipes or conduits and sleeves to prevent the entry of vermin.
- Terminations:
  - Cover plates fitted: Flush with the finished building surface.
  - Fire-resisting and acoustic rated building elements: 50 mm beyond finished building surface.
  - Floors draining to floor wastes: 50 mm above finished floor.
  - Other locations: 5 mm beyond finished building surface.
  - Termite management: To AS 3660.1 (2014).
- Thickness:
  - Metal: 1 mm or greater.
  - PVC-U: 3 mm or greater.

SUPPORT OF PLANT AND EQUIPMENT

Concrete plinths

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

- Surround: Zinc (hot-dipped) coated steel, at least 75 mm high and 1.6 mm thick. Fix to the floor with masonry anchors. Fill with concrete.
- Height: 75 mm or greater, as documented.
- Reinforcement: Single layer of F62 fabric.

- Concrete: Grade N20.
- Finish: Steel float, flush with top edge of the surround.

Support of ground level plant and equipment

Ground level: Conform to the following:

- If the ground slope is 15° or more, or the area of the plant and equipment is extensive, obtain the advice of a professional engineer for the documentation of a suitable slab or platform.
- In all other cases, provide proprietary plastic or concrete supports installed with falls that achieve a raised, impervious and water shedding bearing surface.

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

Support of plant and equipment mounted on roofs or elevated platforms

Platforms: If a platform is required, or the area of the plant and equipment mounted on roofs or elevated platforms is extensive, obtain the advice of a professional engineer for the documentation of a suitable platform.

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

Roof level support: If any of the following apply to roof level support, obtain the advice of a professional engineer:

- The total load from any unit of plant or equipment exceeds 500 kg.
- The load from a unit of plant or equipment to any single support point exceeds 100 kg.
- The average loading of plant and equipment over the area extending 1 m on all sides beyond the plant and equipment exceeds 25 kg/m^2.

RESTRAINT OF NON-STRUCTURAL PARTS AND COMPONENTS

Wind restraint

General: Provide restraints to resist the effect of ultimate limit state wind pressures.

Wind pressure: To AS/NZS 1170.2 (2021).

2.7 BUILDING SERVICES

SERVICES CONNECTIONS

Connections

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

Utility service provider requirements

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

SERVICES INSTALLATION

General

Installation: Install equipment and services as follows:

- Plumb and securely fixed.
- Allow for movement in both structure and services.
- Arrange services running together, parallel to each other and adjacent building elements.

Concealment: Conceal all cables, ducts, trays and pipes except where installed in plant spaces, ceiling spaces and riser cupboards or documented to be exposed. If alternative routes are available, do not locate on external walls.

Lifting: Provide heavy items of equipment with permanent fixtures for lifting to the manufacturer's recommendations.

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

Dissimilar metals

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

Temporary capping

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

Piping

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

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

Changes of direction: Provide as follows:

- If practicable, long radius elbows or bends and sets, and swept branch connections.
- If pipes are led up or along walls and then through to fixtures, provide elbows or short radius bends.
- Do not provide mitred fittings.

Vibration: Arrange and support piping to prevent vibration whilst permitting necessary movement. Minimise the number of joints.

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

Valve groupings: If possible, locate valves in groups.

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

Support and structure

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

Pipe support systems

Standard: To AS 4041 (2006) clause 3.28.

General: Provide hangers, brackets, saddles, clips, and support system components to resist live and dead loads and to control pipe movement caused by thermal and water pressure effects. Incorporate provisions for adjustment of spacing, alignment, grading and load distribution. Support pipework from associated equipment or building structure. Support valves, strainers and major line fittings so that no load is placed on connected piping or transmitted to it during operation and maintenance.

Fixings: Provide fixings to the associated equipment or building structure designed to withstand the loads imposed by the pipe supports.

Channel section supports: Proprietary channel section with clamps and hangers sized to match external diameter of pipe being supported. Provide all components from the same manufacturer.

Channel and fixing material: Metallic-coated steel.

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

Saddles: Do not use saddle type supports for pipes larger than DN 20.

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

Fixing to masonry and concrete: Provide metallic-coated steel or non-ferrous metal bolts or screws into chemical or expanding metal masonry anchors.

Uninsulated pipes: Clamp piping supports directly to pipes. Provide electrical isolation of dissimilar metals.

