Centennial Park
Jubilee Chapel – Operable Walls

for

Centennial Park Cemetery Authority
760 Goodwood Road
PASADENA SA 5042

Specification
Project No.: 190121

Issued for Tender

<table>
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<th>Date</th>
<th>Approved by</th>
</tr>
</thead>
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<tr>
<td>-</td>
<td>12 March 2020</td>
<td>MR</td>
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</tr>
</tbody>
</table>
1 CONDITIONS OF TENDERING

1.1 RESPONSIBILITIES

General
General: Provide a complete genuine tender.

1.2 GENERAL

Status
General: These conditions of tendering will not form part of the contract. Refer to Centennial Park – Invitation to Tender document 04/2020 will form part of the Contract.

Definition
General: In these conditions of tendering, the word principal has the same meaning as owner and proprietor.

Number of tenders invited
Public Tender

Anticipated order of cost
$85,000 ex GST

1.3 PROJECT INFORMATION

Outline description of the works
Provide new double glazed Operable wall system to be fixed to existing structural members with infill double glazed triangular infill pieces within aluminium framing to provide acoustic and visual privacy to the Heysen Chapel and Foyer.

Description of the site
Location: Internal Works within Jubilee Chapel complex

Tender documents
The tender documents comprise the following:
- Conditions of tendering by Centennial Park Authority
- Specifications.
- Drawings.
- Nominated subcontracts. – Lotus Walls
- Subcontract interfacing information, including services and facilities.

Security: Do not disclose to third parties tender documents marked with a classification such as Restricted, Confidential or Secret, except with prior written approval of the principal and subject to conditions imposed.

1.4 FURTHER INFORMATION

Contact person
Inquiries: Refer inquiries to the following:
- Name: Michael Rawlings c/ - Detailstudio Pty Ltd
- Telephone: 08 7220 2683
- Email: Michael@detailstudio.com.au

Examination
General: A full set of documents is available for examination, which may be arranged through the contact person.

Site inspections
General: Information on dates and times at which the site will be available for inspection can be obtained from the contact person.
Conferences
General: Information on dates and times of tender conferences can be obtained from the contact person.

Addenda
General: Written addenda issued by the principal are the only recognised explanations of, or amendments to, the tender documents.

1.5 PREPARATION OF TENDERS

Tender form
Form: Submit the tender on the Tender form provided.
Addenda: Confirm on the Tender form that allowance has been made of each addendum and any extensions of the tender period.
Name and address of tenderer: State the following:
- If an individual, the name in full and address of the individual.
- If an unincorporated body, the registered business name and address of the body and the name in full and address of each member of the body.
- If a company, the name, ABN and registered office address of the company.
Address for service of notices: Include on the Tender form an address for service of notices for the purpose of this tender and any subsequent contract arising out of this tender.
Execution: Sign the Tender form or, if a company, comply with the relevant provisions of the Corporations Law and regulations.

Scope
Scope: Tender for the whole of the work described in the tender documents unless the tender documents provide otherwise.
Exclusions: If unable to tender on parts of the works, inform the contact person in writing as soon as possible, defining the relevant parts and giving reasons.

Completion
General: Complete in full the Tender form and other required documents.
Alterations: Do not alter or add to tender documents except as may be required by these conditions of tendering.

Selected subcontracts
General: Submit with the tender the identity of subcontractors proposed for selected subcontract work.

Alternatives
General: Alternative proposals may be submitted with the tender for consideration, but:
- A conforming tender must be submitted, which complies with the tender documents.
- A detailed description of the alternative must be submitted, stating clearly the manner in which it differs from the requirements of the tender documents whilst complying with the principal’s commercial and technical objectives.

Alternative time for practical completion: Consideration will be given to alternative tenders which offer different times for practical completion. The prescribed liquidated damages will apply to those different times.
Alternative working hours and working days: If the tender includes an allowance for work at times other than the working hours or working days prescribed in the tender documents, submit the working hours and days proposed.

Prequalified subcontractors
Nominated works: Select a subcontractor from the Prequalified subcontractor table.
Prequalified subcontractor table

<table>
<thead>
<tr>
<th>Works</th>
<th>Subcontractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operable Folding walls</td>
<td>Lotus Folding Walls – Gary Wardle – 0420 302 736</td>
</tr>
</tbody>
</table>

Preferred suppliers
Nominated works: Select a subcontractor from the preferred suppliers table.

Preferred suppliers table

<table>
<thead>
<tr>
<th>Works</th>
<th>Suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

Program
General: Submit a construction program in the form of a preliminary bar chart and network diagram, showing the following:
- Sequence of work.
- Periods within which various stages or parts of the work are to be executed.
- Critical paths of activities related to the work.
- Allowance for holidays.
- Restraints imposed by the contract documents.
- Significant milestones including separable parts, if any.
- Activity inter-relationships, including those activities to be undertaken by subcontractors and suppliers, both on and off site.
- External dependencies including provision of access, document approvals and work by others.
- The estimated value of work completed for each month.

Time for submission: Refer to Centennial Park Authority Tender Request Document

Method statements
Submit method statements describing proposals for the following: demolition and construction of works during hours of work.


1.6 SUBMISSION OF TENDERS

Lodgement
Procedure: Enclose tenders in a sealed envelope marked with the description of the work and tender item (if any) and lodge in the tender box at, or send by prepaid post to, the nominated place, by the date and time for closing of tenders.

Facsimile: Facsimile tenders received by the date and time for closing of tenders may be considered provided that a conforming tender, in the form required, is submitted within 24 hours.

Oral tenders: Oral tenders will not be considered.

Franking: Impressions of franking machines are not acceptable evidence of timely posting or dispatch.

Supporting information: Enclose in a separate sealed envelope marked with the description of the work and the identity of the tenderer.

Late tenders
Prepaid post or facsimile: Late tenders submitted by prepaid post or facsimile may be considered, if the principal is satisfied that in the ordinary course of post or transmission they would have been received by the date and time for closing of tenders.

Hand delivery: Late tenders delivered by hand may be considered if the principal is satisfied that under normal circumstances they would have been received by the date and time for closing of tenders and that the delay was beyond the control of the tenderer.

Other: Late tenders sent by other forms of delivery or transmission will not be considered.

Closing of tenders
Date: Tuesday April 7th 2020
Time: 2pm

**Place for lodgement**

Tender box location: Detailstudio Pty Ltd

Address for postal tenders: 453 Morphett Street Adelaide, SA 5000.

**1.7 PROCEDURES AFTER TENDER PERIOD**

**Tender validity period**

General: Unless withdrawn, tenders must remain valid from the date and time for closing of tenders, for the following period: 3 months

**Public acknowledgment of tenders received**

General: A list of tenderers may be posted by the close of business on the day following the closing of tenders. Do not consider this listing to be advice of which tender, if any, will be accepted.

Location of notice board: N/A

**Evaluation of tenders**

General: In evaluating the tenders, the principal may take into consideration the following:

- Conformity with tender documents.
- Capital cost compared with estimated cost.
- Construction period.
- Proposed use of local subcontractors and suppliers.
- Proposed alternatives.
- Alternative working times proposed by the tenderer, and the cost to the principal of providing contract administration for the work under the contract at those times.
- Maintenance and running costs.
- Design proposals.
- Quality of prototypes.
- Construction program.
- Proposed methods.
- Quality assurance.
- Conflicts of interest.
- Life of proposed equipment.
- Standardisation of proposed equipment.
- Tenderer’s CADD format.
- Value for money.
- Tenderer’s resources.
- Tenderer’s current commitments.
- Tenderer’s previous performance.
- Industrial relations and safety records.

Qualifications: Tenders containing unauthorised alterations, additions or qualifications may be rejected.

Unpriced items: Costs relating to items not priced will be assumed to have been included elsewhere in the tender.

**Additional information**

General: If required, submit additional information, by the stipulated date and time, to allow further consideration of the tender before any tender is accepted. Failure to meet this requirement may result in the tender being rejected.

**Confidentiality**

General: Treat as confidential any information provided after the tender period.

**Acceptance of tender**

Non-acceptance: The principal is not bound to accept the lowest or any tender, or to give reasons.

Acceptance: A tender is not accepted until notice in writing of acceptance is:
- Handed to the tenderer.
- Sent by prepaid post to, or left at, the address for service of notices stated in the Tender form.
- Transmitted by facsimile to the tenderer's facsimile number.

Formal instrument of agreement: Required.

**Period between acceptance of tender and possession of site**
Anticipated maximum period: 2 weeks.

## 2 TENDER FORM

Refer to Centennial Park Authority – Invitation and Conditions of Tender 02/2020 for completion of form.
1 GENERAL

1.1 GENERAL

General conditions
General: To Centennial Park – Invitation to Tender document.

Interpretation
Cross reference: The clause INTERPRETATION, in the General requirements worksection, also applies.

1.2 THE SITE

Site restrictions
Site limitations: Comply with the following restrictions on the use of the site: Construction works to be undertaken within the internal area of the Jubilee Complex. Site area to be restricted to agreed area away from the Jubilee Chapel complex.

Hours of Work – To be during business hours but access the facility is available from 7am Monday to Friday and possible Saturday. To be agreed with Centennial Park. Closing time 5pm.

Restricted area’s: Jubilee Chapel complex.

Restricted areas include: Access roads/paths onto and within the site, use of the site for temporary works and constructional plant, including working and storage areas, location of offices, workshops, sheds, roads and parking, is restricted to the following areas. To be agreed with Centennial Park on site

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

- Allow occupants to continue in secure possession and occupancy of the premises for the required period.
- Make available safe access for occupants.
- Arrange work to minimise nuisance to occupants and ensure their safety.
- Protect occupants against weather, dust, dirt, water or other nuisance, by such means as temporary screens.

Proposals: Submit details of proposed methods.
- Purpose of submission: Information only.

Occupied premises schedule

<table>
<thead>
<tr>
<th>Occupants</th>
<th>Occupied premises</th>
<th>Period of occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public and Staff</td>
<td>Jubilee Complex</td>
<td>During Contract Works</td>
</tr>
</tbody>
</table>

Protection of persons and property

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

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

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

Control of run off stormwater: to be confirmed on site
Rectification
Accessways, services: Rectify immediately any obstruction or damage to roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Provide temporary services whilst repairs are carried out.
Property: Rectify immediately any interference or damage to property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

Existing services
General: Attend to existing services as follows:
- If the service is to be continued, repair, divert or relocate. Submit proposals.
- If the service crosses the line of a required trench, or will lose support when the trench is excavated, provide permanent support for the existing service. Submit proposals.
- If the service is to be abandoned, remove redundant parts and make safe.
Proposals: Submit proposals for action to be taken with respect to existing services before starting this work. Minimise the number and duration of interruptions.
- Purpose of submission: For review.

Adjoining property
Notice: At least 10 working days before commencing work, submit to owners and occupants of adjoining property written notice of intention to commence work and an outline description of the type and extent of work.
Conditions for work on adjoining property: N/A
Revealed encroachments: If the works reveal unknown encroachments of adjoining property on to the site or of existing site structures on to adjoining property, immediately seek instructions.
Records: For properties described in the Adjoining properties to be recorded schedule:
- Inspect the properties with the architect and owners and occupants of the properties, before commencement of work.
- Make detailed records of conditions existing within the properties, especially structural defects and other damage or defacement.
- Arrange for at least 2 copies of each record, including drawings, written descriptions, and photographs, to be endorsed by the owners and occupants, or their representatives, as evidence of conditions existing before commencement of work.
Endorsed copies: Submit one endorsed copy of each record. Keep the other endorsed copy on site.
- Purpose of submission: Information only.

Adjoining properties to be recorded schedule

<table>
<thead>
<tr>
<th>Title</th>
<th>Owner</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.3 CONSTRUCTION PLANT

Use of existing services
General: Existing services may be used as temporary services for the performance of the contract subject to conditions stated in the Existing services schedule.

Existing services schedule

<table>
<thead>
<tr>
<th>Service</th>
<th>Conditions of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water and Electricity</td>
<td>During Works</td>
</tr>
</tbody>
</table>

Protective clothing
Protective clothing: Make available protective clothing for the use of visitors.
- Safety helmets: To AS/NZS 1801, Type 1.
- Certification: Required.
  - Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Number of helmets: TBA

Temporary services
Requirement: TBA

Temporary fence
Requirement: TBA

1.4 BUILDING THE WORKS

Surveys
Setting out: Refer to documentation.

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

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

Rectification: If the owner’s survey marks are disturbed or obliterated, immediately give notice and rectify the disturbance or obliteration.

Safety
Accidents: Promptly notify the architect 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, cave-ins and fire risk.

Accident reports: Submit reports of accidents.
- Purpose of submission: Information only.

Contractor’s representative
General: Must be accessible, and fluent in English and technical terminology.

Subcontracting
General: Submit a complete list of proposed subcontractors and suppliers and fully inform them of relevant obligations.

Program of work
Construction program: Show the following:
- Sequence of 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. [After hours work]

Updated program: Identify changes since the previous issue, and show the estimated percentage of completion for each item of work.

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

Order of work schedule

<table>
<thead>
<tr>
<th>Portion of work</th>
<th>Order of work</th>
<th>Time of work</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBA</td>
<td>To be agreed</td>
<td>During Operating Hours of Chapel. To be confirmed.</td>
</tr>
</tbody>
</table>
Site meetings
General: Hold and attend site meetings throughout the contract and ensure attendance of appropriate subcontractors, the architect, and appropriate consultants.

Frequency: Fortnightly
Minutes: Keep minutes of site meetings. Within 5 working days after each meeting, submit to each party written copies of the minutes.
  - Purpose of submission: Review.
Contacts: At the first site meeting, submit names and telephone numbers of responsible persons who may be contacted after hours during the course of the contract.
  - Purpose of submission: Information only.

Items supplied by owner
General: Materials and other items identified in the Items to be supplied schedule will be supplied free of charge to the contractor for installation in the execution of the works. Unload and take delivery of them, inspect them for defects and then take care of them. If defects are found, advise. Return unused items to the owner.
Conditions of supply: N/A
Notice: To be advised.

<table>
<thead>
<tr>
<th>Location</th>
<th>Item</th>
<th>Quantity</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.5 COMPLETION OF THE WORKS

Final cleaning
General: Before practical completion, clean throughout, including interior and exterior surfaces exposed to view.
Samples: Remove non-incorporated samples, prototypes and sample panels.

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

Adjoining property
Evaluation: At practical completion, for properties described in the Adjoining properties to be recorded schedule inspect the properties with the architect and owners and occupants of the properties, recording any damage that has occurred since the pre-commencement inspection.

<table>
<thead>
<tr>
<th>Title</th>
<th>Owner</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Removal of plant
General: Within 10 working days after practical completion, remove temporary works and construction plant no longer required. Remove the balance before the end of the defects liability period.

1.6 PAYMENT FOR THE WORKS

Import costs
Definition: Import costs include costs attributable to exchange rates, customs and import duty of imported content of items purchased for incorporation in the works.
Adjustment: If there are changes in rates applying to import costs of items listed in the Import cost adjustment schedule, add or deduct the amount of the difference to or from the contract sum, as applicable.

**Import cost adjustment schedule**

<table>
<thead>
<tr>
<th>Item</th>
<th>Country of origin</th>
<th>Import cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Anticipated progress payments**
General: At commencement of the works, submit a schedule of anticipated progress claims for the contract period. Submit a revised schedule with each progress claim.
Purpose of submission: Information only.

**Progress claims**
Break down: With each progress claim, submit a statement of amounts claimed in respect of each worksection or trade heading designated in the specification.
Purpose of submission: Review.

**Method of measurement**
General: In conformance with the principles of the Australian Standard Measurement of Building Works (ASMM).
Other civil engineering work: To AS 1181.

### 1.7 MISCELLANEOUS

**Governing law**
Requirements of authorities: The owner, before entering into the contract, has given the notices, paid the fees, and obtained the permits, approvals and other authorisations stated in the Prior applications and approvals schedule.

**Prior applications and approvals schedule**

<table>
<thead>
<tr>
<th>Prior notices given and applications made</th>
<th>Fees paid</th>
<th>Permits, approvals and authorisations received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning Approval- City of Mitcham</td>
<td>Paid</td>
<td>Approved May 2019</td>
</tr>
<tr>
<td>CITB Levy</td>
<td>To be paid by Client</td>
<td></td>
</tr>
</tbody>
</table>
1 GENERAL

1.1 RESPONSIBILITIES

Performance
Structural: If required, provide structures, installations and components as follows:
- Fixed accessways: To AS 1657.
- Structural design actions: To AS/NZS 1170.0 and the Structural design actions schedule.

Design
Design by contractor: If the contractor provides design, use only appropriately qualified persons and
conform to all statutory requirements.
Conflict with the documents: If it is believed that a conflict exists between statutory requirements and
the documents, notify the contract administrator immediately and provide a recommendation to resolve
the conflict.

Noise levels
General: Install systems in conformance with the Noise level schedule and within the limits of the
contract design and documented equipment performance.

1.2 PRECEDENCE

General
Worksections and referenced documents:
- The requirements of other worksections of the specification override conflicting requirements of this
worksection.
- The requirements of the worksections override conflicting requirements of their referenced
documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General
Requirement: Conform to the following:
- Demolition.
- Service trenching.

Common requirements
Requirement: Conform to the following:
- Adhesives, sealants and fasteners.
- Fire-stopping.
- Metals and prefinishes.
- Termite management.
- Timber products, finishes and treatment.
- Building IT components.

Cross referencing styles
Within the text:
- Worksection titles are indicated by Italicised text.
- Subsection titles are indicated by BOLD text.
- Clause titles are indicated by Bold text.
1.4 REFERENCED DOCUMENTS

Contractual relationships
General: Responsibilities and duties of the principal, contractor and contract administrator are not altered by requirements in the documents referenced in this specification.

Current editions
General: Use referenced documents which are the editions, with amendments, current 3 months before the closing date for tenders, except where other editions or amendments are required by statutory authorities.
Site copies: 1 Copy

1.5 INTERPRETATION

Abbreviations
General: For the purposes of this specification the following abbreviations apply:
- AS: Australian Standard.
- EMC: Electromagnetic compatibility.
- MSDS: Material safety data sheets.
- NZS: New Zealand Standard.
- VOC: Volatile organic compound.

