Copy No:

Education Queensland

QUEENSLAND GOVERNMENT

TENDER DOCUMENTS

Education Queensland

COOLER SCHOOLS 1999 PROGRAM

CONTRACT NO.10

SCHOOLS	SAP P/N
Irrelevant 73(2) other state school	
DUNDULA STATE SCHOOL	101177
Irrelevant 73(2) - other state schools	

PROJECT NO. 26446

SCOPE OF WORK

Subsidy Air-Conditioning
FSC Air-Conditioning Resource Centre
FSC Electrical Upgrade

Tender No:	EDCP 0007
Date Issued.	Friday, 28th July 2000
Time/Date Closing:	**2PM, Tuesday, 15th August 2000**
Enquiries By Fax Only To.	Peter Ahern Fax: (07) 3405 5677

TENDER BOX
Strategic Procurement Section
Education House
Floor 13
30 Mary Street
Brisbane QLD 4002

Release

Copy No:

Education Queensland

QUEENSLAND GOVERNMENT

TENDER DOCUMENTS

Education Queensland

COOLER SCHOOLS 1999 PROGRAM

CONTRACT NO.10

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Education House
Floor 13
30 Mary Street
Brisbane QLD 4002

00001

COOLER SCHOOLS 1999 PROGRAM
CONTRACT NO. 10– EDUC 0007
NOTICE TO TENDERERS

Education Queensland

1.0 Tenders close at 2PM, Tuesday, 15th August 2000.

2.0 Lodge at: Tender Box
Strategic Procurement Section
Education House
Floor 13
30 Mary Street
Brisbane, Qld 4002

3.0 You are required to return one (1) original and one (1) copy of all returnable schedules.

4.0 **Conditions of Contract**

- Tenderers are to note that the Department of Public Works' "Special Conditions of Contract and Annexure For Use With Australian Standard Minor Works Contract conditions (AS 4305-1996) have been modified.

- The Conditions of Contract applicable to this tender are Australian Standard Minor Works Contract Conditions (AS 4305-1996) as amended by the Department of Public Works' "Medium Works Conditions of Contract (with or without design) For Use With Australian Standard Minor Works Conditions of Contract AS 4305-1996".

- Tenderers' attention is drawn in particular to the following clauses, which contain the major differences between the current and the superseded conditions. This list is not exhaustive and tenderers should make their own assessment:

    - inclusion of clause 3.1.2 relative to the provision of security,
    - the designation of the previous clause 3.2 to become clause 3.3 which is applicable only if stated in the annexure,
    - increase in margin for profit and overheads on variations pursuant to clause 23.

5.0 **GST Clauses**

Tenderers are to note the inclusion of GST clauses, which are added as Supplementary Conditions of Contract.

6.0 QBSA's Financial Assessment Requirements

In addition to the principles of the Queensland Government State Purchasing Policy, one of the requirements for evaluating Tenderers is conducting a Financial Capacity Assessment.

The Qld Department of Public Works has selected the Qld Building Services Authority (BSA) to assess the financial capability of Tenderers tendering for Government contracts. The BSA, in turn, engages external financial consultants to carry out these assessments.

Your assistance in supplying the information below, within the specified time frame, will result in the awarding of a contract to the successful Tenderer expeditiously.

- A complete set of current financial statements* certified by an external accountant plus a full set of financial statements for the previous financial year, including:
  - balance sheet
  - profit and loss statement
  - trading accounts and any supporting schedules.

  (* Current financial statements means the statements must be complete to one of the following dates:
  31 March 30 June 30 September 31 December
  but they must not be more than 3 months old at the date of assessment of the Tenderer by BSA.)

- The value of the contract receipts for government jobs and non-government jobs for the above statements.

- The value of the general building and house building work for the contract receipts for the above statements.

- Details of any partnerships you/the company may be involved with and full financial statements for each of these partnerships.

- Any other relevant financial information you/the company may wish to submit to assist with the financial assessment.

Tenderers will be required to supply all the above information within 2-3 days of receiving a written request from the BSA and Tenderers must be available to respond to any queries raised by the BSA's financial consultants in relation to the information supplied.

TENDER DOCUMENTS TABLE OF CONTENTS

Education Queensland

QUEENSLAND GOVERNMENT

Education Queensland

CONTENTS

TENDER DOCUMENTS TABLE OF CONTENTS (CONT.)

Education Queensland

QUEENSLAND GOVERNMENT

Education Queensland

RETURNABLE SCHEDULES

Education Queensland

PROJECT SERVICES
Partners in Queensland's Progress

Department of Public Works

Tender Form – for use with Australian Standard Minor Works Contract Conditions AS4305-1996

Name of Principal	Crown in the right of the State of Queensland through the Director General, Education Queensland
Address for lodgement of Tenders	Tender Box Strategic Procurement Section Education House Floor 13 30 Mary Street Brisbane, Qld 4002
Time for close of Tenders at	**2PM, Tuesday, 15th August 2000**

INSTRUCTIONS

1. Tenderer: ☞
Insert the Workers Compensation No. and A.C.N. numbers.
Insert the full name of the tenderer and Queensland Building Services Authority (Q.B.S.A.) licence number.
Include trading name if applicable.

2. Tender Sum ☞
Insert the Tendered Sum.
Warning: The Contract Sum is subject to variation and not rise and fall in accordance with Conditions of Contract.

3. Addenda ☞
If no addenda have been allowed for, indicate X in the box provided.

4. Special Conditions of Contract ☞
Nominate (X appropriate box) the Tenderer's eleeted alternative.

5. Address ☞
Pursuant to clause 32 of the Conditions of Contract insert the **address for Service of Notices.**

6. Execution ☞
(i) Tenderer/agent to sign/affix Common Seal in accordance with its articles of association.

(ii) Print name of signatory/ person who affixed seal. Where signature is that of an agent, written authority from tenderer is to be included with the tender.

Print name of witness. Witness to sign.

Workers Compensation No. ..... A.C.N. No. .....

I / We
.....
Q.B.S.A.
.....License No. .....

the under signed do hereby tender to execute and complete all work and perform all of the obligations in accordance with the terms of the Tender Documentation issued for the purposes of tendering in respect of: .....
.....

for the lump sum of .....
.....
(words only)

The Lump Sum Tender Price includes allowance for the provision of addenda designated

☐ inclusive or; ☐ Nil addenda allowed for in the Tender Sum.

Pursuant to the Special Conditions of Contract clause 3.3,
I / We elect to lodge Security ☐* or; I / We elect to establish a "Retention Fund" ☐*
(tick one only)*

My / Our address for the service of notices is .....
.....
Telephone: (.....).....Facsimile: (.....) .....

(i) Signed Sealed and Delivered on the
.....day of .....200...
by .....
(Name of Tenderer/Tenderer's Agent)
.....
(Signature of Tenderer/Agent)

or

(ii) The Common Seal of ... .
.....is affixed in accordance
with its articles of association by .....
on the.....day of .....200...
in the presence of .....
(Name of Witness always required – please print)
.....
(Signature of Witness)

00003

TENDER SCHEDULE

SECTION OF THE WORKS	Irrelevant 73(2)	Dundala SS				Irrelevant 73(2)
1. FSC Air-Conditioning to Resource Centre – Lump Sum	$	$	$	$	$	
2. FSC Electrical Upgrade – Lump Sum	$	$	$	$	$	
3. Subsidy Air-Conditioning Lump Sum	$	$	$	$	$	
C Learning Block (Classrooms, PC Rooms)	$					
Block K (Resource, Workroom)	$					
Resource Block (Resource – main space, book store, office)		$				
Modular A (2 classrooms)			$			
Resource Centre				$		
Resource Centre (Main space, aides room)					$	

Block E (4 classrooms, staff, Rm A, Rm B, Rm C)						$	
Block L (4 classrooms, staff, Prep, Chaplain, Dark Room						$	
Block L Modular (T5, T6)						$	
Resource Centre							$
Grand Totals for each School (1+2+3) – Lump Sum	$ (i)	$ (ii)	$ (iii)	$ (iv)	$ (v)	$ (vi)	$ (vii)
Grand Total (i)+(ii)+(iii)+(iv)+(v)+(vi)+(vii) – Lump Sum							

Signed by:.....**Date:**.....

On behalf of:.....**(Tenderer's name)**

PRINCIPAL SUPPLIED SPLIT UNITS SCHEDULE

SECTION OF THE WORKS	Irrelevant 73(2)	Dundula SS	Irrelevant 73(2)				
1. FSC Air-Conditioning to Resource Centre	No.	No.	No.	No.	No.	No.	No.
2.5kW wall mounted							
5kW wall mounted							
5kW ceiling suspended							
8kW ceiling suspended							
10kWceiling suspended							
14kW ceiling suspended							
10kW ceiling cassette							
14kW ceiling cassette							
2. Subsidy Air-Conditioning							
2.5kW wall mounted							
5kW wall mounted							
5kW ceiling suspended							
8kW ceiling suspended							
10kWceiling suspended							
14kW ceiling suspended							
10kW ceiling cassette							
14kW ceiling cassette							
Grand Totals for each School (1+2)							
2.5kW wall mounted							
5kW wall mounted							
5kW ceiling suspended							
8kW ceiling suspended							
10kWceiling suspended							
14kW ceiling suspended							
10kW ceiling cassette							
14kW ceiling cassette							
Grand Totals all Schools							
2.5kW wall mounted							
5kW wall mounted							
5kW ceiling suspended							
8kW ceiling suspended							
10kWceiling suspended							
14kW ceiling suspended							
10kW ceiling cassette							
14kW ceiling cassette							
Grand Total all units							

Signed by:.....**Date:**.....

On behalf of:.....**(Tenderer's name)**

Tender Requirements for Design and Construction Contract Tenders

Tenderers are required to submit as part of the tender the following:

A Development Proposal based on the Tender Documents. The Development Proposal is required to contain:

(i) a statement of the names of consultants which the Tenderer proposes to engage and the extent of services envisaged;

(ii) a time program indicating all activities occuring during the time required for the execution of the work under the Contract, including design development, documentation, construction and commissioning activites;

(iii) the projected cash flow;

(iv) details of proposed units required to be ordered by the Principal under the Preferred Supplier Arrangement;

(v) details of evaporative coolers, including make and model (applicable where evaporative cooling is specified);

COOLER SCHOOLS
CODE OF CONDUCT FOR CONTRACTORS

1. General, Background and Limitations

Notwithstanding rules and regulations mentioned under Common Law, Criminal Law, Workplace Health and Safety, Education Queensland regulations and others, these briefing notes are compiled to highlight potential and specific issues related to individuals visiting and working in school premises.

2. Site Rules

- Project start-up meeting comprising representatives from each school, EQ, Project Manager and Contractor.
- Site induction of all Contractors and sub-contractors' staff before entering the site.
- Visitors to report each day at school reception desk recording and stating business, hours, locations etc.
- Clear identification of each worker by name badge. The employer shall be identified either by uniform or badge.
- All communications to follow project/contract structure.
- Incident and accident reports are compulsory and must be lodged on the day of the event.
- Do not use offensive language.
- Do not answer provocation by students.
- Do not smoke on site.
- Do not bring prohibited substances on site.
- Clear all rubbish daily.

3. Records and Documentation

- Visitors logbook signed by visitor and school representative; each day on arrival and departure of site.
- Maintenance book signed by visitor and school representative.
- Site meeting minutes.
- Diary notes.

4. Safety

- Visitors logbook signed by visitor and school representative; each day on arrival and departure of site.
- Ensure safety of staff, teachers, pupils while working at the end of each working day.
- Ensure protection of Contractors equipment, material and school equipment.
- Ensure protection against dust, debris, fumes and spillage.
- Provide safety data sheet of all hazardous material.
- Ensure the fire alarm system (smoke or thermal detectors) are not accidentally activated.
- Ensure the intruder systems are not accidentally activated.

5. Security

- Ensure security against theft.
- Ensure security against vermin and rodents.
- Ensure security against rain, water damage, condensate damage, refrigerant leakage.

6. Co-ordination

Co-ordinate all activities, jobs, start-up, testing, cut in with school representatives and individual occupants of each area.

Co-ordinate all work, equipment layouts and school items to be relocated.

I have read and understood the above details and understand that a non-compliance with the intent herein constitutes a breach in contract.

Acknowledgment:_____ Date:_____

MEDIUM WORKS CONDITIONS OF CONTRACT (WITH DESIGN)

QUEENSLAND GOVERNMENT
DEPARTMENT OF PUBLIC WORKS

Medium Works Conditions of Contract

(with or without design)

for use with

Australian Standard Minor Works Conditions of Contract AS 4305 - 1996

May 1999

Conditions of Tender
Special Conditions of Contract &
Annexure

Prepared by
Legal and Contractual Services
Department of Public Works

00021

Contents Page

00023

Tender Requirements for Design and Construction Contract Tenders

Tenderers are required to submit as part of the tender the following:

A Development Proposal based on the Tender Documents. The Development Proposal is required to contain:

(i) a statement of the names of consultants which the Tenderer proposes to engage and the extent of services envisaged;

(ii) a time program indicating all activities occurring during the time required for the execution of the work under the Contract, including design development, documentation, construction and commissioning activities;

(iii) the projected cash flow;

CONDITIONS OF TENDER

Lump Sum Tenders using AS4305 - 1996 Minor Works Contract Conditions

1. DEFINITIONS

1.1 Meanings assigned to words and expression in the Conditions of Contract shall apply to those words and expressions in the Tender Documents.

1.2 Unless the contrary intention applies, the following definitions also apply;

"Intellectual Property Rights" means copyright, patents and all rights in relation to inventions, registered and unregistered trademarks (including service marks), registered designs, circuit layouts and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields;

"Tender" means an offer submitted by a Tenderer in response to the Tender Documents;

"Tenderer" means any party submitting a Tender in response to the Tender Documents and includes a party requested directly or indirectly by the Principal to submit a Tender;

2. TENDER DOCUMENTS

2.1 "Tender Documents" comprise:

(a) the Tender Form;
(b) these Conditions of Tender;
(c) Minor Works Contract Conditions (AS 4305 - 1996);
(d) the Special Conditions of Contract;
(e) the Code of Tendering (AS4120 - 1994) as amended by these Conditions of Tender;
(f) the Specification and Drawings; and
(g) other documents as are issued and/or referred to by the Principal for the purpose of tendering.

2.2 To the extent of any inconsistency between the Conditions of Tender and AS4120, the Conditions of Tender shall prevail.

3. CONDITIONS OF TENDER

3.1 By receiving a copy of the Tender Documents or submitting a Tender in response to the Tender Documents, a party agrees to be bound by the terms of the Conditions of Tender.

4. NOT BOUND

4.1 The Principal, in its absolute discretion may decline to accept or consider the lowest, best value for money or any Tender.

4.2 Without limiting the generality of Clause 4.1 and notwithstanding that the Principal has invited Tenders from selected organisations or has otherwise procured submission of Tenders:

(a) the Tenderer acknowledges that the Principal has not at the time of inviting tenders satisfied itself as to the Tenderers financial capacity to satisfactorily perform and complete the Contract in accordance with its terms.

(b) the Principal may decline to accept or consider any Tender from a Tenderer who, within seven (7) days prior to the proposed date of acceptance of a Tender or such other date as the Principal may at its absolute discretion advise, is not able to satisfy the Queensland Building Services Authority "QBSA" that it has sufficient financial capacity to satisfactorily perform and complete the Contract in accordance with its terms or is not able or does not elect to comply with any condition that may be imposed by the QBSA in assessing the financial capacity of the Tenderer.

4.3 The Tenderer shall provide to the QBSA within the time stipulated all information requested in relation to the financial capacity of the Tenderer to undertake and complete the work under the Contract.

00027

4.4 In the provision of any information requested, the Tenderer acknowledges and agrees that such information provided may be used by the QBSA in any assessment it may undertake for the purposes of determining the continuing capacity of the licensee to demonstrate that it meets the licensing criteria required by the Queensland Building Services Authority Act.

4.5 All costs of tendering shall be borne by the Tenderer.

5. INFORMATION

5.1 The Tenderer is required to visit the site and satisfy itself of local conditions and facilities and otherwise to acquaint itself with all matters relating to the proposed Contract before submitting its Tender.

5.2 The Principal will not be liable for any claim on the grounds of erroneous or insufficient information.

5.3 The Principal shall not be bound by any oral advice or information given or furnished in respect of the Tender but shall be bound only by written advice or information furnished by an officer of the Department of Public Works and Housing.

5.4 Tenderers shall upon request assist the Principal in its assessment of the Tender by providing further information including but not limited to, financial data and managerial capacity of the Tenderer.

6. TENDER REQUIREMENTS

6.1 Tenders shall be submitted on the Tender Form provided by the Principal.

6.2 The Tender shall be accompanied by all documents required by the Tender Documents to be submitted with the Tender.

6.3 Where a schedule of technical details is required to be lodged with the Tender, the Tenderer shall when requested by the Principal provide such additional information, by way of further details, illustrations, catalogues, brochures and the like, as may be necessary to fully describe the Tender.

6.4 The Tenderer shall complete and sign every document included in the Tender Documents on which provision is made for its signature and (except where otherwise provided) shall lodge every such document completed and signed, witnessed and dated as provided for with the Tender.

7. COMPLIANCE WITH REQUIREMENTS AND ALTERNATIVES

7.1 Any Tender which does not comply in every respect with the requirements of, or which contains provisions not required or allowed by the Tender Documents may be rejected. However, the Tenderer may submit an alternative Tender in **addition** to a conforming Tender.

8. LODGEMENT OF TENDER

8.1 The Tender shall be enclosed in a sealed envelope, addressed and delivered to the "Address for lodgment of Tenders" as indicated on the Tender Form.

8.2 The envelope shall be endorsed with the name of the work tendered for, the closing date and time for receipt of Tenders and the Tenderer's name and address.

8.3 Tenders shall be lodged in the tender box at the location indicated on the Tender Form by being placed therein before the time specified for the closing of Tenders. Any Tender not in the tender box before the specified closing time may be rejected at the discretion of the Principal.

In exercising its discretion the Principal shall, amongst other factors, consider if there is satisfactory evidence that such Tender was:

(a) delivered to the "Address for lodgment of Tenders", stated on the Tender Form, before the specified closing time for receipt of Tenders; or

(b) dispatched to the "Address for lodgement of Tenders" stated on the Tender Form in sufficient time to reach that office under normal circumstances before the specified closing time for receipt of tenders.

00028

8.4 Franking machine stamps will not be accepted by the Principal as proof of the date and time of dispatch of a Tender received after the specified closing time for the receipt of Tenders.

8.5 A tender received by telephonic or telegraphic devices, telegram, telex, facsimile or other electronic means will not be considered.

9. QUALITY ASSURANCE

9.1 The Tenderer shall provide evidence with the Tender that it can comply with the Quality Assurance requirements of the proposed Contract.

10. QUEENSLAND GOVERNMENT'S STATE PURCHASING POLICY

10.1 Notwithstanding any industry practice to the contrary, the Principal may accept a Tender that on a view of all the circumstances appears to it to offer the best value for money and otherwise comply with the fundamental principles set forth in the State Purchasing Policy.

11. CODE OF TENDERING

11.1 The Principal has adopted the Code of Tendering AS4120-1994 as amended by these Conditions of Tender, as its Code of Tendering.

11.2 The Code of Tendering applies to all parties involved in the tender process including the Principal and Tenderer.

11.3 Tenderers agree to comply with the Code of Tendering.

12. INTELLECTUAL PROPERTY

12.1 Intellectual Property Rights in all material submitted by the successful Tenderer in its Tender is hereby assigned to the Principal upon acceptance of the Tender. To the extent that such Intellectual Property Rights (whether of the Tenderer or a third party) cannot be assigned until their creation, such Intellectual Property Rights shall thereupon be assigned to the Principal.

12.2 To the extent that any material submitted in the successful Tender is the subject of pre-existing Intellectual Property Rights of third parties, the Tenderer shall procure an assignment of all such Intellectual Property Rights to the Principal.

13. INTELLECTUAL PROPERTY WARRANTY & INDEMNITY

13.1 The Tenderer warrants that the Intellectual Property Rights to be assigned to the Principal do not and will not infringe the Intellectual Property Rights of any person.

13.2 The Tenderer fully indemnifies the Principal against any loss, costs, expenses, demands or liability, whether direct or indirect, arising out of any claim by a third party against the Principal alleging that the material contained in the Tender or acts by the Principal in relation to the Principal's use of the Tender material infringe any Intellectual Property Rights of that third party.

14. CONTACT PERSON

14.1 The contact person for all inquiries regarding the tender process is

The Programme Manager – Cooler Schools,
Education Queensland
Telephone: (07) 3247 3577.

14.2 The Tenderer must direct all queries in respect of the tender process to the Programme Manager unless directed otherwise by the Principal.

SPECIAL CONDITIONS OF CONTRACT

GENERAL

The Conditions of Contract shall be the "Australian Standard Minor Works Contract Conditions AS4305 - 1996" as amended by these Special Conditions of Contract.

References to "Annexures" to AS4305 shall be read as reference to Annexures attached to these amendments.

References to "attached to these Conditions" shall be read as reference to attachments to these amendments.

In the event of conflict or inconsistency between the provision of AS 4305 - 1996 and these Special Conditions of Contract, the Special Conditions of Contract shall take precedence.

1. INTERPRETATION

"Contract Sum"

Delete/insert

" 'Contract Sum' means -

(a) where the Principal accepted a lump sum, the lump sum;

(b) where the Principal accepted rates, the sum ascertained by calculating the products of the rates and the corresponding quantities in the Bill of Quantities or Schedule of Rates;

(c) where the Principal accepted a lump sum and rates, the aggregate of the sums referred to in paragraphs (a) and (b),

but excluding any additions or deductions which may be required to be made under the Contract."

"Date of Practical Completion"

Delete/insert

" 'Date for Practical Completion' means the last day of the period of time stated in Item 11."

2. NATURE OF CONTRACT

Insert new subclause -

"**2.3 Sales Tax Exemption to Government Departments**

Certain materials, plant and equipment purchased for incorporation into the Works may be exempt from payment of sales tax under the Sales Tax (Exemptions and Classifications) Act. The Contractor shall make its own inquiries to ascertain the extent of any such exemptions."

3. SECURITY AND RETENTION MONEYS

Express the existing clause as subclause "**3.1 Security and Security in Lieu of Retention Moneys**" and insert as the first paragraph:

"3.1.1 Security and retention moneys are for the purpose of ensuring the due and proper performance of the Contract and for the purpose of providing security of payment to Subcontractors of the Contractor (as these terms are defined in the Subcontractors' Charges Act)."

Delete the third paragraph and insert:

"3.1.2 The Contractor may request at any time permission to provide security to be held by the Principal in lieu of retention moneys pursuant to subclause 3.1.1. The Principal may in his entire discretion and without giving reasons reject any such request by the Contractor.

The security shall be in any of the forms stated in Item 12. The form of undertaking attached to these conditions is approved.

In the event that the Contractor requests to provide security in lieu of retention and the Principal elects to agree to the request - the following provisions shall apply notwithstanding any other provision in the Contract to the contrary

(a) The security shall be for an amount equal to 5% of the Contract Sum or such other sum as may be calculated pursuant to subclause (d) hereunder and shall be lodged with the Principal.

(b) Unless and until the expiration of a period of 5 working days after the security is lodged, retention moneys shall be deducted in accordance with clause 3.1.1.

(c) 5 working days after the lodgement of the security - retention moneys pursuant to clause 3.1.1 shall not be deducted and all retention moneys previously deducted (if any) pursuant to this clause shall be the subject of the next following progress certificate issued by the Superintendent with appropriate amounts credited to the Contractor.

(d) Subject to the rights of the Principal under the Contract, the provisions of clauses 3.1, 3.2, and 28 shall apply to the security.

(e) A security given pursuant to this clause 3.1.2 shall be regarded as a performance undertaking with purposes as set out in clause 3.1.1."

Insert further subclauses as follows:

"3.2 **Recourse to Retention Moneys and Conversion of Security**

A Party may have Recourse to Retention Moneys and/or Cash Security.

The Principal may at any time convert into money security that does not consist of money whether or not the Principal is then entitled to exercise a right under the contract in respect of the security. The Principal shall not be liable in any way for any loss occasioned by such conversion.

If after the Principal has exercised all or any of his rights under the contract in respect of the security (except for those set out in this clause), the security or any part thereof then remaining is, but for this clause, releasable to the contractor. The Principal may, before releasing any security or any part thereof then remaining:

(a) ascertain the existence and amount of any Subcontractors' Charge (as defined in clause 3.3);

(b) in the event that any such Subcontractors' Charge is found to exist, the Principal may convert into money any security or any part thereof then remaining that does not consist of money whereupon any money so obtained shall be payable, creditable or allowable to the Contractor pursuant to the Contract in complete or partial satisfaction of the contract price (as the term is defined in the Subcontractors' Charges Act); and

(c) pay into court or otherwise secure the money for the benefit of the chargee from such moneys so payable, creditable or allowable the total amount set out in the said Subcontractors' Charges and account to the Contractor as to the balance, if any."

"3.3 Security for Subcontractors

If stated in the Annexure to the Conditions of Contract, the following clauses have been added to AS4305 - 1996.

3.3.1 Any security or retention monies provided pursuant to this subclause are additional to and distinct from those provided for in clauses 3.1 and 3.2 of the Conditions of Contract and are provided solely on the terms and conditions of this clause.

3.3.2 For the purposes of clause 3.3 the following words and phrases shall have the following meanings:

"**Security**" means 5% of the Contract Sum in any of the forms stated in Item 12. The unconditional undertaking attached to these Conditions is approved;

"**Subcontractor**" means a person who has entered into a contract with the Contractor for the performance of any part of the work under the contract in accordance with clause 5.

"**Subcontractors' Charges Act**" means the Subcontractors' Charges Act 1974-1979 and includes any statutory amendments or regulations thereto.

"**Retention Fund**" means either an undertaking by a financial institution being a trading bank carrying on business in Australia approved by the Contractor and held upon trust upon the terms and conditions contained in clause 3.3.9 hereof and convertible into money on terms and conditions agreed upon between the Contractor and Subcontractor or a trust fund established by the Contractor pursuant to this subclause by the opening of an account which may be either:-

(a) in the joint names of the Contractor and Subcontractor and from which withdrawals may only be made upon the signature of 2 persons, one appointed by each of the Contractor and Subcontractor; or

(b) in the sole name of the Contractor and from which a withdrawal may only be made with the Subcontractor's written consent which is obtained not more than 3 days prior to such withdrawal

or a combination of both undertaking and trust fund.

"**Subcontractors' Charge**" means a Notice of Intention to Claim Charge made or given to the Principal by any Subcontractor concerning the performance of work for a Contractor (as those terms of "Subcontractor", "Contractor" and "Work" are defined in the Subcontractors' Charges Act) purportedly pursuant to the provisions of the Subcontractors' Charges Act.

3.3.3 Any Security provided pursuant to this clause is -

a) firstly for the purpose of satisfying (to the extent of the Security) claims of any Subcontractor or Subcontractors of the Contractor (as these terms are defined in the Subcontractors' Charges Act) in respect of a Subcontractors' Charge (and thereby further securing Subcontractors entitlements to the benefits conferred in the Subcontractors' Charges Act);

(b) secondly, for the purpose of satisfying (to the extent of the Security) any other claims which any Subcontractor has against the Principal pursuant to some other legal entitlement; and

(c) thirdly, to satisfy any claims of the Principal against the Contractor.

3.3.4 Within twenty-eight (28) days of the date of acceptance of tender the Contractor shall either:

(a) lodge the Security with the Principal; or

(b) establish a Retention Fund for the purpose of this clause and give notice thereof in writing to the Principal.

3.3.5 Consequent upon service of a Subcontractor's Charge upon the Principal by any Subcontractor the Principal may at any time convert any Security that does not consist of cash.

3.3.6 Upon receipt of cash Security from the Contractor or upon any conversion of any Security by the Principal pursuant to clause 3.3.5 or upon any payment to the Principal by the financial institution or insurance company pursuant to the terms of any Security, any money so held or obtained by the Principal shall be payable creditable or allowable to the Contractor pursuant to the contract in complete or partial satisfaction of the contract price (as that term is defined in the Subcontractors' Charges Act) and may be paid into Court by the Principal pursuant to the Subcontractors' Charges Act or otherwise dealt with in accordance with the terms of that legislation provided that the moneys so obtained shall not be payable except for the purpose of satisfying a claim referred to in clause 3.3.3(a) or (b).

3.3.7 Subject to clauses 3.3.5 and 3.3.6 and notwithstanding clause 28, any Security provided pursuant to this clause or any part thereof remaining shall not be released by the Principal until after the expiration of three (3) months after the issue of the Certificate of Final Completion. Prior to its release the Principal may ascertain whether or not all of its rights to payment can be satisfied without the need to have recourse to this security. If the Principal is of the opinion that that is not the case the Principal shall then be entitled to withhold the release of this security and to convert it in whole or in part and apply it towards satisfaction of those rights to payment.

3.3.8 Where the Principal converts the security and makes a payment pursuant to clauses 3.3.5 and 3.3.6 hereof, the Principal shall thereupon be entitled to give written notice to the Contractor requiring the Contractor to provide further Security for an amount equal to the payment by the Principal. Failure to provide such further security within 14 days of the date of such notice shall entitle the Principal to deduct this amount from any certificate which may issue pursuant to clause 24 unless the Superintendent has already made such a deduction when certifying for payment pursuant to clause 24.

3.3.9 Any Retention Fund established pursuant to this clause shall be held on trust for the Subcontractor until the Subcontractor becomes entitled to receive it.

3.3.10 Where pursuant to a term in the Subcontract:

(a) the Contractor withholds any retention money from a payment to a Subcontractor, the Contractor warrants that it will forthwith deposit those moneys into a trust fund established pursuant to clause 3.3.4 and hold those moneys in accordance with this clause.

(b) the Subcontractor has provided the Contractor with security in substitution for retention moneys to be retained by the Contractor, the Contractor shall hold that security in accordance with this clause."

4. CONTRACT DOCUMENTS

No amendments

5. SUBCONTRACTING

Insert new paragraph

"The Contractor shall confirm to the Superintendent in writing the name and address of the Subcontractor, the total value of the proposed Subcontract and that the Contractor and the Subcontractor have prior to commencement of any work by the Subcontractor entered into an agreement in writing for the performance of the work which contains provisions concerning Security and Record of Payment in identical terms to those contained in clauses 3.3 and 37 of the Conditions of Contract."

6. PROTECTION OF PEOPLE AND PROPERTY

7. CARE OF THE WORK AND REINSTATEMENT OF DAMAGE

8. DAMAGE TO PERSONS AND PROPERTY

9. INSURANCE OF THE WORK UNDER THE CONTRACT

10. PUBLIC LIABILITY INSURANCE

11. INSURANCE OF EMPLOYEES

12. INSURANCE PROVISIONS

13. SUPERINTENDENT

14. REPRESENTATIVES

15. SITE

16. MATERIALS AND WORK

No amendments.

17. PROGRESS, PROGRAMMING AND SUSPENSION

Insert a new paragraph:-

"The Contractor shall give the Superintendent reasonable advance notice of when the Contractor requires any information, materials, documents or instructions from the Superintendent or the Principal."

18. PRACTICAL COMPLETION

19. EXTENSION OF TIME FOR PRACTICAL COMPLETION

20. DAMAGES FOR DELAY IN REACHING PRACTICAL COMPLETION

21. DELAY OR DISRUPTION

22. DEFECTS LIABILITY

No amendments.

23. VARIATIONS

Insert a new paragraph after paragraph three:-

"The margin for profit and overheads shall be $12^{1}/_{2}$% for work carried out by the Contractor's own workers and $7^{1}/_{2}$% for work carried out by others."

24. CERTIFICATES AND PAYMENTS

No amendment.

25. CERTIFICATE OF PRACTICAL COMPLETION

Insert "written" in the first line before "request".

26. EFFECT OF CERTIFICATES

Delete "or a Certificate of Practical Completion".

28. FINAL CERTIFICATE

Insert at the end of the first paragraph:-

"or give the Contractor in writing the reasons for not issuing the certificate".

29. DEFAULT

Insert at the end of subclause 29.2:-

"Upon giving a notice by the Principal under this clause, the Principal may suspend payments to the Contractor until the earlier of -

(a) the date upon which the Contractor shows reasonable cause;

(b) the date upon which the Principal takes action under Clause 29.3(a) or (b); or

(c) the date which is 7 days after the last day for showing cause in the notice under this clause.

If the Principal exercises the right under clause 29.3(a), the Contractor shall not be entitled to any further payment in respect of the work taken out of the hands of the Contractor unless a payment becomes due to the Contractor under clause 29.3."

30. INSOLVENCY

31. DISPUTE RESOLUTION

32. SERVICE OF NOTICES

No amendments.

Add the following new clauses:-

"33. **WORKPLACE HEALTH AND SAFETY**

For the purpose of this clause the words "Principal Contractor", "serious bodily injury", "dangerous event", "work caused illness" and "work injury" have the meanings assigned to them by the Workplace Health and Safety Act ("the Act").

Upon acceptance by the Principal of the Contractor's offer -

(a) the Principal shall be deemed to have appointed the Contractor to be the Principal Contractor pursuant to s.13 of the Act;

(b) the Contractor shall be deemed to have accepted the appointment; and

(c) the Contractor shall, in respect of the works to be executed under the contract, be responsible for the performance of the functions of the Principal Contractor within the meaning of the Act and Regulations in force under the Act.

Such appointment as Principal Contractor under the Act shall be in force during the continuance of the contract unless sooner revoked by the Principal giving twenty-one (21) days notice in writing to the Contractor of its revocation or by the Principal taking over or cancelling the contract pursuant to any provision of the contract or according to law.

The Contractor shall indemnify and keep indemnified the Principal against all liabilities which may be imposed under or which may arise out of enforcement of any section of the Act or Regulations.

The Contractor shall notify the Superintendent of every serious bodily injury, dangerous event, work caused illness and work injury which occurs on site as soon as possible but not later than twelve (12) hours after such occurrence."

"34. **APPRENTICE TRAINING REQUIREMENTS**

The Contractor, in its execution of the work under the Contract, must employ on the site of the works either directly or indirectly through subcontractors, apprentices/trainees for a number of labour hours no less than 10% of the total hours of the remainder of the labour employed on site. In this regard -

(a) this requirement excludes any consideration in respect of mechanical and electrical trades;

(b) the Contractor must submit to the Principal within seven (7) days after the issue of the Certificate of Practical Completion or termination of the Contract a return in the Form attached to these Conditions. Without prejudice to any other rights under the Contract or otherwise, the Principal may suspend payment and return of retention monies (whether or not held in alternative form) to the Contractor until the return is received."

"35. **GENERAL RIGHT OF SET OFF**

Without limiting the Principal's rights under any other provision in the contract and notwithstanding the provisions of or the issue of a certificate by the Superintendent under clause 24 and 29, the Principal may deduct from any monies due to the Contractor any sum which is payable by the Contractor to the Principal whether or not the Principal's right to payment arises by way of damages, debt, restitution or otherwise and whether or not the factual basis giving rise to the Principal's right to payment arises out of this contract, any other contract, or is independent of any contract. If the monies payable to the Contractor are insufficient to discharge the liability of the Contractor to pay such sum to the Principal, the Principal may have recourse to retention monies or security provided therefor. Nothing in this clause shall affect the right of the Principal to recover from the Contractor the whole of such monies or any balance that remains owing."

"36. **APPLICABLE LAW**

The law governing the Contract, its interpretation, any agreement to arbitrate and the conduct of any arbitration or litigation, is the law of the State of Queensland."

"37. **PAYMENT OF WORKERS AND SUBCONTRACTORS**

37.1 The Contractor, with each payment application, shall provide to the Superintendent a schedule of all subcontractors employed on the Works showing their names, addresses and trade.

37.2 (a) All payments to Subcontractors shall be recorded by the Contractor on a Record of Payments form which shall be in the form attached to these conditions. The Contractor shall ensure that, as to any payment to any Subcontractor, such form is fully completed, executed by the Subcontractor concerned, and kept by the Contractor as proof of compliance with this clause.

(b) At the time of making a progress claim under clause 24 the Contractor shall deliver to the Superintendent a statement naming any Subcontractor who has failed or refused to execute a Record of Payment form or to whom no payment has yet been made and hereby acknowledges that the Superintendent may thereupon notify any such Subcontractor that after the expiration of 10 days from the date of the progress claim the Superintendent proposes to issue a payment certificate to the Principal including such amounts as may be claimed by the Contractor in respect of such Subcontractor.

(c) The Record of Payment forms shall be:

(i) kept by the Contractor until six months after issuance of the Final Certificate by the Superintendent;

(ii) provided to the Superintendent for inspection and copying upon reasonable notice in writing.

(d) At the request of the Contractor and out of moneys payable to the Contractor the Principal may on behalf of the Contractor make payment directly to a worker or Subcontractor.

(e) Before the payment of any money to the Contractor by the Principal, the Superintendent may require the Contractor:

(i) to deliver to the Superintendent a Statutory Declaration in the form attached to these conditions by the Contractor, or where the Contractor is a corporation, by the representative of the Contractor who is in a position to know the facts attested to that all the Subcontractors of the Contractor have been paid all that is due and payable to such Subcontractors up to a date specified by the Superintendent and that all its workers who at any time have been engaged on work under the contract by the Contractor have been paid all moneys due and payable to them up to the date of submission by the Contractor of a progress claim in respect of their employment on the work under the contract;

and, if requested in writing, reasonable supporting documentary evidence thereof,

(ii) to deliver to the Superintendent a Statutory Declaration in the form attached to these conditions by any Subcontractor, or where the Subcontractor is a corporation, by a representative of the Subcontractor who is in a position to know the facts attested to:-

- that all workers who have been engaged by a Subcontractor of the Contractor have been paid all moneys due and payable to them up to the date of submission by the Contractor of a progress claim in respect of their employment on the work under the contract; and

- that all Subcontractors of the Subcontractor have been paid all that is due and payable to such Subcontractors up to the date of submission by the Contractor of a progress claim in respect of the work under the contract

and, if requested in writing, reasonable supporting documentary evidence thereof.

(f) If within 3 days after the request is made by the Superintendent, the Contractor fails to provide a Statutory Declaration in the form attached to these conditions or the documentary evidence requested in a form satisfactory to the Principal (as the case may be) the Principal may, notwithstanding the other provisions of the Contract suspend payments to the Contractor until such Statutory Declaration is provided.

37.3 The Contractor acknowledges that the Principal may release to a Subcontractor details of payments in percentage terms made by the Principal to the Contractor in respect of the works or any part thereof unless the Contractor shows reasonable grounds why such details should not be released or satisfies the Principal, that all payments due and payable to the Subcontractor by the Contractor have been paid.

37.4 If a worker or Subcontractor obtains a court order in respect of monies referred to in clause 5.4 and produces to the Principal the court order and a Statutory Declaration that it remains unpaid, the Principal may pay the amount of the order, and costs included in the order, to the worker or Subcontractor and the amount paid shall be a debt due from the Contractor to the Principal.

37.5 After the making of a sequestration order or a winding up order in respect of the Contractor, the Principal shall not make any payment to a worker or Subcontractor without the concurrence of the official receiver or trustee of the estate of the bankrupt or the liquidator as the case may be."

"38. DESIGN RESPONSIBILITY

If stated in the Annexure to the Conditions of Contract, the following clauses have been added to AS4305 - 1996.

38.1 Design

38.1.1 The Contractor shall:

(a) complete the Design and documentation of the Works including working drawings and trade specifications in accordance with the provisions of the provisions of the Contract and all relevant Statutory Requirements;

(b) have the same liability to the Principal as would an Architect designing and documenting the Works independently under a separate contract with the Principal;

(c) ensure that materials and standards of workmanship prescribed in drawings, trade specifications and other documents are fit for the purpose, consistent with the nature and character of the Works and in accordance with the Contract. Local preferences and trade practices shall be considered in the selection of materials, systems and services.

00039

38.1.2 The Contractor warrants to the Principal that:

(a) the Contractor will exercise the proper skill, care and diligence expected of a competent design professional;

(b) the design and the Works complies with this contract and is fit for the purpose in all respects.

The Contractor shall remain responsible for the design notwithstanding any approval given under the Building Act 1975 or any review or approval of the design undertaken by or on behalf of the Principal.

The Contractor acknowledges that the Principal is relying on the Contractor's skill and judgement in undertaking the design and construction of the Works.

38.2 Building Act

38.2.1 The Authority stated in Item 28 shall be the Authority for the purpose of Building Act approval.

The Contractor shall be responsible for obtaining approval under the Building Act 1975 in respect of the design. For this purpose the Contractor shall pay all fees and submit to the Authority all material necessary for obtaining such approval.

The Contractor shall not carry out or cause to be carried out any building work in respect of which the Building Act 1975 requires approval unless such approval has been obtained.

The Contractor shall remain responsible for the design notwithstanding any approval given under the Building Act 1975, nor any review of approval of the design undertaken on behalf of the Principal.

38.2.2 The Contractor shall allow a minimum of twenty-eight (28) days for Building Act approval.

The Contractor shall liaise with the Principal's Supervisor in order to ascertain requirements with respect to Building Act inspections.

During construction, plumbing and sanitary drainage installations shall be inspected by, and shall comply with the requirements of, the applicable Authority's plumbing and drainage Inspectors. Fees for inspections shall be paid by the Contractor.

38.2.3 Approvals and certificates issued by the relevant Authorities shall be surrendered to the Principal following Practical Completion of the Works."

39. COMPLIANCE WITH STATUTES

The Contractor shall comply with all requirements of any Statute or authority having jurisdiction with regards to the Works and shall, at its own expense, obtain all necessary consents required by or under such Statute or authority."

This Annexure takes the place of the Annexure to the Australian Standard Minor Works Contract Conditions.

ANNEXURE to the Australian Standard Minor Works Contract Conditions

This Annexure shall be completed and issued as part of the tender documents and, subject to any amendments to be incorporated into the Contract, is to be attached to these Contract Conditions and shall be read as part of the Contract.

Item		
1	The Principal: (Clause 1)	Crown in the right of the State of Queensland through the Director General, Education Queensland
2	Address of the Principal:	Education House 30 Mary Street Brisbane Qld 4002
3	The Contractor: (Clause 1)	As per the accepted tender
4	The address of the Contractor:	As per the accepted tender
5	The Superintendent: (Clause 1)	As per Letter of Acceptance
6	The address of the Superintendent:	As per Letter of Acceptance
7	The Contract Documents comprise: (Clauses 1 and 4)	

	Document	No of copies to be provided
(a)	the accepted Tender	1
(b)	the Conditions of Tender	1
(c)	Minor Works Contract Conditions (AS 4305 - 1996)	0
(d)	the Special Conditions of Contract	3
(e)	the Code of Tendering (AS 4120 - 1994) as amended by the Conditions of Tender	0
(f)	the Specification and Drawings	3
(g)	other documents as are issued and/or referred to by the Principal for the purpose of tendering	3

8	**This item is not used.**	
9	Payments under the Contract shall be made at:	Brisbane
10	**This item is not used**	
11	The period of time for Practical Completion: (Clause 1)	12 weeks after the Date of Acceptance of Tender (as adjusted pursuant to the Contract)
12	Security (if provided): (Clause 3.1)	Amount: Not to be provided Form: Either cash or an undertaking, in a form

00041

		approved by the Principal, provided by a financial institution or insurance company approved by the Principal or cash paid in honour thereof.
13	Time for provision of security: (Clause 3.1)	Not to be provided
13A	Special Conditions of Contract for Security for Subcontractors applies or does not apply (Clause 3.3):	Clause 3.3 shall not apply.
14	Amount of limit of indemnity for damage to persons and property: (Clause 8(a))	Unlimited
15	The party to effect a contract works policy of insurance: (Clause 9)	Contractor
16	The amount of contract works insurance cover: (Clause 9)	The Contract Sum plus 20%
17	The party to effect a public liability policy of insurance: (Clause 10)	The Contractor
18	The amount of public liability insurance cover in respect of any one occurrence shall be not less than: (Clause 10)	$10,000,000
19	The time for giving possession of the Site to the Contractor: (Clause 15)	7 days after the Date of Acceptance of Tender
20	Liquidated damages: (Clause 20)	$ rate per day = $\frac{8.5\% \times \text{Contract Sum}}{365}$, or $100 per day, which ever is the greater
21	Extra cost per day for delay or disruption: (Clause 21)	5% of the Contract Sum ÷ (7 x the period of time for practical completion at item 11)
22	The defects liability period: (Clause 22)	52 weeks
23	Times for payment claims: (Clause 24)	Monthly
24	The rate of interest on overdue payments: (Clause 24)	7% per annum
25	**This item is not used.**	
26	**This item is not used.**	
27	Special Conditions of Contract for Design Work shall / shall not apply (Clause 38)	Clause 38 shall apply.
28	The Authority for the purpose of Building Act approval:	The Chief Building Surveyor, Queensland Government Department of Public Works

Approved Form of Unconditional Undertaking - Sub-clause 3.2 (Security in Lieu of Retention)

UNDERTAKING

CONTRACT FOR.....
..... **("THE CONTRACT")**

At the request of .....
..... **ACN** . . . . . .
("the **CONTRACTOR**") and in consideration of.....
.....
("the **PRINCIPAL**") accepting this undertaking in lieu of Retention Moneys provided for in the Contract and, without limiting the generality thereof, for the provision of security to any Subcontractor of the Contractor in respect of a Subcontractors' Charge under the Subcontractors' Charges Act or any other claims which any Subcontractor has against the Principal pursuant to some other legal entitlement.....
.....
ACN . . . . . ("the **FINANCIAL INSTITUTION**") unconditionally undertakes to pay on demand any sum or sums which may from time to time be demanded by the Principal to a maximum aggregate of .....
.....

This undertaking is to continue:

(i) until notification has been received from the Principal that the sum is no longer required by the Principal; or

(ii) until this undertaking is returned to the Financial Institution; or

(iii) until payment to the Principal by the Financial Institution of the whole of the sum.

Should the Financial Institution be notified in writing signed by or on behalf of the Principal that the Principal desires payment to be made of the whole or any part or parts of the sum, it is unconditionally agreed that the Financial Institution will make payment or payments to the Principal forthwith without reference to the Contractor and notwithstanding any notice given by the Contractor not to pay same.

Provided always that the Financial Institution may at any time without being required so to do pay to the Principal the sum of .....
.....
less any amount or amounts it may previously have paid under this undertaking or such lesser sum as may be required and specified by the Principal and thereupon the liability of the Financial Institution hereunder shall immediately cease.

Dated at ..... day of ..... 1996.

Signed in my presence by .....
the Attorney of .....
pursuant to Power of Attorney .....
who is personally known to me:
.....

Signed for and on behalf of .....
.....
by its said Attorney who states that he has no notice of the revocation of the said Power of Attorney at the time of his executing this instrument.

.....

Conditions of Contract Clause 37

Record of Payment Form

(To be submitted to the Principal's Representative by the Contractor)

(The following to be inserted by the Principal)

1. **Contract Description** .....
.....

Contractor .....

(The following to be inserted by the Contractor / Subcontractor)

2. **Subcontractor** .....
.....

Address .....

Subcontract Description .....
.....

SUBCONTRACTOR'S DECLARATION

It is hereby declared that the Subcontractor has received all monies due and payable from the Contractor up to and including ...../...../..... *(insert date on which payment received was due and payable.)*

Further payment to the Subcontractor from the Contractor is not anticipated to be due until ..../..../.... *(Insert date on which the next subcontract progress payment is anticipated to become due. If no further payment is anticipated to become due insert "N.A.".)*

A further Record of Payment Form will be signed by the subcontractor in respect of the anticipated payment when it is received from the Contractor.

Signed .....
(Signature of Subcontractor or its representative)

Name of signatory .....
(Please print)

Date ...../...../.....

Instructions:

Pursuant to clause 37 of the Conditions of Contract it is the responsibility of the Contractor to:-

- *ensure section 2. above is completed in full upon making any payment to a Subcontractor,*
- *notify the Principal's Representative of any refusal or failure by a Subcontractor to complete this Record of Payment form,*
- *retain this Record of Payment form as proof of payment that the Subcontractor has been paid, and*
- *provide this form upon request to the Principal's Representative.*

Upon receipt of payment from the Contractor by the Subcontractor the Subcontractor is to:-

- *complete Section 2 and sign the "Subcontractor's Declaration" as appropriate, and*
- *return this Record of Payment form to the Contractor.*

00044

Conditions of Contract Clause 37

Statement of Contractor

(To be submitted to the Principal's Representative by the Contractor with each payment claim)

To: The Principal's Representative

From: ..... *(the Contractor)*

Contract: .....

Pursuant to clause 37 of the Conditions of Contract you are hereby notified as indicated below of the Subcontractors who have failed or refused to execute a Record of Payment form or to whom no payment has yet been made.

SUBCONTRACTOR NAME AND ADDRESS	SUBCONTRACT DETAILS
1.	.....
2.	.....
3.	.....
4.	.....
5.	.....

Signed ..... Date: . . . . . / . . . . . / . . . . .
(Contractor)

00045

Conditions of Contract Clause 37

Statutory Declaration by Contractor

Oaths Act 1867

Queensland
To Wit

I,..... of.....
.....
in the State of Queensland, do solemnly and sincerely declare that, in relation to the Contract between the
.....*(Insert name of Principal)* . . . . . "the State" and
.....
"the Contractor" for .....
.....(the Contract).

1.... I hold the position of .....
I am in a position to know the facts contained herein and to bind the Contractor by the terms of this declaration, and I am duly authorised by the Contractor to make this declaration on its/his behalf.

2.... All the Contractor's workers who at any time have been engaged on work under the Contract by the Contractor have been paid in full all moneys due and payable to them up to the date of submission by the Contractor of Progress Claim No . .....

3.... All Subcontractors and consultants of the Contractor have been paid all that is due and payable to them up to the date of submission by the Contractor of Progress Claim No.....in respect of their part of the work under the Contract.

And I make this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of the **Oaths Act 1867**.

.....

TAKEN AND DECLARED before me .. ..) ....(Signed)
(name in full)..... ....)
)
at... ....in the State of ....)
this ... .)
day of..... .... 199... .....) ....

A Justice of the Peace

00046

Conditions of Contract Clause 37

Statutory Declaration by Subcontractor

Oaths Act 1867

Queensland
To Wit

I,.... .... of..

....

in the State of Queensland, do solemnly and sincerely declare that, in relation to the Contract between the .... *(Insert name of Principal)* . . . .(the State) and

....

"the Contractor" for ....

....(the Contract)

[name of Subcontractor] ....

("the Subcontractor") is a Subcontractor to the Contractor for part of the work under the Contract, namely:

....

....

1.... I hold the position of ....
I am in a position to know the facts contained herein and to bind the Subcontractor by the terms of this declaration, and I am duly authorised by the Subcontractor to make this declaration on its/his behalf.

2.... All the Subcontractor's workers who at any time have been engaged on work under the Contract by the Subcontractor have been paid in full all moneys due and payable to them up to the date of submission by the Contractor of Progress Claim No ....

3.... All Subcontractors of the Subcontractor have been paid all that is due and payable to them up to the date of submission by the Contractor of Progress Claim No......... .... in respect of their part of the work under the Contract.

And I make this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of the **Oaths Act 1867**.

....

TAKEN AND DECLARED before me . ...) ....(Signed)
(name in full)......... ....)
)
at... ....in the State of ....)
this.... ....)
day of.......... .... 199... ....) ....

A Justice of the Peace

00047

Conditions of Contract
Clause 34

Apprentice Training Requirement - (Form of Return to the Principal)

1. **PRINCIPAL CONTRACTOR**

LEGAL IDENTITY: .....

TRADING NAME: .....

ADDRESS: .....

..... POSTCODE: .....

PHONE NO: ..... FAX NO: .....

CONTACT PERSON: .....

2. **CONTRACTING AUTHORITY**

NAME: .....

ADDRESS: .....

..... POSTCODE: .....

PHONE NO: ..... FAX NO: .....

CONTACT PERSON: .....

3. **CONTRACT DESCRIPTION**

CONTRACT NAME: .....

..... REFERENCE NO: .....