Insulated pipes:

- Spacers: Provide spacers at least as thick as the insulation between piping supports and pipes. Extend either side of the support by at least 20 mm.
- Spacer material: Rigid insulation material of sufficient strength to support the piping and suitable for the temperature application.
- Vapour barriers: For cold pipes, apply aluminium foil tape over the circumference of the spacer to form a vapour barrier. Fit to spacer before installation of the bracket on the pipe.
- Metal sheathing: If metal sheathing is documented, provide a band of the documented sheathing materials between the aluminium foil tape and the support for the full width of the spacer.

Hanger sizes: Conform to the following:

- Gas installations: To AS/NZS 5601.1 (2022) Table 5.8.3.
- Other pipes: Provide hangers sized to the manufacturer's recommendations to suit operating conditions and regulatory requirements including the loads due to valves and other attached components, pipe material, pipe contents and temperature and seismic loads.

Support spacing: Provide supports at no greater spacing than the following:

- Cold and heated water: To AS/NZS 3500.1 (2021) Table 5.7.4.
- Sanitary plumbing: To AS/NZS 3500.2 (2021) Table 10.2.1.
- Stormwater: To AS/NZS 3500.2 (2021) clause 4.9.
- Fuel gas: To AS/NZS 5601.1 (2022) Table 5.8.2.
- Fire sprinklers and combined wet suppression systems: To AS 2118.9 (1995) Table 2.6.1.
- Fire hydrants:
  . Metal piping: To AS 2419.1 (2021) clause 10.6.
  . Plastic piping: To AS/NZS 3500.1 (2021).
- Gaseous fire suppression systems:
  . General gaseous fire suppression systems: To AS 4214 (2018) clause 6.3.4.
  . Carbon dioxide fire suppression systems: To AS 6183 (2011) clause 6.3.4.

- Medical gases: To AS 2896 (2021) Table 4.1.
- Refrigerant: To AS/NZS 5149.2 (2016) Tables 5 and 6.
- Other ferrous pipes under pressure: To AS 4041 (2006) Table 3.28.2.
- Other copper pipes: To AS 4809 (2017) Table 6.2.
- ABS pipes: To AS/NZS 3690 (2009) Table 6.2.
- PVC pipes: To AS/NZS 2032 (2006) Table 6.3.
- Polyolefin including PE and PP pipes: To AS/NZS 2033 (2024) clause 7.3.2.
- Other non-ferrous pipe carrying liquids: To AS/NZS 3500.1 (2021) Table 5.7.4.
- Other pipes carrying air or gases: To AS/NZS 5601.1 (2022) Table 5.8.2.
- Proprietary grooved piping systems: To the manufacturer's recommendations.

Additional supports: Provide additional supports as follows:

- Proprietary grooved piping systems: To the manufacturer's recommendations.
- Valves and other heavy pipe mounted components: Adjacent to the valve or component.
- Adjacent pipe mounted components requiring regular maintenance.
- At changes of direction and adjacent to wall or floor penetrations.
- Where required to anchor piping or control thermal or other movement.

Differential movement

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

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

PLANT AND EQUIPMENT

General

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

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

ACCESS FOR MAINTENANCE

General

Requirement: Provide access for maintenance of all items requiring inspection, measurement, operation, adjustment, repair, replacement and other maintenance-related tasks.

Standards: Conform to the relevant requirements of AS 1657 (2018), AS 1892.1 (2018), AS 2865 (2009) and AS/NZS 3666.1 (2011).

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

Access safety systems: Provide access safety systems to *0193 Building access safety systems*.

Refrigerated or cooling plant: If the space is a refrigerated or cooling chamber inside a duct, air handling plant or similar, provided with an access door or personnel access panel and of sufficient size for a person to enter, provide the following to BCA (2022) G1D3:

- An access door.
- Internal lighting with external indicator lamp.
- An alarm.

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

Plant room flooring surfaces: R10 Slip resistance classification to AS 4586 (2013).

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

Manufacturer's standard equipment: If necessary, modify manufacturer’s standard equipment to provide the plant access documented.

Clearances

Minimum clearances for access: Conform to the following:

- Vertical clearance: Not less than 2100 mm, vertically above horizontal floors, ground and platforms.
- Horizontal clearance: Preferably not less than 750 mm clear, but in no case less than 600 mm between equipment or between equipment and building features including walls.
- If tools are required to operate, adjust or remove equipment, provide sufficient space so the tools can be used in their normal manner and without requiring the user to employ undue or awkward force.
- Hinged or removable components: To the manufacturer's recommendations.
- Within plant items: Conform to the preceding requirements, and not less than the clearances recommended in BS 8313 (1997).