Definitions
General: For the purposes of this specification, the definitions given below apply.
- Attendance: Attendance, provide attendance and similar expressions mean give assistance for examination and testing.
- Contract administrator: Contract administrator has the same meaning as architect’ or superintendent’ and is the person appointed by the owner’ or principal under the contract.
- Default: Specified value, product or installation method which is to be provided unless otherwise documented.
- Design life: The period of time for which it is assumed, in the design, that an asset will be able to perform its intended purpose with only anticipated maintenance but no major repair or replacement being necessary.
- Documented: Documented, as documented and similar terms mean contained in the contract documents.
- Economic life: The period of time from the acquisition of an asset to when the asset, while still physically capable of fulfilling its function and with only anticipated maintenance, ceases to be the lowest cost alternative for satisfying that function.
- Geotechnical site investigation: The process of evaluating the geotechnical characteristics of the site in the context of existing or proposed construction.
- Give notice: Give notice, submit, advise, inform and similar expressions mean give notice (submit, advise, inform) in writing to the contract administrator.
- High level interface: Systems transfer information in a digital format using an open system interface.
- Hot-dip galvanized: Zinc coated to AS/NZS 4680 after fabrication with coating thickness and mass to AS/NZS 4680 Table 1.
- IP: IP, IP code, IP rating and similar expression have the same meaning as IP Code in AS 60529.
- Joints:
  - Construction joint: A joint with continuous reinforcement provided to suit construction sequence.
  - Control joint: An unreinforced joint between or within discrete elements of construction which allows for relative movement of the elements.
  - Contraction joint: An opening control joint with a bond breaking coating separating the joint surfaces to allow independent and controlled contraction of different parts or components, induced by shrinkage, temperature changes or other causes. It may include unbound dowels to assist vertical deflection control.
 Expansion joint: A closing control joint with the joint surfaces separated by a compressible filler to allow axial movement due to thermal expansion or contraction with changes in temperature or creep. It may include unbound dowels to assist vertical deflection control.

 Isolation joint: A joint between elements of a structure designed to isolate structural movement while permitting horizontal and/or vertical movement between abutting elements.

 Weakened plane joint: A contraction joint created by forming a groove, extending at least one quarter the depth of the section, either by using a grooving tool, by sawing, or by inserting a premoulded strip.

 Structural control joint: A control joints (contraction, expansion and isolation) in structural elements when used with applied material and finishes.

 Substrate joint: A joint in the substrate which includes construction joints and joints between different materials.

 SEALANT joint: A joint filled with a flexible synthetic compound which adheres to surfaces within the joint to prevent the passage of dust, moisture and gases.

 Local government authority: A body established for the purposes of local government by or under a law applying in a state or territory.

 Low level interface: Systems transfer information via terminals and voltage free contacts.

 Manufacturer’s and supplier’s recommendations: Recommendations, instructions, requirements, specifications (and similar expressions) provided in written or other form by the manufacturer relating to the suitability, use, installation, storage and/or handling of a product.

 Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
- Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.
- Ferrous open sections zinc coated by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections zinc coated by a continuous or specialised process: To AS/NZS 4792.

 Network Utility Operator: A person who undertakes the piped distribution of drinking water or natural gas for supply or is the operator of a sewerage system or a stormwater system.

 Network Distributor: Body responsible for the distribution and control of electricity.

 Obtain: Obtain, seek and similar expressions mean obtain (seek) in writing from the contract administrator.

 Practical completion or Defects free completion: The requirements for these stages of completion are defined in the relevant building contract for the project.

 Pipe: Includes pipe and tube.

 Principal: Principal has the same meaning as owner, client and proprietor and is the party to whom the contractor is legally bound to construct the works.

 Professional engineer: As defined by the BCA.

 Proprietary: Proprietary means identifiable by naming manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.

 Provide: Provide and similar expressions mean supply and install and include development of the design beyond that documented.

 Readily accessible: To AS/NZS 3000.

 Registered testing authority:
- An organisation registered by the National Association of Testing Authorities (NATA) to test in the relevant field; or
- An organisation outside Australia registered by an authority recognised by NATA through a mutual recognition agreement; or
- An organisation recognised as being a Registered Testing Authority under legislation at the time the test was undertaken.

 Required: Means required by the documents, the local council or statutory authorities.

 If required: A conditional specification term for work which may be shown in the documents or is a legislative requirement.

 Samples: Includes samples, prototypes and sample panels.
- Statutory authority: A public sector entity created by legislation, that is, a specific law of the Commonwealth.
- Supply: Supply, furnish and similar expressions mean supply only.
- Tests:
  . Pre-completion tests: Tests carried out before completion tests.
    * Type tests: Tests carried out on an item identical with a production item, before delivery to the site.
    * Production tests: Tests carried out on a purchased item, before delivery to the site.
    * Progressive tests: Tests carried out during installation to demonstrate performance in accordance with this specification.
    * Site tests: Tests carried out on site.
  . Completion tests: Tests carried out on completed installations or systems and fully resolved before the date for, to demonstrate that the installation or system, including components, controls and equipment, operates correctly, safely and efficiently, and meets performance and other requirements. The contract administrator may direct that completion tests be carried out after the date for practical completion.
- Tolerance: The permitted difference between the upper limit and the lower limit of dimension, value or quantity.
- Verification: Provision of evidence or proof that a performance requirement has been met or a default exists.

1.6 CONTRACT DOCUMENTS

Services diagrammatic layouts
General: Layouts of service lines, plant and equipment shown on the drawings are diagrammatic only, except where figured dimensions are provided or calculable.

Before commencing work:
- Obtain measurements and other necessary information.
- Coordinate the design and installation in conjunction with all trades.

Levels
General: Spot levels take precedence over contour lines and ground profile lines.

Drawings and manuals for existing services
Warranty: No warranty is given as to the completeness or accuracy of drawings and/or manuals of existing services.

1.7 INSPECTION

Notice
Concealment: If notice of inspection is required in respect of parts of the works that are to be concealed, advise when the inspection can be made before concealment.
Tests: Give notice of the time and place of documented tests.
Minimum notice for inspections to be made and for witnessing of tests: Conform to the Notices schedule.
Light level requirements: to AS/NZS 1680.2.4.

Attendance
General: Provide attendance for documented inspections and tests.

1.8 SUBMISSIONS

General
Submit to: Detailstudio Pty Ltd
Default timing: Make submissions at least 5 working days before ordering products for, or starting installation of, the respective portion of the works.
Program: Allow in the construction program for at least the following times for response to submissions:
Shop drawings: N/A
Samples and prototypes: Tile T1 installation method, Fountain testing, Pool Equipment and drainage.

Product/design substitution or modification: N/A

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

**Identification**

General: Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include pertinent contract document references. Include service connection requirements and product certification.

Non-compliance: Identify proposals for non-compliance with project requirements, and characteristics which may be detrimental to successful performance of the completed work.

**Errors**

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

**Submissions - electronic copies**

File format: N/A

Transmission medium: N/A

**Submissions - hard copy**

Quantity: 1 x A1

- Loose documents larger than A3: One transparency on heavyweight plastic film the same size as the standard contract drawings.
- Loose documents up to and including A3: One copy.

Standard contract drawing size: A1

**Authorities**

Authorities’ approvals: Submit documents showing approval by the authorities whose requirements apply to the work.

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

**Building penetrations**

General: If it is proposed to penetrate or fix to the following, submit details of the methods proposed to maintain the required structural, fire and other properties:

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.

**Certification**

General: Submit certification that the plant and equipment submitted meets all requirements of the contract documents.

**Execution details**

General: Before starting the installation of building services, submit 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.

**Inspection and testing**

General: Submit an inspection and testing plan which is consistent with the construction program. Include particulars of test stages and procedures.

Test reports: Submit written reports on nominated tests.
Materials and components
Product certification: If products must conform to product certification schemes, submit evidence of conformance.
Product data: For proprietary equipment, submit the manufacturer's product data as follows:
- Technical specifications and drawings.
- Type-test reports.
- Performance and rating tables.
- Recommendations for installation and maintenance.

Substitutions
Identified proprietary items: Identification of a proprietary item does not necessarily imply exclusive preference for the item so identified, but indicates the necessary properties of the item.
Alternatives: If alternatives to the documented products, methods or systems are proposed, submit sufficient information to permit evaluation of the proposed alternatives, including the following:
- Evidence that the performance is equal to or greater than that specified.
- Evidence of conformity to a cited standard.
- Samples.
- Essential technical information, in English.
- Reasons for the proposed substitutions.
- Statement of the extent of revisions to the contract documents.
- Statement of the extent of revisions to the construction program.
- Statement of cost implications including costs outside the contract.
- Statement of consequent alterations to other parts of the works.
Availability: If the documented products or systems are unavailable within the time constraints of the construction program, submit evidence.
Criteria: If the substitution is for any reason other than unavailability, submit evidence that the substitution:
- Is of net enhanced value to the principal.
- Is consistent with the contract documents and is as effective as the identified item, detail or method.

Samples
Submission: Submit nominated samples.
Incorporation of samples: If it is intended to incorporate samples into the works, submit proposals. Incorporate samples in the works which have been endorsed for inclusion. Do not incorporate other samples.
Retention of samples: Keep endorsed samples in good condition on site, until the date of practical completion.

Shop drawings
General: Include dimensioned drawings showing details of the fabrication and installation of structural elements, building components, services and equipment, including relationship to building structure and other services, cable type and size, and marking details.
Diagrammatic layouts: Coordinate work shown diagrammatically in the contract documents, and submit dimensioned set-out drawings.
Services coordination: Coordinate with other building and service elements. Show adjusted positions on the shop and record drawings.
Space requirements: Check space requirements of equipment and services indicated diagrammatically in the contract documents.
Submission medium: N/A
Drawing size: N/A
Standard: N/A
Checking: Ensure that the drawings have been checked before submission.
Building work drawings for building services: Submit detailed dimensioned drawings showing all:
- Access doors and panels.
- Conduits to be cast in slabs.
- Holding down bolts and other anchorage and/or fixings required complete with loads to be imposed on the structure during installation and operation.
- Openings, penetrations and block-outs.
- Sleeves.
- Plinths, kerbs and bases.
- Required external openings.

2 PRODUCTS

2.1 GENERAL

Manufacturers' or suppliers' recommendations
General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in conformance with the current written recommendations and instructions of the manufacturer or supplier.
Proprietary items/systems/assemblies: Assemble, install or fix to substrate in conformance with the current written recommendations and instructions of the manufacturer or supplier.
Project modifications: Advise of activities that supplement, or are contrary to, manufacturers’ or suppliers’ written recommendations and instructions.

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

Prohibited materials
Do not provide the following:
- Materials listed in the Safe Work Australia Hazardous Substances Information System (HSIS).
- Materials that use chlorofluorocarbon (CFC) or hydro chlorofluorocarbon (HCFC) in the manufacturing process.

2.2 TESTS

Attendance
General: Provide attendance on tests.

Testing authorities
General: Except for site tests, have tests carried out by a Registered testing authority and submit test reports.
- Reports: Submit copies of test reports, including certificates for type tests, showing the observations and results of tests and conformance or non-conformance with requirements.
- Site tests: Use instruments calibrated by authorities accredited by a Registered testing authority.

2.3 MATERIALS AND COMPONENTS

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

Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

Situation
The following classification of situation applies to the Corrosion resistance and durability tables.
- Internal: Building fabric protected from salt and moisture by vapour barriers, sarking, sheathing and building wraps.
- External: Includes external leaf and air spaces behind external leaf brickwork or blockwork walls.
Galvanizing
Severe conditions: Galvanize mild steel components (including fasteners) to AS 1214 or AS/NZS 4680 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).

PVC products
Verification: Provide third party verification to demonstrate that PVC products proposed for the project satisfy the criteria required by the GBCA for their Credit in the Materials category of Green star assessment.

3 EXECUTION

3.1 OFF SITE DISPOSAL

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

3.2 WALL CHASING

Holes and chases
General: If holes and chases are required in masonry walls, provide proposals to demonstrate that the structural integrity of the wall is maintained. Do not chase walls nominated as fire or acoustic rated. Parallel chases or recesses on opposite faces of a wall: Not closer than 600 mm to each other. Chasing of blockwork: Only in core-filled hollow blocks or in solid blocks which are not designated as structural and to the Concrete blockwork chasing table.

Concrete blockwork chasing table

<table>
<thead>
<tr>
<th>Block thickness (mm)</th>
<th>Depth of chase (maximum mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>190</td>
<td>35</td>
</tr>
<tr>
<td>140</td>
<td>25</td>
</tr>
<tr>
<td>90</td>
<td>20</td>
</tr>
</tbody>
</table>

3.3 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 to ensure the rigidity of the assembly.

3.4 SERVICES CONNECTIONS

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

Network distributors’ requirements
General: If the network distributor elects to perform or supply part of the works, make the necessary arrangements. Install equipment supplied, but not installed, by the authorities.

3.5 SERVICES INSTALLATION

General
Fixing: If non-structural building elements are not suitable for fixing services to, fix directly to structure and trim around holes or penetrations in non-structural elements.
Installation: Install equipment and services plumb, fix securely and organise reticulated services neatly. Allow for movement in both structure and services.

Concealment: Unless otherwise documented, conceal all cables, ducts, trays and pipes except where installed in plant spaces, ceiling spaces and riser cupboards. If possible, do not locate on external walls.

Lifting: Provide heavy items of equipment with permanent fixtures for lifting as recommended by the manufacturer.

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

Arrangement: Arrange services so that services running together are parallel with each other and with adjacent building elements.

**Dissimilar metals**
General: 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 long radius elbows or bends and sets where practicable, and swept branch connections. Provide elbows or short radius bends where pipes are led up or along walls and then through to fixtures. Do not provide mitred fittings.

Vibration: Arrange and support piping so that it remains free from vibration whilst permitting necessary movements. Minimise the number of joints.

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

General: If pipes that operate under pressure are to be embedded in concrete or surfacing material conform to AS 2896 clause 4.3.3.3. Pressure test and rectify leaks before the concrete is poured.

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.

**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.

### 3.6 BUILDING PENETRATIONS

**Penetrations**
Fire rated building elements: Seal penetrations with a system conforming to AS 4072.1.

Non-fire rated 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 or conduit penetrates building elements, provide metal or PVC sleeves formed from pipe sections as follows:
- Movement: Arrange to permit normal pipe or conduit movement.
- Diameter (for non fire-rated building elements): Sufficient to provide an annular space around the pipe or pipe insulation of at least 12 mm.
- Prime paint ferrous surfaces.
- Terminations:
If cover plates are fitted: Flush with the finished building surface.
In fire-rated and acoustic-rated building elements: 50 mm beyond finished building surface.
In floors draining to floor wastes: 50 mm above finished floor.
Elsewhere: 5 mm beyond finished building surface.
Termite management: To AS 3660.1.

- Thickness:
  - Metal: ≥ 1 mm.
  - PVC: ≥ 3 mm.

Sleeves for cables: For penetrations of cables not enclosed in conduit through ground floor slabs, beams and external walls provide sleeves formed from PVC pipe sections.

### 3.7 CONCRETE PLINTHS

**Construction**
General: Provide plinths conforming to the Concrete plinths schedule.

### 3.8 SUPPORT AND STRUCTURE

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

### 3.9 PIPE SUPPORTS

**Support systems**
General: Provide proprietary support systems of metallic-coated steel construction.
Vertical pipes: Provide anchors and guides to maintain long pipes in position, and supports to balance the mass of the pipe and its contents.
Saddles: Do not provide saddle type supports for pipes > DN 25.
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 fixings of electrolytically compatible material.
Uninsulated pipes: Clamp piping supports directly to pipes.
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.

**Support spacing**
Cold and heated water pipes: To AS/NZS 3500.1 Table 5.2. Provide additional brackets, clips or hangers to prevent pipe movement caused by water pressure effects.
Sanitary plumbing: To AS/NZS 3500.2 Table 9.1.
Fuel gas: To AS/NZS 5601.1 Table 5.5.
Other pipes: To AS/NZS 3500.1 Table 5.2.

**Hangers**
Conform to the Hanger size table.

<table>
<thead>
<tr>
<th>Nominal pipe size (DN)</th>
<th>Minimum hanger diameter (mm) for single hangers</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 50</td>
<td>9.5</td>
</tr>
<tr>
<td>65 to 90</td>
<td>12.7</td>
</tr>
<tr>
<td>100 to 125</td>
<td>15.8</td>
</tr>
<tr>
<td>150 to 200</td>
<td>19.0</td>
</tr>
</tbody>
</table>
3.10 PLANT AND EQUIPMENT ACCESS

General
Services and equipment: Locate and arrange all services and equipment so that:
- They comply with the relevant requirements of the appropriate Occupational Health and Safety regulations.
- Failure of plant and equipment (including leaks) does not create a hazard for the building occupants.
- Failure of plant and equipment (including leaks) cause a minimum or no damage to the building, its finishes and contents including water sensitive equipment or finishes.
- Safe tray and an overflow pipe are provided to each tank, hot water heater and storage vessel.
- Piping: Provide access and clearance at fittings which require maintenance or servicing, including control valves and joints intended to permit pipe removal. Arrange piping so that it does not interfere with the removal or servicing of associated equipment or valves or block access or ventilation openings.
- Services and equipment are readily accessible for inspection and maintenance and arranged so that inspection and maintenance can be carried out in a safe and efficient manner. Include the following:
  - Conform to the relevant requirements of AS 1470, AS 1657, AS/NZS 1892.1, AS 2865 and AS/NZS 3666.1 for relevant requirements.
  - Minimise inconvenience and disruption to building occupants or damage to the building structure or finishes.
  - Locate plant (including high level tanks) requiring regular inspection and maintenance so it is either safely and readily accessible from floor level or provide permanent access platforms and ladders.
- In false ceilings, locate items of equipment that require inspection and 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.
- Modify manufacturer’s standard equipment when necessary to provide the plant access in the contract documents.

3.11 VIBRATION SUPPRESSION

Standard
Rotating and reciprocating machinery noise and vibration: Vibration severity in Zone A to AS 2625.1 and AS 2625.4.

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

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 so that no stress is placed 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 conforming as follows:
- Construction: Steel or steel-framed reinforced concrete. 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:
- For static deflections < 15 mm: Single or double deflection neoprene in-shear mountings incorporating steel top and base plates and a tapped hole for bolting to equipment.
- For static deflections ≥ 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: ≥ 12 mm between springs and other members such as bolts and housing.
- High frequency isolation: 5 mm neoprene acoustic isolation pads between baseplate and support.
- Levelling: Provide bolts and lock nuts.
- Minimum travel to solid: ≥ 150% of the designated minimum static deflection.
- Ratio of mean coil diameter to compressed length at the designated minimum static deflection: ≥ 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.

3.12 SEISMIC RESTRAINT OF BUILDING SERVICES
Provisions
General: Arrange all components, other than service items exempted in AS 1170.4, to resist seismic loads determined in conformance with AS 1170.4. Securely fix all plant and equipment to the building structure. Do not rely on gravity and/or friction to resist seismic forces.
Anti-vibration mounts: Use horizontally restrained type.
Components: Do not use components that will be damaged by earthquake conditions. Protect systems against the adverse effects of components such as mercury switches that, although not damaged by earthquake, may malfunction.