TOTAL HOURS OF ALL WORKERS EMPLOYED ON SITE DURING PERFORMANCE OF THE WORKS: (*excluding apprentices/trainees and excluding mechanical and electrical trades*) .....(Hours)

CONTRACT TRAINING REQUIREMENT (10% minimum) .....(Hours)

4. **TRAINING DETAILS (In respect of Total Contract) (*)**
(excluding mechanical and electrical trades)

APPRENTICE/TRAINEE NAME	REG. NO. (where applicable)	TRADE OR CLASSIFICATION	PERIOD ON CONTRACT(**)	HOURS	EMPLOYER
			TOTAL HOURS		

(* If insufficient space please attach separate sheet)
(** Insert first date employed on site and last date employed on site)

.....
Signature of Principal Contractor or Authorised Person
..../.../...

00048

Supplementary Conditions of Contract (relating to GST)

40. GOODS AND SERVICES TAX

40.1 Definitions

For the purposes of clauses 39 and 40, the following definitions have the following meanings:

'GST' means a tax in the nature of a supply of goods and services tax levied or imposed by the Commonwealth of Australia;

'GST Date' means the date on which a liability for GST on any supply under the Contract first arises;

'Recipient' means, in respect of a particular supply made under this Contract, the party obliged to pay for that supply;

'Reimbursable Item' means an item of expense incurred by one party in respect of which, under the Contract, that party is entitled to be reimbursed by the other party for the cost of the item;

'Supplier' means, in respect of a particular supply made under this Contract, the party entitled to payment for that supply.

40.2 General GST Price Review

If any supply made under this Contract (other than the supply of a Reimbursable Item) is subject to GST, the Recipient must pay to the Supplier, in respect of that supply, an amount sufficient to ensure that the Supplier retains after payment of GST the amount that the Supplier would have received had GST not been payable or such lesser amount as the Supplier may charge having regard to section 75AU of the *Trade Practices Act 1974* (C'wealth) and any corresponding State or Territory legislation.

40.3 GST on Reimbursable Items

If the supply of any Reimbursable Item under this Contract is subject to GST, then, from the GST Date, the payment due to the Supplier for each Reimbursable Item for which the Recipient is required to reimburse the Supplier under the Contract is to be calculated as follows:

Payment Due = (A-B) x (1 + C)

where:

A = the GST-inclusive price of the relevant Reimbursable Item being the amount paid by the Supplier for that Reimbursable Item;

B = the amount of any GST input tax credit for which the Supplier is eligible on the relevant Reimbursable Item; and

C = the rate of GST applicable at the time of making the calculation, expressed as a decimal.

40.4 Time for Payment

Subject to clause 40.5, the Principal or Contractor, as the case may be, must pay any amount payable under clauses 40.2 and 40.3 on the same date as payment must be made for the supply giving rise to the liability for GST.

40.5 Tax Invoice and Registration

Despite any other provision of this Contract, a Recipient need not make a payment under clauses 40.2 or 40.3 until the Supplier has given the Recipient:

(a) a GST tax invoice for that payment stating the amount of GST paid or payable by the Supplier in respect of the supply to which the GST tax invoice relates; and

(b) evidence satisfactory to the Recipient that the Supplier is a registered supplier for the purposes of GST.

40.6 GST Disputes

If a dispute between the Contractor and the Principal arises out of or in connection with clause 40 of the Contract, including a dispute concerning an Adjustment Amount, then either party shall deliver by hand or send by certified mail to the other party and to the Superintendent a notice of dispute in writing adequately identifying and providing details of the dispute. If the dispute has not been resolved within 14 days after service of a notice of dispute, the dispute must be referred for determination by a person:

(a) who has at least 10 years experience as an accountant practising in taxation;

(b) who is appointed by the Contractor and Principal but if they do not agree who to appoint within 28 days after one party notifies the other that it requires a person to be appointed for the purposes of this clause, then that person is to be nominated at either party's request by the President of the Institute of Chartered Accountants or the President's nominee;

(c) who the parties must instruct to give a written decision with reasons;

(d) who acts as an expert and not as an arbitrator;

(e) whose decision except in the case of obvious error is final and binding; and

(f) whose cost the parties must bear equally.

Pending that person's determination, the Contractor and the Principal must continue to comply with this Contract.

31 DISPUTE RESOLUTION

Delete/Insert the first sentence of clause 31-

'If a dispute between the Contractor and the Principal (other than a dispute arising out of or in connection with clause 40) arises out of or in connection with the Contract, including a dispute concerning a direction given by the Superintendent, then either party shall deliver by hand or send by certified mail to the other party and to the Superintendent a notice of dispute in writing adequately identifying and providing details of the dispute.'

39 COMPLIANCE WITH STATUTES

Add new sentence –

The Contractor's obligation in respect of GST will not necessitate a variation under clause 23 or give rise to any adjustment of the Contract Price or reimbursement entitlement under this clause.

SPECIFICATION – SCOPE

SCOPE – DUNDULA STATE SCHOOL

1 Introduction

1.1 GENERAL

This document outlines the scope of work associated with the upgrade of air-conditioning to the Dundula State School.

1.2 COMPLIANCE WITH THE BUILDING ACT

The contractor shall have the completed design of the installation certified for compliance with the Building Act.

1.3 REFERENCED SECTIONS

The following sections as applicable shall be read in conjunction with this section:

- Specification – Air conditioning
- Specification – Electrical
- Specification – Builders work
- Specification – Preliminaries

1.4 STANDARD AIR CONDITIONING UNITS

Unless otherwise required in specific locations, and approved by superintendent, the air conditioning design shall utilise units from the Carrier and Hitachi models scheduled in Table 1.1. The Principal will supply the units as specified in the Preliminary Conditions of the Contract.

The capacities listed in Table 1.1 are nominal only. The contractor shall refer to the equipment manufacturer's data to determine actual capacities.

Air conditioning units with nominal capacities of 2.5, 5 and 8 kW operate on single-phase supply. Air conditioning units with nominal capacities of 10 and 14 kW operate on three-phase supply.

The 8kW units listed shall be used only in those schools that have no three-phase electrical supply.

Table 1.1 Air conditioning unit schedule

Type of List	GTH (kW)	Make and Model: Carrier	Make and Model: Hitachi
Wall mounted	2.5	42G100C / 38G100C	RAS-09CA1 / AC-09CA1R
Wall mounted	5	42G225C / 38G225C	RAS-5182CA / RAC-5182CA
Under ceiling	5	42ARM018 / 38AV018	
Under ceiling	8	42ARM030 / 38HD030	RAS-30CA1 / RAC-30CA1
Under ceiling	10	42ARM036 / 38HDT036	RPC-3.5AQ5E / RAS-3.5AQE5
Under Ceiling	14	42ARM048 / 38HDT048	RPC-5AQ5E / RAS-5AQE5
Ceiling Cassette	10	40GKX048 / 38GL048	RCI-3.5AQ5E / RA3.5AQE5
Ceiling Cassette	14	40GKX060 / 38GL060	RCI-5AQ5E / RAS-5AQE5

2. Description of installation

2.1 GENERAL

As part of the Cooler Schools program for Education Queensland, air conditioning is to be provided in various areas of the Dundula State School.

The services to be provided shall be as follows:

- Air conditioning to the following areas:
  - The resource area comprising the main resource area, resource centre book store and resource centre staff office.

- The upgrade of the electrical services shall include:
  - Consumer mains
  - Switchboards
  - Sub-mains
  - Underground reticulation conduits and cable pits.
  - Telecommunications conduits and pits

3 Scope of Work

Without limiting the generality of the General Conditions of Contract, and except as otherwise expressly provided herein, the work included, but is not limited to the supply of all material, equipment, warehousing, labour, supervision, services, tools, testing devices, data and drawings, and each and every item of expense necessary for the design, engineering, fabrication, delivery, handling, hauling, unloading, receiving, storage, erection, shop assembly, installation, testing, start up, commissioning and documentation of the following Work:

3.1 DESIGN AND DOCUMENTATION

Detailed design of the air conditioning installation for each room requiring air conditioning as scheduled.

Verification that the number and rating of air conditioning units as scheduled in Table 3.1 is sufficient and suitable for the purpose, and otherwise selection of new units from the standard sizes nominated in Table 1.1 to obtain the specified performance.

Site measurement, setting out, detailed dimensional design and documentation of the Works to ensure the installation suits the requirements of the scope of work.

Detailed calculation (camel heat load program or equal) and design to select the most suitable size of air conditioning unit from the standard sizes made available by the Principal.

Drawings showing all air conditioning units, outside air fans, ducting, supports, condensate lines and any other detail required for documenting the installation of the mechanical services.

Drawings showing all building and plumbing works associated with the installation of mechanical services such as; plinths, enclosures, equipment support, maintenance platforms, penetrations and condensate drain termination points.

Drawings for the site electrical services including the technical data provided in this specification and details of the site conditions:

- Site plans of underground services reticulation and switchboard locations.
- Switchboard layouts and shop drawings.
- Single line diagrams of the distribution system.

Drawings and schematics of the control circuit for each air conditioning and outside air system. These drawings shall clearly describe the operation of the control systems and shall include all additional controls provided by the contractor and their relation to the air conditioning units 'as supplied' controls.

Verification that the number and size of underground conduits is sufficient to enclose the specified number of cables.

Design, where viable, of the alterations required to the existing main switchboard to upgrade the rating to the specified capacity.

The calculation of fault-loop impedance for all new circuits to comply with the requirements of AS/NZS—3000:2000 clause 1.7.4.3 and appendix B.

Evaluation of the prospective fault current at each distribution switchboard, and selection of the over current protection in each functional units to ensure adequate discrimination and cascading as required to provide overload and short circuit protection of the new and existing sections of the installation.

Selection of subcircuit cables for each appliance to provide a current carrying capacity not less than the rated current of the appliance and a voltage drop not exceeding the maximum values calculated from the voltage drop information provided in the schedule of submains.

Design of a cable support system to provide the required strength and space for the specified additional spare capacity.

Submission to the superintendent, the certificate of compliance and test records.

Provision of statutory approvals and licences, and payment of levies necessary for the works. (Except for supply authority charges to upgrade the electricity supply system).

Provision of as built drawings including block diagrams, cable schedules and layouts of equipment.

QA documentation as required.

Operation and maintenance manuals including mechanical and electrical 'as installed' drawings.

Servicing and maintenance of the installation after practical completion including rectification of any defects throughout the specified defected liability period.

Provision of adequate training to the facility nominated operators to ensure effective and efficient operation of all equipment provided to the satisfaction of the superintendent.

3.2 NEGOTIATION WITH THE SUPPLY AUTHORITY

Notification to the supply authority of the proposed demand increases, negotiation to determine the options available and selection of a technically and logistically acceptable and cost effective solution to supply the immediate and projected increased electrical load of the school.

Notification in writing to the superintendent of the resolution of negotiations with the supply authority and facilitating of the payment by the due date by the Principal of any applicable fees. The non-payment of fees to the supply authority shall not constitute a valid reason for an extension of the time to complete the work.

3.3 DEMOLITION

Disconnection and removal of existing electrical services as required for the provision of the specified services.

Coordination with the electricity supply authority for the temporary isolation of the supply to the consumer mains.

Disconnection and removal of redundant cables and switchboards as required.

Making good and painting of surfaces left exposed after removal of redundant equipment.

Handing over to the School Principal any redundant air conditioning units.

3.4 MECHANICAL SERVICES

3.4.1 General

All necessary mechanical services to provide fully operational air conditioning to meet the Performance requirements of this specification. This work shall include, but not limited to, the following:

- Installation of Principal supplied air conditioning units.
- Provision of outside air supply systems.
- Provision of all associated ductwork, insulation, grilles, diffusers and filters.
- Provision of all electrical supply wiring and controls necessary to extend the power supply from the building switchboard to the mechanical services equipment and provide a fully operative installation.
- Provision of all associated refrigeration and condensate drainage pipework.
- Coordination with the building contractor to advise of size and location of all items listed as major associated building works in Section 3.4.6. This shall include detail drawings necessary to convey the extent of work required of the builder.
- Removal of redundant air conditioning units.
- Testing and commissioning
- Service and maintenance of all equipment during the defects liability period.

For Dundula State School the conditioning units supplied shall be Hitachi. For all 2 or 8 hour timer controlled areas requiring the installation of single-phase units, those individual units shall be Carrier. Refer also to Table 3.1.

3.4.2 Air Conditioning Units

Install Principal supplied air conditioning units in the areas scheduled in Table 3.1. The air conditioning units installed shall be located in the nominated areas to achieve optimum air distribution. This shall include; all minor building works required for the installation, provision of electricity supply and the draining of the condensate from each air conditioning unit to a suitable drain system.

The areas to be air-conditioned and the suggested capacities and quantities of air conditioning units required are as follows:

Table 3.1 Air Conditioning Units

Air conditioning unit	Total cooling capacity (kW)	Preferred type of unit *	Control Type
AC.RC.1-1 (Resource Centre)	10	Under Ceiling	8 hr
AC.RC.1-2 (Resource Centre)	10	Under Ceiling	8 hr
AC.RC.2 (Resource Centre Book Store)	5	Wall Mounted	8 hr
AC.RC.3 (Resource Centre Staff Office)	5	Wall Mounted	8 hr

* *Note that where it is not possible to install the preferred type of air conditioning unit due to physical site limitations or the like, an alternative type may be required.*

Hyphenated numbers represent multiple air conditioning units serving the one space.

The capacity and number of air conditioning units listed in Table 3.1 are suggested only and should not be used as a basis for establishing the tender price.

Following acceptance of the tender, the contractor shall confirm the number and capacities of air conditioning units required to meet the Performance requirements for air-conditioned spaces as defined in the Section 3.12 Performance and Guarantee. No negotiations shall be entered into regarding the installation of quantities of units that are additional to the quantities listed in Table 3.1.

Using the Principal Supplied Splits Units Schedule included with this document, the contractor shall advise the Principal of the actual capacities and number of units required.

3.4.3 Outside Air Supply

Provide outside air systems as necessary to introduce the outside air quantities to each of the air-conditioned areas as listed in Table 3.2.

The fans listed are the preferred method for the introduction of outside air however the contractor may make use either of the following methods as necessary to achieve the air quantities specified:

- A soffit mounted intake grille through a ducted system including a panel filter and fan.
- Proprietary wall or window mounted fan units consisting of a weatherproof intake louvre, centrifugal fan, filter and room outlet.

For small areas such as staff offices, outside air may be introduced via a small proprietary wall or window mounted axial fan unit consisting of a weatherproof intake, axial fan and room outlet.

Provide electrical interlocks between air conditioning units and the outside air fans as required under the air conditioning section of this document.

Table 3.2 Outside Air Fans

Fan	Duty (l/s)	Preferred type *
OAF.RC.1-1	170	Wall Mounted Centrifugal
OAF.RC.1-2	170	Wall Mounted Centrifugal
OAF.RC.2	60	Wall Mounted Axial
OAF RC.3	12	Wall Mounted Axial

* *Note that where it is not possible to install the preferred type of fan due to physical site limitations or the like, an alternative type may be required.*

Hyphenated numbers represent multiple fan units serving the one space.

The quantities listed in Table 3.2 are the minimum air quantities to be introduced into each space. The contractor shall confirm with the school Principal the actual number of occupants in the space to determine the actual outside air quantities necessary to meet the requirements of AS1668.2. No negotiations shall be entered into regarding additional costs for air quantities that are higher than those listed in Table 3.2 but necessary to meet the requirements of AS1668.2.

3.4.4 Systems control type

Control systems for Cooler schools installations can take the following three forms:

- Proprietary
- 2-Hour Timer
- 8-Hour Timer.

The contractor shall provide the control system as listed in Table 3.1 and as described in the air conditioning specification section of this document.

Air conditioning units and outside air fans that are designated by hyphenated numbers represent multiple units serving the one space. As such they shall be operated via a single controller and shall run together as a single operating system.

3.4.5 Existing air conditioning units

Redundant air conditioning units are to remain the property of the school and as such are to handed to the school Principal after removal.

Remove three existing wall mounted, packaged room units (RAC's) from the Resource Centre, Resource Centre book store and Resource Centre staff office.

The contractor shall remove, terminate and make safe, all electrical wiring and controls associated with the operation of the redundant air conditioning units. This shall exclude GPOs or electrical supply lines that can be re-used for the installation of new air conditioning units as specified elsewhere in this document.

The redundant air conditioners shall be cleaned, serviced, and returned to the School Principal. Liaise with the School Principal to ensure suitable storage is provided.

3.4.6 Minor Associated Building Works

Associated building and plumbing works of a minor nature shall be carried out by the contractor and will include the following:

- All building penetrations up to 100mm square. Penetrations above 100mm square shall be considered major and shall not be carried out by the contractor.
- Pipework covers.
- Condensate lines from each air conditioning unit to the nominated condensate drainage point as specified elsewhere in this document.
- Electrical supply from circuit breakers in the building switchboard to each air conditioning unit and outside air fan.
- All electrical controls necessary for a complete and operative installation.

3.4.7 Major Associated Building Works

Associated building and plumbing works of a major nature shall be carried out under a separate contract by a building contractor and will include the following:

- Provision of all concrete plinths.
- Provision of all condensing unit enclosures.
- Provision of all galvanised steel condensing unit support stands.
- Provision of all galvanised steel condensing unit wall mount brackets
- Provision of all galvanised steel support brackets for under ceiling fan coil units that may be required in addition to those supplied by the air conditioning unit supplier.
- Roof access ladders, walkways and platforms.
- Rubble pits as required for the termination of condensate lines.
- Cutting and making good all penetrations above 100mm square.
- Cutting of asbestos cement sheet.
- Ceiling penetrations and making good.
- Modifications to 'T' Bar ceiling support structures.
- Roof structure modifications such as trimmers to allow for installation and support of air conditioning units.
- Roof penetrations and flashing as required for the installation and support of air conditioning units and outside air fans.
- Removal of louvres or windows and fitment of fixed panels for the support of outside air fans.
- Making good wall penetrations left after the removal of existing air conditioning units.

3.4.8 Associated Electrical Works

The following works are detailed in the electrical section of the specification

- Upgrade of each building electrical distribution board to accommodate the air conditioning power requirements.
- Provision of new circuit breakers in each building electrical distribution board for connection of air conditioning power supply cabling.

3.5 ELECTRICAL SERVICES

3.5.1 Maximum demand

The anticipated electricity demand of the initial air conditioning equipment is 36 A. The maximum demand after the initial stage of air conditioning will be 162 A and increase to approximately 392 A when all existing and future classrooms and office areas are air conditioned.

3.5.2. Extent of the electrical services upgrade

Electricity supply

- The supply authority need to be advised of the anticipated increase in maximum demand, and the timing of the work, as an upgrade of the power supply to the site may be required.
- The supply authority may require the customer to provide a capital contribution towards the cost of the electricity supply upgrade and a guarantee of minimum revenue.
- Education Queensland will be responsible for the payment of fees and charges as negotiated with the supply authority for the upgrade of the electricity supply to the site.

Consumer mains

- Replacement of the existing consumer mains with new consumer mains from point of supply nominated by the supply authority to the new main switchboard position.

- Provision of new underground conduits for the consumer mains from the point of supply to the new main switchboard.

Main switchboard

The existing 100 A rated main switchboard is located on the verandah of Block A and is inadequate to supply the anticipated load of the final air conditioning and will be reused as the Block A distribution board. A new main switchboard will be located under Block A and constructed as follows:

- Rated current: 400 A.
- Rated short term withstand current: 31.5 kA for 1s
- Rated operating voltage: 415 V.
- Rated frequency: 50 Hz.
- Rated impulse-withstand voltage: 6 kV peak.
- Service conditions: Normal.
- Pollution degree 3.
- Protection rating: IP56.
- Safety measures: Live busbars and terminals covered with shrouds or insulating barriers.
- Form of separation: Form 2 with segregation between incoming and outgoing circuits.
- Ambient temperature: 45°C, with direct sun radiation.
- Fault minimisation and containment measures:
  - Live busbars covered with insulating material
  - Fault containment barriers between functional groups: CT cubicle, busbars and functional units.
- Construction: Multi cubicle type assembly, folded and fully welded 304 grade stainless steel.
- Metering equipment: 3 x 800/5 A class 1.5 current-transformers and 3 direct reading ammeters with restable maximum demand indicators.
- Cable entry: bottom entry for consumer mains and all submains cables.
- Surge protection: 70 kA surge diverters protected with 63 A HRC fuses on each phase.
- Supply authority-metering facilities: segregated cubicle for the supply authority current transformer and separate enclosure for the supply authority meters to the requirement of the relevant supply authority.
- Busbars and chassis constructed to fit the number and size of the scheduled outgoing functional units.

Main switchboard outgoing functional units

Unit rating	100A	160A
Number	12	4

Note Functional units equipped with over-current protection matched to the current carrying capacity of the connected circuit.

- Provisions of new earthing system for the upgraded electricity supply.

Submain Cables

Upgrading of the existing cables and provision of new cables to supply the projected maximum demand of existing and anticipated buildings as shown in Table 3.3.

Provide sub mains to the Resource/Admin Block.

Table 3.3 Cable schedules

Most of the existing submains are adequate to supply only the electrical load of lighting and power outlets, and will require upgrading to provide adequate electricity supply for the projected air conditioning equipment.

The anticipated electrical loads, cable sizes, approximate route length and voltage drop for each submains to each building are contained in Table 3.3.

Table 3.3 Cable schedule

CABLE ROUTE	Connection Source SB	Total Future A.C. Load (A/Ph)	Total Future Max. Demand (A/Ph)	Cable Length (m)	Maximum Allowable Voltage Drop %	Required Cable Size mm² / phase
	Note 1			Note 2	Note 3	Note 4
Consumer Mains	Point of Supply	246	392 (Diversity applied)	35	0.75%	240
Sub mains						
Existing Buildings	-					
A AC Switchboard	MSB	85	85	10	0.26%	25
A Teaching	MSB		80	10	0.24%	25
B Teaching	MSB	53	86	41	0.78%	35
Amenities	MSB					Note 5
Tuckshop	MSB					Note 5
Resource Centre / Admin	MSB	36	71	45	0.70%	35
Pre School	MSB	36	56	30	0.49%	25
Future Buildings	-	-	56	-	-	-

Note 1 The sizes indicated are approximate or unknown. The condition of any existing cable and its suitability for reuse should be verified on site.

Note 2 Cable size may require upgrading if the route length is increased significantly.

Note 3 The voltage drop permitted from the distribution switchboard to the respective appliance shall be 5% of the nominal voltage less the voltage drop in the respective submains and the consumer mains.

Note 4 The number and sizes indicated is for each active and the neutral conductor. Except for the consumer mains, each circuit shall include an earth conductor not less than that shown on Table 5.1 of AS3000.

Note 5 Re-use existing sub mains. Redirect to new MSB.

Distribution switchboards

- Verification of the suitability of the existing distribution switchboards to withstand the increases fault current of the upgraded supply and provision of suitable fault protection or replacement with suitably rated new distribution switchboards.
- Switchboards as shown in Table 3.4.
- Provide a DSB to the Resource/Admin Block.

Table 3.4 Switchboards

The following switchboards will be required to supply the projected increased electrical load.

Table 3.4 Distribution switchboard schedule

Building	Designation	Existing switchboard No of Phases	Rating (A)	Poles no	Spare poles no	Required switchboard Current rating (A)	Poles no	Notes/comments
Teaching A	DSB6	3	100	36	20			Note 6
Teaching B	DSB3	1	55	12	3	100	36	Note 1
DSB7 Block A (AC)		3				100	48	New Board
Resource Centre / Admin	DSB2	1	55	10	0	200	36	Note 1
Pre School	DSB4	3	55	10	1	100	36	Note 1
Amenities	DSB5							
Tuck Shop	DSB1	1						To remain

Note 1 Replace the existing switchboard and transfer the existing circuit to the new switchboard and equip with circuit breakers as required.

Note 2 Install the new switchboard adjacent the existing and supply the existing from the new with suitably protected submain cables.

Note 3 Install the new switchboard adjacent the existing and supply the new switchboard from the existing with suitably protected submain cables.

Note 4 Provide adequate fault limiting protection for the existing and new final subcircuits

Note 5 In buildings with multiple distribution switchboards the air conditioning equipment will be supplied from the new switchboard only.

Note 6 Old MSB to become DSB6. Modify and make good.

Underground Reticulation

- Investigation on site to establish the extent and suitability of any existing underground reticulation system.
- Underground conduits along the cable routes as shown in the following Table 3.5.
- Provide conduits for the mains and Resource/Admin sub mains

Table 3.5 Conduits

All conduits for power cables between cable pits will be 100 mm diameter.

Existing conduits will be reused where practicable to enclose the new cables.

Multiple cables will be installed in each conduit to the maximum recommended in Appendix E of AS3000 and any spare space will be made available for future additions.

The existing underground duct system for the power cables will be upgraded as follows:

Table 3.5 Conduits

From	To	Existing Power Conduits	New Power Conduits	Note/comments
POS	MSB	1x50	1x100	
MSB	Pre School	1x50		Re use if possible
MSB	Admin / Resource Centre	1x32	1x80	Reduce to 50 above ground
MSB	Block 'B'	1x25	1x80	Reduce to 50 above ground

Provision of underground cable ducts for telecommunication services as follows:

- Separate telecommunication cable pits, minimum 610 L x 305 W clear opening and 820 deep, adjacent to the existing electrical services pits and as required to terminate the underground telecommunication conduits.

- One 100 mm and two 50 mm telecommunications conduits between cable pits where new trenches are provided for power cables.

Three 50mm telecommunication conduits between cable pits and buildings where new trenches are provided for power cables.

3.5.2 Minor Associated Building Works

Associated building works of a minor nature shall be carried out by the contractor and will include the following:

- Reinstatement of paving, paths, etc.
- All building penetrations up to 100 mm

3.6 BUILDING WORK

The extent of building works shall be as listed under Major Associated Works in Mechanical Services Section 3.4 and Electrical Services section 3.5.

3.7 TERMINATION POINTS

Coordinate the mechanical, electrical, fire and hydraulic services as appropriate, the **termination** points for electrical power supplies, fire alarm shut down, water supplies and drainage for the equipment and systems.

Electrical supply

- Electricity supply connected to the Point of Supply nominated by the supply authority following notification of the proposed increase of the electricity demand.

- Final subcircuits terminated with new circuit protection devices at the busbars of existing or the new distribution switchboards as indicated in the switchboard schedule.

- Disconnection of existing submains and final subcircuits from existing switchboard and reconnection to new switchboards where new switchboards are scheduled to be replaced.

Fire Alarm / Security Detectors

- Relocate existing fire alarm and security detector circuits connected at the terminal of existing alarm panels as required to ensure the integrity and reliability of the existing alarm panel is not compromised. All work is to be carried out by approved installers.

Hydraulics

- Water supply connected to the existing domestic water supply as required.

- Condensate pipes terminated at gravel pits, sewerage or stormwater as required by Local Regulations.

3.8 TESTING AND COMMISSIONING

Testing and commissioning of the completed installation to demonstrate compliance with the Specification requirements.

All of the inspection and testing data fully documented and recorded on suitable forms so the results can be permanently registered and bound into the final quality assurance documentation.

The tests are intended to demonstrate that all components will function correctly, as separate components and as part of integrated system in accordance with the construction documents and include, but are not limited to, the following:

- Verification of **correct** phase sequence at each 3 phase switchboard and appliance.
- Verification of function of each circuit, appliance, control and protection device, switch, outlet and each control device.
- Verification of compliance of each component of the installation with the relevant requirement of the Australian Standards and statutory authorities.

Submission to the superintendent within 5 days of completion of three copies of the results of the following electrical tests:

- insulation resistance of the consumer mains, main switchboard, submains and distribution switchboards, and LV final subcircuits;
- resistance of the main earthing system;
- impedance of the earth loop at each outlet;
- phase sequence at each 3 phase appliance.

Any work required to make good deficiencies, which become apparent during the commissioning tests, will not constitute a variation to the Contract.

Acceptance of the **installation** will be in writing on successful completion of the **tests** and submission of the test results. The acceptance of the test results will not relieve the Contractor of the responsibility to furnish a satisfactory operating facility, for which the Contractor will continue to be required to undertake rectification as necessary with the Defects Liability Period at no additional cost to the Contract.

3.9 IDENTIFICATION AND LABELS

Identification of the distribution switchboard, circuit number and phase at each switch, motor isolator, and any other accessory at which cables are terminated, with materials and methods approved by the superintendent.

Identification of the respective distribution switchboard with descriptive label as shown on the submain cable schedule or as agreed with the superintendent.

Identification of the telecommunication services cable pits.

3.10 COORDINATION WITH OTHERS

Arrangement of all works so that normal operations of the school can progress in an orderly and efficient manner and any disruption is minimised.

3.11 EXCLUSIONS

The following is specifically excluded from the scope of work:

- Supply of air conditioning units. (The Principal will deliver these to the contractor).
- Payment of any fees and charges imposed by the electricity supply authority.

3.12 PERFORMANCE AND GUARANTEE

3.12.1 Mechanical services

The Contractor shall guarantee that the entire system and each of its components will start up, shut down and operate stably, safely and reliably within the design parameters specified in Table 3.6.

Table 3.6 Air Conditioning Design Parameters

Extreme ambient conditions within which plant shall be required to operate:	Summer: 45°C DB and full solar load
Outside ambient conditions in which air conditioning plant shall be required to achieve CMR:	Summer: 32°C DB, 26.5° WB and full solar load
Internal conditions in which air conditioning plant shall be required to achieve CMR:	Summer: 26°C±1K DB; 55% RH (not controlled)
Electricity supply:	Nominal 415 V, 50 Hz, balanced three phase, earthed neutral; otherwise in accordance with AS 2926, Standard voltages, at the consumer's terminals

The contractor shall ensure that the system is able to efficiently provide not less than the specified Continuous Maximum Ratings (CMR) of performance at full load and at partial loads as required by the design parameters; and that the required ratings are maintained during the defect liability period.

Automatic controls, motors and switchgear and every other component of the entire system must be selected, installed and adjusted for continuous, safe, unattended operation at the specified limiting conditions and be adjusted to comply with this requirement at the time of commissioning.

The installation shall be guaranteed to maintain the Continuous Rating parameters under the specified ambient conditions and to continue to operate without damage under the extreme operating conditions specified in the schedule of outside air fans and air conditioning units.

The outside air systems installed shall be capable of providing, as a minimum, the outside air quantities scheduled in Table 3.2. The contractor shall confirm that the air quantities meet the requirements of AS1668.2 and increase the air quantities as may be necessary to meet those requirements.

3.12.2 Electrical services

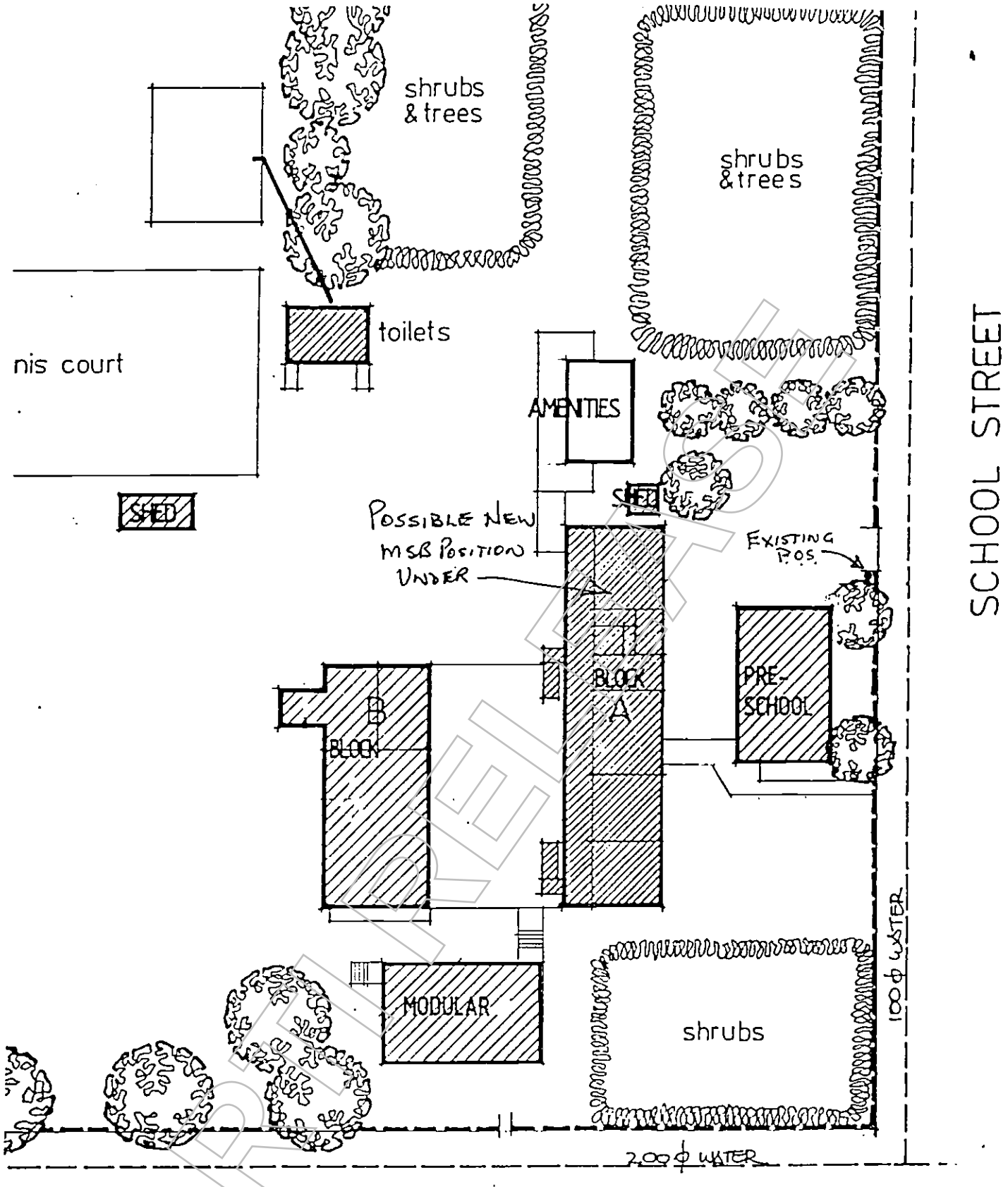
Guarantee that the equipment installed within the limits of this contract will continue to function without damage under all combinations of loads up to the rating of the protective devices, in any weather and ambient conditions specified, provided that the supply voltage and frequency are maintained within the limits specified by the supply authority service rules and conditions of supply.

Guarantee that the entire installation and every component is suitable to operate at the specified ratings under the following ambient conditions:

- outdoors:
  - maximum ambient temperature - 40°with maximum RH 45%
  - maximum average ambient temperature over twenty-four hours - 3°C
  - minimum temperature - °C with RH 100%
  - average temperature difference in twenty-f our hours - 13°
  - mean relative humidity – winter - 80%
  - mean relative humidity – summer - 55%
  - solar radiation – full radiation at 23°south
  - pollution degree – 3°
  - ground temperature - 27°`;
- indoors:
  - maximum ambient temperature- 40°
  - average twenty four hours ambient temperature - 30°
  - pollution degree – 2;
- altitude:
  - less than 1000 m above sea level.

4 Site plan

Refer to attached site plan.



DUNDULA STATE SCHOOL

N.T.S.

00094

SPECIFICATION – AIR CONDITIONING

1. General requirements

1.1 GENERAL

Requirements of individual technical sections of this document override conflicting requirements of this section.

1.2 REFERENCED DOCUMENTS

Current editions
Use referenced documents which are editions, with amendments, current three months before the contract award date, except where other editions or amendments are required by statutory authorities.

General standards
Electrical work: to AS/NZAS-3000:2000

Degree of protection: to AS 1939

Fixed platforms, walkways, stairways and ladders and access ways: to AS 1657

Mechanical ventilation and air-conditioning: to AS 1668.1 and AS 1668.2, as required by the Building Code of Australia.

Water supply: to AS 3500.1.

Plumbing and drainage: to AS/NZS 3500.2

Where work quality standards aren't specifically addressed, they shall comply with the following QMech Standard Specifications:

850-001	Mechanical Services Generally (Minor)
850-570	Painting
850-713	Refrigeration Pipework and Accessories
850-801	Mechanical Electrical (Minor)
850-853	Thermal and Acoustic Insulation
850-881	Ductwork
850-887	DX Package Plant (Minor)
850-884	Fans and Accessories

Copies of the above will be made available to the Contractor on request.

Note:
Where any conflicts occur within this document, the relevant Qmech standard shall take precedence.

Statutory authorities
Comply with the relevant requirements of the following authorities:

- Local Council
- Water supply and drainage authorities
- Electrical supply authority
- Fire service authority
- Occupational Health, Safety and Welfare Regulations

1.3 INTERPRETATION

General
Unless the context otherwise requires, the following definitions apply:

- Supply: 'Supply', 'furnish' and similar expressions mean 'supply only'.
- Install: 'Install', 'fix' and similar expressions mean 'supply, install, test and commission'.
- Provide: 'Provide' and similar expressions mean 'supply, install, test and commission'.
- Proprietary: 'Proprietary' mean identifiable by naming manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Samples: Includes samples, prototypes and sample panels.

Abbreviations

AS: Australian Standards.
BCA: Building Code of Australia
QMech: Project Services Standard Specifications

1.4 FIRE STOPPING

Penetrations through any fire-rated barriers shall be sealed with approved fire stopping devices such as fire dampers and packing after installation of ducts, pipes and conduits. Ensure that the integrity of the fire rating is maintained. The whole method of fire sealing shall be in accordance with the requirements of relevant statutory authorities, including the Building Code of Australia, and manufacturer's recommendations.

1.5 VIBRATION SUPPRESSION

General
The contractor shall take all necessary steps to prevent the transmission of vibration and noise from rotating or reciprocating equipment to all building elements. This shall include the support of external equipment such as condensing units located on concrete plinths or galvanised stands or wall brackets. As a minimum this shall include the installation of vibration isolation mountings as follows:

- **Equipment connected to the building structure**
  Support rotating or reciprocating equipment connected to the structure of any building on vibration isolation mounts as follows:

  - for static deflections < 15mm – single or double deflection neoprene in-shear mountings incorporating steep top and base plates and a tapped hole for bolting to equipment;

  - for static deflections ≥ 15 mm – spring mountings.

  Select mounts to achieve 95% isolation efficiency at the normal operating speeds of the equipment.

- **Condensing units**
  All condensing units shall as minimum be isolated from concrete plinths using 10mm neoprene vibration isolation waffle pad. It is allowable for the waffle pad to be drilled for the installation of a suitable fastener required to fix the unit in place.

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

Fasteners used to fix condensing units in place shall allow for easy removal of the units for major maintenance or replacement. All fasteners fixing condensing units in place shall be grade 304 stainless steel.

1.6 RADIO FREQUENCY INTERFERENCE

Use equipment that generates interference within limits set by AS/NZS 1044. If necessary, provide suppression devices. If appropriate, shield equipment to AS/NZS 1044.

1.7 PAINTING AND MARKING

General

All painting carried out by the contractor shall be undertaken in accordance with QMech standard specification 850-570.

All external and internal services exposed to view are to be painted.

Colours shall be to match adjacent colour schemes.

All ducting visible through grilles shall be painted matt black

Exclusions

Do not coat the following surfaces with paint or corrosion protection systems:

- flexible duct connections, rubber hoses and mountings, and other non-metallic flexible fittings;
- galvanised or zinc-coated pipe, conduit, sheet metal, bolts, fastenings and fittings where normally hidden from view in ceilings, service risers and shafts;
- self-coloured UPVC conduit and fittings;
- dampers except where visible through grilles.

1.8 Marking

General

Mark equipment, electrical wiring, piping, valves, conduits and ducts so that they are readily identifiable.

Piping, conduits and ducts: to AS 1345, as applicable.

Labels
Type: select from the following

- engraved and black filled lettering on stainless steel or brass, at least 1 mm thick
- cast metal
- for indoor applications only, engraved two-colour laminated plastic.

Label edges: if labels exceed 1.5mm thickness, use radiused or bevelled edges.

Minimum lettering heights

Equipment name plates: 40mm.

Warning notices: 7mm.

Automatic controls and electrical equipment: 5 mm.

Isolating switches: 5 mm.

Inside electrical enclosures: 3.5mm.

Other: 3 mm.

1.9 Coordination with the building contractor

The contractor shall liaise with the building contractor to advise the exact extent of works to be provided as Major Associated Building Works listed in the Scope section of this document. The contractor shall provide as a minimum the following information:

- Support requirements for all condensing unit support frames, plinths and enclosures such as weights, mounting points, minimum sizes and location.
- Location and sizes of all roof and wall penetrations
- Location of rubble pits for condensate drainage
- Any other information necessary for the builder to provide all associated works as listed in the scope section of this document.

Design relating to all associated works provided by the building contractor

The building contractor shall be responsible for all design and certification relating to works to be provided as Major Associated building works as listed in the Scope section of this document. This shall include structural certificates, issued by an engineer registered as a professional engineer in Queensland (RPEQ), for all condensing unit and fan coil support frames.

1.10 LOCATION OF AIR CONDITIONING UNITS.

General
The contractor shall liaise with the school principal and Superintendent to determine the location for all equipment.

Fan Coil Units
Particular attention shall be taken to the location of under ceiling fan coil units. Such units shall be located with the rear of the unit as close as possible to a wall within the limitations set down by the manufacturer.

All fan coil units shall be located to avoid existing lighting and ceiling fans.

Condensing Units
Wherever possible, condensing units shall be located in a shaded location either under overhanging eaves or on the southern side of the building. The units can be ground or wall mounted as agreed with the Principal and the Superintendent. Roof mounted condensing units are to be avoided wherever possible.

Locate Condensing units to avoid hot air intrusion to non air-conditioned spaces.

For flood prone areas, condensing units shall be located above flood levels on galvanised steel wall brackets or ground mounted support stands. The contractor shall be responsible for determining such levels and advising the building contractor of the required location and height above ground level for any support brackets or ground mounted stands. All support stands shall be fixed to a concrete plinth. Stainless steel masonry anchors shall be used to fix stands to plinths.

1.11 Condensate drains

Every endeavour shall be made to run condensate lines to the nearest storm water or sewerage connection in accordance with the local council authority requirements.

Condensate lines shall not be run into existing vent pipes or down pipes without prior written approval of the Superintendent.

If no such connection points are readily available, the contractor shall arrange with the building contractor for the provision of a tundish at the building alignment and an underground drain line to a suitable rubble pit for the collection of condensate. Location of rubble pits shall be approved by the Superintendent and the school principal, and meet all local council authority requirements.

Condensate line connections to all drain systems be it sewerage, storm water or a rubble pit shall be via a tundish such as to prevent any backup from the drain system into the air conditioning condensate drain system.

2 Construction standards

2.1 GENERAL

All equipment installed shall be new commercially available in quantity production and well proven in field installation in Queensland.

Locate and install plant and plant items in accordance with manufacturer's instructions and arranged for good access and maintenance.

2.2 AIR-CONDITIONING AND VENTILATION SYSTEMS

Comply with the following standards, codes, regulations and its referenced documents.

- Building Code of Australia
- Workplace Health and Safety Regulations
- SAA/SNZ MP77 A definition of Year 2000 conformity requirements.
- AS 1324 Air filters for use in air-conditioning and general ventilation.
- AS 1571 Copper – seamless tubes for air-conditioning and refrigeration.
- AS 1668 Mechanical ventilation and air-conditioning code.
  Part 1 – Fire and smoke control in multi-compartment buildings.
  Part 2 – Mechanical ventilation for acceptable indoor air quality.
- AS 1677 Refrigeration systems
- AS 1682 Fire Dampers
  Part 1 – Specification
  Part 2 – Installation
- AS 2107 Acoustics – recommended design sound levels and reverberation times building interiors.
- AS 2312 Guide to protection of iron and steel against exterior atmospheric corrosion.
- AS/NZAS-3000:2000 Wiring Rules
- AS 3500 National plumbing and drainage code.
  Part 1 – Water supply.
  Part 2 – Plumbing and Drainage
- AS 4254 Ductwork for air handling systems in buildings
- AS 3663 Acoustics and mechanical vibration – Definition of fundamental qualities and their expression levels
- BS-848 Fans for general purposes:
  Part 2 Methods for Noise
- AS 1345 Identification of contents of piping, conduits and ducts

- AS 1851 Fire protection. Parts 7 & 8

The Australian Institute of Refrigeration, air-conditioning and Heating (Inc.) Application manuals.

- DA 2 Noise control
- DA3 Duct design
- DA15 Air filters
- Occupational Health, Safety and Welfare Regulations.

3 Quality of work and materials

3.1 AUTHORITIES' APPROVALS

Arrange for all inspections required by the relevant authorities at various stages and at completion of the whole installation.

Original document evidencing self-certification or approval by the authorities shall be submitted and copies included in the operating and maintenance manuals.

Make application for all permits required by each relevant authority and pay all associated fees.

3.2 FANS

Install each fan in accordance with manufacturer's recommendations.

Arrange fans and accessories to allow service access for maintenance and removal and for replacement of assemblies and component parts without disturbance of other items of plant.

Wall mounted fans can be fitted in existing window or louvre openings if the installation of the fan does not reduce natural lighting to unacceptable levels. The contractor shall seek the approval of the school principal before proceeding with such an installation. If this is not acceptable to the school principal, the fan shall be installed in the wall.

Fans mounted in window or louvre openings shall be mounted in a suitable fixed panel with sufficient strength to support the fan and to maintain the security integrity of the wall.

For ducted fans, provide air tight flexible connections to prevent transmission of vibration to ductwork. If under negative pressure, ensure that fan inlet areas are not reduced. If necessary, provide expansion pieces between fans and flexible connections.

Ducted fans shall be in-line backward curved centrifugal.

Wall mounted fans shall be centrifugal or axial as listed in the scope section of the document.

Select fans and motors to supply 10% more air than specified against the corresponding increase in system resistance.

3.3 AIR CONDITIONING UNITS

Install in accordance with manufacturer's recommendations.

Condensate from under ceiling air-conditioning units is to be drained under gravity. Condensate pumps are not to be used for this type of unit.

Condensing units shall be mounted on vibration isolation waffle pads as specified in Section 1.5.

3.4 DUCTWORK AND DIFFUSERS

Arrange ductwork neatly. Provide access to ductwork components that require inspection, entry, maintenance and repairs. Where possible, arrange duct runs adjacent and parallel to each other and to building elements.

Provide plenum (cushion head) boxes to diffusers, connected to flexible ductwork. Seal all penetrations.

3.5 PIPING, VALVES AND FITTINGS

Refrigeration pipework and fittings to AS 1571 AND as 1677.

Insulate refrigeration suction lines and liquid lines with 13mm 'Armaflex' type insulation.

Pipe sizing for refrigerant lines shall be established in consultation with the equipment supplier.

Provide 20mm minimum diameter trapped copper or PVC condensate lines from each air conditioning unit. Where condensate lines run within occupied spaces and above ceilings, insulate with 13mm Armaflex' type insulation.

Ensure all pipework is adequately supported and secured to the existing structure with proprietary brackets. As a minimum, all refrigeration lines shall be supported in accordance with QMech Standard Specification 850-713. All condensate lines shall be fixed in place using double-sided saddles at a maximum centre distance of 600mm.

All pipework and electrical cables, external and internal, that are exposed to view, damage or direct sunlight, shall be covered with galvabond or colour-bond steel metal covers. If galvabond covers are used, visible surfaces must be painted to match adjacent building colours. All visible surfaces of Colourbond covers must match adjacent building colours or be treated with a topcoat colour to match.

All sheet metals covers shall be professionally fabricated with lapped and mitred corners and free of any sharp edges and burrs.

In lieu of sheet metal covers, the contractor may use propriety PVC pipework covers.

Seal all penetrations.

3.6 ELECTRICAL SERVICES

The requirements of the Statement of Technical and Functional Requirements for the Electrical Installation shall apply equally to the electrical component of the Mechanical Installation. All electrical work shall be carried out by qualified electricians who hold the requisite certificates of competency issued by the Electrical Workers' and Contractors' Board of Queensland and the Electrical Contractor shall hold an Electrical Contractors' License issued by such Board.

3.7 ACCESS TO SERVICES

All piped services shall be arranged so as to ensure that access is readily available at all times for joint and insulation inspection, etc. and to facilitate easy replacement of defective equipment, if found necessary, in the future.

Access to pipe valves
Service ducts housing piping shall be sized so that valves for floor runs are concealed, with access panels, in the ceiling space. Floor run out pipework shall be kept to a minimum. Run out pipework where required shall generally run over corridors, general office areas, and be kept to a minimum over Library and Computer Rooms. Adequate provision shall be made for servicing of such equipment insitu.

Access for testing and maintenance
Adequate provision shall be made for access to permit testing, servicing and maintaining various system items such as heater protection thermostats/air flow switches, duct mounted return air thermostats, air handling system dampers etc. whether located in plant rooms, duct risers or in above ceiling spaces.

3.8 PAINTING

Paint equipment, ductwork and piping exposed to view with enamel, colours to suit architectural colour scheme. All internal surfaces visible through air outlets and openings shall be painted matt black. All surfaces shall be suitably protected from corrosion.

4 Design criteria

4.1 GENERAL

Design criteria presented herein form the basis for design of the works and for any alternative proposals submitted.

4.2 DESIGN CONDITIONS

Air temperatures

Design Internal Conditions:	Refer to Performance and Guarantee in Scope Document
Design Outdoor Ambient Conditions:	Refer to Performance and Guarantee in Scope Document
Design Occupancy for Ventilation:	Ventilation rates to be as per AS1668-2, or as scheduled in Table 3.2 whichever is the greater.

4.3 NOISE LEVELS

4.3.1 Internal Noise Levels

Noise levels in air conditioned spaces shall not exceed the following levels:

Area	Noise Level
All except as listed below	NR40
Conference or Interview Rooms	NR35
Kitchens	NR45
Manual Arts Workshops	NR45
Cafeteria	NR45
Plant areas	NR55

Noise level measurements within air-conditioned spaces, shall be taken at 1500mm above the floor level at all areas within the space. Noise levels shall not be measured closer than 1m from any flat surface such walls and ceilings.

Internal noise levels in areas adjacent to operating equipment associated with the air conditioning installations shall not have noise impingements of levels higher than those listed above for air conditioned spaces.

4.3.2 External Noise Levels

(a) Noise levels at site boundaries shall meet all local Government requirements for the area and the Division of Noise Abatement and Air Pollution Control.

(b) Noise levels shall not exceed 40 dBA at site boundaries or within 3 metres of noise sensitive areas of the school site.

4.4 SUPPLY AIR

Ducted systems
Air distribution from ducted air conditioning or outside air supply grilles shall provide even, draught free air movement and be readily amenable to modifications to suit partitioning modifications. Air movement to be between 0.10 m/s and 0.25 m/s in occupied spaces measured 1.0 m to 1.5 m above floor level. When a ducted system is used a minimum of one outlet per 15 m^2 shall be provided.

Ductwork shall be concealed within the building fabric wherever possible, eg. ceiling/roof voids. Where ductwork cannot be concealed notify the Superintendent and design/install a surface mounted ductwork installation to the Superintendent's approval.

Ducted outside air systems shall generally consist of a soffit mounted eggcrate grille intake, a panel filter, centrifugal fan, flexible ductwork and a ceiling mounted diffuser outlet. The ceiling outlet shall be mounted in a cushion head box. Outside air shall not be directly connected to air conditioning units. Intake to the ductwork shall be fitted with galv. steel vermin mesh.

Fans shall be three phase backward curved centrifugal.

Provide internal ductwork insulation only as required to the noise criteria specified.

Outside air distribution shall be arranged to provide discharge into the room to provide good mixing of room and outside air before air is returned to the air conditioning unit. Outside air outlets can be located adjacent to air conditioning return air grille only if a stable and reliable return air temperature can be sensed.

In addition to the criteria above, outside air should be introduced into spaces in such a way as to avoid occupants experiencing any hot spots.

Outside air volumes shall be balanced proportionally between each air conditioning unit serving the space.

Wall Mounted Fan Units
Where listed in the Scope section of the tender document, the contractor shall provide proprietary wall mounted fan units.

Where a wall mounted axial fan is listed, the contractor shall provide a single-phase fan unit which has a weatherproof intake grille, an axial fan and inlet grille. No filter is required in this case. The fan speed shall be adjustable to meet the air quantity required.

Where a wall mounted centrifugal fan is listed, the contractor shall provide a single fan unit that has a weatherproof intake, a forward curved centrifugal fan, panel filter and outlet to discharge air into the air conditioned space. The unit case shall be constructed from powder coated sheet metal. The fan speed shall be adjustable to meet the air quantity required.