Elevated services other than in occupied areas

Access classifications:

- Access class A: Readily accessible. Provide clear and immediate access to and around plant items. If plant or equipment is located more than 2.0 m above the ground, floor or platform, provide a platform with handrails accessible by a stair, all to AS 1657 (2018).
- Access class B: If the plant item requiring access is located more than 2.0 m above the ground, floor or platform, provide a platform with handrails accessible by a non-vertical ladder, all to AS 1657 (2018).
- Access class C: Locate plant so temporary means of access conforming to Work Health and Safety regulations can be provided.

Temporary means of access: Make sure there is adequate provision in place, which is safe and effective.

Areas in which access is restricted to authorised maintenance personnel: Provide access as follows:

- Instruments, gauges and indicators (including warning and indicating lights) requiring inspection at any frequency: Readily accessible.
- Access required monthly or more frequently: Access class A.
- Access required between monthly and six monthly: Access class A or B.
- Access required less frequently than six monthly: Access class A, B or C.

Other areas: Provide access as follows:

- Locate to minimise inconvenience and disruption to building occupants or damage to the building structure or finishes.
- In suspended ceilings, locate items of equipment that require inspection and/or maintenance above tiled parts. If not possible, provide access panels where located above set plaster or other

inaccessible ceilings. Arrange services and plant locations to reduce the number of access panels. Coordinate with other trades to use common access panels where feasible.

- Do not locate equipment requiring access above partitions.
- Instruments, gauges and other items requiring inspection at any frequency: Readily accessible.
- Labelling: If equipment is concealed in ceilings, provide marking to **MARKING AND LABELLING**, **Equipment concealed in ceilings**.

Facilities for equipment removal and replacement

Requirement: Provide facilities to permit removal from the building and replacement of plant and equipment, including space large enough to accommodate it and any required lifting and/or transportation equipment. Arrange plant so large and/or heavy items can be moved with the minimum changes of direction.

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

Facilities for access

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

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

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

Insulated plant and services: If insulation must be removed to access plant and services for maintenance, arrange it to allow for removal and replacement without damage.

Piping

Requirement: Conform to the following:

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

Electrical equipment and controls

Electrical equipment: Provide clearances and access space to AS/NZS 3000 (2018).

Switchboards and electrical control equipment: Locate near the main entrance to plant space and with switchboards visible from the plant being operated.

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

VIBRATION SUPPRESSION

General

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

Standard

Machinery noise and vibration: Vibration severity in Zone A to ISO 20816-1 (2016) and ISO 20816-3 (2022).

Speeds

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

Connections

General: Provide flexible connections to rotating machinery and assemblies containing rotating machinery. Isolate pipes by incorporating sufficient flexibility into the pipework or by use of proprietary flexible pipe connections installed to prevent placing stress on pipes due to end reaction.

Inertia bases

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

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

Vibration isolation mountings

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

- Static deflections less than 15 mm: Single or double deflection neoprene in-shear mountings incorporating steel top and base plates and a tapped hole for bolting to equipment.
- Static deflections not less than 15 mm: Spring mountings.

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

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

Spring mountings: Provide freestanding laterally stable springs as follows:

- Clearances: Not less than 12 mm between springs and other members such as bolts and housing.
- High frequency isolation: 5 mm neoprene acoustic isolation pads between base plate and support.
- Levelling: Provide bolts and lock nuts.
- Minimum travel to solid: Not less than 150% of the designated minimum static deflection.
- Ratio of mean coil diameter to compressed length at the designated minimum static deflection: Not less than 0.8:1.
- Snubbing: Snub the springs to prevent bounce at start-up.
- Vertical resilient limit stops: To prevent spring extension when unloaded, to serve as blocking during erection and which remain out of contact during normal operation.

FINISHES TO BUILDING SERVICES

General

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

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

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

Standard: Conform to the recommendations of AS/NZS 2311 (2017) Sections 3, 6 and 7 or AS 2312.1 (2014) Sections 6, 7 and 8, as applicable.

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

Painting systems

New unpainted interior surfaces: To AS/NZS 2311 (2017) Table 5.1.

New unpainted exterior surfaces: To AS/NZS 2311 (2017) Table 5.2.