3.13 FINISHES TO BUILDING SERVICES
General
General: If exposed to view (including in plant rooms), paint new building services and equipment. Surfaces painted or finished off-site: Conform to the Metals and prefinishes worksection.
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
General: Conform to the recommendations of AS/NZS 2311 Sections 3, 6 and 7 or AS/NZS 2312 Sections 5, 8 and 10, as applicable.
Powder coating
Standard:
- Aluminium for architectural applications: To AS 3715.
- Other metals: To AS 4506.
Painting systems
New unpainted interior surfaces: To AS/NZS 2311 Table 5.1.
New unpainted exterior surfaces: To AS/NZS 2311 Table 5.2.
Paint application
Coats: Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur. Ensure 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
Corrosion protection: Provide corrosion protection for the following:
- Underground ferrous piping.
- Underground non-ferrous metal piping in corrosive environments.
Protection methods: 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.
- Continuous wrapping using proprietary petroleum taping material.
- Impermeable flexible plastic coating.
- Sealed polyethylene sleeve.

Low VOC emitting paints
Provide the following low odour/low environmental impact paint types with the following VOC limits:
- Primers and undercoats: < 65 g/litre.
- Low gloss white or light coloured latex paints for broadwall areas: < 16 g/litre.
- Coloured low gloss latex paints: < 16 g/litre.
- Gloss latex paints: < 75 g/litre.

3.14 MARKING AND LABELLING

General
General: Mark services and equipment to provide a ready means of identification and as follows:
- Locations exposed to weather: Provide durable materials.
- Pipes, conduits and ducts: Identify and label to AS 1345 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.

Electrical accessories
General: Label isolating switches and outlets to identify circuit origin.

Equipment concealed in ceilings
Location: Provide a label on the ceiling indicating the location of each concealed item requiring access for routine inspection, maintenance and/or operation. In tiled ceilings locate the label on the ceiling grid closest to the item access point. In flush ceilings locate adjacent to closest access panel. Items to be labelled include but are not limited to:
- Fan coil units and terminal equipment (e.g. VAV boxes).
- Fire and smoke dampers.
- Isolating valves not directly connected to items otherwise labelled.
- Motorised dampers.
- Wall mounted equipment in occupied areas: 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. Store in a pocket on the door of the panel. Lists to include terminal numbers, point addresses, short and long descriptors.

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.
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 ≥ 1 mm thick with black filled engraved lettering.
Emergency functions: To AS 1319.
Colours: Generally to AS 1345 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.
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.
Label locations: Locate labels so that they are easily seen and are either attached to, below or next to the item being marked.
Labelling text and marking: To correspond to terminology and identifying number of the respective item as shown on the record drawings and documents and in operating and maintenance manuals.
Lettering heights:
- Danger, warning and caution notices: ≥ 10 mm for main heading, ≥ 5 mm for remainder.
- Equipment labels within cabinets: ≥ 3.5 mm.
- Equipment nameplates: ≥ 40 mm.
- Identifying labels on outside of cabinets: ≥ 5 mm.
- Isolating switches: ≥ 5 mm.
- Switchboards, main assembly designation: ≥ 25 mm.
- Switchboards, outgoing functional units: ≥ 8 mm.
- Switchboards, sub assembly designations: ≥ 15 mm.
- Valves: ≥ 20 mm.
- Self-adhesive flexible plastic labels:
  - Labels < 2000 mm above floor: 3 mm on 6 mm wide tape.
  - Labels ≥ 2000 mm above floor: 8 mm on 12 mm wide tape.
  - Other locations: ≥ 3 mm.

Operable devices: Mark to provide a ready means of identification. Include the following:
- Controls.
- Indicators, gauges, meters.
- Isolating switches.

Vapour barriers: Do not penetrate vapour barriers.

3.15 SOFTWARE

General
General: Provide the software required for the operation and management of building services systems and equipment.

3.16 WARRANTIES

General
General: If a warranty is documented or if a manufacturer’s standard warranty extends beyond the end of the defects liability period, name the principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

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

Approval of installer: If installation is not by manufacturer, and product warranty is conditional on the manufacturer’s approval of the installer, submit the manufacturer’s written approval of the installing firm.

3.17 OPERATION AND MAINTENANCE MANUALS

General
General: Submit operation and maintenance manuals for the whole of the work.

Authors and compilers: Personnel experienced in the maintenance and operation of equipment and systems installed, and with editorial ability.

Referenced documents: If referenced documents or technical worksections require that manuals be submitted, include corresponding material in the operation and maintenance manuals.

Subdivision: By installation or system, depending on project size.

Format – electronic copies
Printing: Except for drawings required in the RECORD DRAWINGS clause provide material that can be legibly printed on A4 size paper.
Scope: Provide the same material as documented for hardcopy in electronic format.
Quantity and format: Conform to Submissions – electronic copies.

Format – hard copy
General: A4 size loose leaf, in commercial quality, 4 ring binders with hard covers, each indexed, divided and titled. Include the following features:
- Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE MANUAL, to spine. Identify title of project, volume number, volume subject matter, and date of issue.
- Dividers: Durable divider for each separate element, with typed description of system and major equipment components. Clearly print short titles under laminated plastic tabs.
- Drawings: Fold drawings to A4 size with title visible, insert in plastic sleeves (one per drawing) and accommodate them in the binders.
- Pagination: Number pages.
- Ring size: 50 mm maximum, with compressor bars.
- Text: Manufacturers’ printed data, including associated diagrams, or typewritten, single-sided on bond paper, in clear concise English.

Number of copies: 3.

**Date for submission**
Date for draft submission: The earlier of the following:
- 2 weeks before the date for practical completion.
- Commencement of training on services equipment.
Date for final submission: Within 2 weeks after practical completion.

### 3.18 CLEANING

**Final cleaning**
General: Before practical completion, clean throughout, including all exterior and interior surfaces except those totally and permanently concealed from view.
Labels: Remove all labels not required for maintenance.

### 3.19 PERIODIC MAINTENANCE OF SERVICES

**General**
General: During the maintenance period, carry out periodic inspections and maintenance work as recommended by manufacturers of supplied equipment, and promptly rectify faults.
Emergencies: Attend emergency calls promptly.
Annual maintenance: Carry out recommended annual maintenance procedures before the end of the maintenance period.
Maintenance period: The greater of the defects liability period and the period nominated in the Maintenance requirements schedule.

**Maintenance program**
General: Submit details of maintenance procedures and program, relating to installed plant and equipment, 6 weeks before the date for practical completion. Indicate dates of service visits. State contact telephone numbers of service operators and describe arrangements for emergency calls.

**Maintenance records**
General: Record in binders provided with operation and maintenance manuals.
Referenced documents: If referenced documents or technical worksections require that log books or records be submitted, include this material in the maintenance records.
Service visits: Record comments on the functioning of the systems, work carried out, items requiring corrective action, adjustments made and name of service operator. Obtain the signature of the principal’s designated representative.

**Site control**
General: Report to the principal’s designated representative on arriving at and before leaving the site.

### 3.20 POST-CONSTRUCTION MANDATORY INSPECTIONS AND MAINTENANCE

**General**
General: For the duration of the defects liability period, provide inspections and maintenance of safety measures required by the following:
- The Building Code of Australia.
- AS 1851.
- Other statutory requirements applicable to the work.

**Records:** Provide mandatory records.
Certification: Certify that mandatory inspections and maintenance have been carried out and that the respective items conform to statutory requirements. Submit certification.
Annual inspection: Provide an annual inspection and maintenance immediately prior to the end of the defects liability period.
1 GENERAL

1.1 RESPONSIBILITIES

General
Fitness for purpose: Provide adhesives, sealants and fasteners capable of transmitting imposed loads, sufficient to ensure the rigidity of the assembly, or integrity of the joint.
Finished surface: Provide adhesives and sealants that will not cause discolouration.
Compatibility: Do not use sealants or adhesives that are incompatible with the products to which they are applied.
Sealant replacement: Use sealants that can be safely removed without compromising the application of the replacement sealant for future refurbishment.
Selections: Conform to the SELECTIONS.

1.2 PRECEDENCE

General
Worksections and referenced documents:
- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of this worksection overrides conflicting requirements of its referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General
Requirement: Conform to the following:
- General requirements.

1.4 SUBMISSIONS

Installed sealant tests
Sampling: For each sealant test take 3 samples of installed and cured sealant, each at least 50 mm long, from completed joints.
Testing: Submit the results of tests to the Installed sealant tests schedule.
Reinstatement: Make good the joints from which the samples were taken.

<table>
<thead>
<tr>
<th>Item to be tested</th>
<th>Property to be tested</th>
<th>Applicable standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sealants
Samples: Submit colour samples of visible joint sealants.
Documents: Submit technical data sheets.

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of joints and penetrations prepared for the application of sealants to the Installed sealant tests schedule.
1.6 PERFORMANCE

Adhesives and sealants
General: Provide adhesives and sealants capable of transmitting imposed loads, sufficient to ensure the rigidity of the assembly, or integrity of the joint and which will not cause discolouration of finished surfaces.
Compatibility: Do not use sealants or adhesives that are incompatible with the products to which they are applied.
Movement: Where an adhered or sealed joint may be subject to movement, select a system accredited to accommodate the projected movement under the conditions of service.
Refurbishment: Use sealants that can be safely removed and prepared for refurbishment.

Fasteners
Provide fasteners accredited for the particular use, capable of transmitting imposed loads and maintaining the rigidity of the assembly.

2 PRODUCTS

2.1 ADHESIVES

Standards
Mastic adhesive: To AS 2329.
Polymer emulsion adhesive for timber: To AS 2754.2, not inferior to Type 3.

High strength adhesive tape
General description: A foam of cross linked polyethylene or closed cell acrylic coated both sides with a high performance acrylic adhesive system, encased in release liners of paper or polyester.
Product classification: Ensure product suitability for the following substrates:
- Firm high strength foam tapes for high energy surfaces including most bare metals such as stainless steel and aluminium.
- Conformable high strength foam for medium energy surfaces including many plastics and paints, and bare metals.
- Conformable high strength foam for lower energy surfaces including many plastics, most paints and powder coatings, and bare metals.
Thickness: Select the tape to ensure a mismatch between surfaces does not exceed half the tape thickness under the applied lamination pressure.

2.2 SEALANTS

Standards
General: To ISO 11600.

External masonry joints
General: Provide sealant and bond breaking backing materials compatible with each other and the substrate and which are non-staining to masonry. Do not use bituminous materials with absorbent masonry units.
Bond breaking backing:
- Bond breaking materials: Non-adhesive to sealant, or faced with a non-adhering material.
- Foamed materials: Closed-cell or impregnated, not water-absorbing.

Fire rated control joints
General: Provide sealant materials that maintain the nominated fire-resisting rating.
- Fire stopping: To AS 4072.1.

Pointing and bedding
General: Provide sealants for fast moving joints in light weight building elements that are compatible with the contact materials.

Fire rated pointing, bedding and stopping
General: Provide sealant materials that maintain the nominated fire-resisting rating.
- Fire stopping: To AS 4072.1.
Floor control joints
General: Provide trafficable sealants for that are compatible with the contact materials.
Bond breaking backing:
- Bond breaking materials: Non-adhesive to sealant, or faced with a non-adhering material.
- Foamed materials: Closed-cell or impregnated, not water-absorbing.

2.3 FASTENERS

General
Masonry anchors: Proprietary expansion or chemical type.
Plain washers: To AS 1237.1.
- Provide washers to the heads and nuts of bolts, and the nuts of coach bolts.
Plugs: Proprietary purpose-made plastic.
Powder-actuated fasteners: To AS/NZS 1873.4.
Stainless steel fasteners: To ASTM A240/A240M.
Steel nails: To AS 2334.
- Length: At least 2.5 x the thickness of the member being secured, and at least 4 x the thickness if the member is plywood or building board < 10 mm thick.
Unified hexagon bolts, screws and nuts: To AS/NZS 2465.
Fasteners in CCA treated timber: Epoxy coated or stainless steel.

Bolts
Coach bolts: To AS/NZS 1390.
Hexagon bolts Grades A and B: To AS 1110.1.
Hexagon bolts Grade C: To AS 1111.1.

Corrosion resistance
Atmospheric corrosivity category: To the General requirementsworksection.
Steel products: Conform to the Corrosion resistance table or provide proprietary products with metallic and/or organic coatings of equivalent corrosion resistance.

<p>| Corrosion resistance table – Atmospheric corrosivity categories A and B to AS/NZS 2312 |
|---------------------------------------------------------------|---------------------------------------------------------------|</p>
<table>
<thead>
<tr>
<th>SITUATION</th>
<th>SELF DRILLING SCREWS TO AS 3566.2 CLASS</th>
<th>THREADED FASTENERS AND ANCHORS</th>
<th>POWDER ACTUATED FASTENERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MATERIAL</td>
<td>MINIMUM LOCAL METALLIC COATING THICKNESS (µM)</td>
<td>MATERIAL GRADE</td>
</tr>
<tr>
<td>Internal</td>
<td>1</td>
<td>ELECTROPLATED ZINC</td>
<td>4</td>
</tr>
<tr>
<td>External</td>
<td>3</td>
<td>ELECTROPLATED ZINC OR HOT-DIP GALVANIZED</td>
<td>30</td>
</tr>
</tbody>
</table>

<p>| Corrosion resistance table – Atmospheric corrosivity category C to AS/NZS 2312 |
|---------------------------------------------------------------|---------------------------------------------------------------|</p>
<table>
<thead>
<tr>
<th>SITUATION</th>
<th>SELF DRILLING SCREWS TO AS 3566.2 CLASS</th>
<th>THREADED FASTENERS AND ANCHORS</th>
<th>POWDER ACTUATED FASTENERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MATERIAL</td>
<td>MINIMUM LOCAL METALLIC COATING THICKNESS (µM)</td>
<td>MATERIAL GRADE</td>
</tr>
<tr>
<td>Internal</td>
<td>2</td>
<td>ELECTROPLATED ZINC</td>
<td>12</td>
</tr>
<tr>
<td>External</td>
<td>4</td>
<td>HOT-DIP GALVANIZED</td>
<td>50</td>
</tr>
</tbody>
</table>
Corrosion resistance table – Atmospheric corrosivity categories D and F to AS/NZS 2312

<table>
<thead>
<tr>
<th>Situation</th>
<th>Self drilling screws to AS 3566.2 Class</th>
<th>Threaded fasteners and anchors</th>
<th>Powder actuated fasteners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Material</td>
<td>Minimum local metallic coating thickness (µm)</td>
</tr>
<tr>
<td>Internal</td>
<td>3</td>
<td>Electroplated zinc or Hot-dip galvanized</td>
<td>30</td>
</tr>
<tr>
<td>External</td>
<td>Stainless steel 316 ¹</td>
<td>Stainless steel 316</td>
<td>Stainless steel 316</td>
</tr>
</tbody>
</table>

¹ Avoid organic coating in Category F zones.

Finishes
Electroplating:
- Metric thread: To AS 1897.
- Imperial thread: To AS 4397.

Galvanizing:
- Threaded fasteners: To AS 1214.
- Other fasteners: To AS/NZS 4680.

Mild steel fasteners: Galvanize if:
- Embedded in masonry.
- In external timbers.
- In contact with chemically treated timber, other than CCA treated timber.

Epoxy coated:
- CCA Treated timber.

Nuts
Hexagon chamfered thin nuts Grades A and B: To AS 1112.4.
Hexagon nuts Grade C: To AS 1112.3.
Hexagon nuts Style 1 Grades A and B: To AS 1112.1.
Hexagon nuts Style 2 Grades A and B: To AS 1112.2.

Screws
Coach screws: To AS/NZS 1393.
Hexagon screws Grades A and B: To AS 1110.2.
Hexagon screws Grade C: To AS 1111.2.
Hexagon socket screws: To AS 1420 and AS/NZS 1421.
Machine screws: To AS/NZS 1427.
Self-drilling screws: To AS 3566.1 and AS 3566.2.
Self-tapping screws:
- Crossed recessed countersunk (flat – common head style): To AS/NZS 4407.
- Crossed recessed pan: To AS/NZS 4406.
- Crossed recessed raised countersunk (oval): To AS/NZS 4408.
- Hexagon: To AS/NZS 4402.
- Hexagon flange: To AS/NZS 4410.
- Hexagon washer: To AS/NZS 4409.
- Slotted countersunk (flat – common head style): To AS/NZS 4404.
- Slotted pan: To AS/NZS 4403.
- Slotted raised countersunk (oval – common head style): To AS/NZS 4405.
Blind rivets
Description: Expanding end type with snap mandrill.
Type: Closed end for external application, open end for internal application.
End material:
- Aluminium base alloy for metallic coated or colourbond coated steel.
- Stainless steel for stainless steel sheet.
- Copper for copper sheet.
Size:
- For sheet metal to sheet metal: 3 mm.
- For sheet metal to supports, brackets and rolled steel angles: 4.8 mm.

Performance
Loads: Provide fasteners capable of transmitting the loads imposed, and sufficient to ensure the rigidity of the assembly.

3 EXECUTION

3.1 ADHESIVES

Preparation
Substrates: Ensure substrates are:
- Clean and free of any deposit or finish which may impair adhesion.
- If framed or discontinuous, support members are in full lengths without splicing.
- If solid or continuous, excessive projections are removed.
- If previously painted, cracked or flaking paint is removed and the surface lightly sanded.

Contact adhesive
Precautions: Do not use if:
- A substrate is polystyrene foam.
- A PVC substrate may allow plasticiser migration.
- The adhesive solvent can discolour the finished surface.
- Dispersal of the adhesive solvent is impaired.

Two way method: Immediately after application press firmly to transfer adhesive and then pull both surfaces apart. Allow to tack off and then reposition and press firmly together. Tap areas in contact with a hammer and padded block.

One way method: Immediately after application bring substrates together and maintain maximum surface contact for 24 hours by clamps, nails or screws as appropriate. If highly stressed employ permanent mechanical fasteners.

High strength adhesive tape
Preparation:
- Non-porous surfaces: Clean with surface cleaning solvents such as isopropyl alcohol/water, wash down and allow to dry.
- Porous surfaces: Prime the surface with a contact adhesive compatible with the tape adhesive system.

Follow the recommendations of the manufacturer for application to the following: Copper, brass, plasticized vinyl and hydrophilic surfaces such as glass and ceramics in a high humidity environment.

Applied lamination pressure: Ensure the tape experiences 100 kPa.
Application temperature: Generally above 10°C, consult the manufacturer.
Completion: Do not apply loads to the assembly for 72 hours at 21°C.
3.2 SEALANT JOINTING

Preparation for jointing
Cleaning: Cut flush joint surface protrusions and make good. Mechanically clean joint surfaces free of any deposit or finish which may impair adhesion of the sealant. Immediately before jointing remove loose particles from the joint, using oil-free compressed air.
Bond breaking: Install bond breaking backing material.
Taping: Protect the surface on each side of the joint using 50 mm wide masking tape or equivalent means. On completion of pointing remove the tape and remove any stains or marks from the surface.
Primer: Apply the recommended primer to the surfaces in contact with sealant materials.