Outside Air Intakes
Where possible outside air intakes for all types of outside air systems shall be located in shaded areas such as under building eaves or from the southern side of the building. Wall mounted fan units can be located in walls of open verandahs provided approval is received from the school Principal and Superintendent and the fan is located such as to not cause noise or safety problems.

Where it is impossible to draw air from a shaded area, outside air can be drawn from a roof mounted weatherproof cowl. If such an intake is installed, the cowl shall be located at such a height above the roof to avoid any radiant heat load from the roof sheeting. In addition, the duct riser supporting the cowl shall be internally insulated with 50mm insulation.

4.5 DUCTWORK

Supply air ductwork:

Element	Criteria
Main supply air duct. Low Pressure	6.0 m/s maximum. 0.8 Pa/m
Neck velocity for supply air outlet	2.5 m/s maximum

Pressure drop is not to exceed 80 Pa between first and last outlets.

Flexible ducts

Flexible duct sizes are to be in accordance with Qmech standard specification 850-881 Ductwork.

4.6 MISCELLANEOUS PLANT

Element	Criteria
Air Filters	In accordance with the filter supplier's recommendations but not exceeding 2.5 m/s maximum
Door & Transfer Grilles	2.5 m/s through free area
Outside Air Louvres & Grilles.	At a velocity such that there is no water ingress with a maximum face velocity of 2.5m/s.

5 Control System

5.1 GENERAL

Provide a complete and fully automatic electronic control system which allows year round operation of the plant to meet the specified conditions without manual adjustment and which shall include all safety devices to provide complete protection of the plant.

All control components shall be proprietary manufacture and proven design from a recognised supplier with comprehensive stock backup, held in Australia. Control components shall be of the same manufacture, however, where this is not possible, proposed controls not of the same manufacture as the majority of controls, shall be submitted for approval.

Provide current generation systems of robust, tamper-proof fully compatible controls, from the current range of recognised control manufacturers, for which stocks of replacement parts, spares and service facilities are readily available in Queensland.

Qualified service and maintenance personnel fully familiar with the equipment shall be available twenty-four hours per day with spare parts availability on twenty-four hours notice.

After acceptance of tender, wiring schematics showing each component, shall be submitted for perusal before preparation of wiring diagrams.

The calibration, function and sequence of operation shall be checked and adjusted, if required, by a competent controls technician at six monthly intervals (to coincide with the Level 2 service visits) during the Defects Liability Period. Include the outcome of each visit in the service report.

Each item of control equipment shall be clearly marked by an engraved traffolyte label or other approved means to indicate the function it performs.

Provide necessary auxiliary field devices such as room temperature sensors, local control panels, time switches, etc and external control cabling as required to interface with the integral equipment controls and to provide a fully automatic control system.

All controls located within the air-conditioned space or accessible by students and staff shall be a maximum of 24 volt.

Commission and test all systems and calibrate all temperature sensors.

5.2 AIR CONDITIONER AND OUTSIDE AIR FAN CONTROLS

Control of air conditioning for Cooler Schools installations is to be achieved by the following two methods:

- **Proprietary**
  This method is the typical method of control for staff only related areas.

  This method shall utilise the air conditioning supplier's standard controller. Operation of outside air fans shall be via an ON/OFF toggle switch located on the wall adjacent to the controller.

- **Timer control**
  This method is to be used for all student-related spaces.

  This method shall utilise a control panel that incorporates the following functions.
  - An 'ON' press button. Pressing this button shall, via a 0-8 hour adjustable timer, initiate the operation the air conditioning unit/s and, after a time delay of 5 minutes, the outside-air fan/s.
  - An 'OFF' press button that will override the 'ON' and shut off the air conditioning unit/s and outside air fan/s.
  - A green 'RUN' light.

  The timer controlling operation of the air conditioning units shall initially be set to the run for either 2 or 8 hours as listed in Table 3.1 of the Scope Document.

  All timers are to be inaccessible to the building occupants and as such shall be located in a controls enclosure as specified Clause 5.5.

5.3 CEILING CASSETTE AIR CONDITIONING UNITS

In addition to the controls listed in Clause 5.2 above, all ceiling cassette air conditioning units are to be provided with a run-on time function to empty condensate drain trays. At any call to stop air conditioning units, the condensate pump shall continue for sufficient time to drain the tray.

5.4 CONTROL PANELS

Control panels incorporating the press button control functions listed above shall be positioned at 1500mm above the floor and adjacent to light switches in the air-conditioned space. Where possible, the control panels shall match adjacent light switches. Only those controls associated with user operation shall be housed in this panel and shall be 24 volt maximum. The panels shall be clearly labelled 'AIR CONDITIONING'. In addition, each function on the panel shall be labelled to indicate operation ie 'AIR CONDITIONING ON', 'AIR CONDITIONING OFF'.

Control panels for the 'proprietary' installations shall have unit manufacturer's controller positioned on the wall at 1500mm above the floor and adjacent to light switches in the air-conditioned space. The outside air fan controller shall be a flush mount panel to match adjacent light switches and be located adjacent to, and at the same height as, the air conditioning unit controller. Provide clear labelling above each item to indicate operation ie. 'AIR CONDITIONING CONTROL' and 'FRESH AIR FAN SWITCH'.

A single control panel shall control, and simultaneously operate, all air conditioning units serving one area. It shall also simultaneously initiate the 5-minute delay operation of all outside air fan units associated with those air-conditioning units. Following a call to operate from the control panel, sequenced start-up of each individual air-conditioning unit shall be achieved by the unit's internal controls. A call to stop, from either the manual stop button or via the timer, shall stop operation of all equipment serving the space.

5.5 CONTROLS ENCLOSURES

All low voltage controls and electrical wiring (up to and including 24 volt), necessary for a complete and operative operation, but are not necessary for access by room occupants, shall be located in a PVC enclosure with a screw fixed solid cover. This enclosure shall be located at high level in the air-conditioned space. This enclosure shall house such items as timers, equipment supplier's controllers and thermostats.

All high voltage controls (above 24 volts) shall be located in a lockable metal enclosure. This enclosure shall preferably be located outside the air-conditioned space. A suitable location would be above ceilings (if accessible for maintenance), adjacent to electrical distribution boards in the building or in the condensing unit enclosure. If not possible to locate outside the air-conditioned space, this enclosure shall be located at high level adjacent to the low voltage enclosure specified above.

5.6 HITACHI AND CARRIER CONTROL

To achieve the control functions specified above, the contractor shall provide all modifications and additional control items as necessary to the Principal supplied air Hitachi or Carrier conditioning units. The level of modification required will be dependent on brand of air conditioning unit supplied. It is the purpose of this section is to highlight some the modifications and controls necessary to each of the brands and configurations. The following is a list of some of the modifications required however is a guide only and should not be taken as definitive. The contractor shall liaise with the respective equipment manufacturer to determine the full extent of works necessary to provide a fully operative installation.

The contractor shall seek written approval from the equipment suppliers that any modifications and additional controls provided under this contract do not void the equipment warranty.

Refer to the Scope section of the tender document for the brand of unit to be used in each space.

5.6.1 Hitachi Air Conditioning Units

- **Single phase 2.5, 5 and 8 kW wall and under ceiling mount units**
  These units shall only be installed in staff related areas. The units as supplied by the Principal shall include a remote infra-red controller. Any loss of power to these units will require the temperature to be manually reset by the occupant using the remote controller.

  The units shall also be supplied with return air thermostats for control of compressors.

  The contractor shall provide all controls necessary to allow occupant control of the outside fan.

- **Three phase ceiling cassette and under ceiling mount units**
  Each of the units as supplied by the Principal shall include a controller that shall be hard wired to the fan coil unit. The units shall also be supplied with return air thermostats for control of compressors.

  For installations requiring multiple fan coil units serving the one space, one of the controllers shall be utilised for diagnostic enquires and temperature setting of all units. For such installations one air conditioning unit and controller shall serve as a master and other units in the space as slaves.

  All unused controllers shall be returned to the Principal.

  As a minimum the contractor shall be required to supply the following to provide a fully operative installation:

  - A run timer as required for either 2 or 8 hour operation of the air conditioning as specified. The timer shall be hard wired into the fan coil controls and be interlocked to outside air fan units to provide a 5 minute time delay start of fans. For the Hitachi units, the outside air interlock can be achieved via an output from the fan coil unit.
  - Press button start and stop buttons.
  - Run lights.
  - Run on time control for the condensate pump (ceiling cassette only). For the Hitachi units, the run-on interlock can be achieved via an output from the fan coil unit.
  - All other wiring and controls necessary for a complete and operative installation.

  For areas requiring single-phase units to run in conjunction with Hitachi three phase units (ie within the one space), the single-phase units shall be supplied as Carrier units. This due to the limitation of Hitachi single phase units to retain temperature setting after loss of power ie via timer control or power supply failure. Where such a case exists, the contractor shall provide, as a minimum, the following additional controls to operate the Carrier single-phase unit:

  - Interlock to 2 or 8 hours timer control as specified. This interlock shall operate the outside air fan serving the space. This interlock shall start and stop the air conditioning by an interruption of the power supply to the unit. The carrier unit remote infra-red controller shall be used for the initial temperature setting. After commissioning of the unit, this controller shall be housed in the low voltage controls enclosure as specified above.
  - All other wiring and controls necessary for a complete and operative installation.

5.6.2 **Carrier Air Conditioning Units**

- **Single phase 2.5 and 5 kW wall mount units**

  Each unit supplied by the Principal shall include a remote infra-red controller. Where installed in staff only related areas, the units shall be installed to be controlled via the infra red controller allowing temperature settings by the occupant.

  The units shall also be supplied with return air thermostats for the control of compressors.

  The contractor shall provide all controls necessary to allow occupant control of the outside fan.

  Where installed in student related areas the starting and stopping of the air conditioner/s shall be achieved by the interruption of power supply to the unit. This interruption of the power supply shall be via a 2 or 8 hour timer control as specified. Where such a case exists, the contractor shall provide, as a minimum, the following additional controls to operate the air conditioning unit/s:

  - Interlock to timer. This interlock shall also operate the outside air fan serving the space. The remote infra-red controller shall be used for the initial temperature setting. After commissioning of the unit, this controller shall be housed in the low voltage controls enclosure as specified above.
  - All other wiring and controls necessary for a complete and operative installation.

- **Three phase ceiling cassette units**

  The Carrier ceiling cassette air conditioning units supplied by the Principal shall include a number of remote infra-red controllers (typically one per building). This controller shall be used for diagnostic and temperature setting purposes. After commissioning of the unit, this controller shall be housed in a low voltage controls enclosure as specified above.

  Note: One single remote controller can be used for temperature settings of all air conditioning units in the building.

  Each unit shall be supplied with a return air thermostat for control of compressors.

  As a minimum the contractor shall be required to supply the following to provide a fully operative installation:

  - A run timer as required for either 2 or 8 hour operation of the air conditioning as specified. The timer shall be hard wired into the fan coil controls and be interlocked to outside air fan units to provide a 5 minute time delay start of fans.
  - Press button start and stop buttons.
  - Run lights.
  - Run on timer for the condensate pump.
  - All other wiring and controls necessary for a complete and operative installation.

  Areas requiring single-phase units to run in conjunction with three phase units, the starting and stopping the units and associated outside fans shall be as previously described for Carrier single-phase units but interlocked to the common controls operating the three phase units. After commissioning of the unit, the infra-red remote controller supplied with the unit shall be housed in the low voltage controls enclosure as specified above.

- **All three phase under-ceiling units and 5 and 8 kW single phase wall and under ceiling mount units**

  These Carrier air conditioning units supplied by the Principal shall not be supplied with any form of controller as described for the ceiling cassette units above. Also, the units do not come fitted with a thermostat control for operation of the compressor. In this case it is the contractor's responsibility to provide all controls necessary to start and stop the unit and to provide a hard-wired thermostat signal to the fan coil unit and compressor for the automatic control of equipment.

  As a minimum the contractor shall be required to supply the following to provide a fully operative installation:

  - A run timer as required for either 2 or 8 hour operation of the air conditioning as specified. The timer shall be hard wired to the fan coil and condensing unit controls. It shall also be interlocked to outside air fan units to provide a 5 minute time delay start of fans.
  - Press button start and stop buttons.
  - Run lights.
  - Thermostat, thermostat sensor and all associated wiring and controls. The thermostat sensor can be room or unit mounted as necessary to provide stable room temperature control. The thermostat control shall be located in the low voltage controls enclosure.
  - All other wiring and controls necessary for a complete and operative installation.

  For areas requiring single-phase units to run in conjunction with three-phase units, the starting and stopping the units and associated outside fans shall be as previously described for Carrier single-phase units but interlocked to the common controls operating the three phase units. After commissioning of the unit, the infra-red remote controller supplied with the unit shall be housed in the low voltage controls enclosure as specified above.

5.7 SOFT STARTS

The following single-phase air conditioning units shall be supplied with a soft start:

- All Carrier 5 and 8 kW units.
- Hitachi 8 kW units.

The contractor shall install the soft starts as advised by the manufacturer

5.8 POWER FAILURE

In the event of a power failure, all equipment shall, after reinstatement of power, automatically return to its operational state prior to the failure.

The exclusion to this shall be single-phase units serving staff only areas. In this case it is acceptable for the occupants of the space to reset the temperature using the infra-red remote controller.

6 Commissioning

6.1 GENERAL

Acceptance of practical completion and of final completion shall require the Contractor to demonstrate that the system meets the intent of the design.

Any and each deviation from the proposed design concept and design criteria must be supported by individual written approval.

Include the requirements recommended by equipment manufacturer.

6.1.1 Requirement

For each required test, provide a report or certificate in a form suitable for inclusion in an operation and maintenance manual, signed and dated, legibly typed or printed recording:

- the type of test;
- the test procedures;
- the apparatus and instruments used;
- the date, time and place of the test;
- the ambient and other relevant conditions;
- the name, status, function and signature of each person present;
- the test results;
- where applicable, calculations, instrument readings, control settings, name plate ratings, and the like;
- variations to the specification, if any.

6.1.1 Testing and Commissioning methods

Submit for approval, proposed methods for testing and commissioning of all equipment.

6.2 COMPLETION

6.2.1 Commissioning

General

When the installation is complete, commission the installation by putting it into working order and operating it for not less than the designated time controlled period (ie 2 or 8 hour operation). For proprietary control installations the commissioning period shall be a minimum of 2 hours. Make the adjustments necessary to achieve the designated performance under continuous operating service conditions, including balancing, setting the controls, and checking the operation of overload and safety devices, and correcting malfunctions.

All commissioning tests shall be carried out with all equipment in its fully operational state. This shall include all outside fans and time clock controls.

Air conditioning and outside air fan supply air balancing.

Adjust all air-handling systems to give flow rates within +10, -0% of design air quantities, subject to the following:

- Distribution: Distribute air to minimise draughts.
- Fans: Adjust fans to run at lowest fan speeds and power consumption and with minimum resistance to meet the design quantities.
- Filters: All filters must be clean prior to final commissioning tests.

  The contractor shall also carry out simulated dirty filter tests. This test shall simulate a condition equal to the mean and of the initial and final resistance of the filter bank. At this condition the air quantities must not be below that of the design air quantity.

Multiple Systems
If there are multiple inter-related air handling systems, all systems shall operate concurrently.

Dampers
Mark final position of dampers when balancing is complete.

Reports
Include on the commissioning data sheets the design and actual air quantities.

6.2.2 **Practical Completion Acceptance Tests**
Undertake a fully functional trial of the installed equipment prior to practical completion. At this test the contractor shall demonstrate, to the Superintendent's satisfaction, that the installation has reached the fully functional design requirements of the specification.

The contractor shall give the Superintendent 2 weeks written notice of the test date.

The basis for acceptance of the mechanical services installation shall be that all equipment and systems meet the system performance requirements specified and that the systems have operated satisfactorily in normal operating mode for 5 consecutive working days. These requirements must be met before the Certificate of Practical Completion will be issued.

The functional trial will be required to demonstrate stable, safe, reliable operation of the installed equipment through the whole range of plant operation. Supply all labour and test equipment for the trial and, if necessary, coordinate with specialist subcontractors to attend after normal working hours to carry out the trial. If the trial proves unsatisfactory, rectify all faulty work and repeat the trial without contract price variation.

The Contractor's costs for repeating failed tests shall, if requested by the Superintendent, include the cost of the Superintendent's time and expenses for attending the repeated test.

6.2.3 **Cleaning**
At practical completion, clean the following:

- Switchgear and contactors, and other electrical contacts. Adjust as necessary.
- Strainers.
- Air filters. Replace if the resistance exceeds the mean of the initial and final resistance of the filter bank.

7 Service and maintenance

7.1 GENERAL

During the Defects Liability Period carry out periodic service and maintenance inspections as scheduled below and as recommended by equipment manufacturers.

Submit details of service and maintenance procedures and program six weeks before Practical Completion.

It is a particular requirement that the Contractor respond promptly to problems as reported by the end-users. If required, the Contractor shall arrange for a hot swap of air conditioning units or fans within 3 working days of being notified.

7.2 SERVICE AND MAINTENANCE VISITS

The contractor shall carry out, as a minimum, three and six monthly service and maintenance visits to ensure continued reliable operation of the installation. These visits shall include, but not limited to, the following:

Level 1 Service (3 monthly)

- Service all air conditioning equipment as required by the equipment manufacturer.
- Inspect operation of outside air supply systems. Rectify any faults.
- Inspect all condensate drain trays and lines and rectify any leaks or blockages.
- Clean all filters.
- Address any concerns by the school regarding controls, noise levels and general operation of the installation.

Level 2 Service (6 monthly)

- Service all air conditioning equipment as required by the equipment manufacturer.
- Service all outside air fans as required by the fan manufacturer.
- Inspect operation of outside air supply systems. Rectify any faults.
- Inspect all condensate drain trays and lines and rectify any leaks or blockages.
- Clean all filters.
- Address any concerns by the school regarding controls, noise levels and general operation of the installation.
- Check all items of equipment for operation, calibration, performance compliance, temperature and energy consumption, and record values.

- Check motors and machinery for excessive operating temperature, bearing noise and excessive vibration.
- Check anti-vibration supports, brackets and clamps, holding down bolts and flexible connections, for deterioration and for freedom of movement of assembly.
- Check condition of insulation, and repair if damaged.
- Check electrical and control systems, including safety limits for temperature and pressure.
- Record readings of thermometers, gauges, meters, current draw of motors and heaters, control set points and controlled space conditions.
- Check refrigeration systems for temperature, pressure and gas tightness. Rectify any gas leaks and recharge refrigerant system as necessary.
- Replace faulty and damaged parts.

Additional service visits

In addition to the minimum service visits schedule above, the contractor shall carry out any additional service visits necessary to ensure the air conditioning unit manufacturer's warranty is maintained. This may occur in such cases as schools located in dusty locations, necessitating more frequent filter cleaning. The contractor shall clarify with air conditioning unit manufacturer the situations where additional service visits are required.

Final Completion Service (end of defects period)

Immediately before the end of the twelve months defects period, carry out a Level 2 service.

The contractor shall give the Superintendent 2 weeks notice of the end of defects service so that a final inspection can be held concurrently.

Note:
The air conditioning units supplied by the principal have a five-year warranty. In order that this warranty remains valid, regular component servicing and maintenance of the air conditioning equipment must be continued beyond the final completion date in accordance with the manufacturer's requirements. Two weeks prior to the end of the defects period, the contractor shall advise the school principal of this requirement. It shall be the school principal's responsibility to arrange for continuing maintenance beyond the final completion date.

Service and maintenance records

Submit in binders which match the manuals, loose leaf leg book pages designed for recording completion activities including operational and maintenance procedures, materials used, test results, comments for future maintenance actions and notes covering the condition of the installation. Include completed logbook pages recording the operational and maintenance activities performed up to the time of practical completion.

Certificates: Include test and approval certificates.

Service visits: Record comments on the functioning of the system, work carried out, items requiring corrective action, adjustments made and name of service operator. **Obtain the signature of the school principal's designated representative.**

Referenced documents: If referenced documents or technical sections require that log books or records be submitted, include this material in the maintenance records.

Certification: On satisfactory completion of the installation, submit certificates stating that each installation is operating correctly.

8 Shop drawings, operation and maintenance manuals

8.1 SHOP DRAWINGS

The contractor shall produce workshop drawings prior to commencement of installation and manufacture of any components or ductwork necessary for completion of the works and coordination with other trades such as building and electrical works.

All mechanical drawings shall be submitted to the Superintendent for information only. The drawings shall signed by the Contractor's responsible officer. Drawings requiring approval shall also be forwarded to any relevant regulatory authorities.

The drawings shall include, but not limited to the following:

- Arrangement drawings showing size, location and height or depth of all air conditioning fan coils, condensing units, piped services, electrical cables and ductwork. Particularly show the size and fully dimensioned locations of all penetrations.
- Details of working platforms including method of support.
- Details of all condensing unit and fan coil support brackets, platforms and fixing details. A structural certificate, issued by shall by an engineer registered, as professional engineer in Queensland (RPEQ), shall accompany all such drawings. The engineer shall certify that all components are structurally sound.
  Note: It is the building contractors responsibility to provide all structural steel work necessary for the support of air conditioning equipment. This work shall include all design and structural certification as required.
- Layouts and sections of all plant and equipment including ductwork and pipework and associated supports.
- Power and control circuit wiring diagrams of all plant. This shall include dimensioned arrangement of control panels. Such diagrams shall clearly indicate the function of each item of equipment.
- Where packaged equipment is supplied, include the manufacturer's standard circuit diagram, modified to comply with the specified system and control requirements. Should the modifications require the provision of an additional control board or cabinet, a dimensioned arrangement, including equipment layout, of such board or cabinet shall be included.

All drawings shall be done on AutoCAD release 12 (minimum) only use reduction scales 1:20, 1:50, 1:100 or multiples of 10 of these SCALES. All lettering shall be a minimum 3.5 mm high and complying with AS 1100 'Technical drawing Part 101 (1992) – General principles suitable for microfilming'.

The examination of shop drawings by the Superintendent shall not remove the responsibility for the correctness of the dimensions of such drawings not conforming strictly with the requirements of this specification nor compliance with statutory regulations.

8.2 AS INSTALLED DRAWINGS

All workshop and/or detail drawings shall be modified at completion of the installation and used as 'as installed' drawings for inclusion in operation and maintenance manuals. Final copies of the CAD 'as installed' drawings shall be forwarded to the Superintendent.

8.3 OPERATING AND MAINTENANCE MANUALS

Prior to practical completion, prepare and submit to for approval, two draft copies of the operation and maintenance manual. The manuals shall include 'as installed' shop drawings and diagrams together with concise operating and maintenance instructions, schedules and commissioning records specified below. The approval of any such manuals shall not relieve the contractor of any responsibility for the design and operation of the installation. The approval is solely for the purpose of ensuring that the manual includes all necessary data and is 'fit for purpose'.

Within two week's prior to Practical Completion, three bound sets of the final manual shall be submitted to the Superintendent. These manuals shall include all revisions requested by the Superintendent when reviewing the draft manual.

The manual shall give a clear, comprehensive description of all the equipment, components and sub-components, principle of operation, method of operation and maintenance procedures. The descriptions shall be accompanied by flow diagrams, line diagrams and any other illustrations necessary to achieve the required objective.

Operation and maintenance manuals and associated drawings shall be supplied as a quality publication and shall be as follow:

Designer to select type of binding and be consistent with electrical and fire services.

- White A4 sized hard cover, Marbig Catologue No. 150694 2D ring vinyl covered binder with main title in '30 Times Roman' secondary lettering in 12 and 10 Uni' upper and lower case as appropriate.
- Titles for the manuals shall be:

OPERATING AND MAINTENANCE MANUAL

MECHANICAL SERVICES

'..... STATE *HIGH* SCHOOL'

Spine:

'..... STATE *HIGH* SCHOOL – AIR CONDITIONING'

All material contained in the manual shall be printed by an approved process on approved quality paper. This requirement includes all illustrative material.

Include the following type and range of data and information in the manual:

- A contents page;
- drawing list – a complete list of drawings and numbers showing final revision suffix with their titles;

- general description and performance data for all equipment;
- As installed drawings;
- manufacturer's catalogues of the equipment;
- parts list – a schedule of parts duly illustrated and showing name of manufacturer, part number and quantity;
- installation instructions – to describe original installation procedures, alignment diagrams and figures, fit tolerances, and future removal and replacement procedures for all major equipment;
- operating instructions – include all details necessary for correct start up procedure and sequence of operation;
- service and maintenance instructions – include all phases of service and preventive maintenance including such items as a detailed lubrication chart, grade and type of lubricant, correct quantities of oils and greases, and procedures for drain and refill;
- maintenance schedules – include detailed schedules of periodic checks and maintenance and replacement procedures;
- test data – include copies of all test certificates including physical test of materials, as well as machine performance data, noise and vibration test figures and all progressive test data obtained during construction and installation;

SPECIFICATION – ELECTRICAL

1 General requirements

1.1 GENERAL

Requirements of individual technical sections of this document override conflicting requirements for this section.

1.2 REFERENCED DOCUMENTS

1.2.1 Current editions

Use referenced documents which are editions, with amendments, current three months before the contract award date, except where other editions or amendments are required by statutory authorities.

1.2.2 Statutory authorities

Comply with the relevant requirements of the following authorities:

- Local Council
- Electrical supply authority
- Department for Industrial Affairs
- Occupation Health, Safety and Welfare Regulations
- Land Services (Department of Environment and Natural Resource)
- Australian Communications Authority

1.3 INTERPRETATION

1.3.1 General

Unless the context otherwise requires, the following definitions apply:

- Supply: 'Supply', 'furnish' and similar expressions mean 'supply only'.
- Install: 'Install', 'fix' and similar expressions mean 'install only'.
- Provide: 'Provide' and similar expressions mean 'supply and install'.
- Proprietary: 'Proprietary' mean identifiable by naming manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Samples: Includes samples, prototypes and sample panels.

1.3.2 Abbreviations

AS: Australian Standards.

1.4 FIRE STOPPING

Penetrations through any fire-rated barriers shall be sealed with approved fire stopping devices and packing after installation of ducts, pipes and conduits. Ensure that the integrity of the fire rating is maintained. The whole method of fire sealing shall be in accordance with the requirements of relevant statutory authorities, including the Building Code of Australia, and manufacturer's recommendations.

The fire containment properties of switchboards shall be maintained following the installation of cables.

1.5 RADIO FREQUENCY INTERFERENCE

Use equipment which generates interference within limits set by AS/NZS 044. If necessary, provide suppression devices. If appropriate, shield equipment to AS/NZS 1044.

1.6 SUPPLY AUTHORITY

Requirements by the Supply Authority for the installation of pillars and, or the removal of property poles shall be carried out by the Contractor without additional cost to the contract.

All disused equipment shall be removed from site and the disturbed areas reinstated.

2 Electrical supply – consumer and submains, subcircuits

2.1 SCHEDULE

- Consumer mains: As scheduled in Section 4 "Performance and Guarantee".
- Submains: As scheduled in Section 4 "Performance and Guarantee".
- Subcircuits: Power: minimum size 2.5 mm^2.

2.2. APPLICABLE STANDARDS

The following standards are referred to in this section:

• AS 1125	Conductors in insulated electric cables and flexible cords
• AS 1345	Identification of the contents of piping, conduits and ducts
• AS 2053	Non-metallic conduits and fittings
• AS/NZS – 3000:2000	Wiring Rules
• AS 3008.1.1.	Cables for alternating voltages up to and including 0.6/1 kV - typical Australian Conditions

Testing

Certify that the connected electrical installation has been tested in accordance with the requirements of AS/NZS – 3000. Tests shall be witnessed by the Principal.

2.3 CABLES

Cable manufacture

Standards:

- Conductors – to AS 1125
- Selection of cables – to AS 3008.1.1
- PVC insulated cables – to AS 3147.

Cable selection

- Standards: To AS/NZS – 3000 and AS 3008.1.1.
- Ratings: Use AS 3008.1.1. for the selection of cables.
- Conductors: Use multi-stranded copper conductors.

2.4 CONDUITS AND CABLE SUPPORT

Conduits Generally

Standards:

- Non-metallic conduits and fittings – to AS 2053
- Fixings: Provide two fixings per conduit saddle. Do not use explosive-powered or similar equipment unless approved.
- To Woodwork: Conduit matching saddles and round head cadmium-plated steel wood screws.
- To Masonry: Conduit matching saddles and round head cadmium-plated steel screws screwed into expanded or other proprietary type plugs neatly fitting into drilled holes
- To Steelwork: Cadmium-plated steel metal-thread screws. Drill and tap the steelwork for each saddle.
- Support: Unless otherwise specified, fix conduit saddles at a maximum of 600 mm intervals in horizontal runs and 1 metre intervals in vertical runs. Ensure that installed conduits are fully supported during construction.
- Lengths: Up to the commercially obtainable conduit lengths of run, install conduits without joints. Remove all rags, burrs, and sharp edges from each length before completing each conduit joint. Fit moulded plastic screwed bushes to the free ends of metallic conduit runs before installing the conductors.
- Draw-in Boxes: Provide draw-in boxes at suitable intervals not exceeding 30 m in straight runs, and at intervals not exceeding 25 m in other runs including directional changes

Non-metallic conduits and fittings

- Type: Unless otherwise specified, use heavy duty type. Associated fittings shall be of the same material as specified for the conduit.
- Joints: Use cemented joints. Adopt the manufacturer's recommended procedure for making joints.
- Fittings: Use inspection-type fittings in accessible and exposed locations.
- Conduit setting: Where practicable have conduits performed by the manufacturer. At site, use correctly sized springs to form sets in UPVC conduit. Bends shall be of large radii and, after setting, shall maintain effective diameter and shape. Reject conduit sets distorted by kinks, wrinkles, flats or heating.
- Expansion joints: Install flexible couplings where structural expansion joints occur in buildings and in straight runs not embedded in wall chases or floor slabs. Space the flexible couplings in straight runs at intervals of not more than 4 m. Install conduit

saddles close to the flexible coupling in a manner which allows free movement for expansion and contraction.

- Mechanical Damage: In situations where the conduit is exposed to mechanical damage and external to buildings, provide mechanical protection to UPVC conduit for a height of not less than 3 metres above ground or platform level.

- Restrictions On Use: Do not install PVC conduit in locations where
  - exposed to direct sunlight;
  - subject to mechanical damage or high ambient temperatures

- Roof Spaces: Where installed across rafters or joists, fasten conduit to the side to timber battening of adequate dimensions.

- White PVC Conduit: Reserved for Communications and Telstra conduits. Do not use for light and power installations

Flexible conduit

- Type: Use PVC flexible conduit with associated fittings unless specified otherwise. Colour to be same as associated rigid conduit.

- Use: In addition to its use on expansion joints, fit flexible conduit to equipment subjected to vibration or where necessary for adjustment or each of maintenance.

- **Length: The maximum length of a flexible conduit connection shall be 600 mm unless otherwise approved.**

Cable and conduit supports

General

Except in areas such as ceilings, all other areas where cables are accessible, the cable support system shall consist of steel trays for electrical cables.

Support system

Bends, connectors, brackets, and other supports necessary to make a complete cable or conduit support, system shall be of the same manufacture, sized to adequately support the installed cabling.

Steel trays

- galvanise after manufacture to AS 1650;

- minimum steel thickness:

  - trays up to 150 mm wide – 1.0 mm
  - trays from 150 mm to 300 mm wide – 1.2 mm

- folded edge – minimum height 20 mm, radiused;
- slotting – normal or reverse with no burns or sharp edges.

Cable fixing

Slots shall be suitable for fixing cable ties, strapping or saddles.

Bend radius

Bends shall have a minimum inside radius of not less than twelve times the outside diameter of the largest diameter cable carried.

Spare capacity

Provide sufficient space on the tray or ladder for not less than 30% more cables or conduits than specified.

Access

Position the support system to give adequate access for inspecting, replacing, or adding cable.

Cable strapping

Fix cable to the support system by proprietary nylon ties, straps or saddles in accordance with AS NZS – 3000.

Cable protection

Provide a slightly curved support surface under cables leaving the tray or cable ladder to protect the cable sheath from impingement by the tray or ladder edge.

Clearance

Maintain at least 200 mm clearance from hot water. Telephone cable clearances shall comply with the requirements of the Australian Communications Authority.

Installation

Installation generally

- Standard: To AS/NZS – 3000, AS 3008.1 and AS 3012 for construction and demolition sites.
- Three –phase arrangement. Run three-phase single core conductors in trefoil arrangement.
- Handling cables: Handle cables so as to avoid damage to insulation and serving or sheathing. Report all damage and replace or repair damaged cable as directed.
- Straight-through joints: Unless unavoidable due to length or difficult installation conditions, run cables for their entire route length without intermediate straight-through joints. Locate approved joints as directed.
- Installation: Install and adequately support fixed wiring as specified throughout the installation.

Specific applications

- Wiring system: To AS 3013.
- Concealment: Unless otherwise specified, conceal and protect cables and conduits.

Cable colours

Conductors

- colours – use cables with coloured insulation or, if this is not available slide not less than 150 mm of heat shrinkable coloured sleeving to each conductor at the termination points as follows:

  - active conductors in single-phase circuits – red;
  - active conductors in polyphase circuits:

    A phase – red
    B Phase – white
    C phase – blue
    neutral – black;

  - Compacted cables may be used, provided all associated switchboards are marked with the relative information.

Tagging

Identify multicare cables and trefoil groups at each end at crowded intermediate points by means of stamped, non-ferrous tags, fixed around each cable or trefoil group.

Sheathing colour

Grey for flat TPS cables and orange for circular cables.

Setting out of reticulation

- Cable routes: Determine the final routes to suit the building structure or site conditions.
- Surface wiring should only be used where concealment is not possible.
- Arrangement: Arrange cables and conduits parallel with walls, ceilings and floors.

Penetrations

- Fire walls and structural members: Do not penetrate without approval.
- Damp courses: Do not penetrate.
- Floor slab: Install pipes entering a building at ground level under the waterproof membrane and vertically penetrate the membrane and the floor slab.
- Sleeves: Provide UPVC sleeves for cables passing through ground floor slabs, ground floor beams and external walls.
- Penetration size: Provide a penetration of diameter 10 mm greater than the pipe or sleeve diameter.
- Sealing – non-fire rated: Seal penetrations around conduits and sleeves with a weak sand:cement mix, or similar sealing compound approved by the Builder. Seal the space between cables within sleeves with a pliable waterproof compound.

- Sealing – fire rated: Seal cable and conduit penetrations through fire rated barriers with Bradford Harditherm 700 fire seal packing retained in the barrier by close-fitting 12 mm think.

Metallic support systems and fixings

Fabrication

- Provide brackets, racks, hangers and other support sized to adequately support the installed system and equipment, fabricated from structural steel sections or from other materials in sections of equivalent strength.

- Minimum thickness of structural steel sections:

  - angles and bars – 6.5 mm.
  - rods – 10 mm diameter.

Fixing to building structure

- Fix the support by surface fixing to ceilings and walls, or suspension hangers from ceilings, or angle brackets or racks from walls, using the following methods, as appropriate, unless otherwise specified:

  - masonry or concrete walls – drilled masonry anchors
  - concrete slab ceilings – drilled masonry anchors.
  - Masonry anchors to be stainless steel where exposed to weather

- Fire rated penetrations – support systems shall not pass through fire rated barriers. Such systems shall stop at last 150 mm away from fire rated barriers.

- Fixing of tray or ladder – bolt the tray or ladder to the brackets, racks and other supports. Provide a support at each joint in the tray or ladder system.

- Suspend cables etc clear of all ceilings. Existing ceiling hangers shall not be used for this purpose.

Finishes

- Surface preparation – where metal surfaces are to be painted, prepare them as specified by the paint manufacturer.

- Paint system – unless otherwise specified, paint conduits and support systems as follows:

- Indoor locations – full gloss, solvent-borne, applied in accordance with the paint manufacturer's directions.

- Paint colours – in locations exposed to view use a final coat of approved colour, generally to match the surroundings.

Single insulated wiring in conduit

- Not applicable, all 240V or 415V cabling shall be TPS PVC/PVC insulated.

2.5 UNDERGROUND SERVICES

Cables in trenches

Existing surfaces

Before excavating trenches, saw-cut existing concrete and bituminous surfaces on each side of the trench to provide a straight even joint. Lift and store unit paving for later reinstatement.

Excavation

Excavate for underground services, to required lines, levels and grades. Generally, make the trenches straight between personnel access ways, inspection points and junctions, pits and changes in cable route, with vertical sides and uniform grades.

Spoil: If excavated material cannot be used for filling or backfilling, remove it from the site.

Trench widths

Keep trench widths to the minimum consistent with the laying and bedding of the relevant service and construction of personnel access ways and pits.

Trench Depths

General: As required by the relevant service and its bedding method.

Notice: If excavation is necessary below the level of adjacent footings, give notice, and provide necessary support for the footings.

Obstructions

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

Trees

Protect trees from damage by groundworks. Take necessary precautions, including the following:

- Harmful materials: Do not store or otherwise place bulk materials and harmful materials under or near trees. Do not place spoil from excavations against tree trunks, even for short periods. Prevent wind-blown materials such as cement from harming trees and plants.
- Damage: Prevent damage to tree bark. Do not attach stay, guys and the like to trees.
- Work under trees: Do not add or remove topsoil within the drip line of trees. If it is necessary to excavate within the drip line, use hand methods such that root systems are preserved intact and undamaged. Open up excavations under tree canopies for as short a period as practicable.
- Roots: Do not cut tree roots exceeding 150 mm diameter unless permitted. Where it is necessary to cut tree roots, use means such that the cutting does not unduly disturb the remaining root system. Immediately after cutting, apply a bituminous fungicidal scalant to the cut surface to prevent the incursion of rot or disease.

Dewatering

Keep trenches free of water. Place bedding material, services and backfilling on firm ground free of surface water.

Excess excavation

If trench excavation exceeds the correct depth, reinstate to the correct depth and bearing value using compacted bedding material or grade N20 concrete.

Backfilling

Backfill service trenches as soon as possible after the service has been laid and bedded, if possible on the same working day. Place the backfill in layers ≤ 150 mm thick and compact to the density which applies to the location of the trenches to minimise settlement, and so that pipes are buttressed by the trench walls.

Backfill material

Under roads and paved areas: Coarse sand, controlled low strength material or fine crushed rock.

In topsoil areas: Complete the backfilling with topsoil for at least the top 50 mm.

In reactive clay: In sites classified M, H or E to AS 2870, use an impervious material where trenches fall towards footings.

Elsewhere: Well graded, inorganic, non-perishable material, maximum size 75 mm, plasticity index ≤ 55%. Do not place stones greater than 25 mm within 150 mm of services.

Boring

Subcontractor: If under road boring is required in lieu of trenches, engage a suitably qualified subcontractor to do the work. All cables under roads installed in conduits.

Process: Ensure a tight fit to the service conduits. If voids are encountered, fill by pressure grouting.

Reinstatement

- Lawn areas: Provide 150 mm of loam and resow the lawn over the trench and other disturbed areas.
- Paving and roads: Reinstate to match adjacent work, paved surfaces and assets disturbed or removed during excavation of trenching.
- Concrete surfaces: Reinstate concrete surfaces to the original level. If necessary, provide steel reinforcement keyed to the adjacent concrete and laid to prevent the reinstalled concrete from subsidising and cracking.
- Bituminous surfaces: provide crushed rock base and sub-base to match the existing pavement. Prime coat the edges of the existing surfacing with bitumen. Lay and compact hot-mix asphalt so that the edges are flush and the centre is cambered 10 mm above the existing pavement. If hot pre-mix is not available, cold pre-mix may be used.
- Minimum asphalt thickness: 50 mm or the adjacent pavement thickness, whichever is thicker.
- Unit paving: Provide sand bedding and, if necessary, compacted crushed rock base. Reinstate the paving units.

Sealing ducts and conduits

Seal buried entries to ducts and conduits using w waterproof seals. Seal spare ducts and conduits immediately after installation. Seal other ducts and conduits after cable installation.

Cable Pits

General

Draw-in pits: Construction - Electrical pits are to be pre cast pits, constructed from steel reinforced concrete. Communications pits are to be constructed from HDPE plastic, unless otherwise specified.

Pit covers

Electrical Pits: Fit pit with cast iron covers and frames of ribbed plate design capable of carrying the traffic loading of the site. Vertical and horizontal seating surfaces on both cover and frame to be machined surfaces to prevent movement by traffic loading and to provide a watertight fit when a thin film of grease is applied.

Keyholes: Cover keyholes to be designed too positively locate keys, fitted with plastic plugs to prevent entry of dirt

Installation: Covers and frames to be of approved manufacture and installed in accordance with manufacture's recommendations.

Drainage

General: Provide drainage from the bottom of cable pits, either to absorption trenches filled with rubble or to the stormwater drainage system.

Absorption trenches: Minimum size 300 x 300 x 2000 mm.

Underground cable routes

Survey

Accurately record the routes of underground cables before backfilling. Provide a survey plan which identifies the services in relation to permanent site features and other underground services. Clearly identify crossing points of other underground services.

Location marking

General: Accurately mark the location of underground cables using route markers consisting of a marker plate set flush in a concrete base.

Location: Place markers at each joint, route junction, change of direction, termination and idling entry point and in straight runs at intervals of note more than 100 m.

Concrete bases: 200 mm diameter x 200 mm deep, minimum.

Direction marking: Show the direction of the cable run using direction arrows on the marker plate. Indicate distance to the next marker.

Plates: Brass, minimum size 57 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.

3 Low voltage switchboards

3.1 GENERAL

Provide switchboards as scheduled in Scope of Work document, Section "Performance and Guarantee".

Cable terminations protected IP20

3.2 STANDARD

General

Manufactured Switchgear Assemblies. To As 3439.1

Distribution Switchboards (maximum 250 A busbars and maximum 125 A rated protective devices for outgoing circuits): To AS 3439.3.

3.3 INTERPRETATIONS

Definitions

Proprietary assemblies: Low voltage switchgear and controlgear assemblies available as a catalogue item, consisting of manufacturer's standard layouts and equipment.

Custom-built assemblies: Low voltage switchgear and controlgear assemblies manufactured to order.

Rated currents: Rated currents are continuous uninterrupted current ratings within the assembly environment under in-service operating conditions.

Abbreviations

TTA: Type tested assemblies

NTTA: Non-type tested assemblies

PTTA: Partially type tested assemblies.

3.4 DESIGN

Layout

Position equipment to provide safe and easy access for operation and maintenance. Consider functional relationships between items of equipment in the laying out of equipment on the assembly.

Service conditions

Normal service conditions.

Rated currents

Rated currents: Minimum continuous uninterrupted rated currents within the assembly environment, under in-service oppressing conditions.

Fault levels

Rated short-circuit currents: Maximum prospective symmetrical r.m.s. current values at rated operational voltage, at each assembly incoming supply terminal, excluding effects of current limiting devices.

Assembly short-circuit capacity characteristic: Rate main circuit supply and functional units as follows:

- Back-up protective device not provided: Rated short-circuit current for 1 s.
- Back-up protective device provided: Rated short-circuit current for the maximum opening time of the associated protective device.

3.5 AUTHORITIES

Supply authority's equipment

General: Install equipment supplied by the supply authority, and provide wiring to complete the installation.

Tariff meter compartment: Install the supply authority's tariff metering equipment in a separated, or sealed meter compartment or separate meter panel, as scheduled in Scope of Work document, Section "Performance and Guarantee".

3.6 QUALITY

Inspection

Main Switchboard only

Give note so that inspection may be made at the following stages:

- factory assembly completed, with busbars exposed and functional units assembled
- assembly ready for routine testing and dispatch
- assembly installed and connected.
- acceptance.

Pre-completion tests

Type tests (Main Switchboard Only)

To AS 3439.1

Testing facility: Accredited by NATA OR REGISTERED WITH THE Association of Short-Circuit Testing Authorities (ASTA).

Production tests

Carry out the following tests:

- Assemblies: Electrical and mechanical routine function tests at the factory using externally connected simulated circuits and equipment.
- Residual current devices: test using apparatus which displays the trip current and trip time of each device.
- Dielectric testing:
    - NTTAs and PTTAs: 2.5 kV r.m.s. for 15 s.
- Functional testing: Operate mechanical devices, relays, programmable logic controllers and logic controls, protection, interlocking and alarm equipment.
- Protection relays: Primary current injection tests or, if approved, secondary current injection tests, to verify time/current characteristics and settings.

Main switchboard submissions

General

Submit type test certificates for components, functional units and assemblies including internal a rcing-fault tests and factory test data to the supply authority for approval.

Calculations

General: Submit detailed certified calculations verifying deign characteristics.

Standard: To AS 3865 and AS 4388

Type test data

General: Verify that type tests and internal arcing-fault tests, if any, were carried out at not less than the designated fault currents at rated operational voltage.

Alterations to TTAs: Submit records of alterations made to assemblies since the tests.

Product date for proprietary assemblies

Submit the following:

- Types and model numbers of items of equipment
- Overall dimensions.
- Fault level
- IP Rating
- Rated current of components
- Number of poles and spare capacity
- Mounting details

- Door swings
- Paint colours and finishes
- Access details
- Schedule of labels

Shop drawings of custom-built assemblies

- Submit shop drawings showing:
- Types, model numbers and ratings of assemblies
- Component details, functional units and transient protection
- Detailed dimensions
- Shipping sections, general arrangement, plan view, front elevations and cross-section of each compartment.
- Projections from the assembly that may affect clearances or inadvertent operation, such as handles, knobs, arcing-fault venting flaps and withdrawal components.
- Fault level and rated short circuit capacity characteristics
- IP rating
- Fixing details for floor or wall mounting.
- Front and back equipment connections and top and bottom cable entries
- Door swings
- External and internal paint colours and paint systems
- Quantity, brand name, type and rating of control and protection equipment
- Construction and plinth details, ventilation openings, internal arcing-fault venting and gland plate details
- Terminal block layouts and control circuit identification
- Single line power and circuit diagrams
- Details of mains and submain routes within assemblies
- Busbar arrangements, links and supports, spacing between busbar phases, and spacing between assemblies, the enclosure and other equipment and clearances to earthed metals.
- Dimensions of busbars and interconnecting cables in sufficient detail for calculations to be performed to AS 3008.1, AS 3786 and AS 3865.
- Internal separation and form of separation and details of shrouding of terminals
- Labels and engraving schedules

3.7 CONSTRUCTION

General

Provide rigid, ventilated, insect-screened enclosures of panels, doors, or both, giving the designated enclosure, separation and degree of protection.
Provide a machine engraved identification plate screw fixed to the main switch escutcheon with the following:

- manufacturer
- to certify the main switchboard has a type test certificate and /or number
- the date of the type test
- the kVA rating of the switchboard
- The date of installation of the switchboard
- The current rating of the switchboard and busbar system

TTAs and PPAs

Use construction methods verified by required tests to at least the nominated fault level and temperature-rise limits and internal arcing-fault containment and venting.

NTTAs

Fabricate from sheet metal of rigid folded and welded construction. Obtain approval for non-welded forms of construction.

Layout

Compartments: Separate shipping sections, subsections, cable and busbar zones, functional unit modules and low voltage equipment compartments using vertical and horizontal steel partitions which suit the layout and form of separation.

Form 1 enclosures: Separate into compartments using partitions at 1.8 m maximum centres.

Equipment mounting heights above floor to the centre line of the equipment:

- Toggles and handles of circuit-breakers, fused switch units and isolators:
  - wall mounted assemblies: 500 – 900 mm
  - floor mounted assemblies: 200 – 1900 mm
- Control switches, indicating lights, meters and instruments on doors:
  - wall mounted assemblies: 1.0 – 1.7 m.
  - floor mounted assemblies: 200 – 1800 mm
- Push-button emergency switching devices: 800 – 1600 mm

Equipment on doors: Set out in a logical manner in functional unit groups, so it is accessible without the use of tools or keys.

Enclosures

Indoor enclosures:

- Minimum 1.6 mm thick zinc-coated sheet steel, coating class Z200.
- Outdoor enclosures: Minimum 1.6 mm thick 304 grade stainless steel.

Insect proofing

Cover ventilation openings using non-combustible and non-corroding 1 mm mesh.

Equipment mounting panels

General: Strong enough to support the weight of mounted equipment. Construct using minimum 3mm thick metal or non-metallic board with heavy metal angle supports or plates bolted or welded to enclosure sides.

Non-metallic boards: To AS 1795.1.

Front accessible cable zones: 450 mm minimum width.

Equipment fixing

Spacing: Provide sufficient thermal, mechanical and electrical clearance between equipment to ensure proper functioning. Provide 50 mm minimum clearance between

- busbars for lifts, fire services and building emergency services; and
- general installation services, busbars and equipment

Mounting: Use bolts, set screws fitted into tapped holes in metal mounting panels, studs or proprietary attachment clips. Provide accessible equipment fixings which allow equipment changes after assembly commissioning.

Installation: For lightweight equipment, use combination rails and proprietary clips.

Earth continuity

Effectively bond equipment and assembly cabinet metal frame to the protective earth conductor. Strip painted surfaces and coat with corrosion resistant material immediately before bolting to the earth bar. Provide serrated washers under bolt heads and nuts at painted, structural metal-to-metal joints.

Lifting provisions

For assemblies with shipping dimensions exceeding 1.8m high x 600 mm wide, provide fixings in the supporting structure and removable attachments for lifting.

Supporting structure

Provide concealed fixings or brackets to allow assemblies to be mounted and fixed in position without removing equipment.

Wall-mounting

Reinforce at boltholes. For flush or semi-flush assemblies, provide angle trims of the same material and finish as the enclosure.

Floor-mounting

Provide mild steel channel plinth, galvanised to class Z600, with toe-out profile, nominal 75mm high x 40 mm wide x 6 mm thick, for mounting complete assemblies on site. Drill M12 clearance holes in assembly and channel and bolt assemblies to channel. Prime drilled holes using rich organic binder GPC-C-29/16. Bolts to be stainless steel.

Cable entries

General

Provide cable entry facilities within assembly cable zones for incoming and outgoing power and control cabling. Provide sufficient clear space within each enclosure next to cable entries to allow incoming and outgoing cables and wiring to be neatly run and terminated, without undue bunching and sharp bends.

Cover and gland plates

Cover plates: Provide 150 mm maximum width cover plates butted together and covering the continuous cable entry slot.

Gland plates: provide removable gland plates fitted with gaskets to maintain the degree of protection.

materials: 1.5 mm, thick stainless steel, aluminium or brass, 5 mm thick composite material or laminated phenolic. Use 6mm thick brass for MIMS cables and cable glands.

Doors and covers

Width

Maximum 900 mm.

Door swing

At least 90°.

Door stays

General: provide stays to outdoor assembly doors.

Adjacent doors: Space adjacent doors to allow both to open 90° at the same time.

Construction

Provide single right angle return on all sides and fit suitable resilient sealing rubber to provide the degree of protection and prevent damage to paintwork.

Hanging

Provide corrosion-resistant pintle hinges or integrally constructed hinges to support doors. For removable doors, provide staggered pin lengths to achieve progressive engagement as doors are fitted. Provide 3 hinges for doors higher than 1 m. Provide restraining devices and opposed hinges for non lift-off doors.

Door hardware

Provide the following:

- Corrosion-resistant lever-type handles, operating a latching system with latching bar and guides strong enough to withstand explosive force resulting from fault conditions within the assembly.
- Dual, edge mounted, corrosion-resistant 'T' handles with provision for key locking cylinder. Three point roller locking for door greater than 900 m height.
- Captive, corrosion-resistant knurled thumbscrews.

- Locking: Provide "Lowe & Fletcher" or "Lenlock Pty Ltd" No 92268 locks to all switchboard doors.

Number of keys: 2 per assembly.

Door mounted equipment

Protect or shroud door mounted equipment and terminals to prevent inadvertent contact with live terminals, wiring, or both.

Earthing

Maintain earth continuity to door mounted indicating or control equipment using multi-stranded, flexible earth wire, or braid of equal cross-sectional area, bonded to the door.

Covers

Maximum dimensions: 900 mm wide and 1.2 m^2 surface area.

Fixing: Fix to frames using at least 4 fixings. Provide corrosion-resistant acorn nuts if the cover exceeds 600 mm in width. Rest cover edges on the cubicle body or on mullions. Do not use interlocked covers.

Handles: Provide corrosion-resistant 'D' type handles.

Escutcheons

For doors enclosing circuit-breakers, provide escutcheon plates as barriers between operating mechanisms and live parts.

Escutcheon plates

General: provide plats or removable covers with neat circuit-breaker toggle cut-outs allowing interchangeability of 1, 2 and 3 pole circuit-breakers. Provide corrosion-resistant lifting handles or knobs. Provide unused circuit-breaker toggle cut-outs with blanking in-fill pole covers.