Paint application

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

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

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

Underground metal piping

Requirement: Provide corrosion protection for the following:

- Underground ferrous piping.
- Underground non-ferrous metal piping in chemically aggressive soils and environments.

Corrosion protection: Select from the following:

- Cathodic protection: Sacrificial anodes or impressed current. Incorporate a facility for periodic testing. Conform to the recommendations of AS 2832.1 (2015).
- Continuous wrapping using proprietary petroleum taping material.
- Impermeable flexible plastic coating.
- Sealed polyethylene sleeve.

Aggressive soils: If metallic piping or components are installed in chemically aggressive soil, provide additional protection as follows:

- Material: Continuous polyethylene sleeve to ASTM D1248 (2016) with a minimum thickness of 0.25 mm.
- Installation: Wrap or sleeve pipes and components. Tape joints between sections of polyethylene and between polyethylene and piping.

Repairs to finishes

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

Painting of pipe threads: After pipe installation and before other finishes or insulation are applied, paint exposed threads in metallic-coated steel pipe with zinc rich paint.

MARKING AND LABELLING

General

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

- Locations exposed to weather: Provide durable materials.
- Pipes, conduits and ducts: To AS 1345 (1995) throughout its length, including in concealed spaces.
- Cables: Label to indicate the origin and destination of the cable.

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

Label samples and schedules

Requirement: For each item or type of item, prepare a schedule of marking and labelling, including the following:

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

Submission timing: Before marking or labelling.

Electrical accessories

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

Operable devices

Requirement: Mark to identify the following:

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

Equipment concealed in ceilings

Location: Provide a label on the ceiling, to indicate the location of each concealed item requiring access for routine inspection, maintenance and/or operation and as follows:

- Tiled ceilings, locate the label on the ceiling grid closest to the concealed item access point.
- Flush lined ceilings, locate adjacent to closest access panel.

Concealed equipment: Label items including the following:

- Fan coil units and terminal equipment (e.g. VAV terminals).
- Fire and smoke dampers.
- Isolating valves not directly connected to items otherwise labelled.
- Motorised dampers.

Wall mounted equipment in occupied areas

Location: Provide labels on wall mounted items in occupied areas including the following:

- Services control switches.
- Temperature and humidity sensors.

Points lists

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

Pressure vessels

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

Valves and pumps

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

Underground services

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

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

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

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

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

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

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

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

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

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

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

Labels and notices

Materials: Select from the following:

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

Emergency functions: To AS 1319 (1994).

Colours: Generally to AS 1345 (1995) as appropriate, otherwise black lettering on white background except as follows:

- Danger, warning labels: White lettering on red background.

- Main switch and caution labels: Red lettering on white background.

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

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

Lettering heights:

- Danger, warning and caution notices: Minimum 10 mm for main heading, minimum 5 mm for remainder.
- Equipment labels within cabinets: Minimum 5 mm.
- Equipment nameplates: Minimum 40 mm.
- Identifying labels on outside of cabinets: Minimum 5 mm.
- Isolating switches: Minimum 5 mm.
- Switchboards, main assembly designation: Minimum 25 mm.
- Switchboards, outgoing functional units: Minimum 10 mm.
- Switchboards, sub assembly designations: Minimum 15 mm.
- Valves:
  - Not less than DN 65: Minimum 25 mm.
  - Less than DN 65: Minimum 10 mm.
- Self-adhesive flexible plastic labels:
  - Labels less than 2000 mm above floor: 5 mm.
  - Labels minimum 2000 mm above floor: 10 mm.
  - Other locations: Minimum 5 mm.

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

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

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

Vapour barriers: Do not penetrate vapour barriers.

2.8 COMPLETION

TOOLS AND SPARE PARTS

Spare parts

General: Provide spare parts listed as documented.

Replacement: Replace spare parts used during the maintenance period.

Tools and spare parts schedule

Submission timing: At least 8 weeks before the date for practical completion.

Requirement: Prepare a schedule of tools, portable instruments and spare parts necessary for maintenance of the installation. For each item state the recommended quantity and the manufacturer’s current price. Include the following in the prices:

- Checking receipt, marking and numbering in conformance with the spare parts schedule.
- Packaging and delivery to site.
- Painting, greasing and packing to prevent deterioration during storage.
- Referencing equipment schedules in the operation and maintenance manuals.
- Suitable means of identifying, storing and securing the tools and instruments. Include instructions for use.

TRAINING

General

Standard: To SA TS 5342 (2021).