Sealant joint proportions
General weatherproofing joints (width:depth):
- 1:1 for joint widths < 12 mm.
- 2:1 for joint widths > 12 mm.

Sealant application
General: Apply the sealant to dry joint surfaces using a pneumatic applicator gun. Ensure the sealant completely fills the joint to the required depth; that it is in good contact with the full depth of the sides and that there is no air trapped in the joint. Do not apply the sealant outside the recommended working time for the material or the primer.

Weather conditions
Two pack polyurethanes: Do not apply the sealant if ambient conditions are outside the following:
- Temperature: < 5°C or > 40°C.
- Humidity: To the manufacturer’s recommendations.

Joint finish
General: Force the sealant into the joint and finish with a smooth, slightly concave surface using a tool designed for the purpose.

Protection
General: Protect the joint from inclement weather during the setting or curing period of the material.

4 SELECTIONS

4.1 ADHESIVES

Application schedule

<table>
<thead>
<tr>
<th>Application</th>
<th>Product</th>
<th>Relevant worksections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drywall lining / wall panels</td>
<td>Lining</td>
<td></td>
</tr>
<tr>
<td>Engineered panel floors</td>
<td>Engineered panel flooring</td>
<td></td>
</tr>
<tr>
<td>Joinery doors</td>
<td>Doors and access panels</td>
<td></td>
</tr>
<tr>
<td>Mirrors</td>
<td>Glass components</td>
<td></td>
</tr>
<tr>
<td>Stainless steel faced wall panels or splashbacks</td>
<td>Joinery, Applied wall finishes, Stainless steel benching</td>
<td></td>
</tr>
<tr>
<td>Timber joinery fitments</td>
<td>Joinery</td>
<td></td>
</tr>
<tr>
<td>Trims, moulds, skirtings and architraves</td>
<td>Lining</td>
<td></td>
</tr>
<tr>
<td>Mechanical services</td>
<td>Air filters, Ductwork insulation, Mechanical piping insulation, Cool rooms</td>
<td></td>
</tr>
<tr>
<td>Hydraulic services</td>
<td>Hydraulic design and install, Tapware</td>
<td></td>
</tr>
</tbody>
</table>
### 4.2 SEALING, POINTING AND BEDDING

#### Application schedule

<table>
<thead>
<tr>
<th>Application</th>
<th>Relevant worksections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal flashings and rainwater goods</td>
<td>Roofing – combined, Roofing – profiled sheet metal</td>
</tr>
<tr>
<td></td>
<td>Roofing – seamed sheet metal</td>
</tr>
<tr>
<td>Metal flashings and sealing non-porous substrates</td>
<td>Cladding – combined, Curtain walls, Cladding – panels</td>
</tr>
<tr>
<td></td>
<td>Cladding – planks, Cladding – profiled sheet metal</td>
</tr>
<tr>
<td>Window and external doors</td>
<td>Curtain walls, Windows and glazed doors, Doors and access panels, Glass blockwork</td>
</tr>
<tr>
<td>Mechanical services</td>
<td>Air handling plant – combined, Air handling plant – built up, Air handling plant – minor, Air handling plant – packaged, Air filters, Ductwork, Mechanical piping insulation, Cool rooms</td>
</tr>
<tr>
<td>Hydraulic services</td>
<td>Sanitary fixtures, Tapware</td>
</tr>
</tbody>
</table>
1 GENERAL

1.1 RESPONSIBILITIES

Metals
Performance: Provide metals in sections of strength and stiffness suited to their required function, finish and method of fabrication.

1.2 PRECEDENCE

General
Worksections and referenced documents:
- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of this worksection override conflicting requirements of its referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General
Requirement: Conform to the following:
- General requirements.

1.4 SUBMISSIONS

Samples
General: Submit samples of the following:
- Stainless steel: One sample of every mill grade and finish process.
- Adodising: One sample of every colour and finishing option.

2 PRODUCTS

2.1 METALS

Coated steel
Electrogalvanized (zinc) coating on ferrous hollow and open sections: To AS 4750.
Hot-dip galvanizing (zinc):
- Ferrous open sections by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections by a continuous or specialised process: To AS/NZS 4792.
- Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.
Steel wire: To AS/NZS 4534.

Stainless steel
Bars: To ASTM A276.
Plate, sheet and strip: To ASTM A240/A240M.
Welded pipe (plumbing applications): To AS 1769.
Welded pipe (round, square, rectangular): To ASTM A554.

3 EXECUTION

3.1 GENERAL

Metal separation
Incompatible sheet metals: Provide separation by one of the following:
- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
- Insert a concealed separation layer such as polyethylene film, adhesive tape, or bituminous felt.

Incompatible fixings: Do not use.
Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous or paper products.

Brazing
General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.
Butt joints: Do not use butt jointing for joints subject to loads. If butt joints are used, do not rely on the filler metal fillet only.
Filler metal: To AS/NZS 1167.1.

Finishing
Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Make sure self-finished metals are without surface colour variations after jointing.

Preparation
General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.
Standard: To AS 1627.
Priming steel surfaces: If site painting is specified to otherwise uncoated mild steel or similar surfaces prime as follows:
- After fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to unprimed surfaces.

Welding
Aluminium: To AS 1665.
Stainless steel: To AS/NZS 1554.6.
Steel: To AS/NZS 1554.1.

3.2 STAINLESS STEEL FINISHES

Preassembly
Mechanically polished and brushed finishes: Apply grit faced belts or fibre brushes that achieve uni-directional finishes with buffing.
Bead blasted finish: Provide a uniform non-directional low reflective surface by bead blasting. Do not use sand, iron or carbon steel shot. Blast both sides of austenitic grades or stainless steel to equalise induced stress.

Post assembly pre-treatment
Heat discolouration: Remove by pickling.
Welds: Grind excess material, brush, and polish to match the pre assembly finish.

Post assembly finish
Electropolish finish for external installations: Provide an electro-chemical process to stainless steel grade 316.
Brushed electropolish finish: Conform to the following:
- Preassembly finish: No. 4 brushed finish.
- Post assembly finish: Provide an electro-chemical processed finish to achieve a No. 7 to No. 8 brushed finish.
Mirror electropolish finish:
- Pre assembly finish: Mill finish 2B or mirror polished finish.
- Post assembly finish: Provide an electro-chemical processed finish to achieve a No. 8 mirror finish.

Completion
Cleaning: Clean and rinse to an acid free condition and allow to dry. Do not use carbon steel abrasives or materials containing chloride.
Protection: Secure packaging or strippable plastic sheet.

### 3.3 ELECTROPLATING

**Electroplated coatings**
- Chromium on metals: To AS 1192.
  - Service condition number: At least 2.
- Nickel on metals: To AS 1192.
  - Service condition number: At least 2.
- Zinc on iron or steel: To AS 1789.

### 3.4 ANODISING

**General**
- Standard: To AS 1231.
- Thickness grade: To AS 1231 Table H1.

**Sample**
- General: Provide a finish to match the sample in terms of colour and finishing options.

### 3.5 PREPAINTING

**Air-drying enamel**
- Application: Spray or brush.
- Finish: Full gloss.
- General use:
  - Primer: Two-pack epoxy primer to AS/NZS 3750.13.
  - Top coats: 2 coats to AS 3730.6.
- Oil resistant use:
  - Primer: Two-pack epoxy primer to AS/NZS 3750.13.
  - Top coats: 2 coats to AS/NZS 3750.22.

**Equipment paint system**
- Description: Brush or spray application using paint as follows:
  - Full gloss enamel finish coats, oil and petrol resistant: To AS/NZS 3750.22, two coats.
  - Prime coat to metal surfaces generally: To AS/NZS 3750.19 or AS/NZS 3750.20.
  - Prime coat to zinc-coated steel: To AS 3730.15 or AS/NZS 3750.16.
  - Undercoat: To AS/NZS 3750.21.

**Prepainted metal products**
- Standard: To AS/NZS 2728.
- Product type as noted in AS/NZS 2728: Not lower than the type appropriate to the field of application.

**Stoving enamel**
- Application: Spray or dip.
- Internal use:

**Two-pack liquid coating**
- Application: Spray.
- Finish: Full gloss.
- Primer: Two pack epoxy primer to AS/NZS 3750.13.
- Topcoat:
  - Internal use: Proprietary polyurethane or epoxy acrylic system.
  - External use: Proprietary polyurethane system.
3.6 COMPLETION

Damage
General: If prefinishes are damaged, including damage caused by unauthorised site cutting or drilling, remove and replace the damaged item.

Repair
General: If a repair is required to metallic coated sheet or electrogalvanizing on inline galvanized steel products, clean the affected area and apply a two-pack organic primer to AS/NZS 3750.9.
0451B WINDOWS AND GLAZED DOORS

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide windows and glazed doors as documented.

Maintenance
Product design: Provide windows with sashes capable of being opened to satisfy the documented maintenance requirements.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- General requirements.

Manufacturer’s documents
Manufacturer’s and supplier’s documents related to this worksection are: [complete/delete]

1.3 STANDARDS

General
Selection and installation: To AS 2047.
Building classification: 9b

Glazing
Glass type and thickness: To AS 1288, if no glass type or thickness is nominated.
Materials and installation: To AS 1288.
Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.
Terminology for work on glass: To AS/NZS 4668.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Openings prepared to receive windows (where windows are to be installed in prepared openings).
- Fabricated window assemblies at the factory ready for delivery to the site.
- Fabricated window assemblies delivered to the site, before installation.
- Commencement of window installation.

1.5 SUBMISSIONS

Samples
Submit samples of window and door framing as follows:
- Accessory and hardware items documented descriptively or by performance (i.e. not documented as proprietary items) including locks, latches, handles, catches, sash operators, anchor brackets and attachments, masonry anchors and weather seals (pile or extruded).
- Colour samples of prefinished production material (e.g. anodised or organic coated extrusions and sheet) showing the limits of the range of variation in the selected colour.
- Joints made by proposed techniques.
- Sections proposed to be used for frames, sashes, louvres and slats.
- Label each sample, giving the series code reference and date of manufacture.

Submit samples of glazing materials, each at least 200 x 200 mm, showing documented visual properties and the range of variation, if any, for each of the following types of glass or glazing plastics:
- Tinted or coloured glass or glazing plastics.
- Surface modified or surface coated glass.
- Patterned or obscured glass or glazing plastics.
- Ceramic coated glass.
- Wired glass.
- Mirror glass.
Submit samples of generic hardware not documented as proprietary items as follows:
- Particular samples required: N/A

**Shop drawings**
Submit shop drawings showing the following information:
- Full size sections of members.
- Hardware, fittings and accessories including fixing details.
- Junctions and trim to adjoining surfaces.
- Layout (sectional plan and elevation) of the window assembly.
- Lubrication requirements.
- Methods of assembly.
- Methods of installation, including fixing, caulking and flashing.
- Provision for vertical and horizontal expansion.
- Method of glazing, including the following:
  - Rebate depth.
  - Edge restraint.
  - Clearances and tolerances.
  - Glazing gaskets and sealant beads.
Certification: Submit an engineers' certificate confirming compliance with AS 2047.

**Subcontractors**
General: Submit names and contact details of proposed manufacturers and installers. Have windows and glazed doors installed by their manufacturer or by a subcontractor recommended by the manufacturer.

**Type-test reports**
General: Submit type-test reports verifying conformance to AS 2047 and the Window and glazed door performance schedule as follows:
- Fire resistance level: To AS 1530.4.
- Weighted sound reduction index: To AS/NZS 1276.1, ISO 717-1 or AS/NZS ISO 717.1.

**Opacified glass**
General: Submit a statement by the manufacturer certifying that the proposed method of opacifying the glass will not be detrimental to the glass or detract in any way from the glass product warranty.

## 2 PRODUCTS

### 2.1 GENERAL

**Standards**
Flashings: To AS/NZS 2904.
Aluminium extrusions: To AS/NZS 1866.

### 2.2 GLASS

**Glass types and quality**
Standard: To AS/NZS 4667.

**Glazing plastics**
General: Free from surface abrasions, and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.
Safety glasses
Standard: To AS/NZS 2208.
Certification: Required.
Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).
Type: Grade A when used in curtain walls.

Heat soaking
Requirement: All toughened glass products.

Ceramic coated glass
Description: Heat strengthened or toughened glass with a coloured ceramic coating fused to and made an integral part of the surface: To ASTM C1048, Condition B.

Opacified glass
Description: Glass with an opacifier permanently bonded to the inner face.

Unacceptable blemishes in heat-treated flat glass (including tinted and coated glass)
Standard: To AS/NZS 4667.

Insulating glass units (IGUs)
Selection and installation: To AS/NZS 4666.

2.3 GLAZING MATERIALS

General
Glazing materials (including putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges): Appropriate for the conditions of application and the required performance.

Jointing materials
Requirement: Provide recommended jointing and pointing materials which are compatible with each other and with the contact surfaces and non staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Priming
Application: Apply the recommended primer to the surfaces in contact with sealant materials.

Control joints
Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.
Foamed materials (in compressible fillers and backing rods): Closed-cell or impregnated types which do not absorb water.
Bond breaking: Provide backing rods, and other back-up materials for sealants, which do not adhere to the sealant.

2.4 GLASS IDENTIFICATION

Safety glazing materials
Identification: Identify each piece or panel, to AS 1288.

Noise reducing glazed assemblies
Labelling: Label each panel with a legible non-permanent mark, self-destroying when removed, stating and certifying the Rw rating, and identifying the testing authority. Remove when directed.

2.5 LOUVRE WINDOW ASSEMBLIES

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

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

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

Expansion joints
Requirement: Provide for expansion and contraction in continuous sections (e.g. continuous louvres, interlocking mullions) at spacings not exceeding those recommended by the manufacturer, or 6 m, whichever is the lesser.

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

Framed adjustable louvres
General: Provide louvre blades beaded into steel blade surround frames (sash) pivoted to pressed steel main frames, linked together in banks, each bank controlled by a proprietary sash operator.

Fixed metal louvres
General: Provide metal louvre blades mounted in a metal surround frame or subframe, installed as for metal window installations.

Screens
Requirement: Provide metallic coated steel wire or UPVC mesh screens behind louvres to prevent the entry of vermin, birds, rodents and wind blown leaves and papers.

2.7 INSECT SCREENS

Aluminium framed screens
General: Provide aluminium extruded or folded box frame sections with mesh fixing channel, mitred, staked and screwed at corners. Provide an extended frame section where necessary to adapt to window opening gear.
- Mesh: Bead the mesh into the frame channel with a continuous resilient gasket, so that the mesh is taut and without distortion.

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

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

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

Sliding screens
General: Provide a matching aluminium head guide, sill runner, and frame stile sections for screens not part of the window frame.
- Hardware: Nylon slide runners and finger pull handle. Provide pile strip closers against sash where necessary to close gaps.

2.8 BUSHFIRE SCREENS AND SEALS

Requirement
Protection: Protect glazed windows and doors from the ingress of embers.
Standard: To AS 3959.

2.9 SECURITY WINDOW GRILLES

General
General: Provide proprietary metal security grille screens, or operable screen and frame, fixed to the building structure with tamper resistant fastenings.
Security window grilles: To AS 5039
Installation: To AS 5040

2.10 ALUMINIUM FRAME FINISHES

Powder coatings
Standard: To AS 3715.
Grade: Architectural coating.
Product: Dulux Duralloy
Colour: To match black of existing structure

Anodised
Standard: To AS 1231.
Thickness: ≥ 15 microns to 20 microns.
Colour: N/A

2.11 ANCILLARY MATERIALS

Trims
Timber: Solid timber at least 19 mm thick, mitred at corners.

Extruded gaskets and seals
General: Provide seals to the Window and door seal schedule.
Materials: Non cellular (solid) elastopressive seals as follows:
- Flexible polyvinyl chloride (PVC): To BS 2571, 100% solids with high consistency, ultra-violet stabilised.
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.

Flashings
General: Corrosion resistant, compatible with the other materials in the installation, and coated with a non-staining compound where necessary.
Standard: To AS/NZS 2904.

Jointing materials
General: Compatible with each other and with the contact surfaces and non staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Nylon brush seals
General: Dense nylon bristles locked into galvanized steel strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door with double sided PVC foam tape.

Pile weather strips
General: Polypropylene or equivalent pile and backing, low friction silicone treated, ultra-violet stabilised.
Standard: To AAMA 701/702.

Weather bars
General: Provide a weather bar under hinged external doors, locate under the centres of closed doors.
Type: N/A

2.12 HARDWARE

Hardware documented generically
General: Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, compatible with associated hardware, and fabricated with fixed parts firmly joined.

Locks and latches
Standard: To AS 4145.3.
Performance:
- Durability: As Scheduled
- Keying security: To match existing site keying system
Window catches: Provide 2 catches per sash to manually latched awning or hopper sashes over 1000 mm wide.

**Sash balances**
Requirement: Match the spring strength of the balances to the sash weight they support.

**Sash operators**
Requirement: Provide sash operators in conformance with **SELECTIONS**.

## 3 EXECUTION

### 3.1 GLASS PROCESSING

**General**
Processing: Perform required processes on glass, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arrised.

### 3.2 INSTALLATION

**Glazing**
General: Install the glass so that:
- Each piece is held firmly in place by permanent means which enable it to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- Building movements are not transferred to the glass.
- External glazing is watertight and airtight.
Temporary marking: Use a method which does not harm the glass. Remove marking on completion.
Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.
Heat absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

**Preglazing**
Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

**Site glazing**
Minimum dimensional requirements. Conform to the following:
Site check extent of fixed glazing.
External timber framed glazing: Glaze with putty.

**Windows and glazed doors**
General: Install windows and glazed doors so that the frames. Conform to the following:
- Plumb, level, straight and true within acceptable building tolerances.
- Fixed or anchored to the building structure in conformance with the wind action loading requirements.
- Will not carry any building loads, including loads caused by structural deflection or shortening.
- Allow for thermal movement.

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

**Fixing**
Fasteners and fastener spacing: Conform to the recommendations of the manufacturer.
Fasteners: Conceal fasteners.
Packing: Pack behind fixing points with durable full width packing.
Prepared masonry openings: If fixing of timber windows to prepared anchorages needs fastening from the frame face, sink the fastener heads below the surface and fill the sinking flush with a material compatible with the surface finish.

Joints
General: Make accurately fitted tight joints so that neither fasteners nor fixing devices such as pins, screws, adhesives and pressure indentations are visible on exposed surfaces.