Maximum dimensions: 900 mm wide and 1.2m^2 surface area.

Factory finishes

Extent

Apply protective coatings to internal and external metal surfaces of assembly cabinets including covers, except to stainless steel, galvanised, electroplated, or anodised surfaces and to ventilation mesh covers.

Finish coats

Thermostat powder coating or two-pack liquid coating
Paint colours

Standard: To AS 2700.

Colours:

- Indoor assemblies: manufacturer's standard colour.

- Removable equipment panels: of white Y35.
- Assembly interior: White.

Busbars

General

Provide main circuit supply busbars within assemblies, extending from incoming supply terminals to the line side of protective equipment for outgoing functional units and for future functional units.

Standards

To AS 3768, AS 3865 and AS 4388

Definitions

Incoming busbars: Busbars connecting incoming terminals to line side terminals of main switches.

Main circuit supply busbars: Busbars connecting incoming functional unit terminals, or incoming busbars where no main switches are included, to outgoing functional unit terminals or outgoing functional unit tee-offs.

Tee-off busbars: Busbars connecting main busbars to incoming terminals of outgoing functional units.

Material

Hard-drawn high-conductivity electrolytic tough pitched copper alloy bars, designation 110.

Temperature rise limits – active and neutral conductors

Maximum rated current temperature rise limies: 65 ± 1.5°C by type test or calculation to AS 3768 or AS 4388

Cross section

Rectangular with radiused edges.

Supports

General: Sufficient to withstand thermal and magnetic stresses due to maximum prospective fault currents.

Material: Non-hygroscopic insulation capable of holding busbars at 105°C.

Phase sequence

For main busbars and connections to switching devices, set-out phase sequence for phases A, B and C, from left-to-right, top-to-bottom and back-to-front when viewed from the front of the assembly.

Colour coding

General: Provide 25 mm maximum width colour bands permanently applied to busbars at 500 mm maximum intervals with at least one colour band for each busbar section within each compartment.

Active busbars: Red, white and blue respectively for the A, B and C phase.

Neutral busbars: Black

MEN link: Green-yellow and black.

Protective earth busbar: Green-yellow.

Restrictions: Do not use adhesive type colour bands.

Busbar systems

Use multi-pole proprietary busbar assemblies or busbar systems, which have been verified for short circuit capacity and temperature rise-limits by type tests.

Current carrying capacity

Active conductors: Take into account thermal stresses due to short circuit current, assuming magnetic material enclosures located indoors in well-ventilated rooms and 90°C final temperature.

Neutral conductors: Size to match incoming neutral conductor current carrying capacity.

Protective earth conductors: Size for at least 50% of the rated short circuit withstand current for 100% of the time duration.

Tee-off busbars current rating

For individual outgoing functional units: Equal to maximum frame size rating of the functional unit.

For multiple functional units: Equal to the diversity factors of AS 3439.1, based on frame size rating.

MEN links

MEN links > 100mm^2 in section: Bolted removable busbar links stamped '*MEN LINK*', located in the incoming compartment, between neutral and earth busbars.

Fault current limiters

Rate busbars connected to fault current limiters to 100% of the indicated fault current limiter circuit-breaker frame size or fuse base rating.

Busbar links

For current transformers, provide removable busbar links ≤ 450 mm long. Ensure links are sized to suit supply authority C.T.s.

Cable connection flags

General: Provide and support busbar flags for equipment with main terminals too small for cable lugs. Use flag sized to suit cable lug termination, with current rating of at least the maximum equipment frame size.

Phase isolation: Provide phase isolation between flags where the minimum clearance distances phase-to-phase and phase-to-earth are below the component terminal spacing.

Future extensions

Pre- drill the main circuit supply busbar for future extensions and extend busbar droppers into future functional unit locations.

Jointing

Use high tensile steel bolts, washers and nuts, with lock nuts or locking tabs. Do not use tapped holes and studs or the like for jointing current carrying sections.

Busbar insulation

Active and neutral busbars and joints: Select from the following:

- Polyethylene: At lease 0.4 mm thick with dielectric strength of 2.5 kV r.m.s for 1 min, applied by a fluidised bed process in which the material is phase coloured and directly cured onto the bars.
- Close fitting busbar insulation mouldings at least 1 mm thick.
- Heat shrink material: Use only on rounded edge busbars.

Taped joints: Apply non-adhesive stop-off type tape, coloured to match adjacent insulation and half lapped to achieve a thickness at least that of the solid insulation.

Damaged insulation: Repair insulation before energising.

3.8 MAIN SWITCHES

Switch-isolator and combination fuse-switch units

Standard

To AS 3947.3.

Type

Poles: 3.

Rated current: To suit unit installed in enclosure.

The main switch size shall be clearly visible with all escutcheons fixed in place. Where this is not possible, provide an engraved label on the panel

Rated fault capacity

Short circuit making capacity: At least the fault level at assembly incoming terminals.

Breaking capacity: At least the rated full load current.

Utilisation category

Circuits consisting of motors or other highly inductive loads: At least AC-23.

Other circuits: At least AC-22.

Rated duty

Uninterrupted in non-ventilated enclosure.

Operation

Independent manual operation including positive '*ON/OFF*' indicator.

Locking

Provide for padlocking in the '*OFF*' position.

Locate all main switches behind lockable doors

Handles

Removable only when switch is in open position.

Construction

General: Either

- totally enclosed; or
- with full and direct shrouding to fixed live parts of switches and fuses, so that insertion of a screwdriver does not cause faults between phases.

Shrouding: Effective over range of air break switch positions.

Incorporate the following:

- Earthing terminal.
- Neutral link mounted within unit.
- Contact position clearly indicated whether cover is in place or not. For fuses mounted in withdrawable carriage ensuring isolation from supply before access to fuses is possible, secondary indication may be omitted.

3.9 CIRCUIT-BREAKERS

Moulded case and miniature circuit-breakers

Standard

Fault capacity ≥ 10 kA: To AS 3947.2

Rated service short-circuit breaking capacity Ics not less than 100% Icu.

Miniature circuit-breakers

Fault capacity < 10 kA, current rating < = 100 A: Use miniature overcurrent circuit-breakers

Mounting

Mount circuit-breakers so that the '*ON/OFF*' and current rating indications are clearly visible with covers or escutcheons in position. Align operating toggles of each circuit-breaker in the same plane.

Utilisation category

Non-discrimination: Type A.

Partial or full discrimination: Type B.

Adjustable current settings

General: If trip current adjustment control is exposed with covers in position, provide for sealing to prevent tampering.

Labels: Provide labels indicating trip settings.

Trip settings

Adjustable short circuit trip settings: Set to the low position.

Trip units

Circuit-breakers with interchangeable and integrally fused trip units: Connect so that trip units are not live when circuit-breaker contacts are open.

Locking

Provide for locking circuit-breakers in the open position.

Clip tray chassis

For miniature overcurrent circuit-breakers provide clip tray assemblies capable of accepting single, double, or triple circuit-breakers, and related busbars. Provide moulded clip-on pole fillers for unused portions.

Accessories

Rotary handle: Provide *'ON/OFF'* indication, and override release to open door padlocking facility.

Motor operators: Provide selector switches, controls and indicators.

Auxiliary contacts: Minimum rating 5 A.

3.10 COMBINED FUSE – SWITCH (CFS) UNITS

Combined Fuse-Switch (CFS) units

General: Check with the Supply Authority and provide CFS as a Main Switch if necessary, or if scheduled in Scope of Work document, Section "Performance and Guarantee". Provide an extended operating handle, at least 100 mm above the floor, which remains clear of other equipment over the range of positions.

Fuse links: Isolated when switch contacts are open. Provide 3 phase sets of high rupturing capacity (HRC) fuse links.

3.11 NEUTRAL AND EARTH LINKS

Terminals

Provide terminals for future circuits.

Links

Assembly capacity > poles: Provide neutral and earth links at the top and bottom of the circuit-breaker section.

Assembly capacity ≤ 36 poles: Provide links at the point of entry of incoming supply cables.

Mounting: Mount neutral links on an insulated base.

Control circuits: Provide separate neutral and earth links.

Labels: Provide labels for neutral and earth terminals.

Cables > 10 mm²

Provide bolts or studs.

3.12 INTERNAL WIRING

Wiring

Cable type

Provide 0.6/1 kV copper cables. Use V-90HT insulation where directly connected to active and neutral busbars.

Cable interconnections

- Use 1.5 mm² (minimum) internal cables, with minimum V75 insulation rating with stranded copper conductors rated to AS 3008.1. Use cables with current ratings suitable for the internal assembly ambient air temperature and for temperature rise limits of equipment within the assembly.
- Run cables clear of busbars and metal edges.
- Provide cables capable of withstanding maximum thermal and magnetic stresses associated with relevant fault level and duration.
- Run cables neatly. Provide slotted trunking sized for future cables or tie at 150 mm maximum intervals using ties strong enough to withstand magnetic stresses created at the specified fault current. Do not use adhesive supports.
- Ensure wiring for future equipment can be installed without removal of existing equipment.
- Identify power and control cables at both ends using neat fitting ring type ferrules agreeing with record circuit diagrams. Mark to AS 1103.
- Terminate control cables and motor control circuits in tunnel terminals or, if necessary, use suitable palm type lugs and correct crimp tool.
- For equipment mounted on hinged doors run cables on the hinge side to avoid restricting the door opening. Bundle cables using spiral wrap PVC.
- If recommended by device manufacturers, provide shielded wiring.

Adjacent circuit-breakers: If suitable proprietary multi-pole busbar assemblies are available to link adjacent circuit-breakers, do not use cable interconnections.

Cables > 6 mm²

Terminations:

- Tunnel terminals: Single cables.
- Other connection points or terminals: ≤ 2 cables.

Doors: Do not run cables to hinged doors or removable panels.

Supports:

- Spacing at enclosure: ≤ 200 mm from a termination.
- Spacing generally: ≤ 400 mm.
- Strength: Capable of withstanding forces exerted during fault conditions.

Single core cables rated ≥ 300 A: Do not use ferrous type metal cable saddles.

Marking: Terminate marked cables for connection to external controls in correspondingly marked terminals within the assembly.

Control and indication circuits

General: Provide conductors sized to suit the current carrying capacity of the particular circuit.

Minimum size: 1 mm² with 32/0.2 stranding.

Cable colours

Colour code wiring as follows:

- A phase: Red.
- B phase: White.
- C phase: Blue.
- Neutral: Black.
- Earthing: Green-yellow.

Terminations

Submains, light and power circuits

Connect direct to the circuit-breaker terminals.

Other circuits

Connection to circuits ≤ 16 mm²: Provide DIN-type tunnel terminal blocks.

Connection to circuits > 16 mm²: Provide stud-type terminals ≥ 5 mm diameter, sized to continuously carry the load.

Cables > 70 mm²: Stud type terminals, fixed to a DIN-type or G rail.

Tunnel terminals: Provide insulated sleeve ferrules to flexible cables terminated in tunnel terminals.

Identification: Identify cables at both ends using neat ring-type ferrules.

Type: Screw-tightened, clip-on, 35 mm DIN-type, flexible, non-flammable and, as a minimum, suitable for the insertion of a screwdriver blade.

Shrouded terminations:

- Form 4 separation: Cut and shaped polycarbonate solid sheet rigidly fixed into position, with cable cut-outs to underside.
- Degree of protection: IP2X minimum.

Location: Locate terminals to provide ready access to outgoing terminations.

Mounting rails: Screw or rivet mounting rails to assembly at ≤ 500 mm centres. Provide sufficient length to accept a further 20% terminals or 3 terminals, whichever is the greater.

- Arrangement: Terminate internal wiring to one side of the terminal block, leaving the other side for outgoing circuits.
- Grouping: Provide separate terminal groups for final subcircuit and control wiring. Provide oversized barriers between each group of terminals having different voltages and terminal size.
  - Terminals for power wiring: 3 phases or single phase and neutral.
  - Control terminals: In alphabetical or numerical order of wire identification, with the lowest number or letter next to the power terminals.
- Shipping breaks: Provide terminal blocks for interconnecting wiring on each side of shipping breaks.

3.13 MEASUREMENT ACCESSORIES

Current transformers (metering)

Standard

Measurement current transformers: To AS 1675.

Test links

Provide test links for connection of calibration instruments and meters and for shorting of current transformer secondaries. Provide energy meters, maximum demand meters, ammeters and protection relays, with sets of rail-mounted links consisting of screw-clamped slide links and an earth link.

Test studs

For energy and demand meters provide rail-mounted potential test studs or plug connections next to associated current transformer links. Provide at least one set of test studs for each compartment.

Accuracy classification

Energy measurements: Class 0.5M.

Indicating instruments: Class 2M.

Ratings

Rated short time current: At least the short time withstand current equivalent of the circuit in which the transformer is installed.

Rated primary current: At least equal to the current rating of the functional unit.

Secondary windings: Rated at 5 A, burden of 0.4 Ω (10 VA) with star point earthed.

Type

If practicable, use cast resin encapsulated window-type with busbar clamping devices. Otherwise use wound-primary type with mounting feet.

Installation

General: Install transformers to permit easy removal.

Removable links: Provide removable links of minimum lengths for transformers fitted on busbar systems.

Instruments and Meters

Standards

Indicating instruments: To AS 1042.

Electricity meters: To AS 1284 Parts 1, 3 and 4.

Transducers: To AS 1384.

Construction

Indicating and recording instruments: Provide damped movements and impact resistant glass cover. Provide for external adjustment of the zero. Support moving elements of indicating instruments between shock resistant jewel bearings.

Transducers: Totally enclose in flame-retardant, rail-mounted moulded cases.

- Minimum degree of protection: IP52.

Instrument scales

Direct reading analogue type with black lettering on white background with black pointer, capable of indicating the maximum value of the measured variable.

Transducers:

If necessary for transducer operation, provide auxiliary supply. Connect outputs to dedicated rail-mounted isolating type terminals.

Accuracy

Indicating instruments and accessories: Accuracy class 1.5 or lower class index number except Class 3 for thermal maximum demand indicators.

Electricity meters: Class 0.5.

Power factor indicators, phase angle indicators and synchroscopes: 2 electrical degrees maximum error.

Transducers: Class 0.5.

Size

Power distribution assemblies: Provide instruments of the same style and size, with bezel minimum 96 x 96 mm and 90^0 quadrant scale.

Motor control assemblies: On motor starter modules, provide instruments with bezel 72 x 72 mm with 90^0 quadrant scale.

Mounting

Flush mount instruments on hinged panels. Wire with multi stranded flexible cables.

Mount accessories next to associated instruments, inside cabinets.

Protection devices

Voltage circuit protection devices: Group together behind associated instrument or meter cover or hinged door, preferably next to current transformer test links.

Labels

If associated exclusively with one phase, label meters '*RED*', '*WHITE*', or '*BLUE*' as applicable.

Ammeters

Type: Moving iron type.

Overscale: For ammeters subject to motor starting currents, use overload proof scales.

Selector switches: 4-position type with positions designated '*R/W/B/OFF*'. Mount under or next to relevant ammeters.

Maximum demand ammeters

General: Provide an ammeter in each phase with 15 minute response time. Provide for sealing the reset mechanism. Provide a combination 3 point indicator consisting of an instantaneous current pointer, a red maximum demand slave pointer with external reset facility, and a 15 minute demand pointer.

Instantaneous type: 15 minute moving iron instantaneous ammeter element.

Thermal type: Bi-metal 15 minute integrated element.

Accuracy class

Instantaneous: Class 1.5.

Maximum demand: Class 3.

Voltmeters

Type: Moving iron.

Selector switches: 4-position voltage transfer type for measurement of phase-to-phase voltages with off. Mount under or next to relevant voltmeters.

Watthour meters

Type: Rotating element induction disc type or electronic type. If metering is connected across 3 phases, use polyphase meters suitable for unbalanced 3 phase, 4 wire loads. Use single phase meters for 2 or 1 phase metering only.

Current rating: To suit load and overload conditions. Use direct connected meters suitable for current range of 15 A-100 A and meters with 5 A secondary current transformers for higher currents.

Register: Provide a direct reading register of the large figure type. Mark on the scale the metering transformer ratios and the multiplying factor applied to the meter constant.

Covers: Seal main covers.

Indicator lights

Standard

To AS 3947.5.1.

Degree of protection

At least that of the assembly/operating face.

Incandescent indicators

Type: Incandescent oil tight type minimum 22 mm diameter or 22 x 22 mm.

Lamps: Changeable from front of panel without removing the holder.

Lamp rating: 1.2 – 5 W.

Neon indicators

240 V, 12 mm diameter with in-built resistor.

LED indicators

12 or 24 V as necessary, in corrosion-resistant bezel, nominal 5 mm diameter.

Press-to-test

Compartments/subsections with < 5 indicating lights: Provide each indicating light with a fitted integral press-to-test lamp actuator.

Compartments/subsections with ≥ 5 indicating lights: Provide a common press-to-test lamp push-button.

3.14 SWITCHGEAR ACCESSORIES

Residual current devices

Standard

AS 3190.

Integral type

General: Incorporate earth leakage in circuit-breaker protection operation.

Mounting: Comply with *Moulded case and miniature circuit-breakers*, in the *Circuit-breakers* subsection.

Tripping

Residual current classification: Type II.

Maximum tripping current: 30 mA.

Fuses with enclosed fuse links

Standards

To AS 2005 Parts 21.1, 21.2, 29 and 40.

General

General: Provide fuses suitable for the fault level at the assembly, and which discriminate with other protective equipment.

Let-through energy and peak cut-off current: To suit protected equipment.

Utilisation category

Motor circuits: gG.

Back-up protection: gG.

Distribution/general purpose: gG.

Fuse-holders

Mount fuse-holders so that fuse carriers may be withdrawn directly towards the operator and away from live parts. Provide fixed insulation which shrouds live metal when the fuse carrier is withdrawn.

Unenclosed fuses

Provide barriers on both sides of each fuse link, preventing inadvertent electrical contact between phases by the insertion of screwdriver.

Fuse links

Type: Enclosed, high rupturing capacity type mounted in a fuse carrier. If necessary for safe removal and insertion of the fuse carrier, provide extraction handles. Mount on clips within the spares cabinet.

Identification: Clearly indicate Australian manufacturer or distributor.

Busbar mounted fuse holders

Provide fuse carriers with retaining clips, minimum fuse holder 32 A.

Spares

Provide 3 spare fuse links for each rating of fuse link on each assembly.

3.15 CONTROL GEAR

Contactors

Standard

AC. and DC. contactors: To AS 1029.1 or AS 3947.4.1.

Type

Block type, air break, electro-magnetic.

Poles

3.

Minimum rated values

Rated operational current: Full load current of the load controlled.

Rated duty:

- Motors: Intermittent class 0.1.
- Heater banks: Intermittent class 1.

Rating: 16 A.

Mechanical endurance: 10.

Utilisation category:

- Motors: AC-3 or DC-3.
- Heater banks: AC-1 or DC-1.

Contacts life: 1 million operations at AC-3 or DC-3.

Auxiliary contacts

General: Provide auxiliary contacts with at least one normally-open and one normally-closed separate contacts with rating of 6 at 240 V A.C.

Utilisation category: AC-1.

Slave relay: If the number of auxiliary contacts exceeds the number which can be accommodated, provide a separate slave relay.

Mounting

Mount with sufficient clearance to allow full access for maintenance, removal and replacement of coils and contacts, without the need to disconnect wiring or remove other equipment.

Interconnection

Do not connect contactors in series or parallel to achieve ratings.

13.16 CONTROL GEAR ACCESSORIES
Control and test switches

Standards

To AS 3947.5.1 and AS 3947.1.

Rated operational current

Utilisation category: AC-22 to AS 3947.1.

Degree of protection

At least the degree of protection for the assembly.

Push-buttons

Type: Oil-tight, minimum 22 mm diameter, or 22 x 22 mm.

Rated operational current: At least 4 at 240 V A.C.

Marking: Identify functions of each push-button. For latched *'STOP'* or *'EMERGENCY STOP'* push-buttons, state instructions for releasing latches.

Colour code: To AS 3947.5.1.

Illuminated push-buttons: Comply with *Indicator lights*, in the *Measurement accessories* subsection.

Rotary switches

General: Cam operated type with switch positions arranged with displacement of 60^0.

Off position: Locate at the 12 o'clock position. Test positions must spring return to off position.

Rated operational current: At least 6 A at 240 V a.c.

Escutcheon plates: Provide rectangular plates securely fixed to the assembly panel. Identify switch position and function.

Time switches – dial type

Operation: 7 day with synchronous motor or electronically controlled drive from 240 V 50 Hz supply. Provide day omit and manual override facilities.

Mains failure operation: Either by

- 24 hour spring; or
- battery with 100 hour minimum operating capacity and guaranteed 10 year minimum life.

Contact rating: 16 A at 140 V a.c.

Construction: Provide readily accessible means of adjustment. Provide operational settings which are clearly visible when switch cover is fitted.

Dial: Either analogue with 2 hands, or digital with hour and minute display.

Proximity switches

To AS 3947.5.2.

Control relays

Standards

To AS 3947.5.1 and AS 2481.

Operation

Suitable for continuous operation. Select relays in compliance with the control relay selection table.

Table 3.1 Control relay selection

Relay type	Minimum mech. life (million operations)	Base	Minimum contact rating	Inter-changeable	Minimum no. of contact elements
1	5	Plug-in	$1.25I_L$	Yes	2
2	10	Plug-in	5 A at 240 V	Yes	2
3	10	Fixed mounting	5 A at 240 V	Yes	4

Construction

Latch plug-in types to receptacle bases using captive clips which can be applied and released without using tools.

Contact elements

Type: Electrically separate, double break, silver alloy, non-welding contacts.

Duty level: IIIA.

Configuration: For standard relays, provide assemblies with at least 2 sets of contacts and expandable to 8 sets of contacts in the same assembly. Provide at least one normally-open and one normally-closed contact.

On site conversion: Provide contact blocks readily convertible to either normally-open or normally-closed contacts.

Time delay relays

Adjustable over the full timing range with timing repeatability within ± 12.5% of nominal setting.

Electronic relays

Incorporate light emitting diodes indicating energisation states of relays.

Pneumatic relays

Provide sealed chamber type with internal circulating air with linear calibrated time adjustment.

Synchronous relays

Provide synchronous motor drive type relay fitted with anti-stalling device which protects gearing during normal operation.

Phase failure relays
General: Provide separate solid-state phase failure relays which release at

- 85% of normal voltage;
- single phase failure; or
- reverse phase sequence after an appropriate time delay.

Sensing circuit: Rejects induced voltage spikes, and disturbances with frequencies other than 50 Hz.

Back-up protection: Provide high rupturing capacity fuses to each phase.

3.17 ANCILLARY EQUIPMENT

Transient protection

Standards

Main assemblies connected to the MEN earthing system: To AS 4070 Category II.

Main assemblies not connected to the MEN earthing system: To AS/NZS 1768 Category C.

Distribution boards: To AS/NZS 1768 Category B.

Primary protection

Provide shunt connected metal oxide varistors at assembly incoming supply terminals, on the line side of incoming functional units.

Secondary protection

Provide metal oxide varistors or zener diode surge protection to assembly in-built equipment and semi-conductor components which are not able to withstand transient overvoltages exceeding primary protection let-through residual levels.

Components

Short-circuit protective devices and isolators: Back-up each arrestor active supply with a live side 32 A totally enclosed fault current limiting fuse. Provide 32 A multi-pole automatic miniature circuit-breaker on load side of fuses, as an arrestor isolator.

Cables:

- Maximum length between main circuit supply active and associated fuse, isolator, arrestor, neutral and earth conductor connections including MEN link: 1 m.
- Maximum length between earth conductor and earth grid/electrode system: 5 m.
- Installation: Keep cables as short and straight as practicable with line and load side separately bunched 300 mm apart.

Minimum cable size: 6 mm^2 copper.

Surge arrestor enclosures: Totally ventilated sheet metal wall boxes with hinged covers, mounted within or on the wall next to designated assemblies, containing grouped surge arrestors.

Marking: Label each group of primary arrestors, stating their purpose and the necessary characteristics.

3.18 INSTALLATION

Assembly installation

Fixing

Before making interpanel connections, fix assemblies and metering equipment enclosures into position, level and plumb.

Assembly entries

Cable entries

General: Neatly adapt one or more cable entry plates, if fitted, to accept incoming cable enclosure. Use the minimum number of entry plates to leave spare capacity for future cable entries. Do not run cables into the top of weatherproof assemblies.

Single core cables rated > 300 A: Pass separately through non-ferrous gland plates. Do not use metal saddles.

Cable enclosures

Continue cable enclosures to or into assemblies and fit cable entry plates so that the IP rating of the assembly and the fire rating of the cable are maintained.

Cable supports

Support or tie mains and submains cables within 200 mm of terminations. Provide cable supports suitable for stresses resulting from short circuit conditions.

3.19 MARKING

Marking

General

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

Identifying labels

Provide labels fixed to access panels, doors, covers and escutcheon panels and internal equipment, indicating the relevant section and component.

Minimum lettering heights

Main assembly designation: 25 mm.

Distribution assembly designations: 15 mm.

Small proprietary distribution boards: 10 mm.

Main switches: 10 mm.

Outgoing functional units: 8 mm.

Identifying labels (on outside of cabinet rear covers): 4 mm.

Danger, warning and caution notices: 10 mm for main heading, 5 mm for remainder.

Other labels including equipment labels within cabinets: 3 mm.

Label colours

Generally: Black lettering on white background.

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

Danger, warning labels: White lettering on red background.

Fixing

General: Fix labels securely.

Method: Select from the following:

- Screws and double-sided adhesive.
- Fixed in extruded aluminium sections fixed to panels using rivets or countersunk screws.

Aluminium labels: Use aluminium or monel rivets.

Restrictions: Do not use self-tapping or thread-cutting screws.

Set-out

Align horizontally and vertically with adjacent labels.

Labels on assembly exteriors

Manufacturer's name: Required.

Type test certificate and or number: Required

Date of type test: Required

KVA Rating: Required

Date of Installation: Required

Current Rating of Switchboard and Busbar System: Required

Assemblies: Label with essential markings.

Designation labels: For other than main assemblies, provide designation label stating source of electrical supply. Identify separate sections of enclosures.

Assembly controls: Label controls and fault current limiters, including the following:

- Circuit designation for main switches, main controls and submains controls.
- Details of consumers mains and submains.
- Incoming busbar or cable rating too first tee-off.
- Fuse link size.

Labels on assembly interiors

General: Provide labels for equipment within assemblies. Locate so that it is clear which equipment is referred to, and lettering is not obscured by equipment or wiring.

Moulded case circuit-breakers: If circuit-breaker manufacturer's markings are obscured by operating handle mechanisms or motor operators, provide additional markings open to view on or next to the circuit-breaker, ie: - main switch rating

Danger, warning and caution notices

Busbars: If polymer membrane coating is used without further insulation, provide warning notices on the front cover near the main switch or local main switch, and on rear covers, indicating that busbars are not insulated.

Fault current limiters: In assembly sections containing fault current limiter fuses provide caution notices fixed next to the fault current limiters, stating that replacement fuse links are to match as-installed fuse link ratings, make and characteristics. Provide separate label stating fault current limiting fuse ratings.

Externally controlled equipment: To prevent accidental contact with live parts, provide warning notices for equipment on assemblies not isolated by main switch or local main switch.

Stand-by power: Provide waring notices stating that assemblies may be energised from the stand-by supply at any time.

Anti-condensation heaters: To prevent accidental switching off, provide caution notices for anti-condensation heaters.

Custom-built assemblies: For insulation or shrouding requiring removal during normal assembly maintenance, provide danger notices with appropriate wording for replacement of insulation shrouding before re-energising assemblies.

Positioning: Locate notices so that they can be readily seen, next to or, if impracticable, on the busbar chamber covers of functional units, and behind the front cover of functional units. Provide circuit identification labels in the cabling chamber of each functional unit, located next to external terminations.

Circuit schedule

Schedule cards

General: For general light and power distribution boards, provide schedule cards of minimum size 200 x 150 mm, with typewritten text showing the following as-installed information:

- Submain designation, rating and short-circuit protective device. Cable size and route length.
- Light and power circuit numbers and current ratings, cable sizes and type and areas supplied.
- Circuit identification shall match circuit breaker numbers in all cases. It may be necessary to change the numbers on the switches and outlets where switchboards are installed as replacements.

Mounting: Mount schedule cards in a holder fixed to the inside of the assembly or cupboard door, next to the distribution circuit switches. Protect with hard plastic transparent covers.

Single-line diagrams

Custom-built assemblies: Provide single-line diagrams.

Format: Non-fading print, at least A3 size, showing the as-installed situation.

Mounting: Enclose in a non-reflective glazed metal frame and wall mount close to assembly.

3.20 COMPLETION

Completion tests

General

Carry out the following tests:

- Electrical operation.
- Dielectric.

Maintenance

General: Carry out the following:

- Monthly inspections and maintenance work to maintain the assembly.
- Rectify faults, make adjustments, and replace consumable and faulty materials and equipment within 24 hours of notification.

3.21 SWITCHBOARD SCHEDULES

Main Switchboards

Provide the following, unless scheduled otherwise in Scope of Work document, Section "Performance and Guarantee".

Segregation Form	2
Ratings	As scheduled Scope of Work document, Section "Performance and Guarantee"
Construction	Weatherproof IP56, Non-weatherproof IP51
Cable Access	Floor mounted and front connected, where external provide open void under for cable access. Provide underground duct / conduits access to Cable Pit immediately adjacent.
Distribution Section	As scheduled Scope of Work document, Section "Performance and Guarantee"
Instrumentation:	Voltmeter selectable Phase to Phase and Phase to Neutral, Maximum Demand Ammeters.
Fault Rating	As scheduled Scope of Work document, Section "Performance and Guarantee"
Surge Protection.	Surge Diverter 3Ph + N rated 70 kA.
Metering	Current Transformer chamber, with integral metering section

Lock Type:	Lowe and Fletcher No. 92268 or Lenlok equivalent.

Distribution Switchboards (for switchboards with Busbars rated 250A or less)

Segregation Form	1
Ratings	150 A minimum.
Construction	Weatherproof IP56, Non-weatherproof IP51
External Design	Enclosed, wall mounting, if cables cannot be concealed, provide full width duct above extending to ceiling and below extending to floor the switchboard, painted to match switchboard.
Distribution Section	As scheduled Scope of Work document, Section "Performance and Guarantee"
Materials and Finish	Definitions: To AS 3439.1., Enclosure: 1.6 mm thick min., paint: Baked Enamel, Escutcheons: zinc annealed paint, Doors: sheet steel
Fault Rating	As scheduled Scope of Work document, Section "Performance and Guarantee"
Surge Protection.	Surge Diverter 3Ph + N rated 40 kA, unless a Surge Diverter of same rating is already present at that building.
Doors:	Hinge Type: Concealed
Lock Type:	Lowe and Fletcher No. 92268 or Lenlok equivalent.
Busbars:	Number of Phases: 3, Minimum Fault Capacity (kA rms): 6 kA.
Rated Current:	250 A minimum

4 Service and maintenance

4.1 GENERAL

During the Defects Liability Period carry out periodic inspections service and maintenance as recommended by manufacturers of supplied equipment and as scheduled below, and also specified in the Switchboards section.

Submit details of service and maintenance procedures and programme six weeks before Practical Completion.

4.2 MAINTENANCE

Regular maintenance

Make service visits and carry out the following procedures, as applicable:

- Service items of equipment.
- Check equipment items for operation, calibration, performance compliance and record values.
- Check electrical and control systems.
- Replace faulty or damaged parts and expendable components.

Service and maintenance records

Submit in binders which match the manuals, loose leaf log book pages designed for recording completion activities including operational and maintenance procedures, materials used, test results, comments for future maintenance actions and notes covering the condition of the installation. Include completed log book pages recording the operational and maintenance activities performed up to the time of practical completion.

Certificates: Include test and approval certificates.

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 owner's designated representative.

Referenced documents: If referenced documents or technical sections require that log books or records be submitted, include this material in the maintenance records.

Certification: On satisfactory completion of the installation, submit certificates stating that each installation is operating correctly.

5 Quality of work and materials

5.1 AUTHORITIES' APPROVALS

Arrange for all inspections required by the relevant authorities at various stages and at completion of the whole installation.

Original documents evidencing approval by the authorities or self certification shall be submitted to the Superintendent and copies included in the operating and maintenance manuals.

5.2 PERMITS AND FEES

Make application for all permits required by each relevant authority and pay all associated fees.

5.3 ALTERNATIVES, PROPRIETARY MATERIALS AND TRADE NAMES

Include the specified or nominated makes of plant and equipment unless the trade name is followed by the words 'or equal', approved. Trade names marked in the text of the specification in this way are intended only to indicate an acceptable item of plant or equipment in each ease. For these items, alternative makes may be provided having a standard of performance, construction and finish not inferior to those named in the specification. State full details, submit full descriptive literature and arrange for demonstrations if required to support the alternative offer. In the event that the alternative items are found to be inferior to the specified items, provide the specified items without variation in price.

Unless otherwise specified, proprietary materials shall be used only in accordance with the manufacturer's printed directions.

6 Shop drawings, operating and maintenance manuals

6.1 Shop drawings

The arrangement of equipment and plant shown on the drawings is typical only and shall be varied to suit the equipment and plant accepted and coordinated with the structure and other services.

The following drawings shall be submitted progressively and signed by the Contractor's responsible officer. All drawings shall be forwarded for inspection and to relevant authorities for approval.

- An arrangement drawing showing size, location and height or depth of all electrical cables and ducts. Particularly show the size and location of all penetrations, fully dimensioned.
- Power and control circuit wiring diagrams of all switchboards including dimension arrangements showing equipment layout. The diagrams shall clearly indicate the function of each item or equipment and shall include the following as applicable:
  - a simple contactor and relay numbering system to enable easy identification of contacts with appropriate contactors or relays;
  - legend of symbols used – use SAA standard symbols;
  - manufacturer's name and catalogue numbers for particular items of equipment;
  - terminal numbers appropriate to terminal strip marking;
  - rating of circuit-breakers, fuses, switches, motors, transformers, etc.
  - manual reset features;
  - sequence of operation of delayed or sequenced contacts and their time delay;
  - any other details necessary for a clear understanding of the circuitry with minimum effort.
- A plan showing any modifications proposed to the plans and specification.

All drawings shall be done on AutoCAD Release 12 (Minimum) only use reduction scales 1:20, 1:50, 1:100 or multiples of 10 of these scales. All lettering shall be a minimum 3.5 mm high and complying with AS 1100 'Technical drawing Part 101 (1992) – General principles suitable for microfilming'.

The examination of shop drawings shall not remove the responsibility for the correctness of the dimensions of such drawings nor conforming strictly with the requirements of this specification nor compliance with statutory regulations.

All shop and/or detail drawings shall be used as 'as installed' drawings for use in operation and maintenance manuals.

6.2 OPERATING AND MAINTENANCE MANUALS

Within one week of Practical Completion supply three bound sets of the 'as installed' drawings and diagrams, together with concise operating and maintenance instructions, schedules and commissioning records. Drawings to be supplied in both electronic and hard form.

Shop drawings and 'as installed' drawings shall be prepared on a CAD system using AutoCAD. "As installed" drawings will include a site plan of the school site at 1:500 and will include but not be limited to the following information.

- Location of buildings, service roads and covered links.
- Location, construction, size, main switch rating, busbar rating, fault rating, and spare capacity of all new and existing switchboards.
- Location, construction and size of all new and existing electrical and communications pits and conduits.
- Location, size and protection of all new and existing consumers mains and submains.
- Location and extent of Electricity Supply to site.

The format of the site plan will be to Project Services standard format for electrical site plans.

Prepare and supply a draft operating and maintenance manual for approval for all services installed in this contract before Practical Completion.

The manual shall give a clear, comprehensive description of all assemblies, appliances, equipment, components and accessories, principle of operation, method of operation and maintenance procedures. Include flow diagrams, line diagrams and any other illustrations necessary to achieve the required objective.

Supply the operation and maintenance manuals and associated drawings as a quality publication as follows:

- White A4 sized hard cover, 2D ring vinyl covered binder. Marbig 150694 or equal.
- Bind in clear vinyl or plastic folder.

Titles for the manuals shall be (inserting the Site name where applicable):

'OPERATING AND MAINTENANCE MANUAL

ELECTRICAL SERVICES

FOR

.....

Spine:

'..... - ELECTRICAL SERVICES"

Submit at the same time three bound sets of as installed drawings bound as follows:

Title cover shall be:

'..... - ELECTRICAL SERVICES DRAWINGS'.

All material contained in the manual shall be printed by an approved process on approved quality paper. This requirement includes all illustrative material.

Include the following type and range of data and information in the manual:

- general description and performance data for all equipment;
- manufacturer's catalogues of the equipment;
- parts list – a schedule of parts fully illustrated and showing name of manufacturer, part number and quantity;
- installation instructions – to describe original installation procedures, alignment diagrams and figures, fit tolerances, and future removal and replacement procedures for all major equipment;
- operating instructions – include all details necessary for correct start-up procedure and sequence of operation;
- maintenance instructions – include all phases of preventive maintenance;
- imported equipment – include all certified data from the manufacturer for works accepted equivalents, winding diagrams and conductor details for imported electric motors;
- maintenance schedules – include detailed schedules of periodic checks and maintenance and replacement procedures;
- test data – include copies of all test certificates including physical test of materials, as well as machine performance data, noise and vibration test figures and all progressive test data obtained during construction and installation;
- drawing list – a complete list of drawings and numbers showing final revision suffix with their titles.

The operating and maintenance manual shall include all items listed in the maintenance procedure sheets of the ..... building regulations and ..... which are relevant to the systems installed.

Present these items of maintenance pertaining to essential safety provisions as a separate section of the operation and maintenance manual to facilitate the completion of the relevant log sheets as required by the ..... building regulations. Do not repeat elsewhere the items of maintenance included in this section but supplement elsewhere as necessary to ensure that all systems are comprehensively serviced and maintained.

At the end of the defects liability period update the as installed drawings to take account of any changes which have occurred during the defects liability period.

Re-issue drawings for the operating and maintenance manuals, including updating the drawing schedule.

Issue a set of as installed drawings in electronic format corresponding to the latest updated issue in the operating and maintenance manuals.

SPECIFICATION – PRELIMINARIES

1 Programming of the Works

1.1 GENERAL REQUIREMENTS

The Contractor is to produce a time scale bar chart within two weeks of the date of the Letter of Acceptance.

The bar chart shall show the logical progression of all activities necessary for the orderly completion of the design and the work. All restraints or dependencies shall be shown such that the critical path is shown.

The bar chart shall consist of appropriate activities, which accurately represent the Contractors proposed methods of completing the whole of the Work, and shall include the preparation and approval of working drawings, procurement of materials, quality assurance activities, manufacture and execution delivery, as the case may be, of all items of Work.

Key dates shall be clearly shown against relevant activities. Each activity shall be identified by a description, which shall permit easy identification, by reference to a specific portion of the Work.

Any review of or comments upon a program by the Superintendent will not:

a) relieve the Contractor from or alter its liabilities or obligations under the Contract, especially (without limitation) the obligation to achieve Completion by the Date for Practical Completion;

b) evidence or constitute a direction by the Superintendent to accelerate, disrupt, prolong or vary any, or all, of the Contractor's Activities; or

c) affect the time for performance of the Principal's or the Superintendent's Contract obligations, including (without limitation) oblige the Principal or the Superintendent to do anything earlier than is necessary to enable the Contractor to achieve Completion by the Date for Practical Completion.

1.2 PROGRAMME CONSTRAINTS

The Contractor is required to progressively liaise with the Superintendent during the design development stage to ensure that when final documentation is lodged for approval by the Superintendent and school representatives the documentation reflects detailed design issues discussed prior to lodgement for approval.

1.3 NUMBER OF PROGRAMME REVISIONS

Allow to provide at least one updated programme during the construction period.

1.4 MONITORING PROJECT PROGRESS AGAINST PROGRAMME

On a weekly basis, mark-up a copy of the current programme with the progress of each activity clearly indicated. Keep a copy of the latest marked up programme on site.

2 Payments

The contractor is to submit its claim for payment in the form shown in the breakdown on Tender Schedule A.

3 Variation Price Requests

All Contractor variation price requests should be submitted on the standard form. A copy of this form will be provided on acceptance of tender. All backup information, as identified on the form, should be provided with each Contractor price request, to allow the Superintendent to promptly assess the claim.

4 Meetings

The Contractor is to arrange such meetings as may be required by the Superintendent to be held between representatives of the Principal, the Contractor, the Superintendent and any appropriate consultants or Subcontractors. The Superintendent will chair the meetings. The Contractor is to take minutes of the meetings and forward a copy of the minutes to all parties in attendance within three working days after each meeting.

A copy of the minutes shall be faxed to "Programme Manager Cooler Schools" on fax number (07) 3239 0817.

5 Monthly Reports

The Contractor is to issue, to the Superintendent, one copy of a report each month, covering:

- any scope changes – details of potential, requested and approved variations;
- status of the detailed design, documentation and construction work relative to the program;
- identifying any sources of delay and actions to be taken to overcome any delay;
- details of financial progress, estimates of cost for potential, requested and approved variations and progress thereof and any other change or potential change to the financial position of the Contract;
- quality issues;
- workplace health and safety issues;
- human resource changes;
- communications issues;
- procurement issues.

6 Personnel Carrying Out Work

6.1 The Contractor is to ensure that the personnel carrying out the works and the consultants, Contractor's Subcontractors and agents are competent and experienced in the type of work they are undertaking and are registered or licensed under the legislation requiring them to be registered or licensed for the purposes of or incidental to the execution of the Works.

6.2 The Superintendent may direct the Contractor to remove from the Site so as not to have any further connection with the execution of the Works any person employed by the Contractor, its

Subcontractors or agents who in the opinion of the Superintendent misconducts itself or is incompetent or negligent in the performance of itself duties or creates a danger to any person or property. The Contractor is to comply with such direction within the time specified by the Superintendent.

6.3 The Contractor is to ensure that all persons employed to perform the Works, including personnel of the Contractor, its Subcontractors and agents are paid at the rates fixed by relevant awards, determinations, judgments or orders of any tribunals and are employed under the conditions (including hours of work) prescribed therein.

6.4 The Contractor is to ensure that all persons employed to perform the Works, including personnel of the Contractor, its Subcontractors and agents are and remain financial members of an appropriate registered union while working on the Site or carrying out the Works.

6.5 Before commencing work the Contractor is to make itself aware of all industrial matters, including all statutory requirements, awards, codes of industrial conduct, industry agreements and site agreements which may apply to the Works or the Site. The Contractor is to comply at all times with the statutory requirements, awards, codes of industrial conduct, industry agreements and site agreements during the execution of the Works.

6.6 The Contractor is to keep and maintain at the Contractor's site office (or such other place approved by the Superintendent) up to date records concerning:

1) Any superannuation scheme the Contractor is required to make payments to; and

2) Long service leave schemes the Contractor is required to comply with in accordance with statutory requirements, awards, codes of industrial conduct or industry agreements, which apply to the Works or the Site.

6.6 The Contractor is to allow the Superintendent and its representatives access at all reasonable times to the records referred to in paragraph 6.6.

7 Compliance with statutory requirements

7.1 The Contractor is to comply with statutory requirements in respect of the Works and any order of a court or authority affecting the Works.

7.2 The Contractor is to pay any fees, charges, security deposits and like payments in respect of the Works in accordance with statutory requirements.

Note: the contractor is to allow for liaison and negotiation with the statutory electrical supply authority to establish any new or upgraded electrical supply requirements to the site. The Contractor is to allow sufficient time when liaising with the supply authority to ensure that the program is unaffected by the process. The cost of any contributions required to be payed by the supply authority for new or upgraded electrical supplies shall be borne by the Principal. The Contractor is to advise the Superintendent of any such costs during the design phase of the contract.

7.3.1 Without limiting the Contractor's obligations under other paragraphs the Contractor is to:

a) make all applications for approvals and give all notices required to comply with statutory requirements;

b) advise the Superintendent in writing of the intent and details of any proposed application or notice two (2) days before the making of the application or the giving of the notice and provide to the Superintendent a copy of any proposed application or notice and any documents proposed to be used to support the application or notice before making the application or giving the notice and is to comply with any directions of the

Superintendent in relation to the application of the Superintendent in relation to the application of notice;

c) when requested by the Superintendent, provide to the Superintendent a copy of any documents or records and any other information used or relied upon by the Contractor to prepare the application or notice;

d) inform the Superintendent in writing of the requirements or conditions proposed by any authority in relation to the giving of an approval or consent and obtain the written permission of the Superintendent before agreeing to those requirements and conditions; and

e) inform the Superintendent in writing of the time, date and location of any meeting between the Contractor and any authority in sufficient time to enable the Superintendent to arrange representation at the meeting. A representative of the Nominated Representative is entitled to attend any such meeting.

7.4 If, in the Contractor's opinion, any provision of requirement of the Contract is at variance with statutory requirements or the requirements of an order of a court or authority the Contractor is to immediately notify the Superintendent in writing. The notification is to contain detailed particulars of:

a) the provision or requirement which is at variance with statutory requirements or the order; and

b) the amendment or modification of the provision or requirements recommended by the Contractor to comply with statutory requirements or the order.

7.3.2 The Superintendent may direct the Contractor as to the course of action to be taken to ensure that statutory requirements are complied with in the execution of the Works.

8. Confidentiality

In addition to the requirements for Confidentiality specified in the Conditions of Contract, the Contractor is to regard all information discussed at meetings concerning the Contract as confidential and shall not disclose such information to a third party except with the prior written agreement of the Principal, particular to each specific instance.

9 Manufacture and Supply of Materials

If requested by the Superintendent, the Contractor is to notify in writing of:

a) the mode and place of manufacture;

b) the source of supply;

c) the performance capacities; and

d) and other information requested by the Superintendent,

of materials or goods to be used in connection with the Works.

10 Quality Assurance

The Contractor is to develop and maintain a Project Quality Assurance System in accordance with the Quality Assurance clause of the Conditions of Contract.

11 Items to be Supplied by the Principal

The Principal has established a Preferred Supplier Agreement (PSA) for the manufacture and delivery of Split Air Conditioning Units. The Contractor is required to complete the Principal supplied split system schedule and return it with the tender. This will be used by the Principal to draw down against the PSA available stock.

The Contractor is required to take delivery of the units/items which are free of charge to the Contractor and thereafter be responsible for the units/items for use in the execution of the Works.

The Preferred Supplier Arrangement is responsible for delivery of the units to Site. The units will be delivered during normal working hours, ie 9.00 am to 5.00 pm Monday to Friday excluding public holidays.

The contractor is to be responsible for "signing-off" delivery dockets to confirm units/items have been received and is to be responsible for storage, insuring, safekeeping and fitting into the Works from the time of taking possession.

12 As-Built Drawings

The Contractor is to supply to the Superintendent in electronic and hard form acceptable to the Superintendent:

a) "As-Built" drawings for the Works

b) all maintenance and operating manuals referred to in the Specification; and

c) all other information relating to the operation and maintenance of the Works as required by the Superintendent.

13 Return of Documents

The Contractor is to, if requested by the Superintendent, after Practical Completion of the Works or the termination of the Contractor's engagement, return or supply to the Superintendent all documents provided to the Contractor by the Superintendent or in the Contractor's possession or control relating to the Works or the Contract.

14 Dilapidation Record

The Contractor is to the satisfaction of the Superintendent before commencing work on the Site and within 20 days after the Date of Practical Completion:

- inspect all land, footpaths, roads, buildings or other structures which may be affected by the execution of the Works, in the company of the Superintendents representative and a representative of the owner of or authority controlling the land, footpath, road, building or other structure;

- make a written and photographic record of existing visible defects in the land, footpaths, roads, buildings or other structures; and

- lodge with the Superintendent a copy of each record of inspection showing the date of the inspection and signed on behalf of the Contractor and the owner or controlling authority by way of acknowledgment that the record of inspection is true and correct.

15 Security and Access

15.1 The Contractor is to comply with the entry and security procedures nominated by the Superintendent from time to time for access to the Site or a part of the Site.

15.2 The Superintendent may deny access to the Site to the Contractor or any person who does not comply with the entry and security procedures.

15.3 The Contractor is not entitled to any additional payment of compensation or extension of time, in contract, tort or otherwise for any losses suffered by the Contractor or any delay in the progress of the Works arising out of any denial of access to the Site of any person who does not comply with the entry and security procedures.

16 Security System

The Contractor is to arrange where approval is received to work outside nominated hours, with the building maintenance contractor to disarm and rearm appropriate access security devices as required to allow the Works to be completed. The Contractor is to also pay all service call out costs associated with these services at no additional cost to the Principal.

17 Occupied Premises

The Principal or persons authorised by the Principal will continue in possession and occupancy of the school.

The Contractor is to ensure the ongoing and uninterrupted operation of the school other than authorised interruptions as agreed in advance with the Superintendent.

The Contractor is to secure and maintain safe access, by approved means, to occupied premises for the Principal and such authorised persons as shall be notified to the Contractor by the Superintendent. The Contractor is to also prevent unauthorised access.

The Contractor is to arrange work to minimise nuisance to the occupants and ensure their safety.

The Contractor is to ensure that a margin of one metre continuous escape path is maintained clear of debris and obstructions.

Prior to commencing work in sensitive areas and in sufficient time for examination, the Contractor is to submit to the Superintendent complete details of the proposed method of work. The Contractor is not to commence work until approved by the Superintendent.

18 Site Identification

The Site shall be the area within the limits as agreed between the Contractor and Superintendent to allow completion of the Works.

Access on to and around the Site, and use of the Site for temporary works and construction plant, including working and storage areas, location of offices, workshops, sheds, parking and the like, is restricted to those areas agreed by the Superintendent and subject to such conditions as may be imposed by the Superintendent.
The Contractor is to take necessary precautions to secure the assets of the Principal.

The Contractor is not to store waste building materials, poisons, flammable liquids and other dangerous items on Site unless approved by the Superintendent.

19 Prohibited Work Methods and Materials

The Contractor is not to use or permit the use of explosives.

20 Asbestos

No asbestos products or asbestos based materials shall be used in any part or parts of this building or its services and the Contractor is to ensure that Sub-Contractors, Nominated Sub-Contractors, suppliers and others are advised of this restriction.

No compensation will be paid if asbestos is brought on to the Site and subsequently discovered and if discovered such removal and consequential making good or costs will be totally at the expense of the Contractor.

Each school site should have an asbestos management plan in place. The contractor shall make its self aware of any management for the each School site and comply with the requirements of the plan. A copy of any relevant asbestos management plan is available from the school principal.

Should the Contractor find any asbestos on Site not mentioned in the asbestos management plan while, carrying out the Works, then the Contractor should halt work and immediately notify the Superintendent of the existence of asbestos. The Superintendent will provide instructions to the Contractor on the removal and disposal of the asbestos.

21 No Smoking on Site

There is to be no smoking on the site.

22 Information to Subcontractors

Advise Sub-contractors and suppliers and installers of material of the requirements of this section of the specification.

23 Interpretation of Drawings

Check dimensions on Site before proceeding with the work. Notify the Superintendent of any omission or conflict in drawings and their relation to Specifications.

24 Sub-contractors and Suppliers

Within seven (7) days of receipt of the Letter of Acceptance, supply to the Superintendent a complete list of sub-contractors and suppliers proposed for the Works. The Superintendent reserves the right to reject any so listed.

25 Site Amenities

Provide statutory and necessary temporary amenities and temporary sanitary facilities for site workers. Maintain in working condition and clean daily.

26 Temporary Fire Extinguishers

Maintain fully charged and accessible, fire extinguishers as are necessary for the care and safety of the Works, as required by Local Fire Authority.

26 General Attendance on Sub-Contractors

General attendance shall include taking delivery, assisting to unload, storing and protecting Sub-contractor's materials and for allowing Sub-contractors ample working space, scaffolding, hoists and ordinary plant etc. and messing and sanitary accommodation and for cutting away, building in and protecting finished work and making good.

27 Coordination with Other Contractors

The following works on and adjoining the Site will be executed by persons engaged by the Principal and are not included in this Contract:

Contract	Anticipated Programme
Passive Building Measures	During the execution of this programme
Builders Work	In conjunction with this Contract

The Contractor is required to coordinate and liaise with any Contractors engaged by the Principal to enable them to proceed with their work.