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

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

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

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

Demonstrators

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

Operation

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

Maintenance

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

Seasonal operation

General: For equipment requiring seasonal operation, demonstrate during the appropriate season.

CLEANING

Final cleaning

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

Labels: Remove all visible labels not required for maintenance.

Removal of material

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

WARRANTIES

General

Requirement: If a warranty is documented, name the principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

Approval of applicator or installer: If the warranty is conditional on the manufacturer's approval of the applicator or installer, submit the manufacturer's written approval of the installing company, and authorised personnel, with evidence of qualifications and experience in the specific use of the product, material or system.

Principal's responsibilities: Submit details of responsibilities of the principal required to keep warranties in force.

Warranty types

Manufacturer's warranty: Warranty to cover manufacturing defects and defects with products and materials delivered to site.

Manufacturer and applicator's/installer's interlocking warranty: Interlocking warranty to cover manufacturing defects and defects with products and materials delivered to site, including their application or installation.

Supplier's warranty: Warranty to defects in materials delivered to site.

Warranty length

- Structural components such as foundation, roof and wall: 5 years
- Waterproofing and weather proofing, including floor, roof and wall: 5 years.
- General plumbing services: 5 years
- General electrical services: 5 years

Refer to the specific product warranty, such as PEX pipe, under each section.

2.9 TESTING AND COMMISSIONING

TESTING - GENERALLY

Inspection and testing plan

Requirement: Provide inspection and testing plan consistent with the construction program including details of test stages and procedures.

Notice

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

Inspection: Give sufficient notice for inspection to be made of the commissioning, testing and verification tests on completion of commissioning.

Attendance

General: Provide attendance at tests.

Suppliers: If necessary to carry out documented tests, arrange equipment suppliers to assist.

Testing authorities

Requirement: Have tests carried out by an Accredited Testing Laboratory, accredited for the documented test method, except for site tests or test methods that do not have an Accredited Testing Laboratory.

Test equipment

Accuracy: Use testing equipment designed to test and/or measure system performance within the documented tolerances.

Calibration: Use only instruments that have current calibration certificates issued by an Accredited Testing Laboratory. Tag or label instruments with calibration date and calibration authority name. Provide copies of certification if requested.

Maximum period since last calibration: As recommended by the manufacturer but less than 12 months, except as documented.

Recalibration: If dropped or damaged, recalibrate instruments.

Testing equipment: Provide test equipment and tools to perform documented tests as follows:

- Special testing equipment: If documented, provide special equipment, tools and instruments required for testing or calibration.
- Other testing equipment: Provide standard testing equipment.

Testing procedures

Verification: Verify test procedures by:

- Manual testing.
- Monitoring performance and analysing results using the control system trend logs.
- A combination of the above methods.

Sampling: Sampling may be used subject to the following:

- Use a sampling strategy only for multiple identical pieces of non-life-safety or otherwise non-critical equipment.
- If at any point, more than one identical item has failed, stop testing, determine the cause, rectify and document changes made to remaining units, before continuing with functional testing of the remaining units.

Type tests

Type test reports: Required, as evidence of conformance of proprietary equipment.

Sound pressure level measurements

Requirement: Conform to the following:

- Correction for background noise: To AS/NZS 2107 (2016) Table B1.
- External: To AS 1055 (2018).
- Internal: To AS/NZS 2107 (2016).
- Measurement positions: If a test position is designated only by reference to a room or space, do not take measurements less than 1 m from the floor, ground or walls. For large equipment items including chillers, measure at 2 m and 7 m from the equipment item.
- Sound pressure level analysis: Measure the sound pressure level and the background sound pressure level over the full range of octave band centre frequencies from 31.5 Hz to 8 kHz at the designated positions.

- Sound pressure levels: Measure the A-weighted sound pressure levels and the A-weighted background sound pressure levels at the designated positions.

Test outcome

Requirement: Test as documented and achieve the following:

- Pass the documented Pass/Fail test, and/or
- Values that meet documented requirements, and/or
- Verification of manufacturer's claimed performance.

Failure of multiple items

Requirement: If 10% or 3, whichever is greater, of identical pieces (size does not constitute a difference) of equipment fail to perform as documented for any reason, treat all identical units as having failed. Submit notice of failure and conform to the following:

- Within one week of notification, examine all other identical units and record the results. Submit a report of the findings within two weeks of the original failure notice.
- Within two weeks of the original failure notification, submit a signed and dated explanation of the problem, including the cause of failure, the proposed solution, full equipment details and any other information. Do not exceed the documented requirements of the original installation with the proposed solution.