Sealants: If priming is recommended, prime surfaces in contact with jointing materials. If frames are powder coated, apply a neutral cure sealant.

Operation
General: Make sure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and are lubricated.

Protection
Removal: Remove temporary protection measures from the following:
- Contact mating surfaces before joining up.
- Exposed surfaces.
Temporary measures: N/A

In situ touch up
Polyester or fluoropolymer coatings: Contact supplier for approval to apply touch up products, otherwise replace damaged material.

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

3.3 LOUVRE ASSEMBLIES

Installation
General: Screw fix stiles and mullions to the building structure. Provide weather strips to heads and sills.

Framed adjustable louvres
Installation: Screw fix the main frame to the building structure with monel or stainless steel screws or masonry anchors of the type recommended by the louvre manufacturer.

Metal louvres
General: Provide metal louvre blades mounted in a metal surround frame or subframe, installed as for metal window installations.

3.4 HARDWARE

Fasteners
Materials: Use materials compatible with the item being fixed and of sufficient strength, size and quality to perform their function.
- Concealed fixings: Provide a corrosion-resistant finish.
- Exposed fixings: Match exposed fixings to the material being fixed.
Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings.
- Hollow metal sections: Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws. Do not use self-tapping screws or pop rivets.

Proprietary window systems
Requirement: Provide the standard hardware and internal fixing points for personnel safety harness attachment, where required by and conforming with the governing regulations.

Operation
General: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.
Supply
Delivery: Deliver window hardware items, ready for installation, in individual complete sets for each window set, as follows:
- Clearly labelled with the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, fixings and fixing instructions.

3.5 COMPLETION
Trade clean
Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.
Extent: All frames and glass surfaces inside and out.

Hardware
Adjustment: Leave the hardware with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Keys
Contractor’s keys: Immediately before the date for practical completion, replace cylinders to which the contractor has had key access during construction with new cylinders which exclude the contractor’s keys.

Keys: For locks keyed to differ and locks keyed alike, verify quantities against key records, and deliver to the contract administrator at practical completion.

Key codes: Submit the lock manufacturer’s record of the key coding system showing each lock type, number and type of key supplied, key number for re-ordering, and name of supplier.

Maintenance manual
Window and door assemblies: Submit the window and glazed door manufacturer’s published instructions for operation, care and maintenance.
Hardware: Submit the manufacturer’s published recommendations for use, care and maintenance.

Warranties
Window and door assemblies: Submit the manufacturer’s published product warranties.
Hardware: Submit the manufacturer’s published product warranties.

4 SELECTIONS

4.1 SELECTION
W01- W04 – New Capral 419 Double Glazed powdercoated aluminium adaptors to suit 8.5mm Viridian Hush glass with 16mm air gap and 12.5mm Hush glass. System to achieve min Rw 47 as a system. Colour to match black of existing structure.

OW1 – OW2, OW3 – New Lotus Opera Walls – Refer to Internal Finishes Schedule
0455 DOOR HARDWARE

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide door hardware as documented.
Handing: Before supply, verify on site, the correct handing of hardware items.
Hardware specified generically: Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, suitable for use with associated hardware, and fabricated with fixed parts firmly joined.
Operation: Ensure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

Supply
Delivery: Deliver door hardware items, ready for installation, in individual complete sets for each door, as follows:
- Clearly labelled to show the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, fixings and fixing instructions.

1.2 REPLACEMENT ITEMS

Door hardware: Match items being replaced with existing unless documented otherwise. Upgrade hinges as necessary to conform to Hinges table A and Hinges table B.

1.3 CROSS REFERENCES

General
Requirement: Conform to the following:
- General requirements.

1.4 INTERPRETATION

Abbreviations
General: To AS 4145.1 Appendix D.
Definitions
Glossary of terms: To AS 4145.1 Section 2.
Lock functions: To AS 4145.1 Appendix E.

1.5 SUBMISSIONS

Door-by-door schedule
General: Submit a door-by-door hardware schedule.
Information sources: This worksection and the contract drawings.

Refurbishment and alteration work
Reuse of recovered hardware: Submit a proposal describing the standard of cleaning, repair and testing of recovered items and the location where each is to be reused.

Samples
Generic items: Submit samples of hardware items offered as meeting the description of items not specified as proprietary items.
Refurbished items: Submit samples of hardware items offered as meeting the standard of cleaning, repair and testing of recovered items.

Key control System
New works: Submit details of the proprietary key control security system proposed by the lock manufacturer for locks required to accept a group key (master, grandmaster).
Alterations and additions: Submit details to extend the existing key control security system for locks required to accept a group key.

Subcontractors
Automatic door operators: Submit names and contact details of proposed supplier and installer.
Pressure floor mat: Submit names and contact details of proposed supplier and installer.

Record documents
Door hardware schedule: Submit an amended schedule, prepared by the door hardware supplier, showing changes to the contract door hardware schedule caused as follows:
- By the approval of a hardware sample.
- By the acceptance of an equivalent to a specified proprietary item.
- By a contract variation to a door hardware requirement.

Keys
Key codes: Submit the lock manufacturer's record of the key coding system showing each lock type, number and type of key supplied, key number for re-ordering, and name of supplier.
Keys: For locks keyed to differ and locks keyed alike, verify quantities against key records, and deliver to the contract administrator at practical completion.

2 PRODUCTS

2.1 LOCKS AND LATCHES

Standard
General: To AS 4145.2.

Padlocks
Standard: To AS 4145.4.

2.2 HINGES

Butt hinge sizes
Size for door types: Conform to tables as follows:
- Timber doors in timber or metal frames: Hinge table A.
- Aluminium framed doors in aluminium frames: Hinge table B.
- Cupboard doors: Not included in hinge tables.

Measurement: Length (l) is the dimension along the knuckles, not including hinge tips, if any, and width (w) is the dimension across both hinge leaves when opened flat.

Butt hinge materials
Timber doors in timber or steel frames:
Aluminium framed doors in aluminium frames:
Doors fitted with closers: Provide low friction ball bearing hinges.
Fire doors: To AS 1905.1.
Power transfer hinges: Ensure they do not assume any load and are installed with other compatible hinges.

2.3 HINGE TABLES

Hinge table A
Application: Solid core doors. The table can be used to determine the quantity of hinges required for the nominated door leaf sizes and weights only. For door leaf sizes not specified or with applied finishes use the weight of the door to determine the quantity of hinges required. For door leafs over 80 kg, nominate pivot hinges.

The size of the hinge is determined by the door leaf thickness:
- 35 - 43 mm thick door: 100 x 75 mm # butt hinges with a minimum thickness of 2.5 mm.
- 44 - 55 mm thick door: 100 x 100 mm # butt hinges with a minimum thickness of 2.5 mm.
- > 55 mm thick door: Refer to the door by door hardware schedule.
Hinge pin: The symbol # refers to the pin type. Supply fixed pins to doors opening out or designated as a security doors.

Wide throw: If necessary, provide wide throw hinges to achieve the required door swings in the presence of obstacles such as nibs, deep reveals and architraves.

**Hinge table A**

<table>
<thead>
<tr>
<th>Nominal door leaf size (H x W x T) (mm)</th>
<th>Door leaf weight (kg - approx)</th>
<th>Number of hinges</th>
</tr>
</thead>
<tbody>
<tr>
<td>2040 x 400 x 35</td>
<td>≤ 19</td>
<td>2</td>
</tr>
<tr>
<td>2040 x 600 x 35</td>
<td>≤ 29</td>
<td>2</td>
</tr>
<tr>
<td>2040 x 720 x 35</td>
<td>≤ 35</td>
<td>3</td>
</tr>
<tr>
<td>2040 x 820 x 35</td>
<td>≤ 39</td>
<td>3</td>
</tr>
<tr>
<td>2040 x 920 x 35</td>
<td>≤ 44</td>
<td>3</td>
</tr>
<tr>
<td>2040 x 1020 x 35</td>
<td>≤ 49</td>
<td>4</td>
</tr>
<tr>
<td>2040 x 720 x 40</td>
<td>≤ 37</td>
<td>3</td>
</tr>
<tr>
<td>2040 x 820 x 40</td>
<td>≤ 42</td>
<td>3</td>
</tr>
<tr>
<td>2040 x 920 x 40</td>
<td>≤ 48</td>
<td>3</td>
</tr>
<tr>
<td>2040 x 1020 x 40</td>
<td>≤ 52</td>
<td>4</td>
</tr>
<tr>
<td>2040 x 720 x 50</td>
<td>≤ 45</td>
<td>3</td>
</tr>
<tr>
<td>2040 x 820 x 50</td>
<td>≤ 50</td>
<td>3</td>
</tr>
<tr>
<td>2040 x 920 x 50</td>
<td>≤ 57</td>
<td>3</td>
</tr>
<tr>
<td>2040 x 1020 x 50</td>
<td>≤ 68</td>
<td>4</td>
</tr>
<tr>
<td>2400 x 720 x 40</td>
<td>≤ 50</td>
<td>4</td>
</tr>
<tr>
<td>2400 x 820 x 40</td>
<td>≤ 52</td>
<td>4</td>
</tr>
<tr>
<td>2400 x 920 x 40</td>
<td>≤ 55</td>
<td>4</td>
</tr>
<tr>
<td>2400 x 1020 x 40</td>
<td>≤ 60</td>
<td>4</td>
</tr>
<tr>
<td>2400 x 1220 x 50</td>
<td>≤ 72</td>
<td>5</td>
</tr>
<tr>
<td>2040 x 920 x 70</td>
<td>≤ 88</td>
<td>Nominate pivot hinges</td>
</tr>
</tbody>
</table>

**Hinge table B**

Application: Aluminium hinges for aluminium doors, or for doors of other materials in aluminium frames.

<table>
<thead>
<tr>
<th>Nominal hinge size (L x W x T) (mm)</th>
<th>Door leaf weight (kg – approx)</th>
<th>Minimum construction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Knuckles</td>
</tr>
<tr>
<td>100 x 70 x 3</td>
<td>≤ 30</td>
<td>3</td>
</tr>
<tr>
<td>100 x 80 x 3.5</td>
<td>≤ 50</td>
<td>5</td>
</tr>
<tr>
<td>130 x 50 x 3.4</td>
<td>≤ 75</td>
<td>Interfold</td>
</tr>
</tbody>
</table>

## 2.4 DOOR HANGING SYSTEMS

**General**

General: Provide sliding door tracks in conformance with the *Sliding track schedule*.

## 2.5 ANCILLARIES

**Bolts**

General: Provide bolts including barrel bolts, flush bolts and tower bolts with keepers, including lock plates, staples, ferrules or floor sockets.
**Mortar guards**
General: For steel door frame installations, provide mortar guards designed to enable the full extension of the lock tongue or similar devices and the correct operation of the locking mechanism.

**Rebated doors**
General: For mortice locks or latches to rebated doors, provide purpose-made rebated pattern items.

**Strike plates**
General: Use strike plates provided with the locks or latches. Do not provide universal strike plates.

### 2.6 DOOR CONTROLLERS

**General**
Performance: Provide door controllers, pivots, flow or overhead door closers, and automatic door operators, which are suitable for the door type, size, weight and swings required and the operating conditions, including wind pressure.

**Automatic door operators**
General: Provide complete automatic door operators for opening and closing doors, including door hanging (hinges, pivots or sliding gear) and electrical connection to distribution board.
- N/A

Installation: Provide necessary recesses and cores, grout in components where required, and make good. Provide cover plates for access to units in door heads, frames or transoms.

Automatic adjustable function: If the door opening angle or width is manually set below the maximum possible, under conditions of continuous traffic the doors must automatically creep to full opening, returning to reduced opening on the next cycle.

Radio remote door controllers: Provide a device, comprising a radio receiver and separate transmitter, for activating a motorised door operator so as to open and close the door by remote radio signal.

Key switch: If there is no separate access to the enclosure, provide a key switch mounted externally for opening and closing the door from outside the enclosure without the transmitter. Provide two keys.

Light: Provide an internal light which any signal to the receiver also switches on and which remains on for not less than 2 minutes and switches off automatically.

Receiver: House within a wall unit incorporating a push-button switch permanently illuminated. Mount within the enclosure and connect to power.

Transmitter: Portable battery-powered unit sending a coded signal effective up to not less than 12 m from the receiver.

Pressure floor mats: Automatic door activating system consisting of a mat which when deflected by foot pressure operates a switch which activates the door or doors.

Floor mat mounting: N/A

**Closers**
Hinged and pivot doors:
- Fire rated doors: Provide closers tested and certified for use as components of fire door assemblies:
  - Standard: To AS 1905.1.

### 2.7 ELECTRONIC CONTROL DEVICES

**General**
General: Provide electric strikes, electric locks, drop bolts, or similar devices to suit door construction and hardware.

Electromagnetic hold-open devices: To AS 1905.1 and AS 1670.1.

Fail-safe: Connect door control devices in a fail-safe mode to permit egress in the event of power failure.

Fail-secure: Connect door control devices in a fail-secure mode to prevent egress in the event of power failure.

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

Glass doors: Provide tumbler, drop bolts or magnetic holders.

Double leaf doors (solid frame): Provide an electric strike or lock on the fixed leaf, connected to the door frame by concealed flexible wiring.
Activation
Activation device: Provide keypads, card readers or other activation devices, and locate next to entry points.
External: Provide weatherproof (IP56) hoods or housings for external units.
Mounting height: 1200 mm from floor level.

2.8 KEYING

Temporary construction keys and cylinders
Requirement: Provide one of the following:
- Loan cylinder: Install for construction locks and replace at practical completion.
- Construction keyed master key cylinder: Keep up-to-date records of keys issued including recipient’s name, company and contact details, date issued and date returned.

Delivery of keys
Great grandmaster, grandmaster and master keys: Arrange for the manufacturer or supplier to deliver direct to the principal.
Number of keys: Conform to the Number of keys table.

Group keying
Keying system: Provide a group keying system in conformance with the Key codes schedule.
Existing system: Obtain the details of existing group or master key systems to which a new system is required to be an extension.
Future extensions: Provide master and grandmaster group keying systems which are capable of accommodating future extensions.
- Extensions to existing system: New doors to match to existing keying system
Keying control security system: If cylinder or pin-tumbler locks accept a group key (e.g. master key, maison key) provide to those locks a proprietary keying control security system.
Stamping: Stamp keys and lock cylinders to show the key codes and/or door number as scheduled.

Identification
Labelling: Supply each key with a purpose-made plastic or stamped metal label legibly marked to identify the key, attached to the key by a metal ring.

Key material
Lever locks: Malleable cast iron or mild steel.
Pin tumbler locks: Nickel alloy, not brass.

Number of keys table

<table>
<thead>
<tr>
<th>Code</th>
<th>Key type</th>
<th>Minimum number of keys</th>
</tr>
</thead>
<tbody>
<tr>
<td>GGMK</td>
<td>Great grandmaster keys</td>
<td>2</td>
</tr>
<tr>
<td>GMK</td>
<td>Grandmaster keys</td>
<td>2</td>
</tr>
<tr>
<td>MK</td>
<td>Master keys</td>
<td>2 per code group</td>
</tr>
<tr>
<td>KD</td>
<td>Locks keyed to differ</td>
<td>2 per lock</td>
</tr>
<tr>
<td>KA</td>
<td>Locks keyed alike:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-2 locks in code group</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>-3 to 10 locks in code group</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>-11 to 40 locks in code group</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>-41 and over locks in code group</td>
<td>1 per 4 locks or part thereof</td>
</tr>
</tbody>
</table>
3 EXECUTION

3.1 INSTALLATION

Mounting height
Locks and latches: Centreline of the door knob or lever spindle above finished floor: To match existing.

Door stops
Fixing: Fix on the floor, skirting or wall, as appropriate, to prevent the door or door furniture striking the wall or other surface.

Fasteners
Materials: Provide materials compatible with the item being fixed, and of sufficient strength, size and quality to perform their function.
- Concealed fixings: Provide a corrosion resistant finish to concealed fixings.
- Exposed fixings: Match exposed fixings to the material being fixed.

Security: Locate exposed fixings to lock furniture on the inside faces of external doors and on the inside faces of internal doors to lockable rooms.

Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings.
- Hollow metal sections: Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws. Do not use self tapping screws or blind rivets.

Floor springs
General: Form a recess in the floor slab for the floor spring box and grout the box in place so that the cover plate is flush with the finished floor.

Hinges
Metal frames: Fix hinges using metal thread screws.
Timber doorsets: Install butt hinges in housings equal in depth to the thickness of the hinge leaf (except for hinges designed for mounting without housing), and fix with countersunk screws.

3.2 COMPLETION

Adjustment
General: Leave the hardware properly adjusted with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Automatic door operators: Maintain and adjust the system throughout the defects liability period.

Keys
Contractor’s keys: Immediately before practical completion, replace or reset cylinders to which the contractor has had key access during construction and ensure the exclusion of the contractor’s keys.

Maintenance
Automatic door operators: Submit the installer’s proposal for continuing maintenance after completion on an annual renewal basis.
Manual: Submit the manufacturer’s published recommendations for use, care and maintenance of the hardware provided.

Product warranties
Warranty: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer or distributor and the applicator.

Automatic door operators: Submit a warranty (or interlocking warranties) from the supplier and installer for the system and its installation, for a period of at least twelve months from the date of practical completion.
Minimum period: 12 months
Form of warranty: Written
4 SELECTIONS

4.1 SELECTION SCHEDULE

Lock and latch classification
Rating systems: To AS 4145.1 Section 3.
Performance requirements: To AS 4145.2 Section 3.

**General door hardware requirements**
Manufacturer: As Scheduled
Finish: Black Satin – as Scheduled
0461B GLAZING

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide glazing as documented.

Design
Certification: Submit an engineers’ certificate confirming compliance with AS 1288.

Performance
Thermal qualities: U value and Solar heat gain coefficient to SELECTIONS.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- General requirements.

1.3 STANDARDS

Glazing
Glass type and thickness: To AS 1288, where no glass type or thickness is nominated.
Materials and installation: To AS 1288.
Insulating Glass Units: To AS/NZS 4666.
Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.
Roof glazing: To AS 1288 Section 6.

2 PRODUCTS

2.1 GENERAL

Heat soaking
Requirement: All toughened glass products.
Standard: To EN 14179-1.

Heat strengthening
Requirement: Heat strengthen all glass that requires extra strength and thermal resistance.

2.2 GLASS

Glass types and quality
Standard: To AS 1288 and AS/NZS 4667.

Glass and glazing materials
Glass and glazing materials generally: Free from defects which detract from appearance or interfere with performance under normal conditions of use.
Glazing plastics: Free from surface abrasions, and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Safety glasses
Standard: To AS/NZS 2208.
Certification: Required.
Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).
Type: Grade A to AS 1288 when used in curtain walls.