The Contractor shall provide a comprehensive schedule of builders work required for the execution of this contract to the Superintendent four weeks prior to the Contractor requiring any of these works to commence. The schedule of builders work is to be fully comprehensive to allow the tendering of a minor works package and is to include type, quantity, description and drawings as required for all the builders work. Any delays caused by errors and omissions to this schedule or delay in submitting the schedule shall not give rise to an extension to the Contract.

28 Precautions in Carrying Out Work Under the Contract

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

29 Maintenance of Services and Equipment

The Contractor is to ensure that all services and equipment within buildings are maintained fully operational.

Without impairing the overall effectiveness of the fire alarm system, the Contractor is to take precautions to prevent accidental setting off of fire alarms. The Contractor is to bear all costs incurred by any such setting off attributed to any cause whatsoever.

30 Interruption of Existing Services

The Contractor is to take all necessary measures to identify location of services.

The Contractor is to maintain existing services to all occupied areas and existing operational building equipment throughout the Contract period except for approved interruption periods, which are to be kept to a minimum. The Contractor is to be held responsible for any damage suffered by the Principal, or to those users of the building within the precinct of the Site, due to an unauthorised interruption of a service.

The Contractor is to make an application to the Superintendent for approval to interrupt an existing service five (5) working days prior to the intended date of the interruption. If the period for interruption applied for is unacceptable to the Principal for a legitimate reason, the Contractor is to defer or advance the interruption period to suit. There shall be no grounds for claims for damages or extension of time due to the refusal.

30 Joining up to Existing Buildings/Work/Services

Where the method of joining up of old and new work is not otherwise specified the cutting away and joining up shall be carried out in a manner approved by the Superintendent and made good by trades to match existing adjacent work.

31 Interference with Existing Buildings

Notify the Superintendent of connection, disconnection or interference with existing services. Repair to the satisfaction of the Superintendent, damage which occurs to services during currency of the Contract.

32 Damaged Services

Where existing services at or adjacent to the Site are in non-optimum condition, arrange for an inspection by the Superintendent and appropriate Authority. At such meeting, record the condition and follow instructions when issued in writing by the Superintendent.

33 Solid, Liquid and Gaseous Contaminants

The Contractor shall

a) be responsible for the proper disposal, off site, of solids, liquid and gaseous contaminants

b) discharge gaseous contaminants in such a manner that they will be sufficiently diluted with fresh air that the toxicity will be reduced to an acceptable level

c) subject to statutory and local requirements, liquid contaminant may be diluted with water to a level of quality acceptable in the sewer system or contained in approved vessels for disposal at sites approved by the relevant Authority

d) dispose of solid contaminants by removal from the Site to locations approved by the relevant Authority

e) comply with all conditions of the Department of Environmental Protection (DEP) and Environmental Protection Agency (EPA) environmental commitments with regard to the installation are to be complied with

36 Disposal of Refuse

Refuse from construction operation (including food scraps and the like) shall be removed from the Site daily.

37 Explosive Power Tools

Explosive power tools shall not be used, unless previously approved by the Superintendent.

38 Shop Drawings

Shop Drawings mean complete Drawings showing details of fabrication, assembly, installation, fixing and waterproofing methods of specific items or components, and shall include necessary explanatory notes and specifications. Shop Drawings are to include Architectural, steelwork, pipework, ductwork and electrical detail.

When preparing shop Drawings, do the following:

a) include provision in the construction program for the production and distribution, review and return of Shop Drawings

b) refer discrepancies discovered in the Tender/Contract documents to the Superintendent for direction

c) verify relevant dimensions. Dimension drawings so that the items or components fit accurately into the required positions

d) ensure that Shop Drawings conform with the requirements of the specification

e) all Drawings shall be of consistent standard size and presentation

f) review of Shop Drawings shall imply only that the Contractor interpretations of the relevant requirements of the Contract are generally correct, but shall in no way relieve the Contractor of his obligations under the Contract to construct and complete the Works correctly and accurately

g) do not order, manufacture, assemble or supply any item or component needed according to requirements of Shop Drawings until the Superintendent returns the applicable stamped Drawings

h) allow to provide two (2) copies to the Superintendents. The Superintendent will return one (1) copy

39 Miscellaneous Completion Procedures

a) Removal of protection: Except as otherwise indicated or requested by the Superintendent, remove temporary protection devices and facilities installed during the course of the work to protect previously completed work. Remove evidence of protection devices. Remove protection before Practical Completion

b) Trade Cleaning: As each trade completes it's work in each area of the building, the Contractor is required to be responsible for cleaning the area on a daily basis, having regard for the occupants of the building

40 Final Cleaning

Final Cleaning: Provide final cleaning of the work described in this Specification at a time indicated, consisting of cleaning each surface or unit of work to normal 'clean' condition expected for a first class building cleaning and maintenance program.

Examples of required cleaning are:

a) remove labels, which are not required as permanent labels

b) clean exposed exterior and interior hard surfaces finished, to a dirt free condition, free of dust, stains, fingermarks, films and similar noticeable distracting substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective condition

c) wipe clean surface of mechanical and electrical equipment, including lift and similar equipment, remove excess lubrication and other substances

d) remove debris and surface dust from limited access spaces

e) clean concrete floors broom clean

f) clean light fixtures and lamps so as to function with full efficiency

g) if permanent lighting fixtures have been used for construction purposes, replace globes with new

h) clean project Site, including planted sections and footpaths, of litter and foreign substances. Sweep paved areas to a broom clean condition; remove stains, petrochemical spills and other foreign deposits

i) label keys for locks accurately and provide in duplicate to the Superintendent prior to Practical Completion

41 Clean Site and Access Roads

Be responsible for maintaining clean roads and access. Remove and clean away mud, building debris from footpaths, gutters, drains, walls etc when such occurs.

42 Guarantees and Warranty

a) The Contractor or other approved Guarantor or Guarantors is to provide written Guarantees where so specified elsewhere in this Specification

b) Each Guarantee shall be in an approved form and shall specifically include the provisions required herein

c) Guarantee periods shall commence from the date of the Notice of Practical Completion

43 Patent Rights

The Contractor is to ensure that no patent is infringed and that unless otherwise specified, amounts payable and conditions imposed in respect of the manufacture, use of exercise of patented invention are paid and complied with and shall indemnify the Principal against claims, damages, costs, charges and expenses in any way whatsoever arising out of the manufacture, use or exercise by the Contractor of patented invention.

44 Site Access

Site access is to be agreed in writing with the Superintendent

45 Working Hours

Working hours are 7:00am to 6:00pm Monday to Friday, unless otherwise agreed in writing by the Superintendent. Noisy activities are to be limited to outside school hours. The Contractor is to minimise inconvenience to the building occupants.

Works on Site related to this Contract may need to be stopped for short periods of time to accommodate the school operation requirements. The Superintendent will endeavour to notify the Contractor 48 hours in advance, where practical.

The Contractor is to make allowance in the construction programme to accommodate these. Allow for all out of hours work to be included.

46 Noise Control

The Contractor is to take all practicable precautions to minimise noise resulting from work under the Contract. Construction equipment fitted with noise suppressors should be used where practicable.

47 Dust Control

The Contractor is to take all measures to restrict dust caused by the work under the Contract.

48 Sign Boards

The Contractor is not to be permitted to display company sign boards.

49 Year 2000 Compliance Issues – Date Compliance

49.1 MANAGEMENT SOFTWARE SYSTEMS

The Works shall be designed and warranted for Year 2000 compatibility and compliance. If computer software is included in the Works the Contractor is to supply all parts, software and expertise necessary to ensure compliance to industry trends and standards. In particular, all software shall be designed and warranted to year 2000 compatibility and:

i) will manage and manipulate Date Data, including single century formulas and multi-century formulas and date values

ii) will provide Date Data interface values that reflect the century

iii) will function without error or interruption related to Date Data, including without limitation, errors or interruption from functions, which involve Date Data from more than one century

iv) requires that all Date Data (whether received from users, systems, applications or other sources) include an indication of century in each instance, and

v) all date output and results, in any form, will include an indication of century in each instance.

For the purpose of this Clause "Date Data" means any data or input which includes an indication of or reference to date.

a) The Contractor is to provide the Superintendent with information from the software in accordance with the Contract requirement and when requested by the Superintendent

b) The Contractor is to provide backup sources for the software in a form, which the Superintendent may readily copy, duplicate and load into devices in which the software normally resides.

49.1 EQUIPMENT

For the purposes of this clause, "Equipment" means:

a) computer hardware, and

b) equipment, machinery or systems the operation of which is controlled by, or dependent upon, a microprocessor or electronic chip

Without limiting its other warranties under this Agreement, the Contractor represents and warrants that all Equipment installed as part of the Works by the Contractor will provide full functionality and operate without adverse effect with respect to all dates after the date of execution of this Agreement.

49.2 WARRANTY

Without limitation, the requirement that the Equipment provide full functionality with respect to all dates includes the Equipment being generally in compliance with SAA/SNZ MP77:1999 and being able to deal without error or interruption with:

a) leap years

b) functions that are programmed to commence or end on a particular date, and

c) all calculations based on dates, including calculations such as subtractions, additions, percentages, sequences and comparisons

The Contractor is to ensure that where there are any modifications or additions to or upgrades of Equipment installed or used as part of the Works, such modifications, additions or upgrades will comply with the warranties in this Clause.

49.3 TESTING AND RECTIFICATION

The Contractor agrees that, at the request from time to time of the Superintendent, the Contractor:

a) will conduct, or arrange to be conducted, specific comprehensive testing of the Equipment in accordance with this specification to the Owner's satisfaction to ensure compliance of the Equipment with the above warranties, and

b) will rectify or replace as necessary any Equipment which cannot be demonstrated to comply with the above warranties

The cost of all rectification or replacement pursuant to Clause (b) above, shall be borne by the Contractor, but only to the extent that it relates to Equipment, or any part of the Equipment, which was installed in the provision of the Works.

49.4 NOTIFICATION

If either party becomes aware at any time that any Equipment will not or may not fully comply with the above warranties, that party is to immediately notify the other party.

50 Miscellaneous Works Common to all Trades

50.1 GENERAL

The Contractor shall provide all incidental works required for storage, construction, installation, operation and maintenance of the installation with the exception of the items of work described in the Builders Work section of the Specification as being carried out by the Builder.

50.2 MINOR PENETRATIONS

Provide all minor openings through walls, floors, ceilings, bulkheads and rooves.

50.3 MAKING GOOD

Make good existing adjacent surfaces, including painting as required following provision of all openings and access panels or disturbing the surface. The made good surfaces shall match existing.

SPECIFICATION – BUILDERS WORK IN CONJUNCTION

1 Builders Work Specification

1.1 GENERAL

All the works described in Section 2 of this section will be provided under a separate contract, unless the Contractor includes this work in its alternative tender as described in the instructions to tenderers.

The Contractor is to liaise and coordinate with the Builder to have these works completed so that they do not delay the delivery of the Project. Delays due to lack of coordination will not give rise to an extension of the Contract.

2 Schedule of Builder's Works

2.1 STRUCTURAL PENETRATIONS

Provide all structural openings through walls, floors, ceilings, bulkheads and rooves.

2.2 FLASHING AND CAPPING

Provide flashings and cappings for all roof and exposed wall penetrations. Flashing material to AS 2904. Preform to required shapes where possible. Notch, scribe, flute or dress down as necessary to follow the profile of adjacent surfaces. Mitre angles and lap joints 150 mm. Flash projections above or through the roof with two part flashings, consisting of a base flashing and a cover flashing, with at least 100mm overlap. Provide for independent movement between the roof and the projection. Flash pipes by sealing with neutral cured silicone rubber and provision of a proprietary flexible clamping shoe with attached metal surround flashing.

2.3 ASBESTOS

Provide a Management Plan in accordance with the requirements of the Workplace Health and Safety Regulations 1997 'Asbestos Removal Work' when penetrating asbestos cement roofing and obtain written approval from the relevant Authorities before commencing work on site.

2.4 ACCESS PANELS

Provide Access Panels as required through flush ceilings and bulkheads. Material to match adjacent ceiling/bulkhead. Provide perimeter trim to Access Panel and adjacent ceiling/bulkhead. Provide Access Panel support and screw fixings to facilitate regular maintenance access.

2.5 UNDERCUT DOORS

Undercut doors as required. Nominal 25mm, unless noted otherwise. Provide additional frame material as required to maintain integrity of door. Make good as required, including painting.

2.6 MAKING GOOD OF BUILDERS WORK

Make good existing adjacent surfaces, including painting, as required following provision of all openings and access panels or disturbing the surface. The made good surfaces shall match existing.

2.7 ROOF ACCESS

Provide roof access position(s) and walkways, handrails and nominal 600 mm wide maintenance platform around roof mounted evaporative cooling units and other roof mounted equipment. Materials, design and construction to AS1657-1992.

2.7 CERTIFICATION AND APPROVAL

Arrange for all documentation and certification required for the lawful execution of the Builders Work including Building Approval.

2.8 PLINTHS

Provide nominal 100mm thick concrete pads under ground mounted condensing and evaporative cooling units. Materials and construction to AS3600-1994. Concrete: 20 Mpa to AS1379. Reinforcement: F72 fabric to AS1302.

2.9 ENCLOSURES

Provide galvanised mesh enclosures unless approved otherwise by the Superintendent, around all ground mounted condensing and evaporative cooling units, and around other units as instructed by the Superintendent.

2.10 SCAFFOLDING FOR BUILDERS WORK

Provide any scaffolding required for Builders Work. Scaffolding to AS1576.

2.11 RUBBLE PITS

Provide a condensate soakage system. System to be designed to

a) to comply with the relevant local government Authority requirements for the design of transpiration evaporation septic systems, as applicable to the region and

b) to suit local ground conditions with respect to percolation rates. Materials and workmanship to AS3500.3-1990 and AS1945-1990.

c) Condensate pits to be a minimum of 2m from foundations and footings.

2.12 WATER SUPPLY

Provide a cold water supply system installed from the meter, or appropriate location, to draw-off points and connections to other services. Water supply to AS 3500.1.2. Materials and components to SAA MP52.

Submit drawings and schedules showing layout and details of the system, including location, type, grade and finish of piping, fittings, valves, meters and pipe supports, access openings, cover plates, valve boxes and access pits. Test system for leaks. Repair as necessary, replace if damaged and retest.

Provide the fittings necessary for the proper functioning of the water supply system including taps, valves, backflow prevention devices, pressure control devices, strainers, gauges and automatic controls and alarms. All fittings to be brass or equivalent approved. All pipework to be copper or equivalent approved.

2010

SPECIFICATION

(using AS2124 - 1992)

DUNDULA STATE SCHOOL
S88 AMENITIES TYPE B

PROJECT SERVICES
Department of Public Works and Housing Queensland

80 GEORGE STREET
BRISBANE Q 4000

SPECIFICATION
(using AS2124 - 1992)

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SPECIFICATION

DUNDULA STATE SCHOOL

S88 AMENITIES TYPE B

REFERENCE NO.: 21779 / 15097
DATE: May 1999

All enquiries during the Tender Period shall be directed to Mr Ken Hodge, Project Manager
Telephone (07) 4938 4533
Facsimile (07) 4938 4974

All enquiries after the acceptance of tender shall be directed to the Superintendent's Representative.

s.78B

AUTHORISED FOR ISSUE

DATE 4/5/1999

PROJECT SERVICES
DEPARTMENT OF PUBLIC WORKS AND HOUSING
QUEENSLAND

80 GEORGE STREET, BRISBANE Q 4000

This project is based on the Conditions of Engagement between Q-Build and Project Services dated 13 May 1999 BPRSF 190.

The date of Practical Completion is 12 weeks from the date of Project Approval Advice.

Liquidated Damages per day is $50.00.

The Defects Liability Period shall be 6 months after Practical Completion with the exception of plant material which shall be 6 weeks.

SEPARABLE PORTIONS OF THE WORKS

Separable Portion 1 includes:

All work required for practical completion and commissioning of the Small Amenities Block Type B and associated works and including all services, landscaping etc to the new building.

Possession of site for Separable Portion 1 will be as per drawing number 21779/15097-AR1.

Separable Portion 2 includes:

The removal of all fixtures, cutting and sealing of all plumbing services and touch up finishing as required to the existing toilets refer drawing number 21779/15097-AR1.

TABLE OF CONTENTS

This Specification comprises the following Sections and Clauses:

SECTION 000 - PRELIMINARIES

SUBSECTION 001 GENERAL

DESCRIPTION OF THE WORKS - PRELIMINARIES

SCOPE: Nothing in this Clause shall limit, modify or alter the extent or description of the Works as set out in detail elsewhere in the Contract Documents. Subject to the foregoing, the Works generally comprise the erection and completion of school building works including the following building(s):

B63 Amenities Block type B

Additional Work: The Works also include but are not limited to the following:

Earthworks for Building Platform

all as detailed and described in the Contract Documents.

SITE IDENTIFICATION - PRELIMINARIES

LOCATION: The site is situated at:
1 Main Street,
Dundula.

Real Property Description:
Subdivision 1, Portion 339
Parish of Howard
County of Carlisle.

INTERPRETATIONS - PRELIMINARIES

WORDS AND EXPRESSIONS: Any reference in the documentation to the Department of Works & Housing or Administrative Services Department is to be read and understood as the Department of Public Works.

CONTRACT DOCUMENTS - PRELIMINARIES

ITEMS: The contract documents shall comprise:

- Australian Standard General Conditions of Contract AS 2124-1992 (subject to the amendments set forth in the Special Conditions of Contract),
- the Special Conditions of Contract including completed Annexure Part A, and the Particular Conditions of Contract, as issued by the Department of Public Works and Housing and attached to this specification,
- This Specification,
- The accepted Tender Form and accompanying information,
- The Drawings as listed in the 'SCHEDULE OF DRAWINGS' in this Specification,
- Any other drawings or documents issued in accordance with the Contract during the course of the Contract.

STATUTORY REQUIREMENTS - PRELIMINARIES

PRIOR APPLICATIONS: Prior to entering into this agreement the Principal has, in respect of the lawful requirements of public and other authorities applicable to the Works, obtained Building approval under the Building Act and Drainage Approval.

NOTICES TO BE GIVEN AND FEES TO BE PAID: Give notice and pay fees in respect of all other statutory requirements e.g. for local authority on-site drainage inspections and for notifiable projects under the Work Place Health and Safety Act, and comply with all relevant statutory requirements in accordance with the Contract conditions. Take responsibility as the Principal Contractor under the Work Place Health and Safety Act.

BUILDING ACT COMPLIANCE DOCUMENTS: In addition to requirements of Clause 8.3 of the General Conditions of Contract, the Principal shall furnish to the Contractor, one set of Building Act compliance documents. The Building Act compliance documents shall be kept on site as required by the Standard Building By-Laws.

BUILDING INSPECTIONS: Inspections are required for Building Act Compliance purposes. These inspections shall be conducted by a representative of the Department of Public Works and Housing. It will be the Contractor's responsibility to liaise with the nominated inspector regarding:

- the type and nature of inspections required,
- the staging and timing of such inspections, and
- notification periods required prior to required inspections.

Fire Services: Where the building contains "special fire services" (as defined in Appendix 6 to the Standard Building By-Laws 1991), give 48 hours minimum notice to the Superintendent and the Commissioner fo Fire Services so that they can be inspected and, if necessary, tested at the following stages:

. after installation and before concealment by subsequent construction work, and
. after installation and before interior finishes are applied.

FIRE SERVICES DOCUMENTATION: Prior to requesting Practical Completion, prepare the following documents, which are required subject to the provisions of Section 6.10 of Part 6 of the Standard Building Law:

. a list of all "fire safety installations" as defined in Appendix 5 of the Standard Building Law and
. 3 copies of "as constructed" drawings showing the location of such fire safety installations.

Furnish to the Superintendent:

. 2 copies of the "as constructed" drawings.

Furnish separately to the Superintendant (marked for the attention of the relevant Building Act compliance Officer):

. the list of all "fire safety installations and
. 1 copy of the "as constructed" drawings.

Supply all documents collated,bound and parcelled.

SUBSECTION 020 DOCUMENTS

INTERPRETATION OF DRAWINGS - PRELIMINARIES

DIAGRAMMATIC LAYOUTS: The layout of plant and equipment as shown on the Drawings is diagrammatic only. Obtain measurements and other information necessary to carry out the work specified.

EXISTING WORK: Verify the dimensions of the existing work before proceeding and notify discrepancies as required by the Contract.

LEVELS: Spot levels shall take precedence over contour lines and ground profile lines.

BUILDING MAINTENANCE MANUAL - PRELIMINARIES

REQUIREMENT: At the Date of Practical Completion, provide to the Superintendent, 3 copies of the building maintenance manual in a three-ring hard plastic covered binder. The manual shall contain the following:

- all documents specified throughout this Specification to be included in the building maintenance manual;
- copies of all warranties and guarantees;
- copies of all manufacturer's instructions;
- maintenance instructions.

AS-CONSTRUCTED DRAWINGS - PRELIMINARIES

REQUIREMENT: Where as-constructed drawings are called for in the Contract, prepare drawings showing the "as installed" locations of building elements, plant, equipment and the like. Show coordinate dimensions where applicable. Submit two copies of each drawing.

FORMAT: Where appropriate use the same sheet size and format as the Contract Drawings. On request the Principal will supply transparent copies of the Contract Drawings as the basis for work as executed drawings.

DRAWINGS IN MANUALS: Where operation and maintenance manuals are called for in the Contract, include in each manual a copy of each work as executed drawing relevant to that portion of the Works, revised to show any changes found necessary for the satisfactory operation and maintenance of plant and equipment.

SUBSECTION 024 DESIGN PARAMETERS

DESIGN CRITERIA - PRELIMINARIES

WIND LOAD: The design wind criteria, applied in accordance with AS 1170.2, using Permissible Stress Methods, are:

Design Wind Speed (V_z): 50 metres per second.

Internal Pressure Co-efficients ($C_{p,i}$): + 0.7 - 0.5

Local Pressure Factors (K_1): To be applied.

CERTIFICATION: Where a certificate is required to be submitted by a Structural Engineer, the Engineer shall be a practising Professional Engineer registered under the Professional Engineer's Act 1988 (Queensland).

SUBSECTION 060 ADMINISTRATION

PROGRAMME OF WORK - PRELIMINARIES

CONSTRUCTION PROGRAMME: The Contractor shall supply a construction programme in accordance with the following:

BAR CHART:
Requirement: Within 14 Dunduladar days after notification of acceptance of the tender, submit to the Superintendent 5 copies of a detailed bar chart showing intended progress against a suitable time scale, with provision made for entering actual progress. If the Superintendent considers that this bar chart is not sufficient for his purposes or otherwise not satisfactory, he may require the Contractor to provide an amended bar chart within 7 days of being requested to do so.

Revisions: If at any time during the carrying out of the work the progress for any item of work shown on the bar chart is less than that forecast by the bar chart or the Superintendent considers that the bar chart does not show a satisfactory programme of work, he may request the Contractor to provide within a stated period, a bar chart showing a revised work plan.

Payment: The Principal may refuse payment upon any certificate until such bar charts have been provided.

UPDATING:
Number of Updates: Allow for providing the Provisional Quantity of 1 updates of the construction programme at a provisional rate per update as nominated by the Contractor in the Form of Tender.

Requirement: The updating of the Construction Programme shall meet the following requirements:

- All copies of the Construction Programme and Time Analysis shall be updated as requested in writing by the Superintendent. Such updates shall be delivered to the Superintendent within seven working days of the request. The number and cost of updates actually provided will be adjusted against the provisional items above.

- For the purpose of this Contract:

  "STATUS" is defined as - "accurately recording the status of the work based on the percentage of activities complete on the applicable programme".

  "UPDATING" is defined as - "correcting activity sequences and adding or deleting activities, where necessary, to produce a network and analysis clearly indicative of the current job status and the intended progress".

- The status of the works is to be reviewed at one month periods in conjunction with such representatives as may be nominated by the Superintendent.

- Notwithstanding such reviews, prepare a monthly status report for submission and review by the Superintendent at the project team meeting. The status report shall contain description of critical activities, current status, non-critical activities which durations have varied, contract completion date, programme completion date, report on milestones to be achieved over the ensuing month and items critical to maintain the programme original status.

- No changes of activity duration during the course of the works shall be made without agreement of the Superintendent.

- Outstanding claims for extension of time shall not negate the Contractor's obligation to provide an updated programme.

- In the event that the Contractor does not comply with the provisions relating to updating, the Principal may arrange to have a default rectified by other persons at the Contractor's expense.

EXTENSIONS OF TIME:
Requirement: All extensions of time granted to the Contractor shall be incorporated in the construction programme by adjustment of the programme relative to current job situation at the update immediately following the granting of the extension.

Support Data: Applications for Extensions of Time under Clause 35.5 of the General Conditions of Contract shall be supported by data based on the updated constructed programme together with a time analysis indicating how critical activities were or will be affected and the effect on the Project Completion Date.

Assessment: Extensions of Time will be assessed on a normal 5 day working week (i.e. Monday to Friday).

Format: The format for submission of claims for Principal caused delays for Extension of Time is as follows:-

STATEMENT OF FACTS AND SUPPORTING DATE REQUIRED FOR SUBMISSION OF CLAIMS FOR PRINCIPAL CAUSED DELAYS FOR EXTENSIONS OF TIME

ITEM	DESCRIPTION
A. Claim	Identification of the Claim; description
B. Costs	Cost of Claim: 1. Whether costs are to be claimed. 2. Amount of costs claimed.
C. Contractual Basis	The contractual reason on which the claim is based (with references).
D. Cause	Cause of Claim: i.e. late supply information; variation; etc.
E. Duration	1. Time claimed. 2. Identification of time on the programme Dunduladar.
F. Programme Effects	Effects on: 1. Critical activities. 2. The critical path. 3. Non-critical items of work. 4. Other.
G. Graphic Presentation (to demonstrate the difference between the planned work and the actual work.	Network Diagrams detailing: 1. The original programmed activities with allowances for approved extensions of time. 2. The as-constructed details which will support the claim.
H. Documentation	Copies of all information relating to the claim, e.g. 1. Correspondence 2. Variations 3. Site Instructions 4. Requests for Information 5. Transmittals 6. Drawings (where possible) 7. Any other information, i.e. background information that is relevant to the claim, (e.g. relevant minutes from site meetings, etc.)

l.	Mitigation	1. Identify what action has been taken or is possible, to mitigate the delay, or costs of the delay.

Absence of Agreed Programme: In the absence of an agreed planning programme the Superintendent is not bound to base decisions on the Contractor's programme and will make decisions in a reasonable manner based on information available at the time.

PROGRAMME CHART - PRELIMINARIES

REQUIREMENT: Mount and display in the Contractor's site office the bar chart or network diagram based on the construction programme and keep up to date.

SITE MEETINGS - PRELIMINARIES

REQUIRED MEETINGS: Throughout the duration of the Contract, arrange meetings at fortnightly or other agreed intervals with appropriate Sub-Contractors and the Superintendent and, unless otherwise directed by the Superintendent, keep minutes of such meetings and have 2 copies thereof forwarded to the Superintendent within 3 working days after each meeting.

CONTACTS: At the first site meeting submit to the Superintendent the names and telephone numbers of all responsible persons who may be contacted after hours during the course of the Contract.

SUBSECTION 070 SITE

OCCUPIED PREMISES - PRELIMINARIES

OCCUPANCY BY PRINCIPAL: The Principal or persons authorized by the Principal will continue in possession and occupancy of the parts of the school reserve and existing buildings.

ACCESS: Secure and maintain safe access by approved means to occupied premises for the Principal and such authorized persons as shall be notified to the Contractor by the Principal, and prevent unauthorized access.

COMFORT AND SAFETY: Arrange work in occupied or partially occupied premises to minimize nuisance to the occupants and ensure their safety.

PROTECTION: Protect the occupants against weather, dust, dirt, water or other nuisance by means of temporary screens or the like.

CONTRACTOR'S SITE AREAS - PRELIMINARIES

EXTENT: The Contractor's site area shall be limited to those areas as shown on the Drawings or as directed by the Superintendent.

RESTRICTIONS: The Contractor's access on to and around the site, and use of the site for Temporary Works and Constructional Plant, including working and storage areas, location of offices, workshops, sheds, roads, parking and the like, shall be restricted to the site as defined above or as approved by the Superintendent, and subject to such conditions as are stated in the Contract.

EXISTING SERVICES - PRELIMINARIES

GENERALLY: Existing services (such as drains, watercourses, public utility and other services) if encountered, obstructed, or damaged in the course of performing the work under the Contract, shall be dealt with as follows:

- If the service is to be continued: Repair, divert, relocate as required

- If the service is to be abandoned: Cut and seal or disconnect, and make safe

in either case to satisfy the authorities concerned.

DISCONNECTED METERS: Return to the appropriate supply authority.

COST: The cost of dealing as above with 'live' services not visible or the location of which could not be ascertained by the Contractor from the appropriate authority or from the Contract will be valued as a variation to the work under the Contract provided that the Contractor has taken all reasonable precautions to determine the location of existing services and safeguard them before trenching, relevelling, roadmaking, demolition, or similar operations are commenced.

NOTIFICATION: Notify the Superintendent immediately upon the discovery of services or obstructions not shown on the Drawings.

INTERRUPTION TO EXISTING SERVICES - PRELIMINARIES

MAINTENANCE: Maintain existing services to the school throughout the Contract Period except for approved interruption periods which are to be kept to a minimum.

NOTICE: Make application to the Superintendent for approval, to interrupt an existing service, 3 working days prior to the intended date of interruption.

ADVICE: With the application for interruption, advise the Superintendent of any consequences of the interruption and the measures proposed for rectification of any problems arising.

SURFACE LEVELS - PRELIMINARIES

EXISTING LEVELS: Before commencing earthworks operations, check the surface levels shown on the Drawings. If it is found that these levels differ significantly from the existing ground surface level, immediately notify the Superintendent in writing before commencing work thereon. The Superintendent shall, on receipt of the notice, investigate and determine the additional quantity of earthworks if any.

ACCEPTANCE: The Contractor shall be deemed to have accepted these natural surface levels upon disturbing or covering the surface.

SUBSECTION 075 ENVIRONMENTAL PROTECTION

ENVIRONMENTAL CONTROL - PRELIMINARIES

OBTAIN APPROVAL: Do not form new tracks, alter existing tracks, erect camps, remove trees or shrubs, cut fences, or any other such things without approval.

FIRE PROTECTION - PRELIMINARIES

RESTRICTIONS: Do not light fires on Site.

EXISTING FLORA - PRELIMINARIES

PROTECTION: Protect from damage all trees and other plants which

- are shown or specified to be retained, or
- need not be removed or damaged for construction operations.

DUST AND NOISE - PRELIMINARIES

DUST CONTROL: Restrict dust caused by the Works to a minimum.

NOISE CONTROL: Take all practicable precautions to minimize noise resulting from work under the Contract. Fit all construction equipment with noise suppressors and use so that noise is minimized.

SUBSECTION 080 PLANT

SITE OFFICE - PRELIMINARIES

FOREMAN'S OFFICE: Provide, erect and maintain a satisfactory office for the Foreman where shown on the Drawings and/or as directed, having good ventilation and lighting, a long bench for reading drawings, adequate drawer space for storing drawings and documents, adequate lockable drawer space for the Building Act compliance documents, and remove on completion.

Fire Fighting Equipment: Provide in the Foreman's Office one Dry Chemical 4.5 kg fire extinguisher to AS 1846.

Temporary Telephone: Provide a temporary telephone in the Foreman's Office and pay charges for installation, rental and all calls including those made by the Superintendent relevant to the project. Pay charges for removal on completion.

REQUIREMENT: Sweep and dust the office(s) regularly. If, during the progress of the Works, it becomes necessary to move the office(s), this shall be done without charge and with minimum of inconvenience. Provide access to the office(s) at all times.

REMOVAL: Remove the office(s) and contents on completion of the Works after obtaining permission of the Superintendent.

TEMPORARY FENCE - PRELIMINARIES

REQUIREMENT: Enclose the work and plant area within the defined contractors site area with a temporary fence with adequate gates to satisfy requirements of the Workplace Health & Safety Act. Remove on completion and make good the grounds.

TEMPORARY SERVICES - PRELIMINARIES

GENERAL: Maintain the temporary services during the execution of the work under the Contract. Install such services in accordance with the requirements of the Relevant Authorities. Make such services available to Sub-Contractors. On completion, disconnect temporary services and clear away all traces.

POWER: Provide temporary mains electricity supply to the site such that all parts of the Works requiring power can be reached by a 30 metre lead, through a minimum of four 10 Amp, single phase 240 volt outlets. Protect the supply with at least one approved earth leakage circuit breaker of nominal tripping current of 30 mA and such that excessive tripping does not occur. Test breaker operation weekly. Pay charges in connection with the installation, use and removal of the service.

WATER: Provide temporary mains water supply having not less than one fixed 20 mm outlet located where directed by the Superintendent.

TEMPORARY ROADS - PRELIMINARIES

REQUIREMENT: Provide any necessary temporary roadway as agreed with the Superintendent and make good on completion.

SIGNBOARD - PRELIMINARIES

REQUIREMENT: Provide, erect on posts where approved, and maintain throughout the works, a signboard size 1700 x 1000 mm in accordance with Standard Detail S.1737. Paint and signwrite to detail, using letter sizes and styles as approved by the Superintendent.

SIGNWRITING: The board shall bear the names of the project, Design Authority and Contractor.

REMOVAL: Dismantle and remove on completion of Works.

OTHER SIGNBOARDS: The Superintendent's approval shall be obtained for any Contractor's signboard or Sub-Contractor's signboards.

SUBSECTION 090 COMPLETION

CLEANING ON COMPLETION - PRELIMINARIES

Requirement: On completion, ease and adjust all moving parts, doors, windows, etc., examine and clear all drains and gutters, ensure all bolts and screws are tight, and test all services are working, to the approval of the Superintendent.

Carry out the work outlined below using labour skilled in the particular operation required and to the Superintendent's satisfaction:-

- Clean all windows, both inside and out on all faces.
- Remove all render and other spots on metal sashes, box sections and other surfaces.
- Dust all walls, ledges and projections, etc.
- Wash and clean fittings, mirrors, walls, sinks, etc.
- Wash and dry all floors and concrete slab areas.
- Remove all paint spots from floors and walls.
- Clean out all ducts, cupboards, etc.
- Clean and polish all chrome, hardware and other fittings.

FLOORS: Clean floors one at a time and after each floor is completed, lock it off. If any further work is carried out in the room, reclean the entire floor.

KEYING: On completion of the cleaning, check the keying system and provide all keys for all locks as specified in the 'HARDWARE' Section.

SUBSECTION 100 MATERIALS AND WORKMANSHIP

STANDARDS - PRELIMINARIES

CURRENT EDITIONS: An Australian or other standard applicable to the Works shall be the edition last published not later than one month prior to the closing date for tenders.

SITE COPIES: Keep on the site a copy of each standard referred to in the Specification which specifies site operations or site codes of practice.

SAMPLES - PRELIMINARIES

APPROVED SAMPLES: Items in respect of which samples are specified shall be in accordance with an approved sample, or within a range defined by approved samples, as determined by the Superintendent, otherwise such items shall be liable to rejection. Keep approved samples in good condition on the site until Practical Completion.

DELAY: Where the Specification requires samples to be submitted by the Contractor, the Contractor shall be solely responsible for the consequences of delay resulting from failure to allow adequate time for the assessment and approval of samples, or from the rejection of samples which do not comply with the Specification, or the like.

TESTING - PRELIMINARIES

INDEPENDENT TESTING AUTHORITY: Unless otherwise specified, any testing required by the Contract to be by an independent authority shall be carried out by an approved member of the National Association of Testing Authorities Australia (NATA).

WARRANTIES - PRELIMINARIES

NAME THE PRINCIPAL: Unless otherwise specified or agreed, warranties or guarantees specified in the Contract shall name the Principal as warrantee and shall be included by the Contractor within the Building Maintenance Manual.

COMMENCEMENT: Unless otherwise specified, the commencement date for warranties or guarantees shall be the Date of Practical Completion.

PROPRIETARY ITEMS - PRELIMINARIES

IMPLICATION: The identification of a proprietary item shall not necessarily imply exclusive preference for the item so identified, but shall be deemed to indicate the required properties of the item.

INFORMATION: When offering an alternative for approval, provide all available technical information, and any other relevant information requested by the Superintendent. If so requested, obtain and submit reports on relevant tests by an independent testing authority.

ALTERATIONS: State whether the use of the alternative will require alteration to any other part of the Works, and any consequent variation to the Contract sum.

SEALED CONTAINERS - PRELIMINARIES

REQUIREMENT: Materials and products supplied by the manufacturer in closed or sealed containers or packages shall be brought to the point of use in the Works in the original unbroken container or package, otherwise they shall be liable to rejection.

JOINING UP - PRELIMINARIES

GENERALLY: Carry out the joining of new work to existing work, and any consequent cutting away, in a manner approved by the Superintendent, and make good to match existing adjacent work in all respects.

CHANGES TO EXISTING - PRELIMINARIES

NOTICE: Before making any changes to existing items or work, give 5 working days' notice to the Superintendent and carry out the work only under his supervision.

YEAR 2000 CONFORMITY

INTERPRETATION: "Year 2000 conformity" has the meaning given to that expression in Australian Standard SAA/SNZ MP77:1998; "goods" covers any property and includes software, a computer system, plant, machinery and equipment, fixtures and fittings.

WARRANTY: With regard to this contract, the Contractor promises the Principal that:

Goods produced: Any goods produced by the Contractor for the Principal will comply with the requirements for year 2000 conformity and, further, will do so without the requirement for any special steps to be taken (eg. the use of one of alternative methods of use) save for any steps that are not onerous or difficult or time consuming and are specifically pointed out in writing to the Principal prior to use of the goods.

Goods used or relied on: There will not be adverse effect by the Contractor's (or the Contractor's subcontractors) use of, or reliance on, goods that do not comply with the requirements for year 2000 conformity.

TESTS: The Contractor will, if requested, in a prompt and efficient manner, demonstrate to the Principal by way of reasonable means, that the goods comply with the requirements of this contract in relation to year 2000 conformity.

SECTION 210 - GROUNDWORKS

SUBSECTION 001 GENERAL

TERMS - GROUNDWORKS

STANDARD: To AS 1348.

LINE OF INFLUENCE: A line extending downward and outward from the bottom edge of a footing, slab or pavement.

Angle from Horizontal: 45 degrees, unless shown otherwise on the Drawings or approved by the Superintendent.

SERVICES: Pipes, cables, ducts, associated structures or similar objects, including electrical, communication and control cables, drains, sewers, water pipes, gas pipes, and the like.

SITE INVESTIGATION - GROUNDWORKS

REPORT: A soil investigation has been carried out for this project.

Location: The report is inserted at the back of this specification.

LIABILITY OF PRINCIPAL LIMITED: The Contractor agrees to accept and use the report and the information it contains on the basis that the Principal is responsible only for the accuracy of the factual information contained therein, and the Contractor hereby releases the Principal and his employees from all liability and from any and all claims or causes of action arising or which may arise out of any reliance placed upon the adequacy interpretation or sufficiency of the report and the opinions and recommendations contained in the report, by the Contractor or any other person under the control of the Contractor at the time of tender or at any other time.

RECORDS OF MEASUREMENT - GROUNDWORKS

REQUIREMENTS: If a schedule of rates applies to the work, or provisional quantities are specified, or there have been variations to the Contract levels or dimensions of excavations, unless otherwise directed, do not commence backfilling or place any permanent work in excavations until agreement has been reached and recorded on the following:

- depth of excavations related to the datum
- final plan dimensions of excavations related to the building grid system or set out lines as applicable
- quantities of excavations in rock, if applicable to the Contract
- quantities of fill and/or topsoil imports being recorded separately.

CERTIFIED RECORDS: Provide a copy of the agreed records of measurement certified by the Contractor and the Superintendent.

TOLERANCES - GROUNDWORKS

SURFACES: Finish groundworks to smooth uniform and free draining surfaces as normally produced by a grader blade and conforming to the following tolerances:

LOCATION	TOLERANCES ABSOLUTE	RELATIVE Linear	Surface
Groundworks under slab Not wholly above or paved areas. finished level.	+ 5 mm to -20 mm or below the design	10 mm	
Groundworks under footings.	+ 0 mm to -50 mm	-	-
Excavation in trenches for pipes and the like.	+ 5 mm to -50 mm	-	-
Groundworks in areas not Not wholly above covered by the above. finished level.	+ 25 mm to -25 mm or below the design	10 mm	
Batter slopes.	Not steeper than slope shown on the Drawings or specified.	-	-

PLAN DIMENSIONS: Unless otherwise permitted by the Superintendent, work within construction tolerances of + 75 mm to -0 mm for plan dimensions of bulk groundworks. Do not construe this as permitting any encroachment beyond legal limits.

LOWER GROUNDWORKS: At the time of subsequent construction, fill surfaces lower than the specified finished level but in accordance with the first item above, to the correct level with material specified for the paved area. The cost of this work shall be deemed to be included in the Contract Sum. Treat groundworks or excavations, lower than the specified finished level but in accordance with the second and third items above in accordance with 'EXCESS EXCAVATION - GROUNDWORKS'.

EQUIPMENT - GROUNDWORKS

REQUIREMENT: Maintain all equipment in good condition and ensure that it is operated by persons experienced and skilled in its use. Produce evidence of such experience if so required by the Superintendent.

RATINGS: Use equipment of specified ratings. Produce evidence to the Superintendent's satisfaction when requested or specified.

SUBSECTION 065 TESTS

TESTING - GROUNDWORKS

GENERALLY: Test materials as required by the Specification or the Drawings in accordance with the following:

- Testing Body: Use only a recognised approved NATA testing laboratory for all testing specified in 'GROUNDWORKS'.

- Selection: Arrange for all tests to be carried out and for test samples to be selected by laboratory personnel from either samples submitted to the Superintendent or from the site of works whichever is applicable and give all assistance necessary for the sampling and testing procedures.

- Test Certificates: Supply duplicate copies of all test certificates to the Superintendent within 24 hours of completion of such testing.

IMPORTED MATERIALS: Test all imported materials to ensure compliance with the Contract documents. Test in accordance with the following:

(1) Prior to acceptance for incorporation into the work; and

(2) At a rate of one series of tests for every 1000 cubic metres of imported material or part thereof incorporated into the works, unless shown otherwise on the Drawings.

Non-Compliance: Where 'Imported Materials' tests show that the material does not comply with requirements of the Contract, remove from site all material that is not in compliance and re-submit samples to the Superintendent and arrange for further testing to be carried out in accordance with the preceding sub-paragraphs of this Clause. All costs incurred in connection with re-testing shall be deemed to be included in the Contract Sum.

COMPACTION TESTING: Test for compliance with criteria stated in 'COMPACTION - GROUNDWORKS' as directed by the Superintendent but in the absence of any direction to the contrary, carry out testing in accordance with the relevant test requirements of AS 1289, at the rate of one test per layer per 1000 square metres or part thereof of cut areas, subgrades or filling, except that the total number of acceptable compaction tests on any project shall not be less than 4.

Non-compliance: Where compaction tests indicate that the required Contract standards have not been achieved, take remedial action and arrange for any re-testing required by the Superintendent. All costs incurred in connection with retesting, shall be deemed to be included in the Contract Sum.

COSTS OF TESTS - GROUNDWORKS

PROVISIONAL QUANTITY: Perform all tests stated in the Schedule of Provisional Quantities, and include in the Contract Sum for all costs including attendance associated with these tests. Provide all-inclusive rates for tests nominated in the Schedule of Provisional Quantities.

SUBSECTION 070 SITE MANAGEMENT

SURVEY MARKS - GROUNDWORKS

CHECK: Before using the survey marks provided in accordance with the Contract, the Contractor shall satisfy himself that they are the marks shown on the Drawings, that they have not been disturbed and that their levels, if shown on the Drawings, agree with the levels of one or more existing features on the site.

INSPECTION - GROUNDWORKS

NOTICE: Give not less than 2 working days notice that the following will be ready for inspection:

- Items to be measured as listed in 'RECORDS OF MEASUREMENT - GROUNDWORKS'.

- Prior to the placing of permanent works in excavations and the backfilling thereof.

- Prior to the placing of permanent works in fill.

- Prior to placing of paving materials.

TREES TO BE RETAINED - GROUNDWORKS

GENERALLY: Trees to be retained are those shown on the Drawings.

MARKING: Mark trees to be retained with a 100 x 50 mm zincanneal tag, painted yellow. Secure the tag to the tree with a loose galvanized steel wire band.

REPAIR: Repair trees damaged during the work.

REMOVAL: If repair work is impracticable, or is attempted and is rejected, remove the tree and root system and make good, and either replace the tree with a replacement tree of the same species and similar size or pay damages.

DAMAGES: If replacement is not approved for any tree removed pursuant to the above, pay damages assessed as the cost of replacement. If replacement with a smaller tree is permitted, pay damages assessed as the difference between the replacement cost of the smaller and larger tree.

TREE ENCLOSURES - GROUNDWORKS

PROTECTION: Provide protection to trees and shrubs liable to damage as shown on drawings for the duration of the work under the Contract and remove when directed.

WORK NEAR TREES - GROUNDWORKS

PROTECTION: Protect trees to be retained on the site. Take necessary precautions, including the following:

Harmful Materials: Do not store or otherwise place bulk materials and harmful materials under or near trees. Do not place spoil from excavations against tree trunks, even for short periods. Prevent wind-blown materials such as cement from harming trees and plants.

Damage: Prevent damage to tree bark. Do not attach stays, guys and the like to trees.

Work under Trees: Do not add soil or remove surface soil within the drip line of trees. If it is necessary to excavate within the drip line, use hand methods such that root systems are preserved intact and undamaged. Open up excavations under tree canopies for as short a period as possible.

Roots: Do not cut tree roots exceeding 50 mm diameter unless approved. Where it is necessary to cut tree roots, use means such that the cutting does not unduly disturb the remaining root system. Cuts to be clean without jagged edges and at right angles to the root. Immediately after cutting, treat the cut surface with a Tree Wound Dressing to prevent the incursion of rot or disease.

Tree Wound Dressing: Australian Tree Care Services or equal approved water soluble acrylic/nylon of approved colour applied in 3 thin coats to extend at least 50 mm onto sound undisturbed bark in accordance with the manufacturers' recommendations.

Backfilling: Backfill to excavations around tree roots with soil as specified in 'LANDSCAPE'. Add an approved prolonged release type having an NPK ratio of 16 : 4.4 : 8.3 around the stem of the tree within the drip line of the canopy. Apply fertilizer at the rate of 50 grams per tree. Place the backfill layers, each of 150 mm maximum depth, compacted to a dry density similar to that of the original or surrounding soil. Do not backfill around tree trunks to a height greater than 150 mm above the original ground surface. Immediately after backfilling, thoroughly water the root zone surrounding the tree.

Compacted Ground: Avoid compaction of the ground under trees. If compacting nevertheless occurs, for example from the operation of heavy constructional plant, loosen the soil by ripping to a depth of 100 mm.

OTHER ITEMS TO BE RETAINED - GROUNDWORKS

REQUIREMENTS: Preserve buildings, fences, poles, services and the like where so directed on the Drawings or elsewhere specified. Adequately protect them from damage during progress of the work.

EROSION CONTROL - GROUNDWORKS

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

NECESSARY MEASURES: Adopt such measures as may be necessary for erosion control, including the following where applicable:

- Staging - Staging of operations (e.g. clearing, stripping);
- Restoration - Progressive restoration of disturbed areas;
- Drains - Temporary drains and catch drains;
- Dispersal - Diversion and dispersal of concentrated flows to points where the water can pass through the site without damage;
- Spreader banks - or other structures to disperse concentrated run-off;
- Silt traps - Construction and maintenance of silt traps to prevent discharge of scoured material to downstream areas;
- Temporary grassing - or other treatment to disturbed areas (e.g. contour ploughing);
- Temporary fencing.

PROPOSED MEASURES: At least two weeks before commencing clearing operations, submit documents showing the proposed temporary erosion control measures, including plans showing layouts, levels, temporary structures and the like, staging proposals and stormwater runoff calculations.

MAINTENANCE: After each rain inspect, clean, and repair if required, temporary erosion and sediment control works.

REMOVAL: Remove temporary erosion control measures when they are no longer required.

DEWATERING - GROUNDWORKS

REQUIREMENT: Maintain the site in such condition that it is well drained and keep excavations drained and protected from entry of surface and subterranean water at all times during the course of the Contract. Provide all necessary temporary catch drains, cut-off drains, sumps, pumping, bailing or other suitable and effective means necessary to ensure compliance with this requirement.

SPOIL - GROUNDWORKS

SURPLUS EXCAVATED MATERIAL: Remove from the Site surplus excavated material unless otherwise specified or directed.

DISPOSAL: The Contractor shall be solely responsible for the safe and harmless disposal of surplus excavated material away from the site.

SITE RESTORATION - GROUNDWORKS

REQUIREMENTS: Where existing ground surfaces are not required to be varied as part of the Works, restore them to the condition existing at the commencement of the work under the Contract.

SUBSECTION 120 MATERIALS

IMPORTED FILLING - GROUNDWORKS

FILL: Provide imported fill which is stable, free from organic matter, free from radioactive or chemical contaminants, has a linear shrinkage not greater than 12%, has a plasticity index not less than 2% nor greater than 20%, and a limitation of stone size in accordance with the requirements of the COMPACTED LAYER METHOD of 'PLACING FILLING - GROUNDWORKS'.

FILTER MEDIA: Provide filter media as filling, consisting of material with the following size distribution and evenly graded throughout the size range, behind retaining walls and elsewhere, as specified or shown on Drawings, as follows:

15% size	0.4 mm to 1.3 mm
85% size	1.3 mm to 9.5 mm

SAMPLES: Submit to the Superintendent two samples together with test certificates of each of the types of imported material intended for use on the job, each clearly marked with the type of material, its source and the name of the job. Conform with AS 1289 regarding sampling procedure and sample size.

Deliver: Deliver both samples to the Superintendent's office at the site of the works and store as directed. Do not commence delivery of material for incorporation into the works until the samples have been accepted by the Superintendent for the purpose for which they are intended.

QUALITY: All materials delivered to the site for incorporation into the works shall be of a quality not less than the accepted sample. Remove imported material of lesser quality from the site within 3 days of notification by the Superintendent.

SUBSECTION 142 EXCAVATING

REMOVAL OF SURFACE MATERIAL - GROUNDWORKS

REQUIREMENT: Unless a lesser volume or depth is shown on the Drawings, strip all topsoil over the areas of the Works. Lift this surface material complete with any grass and keep separate from all other materials.

FOR RE-USE: Refer to 'IMPROVED SITE STRIPPED TOPSOIL - LANDSCAPE'.

STOCKPILING: Stockpile stripped topsoil in the location shown on the Drawings or, if not shown, in a location approved by the Superintendent and ensure adequate protection of the piles from wind or water erosion. Do not burn-off or remove any plant growth except noxious weeds which may occur during the storage period but plough into the stripped topsoil periodically and, in particular, immediately before the stripped material is re-used. Remove any noxious weeds from the stockpiles periodically and destroy. Do not allow traffic onto the stockpiles.

EXCAVATIONS - GROUNDWORKS

EXTENT: Excavate as required or as shown on the Drawings, including but not necessarily limited to the following:

Site Surface: Excavate over the site to give correct levels and profiles as the basis for construction, paving, filling, landscaping and the like. Make allowance for compaction or settlement.

Falls: Grade to minimum falls of 1:100 away from buildings unless noted otherwise.

Requirements of Detailed Excavation: Excavate to the Contract depths and extent necessary to accommodate all foundation elements and any formwork, blinding concrete, working spaces and waterproofing processes.

Trim: Trim bottom of all excavations as necessary to attain the required levels, grades and profiles of the finished work.

PROOF ROLLING: Proof roll excavations for pavements, filling and non-spanning slabs on ground to determine the extent of any bad ground.

PAYMENT FOR EXCAVATION - GROUNDWORKS

DEFINITION: The following definitions apply:

- Bulk Excavation: Comprises all types of excavations other than those mentioned in Detailed Excavation. The material to be excavated in Bulk Excavation is not divided into classes and the Contract Sum shall be deemed to include for the costs of excavating the Bulk Excavation in any type of material encountered.

- Detailed Excavation: Comprises excavation of pits and trenches for all foundation elements and the like, drainage, hydraulic, electrical and other services, but shall not include excavation for underpinning, tunnelling, or bored piers and caissons which, where applicable, are specified under other Sections of the documentation. In detailed excavation work, material to be excavated is divided into two classes, either ROCK, or OTHER THAN ROCK, in accordance with the definitions of such material given in the following.