Rectification of failure under test

Requirement: If an item fails a documented test, rectify the cause of failure and repeat the test.

Submissions: If submission of test results is documented, submit results of both successful and unsuccessful tests.

Test reports

Requirement: Include the following:

- Documented performance criteria including, if documented, tolerances.
- Observations and results of tests and conformance or non-conformance with documented requirements.

Test validity period

Requirement: As documented or, if no validity period is documented, no older than 5 years.

Controls

General: Calibrate, set and adjust control instruments, control systems and safety controls.

Circuit protection

General: Confirm that circuit protective devices are sized and adjusted to protect installed circuits.

Certification

General: On satisfactory completion of the installation, testing and commissioning and before the date for practical completion, certify that each installation is operating correctly.

Integrated system tests

Requirement: Conduct integrated system tests as documented.

Tests: Provide the following:

- Test the integrated operation of the systems listed in each mode documented.

- Restoration of the systems to their pre-test condition on completion of the tests above.

Failure: If any of the systems fails to perform as documented, including return to normal operation, rectify the cause and repeat the integrated system test.

Deferred and seasonal tests

Deferred tests: If documented testing cannot be completed at the scheduled or documented time, the Superintendent may direct that they be deferred to a later time but as soon as possible after the scheduled or documented time.

Seasonal tests: If documented tests are dependent on specific weather conditions, they may be deferred to a time when weather conditions are close to the documented test conditions. Complete seasonal testing as soon as possible but no later than one month before the end of the defects liability period.

Functional tests

Function: Carry out functional and operational tests on each energised equipment item and circuit.

COMMISSIONING

Standard

Requirement: Conform to SA TS 5342 (2021).

Static completion

Requirement: Systems, components and building elements are statically complete when:

- Their construction and installation is complete and as documented, including completion of all systems, components and building elements on which they are dependent for commissioning.
- All pre-commissioning tests have been successfully completed.
- They are safe and ready for commissioning.
- All cleaning that may adversely affect commissioning is complete.
- They have been inspected and all outstanding remedial work that may adversely affect commissioning is complete.
- All spaces required for access for commissioning are safe to use and cleared of obstructions that may adversely affect commissioning.

Commissioning plan

Requirement: Provide a commissioning plan to SA TS 5342 (2021) including the following:

- A summary of the work covered by the commissioning plan.
- The parties responsible for this work and any commissioning interrelationships.
- The basis of the design.
- General sequence of commissioning.
- Project specific commissioning methodologies for each system and building element to be commissioned.
- Pre-commissioning requirements.
- Project specific commissioning procedures for each commissioning activity including integrated system tests, deferred and seasonal tests.
- A project specific building tuning plan for all commissioned systems. Include building tuning procedures and tuning team members.
- Requirements for witnessing of tests and documented demonstrations of completion of commissioning.

- Commissioning program to **COMMISSIONING**, **Commissioning program**.

Commissioning program

Submissions: Submit a program consistent with, and forming part of, the construction program as follows:

- Set out the proposed program for completion, commissioning, testing and instruction.
- Identify related works and timing of the works prerequisite to successful and timely completion of the works.

Revisions: Submit revisions of the program as the project proceeds.

Plant operating period: Include time in the program for the documented plant operating period before the date for practical completion.

Commissioning activities

Requirement: Provide the following to SA TS 5342 (2021):

- Manage the commissioning process.
- Establish and manage the completion process.
- Review design documents for commissionability. Submit a report including any recommended changes.
- Review documented commissioning requirements. Submit a report including any recommended changes.
- Review construction documents for commissionability. Submit a report including any recommended changes.
- Develop, review and update the commissioning plan and commissioning program.
- Develop, review and update commissioning methodologies.
- Develop, review and update commissioning procedures.
- Report on interdependencies between trades that may affect commissioning.
- Develop, review and update procedures for initial start-up of systems.
- Develop, review and update integrated system test procedures.
- Carry out pre-commissioning activities. Record results and submit pre-commissioning records.
- Conduct commissioning activities to the commissioning methodologies and procedures. Record and submit commissioning records.
- Facilitate and conduct integrated system tests and demonstrations. Record and submit integrated system test records.
- Conduct documented demonstrations of completion of commissioning.
- Report on the progress of commissioning work.
- Report on conformance to the commissioning plan and program.
- Report on commissioning defects and issues and progress on their resolution.
- Develop, review and update commissioning report.
- Develop, review and update training materials, conduct training sessions to **TRAINING**.
- Develop, review and update operation and maintenance manuals to **OPERATION AND MAINTENANCE MANUALS**.
- Manage and report deferred and seasonal testing activities to **TESTING - GENERALLY**.
- Management and reporting of building tuning process.
- Periodically review performance data.