Insulating glass units (IGUs)
Manufacture and installation: To AS/NZS 4666.
Glass thickness selection: To AS 1288.

2.3 GLAZING MATERIALS

General
Glazing materials (including putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges): Appropriate for the conditions of application and the required performance.

Jointing materials
Compatibility: Provide recommended jointing and pointing materials which are compatible with each other and with the contact surfaces and non-staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Glazing tapes
Standards: To AAMA 800, Products coded 804.3, 806.3, or 807.3, as applicable.

Elastomeric sealants
General: Provide elastomeric sealants in conformance with the Elastomeric sealant schedule.

Sealing compound (polyurethane, polysulphide, acrylic):
- Single component: Type II, Class A.
- Multi component: To ASTM C920.

Sealing compound (silicone):
- Single component: Class A.
- Multi component: To ASTM C920.

Sealing compound (butyl): To ASTM C1311.

Glazing compounds: To AAMA 800 coded 802.3 (Types I or II), or 805.2, as applicable.

Narrow joint seam sealer: To AAMA 800, Products coded 803.3.

Non drying sealant: To AAMA 800.

Expanded cellular glazing tape: To AAMA 800.

Very high bond pressure sensitive tapes: To ASTM D897, ASTM D1002, ASTM D3330M, ASTM D3652M, ASTM D3654M, or ASTM D3715M.

Elastomeric sealants schedule

<table>
<thead>
<tr>
<th>Sealant type</th>
<th>Material</th>
<th>Location or function</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
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</tr>
</tbody>
</table>

Pile weather strips
Standard: To AAMA 701/702.

Location: N/A

Materials: Polypropylene or equivalent pile and backing, low friction silicone treated, ultra violet stabilised.

Finned type: A pile weather seal with a central polypropylene fin bonded into the centre of the backing rod and raised above the pile level.

Extruded gaskets and seals
Type: Non cellular (solid) elastopressive seals.

Material:
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.
- Flexible polyvinyl chloride (PVC): To BS 2571, E type compounds, colour fastness grade B.
Primings
Compatibility: Apply the recommended primer to the surfaces in contact with sealant materials.

Control joints
Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.
Foamed materials (in compressible fillers and backing rods): Closed-cell or impregnated types which do not absorb water.
Bond breaking: Provide backing rods, and other back-up materials for sealants, which do not adhere to the sealant.

2.4 GLASS IDENTIFICATION
Safety glazing materials
Identification: Identify each piece or panel, to AS 1288.

Noise reducing glazed assemblies
Identification: Label each panel with a legible non-permanent mark, self-destroying when removed, stating and certifying the $R_W$ rating, and identifying the testing authority. Remove when directed.

3 EXECUTION

3.1 GLASS PROCESSING

General
Processing: Perform required processes on glass, including cutting, obscuring, silvering and bending.
Form necessary holes, including for fixings, equipment, access openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arrised.

Glass processing schedule

<table>
<thead>
<tr>
<th>Glass element</th>
<th>Location</th>
<th>Type of process</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.2 INSTALLATION

Glazing
General: Install the glass so that:
- Each piece is held firmly in place by permanent means which enable it to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- Building movements are not transferred to the glass.
- External glazing is watertight and airtight.
Temporary marking: Use a method which does not harm the glass. Remove marking on completion.
Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.
Heat absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Preglazing
Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.
Curtain walls: Supply inclusive of glazing, shop preglazed.

Site glazing
Minimum dimensional requirements (mm):
External timber framed glazing: Glaze with putty.
3.3 COMPLETION

Trade clean
Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.
Extent: All frames and glass surfaces inside and out.

Warranties
General: Submit a warranty, signed by the glazing subcontractor, undertaking to repair or replace glass and glazing materials which, within the warranty period, become defective or prove unsuitable for the specified application; provided that the manufacturers’ recommendations for the maintenance of the material have been followed during the warranty period.
Glass manufacturer’s warranty: An undertaking, conditional only on compliance with the manufacturer’s recommendation for installation and maintenance, to supply replacement glass units to the site for replacement of defective units defined as follows:
- IGU units: Units in which the hermetic seal has failed as evidenced by intrusion of foreign matter, or internal condensation at temperature above 2°C.
- Coated glass units (including coated SIG units): Units in which the metallic coating shows evidence of manufacturing defects, including but not necessarily limited to cracking or peeling, as determined in conformance with ASTM C1048.
Toughened glass warranty: The manufacturer’s warranty certifying that toughened glass supplied for use in curtain walls has been subjected to a heat soaking process which has converted at least 95% of the nickel sulphide content to the stable beta-phase.
Minimum period: 12 months
Form of warranty: Written

Maintenance manual
Requirement: Submit manufacturers’ published recommendations for service use.

Cleaning
Requirement: Replace damaged glass and leave the work clean, polished, free from defects, and in good condition.

4 SELECTIONS

4.1 SELECTION

W01-W04 – New Capral 419 Double Glazed powdercoated aluminium adaptors to suit 8.5mm Viridian Hush glass with 16mm air gap and 12.5mm Hush glass. System to achieve min Rw 47 as a system. Colour to match black of existing structure.
1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide coating systems to new or previously painted substrates as follows:
- With sound adhesion and durability.
- Consistent in colour, gloss level, texture and dry film thickness.
- Free of runs, sags, blisters, or other discontinuities.
- Paint systems fully opaque.
- Clear finishes at the level of transparency consistent with the product.
- Fully adhered.
- Resistant to environmental degradation within the manufacturer’s stated life span.

Selections: Conform to the SELECTIONS.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- General requirements.

1.3 STANDARDS

Painting
General: Comply with the recommendations of those parts of AS/NZS 2311 which are referenced in this worksection.

1.4 SUBMISSIONS

Clear finish coated samples
General: Submit pieces of timber or timber veneer matching the timber to be used in the works, prepared, puttied, stained, sealed and coated in conformance with the specified system, of sufficient size so that, each piece can be cut into 4 segments, marked for identification, and distributed as directed.

Opaque coated samples
General: Submit, on representative substrates, samples of each coating system showing surface preparation, colour, gloss level, texture, and physical properties; to the Coated samples schedule.

Coated samples schedule

<table>
<thead>
<tr>
<th>Substrate</th>
<th>Paint system</th>
<th>Colour</th>
<th>Sample size</th>
</tr>
</thead>
</table>

Paint
General: Submit the selected manufacturer’s details at least 3 weeks before the paint is required, as follows:
- Paint brand name and paint line quality statement.
- Material safety data sheets (MSDS) showing the health and safety precautions to be taken during application.
- The published recommendations for maintenance.
2 PRODUCTS

2.1 PAINTS

Paint brand
Quality: If the product is offered in a number of levels of quality, provide premium quality lines.

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

Clear timber finish systems: Provide only the combinations of putty, stain and sealer recommended by the manufacturer of the top coats.

Delivery
General: Deliver paints to the site in the manufacturer’s labelled and unopened containers.

Putty and fillers
Material: To the recommendation of the paint system manufacturer, as suitable for the substrate and compatible with the primer.

Tinting
General: Provide only products which are colour tinted by the manufacturer or supplier.

Toxic ingredients
General: Comply with the requirements of Appendix I Uniform Paint Standard to the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

3 EXECUTION

3.1 PREPARATION

Order of work
Other trades: Before painting, complete the work of other trades as far as practicable within the area to be painted, except for installation of fittings, floor sanding and laying flooring materials.

Clear finishes: Complete clear timber finishes before commencing opaque paint finishes in the same area.

Protection
General: Before painting, clean the area and protect it against dust entry. Use drop sheets and masking to protect finished surfaces or other surfaces at risk of damage during painting.

Internal and external fixtures and furniture: Remove door furniture, switch plates, light fittings and other fixtures before starting to paint, and refix in position undamaged on completion of painting.

Adjacent surfaces: Protect adjacent finished surfaces liable to damage from painting operations.

Wet paint warning
General: Place notices conspicuously and do not remove them until paint is dry.

Repair
General: Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition. Touch up new damaged decorative paintwork or misses only with the paint batch used in the original application.

Substrates
General: Prepare substrates to receive the painting systems.

Cleaning: Clean down the substrate surface. Do not cause undue damage to the substrate or damage to, or contamination of, the surroundings.

Filling: Fill cracks and holes with fillers, sealants, putties or grouting cements as appropriate for the finishing system and substrate, and sand smooth.

Clear finish: Provide filler tinted to match the substrate.

Clear timber finish systems: Prepare the surface so that its attributes will show through the clear finish without blemishes, by methods which may involve the following:
- Removal of bruises.
- Removal of discolorations, including staining by oil, grease and nailheads.
- Bleaching where necessary to match the timber colour sample.
- Puttying.
- Fine sanding (last abrasive no coarser than 220 grit) to show no scratches across the grain.

**Unpainted surfaces**
Standard: To AS/NZS 2311 Section 3.

**Previously painted surfaces**
Preparation of a substrate in good condition: To AS/NZS 2311 clause 7.4.
Preparation of a substrate in poor condition: To AS/NZS 2311 clause 7.5.
Preparation of steel substrates with protective coatings: To AS/NZS 2312 Section 10 and AS 1627.1.
Additional preparation:
- Seal stained ceilings before the application of latex paints.
- Clean PVC with methylated spirit and a nylon scouring pad.
- Remove wallpaper and glue size with clean water and seal before painting.
- Remove water based kalsomine or lime wash paints by brushing with warm water.

### 3.2 PAINTING

**Light levels**
General: ≥ 400 lux.

**Drying**
General: Use a moisture meter to demonstrate that the moisture content of the substrate is at or below the recommended maximum level for the type of paint and the substrate material.

**Paint application**
Standard: To AS/NZS 2311 Section 6.
Timing: Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur. Apply subsequent coats after the manufacturer's recommended drying period has elapsed.

**Painting conditions**
General: Do not paint in dusty conditions, or otherwise unsuitable weather as follows unless the paint is suitable and recommended for such conditions:
- Relative humidity: ≥ 85%.
- Surface temperature ≤ 10°C or ≥ 35°C.

**Priming before fixing**
General: Apply one coat of wood primer (2 coats to end grain) to the back of the following before fixing in position:
- External fascia boards.
- Timber door and window frames.
- Bottoms of external doors.
- Associated trims and glazing beads.
- Timber board cladding.

**Spraying**
General: If the paint application is by spraying, use conventional or airless equipment which does the following:
- Satisfactorily atomises the paint being applied.
- Does not require the paint to be thinned beyond the maximum amount recommended by the manufacturer.
- Does not introduce oil, water or other contaminants into the applied paint.

Paint with known health hazards: Provide masking, ventilating and screening facilities generally to the standards set out for spray painting booths, AS/NZS 4114.1 and AS/NZS 4114.2.

**Sanding**
Clear finishes: Sand the sealer using the finest possible abrasive (no coarser than 320 grit) and avoid cutting through the colour. Take special care with round surfaces and edges.
Repair of galvanizing
General: For galvanized surfaces which have been subsequently welded, prime the affected area.
Primer: Organic zinc rich coating for the protection of steel to AS/NZS 3750.9 Type 2.

Tinting
General: Tint each coat of an opaque coating system so that each has a noticeably different tint from the preceding coat, except for top coats in systems with more than one top coat.

Services
General: If not embedded, paint new services and equipment including in plant rooms, except chromium, anodised aluminium, GRP, UPVC, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Repaint proprietary items only if damaged.

Windows
Operation: Ensure that opening windows function correctly before and after painting.

Door leafs
Drying: Leave doors fixed open to allow drying. Do not allow door hardware, accessories or the like to damage the door finish during the drying process.

4 SELECTIONS

4.1 PAINTING SYSTEMS

New unpainted interior surfaces
Standard: To AS/NZS 2311 Table 5.1.

New unpainted exterior surfaces
Standard: To AS/NZS 2311 Table 5.2.

Specialised painting systems
Standard: To AS/NZS 2311 clause 5.2 for the following final coats:
- High build textured or membrane finishes (B38 to AS/NZS 2311).
- 2 pack gloss pigmented polyurethane (B44 to AS/NZS 2311).
- 2 pack epoxy (B29 to AS/NZS 2311).
- 2 pack water based epoxy (B29A to AS/NZS 2311).

Previously painted surfaces
Standard: To AS/NZS 2311 Section 8.

4.2 PAINTING SCHEDULES

General
Number of coats: Unless specified as one or two coat systems, each paint system consists of at least 3 coats.
Final coat selection: To the Interior painting schedule and the Exterior painting schedule.

Low VOC emitting paints
Provide the VOC limits noted in the Interior painting schedule and the Exterior painting schedule.

Paint colours
Number of separate colours: Supply paint to the Paint colour schedule.
Appendix A

Finishes Schedule
INTERNAL FINISHES SCHEDULE.

project: Centennial park – Heysen Chapel and Foyer       date issued: 10th December 2019
project no.: 190121      revision no.: -

- Contractor is to allow to appropriately prepare all surfaces for the various materials, finishes and fixtures as scheduled and provide all necessary framing and fixings as required.
- Allow for any preparation, incidental grinding, topping, filling, etc. which may be necessary to ensure smooth surface.
- Refer to and coordinate with all of the Drawings and Specification.
- No substitutions or alternatives are acceptable unless approved prior by the Architect (including substitutions as a result of inappropriate programming deficiencies or ordering lead times.
- Preference for Australian made products, unless specified otherwise.
- Install all products in accordance with Manufacturer’s Recommendations and Instructions.
- Warranties of all materials and finishes shall be in accordance with the manufacturers and/or suppliers specifications.

<table>
<thead>
<tr>
<th>Code</th>
<th>Type</th>
<th>Supplier / Description</th>
<th>Details / Finish</th>
<th>Remarks</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>OW1</td>
<td>Operable Wall</td>
<td>Lotus</td>
<td>Type: Opera Operable Wall OP100/48G/CD2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type 1</td>
<td></td>
<td>Size: 4x equal width panels @ 2895mm H</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Panels: Double glazed panels incorporating clear laminated glass</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frame Finish: Powder coat Black Gloss</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2609132G to match existing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Seals: Top: Sweep seal, Bottom: Retractable seal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OW2</td>
<td>Operable Wall</td>
<td>Lotus</td>
<td>Type: Opera Operable Wall OP100/48G/CD2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type 2</td>
<td></td>
<td>Size: 4x equal width panels @ 2895mm H</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Panels: Double glazed panels incorporating clear laminated glass</td>
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<td></td>
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<td></td>
<td>Frame Finish: Powder coat Black Gloss</td>
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<tr>
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<td></td>
<td>2609132G to match existing</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Seals: Top: Sweep seal, Bottom: Retractable seal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Type</td>
<td>Supplier / Description</td>
<td>Details / Finish</td>
<td>Remarks</td>
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<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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<td></td>
</tr>
</tbody>
</table>
| OW3  | Operable Wall Type 3      | Lotus                  | Type: Opera Operable Wall OP100/48G/CD2  
Size: 4x equal width panels @ 2600mm H  
Panels: Double glazed panels incorporating clear laminated glass  
Frame Finish: Powder coat Black Gloss  
Seals: Top: Sweep seal, Bottom: Retractable seal |          |
| W01-04 | Fixed Glass              |                        | Type: Double glazed 419 aluminium framed  
Finish: Powder coat Black Gloss 2609132G to match existing |          |
| WF1  | Window Film               |                        | Type: Frosted vinyl film applied to glazing with Frosted white printed graphic  
Artwork: To be agreed with client  
Height: as shown on Internal Elevation drawings |          |
| DH1  | Door Handle               | Allegion               | Type: Legge 6000 Bergen Lever L6002/BSBC  
Description: Legge 1/2 Set Fixed Berg  
Finish: Satin black chrome SBC |          |
Appendix B

Structural Drawings and Specifications

CrakerJack Consulting Engineers:
STRUCTURAL SPECIFICATION

FOR

CENTENNIAL PARK – HEYSEN CHAPEL FOYER

AT

760 GODWOOD ROAD,
PASADENA, SA 5042

PREPARED BY
CRACKERJACK CONSULTING ENGINEERS PTY LTD

CONTRACT NO: S19_035.S16_014-02
REPORT NO: S19_035.S16_014-02_STRUCTURAL SPECIFICATION
ISSUE DATE: 27.11.2019
REVISION: - T - Tender
1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide structural steelwork, as documented and provide for the fixing of adjoining building elements that are to be connected to or supported on the structural steel.

1.2 CROSS REFERENCES General
Requirement: Conform to the following work section(s):
- General requirements.
- Steel – hot-dip galvanized coatings.
- Steel – protective paint coatings.

1.3 STANDARDS

General
Materials, construction, fabrication and erection: To AS 4100. Cold-formed steel: To AS/NZS 4600.

1.4 INTERPRETATION

Abbreviations
AESS: Architecturally Exposed Structural Steel.
ILAC: International Laboratory Accreditation Cooperation.

1.5 INSPECTION

Notice – off site
Inspection: Give notice so that inspection may be made of the following:
- Materials including welding consumables before fabrication.
- Submission of the proposed welding procedure to prevent distortion and non-ductile welds in tension zones.
- Testing of welding procedures and welder qualification tests.
- Commencement of shop fabrication.
- Commencement of welding.
- Before placement of root runs of complete penetration buttwelds.
- Completion of fabrication before surface preparation.
- Surface preparation before shop painting.
- Completion of protective coating before delivery to site.

Notice – on site
Inspection: Give notice so that inspection may be made of the following:
- Steelwork on site before erection.
- Anchor bolts in position before casting in.
- Steelwork and column bases erected on site, before grouting, encasing, site painting or cladding.
- Tensioning of bolts in categories 8.8/TB and 8.8/TF.
- Reinforcement and formwork in place before any encasement.
- Completed grouting, encasement, fire protection or site painting.
1.6 SUBMISSIONS

Anchors
Concrete or masonry anchors: If masonry anchors other than as shown on the drawings are required or proposed for the support or fixing of structural steel, submit evidence of the anchor capacity to carry the load.

Bolts
Compliance: Submit a manufacturer’s compliance/test certificate from an ILAC accredited testing organization confirming conformance with AS/NZS 1252.
Independent certification: Provide a local NATA-accredited laboratory independent compliance certificate based on appropriate testing and verification.

Execution
Survey certificates: As built survey of erected steelwork.
Anchor bolts: If anchor bolts do not meet specified location tolerances, submit proposals that will allow steel erection to proceed.
Splicing: If splicing of structural members is intended, submit proposals.
Welding procedures: Submit details of proposed welding procedures, using the WPS form in Appendix C of AS/NZS 1554.1.
Identification marks: If members and/or connections are to be exposed to view submit details of proposed marking.
Distortions: Submit proposals for preventing or minimizing distortion of galvanized components, welded components or welded and galvanized components; and proposals for restoration to design shape.

Record drawings
General: Supply as-built structural and shop drawings.