- Rock: Comprises any material which in the opinion of the Superintendent, cannot be excavated by a track mounted hydraulic excavator similar to a Caterpillar 225, having a manufacturer's rating for maximum break-out force at the bucket of not less than 110 kN, using a 610 mm nominal width bucket; or else if in the opinion of the Superintendent, the use of an excavator equal to that specified above is considered inappropriate for any reason other than the Contractor's chosen method of operation, 'Rock' shall be any material assessed by the Superintendent as equivalent to that defined above.

- Other Than Rock: (Also referred to as 'earth'):
  Comprises all other material encountered in the excavations.

ROCK EXCAVATION: Notify the Superintendent immediately it is considered that rock has been encountered and await instructions before proceeding further with excavation.

In respect to 'Detailed Excavation', the Contract Sum shall be deemed to be based on all excavation being in 'Other Than Rock', except as provided in the Schedule of Provisional Quantities where appropriate.

METHOD OF MEASUREMENT: In a Contract for which a Bill of Quantities (or Schedule of Rates or Schedule of Prices) has been provided by the Principal, use the method of measurement evidenced by such bill or schedule. In the absence of a bill or schedule, use the method of measurements as described below:

Detailed Excavations Other than Pipe Trenches: Calculate the volume of rock excavation as the plan dimensions of the element times the depth to Contract level measured from formation or rock level whichever is the lowest. The Contractor shall be deemed to have included in his rates for rock such allowance as he considers necessary outside the plan dimension of the element where formwork or working space is required for the formation of the element or for follow-up trades.

Single-Pipe Trenches: Measure the trench width as the nominal internal diameter of the pipe plus 300 mm with a minimum overall width of 610 mm and measure the depth to the underside of the pipe or specified depth of bedding, if any.

Multiple-Pipe Trenches: Measure the trench width as the extreme distance as specified between the outer edges of the barrels of the outermost pipes plus 300 mm, with a minimum overall width of 610 mm and measure the depth to the underside of the lowest pipe or specified depth of bedding, if any.

EXPLOSIVES - GROUNDWORKS

REQUIREMENT: Do not use explosives in groundworks unless approved.

APPROVAL: Blasting for rock removal or any other purposes will only be permitted with written permission from the Superintendent.

PERMIT: A permit issued by a geographical local authority for the use of explosives in their area is a pre-requisite essential to the granting of permission by the Superintendent. Where Model By-Laws relating to the use of explosives have been adopted by the Local Authority, the permit shall comply with these By-Laws and AS 2187 and AS 2188.

INDEMNIFY: Indemnify the Principal against any claims for damage, death or injury resulting from the blasting when written permission from the Superintendent is given.

NO CLAIM: No claim will be considered arising from the refusal of the Superintendent or any authority having jurisdiction to allow blasting.

BAD GROUND - GROUNDWORKS

DEFINITION: Except for 'Moisture affected' ground as described in 'MOISTURE AFFECTED GROUND - GROUNDWORKS', bad ground is defined as ground unsuitable for the purposes of the works including, but not being limited to, uncompacted existing filling liable to subsidence, ground containing organic matter, cavities, faults and fissures, ground contaminated by substances harmful to the works and persons, or either, including oil, chemicals and the like, ground which becomes unstable, or any other condition which in the opinion of the Superintendent, warrants removal.

NOTIFICATION: If bad ground is encountered during the work under the Contract, notify the Superintendent immediately and obtain instructions before carrying out any further work in the affected area.

VERIFICATION: Allow the Superintendent a period of one ordinary working day to carry out an examination and, if required, any necessary testing of the material in order to verify the existance of bad ground and, if confirmed, issue a written direction to the Contractor for the necessary work required.

VARIATION: If the Contractor has not caused or contributed to the conditions described above or any of them, whether directly or indirectly or by act or omission, and if their occurrence was not ascertainable and could not reasonably have been anticipated during the tender period by a Contractor competent and experienced in carrying out work of the type concerned, if he had done that which by Clause 12 of the General Conditions of Contract the Contractor is deemed to have done, then the additional work carried out by the Contractor, pursuant to such direction, shall constitute a variation to the work under the Contract. Otherwise, such additional work shall be borne by the Contractor and shall be deemed to be included in the Contract Sum.

MOISTURE AFFECTED GROUND - GROUNDWORKS

OBLIGATION: Where, because of the presence of water or high moisture content, the subgrade or base of excavation and/or the fill material are unable to support construction equipment, or it is not possible to compact the subgrade and/or the overlying fill material, or the material is unsuitable for the purposes of the works after complying with 'Approval' below carry out any and all work necessary on the moisture affected material to enable the work under the Contract to proceed.

CONDITIONING WORK: This work may include, but not be limited to, allowing the moisture affected material to dry, scarifying and/or working the moisture affected material to accelerate drying, replacing the moisture affected material.

APPROVAL: Prior to commencement, give 2 working days notice of the nature and extent of any proposed conditioning work to the Superintendent and obtain the Superintendent's written approval. Any such approval shall not relieve the Contractor of his responsibilities under the Contract nor rejection of a proposal constitute grounds for a claim.

REMOVE: Remove all excavated material unsuitable for incorporation in the work to a tip off-site provided by the Contractor unless directed otherwise by the Superintendent.

INCLUDED IN CONTRACT SUM: Where the high moisture content is a direct consequence of rain or if high moisture content could reasonably have been anticipated from available information by a Contractor competent and experienced in carrying out work of this type, then the time and cost of all of the above work and any consequential work arising therefrom, shall be borne by the Contractor and shall be deemed to be included in the Contract Sum. If in the opinion of the Superintendent the Contractor has done everything reasonable to mitigate against the consequent effects of rain or high moisture content and had not caused or contributed to the above condition, except as provided above, whether directly or indirectly or by act or omission, this additional work shall constitute a variation to the work under the Contract.

BEARING SURFACES - GROUNDWORKS

LOADBEARING ELEMENTS: Provide even plane bearing surfaces for loadbearing elements including footings and the like. Step as necessary, or as shown on the Drawings, to accommodate level changes. Make the steps to the appropriate courses if supporting masonry.

DETERIORATION - GROUNDWORKS

AFTER ACCEPTANCE: If the finished surface deteriorates after acceptance because of water or other causes, excavate further and backfill with material to provide a finished surface in accordance with the Contract requirements.

Approval: Prior to commencement, give 2 working days notice of the nature and extent of any proposed conditioning work to the Superintendent and obtain the Superintendent's written approval. Any such approval shall not relieve the Contractor of his responsibilities under the Contract nor

rejection of a proposal constitute grounds for a claim.

Included in Contract Sum: The time and cost of all work and any consequential work arising therefrom, shall be borne by the Contractor and shall be deemed to be included in the Contract Sum.

EXCESS EXCAVATION - GROUNDWORKS

VARIATION: Except as provided in 'BAD GROUND - GROUNDWORKS' or 'MOISTURE AFFECTED GROUND - GROUNDWORKS' the Contractor shall not be entitled to contract variation or extension of time for excavation in excess of that required by the Contract, including excavation below required depths, or additional excavation which the Contractor may elect to undertake to permit the use of certain constructional plant, and any consequent additional backfilling, compacting or testing.

REINSTATEMENT - GROUNDWORKS

REQUIREMENT: Where excavation exceeds the required depths, whether as a result of instructions given by the Superintendent pursuant to 'BAD GROUND - GROUNDWORKS', or excess excavation by the Contractor as defined in 'EXCESS EXCAVATION - GROUNDWORKS', or by the discovery of voids, fissures and the like, reinstate to the correct depth and required bearing value by either:

- For excess bulk excavations; Backfill as specified in 'PLACING FILLING - GROUNDWORKS'.

- For excess excavation for foundations; Clean detailed excavation for foundations taken deeper than specified or shown on the Drawings, of all loose material, and backfill to the correct level with concrete of characteristic compressive strength of 15 mPa. If so directed by the Superintendent, trim the bottom of excavations to attain the required grades and profiles as required under the Contract.

- For excess excavation for service trenches; Clean trench excavation for pipes and services inadvertently taken deeper than specified or shown on Drawings, of all loose material and bring the trench bottom to design level with either properly compacted pipe bedding material or imported material as defined in 'IMPORTED FILLING - GROUNDWORKS'. Notwithstanding the foregoing, the Superintendent may direct that site material be used.

SUPPORTING EXCAVATIONS - GROUNDWORKS

TEMPORARY SUPPORTS: Design, provide, erect and maintain all temporary supports necessary to retain earth and support sides of excavations and adjoining buildings and other structures, in compliance with the requirements of the Workplace Health and Safety Act 1989 and any amendments thereto.

REMOVAL: Remove temporary supports progressively as backfilling proceeds, unless otherwise instructed.

SUBSECTION 214 SERVICES GROUNDWORKS

SERVICE TRENCHES - GROUNDWORKS

EXCAVATION: Excavate trences truly straight with uniform grades unless specifically directed otherwise. Make trench sides as near vertical as material will allow. Leave clear space of at least 300 mm between the excavation and the spoil to prevent spoil. Keep floor of trenches free of loose material.

TRENCH WIDTHS: Provide minimum trench width consistent with the laying and bedding of pipes. Normally provide trench widths equal to the nominal internal diameter of pipe plus 300 mm. Increase trench widths where necessary to permit the construction of manholes and pits.

TRENCH DEPTHS: As required by the relevant service and its bedding method. Provide clearance at joints as required to accommodate pipe sockets and to relieve them of any load when the pipes are bedded and the trenches backfilled.

OBSTRUCTIONS: Cut back roots encountered in trenches to not less than 600 mm clear of the relevant service. Remove such other obstructions which may, in the opinion of the Superintendent, interfere with the proper functioning of the service.

INSPECTION: Lay no pipes, conduits, cables, etc., until trenches have been inspected and accepted by the Superintendent for such purposes. Give minimum of 2 clear working days notice that inspection is required.

BACKFILLING SERVICE TRENCHES - GROUNDWORKS

GENERALLY: Backfill service trenches as soon as possible after approval of laid and bedded service, generally as specified in 'PLACING FILLING - GROUNDWORKS', using the 'Compacted Layer Method'.

COMPACTION STANDARD: Compact as specified in 'COMPACTION - GROUNDWORKS' to to the compaction density which applies to the location of the service trench.

PIPE TRENCHES: Compact so that the pipe is buttressed by the walls of the trench.

BACKFILL MATERIAL: Unless otherwise specified, backfill with general filling, with no stones retained on a 25 mm sieve occurring within 150 mm of the service. For materials other than the above as cover or backfilling to particular services, refer to the relevant services Sections.

SURFACE SOIL: Where service excavations occur in areas of soil mix and improved site stripped topsoil, complete the backfilling with soil as specified in 'PLACING SPECIFIED SOIL - LANDSCAPE'.

SUBSECTION 218 PLACING AND COMPACTION

PREPARATION FOR FILLING - GROUNDWORKS

GENERALLY: Suitably prepare the ground surface to receive filling.

UNDER SLAB OR PAVING: Water and roll the subgrade to achieve the densities stated for such locations in 'COMPACTION - GROUNDWORKS'. If necessary, loosen the ground to a depth of 200 mm and adjust the moisture content before compaction.

BENCHING EMBANKMENTS: When an embankment is to be constructed on an existing surface with a slope exceeding 8 horizontal to 1 vertical, cut a bench of adequate width at the toe of the embankment to permit the initial embankment construction to proceed with horizontal layers of uniform cross sectional depth. In addition, where the slope of the existing surface is 3 horizontal to 1 vertical, or steeper, cut into the natural surface under the embankment to provide a continuous series of horizontal steps at least 0.3 m deep forming keys for the embankment.

FILTER FABRIC - GROUNDWORKS

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

PROTECTION: Provide heavy duty protective covering. Store clear of the ground and out of direct sunlight. During installation do not expose the filter fabric to sunlight for more than 14 days.

PREPARATION: Before placing the filter fabric trim the ground to a smooth surface free from cavities and projecting rocks.

PLACING: Lay the fabric flat, but not stretched tight, and secure it with anchor pins. Overlap joints 300 mm minimum.

PLACING FILLING - GROUNDWORKS

EXTENT: Place and compact filling to the dimensions, levels, grades and cross section as required by or as shown on the Drawings, and so that the surface is always self draining.

FILLING: Filling shall be taken to include 'Backfilling' as may be appropriate. Unless otherwise specified, use suitable excavated material resulting from work under the Contract.

Deficiency in Quantity: Make up any deficiency in quantity of excavated material with imported filling.

Sound Material: For all filling use sound material, free of organic matter or any material that will not form a stable fill.

Full Width: Bring up fill evenly over the full width of embankments or excavations.

CONSTRUCTION METHODS: Construct filled areas by either 'Compacted Layer Method', 'Sand Fill Method' or 'Rockfill Method', as specified or shown on the Drawings.

COMPACTED LAYER METHOD: Place each layer with controlled moisture content and compact to density specified in 'COMPACTION - GROUNDWORKS'.

Layers: Except as provided herein, deposit and spread fill material in uniform layers to a depth of not more than 225 mm, loose measurement. Layer thickness for backfill to concrete structures shall not exceed 150 mm loose measurement.

Limitation of Stone Size: Include no stone over 50 mm greatest dimension in the top 225 mm of filling below the groundworks 'Finished Surface Level' (as defined in 'COMPACTION - GROUNDWORKS').

Concession on Size: The Superintendent may permit stones over 225 mm measurement in lower layers if he is satisfied that compaction standards can be achieved. No claim for extra time or cost will be recognised should such permission be refused.

SAND FILL METHOD: Place cohesionless material using moisture, plant and thickness of layers appropriate to the material and to the Superintendent's satisfaction. Do not use moist placing methods where the natural material under or adjacent to the sand fill will be adversely affected.

ROCKFILL METHOD: Use where material available is predominantly coarse and mechanical interlock is relied on for stability. Place, doze, rip, roll, work and break material until stable interlock is achieved.

Layers: Deposit and spread fill material in uniform layers to a depth not greater than 1500 deep, with full width construction. Do not use rock over 1000 mm in greatest dimension. Place the top 600 mm below the groundworks 'Finished Surface Level' (as defined under 'COMPACTION - GROUNDWORKS') in accordance with the Compacted Layer Method. Lock the surface of the rockfill

layer with smaller stone and fill to prevent material from subsequent layers entering the rockfill.

PLACING AGAINST CONCRETE: Do not carry out filling to foundations, retaining walls and the like until their concrete has reached its design 28 day strength or 21 days have elapsed, whichever period is the greater and provided always that structural support elements where required have been completed to the Superintendent's satisfaction.

PLACING AT STRUCTURES: Place and compact filling in layers simultaneously on both sides of structures, culverts and pipelines to avoid differential loading.

COMPACTION - GROUNDWORKS

DEFINITION OF FINISHED SURFACE LEVEL: For the purposes of this clause, 'COMPACTION - GROUNDWORKS', 'finished surface level' means the finished surface level of the groundworks excluding topsoil or any pavement construction.

COMPACTION STANDARDS: The standards of compaction are defined as follows:

Standard A:
Cohesive Material - Dry Density Ratio of 95% of the maximum dry density as determined by tests 5.2.1, 5.3.1 and 5.4.1 of AS 1289.

Cohesionless Material - Density Index of 75% as determined by test E6.1 of AS 1289.

Standard B:
Cohesive Material - Dry Density Ratio of 90% of the maximum dry density as determined by tests 5.2.1, 5.3.1 and 5.4.1 of AS 1289.

Cohesionless Material - Density Index of 75% as determined by text E6.1 of AS 1289.

DENSITY REQUIRED: Compact the various parts of the work in accordance with the following:

Cut Areas: Compact finished surface in cut areas to Standard A as specified in Compaction Standards for a depth of 150 mm below the 'Finished Surface Level'.

Fill Areas: Compact filling placed by the 'Compacted Layer Method' to the following standards:

- Bulk filled areas, upper layer: In embankment, unless otherwise specified, within 225 mm of 'Finished Surface Level' - to Standard A of Compaction Standards.

- Lower Layers: In embankment, at levels lower than 225 mm below 'Finished Surface Level' - to Standard B of Compaction Standards.

Natural Ground: In the top 150 mm of natural ground after stripping.

- Where the 'Finished Surface Level' is within 300 mm of the natural surface after stripping - to Standard A of Compaction Standards.

- Where the 'Finished Surface Level' is greater than 300 mm above the natural surface after stripping - to Standard B of Compaction Standards.

Under Structures: Prepared surface under footings, slabs, ground beams and the like - to Standard A of Compaction Standards.

Backfill to Structures: Backfill to footings, ground beams, walls and the like - to Standard A of Compaction Standards.

PROTECTION: Protect the works during compaction from damage by compaction operations. Compact by hand if necessary to prevent damage or disturbance to services, pipe joints, and the like.

SECTION 220 - CONCRETE

SUBSECTION 001 GENERAL

SCOPE - CONCRETE

OUTLINE DESCRIPTION: This section applies to all concrete forming part of the works.

STANDARDS - CONCRETE

SITE COPY: Keep on the site a copy of AS 3600, AS 1510, AS 1509 and AS 1012, Parts 1, 3 and 8.

INSPECTION - CONCRETE

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

- Completed formwork;
- Reinforcement fixed in place;
- Cores and embedments fixed in place;
- Placing of Concrete.

MINIMUM NOTICE REQUIRED: 24 hours in advance of time when work will be ready for inspection and allow one working day for the inspection to be carried out before approval will be given.

SUBSECTION 065 TESTING AND ASSESSMENT

TESTING - CONCRETE

GENERALLY: All costs associated with specified calibration sampling and testing shall be deemed to be included in the Contract Sum.

STRENGTH GRADE ASSESSMENT: Use Project Assessment of Strength Grade in accordance with AS 3600.

TESTING CERTIFICATION: Use NATA registered bodies for testing and certificates unless approved otherwise. In this section the word "certificate" means certificates by NATA registered body, unless approved otherwise.

AUTHORITY AND PERSONNEL: The organization or organizations responsible for testing and assessment of concrete and concrete materials and the personnel engaged in site sampling and in handling test specimens obtained on the site, shall be subject to the approval of the Superintendent.

RECORDS:
Production Assessment Records: To AS 3600 Clause 20.6.

Other Test Records: For each required test maintain the records and reports of test results required by AS 1012, or similar information tests not covered by AS 1012. Make the records available on request.

CERTIFICATES: Forward original Test Certificates, or true copies, to Superintendent without delay.

PERFORMANCE TESTS - CONCRETE

REQUIREMENT: Test for properties specified or else shown on the Drawings.

COMPRESSIVE STRENGTH ASSESSMENT:
Frequency of Sampling: In addition to the requirements of AS 3600 take samples of concrete in columns, bearing walls and footings, for other than strip footings, at one sample per batch.

TEST SPECIMENS - CONCRETE

STANDARD: Prepare test specimens to the relevant Part of AS 1012.

MOULDS: Use only rigid steel moulds.

TEST SPECIMENS: To AS 1012 Part 8.

Curing: To AS 1012 Part 8, Clause 1.9 and 2.9 as applicable, under conditions appropriate to relevant Standard Temperature Zone; Initial curing to AS 1012 Part 8, Clause 1.9.2 and 2.9 as applicable.

Demoulding: To AS 1012 Part 8, Clause 1.10 and 2.9 as applicable.

Transport to Laboratory: To AS 1012 Part 8, Clause 1.11 and 2.10 as applicable.

REJECTION - CONCRETE

STANDARD: To AS 3600 Clause 19.1.10, with the addition that concrete shall be liable to rejection if the compression strength of any representative sample is less than 0.8 of the specified F'c.

REMOVAL: Remove rejected concrete from the site.

RETENTION: Where the Contractor bears all costs associated with the testing and re-testing of work liable for rejection, the Superintendent may permit the retention of such hardened concrete on the basis of:

- the criteria in AS 3600 Clause 19.1.10.3;
- an appraisal of the statistical information related to the concrete strength;
- approved remedial work;
- agreement by the Contractor to accept a deduction in the Contract Sum, valued at the absolute discretion of the Superintendent.

SURFACE REPAIR - CONCRETE

REPAIR CONDITIONS: Concrete liable to rejection because of surface defects may in some cases be accepted subject to the successful repair of the defects. Repair may be attempted only if prior approval is given. The Superintendent may refuse approval, or, if approval is given, may reject the concrete if the repair is unsuccessful.

REPAIR PROCEDURE: Where repair is necessary and permitted, it shall be done at no cost to the Principal; carried out by skilled workmen; and completed within 24 hours after formwork stripping, or for unformed surfaces within 24 hours after concrete placing, or within such other greater interval permitted by the Superintendent.

REJECTION: Approval will not be given to repair the following formed surfaces where bony concrete or the like defects exceed the extent defined in the following table:

Extent of defective concrete	Location Walls	Slab soffits	Beam sides	Column faces
Isolated areas	0.1 m^2 x 50 mm deep	0.25 m^2 x 25 mm deep	0.05 m^2 x 40 mm deep	Nil
Maximum total area	2% of surface	1% of soffit	3% of any one surface	Nil

SUBSECTION 081 FORMWORK

FORMWORK GENERALLY - CONCRETE

STANDARDS: To AS 3610 and AS 3600 Clause 19.6.

REQUIREMENT: Design and construct formwork so that concrete, when cast in the forms, will have the dimensions, shape, location and surface finish required by the Contract.

RESPONSIBILITY: The Contractor shall be responsible for the sufficiency of the formwork, except to the extent, if any, that formworks design is shown on the Drawings or specified.

DEFECTIVE FORMWORK: If formwork fails to meet the requirements of the Contract, the Superintendent may reject it and any concrete which has been cast in it. In that case, remove the rejected concrete, form construction joints, reconstruct the formwork and recast the concrete.

INSPECTION OPENINGS: Provide temporary openings at the base of column and wall forms and elsewhere where necessary or directed by the Superintendent, to facilitate cleaning and inspection prior to the placing of the concrete.

FORMWORK DOCUMENTATION - CONCRETE

REQUIREMENT: Submit formwork documentation, to include the information contained in AS 3610 Clause 4.7, for the Superintendent's information.

DIMENSIONAL TOLERANCES - CONCRETE

STANDARD: To AS 3600 Clause 19.5, as modified by AS 3610 Section 3. However the requirements of this clause shall apply if they are more stringent.

REQUIREMENT: Formwork shall be constructed so that the deviation of any point on the surface of a concrete element from its correct position in space shall not exceed the value below. The deviations in beams and slabs shall be measured before the removal of shoring.

Formwork Class to AS 3610	Deviation from Absolute Correct Position
2	15 mm
3	20 mm
4	25 mm

FORMED SURFACES - CONCRETE

STANDARD: To AS 3610.

OFF-FORM FINISH: Unless otherwise specified or shown on the Drawings, the minimum standard of finishes to formed surfaces shall be as follows:

Concrete Element or Surface	Formwork Class
Normal architectural work and surfaces not otherwise specified	2
Civil engineering works	3
Surfaces to be rendered or hidden by other finishes	4
Surfaces permanently concealed (e.g. footings, rear faces of retaining walls)	5

VISUALLY IMPORTANT SURFACES - CONCRETE

DEFINITION: Visually important surfaces include, but are not necessarily limited to, concrete constructed using AS 3610 formwork classes 2 and 3.

REJECTION: In accordance with AS 3610 Clause 5.6.

SET OUT: For visually important surfaces, set out formwork as shown on the Drawings, or if not shown, to give a regular arrangement of panels, joints, bolt holes and the like in all surfaces of visible elements.

CORNERS AND ANGLES: Unless otherwise specified -

- External corners and angles: Fillet the formwork corners so as to form chamfers on the concrete, 45 degrees bevel, 25 mm on the face.

- Internal corners and angles: Do not form fillets to interior corners or angles of formed concrete unless detailed as such.

FORM TIE BOLTS - CONCRETE

REQUIREMENTS: Use form tie bolts consistent with class of surface specified for member as a whole.

FIXING: Retain in place embedded tie bolts, and terminate not less than two diameters or twice the minimum dimension of the tie bolt or 10 mm whichever is the greater, in from the formed faces of the concrete. Construct the tie bolts so that removal of the ends or end fasteners can be done without spalling at the faces of the concrete. Keep form tie bolts clear of the steel reinforcement and under no circumstances use the steel reinforcement to support the formwork.

MAKING GOOD: Thoroughly clean recesses resulting from the removal of ends of tie bolts, saturate with water and fill with mortar in the proportion of 1 part cement to 3 parts of the sand used in work in which the cavity occurs and float flush. If in the opinion of the Superintendent, the finished surface is not satisfactory, carry out further treatment using the mortar specified above and rub down with a medium coarse carborundum stone until a surface is produced consistent with the class and colour of surface finish specified for the member as a whole.

FORMWORK REMOVAL - CONCRETE

STANDARDS: To AS 3600 Clause 19.6 and AS 3610 Clause 5.4.3.

MINIMUM STRIPPING TIMES:

Concrete made with Type A or D Cement: The recommended minimum stripping times given in the above standards.

Concrete made with other than Normal (Type A or D) Cement: Increase the recommended minimum stripping times given in the above standards as follows:

- Concrete made with Type C cement: Increase the times by 3 days.
- Concrete incorporating Pozzolanic Materials: Increase the times by 50%.

REDUCTION OF STRIPPING TIMES: Notwithstanding that the requirements for compressive strength have been satisfied, agreement to reduced stripping times will also be dependent on the Superintendent being satisfied that curing will not be adversely affected. If added curing procedures are required, they shall be at no additional cost to the Principal.

RESHORING: May be employed subject to prior approval.

PERMANENT LOADING: Do not place permanent loads, including masonry walls and the like, on concrete structure while it is still supported by formwork.

SUBSECTION 120 CONCRETE MATERIALS

MATERIALS - CONCRETE

CONCRETE MATERIALS GENERALLY: To AS 3600 Section 19.

FLY ASH AND BLENDED CEMENT:
Proportions: Notwithstanding the provisions of Australian Standards the proportion of fly ash by weight to the total mixture of cement and fly ash shall not be greater than 25%. Maintain constant fly ash content throughout project.

Source: Do not change source of supply without approval of Superintendent and advise Superintendent of any factors that could affect properties of the concrete including colour (e.g. change in quality of coal).

CHEMICAL ADMIXTURES: To AS 1478 used in accordance with AS 1479. Admixtures shall not be used as a means of reducing the cement content.

RESTRICTIONS ON CHEMICAL CONTENT: To AS 3600 Clause 4.9.

Chlorides: Notwithstanding the requirements of AS 3600, only use admixtures which are free of chlorides and/or compounds containing chloride.

Proof: Supply supportive evidence from a testing authority acceptable to the Superintendent that any proposed admixtures are chloride free.

AGGREGATE SOURCE: Submit to Superintendent for information the source(s) of supply of aggregate. Provide written statement from each supplier confirming availability of adequate reserves of uniform aggregate for duration of Contract.

STORING MATERIALS - CONCRETE

CEMENT, FLY ASH AND BLENDED CEMENT: Store in protected storage to keep free from damp and other material contamination. Date stamp bags. Use in chronological order.

MIX PROPORTIONS - CONCRETE

RESPONSIBILITY: Meet specified performance requirements shown on the Drawings. Take responsibility for the selection of mix materials and proportions.

MIX DESIGN: Submit concrete mix grading curves and mix design ratios to Superintendent's Representative for information, prior to commencing concreting operations, and for each subsequent variation of mix proportions.

Test Results: Supply laboratory results of strength tests on sample mixes if requested by Superintendent. Cost of provision of same shall be deemed to be included in the Contract Sum.

READY MIXED SUPPLY - CONCRETE

STANDARD: To AS 1379, from an approved supplier. Deliver in agitating trucks.

ELAPSED DELIVERY TIME: Do not use concrete which is more than 1-1/2 hours old after the addition of cement to either aggregate or water.

DELIVERY DOCKET: For each batch, obtain, keep and make available on request a docket containing the information required by AS 1379 Clause 7.5, and stating in addition:

- the concrete element or part of the works for which the concrete was ordered;
- the total amount of water in the concrete as delivered;
- the source of the coarse aggregate.

SITE ADDITIONS: Notwithstanding the provision of AS 1379, do not add water or any other material to the concrete at the site without approval of the Superintendent. For addition of water on site to be considered, it is a prerequisite that an appropriate measuring method satisfactory to the Superintendent be provided and that the delivery docket be endorsed by the manufacturer that water may be added at site. No claim shall be entertained arising from Superintendent's refusal to allow addition of water on site.

SITE MIXED SUPPLY - CONCRETE

MANUFACTURE: Mix concrete in an approved plant located on the construction site but complying with the relevant requirements of AS 1379 including Sections 4, 5, 6, 7 and Appendix A.

PLANT AND LOCATION: Take all responsibility for use and location of mixing plant and make good any consequent damage.

ELAPSED TIME: Site mixed concrete is liable to be rejected if the elapsed time between the wetting and the discharge of the mix exceeds 45 minutes.

MIXING TIME: Not less than 90 seconds for mixes of 1 m^3 or less. Increase by 30 seconds for each additional cubic metre or part thereof.

EMERGENCIES: Mixing by hand in emergencies is not permitted.

SUBSECTION 124 REINFORCEMENT

REINFORCEMENT SUPPLY - CONCRETE

STANDARD: To AS 3600 Clause 19.2.

REQUIREMENT: Supply and fix reinforcement, including the necessary tie wires, support chairs, spacers and the like.

IDENTIFICATION: Reinforcement shall be readily identifiable as to grade and origin.

COMPLIANCE WITH STANDARD: Obtain from the manufacturer and furnish a certificate of compliance with the relevant standard AS 1302, AS 1303, or AS 1304, or furnish a test certificate to the relevant standard from an approved testing authority.

BENDING REINFORCEMENT: Submit for approval details of proposed bending not shown on the Drawings.

SPLICING REINFORCEMENT: Submit for approval details of proposed splicing not shown on the Drawings.

WELDING REINFORCEMENT: Obtain permission before welding. Reinforcement which is not to AS 1302, AS 1303, or AS 1304, if permitted to be used, shall not be welded.

FIXING REINFORCEMENT - CONCRETE

TOLERANCE ON POSITION: To AS 3600 Clause 19.5.3.

REINFORCEMENT SPACING: To AS 3600 Clause 8.1.7 and as shown on the Drawings.

CONCRETE COVER: To AS 3600 Clause 4.10.2 and 4.10.3 and Section 5.

FIXING REQUIREMENTS: Secure the reinforcement against displacement by tying at intersections with annealed iron wire ties not smaller than 1.25 mm diameter, or by approved clips. Bend the ends of wire ties away from nearby faces of forms. The ties shall not project into the concrete cover.

Mats: In reinforcement in the form of a mat, secure each bar at alternate intersections, and at other points as required.

Beams: Secure each beam ligature to a bar in each corner of the ligature. Secure longitudinal beam reinforcement by spacers or ties at not more than 1000 mm intervals.

Columns: Secure longitudinal column reinforcement to all ligatures at every intersection.

REINFORCEMENT SUPPORTS - CONCRETE

STANDARD: To AS 3600 Clause 19.2.5.

SUPPORT TYPES: Use purpose-made concrete, metal or plastic supports. For exposure classification A1, provide a protective coating to ferrous metal which extends to the surface of the concrete. For exposure classifications more severe than A1 use plastic supports of adequate strength, or concrete supports of the same concrete mix as the concrete element.

SUPPORTS OVER MEMBRANES: Prevent damage to waterproofing membranes or vapour barriers. Place a metal or plastic plate under each support to prevent puncturing.

SUPPORT SPACING: Maximum support spacing of slab reinforcement: 60 diameters for bars and 750 mm for fabric.

SUBSECTION 171 PLACING

PLACING AND COMPACTION - CONCRETE

STANDARD: To AS 3600 Clause 19.1.3.

METHOD: Notwithstanding AS 3600, use any method, suitable to the compaction and location of the concrete, which will result in the strength and serviceability specified or shown on Drawings.

GENERALLY: Place all concrete under the direct supervision of a suitable foreman experienced in concrete construction. For ready mixed concrete do not add water at the site except as provided in the clause 'READY MIXED SUPPLY - CONCRETE'. Do not use concrete:

- If the slump is not in accordance with the contract documents.
- After the Maximum Elapsed Time as appropriate as specified in 'READY MIXED SUPPLY - CONCRETE'.

HORIZONTAL MOVEMENT: Do not attempt to move a mass of concrete along the forms to its final position. Movement may be by means of suitable clean chutes, troughs or pipes. Do not use water to facilitate the movement.

VERTICAL MOVEMENT: In vertical elements, limit the free fall of concrete to 1500 mm per 100 mm element thickness, by means such as enclosed chutes, access hatches in forms, and the like. As far as practicable keep chutes vertical and full of concrete during placement, with ends immersed in the placed concrete.

LAYERS: Place concrete in layers not more than 300 mm thick. Compact each layer before the preceding layer has taken its initial set, so that the two are blended by the compaction process.

RAIN: Concrete exposed to rain before it has set, including during mixing, transport or placing, shall be liable to rejection.

SEQUENCE OF POURS: Minimize shrinkage effect by pouring the sections of the work between approved construction joints in a sequence such that there will be suitable time delays between adjacent pours.

Minimum Time Delays: If the required sequence and minimum time delays are not shown on the Drawings submit a proposed sequence and times for approval. Do not place fresh concrete against hardened concrete which is less than 3 days old.

COMPACTION: Use vibrators and hand methods as appropriate to remove air bubbles and compact the mix. Use form vibrators where use of immersed vibrators is impracticable. Do not over-vibrate. Do not allow vibrators to come into contact with partially hardened concrete, or reinforcement embedded in it. Do not use vibrators to move concrete along the forms.

PUMPING: Use pumped concrete only if approved. Submit details of the proposed mix when requesting approval.

HOT WEATHER PLACING - CONCRETE

REQUIREMENT: The provisions of this clause shall apply to concreting when the surrounding shade outdoor temperature is greater than 32°C.

MIXING: Do not mix concrete when the outdoor shade temperature on the site exceeds 38°C, unless otherwise approved and then only subject to such conditions as may be imposed.

HANDLING: Take precautions to prevent premature stiffening of the fresh mix and to reduce water absorption and evaporation losses. Mix, transport, place and compact the concrete as rapidly as possible.

PLACING: Before and during placing maintain the formwork and reinforcement at a temperature not greater than 32°C by protection, cold water spraying, or other effective means. When placed in the forms, the temperature of the concrete shall not exceed the following:

Concrete Element:	Temperature Limit:
Normal concrete in footings, beams, columns, walls and slabs:	32°C
Concrete in large mass concrete sections; or	
Concrete of strength 40 MPa or greater, in sections exceeding 600 mm in thickness:	25°C

SUBSECTION 174 CURING AND PROTECTION

CURING - CONCRETE

STANDARD: To AS 3600 Clause 19.1.5.

GENERALLY: Protect fresh concrete from premature drying and excessively hot or cold temperatures. Maintain the concrete at a reasonably constant temperature with minimum moisture loss for the curing period.

CURING PERIOD: (from time of placing): Notwithstanding anything stated elsewhere to the contrary, cure continuously until the cumulative number of days or fractions thereof, not necessarily consecutive, during which the air temperature in contact with the concrete is above 10°C, totals not less than the following:

Concrete made with Normal Portland Cement:	7 days
Concrete made with High Early Strength Cement:	4 days
Concrete made with Blended Cement, Fly Ash or Granulated Blast Furnace Slag:	10 days

CURING METHODS: Submit for approval the proposed method of curing, which may include the following:

- ponding or continuous sprinkling with water (moist curing);
- an impermeable membrane;
- an absorptive cover kept continuously wet;
- steam curing;
- an approved curing compound (not for hot weather curing).

Ensure that the curing method used is compatible with any finish to be applied to the surface.

CERTIFICATION: Certification to be in accordance with 'TESTING - CONCRETE'.

CURING COMPOUNDS: To ASTM C309. Submit certified test results for:

- curing efficiency;
- discoloration of concrete surfaces;
- adverse effect on adhesion of applied finishes.

HOT WEATHER CURING: Cure concrete placed when the surrounding air temperature exceeds 25°C, or concrete placed subject to drying winds, by either:

- one of the methods (but not curing compounds) specified in this Clause under CURING METHODS; or

- a fog spray application of aliphatic alcohol evaporation retardant.

VISUALLY IMPORTANT SURFACES: Produce uniform colour on adjacent surfaces by uniform curing methods.

PROTECTION - CONCRETE

LOADING: Protect the concrete from damage due to load overstresses, heavy shocks and excessive vibrations, particularly during the curing period. Do not place construction loads on self-supporting structures which will overstress them. Provide calculations to justify the adequacy of the structure to sustain any construction loads.

SURFACE PROTECTION: Protect finished concrete surfaces from damage from any cause, including mortar splashes and stains, timber stains, rust, stains, chemical attack, additives, curing compounds, protective coatings, rain, running water, and the like.

SUBSECTION 229 EMBEDMENTS, CORES AND FIXINGS

FIXINGS AND EMBEDDED ITEMS - CONCRETE

STANDARD: To AS 3600 Section 14.

GENERALLY: Take responsibility for co-ordinating the provision of core holes and embedment requirements of all trades whether or not shown on the Contract Drawings.

No Cores: Do not cut cores in hardened concrete without prior approval of the Superintendent.

General Guidance: Note that the requirements specified below, are given for general guidance only, and strict compliance therewith does not necessarily mean that approval will be automatic.

SHOP DRAWINGS: If the locations of embedded items are not shown on the Drawings, or are shown diagrammatically, or if it is proposed to vary the locations shown, submit shop drawings showing the proposed locations, clearances, cover, and the like.

STRUCTURAL INTEGRITY: In locating embedded items or in allowing for cored holes, do not cut reinforcement or hardened concrete, unless specifically provided for and clearly detailed on Drawings, or approved by the Superintendent.

TOLERANCES OF PLACEMENT: Unless otherwise shown on the Drawings or specified, permitted deviations from correct positions shall be:

- Embedded items generally: Plus or minus 10 mm.
- Fixings, anchor bolts and the like: Plus or minus 3 mm.

PRESSURE PIPES: Where embedded pipes contain liquid or vapour at a pressure of more than 10 kPa, test for leaks and furnish the test results to the Superintendent.

REJECTION: The cost of any additional lengths of pipe or conduit lines made necessary by the rejection of embedment or core proposals shall not be as grounds for a claim.

PROTECTION OF FIXINGS - CONCRETE

REQUIREMENT: Embedded and inserted fixings, including anchor bolts and the like: galvanize to AS 1650 unless otherwise specified. Grease threads,. Protect from damage during concreting and the like operations.

INSERTED FIXINGS - CONCRETE

LIMITATION: Use fixings inserted by drilling (including masonry anchors and the like), or by explosive tools, only if specified or approved.

SUBSECTION 292 UNDERLAYS, MEMBRANES

SLABS ON GROUND - CONCRETE

REQUIREMENT: Provide suitable bases, working bases and waterproofing underlays or membranes to concrete slabs laid on ground, of the types shown on the Drawings and specified here.

FILM UNDERLAY - CONCRETE

MATERIAL: High-impact resistant polyethylene film, thickness not less than 0.2 mm, pigmented and branded by the manufacturer.

BASE PREPARATION: Provide a working base of platform material, unless otherwise shown on the Drawings or approved by the Superintendent. Provide an even surface free of any projections likely to damage film underlays and adequate to provide a firm base for reinforcement supports, or any other items to be supported.

INSTALLATION: Lay over the base. Lap joints not less than 200 mm. Face the laps away from the direction of concrete pour. Seal laps with pressure-sensitive adhesive tape to AS 1599, Serial number 19. Similarly seal around unavoidable penetrations such as service pipes and the like. Take the underlay up vertical faces as far as the damp proof course where applicable, and fix at the top by tape sealing. Arrange to have vertical laps only on vertical or inclined surfaces. Patch or seal any punctures or tears before pouring concrete.

SUBSECTION 480 JOINTS

CONSTRUCTION JOINTS - CONCRETE

STANDARD: To AS 3600, clauses 14.1 and 19.4.1.

GENERALLY: Do not place fresh concrete against hardened concrete which is less than 3 days old.

LOCATION: Make construction joints where shown on the Drawings. Do not relocate or eliminate a construction joint, or make a construction joint not shown on the Drawings, without prior approval. This includes emergency construction joints made necessary by unforeseen interruptions to the concrete pour.

FINISH AT CONSTRUCTION JOINTS: Unless otherwise shown on the Drawings or specified, butt join the surfaces of adjoining pours. Comply with the tolerances specified in 'DIMENSIONAL TOLERANCES - CONCRETE'. In visually important surfaces make the joint straight and true, and free from impermissible blemishes relevant to its AS 1510 Class or Type.

MOVEMENT JOINTS - CONCRETE

REQUIREMENT: Construct movement joints (including expansion and contraction joints, isolation joints, and control joints) in the locations and to the details shown on the Drawings.

JOINT FILLING - CONCRETE

PREPARATION: Where the Drawings show joints to be filled with jointing materials, including sealants, bond breakers, backing rods, preformed strips, and the like, dry and clean the joint surfaces before application, and prime if and as recommended by the joint.

WATERTIGHTNESS: Apply the jointing materials so that joints subject to ingress of water are made watertight.

FINISH: Unless otherwise shown on the Drawings, finish visible jointing materials neatly flush with the adjoining surfaces.

JOINTING MATERIALS - CONCRETE

TYPES: Use jointing materials of the types shown on the Drawings, as recommended by the material manufacturer for the location and type of joint, compatible with adjacent materials and non-staining to the concrete in visible locations.

LEAD FREE: Use only materials free of lead.

PRIMING: Except where priming is not recommended by the jointing materials manufacturer, apply the appropriate primer to concrete surfaces in contact with jointing materials.

SUBSECTION 490 TRIM

DOOR RAMPS - CONCRETE

REQUIREMENT: Provide ramps to external door thresholds as shown on Drawings, whether in concrete paths or concrete verandahs. Form integral with concrete slab and finish with a nylon broom finish. Ends to be straight cut with exposed edges rounded or mitre splayed as indicated on drawings. Ramps not to extend more than 450 mm out from face of building or have a gradient steeper than 1:8.

CONCRETE PATHS - CONCRETE

REQUIREMENT: For external concrete paths not forming part of Covered Links where shown on Drawings provide 75mm thick reinforced with F52 mesh positioned 25mm from top of slab. Concrete strength shall be minimum 17.5 Mpa.

EXPANSION JOINTS: Form expansion joints at maximum 9 metre centres or as located on Drawings using 10mm bituminous felt or equal. Seal top of joints with a 12mm deep bead of elastomeric rubberised sealant.

CONSTRUCTION TOLERENCE: Walkways, ramps and landings shall be constructed with smooth transitions between sections of different gradients, materials, at gully grates, surface gutters, crossings and the like. The maximum constuction tolerance between abutting trafficable surfaces shall be 5mm, with a rounded edge to any protruding surface.

NOTE: Concrete paths forming part of Covered Links shall be constructed as shown on detailed drawings.
Concrete paths and ramps shall have an unobstructed width of not less than 1000mm.

SUBSECTION 530 FINISHES

FINISHES - CONCRETE

LOCATIONS: Shown on the Drawings or 'APPLIED FINISHES SCHEDULE'.

OFF-FORM FINISHES: Specified in 'FORMED SURFACES - CONCRETE'.

TOLERANCE CLASSES: Tolerance classes noted on the Drawings shall be as follows, determined by a straight edge placed anywhere on the surface in any direction.

CLASS A: Maximum deviation from a 3 m straight edge: 3 mm.
CLASS B: Maximum deviation from a 3 m straight edge: 6 mm.
CLASS C: Maximum deviation from a 600 mm straight edge: 6 mm.

SCREEDING: Finish slab surface with a screed to finished levels. In the absence of anything to the contrary, produce surface to Class B.

MACHINE FLOATED FINISH: Finish screeded surface with approved power driven equipment.

STEEL TROWELLED FINISH: After screeding, produce the final finish with steel hand trowels, free of trowel marks, uniform in texture and appearance.

WOOD FLOAT FINISH: After screeding, produce the final finish with a wood float.

BROOM FINISH: After screeding, give the surface a coarse texture by drawing an approved tool (broom, stiff brush, or the like) across the surface. Finish with steel tooled edge except where abutting pavers, concrete or the like.

NON-SLIP FINISH: Blend silicone carbide granules of size range 595 - 1410 micrometres with portland cement in the proportions recommended by the Supplier. Apply the blend at the rate of 1 kg per square metre to top surface of concrete prior to finishing concrete in accordance with the manufacturer's recommendations.

EXPOSED AGGREGATE FINISH: For paving requiring an exposed aggregate finish, use a ready mixed concrete designed specifically for such work with the following properties:-

Aggregate Size: 10 - 14 mm.

Slump: 60 - 70 mm.

Strength: F'c - 25 MPa.

Exposing Aggregate: Use pressure water spraying following steel trowelling.

Surface Retarding Agents: May be used in accordance with manufacturer's specification. Sugar and water mixture shall not be used for this purpose.

Test Panels: Lay test panels where directed by the Superintendent until a standard acceptable to the Superintendent is achieved. This standard shall then be the quality required throughout the Works.

TOPPING - CONCRETE

LOCATION: Internal wet area floors where concrete is recessed.

MIXING: To AS CA27, from cement and sand with minimum water.

WORKING TIME: Do not use mortar after the initial set has occurred. Do not retemper mixes.

PROPORTIONING: 1:3 cement:sand to obtain satisfactory adhesion with the addition of the additive.

THICKNESS: To suit thickness of resilient finish so that finished top surface of resilient finish is in the same plane as adjacent floor finishes or where there is no resilient finish so that finished top surface of topping is in the same plane as adjacent floor finishes. Finish topping to falls to outlets as shown on Drawings.

DEVIATION: Maximum deviation of the topping from its true form (plane, warped plane, camber, and the like): 1:300.

ADDITIVE: "Laticrete No. 3701" in a 50:50 water mix.

PREPARATION: Prepare the background in accordance with Laticrete International Inc.'s recommendations.

FINISHES SCHEDULE - CONCRETE

Finish	Concrete Element
Wood Float	Internal slabs generally where no further finish is to be applied.
Steel Trowel	Slabs to receive vinyl finish.
Machine Float	Slabs to receive carpet finish.
Broom Finish	External slabs generally including paths, steps, verandahs and the like, and footpath crossings.
Non-Slip Finish	Top surface of concrete stair treads, mid-landings and for a width of one metre to slabs at top and bottom of stairs.
Off-form	Columns.

Surfaces to receive any other applied finish: Confer with the specialist sub-contractor of each finish to determine the nature of surface required prior to pouring slabs and ensure the finished slab meets that requirement.

SECTION 230 - MASONRY

SUBSECTION 001 GENERAL

SAMPLES - MASONRY

REQUIREMENT: Submit samples of the following:

- Not less than four units of each face type, representing the total range of variation of colour, texture, surface irregularities (including defective arrises), and regularity of shape.
- Mortar for facework.
- Jointing to facework.

INSPECTION - MASONRY

NOTICE: Give not less than 3 working days' notice so that the following may be inspected:

- Items to be built-in: Located in their correct positions, including damp-proof course, flashings, bolts, structural steelwork, and the like;
- Bottoms of cavities: After cleaning out;
- Bottoms of core holes: Before grouting;
- Control joints: Joints ready for insertion of joint filler.

SUBSECTION 122 MORTARS

MORTAR MATERIALS - MASONRY

CEMENT: To AS 1315, Type A - normal cement.

LIME: To AS 1672.

SAND: To AS 3700.

SAND FOR FACEWORK: From an approved source, selected for colour and grading.

WATER: To AS 3700.

ADMIXTURES: Will not be permitted unless prior written approval has been obtained.

COLOURING PIGMENTS: Lime proof natural or synthetic metallic oxides compatible with cement, to BS 1014, not exceeding 10% by weight of cement in any mix, unless otherwise approved.

WATER THICKENER: Carboxy methyl cellulose with viscosity gradings in the range 4 000 cP to 40 000 cP, "Dynex" by A.V.Syntec or equal non air entraining water retaining agent, may be used in conjunction with washed sand where prior approval has been obtained.

MORTAR - MASONRY

STANDARD: To AS 3700.

MORTAR MIX: 1:1:6 cement:lime:sand.

PREMIXED MORTAR: Do not use unless prior approval has been obtained.

FACE OR POINTING MORTAR: Colour and texture to match approved sample.

GROUT - MASONRY

LOCATION: To cores noted as 'filled core' on Drawings.

CORE FILLING GROUT: To AS 3700, clause 2.4.

SUBSECTION 134 MASONRY UNITS

MASONRY UNITS - MASONRY

DEFINITIONS:
Face Units: Masonry units used in facework including purpose-made units such as squints, queen closers and the like.

Facework: Visible masonry.

Criteria for Face Units: General good appearance and freedom from defects, within the range of approved samples. Use solid masonry units in facework where perforations would otherwise be visible.

CLAY BRICKS: To AS 1225.

Location: To outer leaf of external cavity walls as shown on Drawings and/or to bag rack enclosure.

Manufacture and Type: NUBRIK or equal approved.

CONCRETE MASONRY UNITS: To AS 2733.

Source: Obtain blocks from the approved source.

Manufacturing Dimensions and Form: Use blocks of the dimensions and form shown on Drawings.

Grading: 12.

SUBSECTION 140 WORKMANSHIP

WORKMANSHIP GENERALLY - MASONRY

STANDARD: To AS 3700, Section 8.

'GRASSING' OF BRICKS: Do not lay clay bricks until they have been out of the kiln for at least 14 days.

CHASES: Do not chase masonry without prior approval.

CLEANING: Clean masonry progressively as the work proceeds. Clean facework to remove mortar smears, stains, discolouration, and the like.

SETTING OUT - MASONRY

ROD AND BOND: Set out masonry so as to maintain the specified rod and bond with bed joints and vertical joints of equal and uniform width and with the minimum cutting of masonry units.

Brick Rod: 7 courses to 600 mm. Block Rod: 3 courses to 600 mm.

BONDING - MASONRY

BONDING PATTERN FOR FACEWORK: Stretcher bond generally unless otherwise shown on the Drawings.

MONOLITHIC STRUCTURAL ACTION:
Standard: To AS 3700 Rule 3.9.

Tie Bonding: To AS 3700 clause 3.9.3 at intersecting walls.

BUILDING IN - MASONRY

GENERALLY: Make provision as the work proceeds for the incorporation of items to be built in or keyed to the masonry.

SERVICES: Wherever practicable, run services in the core holes of masonry units or otherwise provide holes, sleeves and the like during the erection of masonry to avoid cutting away and making good.

STEEL DOOR FRAMES: Where steel door frames are specified or shown on Drawings in masonry walls or abutting concrete columns, fill voids at the back of jambs solid with mortar as the work proceeds.

JOINTING - MASONRY

STANDARD: To AS 3700 clauses 3.6.2 and 8.7.2.

POINTING: Point up joints around flashings as necessary.

CONCEALED WORK: Strike joints flush in masonry not exposed to view.

FACEWORK JOINTS: Work with a jointing tool to a dense smooth surface.

Brick Face Joint Profile: Ironed.

Block Face Joint Profile: Ironed.

FACEWORK - MASONRY

LOCATION: All exposed masonry.

COMMENCEMENT: From top of slab or slab recess as detailed.

PERPENDS: Keep perpends in alternate courses vertically aligned.

COLOUR MIXING: Distribute the approved colour range of face units evenly throughout the facework. So as to prevent colour concentrations and 'banding' from occurring.

DOUBLE FACE WALLS: Select masonry units for uniform width and double-face qualities in single leaf masonry with facework both sides. Before commencement, obtain a ruling as to which is the preferred face, and favour that face should a compromise be unavoidable.

SUBSECTION 300 STRUCTURAL ELEMENTS

CORROSION PROTECTION - MASONRY

REQUIREMENT: Provide corrosion protection for metal items built into or in contact with masonry.

WALL TIES - MASONRY

STANDARD: To AS 2699. Installation to AS 3700 Rules 3.9 and 3.10.

MATERIAL: Galvanised steel.

CLASSIFICATION: Medium duty for normal cavity and veneer construction, heavy duty for cavities over 80 mm.

Embedment: 75 mm where cavities width exceeds 80 mm.

CATEGORY: Cavity ties or masonry veneer ties as appropriate to the service condition.

EMBEDMENT: 50 mm minimum embedment of a tie in the mortar joint of wall.

TIES IN EXTERNAL WALLS: Install so that water cannot cross the cavity via the tie.