Verification of commissioning

Requirement: On completion of commissioning of the equipment or system, provide additional tests to verify that it is fully commissioned and operating to documented requirements

2.10 FUNCTIONAL SPACE REQUIREMENT

Refer to the documents below for the Netball, basketball and Squash Court specifications:

- The Sport Dimension Guide for Playing Areas – Sport and Recreation Facility of Department of Sport and Recreation.
- Netball Australia, National Facility Policy
- Netball Victoria, Compliance Fact Sheet

The design and construction of the building to meet the below functional space requirement :

- 1 large space suitable for multisport: double netball courts / double basketball courts, complete with line marking as shown in Attachment G
- plus, a clear 3m wide corridor on one side of the double court for spectator seatings.
- Ceiling height clearance for Netball Court is not less than 8.3m
- A fitness area / gymnasium designed to facilitate future conversion to two squash courts, including structure and space requirements
- Ceiling height clearance for Gym is not less than 5.64m (to suit future Squash Court conversion)
- Gym roof structure to support top of a new partition wall dividing the 2 squash courts centre of the gym
- Gym walls enable additional specialised squash court wall linings to be directly applied on top.
- Provide sufficient acoustic-absorbent surfaces to ensure the noise level is under 82 dBA and reverberation level between 1 to1.5 seconds of the indoor court and public GYM at peak use.

- Public and staff male toilet: 2 closet pans (incl an ambulant), 1 urinal and 2 hand basins
- Public and staff female toilet: 3 closet pans (incl an ambulant), 2 hand basins
- 2 x Player change room unisex each has: 3 showers, 3 closet pans (incl an ambulant) and 2 hand basins, and a general benches area enough for 15 players (min 18m^2 and 15m of bench length). All shower cubicles with adequate dry section with hooks and bench seat
- 1 UAT with shower, including a baby change table furthest away from the shower.
- A cleaner room minimum 2.5m^2 with a cleaner sink and 2m x 3 levels storage shelves and 2m broom rack.

- A large storage space with a large open door suitable for moving and storing large sports equipment such as mobile basketball hoops, movable benches, etc.

- A general 5-6m wide foyer connecting to the court, changerooms, toilets and one entrance.
- At least 2 entrance doors connecting to the existing pavilion area and the existing pool area.
- Multiple exit doors as per NCC requirement.
- A universal access pedestrian path/area of at least 3m x 3m immediately next to all escape doors, adjacent to any vehicle driveway or parking, to protect people walking out into moving vehicles.
- Allow for any future access path to connect to all entrance doors and escape doors.

2.11 EXISTING AND NEW SERVICES

Allow for relocating existing underground services as required.

Allow for modification or upgrade existing services to suit new building services requirements, such as supply water, sewer/septic, electrical, NBN, etc, as required.

2.12 STRUCTURE

A concrete floor is generally preferable.

Large prefab structures, such as steel or mass timber, are preferable for fast construction.

2.13 BUILDING ENVELOPE GENERAL

Durable, low maintenance and insulated to meet section J Energy Efficiency requirements under NCC.

2.14 WALL SYSTEM

Prefabricated and well-insulated wall units, such as timber or steel stud modules preferable.

Internal lining of the basketball court with strong, durable, impact-resistant material to withstand wear and tear from basketball and netball game play exceed or equivalent to Gyprock Impactchek 13mm plasterboard system.

Total System R-Value of wall not less than 2.4

External wall cladding to be impact-resistant exceed or equivalent to Cemintel Barestone 9mm Fibre Cement Sheet system.

Wall cladding manufacturer's warranty of not less than 15 years

Wet area lining with moisture and impact resistant exceed or equivalent to Gyprock EC08 Complete 13mm plasterboard.

2.15 ROOF AND CEILING SYSTEM

Roof system with insulation to the main roof to provide a Total System R-value not less than 4.0.