Samples
AESS: Submit samples of AESS as documented in the AESS schedule.
Special finishes: Submit samples of finished steel as documented in the Special finishes schedule.
Minimum sample sizes: 0.1 m².

Shop drawings
General: Submit shop drawings showing the following information:
- Relevant details of each assembly, component and connection.
- Information relative to fabrication, surface treatment, transport and erection.
Specific requirements: Include the following information:
- Marking plans.
- Identification.
- Steel type and grade.
- Dimensions of items.
- Required camber, where applicable.
- Fabrication methods including, where applicable, hot or cold forming and post weld heat treatment.
- Location, type and size of welds and/or bolts and bolt holes.
- Weld categories and bolting categories.
- Orientation of members.
- Surface preparation methods and coating system if shop applied.
- Best practice details in relation to application of protective coatings.
- Breather holes for hollow sections (with seal plates) being hot-dip galvanized.
- Procedures necessary for shop and site assembly, and erection.
- Location of and preparation for site welds.
- Temporary works such as lifting lugs, support points, temporary cleats and bracing which are required for transport and erection of the structural steelwork, and the procedure for final removal.
- Required fixings for adjoining building elements.
Substitution: If alternative sections or connections are proposed, provide details.
Purlins and girts: If it is proposed to support anything other than cladding on or from purlins and girts, provide details.

Splices: If variations to documented splice locations or additional splices are proposed, submit details.

**Subcontractors**
General: Submit names and contact details of proposed fabricator and installer.

**Tests**
Steel properties: Submit evidence that the steel used in the work conforms to the cited material standards.

Bars and sections: Submit results of all non-destructive tests.

Plates: Submit results of all ultrasonic tests.

Welds: Submit results of all non-destructive examinations.

## PRODUCTS

### 2.1 STEEL TYPE AND GRADE

**Material**
Steel members and sections: Conform to the **Steel grade (minimum) table** and as documented in the **Steel grade (minimum) schedule**.

**Steel grade (minimum) table**

<table>
<thead>
<tr>
<th>Type of steel</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal beams and columns, parallel flange channels, large angles to AS/NZS 3679.1</td>
<td>300</td>
</tr>
<tr>
<td>Flat, small angles, taper flange beams and columns to AS/NZS 3679.1</td>
<td>250</td>
</tr>
<tr>
<td>Welded sections to AS/NZS 3679.2</td>
<td>300</td>
</tr>
<tr>
<td>Hot rolled plates, floor plates and slabs to AS/NZS 3678</td>
<td>250</td>
</tr>
<tr>
<td>Hollow sections to AS/NZS 1163: Circular sections less than 165 mm nominal outside diameter</td>
<td>C350</td>
</tr>
<tr>
<td>Hollow sections to AS/NZS 1163: Sections other than the above</td>
<td>C450</td>
</tr>
<tr>
<td>Cold formed purlins and girts to AS 1397</td>
<td>G450 Z350 or Z450</td>
</tr>
</tbody>
</table>

**Steel certification**
Acceptable evidence: Certified mill test reports, or test certificates issued by the mill in conformance with AS/NZS 1163 clause 13.2.2 for cold formed hollow sections, AS/NZS 3679.1 clause 11.2.2 for hot rolled bars or sections or AS/NZS 3679.2 clause 10.2.3 for welded I-sections.

Alternative: Have the steel tested by an independent NATA or ILAC accredited testing authority for compliance with the chemical composition and mechanical test requirements of the cited material standard.

At least 60% of the fabricated structural steelwork is supplied by a steel fabricator/steel contractor accredited to the Environmental Sustainability Charter of the Australian Steel Institute (ASI).

**Testing**
Requirement: As documented in the **Non-destructive testing of bars and sections schedule**.

### 2.2 BOLTS

**Bolts, nuts and washers**
Finish: Hot-dip galvanized, corrosion-free, and in serviceable condition.

## EXECUTION

### 3.1 FABRICATION AND ERECTION

**General**
Care: Shop detail and fabricate members so that they can be properly erected.

Substitution: If substitution of members is proposed, provide details.
Beam camber
General: If beam members have a natural camber within the straightness tolerance, fabricate and erect them with the camber up.

Straightening
Care: If correcting distorted members, conform to the submitted procedures and avoid damage.

Site work
General: Other than work shown on the shop drawings as site work, do not fabricate, modify or weld structural steel on site.

Identification marks
General: Provide marks or other means of identifying each member compatible with the finish, for the setting out, location, erection and connection of the steelwork in conformance with the marking plans.
High strength bolting: If the work includes more than one bolting category, mark high-strength structural bolted connections with a 75 mm wide flash of colour, clear of holes.
Cold formed members: Clearly mark material thickness.
Monorail beams: Identify and mark rated capacity in conformance with AS 1418.18 clause 5.12.6.

Tolerances
Measurement: Check tolerances by measurement after fabrication and application of corrosion protection.
Conformance: To AS 4100 clause 14.4.

3.2 WELDING

General
Standard: To AS/NZS 1554.1.

Weld category
Weld categories not shown on the drawings: Category SP.

Weld type
Weld type not shown on the drawings: Submit proposals for weldtype and electrodes.

Non-destructive weld examination
Standard: To AS/NZS 1554.1.
Methods: Conform to the Non-destructive weld examination (NDE) table.
Radiographic and ultrasonic examination: By an independent testing authority.
Repairs: Repair welds revealed as faulty by non-destructive examination and repeat the examination.

Non-destructive weld examination (NDE) table
Refer to drawings.

3.3 BOLTING

General
Standards: To AS 1110.1, AS 1111.1 and AS/NZS 1252.

Bolting category
General: As documented in the Bolting category schedule.

Connections
Connection type: For connections not documented, submit proposals.
Bolting category 8.8/TF contact surfaces: Clean, as rolled and free from applied finishes.

Anchor bolts
General: Provide each anchor bolt with 2 nuts’ and 2 oversize washers and provide sufficient thread to permit the levelling nut and washer to be set below the base plate.
Galvanizing: Galvanize all components.
Hexagonal bolts: To AS 1111.1.
Hexagonal nuts: To AS 1112.3.
Plain washers: To AS 1237.1.
Set out: Set out bolt groups using templates and subject to survey check.
Lock nuts
General: Provide lock nuts for bolts in moving parts or parts subject to vibration and for vertical bolts in tension.

Tensioning of bolting categories 8.8/TB and 8.8/TF
Method: Use part-turn-of-nut or load indicating washers.

Permanent bolting
Completion: Bolt only when correct alignment and preset or camber has been achieved.

3.4 ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

General
Requirement: Provide AESS as documented in the AESS schedule.
Standard: Conform to the requirements of ASI/SCNZ AESS E - AESS Sample specification.

Fabrication
Requirement: Conform to the requirements of ASI AESS F - AESS Code of practice.
Welds: Make intermittent welds appear continuous, either with additional welding, caulking or filler.
Corners and edges: Grind fair those corners and edges, which are sharp, marred, or roughened.
Rough surfaces: Deburr and ground smooth.

3.5 SURFACE PREPARATION AND TREATMENT

General
General: Conform to the Steel – protective paint coatings and/or Steel – hot-dip galvanized coatings Work sections as appropriate.
AESS surface preparation: Class 2 blast and to the requirements of ASI AESS F - AESS Code of practice.

3.6 SPECIAL FINISHES

General
General: Apply special finishes as documented in the Special finishes schedule.

3.7 METAL SPRAYING

General
General: Apply sprayed metal finishes as documented in the Metal spray schedule.

3.8 FIRE PROTECTION COATINGS

General
General: Apply fire protection to structural steelwork in conformance with the Structural fire protection systems work section.

3.9 ERECTION

General
Standard: To AS 3828.
Execution: Make sure that every part of the structure has sufficient design capacity and is stable under construction loads produced by the construction procedure or as a result of construction loads, which are applied.
Calculations: If required to justify the adequacy of the structure to sustain any loads and/or procedures, which may be imposed, provide calculations.

Temporary work
General: Provide all necessary temporary bracing or propping.
Temporary connections: If required cleats are not shown on shop drawings, submit details.
Temporary members: If temporary members are required, fix so as not to weaken or deface permanent steelwork.
Hand cutting
General: If hand cutting of bolt holes appears to be necessary, submit a report and proposed alternative options.
Cold-formed purlins
Trimming members: Provide to support edges of roof sheeting along hips, valleys and roof penetrations.

Movements
General: Allow for thermal movements during erection.

Site welds
Completion: Weld only when correct alignment and preset or camber have been achieved.
Overhead welding: If overhead welding is required, submit proposals.

Clearances
End clearances at connections (mm): 10

Anchor bolts
General: For each group of anchor bolts, provide a template with setting out lines clearly marked for positioning the bolts when casting in.

Grouting at supports
Preparation: Before grouting steelwork to be supported by concrete or masonry, set steelwork on packing or wedges.
- Permanent packing or wedges: Form with solid steel or grout of similar strength to the permanent grout.
- Temporary packing or wedges: Remove before completion of grouting.
Timing: Grout at supports before the construction of any supported floors, walls, roofing, wall cladding or precast.
Temperature: Do not grout if the temperature of the base plate or the footing surface exceeds 35°C.
Type: FOSROC CONBEXTRA GP
Minimum compressive strength (MPa): 40 MPa
Minimum thickness (mm): 15mm
Maximum thickness (mm): 30mm

Handling
Care: Handle members or components without overstressing or deforming them.
Protection: Wrap or otherwise protect members or components to prevent damage to surface finishes during handling and erection.

Drifting
Limitation: Use drifting only to bring members into position, without enlarging holes or distorting components.

3.10 REPAIRS
General
General: Repair finishes to restore the full integrity of each phase and each coating.

3.11 COMPLETION
Tolerances
Conformance: After erection is complete confirm conformance with AS 4100 clause 15.3.

Temporary connections
General: Remove temporary cleats on completion and restore the surface.

4 SELECTIONS

4.1 SCHEDULES
Refer to drawings
STRUCTURAL SPECIFICATION

FOR

CENTENNIAL PARK – HEYSEN CHAPEL FOYER

AT

760 GODWOOD ROAD,
PASADENA, SA 5042

PREPARED BY
CRACKERJACK CONSULTING ENGINEERS PTY LTD
CONTRACT NO: S19_035.S16_014-02
REPORT NO: S19_035.S16_014-02_STRUCTURAL SPECIFICATION
ISSUE DATE: 27.11.2019
REVISION: - T - Tender
1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide structural steelwork, as documented and provide for the fixing of adjoining building elements that are to be connected to or supported on the structural steel.

1.2 CROSS REFERENCES General
Requirement: Conform to the following work section(s):
- General requirements.
- Steel – hot-dip galvanized coatings.
- Steel – protective paint coatings.

1.3 STANDARDS

General
Materials, construction, fabrication and erection: To AS 4100. Cold-formed steel: To AS/NZS 4600.

1.4 INTERPRETATION

Abbreviations
AESS: Architecturally Exposed Structural Steel.
ILAC: International Laboratory Accreditation Cooperation.

1.5 INSPECTION

Notice – off site
Inspection: Give notice so that inspection may be made of the following:
- Materials including welding consumables before fabrication.
- Submission of the proposed welding procedure to prevent distortion and non-ductile welds in tension zones.
- Testing of welding procedures and welder qualification tests.
- Commencement of shop fabrication.
- Commencement of welding.
- Before placement of root runs of complete penetration buttwelds.
- Completion of fabrication before surface preparation.
- Surface preparation before shop painting.
- Completion of protective coating before delivery to site.

Notice – on site
Inspection: Give notice so that inspection may be made of the following:
- Steelwork on site before erection.
- Anchor bolts in position before casting in.
- Steelwork and column bases erected on site, before grouting, encasing, site painting or cladding.
- Tensioning of bolts in categories 8.8/TB and 8.8/TF.
- Reinforcement and formwork in place before any encasement.
- Completed grouting, encasement, fire protection or site painting.
1.6 SUBMISSIONS

Anchors
Concrete or masonry anchors: If masonry anchors other than as shown on the drawings are required or proposed for the support or fixing of structural steel, submit evidence of the anchor capacity to carry the load.

Bolts
Compliance: Submit a manufacturer’s compliance/test certificate from an ILAC accredited testing organization confirming conformance with AS/NZS 1252.
Independent certification: Provide a local NATA-accredited laboratory independent compliance certificate based on appropriate testing and verification.

Execution
Survey certificates: As built survey of erected steelwork.
Anchor bolts: If anchor bolts do not meet specified location tolerances, submit proposals that will allow steel erection to proceed.
Splicing: If splicing of structural members is intended, submit proposals.
Welding procedures: Submit details of proposed welding procedures, using the WPS form in Appendix C of AS/NZS 1554.1.
Identification marks: If members and/or connections are to be exposed to view submit details of proposed marking.
Distortions: Submit proposals for preventing or minimizing distortion of galvanized components, welded components or welded and galvanized components; and proposals for restoration to design shape.

Record drawings
General: Supply as-built structural and shop drawings.

Samples
AESS: Submit samples of AESS as documented in the AESS schedule.
Special finishes: Submit samples of finished steel as documented in the Special finishes schedule.
Minimum sample sizes: 0.1 m².

Shop drawings
General: Submit shop drawings showing the following information:
- Relevant details of each assembly, component and connection.
- Information relative to fabrication, surface treatment, transport and erection.
Specific requirements: Include the following information:
- Marking plans.
- Identification.
- Steel type and grade.
- Dimensions of items.
- Required camber, where applicable.
- Fabrication methods including, where applicable, hot or cold forming and post weld heat treatment.
- Location, type and size of welds and/or bolts and bolt holes.
- Weld categories and bolting categories.
- Orientation of members.
- Surface preparation methods and coating system if shop applied.
- Best practice details in relation to application of protective coatings.
- Breather holes for hollow sections (with seal plates) being hot-dip galvanized.
- Procedures necessary for shop and site assembly, and erection.
- Location of and preparation for site welds.
- Temporary works such as lifting lugs, support points, temporary cleats and bracing which are required for transport and erection of the structural steelwork, and the procedure for final removal.
- Required fixings for adjoining building elements.
Substitution: If alternative sections or connections are proposed, provide details.
Purlins and girts: If it is proposed to support anything other than cladding on or from purlins and girts, provide details.

Splices: If variations to documented splice locations or additional splices are proposed, submit details.

**Subcontractors**
General: Submit names and contact details of proposed fabricator and installer.

**Tests**
Steel properties: Submit evidence that the steel used in the work conforms to the cited material standards.
Bars and sections: Submit results of all non-destructive tests.
Plates: Submit results of all ultrasonic tests.
Welds: Submit results of all non-destructive examinations.

## PRODUCTS

### 2.1 STEEL TYPE AND GRADE

**Material**
Steel members and sections: Conform to the Steel grade (minimum) table and as documented in the Steel grade (minimum) schedule.

#### Steel grade (minimum) table

<table>
<thead>
<tr>
<th>Type of steel</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal beams and columns, parallel flange channels, large angles to AS/NZS 3679.1</td>
<td>300</td>
</tr>
<tr>
<td>Flat, small angles, taper flange beams and columns to AS/NZS 3679.1</td>
<td>250</td>
</tr>
<tr>
<td>Welded sections to AS/NZS 3679.2</td>
<td>300</td>
</tr>
<tr>
<td>Hot rolled plates, floor plates and slabs to AS/NZS 3678</td>
<td>250</td>
</tr>
<tr>
<td>Hollow sections to AS/NZS 1163: Circular sections less than 165 mm nominal outside diameter</td>
<td>C350</td>
</tr>
<tr>
<td>Hollow sections to AS/NZS 1163: Sections other than the above</td>
<td>C450</td>
</tr>
</tbody>
</table>
| Cold formed purlins and girts to AS 1397                                      | G450  Z350 or Z450

**Steel certification**
Acceptable evidence: Certified mill test reports, or test certificates issued by the mill in conformance with AS/NZS 1163 clause 13.2.2 for cold formed hollow sections, AS/NZS 3679.1 clause 11.2.2 for hot rolled bars or sections or AS/NZS 3679.2 clause 10.2.3 for welded I sections.
Alternative: Have the steel tested by an independent NATA or ILAC accredited testing authority for compliance with the chemical composition and mechanical test requirements of the cited material standard.

At least 60% of the fabricated structural steelwork is supplied by a steel fabricator/steel contractor accredited to the Environmental Sustainability Charter of the Australian Steel Institute (ASI).

**Testing**
Requirement: As documented in the Non-destructive testing of bars and sections schedule.

### 2.2 BOLTS

**Bolts, nuts and washers**
Finish: Hot-dip galvanized, corrosion-free, and in serviceable condition.
**Beam camber**
General: If beam members have a natural camber within the straightness tolerance, fabricate and erect them with the camber up.

**Straightening**
Care: If correcting distorted members, conform to the submitted procedures and avoid damage.

**Site work**
General: Other than work shown on the shop drawings as site work, do not fabricate, modify or weld structural steel on site.

**Identification marks**
General: Provide marks or other means of identifying each member compatible with the finish, for the setting out, location, erection and connection of the steelwork in conformance with the marking plans.
High strength bolting: If the work includes more than one bolting category, mark high-strength structural bolted connections with a 75 mm wide flash of colour, clear of holes.
Cold formed members: Clearly mark material thickness.
Monorail beams: Identify and mark rated capacity in conformance with AS 1418.18 clause 5.12.6.

**Tolerances**
Measurement: Check tolerances by measurement after fabrication and application of corrosion protection.
Conformance: To AS 4100 clause 14.4.

### 3.2 WELDING

**General**
Standard: To AS/NZS 1554.1.

**Weld category**
Weld categories not shown on the drawings: Category SP.

**Weld type**
Weld type not shown on the drawings: Submit proposals for weld type and electrodes.

**Non-destructive weld examination**
Standard: To AS/NZS 1554.1.
Methods: Conform to the Non-destructive weld examination (NDE) table.
Radiographic and ultrasonic examination: By an independent testing authority.
Repairs: Repair welds revealed as faulty by non-destructive examination and repeat the examination.

**Non-destructive weld examination (NDE) table**
Refer to drawings.

### 3.3 BOLTING

**General**
Standards: To AS 1110.1, AS 1111.1 and AS/NZS 1252.

**Bolting category**
General: As documented in the Bolting category schedule.

**Connections**
Connection type: For connections not documented, submit proposals.
Bolting category 8.8/TF contact surfaces: Clean, as rolled and free from applied finishes.

**Anchor bolts**
General: Provide each anchor bolt with 2 nuts’ and 2 oversize washers and provide sufficient thread to permit the levelling nut and washer to be set below the base plate.
Galvanizing: Galvanize all components.
Hexagonal bolts: To AS 1111.1.
Hexagonal nuts: To AS 1112.3.
Plain washers: To AS 1237.1.
Set out: Set out bolt groups using templates and subject to survey check.
Lock nuts
General: Provide lock nuts for bolts in moving parts or parts subject to vibration and for vertical bolts in tension.