CAVITY AND MASONRY VENEER CONSTRUCTION: Provide wall ties at maximum spacings as follows:

Generally: 600 mm horizontally and vertically.

Around Openings: 300 mm all round the perimeter of the opening and within 300 mm of the opening, spaced as evenly as possible.

REINFORCED MASONRY: Locate the ties in the unreinforced courses.

ABUTMENTS: Tie masonry to unbonded intersecting walls, buttresses, structural frames, supports and the like with masonry veneer ties at 250 mm maximum centres.

ANCHORAGE: Fixing of masonry veneer ties at abutments: to AS 2699, clause 8.5, and as follows:

To Steel Wall Frames: No. 10 x 16 mm Wafer head tek screws.

BOND BEAMS - MASONRY

REQUIREMENT: Where shown on Drawings, provide bond beams using purpose-made hollow blocks reinforced as shown on Drawings.

REINFORCED MASONRY LINTELS - MASONRY

REQUIREMENT: Where shown on Drawings, provide block masonry lintels using purpose-made U-section hollow blocks as permanent formwork, reinforced as shown on Drawings.

SUBSECTION 400 ENVELOPE ELEMENTS

CAVITY WALLS - MASONRY

STANDARD: To AS 3700. Cavity width as shown on Drawings.

OPENINGS: Close the cavity at the jambs of external openings and abutments where shown on the Drawings.

MASONRY VENEER - MASONRY

STANDARD: To AS 3700. Cavity width as shown on Drawings.

MASONRY VENEER INSULATION: Specified in 'THERMAL WALL INSULATION - PARTITIONS'.

SUBSECTION 461 VENTS

WEEP HOLES - MASONRY

LOCATION: Provide weep holes in the form of open perpends to external leaves of cavity and veneer walls in the course above damp-proof courses.

Spacing: Not exceeding 1200 mm.

SUBSECTION 480 JOINT INSERTIONS

DAMP-PROOF COURSE - MASONRY

STANDARD: To AS 3700.

MATERIAL: 0.55 mm thick bitumen coated aluminium.

LOCATION: Unless otherwise specified or shown on the Drawings, build damp-proof courses into the following locations where applicable:

- Cavity and veneer walls built off slabs on ground: Under the bottom course of the outer leaf, continuous across the cavity and 75 mm up the inner face. Fix to the studs or inner masonry skin. Project 10 mm beyond external slab edge and turn down at 45 degrees.

WORKMANSHIP: Lay in single lengths.

FLASHINGS AND WEATHERINGS - MASONRY

STANDARD: To AS 3700.

MATERIAL: 0.55 mm thick bitumen coated aluminium.

LOCATION: Unless otherwise specified or shown on the Drawings, build flashings and weatherings into the following locations where applicable:

- At abutments with structural frames or supports: Vertical flashing in cavity from 150 mm wide material, wedged and grouted into groove in frame opposite cavity.

- At stiles where cavities are closed: Full height flashing extending 75 mm beyond the closure into the cavity, interleaved with sill and head flashing at each end. Fix to frames.

CONTROL AND ABUTMENT JOINTS - MASONRY

REQUIREMENT: Provide control and abutment joints where shown on the Drawings.

STANDARD: To AS 3700 clause 3.5.

SIZE:
Control Joints: 15 mm minimum compressed thickness, the full depth of the masonry leaf unless otherwise shown.

Abutment Joints: 10 mm maximum thickness, the width as shown on the Drawings.

JOINT FILLER:
Priming: Unless priming is not recommended by the jointing material manufacturer, apply the appropriate primer to masonry surface in contact with jointing materials.

Back-Up Material: Pabco "Presstite" or equal approved compressible bitumen impregnated polyurethane filler.

Bond Breaking: Back-up materials for sealants, including backing rods and the like, shall not adhere to the sealant, or shall be faced with a non-adhering material.

Sealant: Sealant of the types shown on the Drawings and/or as recommended by the material manufacturers for the location and service conditions, compatible when used together, and non-staining to masonry.

Sealant Proportions: The depth shall be not greater than the joint width, nor less than two-thirds the joint width.

SUBSECTION 500 FINISHES

APPLIED FINISHES - MASONRY

PAINT: Paint internal and external exposed surfaces of concrete masonry units with paint system specified in 'PAINTING'.

SECTION 250 - STRUCTURAL STEEL

SUBSECTION 001 GENERAL

SCOPE - STRUCTURAL STEEL

OUTLINE DESCRIPTION: This section applies to the provision, fabrication, treatment, erection and connection of structural steelwork.

STANDARDS - STRUCTURAL STEEL

SITE COPY: Supply and keep on site a copy of AS 1250, AS 1511, AS 1554, MA1.9.

SHOP DRAWINGS - STRUCTURAL STEEL

REQUIREMENT: There is no requirement to submit shop drawings of the structural steelwork to the Superintendent.

INSPECTION - STRUCTURAL STEEL

NOTICE: Give sufficient notice so that inspection may be made at the following stages:

- Commencement of shop fabrication;
- Commencement of welding procedure tests;
- Commencement of welding;
- Prior to the placement of the root runs of complete penetration butt welds;
- Completion of fabrication prior to surface preparation;
- Commencement of surface preparation prior to protective coating;
- Completion of protective coating prior to delivery to site;
- Steelwork on site prior to erection;
- Completion of erection prior to encasing or fixing cladding;
- Encasing.

FABRICATION MAY PROCEED: In the absence of any directions to the contrary, after the expiry of such two days notice, the Contractor may proceed with his obligations under the terms of the Contract, but this shall not be construed as implying and approval or negating the responsibility of the Contractor to complete the work in accordance with all the requirements of the Contract.

IDENTIFICATION - STRUCTURAL STEEL

MARKS: Provide suitable and sufficient marks or other means for identifying each member, including bolts and loose items, and for the correct setting out, location, erection and connection of the steelwork.

STEEL GRADE IDENTIFICATION: To AS 1250, clause 11.1.4.

CONNECTIONS: Mark connections to distinguish those requiring high-strength bolts from others. Deliver bolts of each size and type in separate containers suitably identified.

HANDLING AND STORAGE - STRUCTURAL STEEL

GENERALLY: To SAA MA1.9, section 9.1.4. Handle and store steelwork so as to protect it from damage, including overstress, distortion, damage to surfaces and applied finishes, contamination by foreign matter, and the like.

CORRECTION OF FAULTS: To AS 1250 clause 11.1.3.

SUBSECTION 120 MATERIALS

STEEL TYPE AND GRADE - STRUCTURAL STEEL

STANDARDS: Steel shall be of the types and grades shown on the Drawings, to the appropriate material standard, and to AS 1250, Section 2, or AS 1538 clause 1.7 in the case of cold-formed sections.

COMPLIANCE WITH STANDARD: For each batch of steel supplied to the Works, provide the manufacturer's Certificate of compliance and Test certificates specified in AS 1227, clause A5.

INDEPENDENT TESTS: Alternatively, have the steel independently tested to AS 1227 clause A4, for compliance with the chemical composition and mechanical test requirements of the appropriate material standard.

TESTING CERTIFICATION: Use NATA registered bodies for testing and certificates unless approved otherwise. In this Section understand that the word 'certificate' means certificate by NATA registered body, unless approved otherwise.

REJECTION: Steel which cannot be shown to comply with the appropriate material standard is liable to rejection.

BOLTS - STRUCTURAL STEEL

HIGH STRENGTH BOLTS, NUTS AND WASHERS: To AS 1252.

Lengths and Washers for High-Strength Bolts: Unless noted otherwise on drawings use bolts threaded with length sufficient to prevent threads in section at interfaces of connected parts of the work. Use washers, flat or tapered as necessary, for each nut and for each head which is to be rotated.

COMMERCIAL MILD STEEL BOLTS: To AS 1111.

Particular Requirements, Commercial Bolts: Unless otherwise shown or directed, use mild steel drop forged bolts with hexagon heads and nuts and ISO metric coarse pitch threads. Unless otherwise noted on drawings use bolts threaded length sufficient to prevent threads in section at interfaces of connected parts of the work. Use washers, circular, clipped, flat or tapered as necessary, for each nut and for each head which is to be rotated.

Coatings, Commercial Bolts: Coat commercial bolts as follows:

- For steelwork to be hot dipped galvanised (GALV) - Hot dipped galvanised.
- For steelwork to be primed with Special Purpose Primer (IP2) - Hot dipped galvanised.

MILD STEEL NUTS: To AS 1112.

MILD STEEL WASHERS: To AS 1237.

SUBSECTION 170 FABRICATION

FABRICATION - STRUCTURAL STEEL

STANDARD: To AS 1250, Section 11.

FABRICATION: Fabricate in an approved workshop unless otherwise specified or permitted.

CUTTING: Saw cut ends of hot rolled steel sections, cold formed steel sections and steel tubes. Other sections may be cut by shearing, cropping or sawing. Do not use hand operated flame cutting tools. Machine flame cutting may be used for the preparation of edges for welding, but surfaces shall be smooth, uniform, free from fins, tears, loose scale, slag, rust, grease, paints, any other foreign material and other defects.

SPLICES AND JOINTS: Structural members shall be in single lengths unless otherwise required by the Contract or permitted.

WELDING OF 'OFF-CUTS': Do not weld 'off-cuts' or short lengths to make up the required length of any member. Permission may be given by the Superintendent to join, by one weld, members of long final length, provided written request from the Contractor is so received.

Column Splices: If required or permitted: To AS 1250, clauses 6.5.1. and 11.2.4 (full contact). Unless otherwise shown, make column splices between 500 mm and 800 mm above finished floor level.

FABRICATION TOLERANCES: To AS 1250 clause 11.2.

Straightness: To AS 1250 clause 11.2.2.

Straightening Methods: Generally as described in SAA MA1.8 Section 8.2.2.

Beam Camber: If beam members have a natural camber within the straightness tolerance, fabricate and erect them with the camber up.

Machined Surfaces: To AS 1250, clause 11.2.4.1.

TEMPORARY CONNECTIONS: Generally to SAA MA1.9 Section 9.4.4. Do not locate cleats other than as shown on the Contract Drawings without prior permission. Remove temporary connections on completion and restore the permanent surface.

HOLES FOR BOLTS AND RIVETS: To AS 1250, clause 11.3.4. Do not use flame cutting for any holes.

WELDING - STRUCTURAL STEEL

STANDARDS: To AS 1250, clause 11.3.3, and AS 1554.

STUD WELDING: To AS 1554 Part 2.

SITE WELDS: Do not site weld without prior permission. Wherever possible locate site welds in positions for down hand welding.

WELD CATEGORIES: Use SP (special purpose) category welds unless noted otherwise.

QUALIFICATION OF WELDING PERSONNEL: Welding operators shall have passed the tests specified in AS 1796 and be in possession of the appropriate certificate issued by an examining authority specified therein.

WELD TESTING: If butt weld testing by radiographic or ultrasonic examination is called for on the Drawings or specified, have the tests performed by an independent testing authority and submit the relevant test report.

Radiographic Examination: To AS 1554, Part 1, clause 6.3.

Ultrasonic Examination: To AS 1554, Part 1, clause 6.4.

CORRECTION OF FAULTY WELDS: To AS 1554, Part 1, clause 5.8. After correcting a faulty weld revealed by a required test, retest it as specified above under WELD TESTING.

SUBSECTION 180 ERECTION

ERECTION - STRUCTURAL STEEL

STANDARD: To AS 1250, clause 11.4.

ERECTION TOLERANCES: To SAA MA1.9 Section 9.4. and Fig 9.24.

Beam Clearances at Each End, Maximum: 2 mm for web cleated ends, 3 mm for ends without web cleats.

Anchor Bolt Position Tolerances:

- deviation of a bolt within a bolt group: +/- 3 mm
- deviation between groups: +/- 6 mm
- maximum accumulated deviation between groups: +/- 6 mm per 30 m
- centre of bolt group off grid: Not greater than 6 mm
- projection of bolt end: + 25 mm, - 5 mm.

GROUTING SUPPORTS: To AS 1250, clause 11.4.4.

Grout Type and Strength: As shown on the Drawings.

BOLTING: To AS 1250, clause 11.3.5.

HIGH STRENGTH BOLTING: To AS 1511.

SECTION 500 FINISHES

SURFACE PREPARATION - STRUCTURAL STEEL

PREPARATION: On completion of shop fabrication, and prior to erection on site and irrespective of any prior application of paint to the steelwork, clean steelwork as follows:-

- For steelwork to be hot dip galvanised (GALV) - clean by suitable preliminary treatment and subsequent acid cleaning or pickling to produce a clean metallic surface suitable for galvanizing.

- For steelwork to be prime painted IP2 - by abrasive blast, to a standard of finish equal to or better than Class Sa 2-1/2 finish described in AS 1627.

NO FREE SILICA: Any substance, including sand, containing free silica shall not be used as an abrasive in any blast cleaning operations.

RECLEAN: Prior to application of paint, re-clean as specified above any cleaned surfaces left unpainted longer than 4 hours after prior cleaning. Prior to encasement, re-clean as specified above any surface to be encased which does not have a standard of finish equal to or better than Class Sa 1 of AS 1624.

PAINTING - STRUCTURAL STEEL

COATING SYSTEMS: Apply the paint coating systems (including both decorative and protective coatings) shown on the Drawings.

PRIMING: Priming as follows:

- Special Purpose Primer (IP2) - Paint steelwork with a two-pack inorganic ethyl silicate zinc primer to GPC C-29/8 depositing a minimum of 75 microns dry film thickness on the substrate applied in one coat.

DRYING TIME: Carry out painting, unless otherwise specified, within 4 hours of cleaning and allow 24 hour drying time before recoating and 72 hour drying time before commencing delivery to site.

UNPAINTED AREAS: Do not paint contact surfaces of high strength friction-grip bolted connections, surfaces against which concrete is to be poured, and surfaces within 50 mm of locations where "field welds" are required.

COLUMN BASES: Where steel columns have encased bases, extend the priming of the shaft 25 mm below the top of the encasing.

AFTER ERECTION: On completion of bolting or site welding, clean with a wire brush or other acceptable methods, bolts, damaged areas of paint and galvanizing and areas previously specified to remain unpainted, to an equivalent standard specified, then treat as follows:

- For prime painted steelwork - feather any existing paint to a fine edge. Repaint cleaned areas with primer specified above, overlapping existing paint by 25 mm minimum.

- For galvanized work (GALV) - apply one coat of 50 microns dry film thickness of an approved single pack epoxy zinc rich paint to GPC P-14/1 made by a manufacturer approved by the GPC to manufacture that product.

APPROVED PAINT MANUFACTURER: Use paints made by a manufacturer approved by the GPC to manufacture the paint. Use the same brand of paint for subsequent touch-up and additional coats.

PAINT GAUGE: Upon request provide the Superintendent with an approved thickness gauge such as an 'Elcometer' for use in testing paint thicknesses.

GALVANIZING - STRUCTURAL STEEL

STRUCTURAL SECTIONS: To AS 1650.

THREADED FASTENERS: To AS 1214.

SECTION 260 - METALWORK

SUBSECTION 100 MATERIALS AND WORKMANSHIP

MATERIALS - METALWORK

METALS: Use metals suited to their required function, finish and method of fabrication, in sections of adequate strength and stiffness for their purpose.

WORKMANSHIP - METALWORK

PREFABRICATION: Fabricate and pre-assemble items in the workshop wherever practicable.

EDGES AND SURFACES: Keep clean, neat and free from burrs and indentations. Remove sharp edges without excessive radiusing.

JOINTS: Fit accurately to a fine hairline.

TUBE BENDS: Form bends in tube without unduly deforming the true cross section.

COLOURS: Match colours of sheets, extrusions and heads of fastenings in colour finished work.

METAL SEPARATION: Separate incompatible metals by suitable means, including but not necessarily limited to separation layers, sleeves, or gaskets of plastic film, bituminous felt, mastic, paint coatings, and the like. Separation materials shall not be visible on exposed surfaces.

THERMAL MOVEMENT: Provide for thermal movement in joints and fastenings, and in the installation of assemblies such as frames. Make the provision sufficient to prevent harmful effects from stress and fatigue, such as opening of joints, tearing and buckling of sheet metals and thin sections, and the like.

WELDING, BRAZING, SOLDERING - METALWORK

VISIBLE JOINTS: Finish visible joints made by welding, brazing or soldering by grinding smooth, buffing or the like methods appropriate to the class of work before painting, galvanizing, or the like further treatment. Aluminium after jointing shall be without visible surface colour variations.

STRUCTURAL STEEL WELDING: Specified in the 'STRUCTURAL STEEL' Section.

ALUMINIUM WELDING: To AS 1665.

SUBSECTION 300 STRUCTURAL MEMBERS

FASTENINGS - METALWORK

GENERALLY: Fastenings, including anchors, lugs, screws, rivets and the like, shall be of approved type, appropriate to the work, capable of transmitting the loads and stresses imposed, and sufficient to ensure the rigidity of the assembly.

FASTENINGS TO COPPER: (including copper alloys): Copper or copper-alloy fixing devices of a type suitable to the purpose, not ferrous metals, galvanized or plain, or metals containing aluminium.

Nails: Flat-head copper.
Rivets: Blind rivets unless otherwise specified.

FASTENINGS TO ALUMINIUM: (including aluminium alloys): Aluminium alloy or non-magnetic stainless steel unless otherwise specified. Use cadmium-plated steel fastenings only in protected situations subject to approval.

Self-tapping Screws: Stainless steel.
Nails: Aluminium or stainless steel.
Rivets: Blind rivets.

SCREWS - METALWORK

TAPPING AND DRIVE SCREWS: To AS B194.
MACHINE SCREWS: To AS 1427.
SOCKET HEAD CAP SCREWS: To AS 1420.
SOCKET HEAD SET SCREWS: To AS 1421.

EXPOSED SCREW HEADS: Countersunk Philips or socket head unless otherwise specified, finishing flush in countersinkings.

MASONRY ANCHORS - METALWORK

EXPANSION: Patent expansion type of approved manufacture unless otherwise specified.

SUBSECTION 500 FINISHES

PROTECTION - METALWORK

GENERALLY: Protect metalwork during the work under the Contract as necessary to prevent damage or defacement.

IRON AND STEEL (ungalvanized): Prime as specified for the relevant coating system specified in 'PAINTING'.

METAL BUILDING SHEETS: Surface discoloration or other damage resulting from neglect of protective measures shall be cause for rejection.

TEMPORARY COATINGS: Provide finished surfaces of aluminium and its alloys, stainless steel, chromium plating and the like decorative surfaces with a temporary coating before installation, and remove all traces upon completion of the Works.

HOT DIP COATINGS - METALWORK

FABRICATION: Complete welding, cutting, drilling and other fabrication before coating.

COATINGS: Unless otherwise specified, zinc coatings shall be by the hot dip method as follows:

Ferrous Articles Generally: To AS 1650.
Ferrous Wire: To AS 1650, Section 4, Type A.
Steel Sheet: To AS 1397, coating class as specified for the particular item.
Threaded Fasteners: To AS 1214.

COLD GALVANIZING: Where site welding is unavoidable to hot dip galvanized items apply cold galvanizing paint to the welded area in accordance with the manufacturer's recommendations.

POWDER COATING - METALWORK

PERFORMANCE REQUIREMENTS:
On Aluminium: To AS 3715.

PREPARATION:
Unprotected Steel: Remove rust by abrasive blast to AS 1627.4 Class 3, clean by immersing in trichloroethylene or an alkaline solution, and apply a coat of iron phosphate.

Galvanized Steel: Clean by immersing in a suitable alkaline or acidic solution, apply a chromate or zinc phosphate chemical conversion coating, rinse and degas.

Aluminium: Clean by immersing in a suitable alkaline or acidic solution, caustic etch and apply a chromate chemical conversion coating.

APPLICATION: Apply powder using an electrostatic spray gun or fluidized bed such that no dust particles or other impurities blemish the final product.

BAKING: After application, bake the film in an oven accurately controlled to the temperature recommended by the coating manufacturer.

LIMITATION: Do not apply powder coating to any metal surfaces without the approval of the Superintendent in writing.

DRY FILM THICKNESS: 70 - 80 microns.

ANODIZING - METALWORK

ANODIZED COATINGS ON ALUMINIUM: To AS 1231.

THICKNESS: 20 microns.

SECTION 270 - WOODWORK

SUBSECTION 001 GENERAL

SCOPE - WOODWORK

OUTLINE DESCRIPTION: Execute all woodwork necessary for the completion of the Works in accordance with this Section. Refer also to the following sections:

HARDWARE	Door hardware.
PARTITIONS	Partition systems including metal stud frames.
WINDOWS	All windows.
DOORS	All doors and frames.
PAINTING	Applied finishes to timber

INSPECTION - WOODWORK

NOTICE: Give 2 working days' notice so that the following may be inspected:

- erected structural timber work;
- bolts after final tightening.

TIMBER IDENTIFICATION - WOODWORK

REQUIREMENT: Identify all timbers by one of the following methods:

Clear Finished Timbers: Provide a suppliers' certificate (which may be included on an invoice or delivery docket) showing that the timber complies with the Specification.

Other than Clear Finished Timbers: Brand the timbers to show the grade, source of grading, and other branding or marking requirements of the applicable Australian Standard.

Structural Timber Branding: Brand all structural timber, structural plywood, and plywood for exterior use, under the authority of a recognised quality assurance programme applicable to the product. Include the following data:

- stress grade;
- method of grading;
- "seasoned" or "s" (if applicable);
- the certification mark of the quality assurance programme.

DURABILITY - WOODWORK

NATURAL DURABILITY: Unless otherwise specified, use timbers having natural durability appropriate to the conditions of use, or preservative-treated timber of equivalent durability.

Class 1 - Timbers in contact with the ground.

Class 2 - Timbers above ground, not in continuous contact with moisture, well ventilated, protected from moisture but exposed to the weather.

Class 3 - Timbers above ground, not in continuous contact with moisture, well ventilated, protected with a finish and well maintained.

Class 4 - Timbers fully protected from moisture, indoors, above ground and well ventilated

HAZARD CLASSIFICATIONS: Hazard levels and natural durability classes to Timber Utilization and Marketing Act (Qld), as appropriate to end use:

H1 - Fully protected indoors;
H2 - Termite hazard only;
H3 - Above ground, well ventilated but weather exposed;
H4 - In ground non critical members or above ground moist applications.

PRESERVATIVE TREATMENT - WOODWORK

PRESSURE TREATMENT: If preservative treatment of timber is specified or required by law, either mark the timber with the relevant "H" brand or treat to the Timber Utilization and Marketing Act (Qld).
WATER-REPELLENT TREATMENT: To AS 1606 and AS 1607.

TERMITE-RESISTANT TREATMENT: To AS 1604

SUBSECTION 120 MATERIALS

TERMINOLOGY - WOODWORK

STANDARD: To AS O1.

INDIVIDUAL TIMBERS: 'Standard trade common names' of AS 1148 and AS 2543.

GROUPS OF TIMBERS: Terms employed for that purpose in relevant Australian standards.

PLYWOOD: To AS 2289.

TIMBER QUALITY - WOODWORK

REQUIREMENT: Use timbers suited to their intended purposes, which have been graded to the relevant Australian standard unless otherwise specified. Structural timber shall be graded under the authority of a recognized Timber Quality Assurance Programme.

Structural timbers shall be Termite resistant, Hazard level H2.

SEASONING - WOODWORK

REQUIREMENT: Make milled or dressed products from timbers within 3% of the equilibrium moisture content (EMC) appropriate to the timber and its intended conditions of use, and unless otherwise specified not greater than 15% nor less than 10%, with no more than 3% difference between any two pieces in any one group. Submit evidence of moisture content if requested: to AS 1080 Part 1.

TIMBER GRADES - WOODWORK

HARDWOODS:
Structural, Visually Stress Graded: To AS 2082.

Milled Products: To AS 2796.

SOFTWOODS (CONIFERS):
Structural, Visually Stress Graded: To AS 2858.

Milled Products from Australian Grown Conifers: (excluding Radiata Pine and Cypress Pine): To AS 1782 - 1787 inclusive, as appropriate.

Milled Products from Radiata Pine: To AS 1492 - 1498 inclusive, as appropriate.

Milled Products from Cypress Pine: To Industry Standard TRADAC Interim Code of Practice, Grading Rules for Cypress Milled Products.

Sawn Douglas Fir (Oregon) and Western Hemlock (Canada Pine) for Dressing Purposes: To AS 2440.

Western Red Cedar for Dressing Purposes: To AS 2440.

MECHANICAL STRESS GRADING: To AS 1748 and AS 1749.

MACHINE PROOF GRADING:
Cypress Pine: To Industry Standard TRADAC Interim Code of Practice for Machine Proof Grading Cypress.

Radiata Pine: To Industry Standards RPRI 103 and RPRI 104.

STRUCTURAL TIMBERS: Stud grade and lintel grade where appropriate. Appearance grade if exposed to view in the finished work.

DRESSED TIMBERS: Where the relevant Australian standard specifies more than one grade, use the following:

Timbers for Transparent Finish: The highest commercially available grade in the standard.

Timbers for Opaque Finish: Hardwood - select grade to AS 2796. Softwood - standard grade if more than one grade specified in appropriate Australian Standard.

VISIBLE WORK - WOODWORK

REQUIREMENT: Where timber, including sawn timber, is required for work having clear or stained finishes, keep the visible faces, edges and corners clean and free of blemishes such as branding marks, crayon marks, chalk marks, marks caused by machining, conveying and handling, and the like which will be visible in the finished work.

DIMENSIONS - WOODWORK

TOLERANCES: Unless otherwise specified, the actual cross-sectional dimensions of timbers may vary from the dimensions stated herein or on the Drawings by the tolerances (if any) permitted in the relevant Australian standards.

Framing Timbers: AS 1684 or as specified on Drawings.

'GAUGED' OR 'SIZED': Tolerance + 2 mm - 0.

Seasoned Sizes: The actual sizes of timbers specified to be seasoned shall be not less than the stated sizes, except for tolerances permitted in relevant Australian standards.

Finished Sizes: The actual dimensions of structural, dressed or milled timbers shall be not less than the stated dimensions, except for stated dimensions qualified by a term such as 'nominal' or 'out of' or equivalent, to which a machining tolerance of - 3 mm maximum per dressed face shall apply.

SUBSECTION 136 PANEL AND SHEET PRODUCTS

PLYWOOD AND BLOCKBOARD - WOODWORK

INTERIOR USE: To AS 2270.
Bond Type: C.

EXTERIOR USE: To AS 2271.
Bond Type: A.

VENEER QUALITY: As specified in 'VENEERS - WOODWORK'.

STRUCTURAL PLYWOOD: To AS 2269.
Surface Grade: C.
Stress Grade: F11.

PARTICLEBOARD - WOODWORK

STANDARD: To AS 1859. All particleboard to be HMR (highly moisture resistant) type in accordance with the Australian Particleboard Research Institute Standard.

MELAMINE FINISH PARTICLEBOARD: Particleboard pre-finished with a melamine surface bonded to both faces.

FIBRE BUILDING BOARDS - WOODWORK

HARDBOARD: To AS 2458.

Classification: Unless otherwise specified:
- Interior use generally: Standard hardboard Type GP.
- Where shown on Drawings: Tempered hardboard.

VENEERS - WOODWORK

VENEER QUALITY: To AS 2270 and AS 2271, and as follows, unless otherwise specified:

Veneer Quality A: Visible surfaces specified to have clear finishes or to have no coated finish.

Veneer Quality B: Visible surfaces specified to have opaque finishes.

Veneer Quality C and D: Non-visible surfaces.

Decorative Quality S: To all veneers to have clear finish. Species and type as shown on Drawings.

LAMINATED PLASTIC SHEET - WOODWORK

STANDARD: To AS 2924.

CLASS: Use classes appropriate to the 'typical applications' of AS 2924, Table 1.

THICKNESS: Unless otherwise specified:

For Horizontal Surfaces fixed to a Continuous Background: 1.2 mm.

For Post-Formed Laminate fixed to a Continuous Background: 0.8 mm.

For Vertical Surfaces fixed to a Continuous Background: 0.8 mm.

For Edge Strips: 0.8 mm.

FIXING: Fix to continuous backgrounds with spray applied contact cement containing a heat resistant additive to AS 2131, in accordance with the manufacturer's recommendations. For small areas (e.g. edges) hand applied adhesives as above may be used.

SUBSECTION 150 WORKMANSHIP

WORKMANSHIP GENERALLY - WOODWORK

EXTENT: Perform the operations including framing, trimming, assembling, joining, fixing, finishing, and the like and provide the accessories necessary for the satisfactory completion of woodwork items. Ease and adjust moving parts, lubricate hardware as necessary, and leave the completed work in a sound, clean working condition.

UNSEASONED TIMBER: Where unseasoned timber is used, or variations in moisture are likely, make allowance for shrinkage, swelling and differential movement.

PLOUGHING: Back plough boards liable to warping (e.g. if exposed externally on one face). Make the width, depth, number and distribution of ploughs appropriate to the dimensions of the board and degree of exposure.

JOINTS: Use timber, panels and sheets in single lengths whenever possible. If joints are necessary make them over supports unless otherwise shown or specified.

EDGES: Arris edges of work to receive paint or similar coatings. Arris or round off visible edges to approval.

PRIMING: Where woodwork is specified to be painted, prime the hidden surfaces before assembly.

FRAMING: Trim where necessary for openings, including those required by other trades.

JOINERY - WOODWORK

GENERALLY: Make joinery to details shown on the Drawings.

FINISHES: Where joinery is specified to have clear or tinted finishes, match adjacent pieces to approval.

FASTENINGS: Conceal fastenings where possible, otherwise punch or sink the heads below the surface and fill flush by an approved means to match the finished surface.

PLUGGING: If fastenings are specified to be plugged, sink them below the surface and cover with flush matching wood plugs showing face grain (not end grain).

STOPPING: If fastenings are specified to be stopped, fill flush with an approved colour matching putty, filler or dowel.

JOINTS: Scribe internal and mitre external joints.

TIMBER SURFACES - WOODWORK

CLASSIFICATION: To AS 1728.

REQUIREMENT: Finish visible timber to the surface type most nearly corresponding to the "examples of applications" in Table C1, C2 and C3 of the commentary to AS 1728, and not less than the following:

- Visible sawn timbers (seasoned): No. 4 Sawn Surface (fine);
- Visible sawn timbers (unseasoned): No. 3 Sawn Surface (medium);
- Visible dressed timbers: No. 4 Dressed Surface (fine);
- Joinery and dressed timbers: (including veneers visible internally): No. 2 Abraded Surface (smooth) for gloss paint finish; No. 3 Abraded Surface (very smooth) for polished, clear, tinted or the like finish;
- Band Sawn Surface (unseasoned): No. 3 Sawn Surface (medium);

- Band Sawn Surface (seasoned): No. 4 Sawn Surface (fine).

SUBSECTION 300 STRUCTURE

FASTENINGS - WOODWORK

GENERALLY: Provide all necessary fixings and fastenings, anchors, lugs, nails, screws, bolts, straps and the like of approved types, sufficient to transmit all the loads and stresses to be imposed and ensure the rigidity of the assembly. Drill timbers for fastenings where appropriate and where necessary to prevent splitting and make allowance for splitting.

STEEL FASTENINGS: If exposed to weather, or used in external timbers or in contact with chemically treated timbers, hot dip galvanize to AS B193 or AS 1214 or AS 1650, Section 5 or (for nails) Section 4, Type A, as appropriate.

FASTENINGS FOR TIMBER ENGINEERING PURPOSES: Including bolts, coach screws, tooth plate connectors, and nail plate connectors: To AS 1720.1 Section 4, of galvanized steel unless otherwise specified.

EXPLOSIVE DRIVEN FASTENINGS: Use only where specified or approved.

NAILS: Use types appropriate for the purpose, or as recommended by the manufacturer for the fixing of building boards or other manufactured sheets.

Steel Nails: To AS 2334.

Nail Length for fixing Cladding, Lining and the like: Not less than 2 1/2 times the thickness of the member or members the nail is being used to secure. (Not less than 4 times if the member is plywood or building board under 10 mm thick.)

Nailing in Frames: To AS 1684, Section 6.

SCREWS:
Wood Screws: To AS 1476;
Self-Drilling Screws: To AS 3566.
Coach Screws: To AS 1393.

BOLTS: To AS 1111. M12 unless shown otherwise.

WASHERS: To AS 1237. Provide washers to the heads and nuts of all bolts and coach screws.

MASONRY ANCHORS: Purpose-made proprietary expansion or chemical types.

HOOP IRON STRAPS: 30 x 1.0 mm or 25 x 1.2 mm galvanized unless otherwise specified.

PLUGS IN MASONRY: Seasoned softwood, or plastic plugs of an approved type.

CORROSION PROTECTION:
Galvanizing: Galvanize steel fastenings to AS B193 or AS 1214 or AS 1650, Section 5 or (for nails) Section 4, Type A, as appropriate where

- exposed to weather;
- in external timbers;
- in contact with chemically treated timber.

Coating: Before placing galvanized bolts in contact with CCA treated timber, coat the bolt with a heavy bodied grease or bituminous coating.

ADHESIVES - WOODWORK

REQUIREMENT: Provide adhesives of the types appropriate to their purpose, and apply them so that they transmit the loads and stresses imposed and ensure the rigidity of the assembly without causing discolouration of finished surfaces.

CONTACT ADHESIVE: To AS 2131.

WALLBOARD ADHESIVE: To AS 2329.

PVAC EMULSION: To AS 2370, Type 2 if required to be water resistant.

STRUCTURAL ADHESIVE: To AS 1328 clause 2.2.

SUBSECTION 443 SHEETING AND LINING APPLICATIONS

FIBRE CEMENT CLADDING SYSTEM - WOODWORK

LOCATION: Fascia and barge cladding as shown on Drawings.

PRODUCT: Flat autoclaved exterior use fibre cement sheet 6 mm thick, with bevelled edges free of imperfections.

JOINTS:
Horizontal Joints: Not permitted.

Vertical Joints: Butt vee joint in approved locations.

Expansion Joints: Provide expansion joints at the end of each sheet by leaving a 3 mm gap and filling with "Expandite Ureflex Extra" or equal approved one part polyurethane sealant suitable for painting as recommended by the sheeting manufacturer.

FIXING:
To Timber: 2.0 x 30 mm nails.

To Light Steel Framing: Pre-drill sheets and fix with No. 8 x 20 mm countersunk head screws, zinc or cadmium plated and chromate passivated.

FINISH: Paint with paint system specified in 'PAINTING'.

INSULATION:
Material: Reflective foil laminate to AS 1903 except a lesser tensile strength in the longitudinal direction of 12 kN/m and 7.5 kN/m in the transverse direction is permitted.

Class: A.
Grade: A.
Type: 1.

Installation: To AS 1904, Rule 7. Apply behind fascias and barges to sealed areas.

SOFFIT LINING - WOODWORK

PRODUCT: Autoclaved fibre cement flat sheet, suitable for suspension fixing, smooth sanded, fixed as recommended by the manufacturer.

ACCESSORIES: Fastener type, length, gauge and set out, bedding and topping compounds, and the like accessories shall be as recommended by the sheet manufacturer.

SHEET THICKNESS: 6 mm.

FRAMING: Timber and/or metal as shown on Drawings.

TRIM: Finish at wall and fascia with folded metal trim, shadowline edge, or aluminium angle and cap mould as detailed on drawings.

JOINTS: Butt vee joint.

MOVEMENT JOINTS: Provide 5 mm wide movement joints at columns or at 7200 mm maximum centres.

VENTING: Provide slotted vents to soffit lining where shown on Drawings. Vent slots size , spacing and extent to be as shown on drawings.

SUBSECTION 450 ROOFS, CEILINGS

FIXINGS TO BEAMS AND PLATES - WOODWORK

REQUIREMENT: Where timber roof beams and plates bear on timber supporting members fix with 2 galvanised framing anchors. Fix with 3 galvanised clouts into hardwood and 4 galvanised clouts into all other timber members.

ROOF FRAMING - WOODWORK

STANDARD: To AS 1684, Section 5.

SIZES: As shown on Drawings.

FIXING: As detailed on Architectural drawings. Fix to structural steelwork as detailed on Engineer's drawings.

MAIN FASCIA, AWNING AND VERANDAH FRAMING: Where drawings indicate timber members sizes and stress grading as shown.

DOMELIGHT FRAMING: F14 hardwood trimmers, upstand and soaker board. F8 pine duct framing and trim.

BARGES - WOODWORK

TIMBER SPECIES: Dressed hardwood.

SIZES: As shown on Drawings.

FIXING: Countersink screw fix to rectangular hollow section roof framing.

FINISH: Paint with paint system specified in 'PAINTING'.

SUBSECTION 490 TRIM

TIMBER TRIM - WOODWORK

REQUIREMENT: Provide timber trim in the locations and of the species, sizes and profiles shown on the Drawings or specified.
INFILL: To head of single weldmesh gate. F14 dressed hardwood infill fixed to steel framing.

FINISH: Paint timber trims with paint system as specified in 'PAINTING'.

COAT AND HOOK RAILS - WOODWORK

REQUIREMENT: Dressed Pine rail as detailed on Drawings.

FIXING:
To Masonry Walls: Fix with 12 mm diameter countersunk masonry anchors with heads sunk and filled.

To Steel Stud Walls: Securely fix to steel studs with approved fasteners with heads sunk and filled.

FINISH: Paint with paint system specified in 'PAINTING'.

SUBSECTION 600 FIXTURES AND FURNITURE

FIXTURES GENERALLY - WOODWORK

EXTENT: Provide fixtures and furniture as shown on the Drawings, made up from materials and finished with products as noted on the Detailed Drawings.

FINISHES AGAINST ADJACENT SURFACES: Finish all fixtures neatly against adjacent surfaces in materials and finishes to match the fixtures. Scribe ducts, splashbacks, benches, shelving and the like neatly around projecting window sections, columns and the like and into all recesses to close off all gaps. Provide all penetrations and trim openings for building services.

CABLE ACCESS: When and where shown on drawings cut neat hole in benchtop for and provide plastic "Cable Set", HAFELE Type B 80mm diam., black, or equal approved.
CUPBOARD DOOR FRAMES: Where doors are in wall openings, provide frames as specified in 'TIMBER DOOR FRAMES - DOORS'.

WORKMANSHIP: Construction of all joinery fixtures shall be to the best quality standards available within the industry. Indicate methods of jointing, housing, drilling for bolts, countersinking, mitring, scribing, framing, grooving, notching, rebating mortising, tenoning, tounging, punching and preparing for applied finishes on Shop Drawings and obtain permission to use prior to commencing fabrication. No additional cost shall be considered for compliance with good trade practice.

CUPBOARD DOOR HARDWARE - WOODWORK

HINGES: Concealed, spring loaded Hettich 'Euromat 3955' or equal approved, 170 degree opening. Provide 2 hinges per door up to 900 mm high, 3 hinges up to 1600 mm high and 4 hinges for doors over 1600 mm high.

HANDLES: 1 per door: Efco 70 or equal approved D type chrome plated brass where indicated.

MOUNTING HEIGHT: Mount handles at 1000 mm above floor or as near as possible thereto, but not closer than 100 mm from top or bottom of door as case may be. On middle rails of framed doors.

LOCKS: One per door: Key operated cam lock - Howard Silvers Type 0829 or equal approved.
Key to be removable in locked or unlocked condition.

Keying: Keyed to differ.

CATCHES: Double ball brass cupboard catch. 1 per door for doors up to 1200 mm high, 2 per door for doors over 1200 mm high.

FINGER PULLS: Where shown on drawings, to be extruded clear anodized aluminium "G" pull with ends rounded to 20 mm radius. Rub smooth all exposed edges.

SHOWER SEATS - WOODWORK

FOLD AWAY TYPE:
Description: Fold away slatted shower seat Dalco or equal approved.
where shown approx. 960 x 400 mm Dalco 18533,
where shown approx. 350 x 300 mm Dalco 18501

Installation: Securely fix seat to wall with stainless steel screws to suit fixing points into masonry anchors.

Location: To Handicapped Toilets where shown on Drawings.

SUBSECTION 650 SIGNS

SIGNS GENERALLY - WOODWORK

REQUIREMENT: Provide all signs required by Statutory Authorities, fire protection systems and the like. Refer to 'SIGNBOARD - PRELIMINARIES' for job sign. Refer to 'ELECTRICAL SERVICES' for signs associated with electrical work.

IDENTIFICATION SIGNS - WOODWORK

TYPES:
Generally: Signs shall be as shown on the details for the types as specified in 'SCHEDULE OF SIGNS - SCHEDULES'.

Disabled Persons Signs: Provide signs in accordance with AS 1428. Signs to be 100 x 100 mm mounted 900 mm above floor to bottom of sign where specified in the 'SCHEDULE OF SIGNS - SCHEDULES'.

LOCATION: Locate signs in positions shown on Drawings.

FIXING: Fix signs internally with 19 mm x M6 chrome plated, pan head, self tapping screws, with a minimum of four screws per sign and spaced at 300 mm maximum centres. Minimum edge distance for screws - 25 mm.

EXIT SIGNS - WOODWORK

REQUIREMENT: Where EXIT signs are shown on drawings and where they are not nominated on Electrical Drawings as illuminated types provide perspex EXIT signs in accordance with the requirements of the Queensland Building Act.

SIGN SAMPLES - WOODWORK

REQUIREMENT: Submit samples of the following:

- Sign types scheduled in the 'SCHEDULE OF SIGNS' and Exit signs.

INCORPORATION INTO THE WORKS: Lettering to be taken from the Schedule as applicable. If the standard of sign is approved, the samples may be incorporated in the works.

SECTION 280 - GLAZING

SUBSECTION 020 DESIGN

GLASS DESIGN - GLAZING

WIND CONDITIONS: Provide glass of thicknesses sufficient to withstand the wind conditions specified:

Wall Pressure (50 m/s):
- Typical: +/- 2.1 KPa
- Within 3.6 m of building corner: - 3.0 KPa
- Internal partitions: 1.0 KPa

Sign Convention: + pressure on the external surface,
- suction on the external surface.

MINIMUM THICKNESS: Notwithstanding the design thickness of glass, do not provide glass under the following thicknesses:

Glass Generally: 5 mm.
Safety Glass: 6.5 mm.

HUMAN IMPACT: Provide safety glass required for human impact in accordance with AS 1288.

CERTIFICATION: Refer DESIGN CONDITIONS in section 461 WINDOWS for required certification.

DOOR GLASS - GLAZING

DOORS: Notwithstanding the safety glass requirements of AS 1288, provide all glass in doors as 6.5 mm thick safety glass.

SUBSECTION 120 MATERIALS

GLASS - GLAZING

STANDARD: To BS 952, Part 1, of approved manufacture, and of kinds and grades specified or shown on the Drawings.

QUALITY: Free from defects which detract from appearance or interfere with performance under normal conditions of use.

TRANSPARENT GLASS - GLAZING

TYPE: Clear float glass.

Quality: Silvering quality for mirrors, otherwise general quality.

SAFETY GLASS - GLAZING

STANDARD: To AS 2208.

LAMINATED SAFETY GLASS: Several sheets of glass bonded together by one or more plastic sheet interlayers.

Glass Type: Clear float.

Interlayer Type: Clear.

Interlayer Thickness: As required by design conditions.

Impact Resistance: To AS 2208, Grade A.

MIRRORS - GLAZING

REFLECTIVE SURFACE: A layer of chrome silver or equivalent metal.

PROTECTIVE COATINGS: One layer of copper, one layer of protective mirror-backing paint, one coat moisture sealer and 0.3 mm vinyl film. Apply moisture sealer to glass edges.

MIRROR GLASS: Glass of silvering quality backed with a reflective surface layer and protective coatings.

Glass Type: Clear float of silvering quality.

Glass Thickness: 6 mm.

Edge Finish: Round polished.

Joins: Joins in large mirrors to be butt joints with arrised edges, sealed with silicone non acetic mastic.

GLAZING MATERIALS - GLAZING

STANDARD: To AS 1288, Section 2.

GLAZING COMPOUND: Butyl rubber base.

LINSEED OIL PUTTY: A mixture of whiting and linseed oil or vegetable oils, with colouring pigments where required.

ELASTOMERIC SEALANTS:
One-part Polysulphide-based: To AS 1526
Two-part Polysulphide-based: To AS 1527
One-part Silicone, Neutral or Acetoxy Cure: To TTS-001543A

GLAZING TAPES: An approved closed cell PVC glazing tape for the particular application.

PREFORMED GASKETS (rubber or rubber-like materials): To BS 4255.

SUBSECTION 140 WORKMANSHIP

WORKMANSHIP - GLAZING

GENERALLY: To AS 1288, and the recommended practice of the Federal Glass Merchants Association of Australia.

OPERATIONS: Perform necessary operations including cutting, processing, setting, fixing, cleaning and the like.

BUILDING MOVEMENTS: Use methods such that building movements resulting from wind and thermal effects are not transferred to the glass.

MARKING - GLAZING

TEMPORARY MARKING: Use a soluble marking compound, and remove all traces on completion. Do not use lime or advertising stickers.

PERMANENT MARKING of safety glasses:
By Manufacturer: To AS 2208, Rule 2.5.

Toughened Safety Glass: Do not cut, work or permanently mark after manufacture.

CLEANING AND REPLACEMENT - GLAZING

REPLACEMENT: On completion replace damaged glass.

CLEANING GENERALLY: Use non-damaging methods. Leave the whole of the work clean, polished and in good condition.

GLASS INSTALLATION METHODS - GLAZING

STANDARD: To AS 1288, Section 7.

LAMINATED GLASS: Follow the recommendations of the manufacturers in addition to the requirements of AS 1288. Use glazing materials which do not cause deterioration or discoloration of the interlayer.

PROCESSING - GLAZING

GENERALLY: As described in BS 952, Part 2.

HOLES: Form necessary holes for fixings, equipment, access holes, speaking holes, and the like. Arris exposed edges.

FIXING MIRRORS - GLAZING

FRAME AND BACKING: Proprietary aluminium frames - Centor 'TJ' snap bead mould or equal anodized to selected colour, all round mirror, corners mitred. Bed mirror edges in continuous resilient gasket. Attach frame to background with concealed screw fixings. Seal frame to background with silicone sealant. Do not allow sealant to contact mirror back. Back mirrors with 6 mm thick tempered hardboard.

Multiple Mirrors: Where multiple mirrors are butted together, provide aluminium frames as specified to top, bottom and overall ends. Butted edges to be fixed to backing with a suitable double sided adhesive tape. Wide panels to be similarly adhered to the backing midway.

SECTION 410 - HARDWARE

SUBSECTION 001 GENERAL

WARRANTIES - HARDWARE

REQUIREMENT: Obtain and furnish to the Principal the warranties offered by the manufacturers of hardware items used in the Works.

INCLUSION: Include the warranties in the Building Maintenace Manual as specified in 'BUILDING MAINTENANCE MANUAL - PRELIMINARIES'.

SUBSECTION 100 MATERIALS AND WORKMANSHIP

LOCKS, LATCHES AND FURNITURE - HARDWARE

MERCHANTABLE QUALITY: Provide locks, latches and furniture fabricated free from flaws and defects, with parts firmly joined, and working parts accurately fitted to smooth close bearings, free from rattle or excessive play, appropriately lubricated.

INSTALLATION - HARDWARE

GENERALLY: Install hardware to manufacturer's recommendations and ensure accurate alignment. On completion leave hardware clean, undamaged, in working order, and lubricated where appropriate with the correct lubrication.

FIXINGS: Install hardware with fixings appropriate to the item and of adequate gauge and length to provide firm fixing. Match exposed fixings to the material fixed.

SECURITY: Ensure exposed fixings to door furniture are located on the inside face of exterior doors and the inside of the room being locked.

BUTT HINGES: Install mortice butt hinges in housings in joinery doorsets with fixing to AS 1909 Clause 7.6. Housing not required for non-morticing hinges.

Loose Pin Butt Hinges: If loose pin butt hinges are to be used on doors opening out, use hinges fitted with a security locking pin.

Wide Throw Hinges: Provide where necessary to achieve the door swings shown on the Drawings in the presence of obstacles, e.g. doors opening around a nib or architrave.

Lift-off Hinges: Provide 'lift-off' type to WC cubicle doors when required by regulations.

STRIKE PLATES: Use only strike plates provided with the locks specified and not 'universal' strike plates.

MORTAR GUARDS: Ensure mortar guards in steel door frames are of adequate dimensions and correct profile to enable the full extension of the lock tongue and correct operation of the locking mechanism.

DOOR STOPS: Fix door stops on the skirting or wall, as appropriate or as directed, to prevent the door furniture striking the wall or other surface or the overstressing of door closers.

PROTECTION: During the work under the Contract protect hardware as necessary to prevent damage including staining, corrosion, scratching or other defacement.

FINAL ADJUSTMENT: Ensure that hardware items, door closer settings and the like, are finally adjusted at Practical Completion.

MAINTENANCE: Obtain and furnish to the Principal the manufacturers' printed recommendations for the maintenance of the hardware items installed.

Location: Include these recommendations in the Building Maintenance Manual as specified in 'BUILDING MAINTENANCE MANUAL - PRELIMINARIES'.

SUBSECTION 414 KEYING

KEYS - HARDWARE

STAMPING: Code stamp keys as follows. Code stamp lock cylinders in an approved location.

Key	Stamping
Grand Master Keys:	GMK
Master Keys:	With the alphabetical coding noted in the "MK GROUP" column in the 'KEY CODE SCHEDULE'
Keyed Alike Keys:	Only with the numerical coding noted in the "KA GROUP" column in the 'KEY CODE SCHEDULE'
Keyed To Differ Keys:	For keys that are not the "Rivers Locking System" or other special security system, stamp with the coding nominated in the 'KD' column in the 'KEY CODE SCHEDULE'

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

KEY MATERIAL:
Pin Tumbler Locks: Nickel alloy, not brass.

Lever Locks: Malleable cast iron or mild steel.

KEYING ARRANGEMENT:
Keying Level: All schools shall be on a grandmaster keying system.

Keying Control Security: Where an existing master keying system with registered and signatory key control is in use, Contractor is to ascertain through the Superintendent its acceptability and, if acceptable, extend it to the new work. Where there is no system or it is not acceptable provide the keying system as a Lockwood "Status 6 - Serviced Level" or equal approved.

KEY CODES: Key cylinder or pin-tumbler locks to the code groups scheduled in the 'KEY CODE SCHEDULE - HARDWARE'.

EXTENSIONS TO SYSTEM: The keying systems as specified shall be capable of accommodating future extensions.

RECORDS: Obtain from the lock manufacturer or supplier, and furnish to the Principal, a record of the key coding system showing each lock type, type of key supplied, key number for re-ordering, and name of supplier.

Inclusion: Include the above keying information in the Building Maintenance Manual as specified in 'BUILDING MAINTENANCE MANUAL - PRELIMINARIES'.

PROJECT KEY: A 'project' or 'construction' key may be used only if approved, and if used shall be rendered inoperative upon Practical Completion. Otherwise any cylinders installed during construction shall be replaced immediately before Practical Completion.

NUMBER OF KEYS: Unless otherwise specified, supply keys in the following quantities:

Grandmaster Key:	2 keys
Master Keys:	2 keys per code group
Locks Keyed to Differ:	2 keys per lock except where specified otherwise.
Locks Keyed Alike:	For each 'keyed alike' code:

Number of Locks in Code Group:	Number of Keys:
2 - 4	4
5 - 10	6
11 - 50	10

DELIVERY:
Master Keys: Arrange for the manufacturer or supplier to deliver direct to the Principal.

All Other Keys: Deliver to the Principal upon Practical Completion.

REMOTE PADLOCKS - HARDWARE

ANCILLARY STRUCTURES AND ENTRY GATES: Where padlocks are required for entry gates and ancillary structures they shall be 'Keyed to Differ' and 'Grandmaster Keyed'. Keys shall be stamped with the prefix "X" followed by a numeral. The numerals shall be in sequential order commencing at "1".

SUBSECTION 630 FIXTURES

FIXTURES - HARDWARE

GENERALLY: Supply and install the hardware fixtures specified in the 'FIXTURES SCHEDULE - HARDWARE'.

SUPPORT: Provide appropriate back support, such as noggings to wall framing, for fixing hardware fixtures.

SUBSECTION 999 HARDWARE SCHEDULES

DOOR HARDWARE SCHEDULE - HARDWARE

PREPARATION: The following Door Hardware Schedules have been prepared using the catalogue reference numbers of Ogden Industries for their "Lockwood" locks, latches and furniture and the other proprietary items as listed in the legend.