Ceiling lining is generally not required except where the functional space requires to be functionally, acoustically or thermally isolated from adjacent spaces (such as Gym and changeroom)

Roof cladding manufacturer's warranty of not less than 15 years

2.16 ROOF DRAINAGE AND SITE DRAINAGE

No box gutter or valley gutter allowed. All external gutters to have overflow or a fail-safe design to prevent water ingress into the internal building or building cavities.

Site drainage to allow for all surface water to drain away from new and existing buildings and facilities, including the adjacent trotting track and oval. Any underground drainage with a fail-safe design that does not flood existing and new buildings.

Provide a no-water-leak warranty of a minimum of 5 years, including the repair of any damage to internal finishes, wall system and structures, at no cost to the Principal.

2.17 FLOOR

All floor structure, finishes, size and painted line to suit the functional requirements of:

- Basketball court
- Netball court
- GYM with equipment including weight and free weight.
- Waterproof floor finishes for all wet area.
- Min 2m x 2m entrance mat area at each entrance door (min 2 entrance doors)

Functional requirements include but are not limited to, durability against foot traffic, ball bouncing, shock absorption, splinter-free, traction and grip, low maintenance
According to the Sport Dimension Guide for Playing Areas – Sport and Recreation Facility of the Department of Sport and Recreation.

2.18 LIGHTING

Provide natural light to meet or exceed the NCC requirements.

Sport lighting according to the Sport Dimension Guide for Playing Areas – Sport and Recreation Facility of the Department of Sport and Recreation, pages 11 to 13

Lighting fitting for Indoor courts to withstand or be protected from impacts

Changerooms, toilets and general area lighting must be not less than 150 lux and meet or exceed NCC requirements.

Allow for lighting control for each area independently.

2.19 ELECTRICAL

Design, supply and install the electrical system for the whole building to meet current NCC and Regulations, including connection to the site power system and to the grid.

Provide 6 wall-mounted double GPOs for each changeroom

Provide 1 wall-mounted double GPO each for UAT, male toilet, female toilet, and cleaner.

Provide 12 wall-mounted double GPOs indoor court

Provide 12 wall-mounted double GPOs for the Gym

All final locations of GPOs to be confirmed by the Principal

Allow for a future solar system up to 100kw, including roof access, roof safety system, cables, switchboard, and site power infrastructure.

2.20 HYDRAULIC DESIGN – INC ROOF PLUMBING

Design, supply and install the hydraulic system for the whole building to meet current NCC and Regulations.

Include a hot water system with Thermostatic Mixing Vales, a Ring Main system and timer.

Any PEX pipe warranties cover manufacturing defects and faulty workmanship for 25 years.

Allow for roof plumbing to collect and deliver roof storm water to the principal's storm water tank.

2.21 MECHANICAL DESIGN

Design, supply and install the mechanical system for the whole building to meet current NCC and Regulations and AS1668.2:2024.

Ventilation to meet NCC requirements in all spaces for the maximum occupancy at any given time.

Provide 4 Big Ass Fans 5.5m Powerfoil ceiling fans for the netball courts area

Provide 2 Big Ass Fans 3m Essence ceiling fans for the GYM area

Locate the ceiling fan to optimise air flow and user comfort and ensure compliance with the supplier's clearance guidelines.

2.22 WET AREA DESIGN, FINISHES, CABINETWORKS

All wet area designs and construction must meet NCC standards and be robust enough to withstand the expected use of sports players and the general public.

All cabinetwork and finishes in the wet area are to be moisture and water-resistant to meet NCC and Australian Standards.

Provide a warranty of not less than 5 years for floor finishes, wall lining and finishes, wet area cabinetworks against moisture damage or delamination.

2.23 SPORT FIXTURE AND FITTING

Supply and install:

- 4 mobile basketball hoops system to be raised and lowered as needed.
- 4 mobile Netball court rings system (or to be easily removable and installed by user) – to be in 2 sizes for junior netball and senior netball
- Retractable Net to separate courts

All system to meet the Australian Sport Standard and relevant Standards in Australia, such as ‘Consumer Goods (Basketball Rings and Backboards) Safety Standard 2017’

2.24 DOORS AND WINDOWS

Solid core doors with kickplate and durable hardware.

Glaze or metal mesh windows where appropriate for natural light and ventilation.

All external door to be durable against moisture or provide a shelter such as a door alcove for weather protection.

Warranty on all doors of not less than 5 years against the weather and regular use of the sports facility.