Tensioning of bolting categories 8.8/TB and 8.8/TF
Method: Use part-turn-of-nut or load indicating washers.

Permanent bolting
Completion: Bolt only when correct alignment and preset or camber has been achieved.

3.4 ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

General
Requirement: Provide AESS as documented in the AESS schedule.
Standard: Conform to the requirements of ASI/SCNZ AESS E - AESS Sample specification.

Fabrication
Requirement: Conform to the requirements of ASI AESS F - AESS Code of practice.
Welds: Make intermittent welds appear continuous, either with additional welding, caulking or filler.
Corners and edges: Grind fair those corners and edges, which are sharp, marred, or roughened.
Rough surfaces: Deburr and ground smooth.

3.5 SURFACE PREPARATION AND TREATMENT

General
General: Conform to the Steel – protective paint coatings and/or Steel – hot-dip galvanized coatings Work sections as appropriate.
AESS surface preparation: Class 2 blast and to the requirements of ASI AESS F - AESS Code of practice.

3.6 SPECIAL FINISHES

General
General: Apply special finishes as documented in the Special finishes schedule.

3.7 METAL SPRAYING

General
General: Apply sprayed metal finishes as documented in the Metal spray schedule.

3.8 FIRE PROTECTION COATINGS

General
General: Apply fire protection to structural steelwork in conformance with the Structural fire protection systems work section.

3.9 ERECTION

General
Standard: To AS 3828.
Execution: Make sure that every part of the structure has sufficient design capacity and is stable under construction loads produced by the construction procedure or as a result of construction loads, which are applied.
Calculations: If required to justify the adequacy of the structure to sustain any loads and/or procedures, which may be imposed, provide calculations.

Temporary work
General: Provide all necessary temporary bracing or propping.
Temporary connections: If required cleats are not shown on shop drawings, submit details.
Temporary members: If temporary members are required, fix so as not to weaken or deface permanent steelwork.

Hand cutting
General: If hand cutting of bolt holes appears to be necessary, submit a report and proposed alternative options.
Cold-formed purlins
Trimming members: Provide to support edges of roof sheeting along hips, valleys and roof penetrations.

Movements
General: Allow for thermal movements during erection.

Site welds
Completion: Weld only when correct alignment and preset or camber have been achieved.
Overhead welding: If overhead welding is required, submit proposals.

Clearances
End clearances at connections (mm): 10

Anchor bolts
General: For each group of anchor bolts, provide a template with setting out lines clearly marked for positioning the bolts when casting in.

Grouting at supports
Preparation: Before grouting steelwork to be supported by concrete or masonry, set steelwork on packing or wedges.
- Permanent packing or wedges: Form with solid steel or grout of similar strength to the permanent grout.
- Temporary packing or wedges: Remove before completion of grouting.
Timing: Grout at supports before the construction of any supported floors, walls, roofing, wall cladding or precast.
Temperature: Do not grout if the temperature of the base plate or the footing surface exceeds 35°C.
Type: FOSROC CONBEXTRA GP
Minimum compressive strength (MPa): 40 MPa
Minimum thickness (mm): 15mm
Maximum thickness (mm): 30mm

Handling
Care: Handle members or components without overstressing or deforming them.
Protection: Wrap or otherwise protect members or components to prevent damage to surface finishes during handling and erection.

Drifting
Limitation: Use drifting only to bring members into position, without enlarging holes or distorting components.

3.10 REPAIRS

General
General: Repair finishes to restore the full integrity of each phase and each coating.

3.11 COMPLETION

Tolerances
Conformance: After erection is complete confirm conformance with AS 4100 clause 15.3.

Temporary connections
General: Remove temporary cleats on completion and restore the surface.

4 SELECTIONS

4.1 SCHEDULES
Refer to drawings
CENTENNIAL PARK – HEYSEN CHAPEL FOYER OPERABBLE WALL
STRUCTURAL CALCULATIONS

CENTENNIAL PARK-HEYSEN CHAPEL,
760 GOODWOOD ROAD
PASADENA SA 5042

PREPARED FOR
DETAIL STUDIO
C/O MICHAEL RAWLINGS

PREPARED BY
CRACKERJACK CONSULTING ENGINEERS
PTY LTD

JOB NO: S19_035.S16_014-02
YOUR REF:
ISSUE DATE: 27TH NOVEMBER 2018
REVISION: -

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CONTENTS PAGE

CONTENTS

PAGE NO.

1.0 STRUCTURAL CALCULATIONS 1.01- 1.06
Analysis of simply supported steel beam with UDL

As per AS1170.0, 1170.1 and AS4100

Beam Name: OWB1 Operable Wall Beam
Span = 4.00 m

<table>
<thead>
<tr>
<th>Design Loads</th>
<th>Load Description</th>
<th>(LF)</th>
<th>Weight (kPa) x Load Width (m)</th>
<th>UDL (kN/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>S/W</td>
<td>1</td>
<td>0.21 x 1.00</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>Floor</td>
<td>0</td>
<td>3.00 x 0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>SDL</td>
<td>0</td>
<td>0.80 x 0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Wall Above</td>
<td>1</td>
<td>0.64 x 2.70</td>
<td>1.73</td>
</tr>
<tr>
<td></td>
<td>Roof</td>
<td>1</td>
<td>0.40 x 2.75</td>
<td>1.10</td>
</tr>
<tr>
<td>Q</td>
<td>Floor Live</td>
<td>0</td>
<td>0.00 x 0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Roof Live</td>
<td>1</td>
<td>0.28 x 2.75</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>Solar Panel</td>
<td>0</td>
<td>0.00 x 0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Operable Wall</td>
<td>1</td>
<td>0.64 x 0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Shelf</td>
<td>0</td>
<td>0.00 x 0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>W</td>
<td>Ult (down)</td>
<td>0</td>
<td>0.00 x 0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Ult (up)</td>
<td>1</td>
<td>0.90 x 2.75</td>
<td>2.48</td>
</tr>
<tr>
<td></td>
<td>Serv (down)</td>
<td>0</td>
<td>0.00 x 0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Serv (up)</td>
<td>1</td>
<td>0.70 x 2.75</td>
<td>1.93</td>
</tr>
</tbody>
</table>

\[ \Psi_s = 0.7 \]

Serviceability limit state design

\[
\begin{align*}
G &= 3.03 \text{ kN/m} \\
Q &= 0.78 \text{ kN/m} \\
G+\Psi_s Q &= 3.58 \text{ kN/m}
\end{align*}
\]

Enter acceptable \( \Delta_{\text{serv}} = \frac{L}{600.0} = 5.00 \text{ mm} \)
(or enter mm max) \( \frac{600.0}{L/6.67} \) (enter this value above)

Minimum \( I_{xx} \) Required = 11.93 \( \times 10^6 \) \( \text{mm}^4 \)

Beam required for serviceability

\[
\begin{align*}
\text{UB} & \quad \text{180UB18.1} \\
\text{UC} & \quad \text{150UC23.4} \\
\text{PFC} & \quad \text{180PFC}
\end{align*}
\]

\[
\begin{align*}
\Delta_G &= 3.6 \text{ mm L/1116} \\
\Delta_Q &= 0.9 \text{ mm L/4338} \\
\Delta_{G+\Psi_s Q} &= 4.2 \text{ mm L/946} \\
\Delta_{W_{\text{sup}}} &= 2.3 \text{ mm L/1758} \\
\Delta_{W_{\text{down}}} &= 0.0 \text{ mm L/}
\end{align*}
\]

Beam chosen
\[
\begin{align*}
180PFC
\end{align*}
\]
Beam Name: OWB1 Operable Wall Beam

**Strength limit state design**

<table>
<thead>
<tr>
<th>Beam</th>
<th>Capacity:</th>
<th>( M^* ) (1.2G+1.5Q)</th>
<th>( \Phi M^* ) (1.2G+1.5Q)</th>
<th>( M^* ) (1.2G+W( u ) down)</th>
<th>( \Phi M^* ) (1.2G+W( u ) down)</th>
<th>( M^* ) (0.9G+W( u ) up)</th>
<th>( \Phi M^* ) (0.9G+W( u ) up)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2G+1.5Q</td>
<td>4.81 kN/m</td>
<td>9.62 kNm</td>
<td>9.62 kNm, ( le = 4.00 ) m</td>
<td>7.28 kNm, ( le = 4.00 ) m</td>
<td>0.51 kNm, ( le = 4.00 ) m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2G+W( u ) down</td>
<td>3.64 kN/m</td>
<td>7.28 kNm</td>
<td>7.28 kNm, ( le = 4.00 ) m</td>
<td>0.51 kNm, ( le = 4.00 ) m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.9G+W( u ) up</td>
<td>0.25 kN/m</td>
<td>0.51 kNm</td>
<td>0.51 kNm, ( le = 4.00 ) m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Beam length = 4.00 m

**Support reactions**

\[ G = 6.07 \text{ kN} \]
\[ Q = 1.56 \text{ kN} \]
\[ W_{ult, down} = 0.00 \text{ kN} \]
\[ W_{ult, up} = 4.95 \text{ kN} \]
\[ W_{s, down} = 0.00 \text{ kN} \]
\[ W_{s, up} = 3.85 \text{ kN} \]

\[ 1.2G+1.5Q = 9.62 \text{ kN} = V^* \]
\[ 1.2G+W_{u \ down} = 5.46 \text{ kN} = V^* \]
\[ 0.9G+W_{u \ up} = 0.51 \text{ kN} = V^* \]

**NOTES:**

ADOPT 150PFC  GRADE 300+  \( W \) (kg/m)  \( \frac{17.7}{17.7} \)

\[ \Phi M^* (1.2G+1.5Q) = 17.80 \text{ kNm} \]
\[ \Phi M^* (1.2G+W_{u \ down}) = 17.80 \text{ kNm} \]
\[ \Phi M^* (0.9G+W_{u \ up}) = -17.80 \text{ kNm} \]
Job No: S19_035.S16_014/02

Design By: GS

150 PFC is used for combined section properties as Ixx for 150 PFC < 152x76 Tapered Channel

<table>
<thead>
<tr>
<th>Component</th>
<th>Area a (mm²)</th>
<th>Centroid Y(mm)</th>
<th>aY mm²</th>
<th>aY² mm⁴</th>
<th>I_{self} mm⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Flange</td>
<td>712.5</td>
<td>157.25</td>
<td>112.0E+3</td>
<td>17.6E+6</td>
<td>5.4E+3</td>
</tr>
<tr>
<td>Btm Flange</td>
<td>712.5</td>
<td>16.75</td>
<td>11.9E+3</td>
<td>199.9E+3</td>
<td>5.4E+3</td>
</tr>
<tr>
<td>Web</td>
<td>786</td>
<td>87</td>
<td>68.4E+3</td>
<td>5.9E+6</td>
<td>1.1E+6</td>
</tr>
<tr>
<td>Plate</td>
<td>900</td>
<td>6</td>
<td>5.4E+3</td>
<td>32.4E+3</td>
<td>10.8E+3</td>
</tr>
<tr>
<td>Total</td>
<td>3111</td>
<td></td>
<td>197.8E+3</td>
<td>23.8E+6</td>
<td>1.1E+6</td>
</tr>
</tbody>
</table>

\[ Y = \frac{\Sigma aY}{\Sigma a} = 64 \text{ mm} \]

\[ I_{11} = \Sigma I_{self} + \Sigma aY^2 = 24.9E+6 \text{ mm}^4 \]

\[ I_{xx} = I_{11} - AY^2 = 12.4E+6 \text{ mm}^4 \]
Channels (taper flange)

| Designation | h   | b   | tw  | tf  | r1  | r2  | brf | β   | m   | A   | lk  | Zx  | nx  | ly  | Zy  | ry  | J   | Gw  | Zpx | Zpy | htf | hw  | ac  | ay  |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|             | mm  | mm  | mm  | mm  | mm  | mm  | kg/m | deg | mm  | 10 mm| mm  | 10 mm| mm  | 10 mm| mm  | 10 mm| mm  | 10 mm| mm  | mm  | mm  | deg | kg/m | mm  |
| DIN taper flange |     |     |     |     |     |     |       |     |     |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 100x50x11   | 100.0 | 50.0 | 6.0 | 8.5 | 8.5 | 4.5 | 25.6 | 94.57 | 10.5 | 1.34 | 2.05 | 40.9 | 39.1 | 290 | 8.40 | 14.7 | 26.8 | 1.372 | 48.8 | 16.1 | 11.8 | 64.4 | 31.7 | 15.5 |
| 120x65x13   | 120.0 | 55.0 | 7.0 | 9.0 | 9.0 | 4.5 | 27.5 | 94.57 | 13.3 | 1.70 | 3.64 | 60.7 | 46.3 | 361 | 11.1 | 15.9 | 39.7 | 0.826 | 72.7 | 21.3 | 13.3 | 82.1 | 32.7 | 16.1 |
| 140x60x16   | 140.0 | 60.0 | 7.0 | 10.0 | 10.0 | 5.0 | 30.0 | 94.57 | 16.0 | 2.04 | 6.05 | 86.4 | 54.5 | 625 | 14.7 | 17.5 | 54.8 | 1.64 | 103 | 28.3 | 14.0 | 97.9 | 36.4 | 17.6 |
| 160x65x19   | 160.0 | 65.0 | 7.5 | 10.5 | 10.5 | 5.5 | 32.5 | 94.57 | 18.9 | 2.40 | 9.25 | 116 | 62.1 | 851 | 18.3 | 18.8 | 71.2 | 2.95 | 138 | 35.2 | 15.2 | 116 | 38.5 | 18.4 |
| 180x70x22   | 180.0 | 70.0 | 8.0 | 11.0 | 11.0 | 5.5 | 35.0 | 94.57 | 22.0 | 2.80 | 13.5 | 150 | 69.6 | 114 | 22.4 | 20.1 | 91.1 | 5.06 | 179 | 43.1 | 16.4 | 133 | 40.6 | 19.3 |
| 200x75x25   | 200.0 | 75.0 | 8.5 | 11.5 | 11.5 | 6.0 | 37.5 | 94.57 | 25.3 | 3.22 | 19.1 | 191 | 77.1 | 148 | 26.9 | 21.4 | 115 | 8.19 | 228 | 61.9 | 17.4 | 151 | 42.7 | 20.1 |
| 220x80x29   | 220.0 | 80.0 | 9.0 | 12.5 | 12.5 | 6.5 | 40.0 | 94.57 | 29.4 | 3.74 | 26.9 | 245 | 84.8 | 196 | 33.5 | 22.9 | 155 | 13.2 | 291 | 64.4 | 17.6 | 167 | 45.5 | 21.5 |
| 260x90x38   | 260.0 | 90.0 | 10.0 | 14.0 | 14.0 | 7.0 | 45.0 | 94.57 | 37.9 | 4.83 | 48.2 | 371 | 100 | 317 | 47.9 | 25.6 | 247 | 30.2 | 442 | 91.9 | 18.6 | 201 | 50.4 | 23.7 |
| 300x100x46  | 300.0 | 100.0 | 10.0 | 16.0 | 16.0 | 8.0 | 50.0 | 94.57 | 46.1 | 5.88 | 80.3 | 535 | 117 | 493 | 67.6 | 29.0 | 364 | 62.3 | 632 | 130 | 18.7 | 232 | 58.3 | 27.0 |
| BS taper flange |     |     |     |     |     |     |       |     |     |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 76x38x7    | 76.2 | 38.1 | 5.1 | 6.8 | 7.6 | 2.4 | 16.5 | 95 | 6.72 | 1.855 | 743 | 19.5 | 29.5 | 107 | 4.09 | 11.2 | 12.0 | 1.085 | 23.5 | 7.78 | 11.2 | 45.8 | 23.3 | 11.9 |
| 127x64x15  | 127.0 | 63.5 | 6.4 | 9.2 | 10.7 | 2.4 | 28.5 | 95 | 14.9 | 1.90 | 4.83 | 76.0 | 50.4 | 672 | 15.2 | 18.6 | 47.2 | 1.499 | 89.5 | 29.3 | 13.8 | 84.0 | 40.2 | 19.4 |
| 152x76x7   | 152.0 | 76.2 | 6.4 | 9.0 | 12.2 | 2.4 | 34.9 | 95 | 17.9 | 2.28 | 6.5 | 115 | 61.1 | 114 | 21.0 | 22.3 | 56.9 | 3.62 | 130 | 41.2 | 16.9 | 106 | 47.8 | 22.1 |
| 178x85x10  | 178.8 | 54.0 | 5.8 | 8.3 | 8.3 | 3.2 | 24.1 | 92 | 14.6 | 1.85 | 8.6 | 96.8 | 68.1 | 461 | 11.6 | 15.8 | 32.8 | 2.299 | 115 | 21.4 | 21.4 | 143 | 29.3 | 14.2 |
| 381x102x55 | 381.0 | 101.6 | 10.4 | 16.3 | 15.2 | 4.8 | 45.6 | 95 | 55.0 | 7.01 | 149 | 780 | 146 | 5.79 | 75.7 | 28.7 | 439 | 128 | 931 | 144 | 23.4 | 313 | 53.8 | 25.2 |
**Check** 152 x 76 PFC with 12 THK PLATE

\[ I_{xy} = 12.4 \times 10^6 \text{ mm}^4 \]  
\[ S = \frac{\pi}{384} \times \frac{3.58 \times 4000}{2 \times 15^2 \times 12.4 \times 10^6} = 4.8 \text{ mm}^3 \]  
\[ \text{Service OK} \]

**Nominal Capacity of 152 x 76 PFC**

\[ f_{M2} = (0.9) (112 \times 10^3) (250 \text{ MPa}) \]

\[ = 25.2 \text{ kN/m} > f^* \]
<table>
<thead>
<tr>
<th>Ref:</th>
<th>Calculations</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>OWB1</td>
<td>Checks at 305 x 203 x 6.3 KPa&lt;br&gt;( \sigma_{cm} = 4 ) M&lt;br&gt;( f_{ck} = 83 \times 214 \times 10^6 ) N/m²&lt;br&gt;( f = \frac{5 \times 3.58 \times 10^6}{2 \times 10^6} = 0.7 ) M&lt;br&gt;( \text{Hence, Ok in Service} )</td>
<td></td>
</tr>
<tr>
<td>OWB2</td>
<td>Checks at 305 x 203 x 6.3 KPa&lt;br&gt;( \sigma_{cm} = 4 ) M&lt;br&gt;( f_{ck} = 83 \times 214 \times 10^6 ) N/m²&lt;br&gt;( f = \frac{5 \times 3.58 \times 10^6}{2 \times 10^6} = 0.7 ) M&lt;br&gt;( \text{Hence, Ok} )</td>
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