ALTERNATIVES: Alternative proprietary items will be considered if offered in accordance with PROPRIETARY ITEMS - PRELIMINARIES.

LEGEND:

CODE	ITEM	DESCRIPTION
	Locks & Latches, Furniture:	"Lockwood" by Ogden Industries unless specified otherwise
	Hinges to timber doors in aluminium frames:	Stainless steel Fast Fix type hinge, with ball bearing and stainless steel pin, Doric DH19 or equal approved. Fixed pins to outward opening external doors. Fixing to aluminium frames to be reinforced with backing plates.
	Hinges to doors without door closers:	"Lane" 8580SS, 100 x 75 x 2.5 mm unless specified otherwise
	Hinges to doors with door closers:	"Lane" SB554SS, 100 x 75 x 2.5 mm. to inward opening doors "Lane" SB558SS, 100 x 75 x 2.5 mm. to outward opening doors
	Hinges to flyscreen doors:	Specified with door.
	Door Closers:	"Lockwood".
BB	Barrel Bolt:	"Lockwood" L333 x 150 to top and bottom of small leaf.
CH	Cabin Hook:	"Emro Products Pty.Ltd." No. 144 100 mm long stainless steel anti-vandal cabin hook. (to both leaves of double door).
DH	'D' Handle:	"Lane" 421144 mounted 900 mm above floor.
DS	Door Stops:	75 mm "Sylon" white. (to both leaves of double door).
DSL1	Door Seals:	"Raven" RP30 with RP13 low profile threshold.
DSL2	Door Seals:	"Raven" RP8 and RP10.
DSL3	Door seals:	"Raven" RP71
SEC	Security Lock:	MUL-T-LOCK 4 way deadlock with central Gamma cylinder lock, key operated from outside and freely openable from inside, with case hardened tips to shoots, or other equal approved multi-point deadlocking system. Door to be prepared for the MUL-T-LOCK system by a specialist firm recommended by the manufacturer of the lock system. Hinges to be "Lane" SH8580SS, 100 x 75 x 2.5 mm or equal approved heavy duty hinge with security button.
SDT	Sliding Door Track:	"Bangor" straight light single track system. Face of wall installation. Aprons - 2 x No. 141 with 2 x No. 125 adjustable nuts. Guide rollers - 3 x No. 56 with 25 x 3 steel wearing strip fitted to full width of door. Complete with clip on white metal pelmet.

DOOR HARDWARE SCHEDULE (AMENITIES BLOCK TYPE B B63) - HARDWARE

DOOR NO.	LOCK/LATCH	FURNITURE	HINGE QTY	MISCELLANEOUS ITEMS	
–					
1/1	3572X	1028/1096	3	CH, DS	
2/1	245				
2/2	Toilet Partition				
2/3	Toilet Partition				
2/4	Toilet Partition				
3/1	3572XT	1090/1093	3	CH, DS	
3/2	Toilet Partition				
5/1	Toilet Partition				
5/2	Toilet Partition				
5/3	Toilet Partition				
5/4	Toilet Partition				
5/5	245				
6/1	3572X7	1090/1093	3	CH, DS	Install hardware to ensure handle height is between 900 & 1100mm.

KEY CODE SCHEDULE (AMENITIES BLOCK TYPE B B63) - HARDWARE

DOOR NO.	KD	KA GROUP	MK GROUP	GMK	COMMENTS
1/1		48	SE	Yes	
2/1		48	SE	Yes	
3/1		48	SE	Yes	
5/5		48	SE	Yes	
6/1		48	SE	Yes	

FIXTURES SCHEDULE - HARDWARE

REQUIREMENT: Provide the following fixture items, or equal approved, in the locations and in the quantities shown on the Room Fitout Drawings or Detail Drawings:

Item:	Description:	Finish:
To all Staff and Student toilets		
Toilet roll holder (RH)	Bowscott Dualine stainless steel lockable	
Towel rail (TR)	Bobrick B674 - 19 mm stainless steel towel rail with stainless steel end fixing brackets. Length as shown on Drawings.	Bright
Soap dish	Bobrick B680	Bright
Recessed toilet roll holder	Bobrick B667	Bright
Grab rail	To profile shown on Drawings, 32 mm outside diameter stainless steel tube grade 304 fixed to wall with 60 mm clearance and matching fixings in accordance with AS1428.1.	Satin
Paper towel dispenser	Bowscott 00020	White epoxy metal
Single robe hook	Lane BVRH-3 fixed to timber rail.	Lacquer
Aluminium rail	Sylon Mini Bedscreen - 24 x 16 x 1.4 mm aluminium rail hung from 12 mm stainless steel suspension hangar at corner and fixed to walls with stainless steel screws.	Anodized
Shower curtain	Full length, double sided terylene, weighted with terylene coated chain sewn into bottom hem. Brass or plastic eyelets to top edge at 100 mm centres. Plastic rings, one to each eyelet, Lane '592' x 19 mm.	

SECTION 444 - PARTITIONS

SUBSECTION 003 PERFORMANCE

DIMENSIONAL TOLERANCES - PARTITIONS

MISALIGNMENT: Of adjoining surfaces at grid junctions: 1 mm maximum.

DEVIATION: From true grid lines and planes: 1:1000 up to 3 mm maximum.

SUBSECTION 140 WORKMANSHIP

INSTALLATION - PARTITIONS

GENERALLY: Suitably prepare the base to receive the partitions. Protect existing work from damage during the installation and make good any such damage. Provide temporary coverings if necessary. Erect the partitions to the tolerances specified, and firmly fixed.

SUBSECTION 444 PARTITION SYSTEMS

COMPRESSED FIBRE CEMENT TOILET PARTITIONS - PARTITIONS

DESCRIPTION: Partitions consisting of divisions, fronts and nibs as shown on Drawings made from high density fibre cement panels with timber doors and the necessary fixings and hardware, fixed where shown on the Drawings or specified.

Proprietary Item: Partitions to be Hardie's 'Hardicolor' system or equal approved, factory finished, supplied and installed by the manufacturer.

PANELS: Compressed fibre cement sheets 18 mm thick with square stone cut edges ground smooth and arrised, slightly nosed.

Finish: Finish with Dimet "Imperite 315" to a minimum thickness of 50 microns and "Imperite 300" polyurethane to a total minimum thickness of 75 microns in at least 2 coats.

Divisions: Other than where partition divisions are 900 x 900 mm, form in two sections jointed horizontally with an extruded anodized aluminium H section.

FIXING:
Divisions and Nibs to Walls and Fronts: Anodized aluminium channels of internal width to fit panel thickness, fixed at 300 mm maximum centres to walls with galvanized screws in patented nylon plugs and to panels with aluminium pop rivets or galvanized screws.

Divisions to Floor: Where divisions are shown as supported on brackets, provide 20 mm outside diameter stainless steel tubular support bracket satin chrome finish with floor plate and U-shaped top section, fixed to division and to concrete floor with stainless steel fixings and masonry anchors.

Fronts and Nibs to Floor: Two 55 x 6 mm brass dowels each junction.

HEAD CHANNEL: Where partition system is shown as having head channels or is required by the manufacturer, provide anodized aluminium continuous channels across fronts and screw fix to tops of fronts and nibs. Fix to wall brackets. Form the channel into a box section over doorways by snapping in a mating channel insert.

INSET BRACE: Where shown on Drawings, provide suitable inset brace to end of partition inside head channel and fix to wall to ensure stability of free-standing division.

DOORS: Where partition system is shown as having doors, form doors from 20 mm thick highly moisture resistant particleboard solid core with laminated plastic facing to all faces and edges.

DOOR HARDWARE: 2 bolt through hinges, 1 slotted indicator, 1 bolt and staple and 1 coat hook bumper as supplied by the partition manufacturer, satin chrome plated finish.

ALTERNATIVE MATERIAL: Melamine finished high density wood fibre sheeting with self edging, Laminex HD3 Decorated or equal approved, may be substituted for the compressed fibre cement sheeting. The sheeting is to be used in accordance with the manufacturers recommendations,

SECTION 450 - ROOFING

SUBSECTION 001 GENERAL

INSPECTION - ROOFING

NOTICE: Give 3 working days' notice so that the following may be inspected:

- Substructure
- Sarking
- Insulation

WARRANTY - ROOFING

REQUIREMENT: Before commencing the relevant installation, provide a written warranty indemnifying at no cost to the Principal, the complete installation against defects caused by design, fabrication or installation and the consequences thereof including weather penetration, air infiltration, physical deterioration, vermin infestation and the like, for a period of 2 years after Date of Practical Completion.

Safety Mesh: Provide a written warranty that the roof safety mesh has been installed in accordance with the recommendations of the manufacturer of the mesh and include the manufacturers identity.

INCLUSION: Include the warranties in the Building Maintenance Manual as specified in 'BUILDING MAINTENANCE MANUAL - PRELIMINARIES'.

ROOF STRUCTURE - ROOFING

PREPARATION: Prepare the roof structure so that it is satisfactory for acceptance of specified roofing before commencing fixing or laying. Ensure that fascia framing is trimmed to the roof pitch to prevent deformation of roof sheeting at eaves.

SUBSECTION 003 PERFORMANCE

PERFORMANCE CRITERIA - ROOFING

MINIMUM REQUIREMENTS: As installed, the roofing system and associated work shall remain intact and waterproof under the design conditions specified in 'DESIGN CRITERIA - PRELIMINARIES' and shall provide adequate means for dealing with condensation, capillary action, corrosion and thermal movement and shall support loads for access for normal maintenance without impairment of performance.

ANCILLARY ITEMS: Provide fixings to ancillary items such as gutters, flashings, capping, downpipes and the like, so that they will withstand the forces applicable to the design conditions specified in the 'DESIGN CRITERIA - PRELIMINARIES'.

SUBSECTION 100 MATERIALS AND WORKMANSHIP

PROTECTION - ROOFING

REQUIREMENT: Keep the roofing and rainwater system free of debris and loose material during construction, and leave them clean and unobstructed on completion. Repair all damage to the roofing and rainwater system to the manufacturer's recommendations.

Touch Up: If it is necessary to touch up minor damage to prepainted metal roofing, obtain prior approval of the method.

METAL SEPARATION - ROOFING

REQUIREMENT: Prevent direct contact between incompatible metals and between green hardwood or chemically treated timber and aluminium or coated steel.

FASTENINGS - ROOFING

FASTENING GENERALLY: Galvanized self drilling screws to AS 3566, Class 3.

FINISH: If the roof sheeting is Colorbond finish, prefinish exposed fasteners with an oven baked polymer coating to match the roofing finish.

SUBSECTION 117 INSULATION

THERMAL INSULATION - ROOFING

LOCATION: To whole of roof areas except areas such as open roofed areas, Multi-Purpose Covered Areas, covered links and the like which are not ceiled or enclosed... unless otherwise shown on Drawings.

MATERIAL:
Insulation with Foil One Side: 50 mm fibreglass roll to AS 3742 with reflective foil to AS 1903 bonded to one side. Reflective foil shall be class A, grade A, type 1 except a lesser tensile strength in the longitudinal direction of 12 kN/m and 7.5 kN/m in the transverse direction is permitted.

INSTALLATION: Press hard up under roofing and hold in place with support wire mesh.

INSULATION SUPPORT / SAFETY MESH - ROOFING

REQUIREMENT:
Generally: Under thermal insulation provide galvanized wire roof safety mesh designed as a fall protection barrier as required by the Workplace Health and Safety Act. Mesh to be equivalent that specified in AS2424 with not less than 2mm diameter wires, maximum longitudinal wire spacing 150mm and maximum cross wire spacing 300mm. Fix to purlins as recommended by the manufacturer of the safety mesh or in accordance with AS2424, and tension sufficiently to maintain the insulation in contact with the roof sheeting.

SUBSECTION 136 SHEET ROOFING

METAL ROOFING - ROOFING

DESCRIPTION: Preformed sheet and purpose made accessories, forming part of an approved proprietary metal roofing system to AS 1562.

MATERIAL: 'Spandek Hi-ten 700' 0.53 mm thick, aluminium/zinc coated steel sheet by Lysaght Brownbuilt Industries or equal approved.

FINISH: XRW Colorbond to selected colour.

METAL ROOFING INSTALLATION - ROOFING

LAYING AND FIXING: To AS 1562. Screw fix in accordance with the manufacturer's recommendations. Remove and replace any sheeting damaged during installation.

RIDGES AND EAVES: Treat ends of sheets as follows:

- Turn pans of sheets up 80 degrees at ridges and peaks and down 15 degrees at gutters and eaves with purpose-made tools;
- Where shown on drawings, under ridge flashings and eaves projections provide purpose made fillers of closed cell polyurethane fitted neatly to provide water stop and birdproofing. Locate water stops near to front edge of overflashings, adjacent to fixings and neatly to sheet profile.
- Project sheets 50 mm into gutters.

END LAPS: Sheets to be full length. End laps not permitted.

FASTENINGS: To manufacturer's recommendations and complying to AS 3566. Unless otherwise specified:

Spandek: Screw fix through crests with hex head, self-drill screw, No. 12 x 45 mm (No. 14 in the case of projects having a design wind speed of 50 m/s), EPDM seal (LBI code SHS 1245) or equal. Fix with 4 fasteners per sheet at end supports and 3 fasteners per sheet at intermediate supports. Provide additional side lap fastener at mid span of sheet.

CLEAN UP: Carefully sweep roof and gutters clear of all debris and metal particles on completion.

SUBSECTION 456 ROOF PROJECTIONS

PROJECTING ROOF LIGHTS - ROOFING

MATERIAL:
Polycarbonate Sheet: To AS 2208, free from surface abrasions.

DOMELIGHTS:
Description: Clear UV resistant polycarbonate roof dome with frame from 0.8 mm galvanized steel. Size to suit openings shown on Drawings. Fit with removable solar control panel of metal coated polyester film held in aluminium surround. Acrylic domes (whether high impact or not) will not be considered as an alternative to polycarbonate in this application. Vented dome to be complete with self supporting injection moulded 12mm grid eggcrate diffuser. Non-vented dome to be complete with self supporting acrylic pyramid pattern diffuser.

Certification: Provide a certificate, signed by the manufacturer and the installer, verifying that the roof dome(s) installed is UV resistant polycarbonate.

Ventilation: Dome to be non-vented type unless otherwise shown on Drawings. Where vented type is shown, provide clearance around solar control panel to provide equal ventilation to domelight. Where domes are shown to be fitted with exhaust fans, supply complete with fan of capacity shown.

Installation: Install as shown on details and in accordance with manufacturer's recommendations min 600 mm wide soaker lapped a further min. 150 under top sheet and min 200mm apron flashing of 0.6 mm aluminium/zinc coated steel sheet flashing to suit the roof profile. Form upstand surround sufficient to provide a 100 mm minimum clearance between the roof sheeting ridges and the top of the upstand. Curtail sheet ribs at sides to form an adequate apron. Cap and seal ends of curtailed ribs with Silicone Roof Sealant.

Where fan vented type is shown, locate controller where directed by Superintendent.

Security: Provide galvanized security mesh equal to ARC 'Weldmesh WG44KG5', galvanized to AS 1650 Type A. Fully weld mesh to a perimeter galvanised angle frame and weld frame to domelight surround.

ROOF EXHAUST FAN - ROOFING

LOCATION: Where shown on drawings to Self Help/Disabled Persons Toilets.

DESCRIPTION: A 230 mm diameter exhaust fan suitable for roof mounting and as follows:-
- minimum free air quantity 190 litres per second at 24 rev.per second maximum,
- capable of being mounted at any angle to allow installation with axis at right angles to the roof sheeting,
- motor capable of being removed from housing for maintenance,
- fitted with 300 mm diameter spigot for flexible ducting,
- without shutters,
- Vent-Axia TL9RF or approved equal.

INSTALLATION:
- Instal in roof in accordance with the manufacturer's recommendations. Flash at penetrations through roof with 0.6 mm aluminium/zinc coated steel sheet.
- Provide and instal flanged aluminium egg-crate ceiling grille with 300 mm diameter spigot and connect to fan with flexible ducting.
- For switch control see Electrical drawings.

SUBSECTION 734 ROOF PLUMBING

RAINWATER GOODS - ROOFING

GENERALLY: Provide the flashings, cappings, gutters, outlets, downpipes, and the like necessary to complete the roof system.

Metal Rainwater Goods: To AS 2179 and AS 2180.

JOINTING SHEET METAL - ROOFING

BUTT JOINTS: Make butt joints over a backing strip of the same material.

SOLDERED JOINTS: Do not solder aluminium or aluminium/zinc coated steel.

FASTENERS: (Rivets, screws and the like): Generally as specified in 'FASTENINGS - ROOFING'.

SEALING: Seal fasteners and mechanically fastened joints. Fill the holes of blind rivets with neutral-cured silicone rubber sealant.

FLASHINGS, CAPPINGS - ROOFING

GENERALLY: Flash roof junctions, upstands, abutments, and projections through the roof to AS 2904. Prefabricate where possible. Form to required shape. Notch, scribe, flute or dress down as necessary to follow profile of adjacent surfaces. Mitre angles and lap joints 150 mm in running lengths.

MATERIAL: Flashings to be from 0.6 mm thick aluminium/zinc coated steel sheet unless shown or specified otherwise.

FINISH: As specified in 'FINISH TO ROOFING ACCESSORIES - ROOFING'.

EXPANSION JOINTS: Fold the flashing back 40 mm each side of the joint leaving a 10 mm gap. Interleave an expansion cap of the same material with the folds, and welt the whole to the profile of the flashing. Set the joint in a mastic sealant. Do not use fastenings, or fasten one side of the joint only.

Expansion Joint Spacing: 6 metre maximum.

FLASHINGS TO PENETRATIONS & UPSTANDS: Flash projections above or through the roof with two-part flashings, consisting of a base flashing and a cover flashing. Provide for independent movement between the roof and the projection.

Base Flashing: Not less than 150 mm horizontal cover and 150 mm vertical cover. On the upstream side extend the horizontal cover under the next overlap of the roofing material, or seal and fasten to the roof sheeting. Elsewhere fix to the tops of the sheeting corrugations where applicable, with fastenings and washers as recommended for the roofing system.

Cover Flashing: Overlap the vertical upstand of the base flashing by not less than 100 mm.

Fixing to Masonry or Concrete: Turn 25 mm into joints or grooves, wedge at 200 mm centres with compatible material, and point up. Step in courses to the roof slope. Interleave with damp-proof course, if any.

Fixing to Pipes and the Like: Sealed with neutral-cured silicone rubber and secured with a clamping ring.

GUTTERS GENERALLY - ROOFING

REQUIREMENT: Provide accessories as necessary, including joints, bends, returns, outlets (thimbles, spigots and the like) for downpipes and overflows, stop ends, stiffening gussets at corners, supporting brackets, overstraps, and the like, purpose-made as part of the gutter system.

EAVES GUTTERS - ROOFING

GENERALLY: Min. 175 mm wide Quad gutter x 100 mm minimum deep at front with back higher than front formed from 0.6 mm thick aluminium/zinc coated steel sheet, Stramit 175 mm Quad or equal approved. Form stop ends, angles and returns. Turn down into outlets. Finish gutters square ended as detailed.

FINISH: As specified in 'FINISH TO ROOFING ACCESSORIES - ROOFING'.

BRACKETS:
Material: As for gutters.
Thickness: To AS 2180, Clause 2.
Spacing: At stop ends, and between stop ends at intervals of not more than 1200 mm.
Fixing: Screw fix to fascia.

MINIMUM FALLS: 1 in 500.

INSTALLATION:
Install gutters to overflow at front generally over the length of run. Note that gutters not fitted to meet this requirement will be rejected.

METAL FASCIA/BARGE - ROOFING

DESCRIPTION: 0.6 mm thick aluminium/zinc coated steel sheet fascia, barge or peak capping of plain profile with height on exposed face to match eaves gutter, including accessories such as end and corner trims, cappings, proprietary fixing clips and the like as detailed on Drawings.

FINISH: As specified in 'FINISH TO ROOFING ACCESSORIES - ROOFING'.

LEAF GUARDS - ROOFING

REQUIREMENT: Provide a hemispherical dome leaf guard over each downpipe of 0.9 mm galvanized wire mesh at 7 mm maximum centres, in a 1.6 mm galvanized wire frame.

FRC DOWNPIPES - ROOFING

MATERIAL: Form downpipes from 100 or 150 mm diameter standard quality proprietary fibre reinforced concrete column as shown on Drawings. Connect heads to metal downpipes and the like. Provide access opening with cover at feet and connect feet to rainwater drains with socket adaptors and a suitable jointing method.

Finish: Paint with paint system specified in 'PAINTING'.

STRAPS: 50 x 3 mm galvanized steel straps at 2 metres maximum spacing and as shown on Drawings. Fix to columns as shown on Drawings. Provide 25 mm diameter galvanized pipe spacer between downpipe and column and secure with M8 galvanized bolt.

Finish: Paint with paint system specified in 'PAINTING'.

METAL CONNECTING DOWNPIPES - ROOFING

REQUIREMENT: Provide 100 or 150 mm nominal outside diameter x 0.6 mm thick aluminium/zinc coated steel sheet rainwater downpipe from gutter to fibre reinforced concrete downpipe as shown on Drawings. Where pipe is shown as connected to fibre reinforced concrete downpipe, ensure diameter of pipe is such that it fits snugly inside and projects 100 mm into top of downpipe and silicone seal.

FLASHING: Flash around downpipe where it passes through awning roof with 0.6 mm aluminium/zinc coated steel sheet flashing as specified in 'FLASHINGS, CAPPINGS - ROOFING'.

FINISH: As specified in 'FINISH TO ROOFING ACCESSORIES - ROOFING'.

FINISH TO ROOFING ACCESSORIES - ROOFING

REQUIREMENT: Finish roofing accessories such as metal gutters, downpipes, spreaders, fascias/barges, flashings, cappings and the like as follows:

Finish: XRW Colorbond to selected colour.

SECTION 459 - SUSPENDED CEILINGS

SUBSECTION 001 GENERAL

GENERAL REQUIREMENTS - SUSPENDED CEILINGS

STANDARD: To AS 2785.

SITE COPY: Keep a copy of AS 2785 on Site.

APPROVED SUB-CONTRACTORS - SUSPENDED CEILINGS

PROPRIETARY SYSTEMS: Supply suspended ceilings as complete proprietary systems fabricated and installed by approved specialist firms.

WARRANTY - SUSPENDED CEILINGS

REQUIREMENT: Provide a written warranty indemnifying at no cost to the Principal, the complete suspended ceiling installation for a period of 5 years against defective manufacture, workmanship and installation and the consequences thereof.

INCLUSION: Include the warranty in the Building Maintenance Manual as specified in 'BUILDING MAINTENANCE MANUAL - PRELIMINARIES'.

SUBSECTION 003 PERFORMANCE

PERFORMANCE CRITERIA - SUSPENDED CEILINGS

STRENGTH: To AS 2785.

Upward Wind Load: When the ceiling system is tested in accordance with AS 2785 appendix D, it shall withstand, without the failure of any component, a load equal to 0.8 times the dead load of the system plus twice the upward wind load over the central area of the test specimen equivalent in area to 4 tiles or panels and symmetrically disposed with regard to the 4 central hangers.

Hangers: The failure of one hanger shall not cause a progressive failure.

STRUCTURE-BORNE SOUND: Structure-borne sound shall not be amplified by the ceiling system. Provide suitable means of reducing contact vibrations between structure and ceiling, for example the interposition of resilient materials or the use of mounting springs.

TEMPERATURE AND HUMIDITY EFFECTS: To AS 2785 Clause 3.5.

HEIGHT ADJUSTMENT - SUSPENDED CEILINGS

REQUIREMENT: Provide height adjustment by means of a length adjustment device to each hanger, permitting length variation of 50 mm or more.

Locking: To AS 2785 clause 4.3.

SUBSECTION 064 QUALITY CONTROL

DATA SUBMISSIONS - SUSPENDED CEILINGS

REQUIREMENT: Before commencing installation, obtain and submit the following data:

Manufacturer's Data: The suspended ceiling manufacturer's published product data for the ceiling system, including:

- technical specifications;
- recommendations for installation;
- product warranties; and
- manufacturer's test data.

Testing Authority's Reports: Showing compliance with the criteria of specified laboratory tests.

Approval of Installer: If the installation is not by the product manufacturer, and the manufacturer's warranty is conditional on his approval of the installer, the manufacturer's written approval of the specialist installing firm.

Acceptance of Substrate: The installing firm's written statement certifying that the building structure or substrate is satisfactory to receive the installation.

SUBSECTION 065 TESTING

PERFORMANCE TESTS - SUSPENDED CEILINGS

REQUIREMENT: Furnish manufacturer's certificates, of previously conducted tests, for the performance requirements specified.

TEST METHODS - SUSPENDED CEILINGS

STRENGTH: To AS 2785 Appendix D. This method shall apply to the testing of flush ceilings as well as to panel or tile ceilings.

UPWARD WIND LOAD: To AS 2785 Appendix D.

DESIGN WIND CONDITIONS: The design wind speed, terrain category and internal pressure co-efficient are as specified in 'DESIGN CRITERIA - PRELIMINARIES'.

Pressure Factor: Apply local pressure factors in accordance with Clause 3.4.5 of AS 1170 Part 2.

SUBSECTION 140 WORKMANSHIP

INSTALLATION - SUSPENDED CEILINGS

GENERALLY: Protect existing work from damage during the installation, and make good any such damage. Erect the ceilings level, on their correct alignments, and firmly fix so that under normal conditions there is no looseness or rattling of ceiling components. Avoid the faults described in Appendix B of AS 2785, by providing the relevant features there recommended.

FASTENINGS: Fastenings shall not be visible in the finished ceiling.

SERVICE ACCESS: Where shown on drawings pairs of panels and grid member between to be removable to allow access to mechanical equipment in roof space. Attach sign to removable grid member as shown on Mechanical drawings.

INSTALLING SUPPORTS - SUSPENDED CEILINGS

SUPPORT MEMBERS: Space the support members as required by the loads on the system and the type of ceiling, and allow for the installation of services and accessories shown on the Drawings, including ductwork, light fittings, diffusers and the like. Provide fixing of such items. Do not suspend from services (e.g. ductwork) unless the service has been designed to accept the ceiling load.

BRACING: Provide where necessary to prevent lateral movement.

PANEL AND SHEET INSTALLATION - SUSPENDED CEILINGS

GENERALLY: Fit panels accurately and neatly, free from air leakage and staining. Provide additional support and/or bracing to panels which are required to carry dead loads other than the panel's own weight.

PLASTERBOARD: Application to AS 2589.

SUBSECTION 300 STRUCTURE

SUSPENSION SYSTEMS - SUSPENDED CEILINGS

STANDARD: To AS 2785 Section 2.

INTERNAL SUSPENSION SYSTEMS:
Two way exposed

Tee system:	Rondo 'Balanced Tee' or equal approved.
Screw-up system:	Rondo 'Screw Up' or equal approved.
Components:	As detailed on Drawings and as required by the manufacturer.
SUSPENSION RODS:	6 mm soft galvanized rod threaded at bottom end.

SUBSECTION 459 CEILING SYSTEMS

SHEET PLASTERBOARD - SUSPENDED CEILINGS

LOCATION: Where noted as "CT2" on the Reflected Ceiling Plan including bulkhead perimeters.

MATERIAL:

13 mm plasterboard to AS 2588. OR

10 mm light weight resilient plasterboard with fibre reinforced core, Boral UNISPAN or equal approved.

Edge Type: Recessed, taped and set.

HEIGHT: As shown on Drawings.

FINISH: Paint with paint systems specified in 'PAINTING'.

SUBSECTION 480 JUNCTION DETAILS

CONTROL JOINTS - SUSPENDED CEILINGS

LOCATION: Provide control joints at junction of different systems and changes in levels. For flush jointed systems provide joints to give a maximum panel size of 10 metres x 7.2 metres. Where possible, position joints over partitions or to intersect lighting fixtures, vents or diffusers.

JOINTS: Leave 10 mm wide gap between ceiling sheets and form control joints with purpose-made control joint beads for full depth of lining with removable soft vinyl centre strip. Remove insert after topping compound sets and fill with an approved double-sided PVC closed cell foam sealant and round plastic insert.

SUBSECTION 490 TRIM

TRIM GENERALLY - SUSPENDED CEILINGS

REQUIREMENT: Provide trim at junctions with other building elements and surfaces, e.g. walls, beams, penetrations, and the like, consistent with the style, materials and finishes of the ceiling system generally unless otherwise specified.

TRIM TO PLASTERBOARD - SUSPENDED CEILINGS

REQUIREMENT: Provide corner beads, casing beads, stop beads and the like, consisting of purpose-made sections of approved material and pattern, including powder coated rolled angle trim to curved face of columns.

SERVICE PENETRATIONS - SUSPENDED CEILINGS

REQUIREMENT: Provide openings for, and fit the ceiling system up to, services elements, e.g. light fittings, ventilation outlets, detectors and the like. Trim as specified in 'TRIM GENERALLY - SUSPENDED CEILINGS'.

CEILING MANHOLE - SUSPENDED CEILINGS

CONSTRUCTION: Interior use plywood of thickness and size shown on Drawings.

SUPPORT: Trim suspension tee system to all sides of manhole as detailed on Drawings.

STIFFENING: If the manhole is of a size that the plywood will require stiffening to prevent sagging, adhere appropriate timber battens to the back of the panel in both directions.

FINISH: Paint with paint system specified in 'PAINTING'.

SERVICE HATCH - SUSPENDED CEILINGS

REQUIREMENT: Adjacent to the ceiling mounted sensor for the Demand Controlled Flushing System provide a zinc coated steel framed and hinged 450mm x 450mm service access hatch, Trafalgar or equal.

SUPPORT: Trim suspension system as necessary to support frame.

FINISH: Paint with paint system specified in 'PAINTING'. Colour to match ceiling.

SUBSECTION 500 FINISHES

PREFINISHES - SUSPENDED CEILINGS

GENERALLY: Repair damaged prefinishes by recoating either before or after installation.

SECTION 461 - WINDOWS

SUBSECTION 001 GENERAL

APPROVED SUB-CONTRACTORS - WINDOWS

PROPRIETARY SYSTEM: Supply the window system as a complete proprietary system fabricated and installed by an approved specialist firm.

SHOP DRAWINGS - WINDOWS

REQUIREMENT: Supply shop drawings showing the following information where applicable to the window installation. Where the information is in accordance with details included in the contract documents a statement to this fact may be submitted instead:

- layout (sectional plan and elevation) of the window assembly
- full size sections of members
- methods of assembly
- methods of installation, including fixings, caulking, flashing
- provision for vertical and horizontal expansion
- junctions and trim to adjoining surfaces
- hardware, fittings and accessories
- glazing details including method, tolerances, rebate depths, edge restraint.

WARRANTY - WINDOWS

REQUIREMENT: Provide a written warranty indemnifying at no cost to the Principal, the complete window system installation for a period of 2 years after Practical Completion, against defective manufacture, workmanship and installation and the consequences thereof including weather penetration, air infiltration, physical deterioration, vermin infestation and the like.

INCLUSION: Include the warranty in the Building Maintenance Manual as specified in 'BUILDING MAINTENANCE MANUAL - PRELIMINARIES'.

FABRICATION - WINDOWS

JOINTS: Make junctions so that no fixings, such as pins, screws, pressure indentations, and the like, shall be visible on exposed faces.

OPERATION: Moving parts shall operate freely and smoothly without binding or sticking, at correct tensions or operating forces.

PROTECTION: Protect surfaces during the work under the Contract as necessary to prevent damage or defacement.

Temporary Coating: Provide a temporary coating to finished metal surfaces, and remove all traces on completion of the Works.

INSTALLATION - WINDOWS

BUILDING LOADS: Install the windows by methods which ensure that neither the window frame nor the fixings will carry building loads.

METAL WINDOWS:
Building in to Masonry: By means of anchor brackets and attachments to AS 2047 Rule 2.3 and AS 2048 Rules 8, 9, 10 and 11.

Fixing to Prepared Openings: Pack with durable full-width packing behind the fixing points. Fix in accordance with the manufacturer's recommendations and in any case at spacings not exceeding 600 mm with screws not less than 2.5 mm diameter into masonry anchors in masonry structures and into the frame members of timber or metal framed structures.

ANCHOR BRACKETS: Where not shown otherwise, fabricate from mild steel of a size appropriate to the design conditions specified, bent to shape, galvanized to AS 1650, bitumen coated where in contact with aluminium.

DESIGN CONDITIONS - WINDOWS

REQUIREMENT: The window suite fixings shall be designed and installed to allow for the design wind conditions specified:

Wall Pressure (50 m/s):
- Typical: +/- 2.1 KPa
- Within 3.6 m of building corner: - 3.0 KPa
- Internal partitions: 1.0 KPa

Water Penetration Design Pressure: +/- 300 Pa

Sign Convention: + pressure on the external surface,
- suction on the external surface.

CERTIFICATION: Submit written certification that the window units supplied, including installation and glazing, conform to the relevant Building Codes and Australian Standards and to the design wind conditions specified.

SUBSECTION 410 HARDWARE

HARDWARE GENERALLY - WINDOWS

HARDWARE FOR METAL WINDOWS: To AS 2047 Rules 2.5 and 3.6.

STANDARD HARDWARE: Unless otherwise specified, provide the windows with standard hardware purpose-made by the window manufacturer for the window system, or recommended by the window manufacturer for the purpose.

SUBSECTION 461 WINDOW ASSEMBLIES

OPENINGS - WINDOWS

LOCATION OF OPENINGS AND FIXED PANELS: Locate opening sash and fixed panels in windows as shown on the Drawings.

ALUMINIUM ASSEMBLIES - WINDOWS

WINDOW SYSTEM: "Series 888 Queensland School Suite" as detailed complete with identification markings.

CONSTRUCTION: Fabricate as shown on Drawings and as follows:

SECTION THICKNESS:
Aluminium Frame Thickness: 2.2 mm min.
Aluminium Sash Thickness: 2.0 mm min.

FINISH:
Flyscreen Gauze: Black anodized.
Sliding and fixed sashes: Clear anodized.
All Other Aluminium Work except Louvres: Clear anodized.

ANODIZING THICKNESS: 20 microns.

ADJUSTABLE LOUVRES - WINDOWS

DESCRIPTION: 152 mm aluminium L.W.A. 'Breezeway' or equal approved with white injection moulded polypropylene clips. Handle to be equal to Slimline design.

The number of handles per bank of louvres and the provision of Locking Bars and Torsion Bars to be as recommended by the manufacturer for the span, number and type of blades being used. Refer requirements of Subsection 001 DESIGN CONDITIONS - WINDOWS and AS2047.

Metal Blades to be extruded aluminium.

FINISH:
Metal Blades: White baked enamel.
Frames: White powder coated. 70 to 80 microns thickness.

INSTALLATION: As detailed. Provide weather strips to heads and sills.

SUBSECTION 468 SCREENS, GRILLES

SECURITY SCREENS - WINDOWS

TYPE: "Amplimesh" aluminium security screen in aluminium channel frame.

FINISH: White powder coated screen in clear anodised frame.

EXTENT: To all louvres.

Installation: Fix to window box sections with vandal proof security screws.

SUBSECTION 480 JUNCTIONS

JUNCTIONS WITH BUILDING - WINDOWS

WATER SHEDDING: Install flashings, drips, storm moulds, caulking, pointing or the like 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.

FLASHINGS AND WEATHERINGS - WINDOWS

GENERALLY: Flashings and weather bars shall be compatible with the other materials in the installation, and coated with a non-staining compound where necessary. Include the non-staining property in any guarantee required of the assembly.

JOINTING MATERIALS - WINDOWS

TYPES: Caulk and point the window frames to the building structure, using jointing and pointing materials, including sealants, mastics, primers, gaskets, compressible fillers and the like, of the types shown on the Drawings, as recommended by the material manufacturers for the location and function, compatible when used together, and non-staining to finished surfaces. Do not use bituminous materials on absorbent surfaces. Separate the frames from the structure, using approved separation tape as shown and where required to achieve the desired separation.

ELASTOMERIC SEALANTS: To AS 1288, clause 2.2.

PRIMING: Unless priming is not recommended by the jointing material manufacturer, apply the appropriate primer to the surfaces in contact with jointing materials.

FOAMED MATERIALS: (In compressible fillers, backing rods and the like): Closed-cell or impregnated types which do not absorb water.

BOND BREAKING: Back-up materials for sealants, including backing rods and the like, shall not adhere to the sealant, or shall be faced with a non-adhering material.

SEALANT PROPORTIONS: The depth of elastomeric sealant shall not be greater than the joint width, nor less than two-thirds the joint width.

SUBSECTION 490 TRIM

TRIM GENERALLY - WINDOWS

REQUIREMENT: Provide all necessary trim angles and the like as shown on Drawings and as necessary for the complete installation in accordance with the design criteria.

SECTION 464 - DOORS

SUBSECTION 001 GENERAL

DATA SUBMISSIONS - DOORS

REQUIREMENT: For each type of metal door frame, door, doorset assembly, overhead doorset and operable room divider, submit the following:

Manufacturer's Data: Manufacturer's published product data including:

- technical specifications;
- type test or factory test data;
- recommendations for installation and service use and the like.

Testing Authority Reports: Showing compliance with the performance criteria specified.

Certification: Manufacturer's written statement certifying that the product complies with the specification, and is suitable for the specified application.

PROJECT TESTS - DOORS

TIMBER DOOR TESTS: Where the Works include more than 10 doors of any AS 2688 door type, the Superintendent may elect to perform, upon doors of that type selected by the Superintendent from doors delivered to the site for inclusion in the Works, the type tests specified in Appendices A, B and C of AS 2688 in the following ratio:

Quantity of door type supplied to the Works:	Number of tests of that door type:
10 - 50	2
51 - 100	3
101 - 200	4
More than 200	3%

Contractor's Responsibility: Provide space for testing, handling of selected doors and general attendance on the Superintendent and his testing agent.

Rejection: For each type tested, if any of the applicable tests is failed by two doors or one-third the number of doors tested, whichever is the greater, then all doors of that type are liable to rejection.

SUBSECTION 100 MATERIALS AND WORKMANSHIP

PROTECTION - DOORS

SURFACES: Protect surfaces during the course of the Works as necessary to prevent damage or defacement.

Temporary Coating: On or before completion of the Works, or before joining up to other services, remove all traces of any temporary coatings used as a means of protection.

GLAZING - DOORS

PREGLAZING: Supply glazed doors preglazed unless otherwise specified.

GLASS TYPES, THICKNESSES, AND GLAZING METHOD: Specified in the 'GLAZING' Section.

FLUSH DOORS IN-WINDOW FRAME INSTALLATION - DOORS

WINDOW AND DOOR ASSEMBLIES: Where doors are shown or specified to be installed in window frames as part of a combined window and door assembly, the door frame shall be as specified in 'WINDOWS' for the relevant window type, plus appropriate modifications and accessories necessary for the door installation, including door seat rebates, strike plates, buffers, and the like, and provision for fixing specified hardware such as hinges, door closers and the like.

SUBSECTION 360 DOOR FRAMES

STEEL DOOR FRAMES - DOORS

DESCRIPTION: Frames assembled from steel sections, including necessary accessories such as buffers, strike plates, spreaders, mortar guards, switch boxes, fixing ties or brackets, cavity flashing and the like, with suitable provision for fixing specified hardware; prefinished with protective coatings, built in or fixed to prepared openings.

SECTIONS: Form from coated steel sheet to AS 1397. Incorporate rebates or double rebates where required.

ASSEMBLY METHODS:
Welded: Shop assembly by continuous welding. Grind the welds smooth and cold galvanize the welded joints before shop priming.

SHOP PRIMING: Shop prime the sections for the specified painting system.

ACCESSORIES: Provide the following as required by the installation:

Spreader: Removable spreader bar for frames to be built into masonry construction.

Hardware Accessories: Mortar guards, reinforcing plates and the like for the specified hardware. Ensure mortar guards are of adequate dimensions and correct profile to enable the full extension of the lock tongue and correct operation of the locking mechanism.

Strike Plates: Use only strike plates provided with the locks specified and not 'universal' strike plates.

Buffers: Two resilient grummet buffers.

Cavity Flashing: For external frames in cavity and veneer masonry.

HARDWARE: Make suitable provision for fixing the hardware specified for the relevant doorsets including hinges, closers and the like.

Hinges: Screw fix.

INSTALLATION:
Building in to Masonry and Concrete: By means of galvanized rod ties attached to stiles at 400 mm maximum centres. Build in and grout up solid.

Fixing to Stud Frames: By means of galvanized brackets clipped to frame stiles at 600 mm maximum centres and fastened to the stud frame as recommended by the manufacturer.

Fixing to Steel Columns: Fully continuous weld both sides of frame to columns.

TYPE: SF1

SECTION:
Profile: Single rebate 'C' section.

Width Overall: 120 mm minimum.

Width between Back Flanges: 90 mm.

Width of Architrave Faces: 38 mm minimum.

Width of Rebate for Door: 40 mm minimum to suit door.

Depth of Door Seat Rebate: 25 mm minimum.

Steel Sheet and Thickness: 1.6 mm aluminium/zinc coated furniture steel.

HARDWARE: As specified in 'HARDWARE'.

SUBSECTION 464 DOORSET ASSEMBLIES

FLUSH DOORS - DOORS

CONSTRUCTION: To the appropriate section of AS 2688. Form rebates if required on edges of doors in solid matching edge strips.

DOOR THICKNESS: 35 mm generally, 40 mm for external doors, internal doors in aluminium frame, where door width exceeds 900 mm, or where noted in schedule.

EDGE STRIPS: To AS 2688, thickness 12 mm to all edges.

FLUSH DOOR TYPES:
Solid Core: To AS 2688 Section 6 with particle board core and with facing as scheduled in the 'DOOR SCHEDULE'.

Cell Core: To AS 2688 Section 3, with core of cellular paper or wood curls, and with facing as scheduled in the 'DOOR SCHEDULE'.

FACING:
Plywood: Exterior use plywood to both faces of door having "Hoop Pine" veneer, quality B, for paint finish.

Hardboard: Standard Type GP.

Steel Sheet: 1 mm thick aluminium/zinc coated steel sheet glued to both faces with caps of the same material to all edges.

ADDITIONAL REQUIREMENTS: For cell core flush doors, provide additional frame material where necessary to take specified hardware, fastenings, grooves and the like.
All flush timber doors: Set locks at 900mm high to the centerline of the lock case.

PRIMING: Prime timber doors as specified in 'PAINTING', on all surfaces, including top and bottom edges, before hanging.

FINISH: Paint with paint system specified in 'PAINTING'.

INSERTS IN FLUSH DOORS - DOORS

GRILLES:
Description: Fixed aluminium louvre blades equal to "Dragon" size as specified in 'DOOR SCHEDULE - DOORS'.

Finish: Clear anodised.

LOUVRE ARRANGEMENT:
Horizontal: Louvres span between frame stiles or mullions.

FRAMES: Include the necessary internal and external corners, beads, brackets, anchors and the like accessories as required by the installation. Fix louvres from the inside to prevent unauthorized removal.

SINGLE WELDMESH GATE (WG1) - DOORS

CONSTRUCTION AND MEMBER SIZES: As detailed on Drawings.

MESH: Galvanized mesh welded to frame at each cross wire.

HARDWARE:
Hinges: As detailed on Drawings.

Padlock: Specified in 'DOOR HARDWARE SCHEDULE - HARDWARE'.

Padbolt: 12 mm diameter galvanized padbolt to mid-rail with galvanized jamb plate fixed to masonry with masonry anchors as detailed. Provide galvanized hold open bracket to receive bolt and fix to masonry with masonry anchors.

INSTALLATION: As detailed on Drawings.

FINISH: Hot dip galvanize after fabrication.

SIDE PANEL: Construct side panel to match gate and fix as detailed on Drawings as detailed on Drawings.

FRAME: Full perimeter frame mitred and welded at angles.

SUBSECTION 999 DOOR SCHEDULES

LEGEND TO DOOR SCHEDULE - DOORS

FRAMES:

CODE	FRAME TYPE
AF1	Aluminium
SF1	Steel, single rebate
SF2	Steel, double rebate
SF3	Steel, special
TF1	Timber with stop
TF2	Timber without stop

DOORS:

CODE	DOOR TYPE	FACING MATERIAL
SC1	Solid core	Exterior use plywood
SC2	Solid core	Hardboard
SC3	Solid core	Exterior use plywood steel faced
SC4	Solid core	Exterior use plywood steel faced with screwed/welded on steel angle/tee meeting stiles
CC1	Cell core	Exterior use plywood
CC2	Cell core	Hardboard
AC	Acoustic door	
AS1	Glazed aluminium sliding door	
AS2	Glazed aluminium hung door	
AA1	Single accordion	
AA2	Double accordion	
AA3	Accordion acoustic (STC33)	
CG	Single crimp mesh gate	
FSD	Flyscreen door	
MD	Side hung metal doorset	Colorbond aluminium/zinc coated steel
RG	Roller grille	
RS1	Roller shutter	
RS2	Heavy duty roller shutter	
SRD	Strongroom doorset	
WG1	Single weldmesh gate	

DOOR SCHEDULE (AMENITIES TYPE "B" B63) - DOORS

Door No:	Nom. Door Leaf Size(s):	Frame Type:	Door Type:	Panel Over:	Remarks:
1/1	2400 x 720	SF1	SC1	No	Project frame allow 180 deg open
2/1	2400 x 900		WG1		
	2400 x 800				Fixed side panel to match gate
2/2	1800 x 600	Toilet Partition			
2/3	1800 x 600	Toilet Partition			
2/4	1800 x 600	Toilet Partition			
3/1	2400 x 820	SF1	SC1	No	
3/2	1800 x 600	Toilet Partition			
5/1	1800 x 600	Toilet Partition			
5/2	1800 x 600	Toilet Partition			
5/3	1800 x 600	Toilet Partition			
5/4	1800 x 600	Toilet Partition			
5/5	2400 x 900		WG1		
	2400 x 800				Fixed side panel to match gate
6/1	2040 x 950	SF1	SC1	No	Grilles - 2no. 600 x 150mm. One mounted at top of door, the other at bottom of door.

SECTION 552 - TILING

SUBSECTION 001 GENERAL

SAMPLES - TILING

REQUIREMENT: Submit samples of each type of tile specified, illustrating the extremes and average of the ranges of properties available in tiles complying with the Specification.

SUBSECTION 120 MATERIALS

MATERIALS GENERALLY - TILING

SAND: To AS CA27, graded to Table 1 of the Appendix to that code.

CEMENT: To AS 3972, Type GP - general purpose Portland cement.

WHITE CEMENT: To AS 3972, Type GP, with iron salts content not exceeding 1%.

LIME: To AS 1672.

WATER: To AS CA27.

PIGMENTS: To BS 1014, manufactured either synthetically or from naturally occurring mineral ores, resistant to lime bloom or efflorescence.

Pigment Proportion: Not exceeding 5% by weight of cement in any mix, unless otherwise approved.

ADHESIVES - TILING

STANDARD: To AS 2358

GENERALLY: Use adhesives compatible with the materials and surfaces to be adhered and in accordance with the adhesive manufacturer's recommendations for the conditions of use.

TYPE: Two part liquid/powder waterproof, flexible adhesive equal to 'Resaflex' by Australian Building Adhesives Pty. Ltd.

PRECAUTION: Clean out tile joints before adhesive sets to prevent black adhesive show-through.

GROUT - TILING

PROPRIETARY GROUT: A proprietary product, compatible with the type of adhesive used, mixed and used to manufacturer's recommendations. Equal to "Abacolor" mixed with "ABA Flexible Waterproof Grout Additive" by Australian Building Adhesives Pty. Ltd.

SEALANTS - TILING

REQUIREMENT: Use silicone rubber sealant of approved manufacture compatabile with the application and the service condition. If priming of the surfaces is recommended by the sealant manufacturer, apply the appropriate primer.

SUBSECTION 134 TILES

TILES GENERALLY - TILING

CRITERIA: Tiles shall be even and regular in size, true to plane, free of warps, cracks, crazing, discolouration or defects, and shall have undamaged arrises.

CERAMIC TILES: To BS 6431.

EXPOSED EDGES: Glazed tiles for use in positions where the edge is exposed shall be purpose-made border tiles with the exposed edge glazed to match the tile face.

TILE TYPE:

Wall Tiles & Splashback Tiles: 100 x 100 x 5.5 mm Johnson Tiles "Waringa Terracotta Micros" Gloss or equal approved.

Floor Tiles: Unglazed fully vitrified tiles, "Simons" Bretagne or equal approved with skirting tile to match as detailed on the drawings.

ACCESSORIES - TILING

GENERALLY: Provide tile accessories such as round edge tiles and coved skirting tiles, matching the surrounding tiles as to composition, colour and finish, unless otherwise specified or scheduled.

COVES, NOSINGS, SKIRTINGS, AND THE LIKE: Where necessary include matching stop ends, internal and external angle tiles, and the like, moulded for that purpose.

SUBSECTION 140 WORKMANSHIP

WORKMANSHIP GENERALLY - TILING

MANUFACTURERS' RECOMMENDATIONS: Use manufactured items including tiles, adhesives, grout, sealant, caulking compound and the like in accordance with the manufacturers' recommendations.

CUTTING AND LAYING: Lay tiles in accordance with BS 6431. Cut tiles neatly to fit around fixtures and fittings, and at margins where necessary. Drill holes without damaging tile faces. Rub edges smooth without chipping. Return tiles into sills, reveals, openings and where walls are packed out to avoid circular corner columns. Butt up to returns, frames, fittings, and other finishes. Strike and point up beds where exposed.

FALLS AND LEVELS: Grade floor tiling to even and correct falls where required (e.g. to floor wastes). Make level junctions with walls. Where falls are not required, lay level.

FINISHED LEVELS: Unless otherwise specified, maintain finished floor levels without step or break at changes of floor finish, including carpet.

DEVIATION: Maximum deviation of the finished floor level between points of contact under a 2m straight edge laid in any direction on an area of uniform grade: 1:300 or 3mm, whichever is the lesser.

SETTING OUT - TILING

BOND: Stack bond with joints accurately aligned in both directions, level and plumb.

MARGINS: Use only whole tiles at margins where practicable, otherwise set out to give equal margins of cut tiles unless otherwise specified or shown. If margins less than half tile width are unavoidable, locate the cut tiles where they are least conspicuous.

FIXTURES: Before tiling ensure that fixtures interrupting the tile surface, such as plumbing and electrical items, boxes, access panels, and the like are accurately positioned in their designed or optimum locations relative to the tile layout. Where possible position tiles so that holes for fixtures and the like occur at the intersection of horizontal and vertical joints or on the centre lines of tiles. Continue tiling fully behind WC pedestals and cisterns.

PREPARATION OF TILES - TILING

ADHESIVE BEDDING: Adhesive fix all tiling. Fix tiles dry; do not soak unless recommended by the adhesive and tile manufacturers.

BEDDING GENERALLY - TILING

REQUIREMENT: Bedding methods and materials shall be appropriate to the tile, the background, the conditions of service, and such as to leave the tile firmly and solidly bedded in the bedding material and adhered to the background.

BEDDING THICKNESS - TILING

THIN BED: Minimum thickness 1.5 mm, maximum 3 mm. May be used when the background deviation does not exceed 3 mm when tested with a 2000 mm straight edge. The entire tile back shall be covered with adhesive when the tile is bedded.

THICK BED: Minimum thickness 3 mm, maximum 12 mm. Use on backgrounds with deviations up to 6 mm when tested with a 2000 mm straight edge.

TILE JOINTS - TILING

JOINT WIDTHS: Set out tiles to give uniform joint widths within the following limits:

Internal Ceramic Wall Tiling: Minimum 1.6 mm - maximum 3 mm.

Vitrified floor tiles: Minimum 3 mm - maximum 5 mm.

GROUTING - TILING

GENERALLY: Before grouting, obtain approval for the proposed grouting methods and materials. Commence grouting as soon as practicable after bedding has set. Clean out joints as necessary before grouting. Protect vulnerable tile faces (e.g. soft glazes) from abrasive grouts, where necessary by masking.

GROUTING METHODS: Fill the joints solid and tool flush. Clean off surplus grout. Wash down when grout has set. When grout is dry, polish the tile surface with a clean cloth.

EDGES OF TILES: Grout exposed edge joints as specified for the face joints.

CLEANING AND PROTECTION - TILING

GENERALLY: Keep the work clean as it proceeds. Protect finished work from damage. Keep traffic off floors until the bedding has set and attained its working strength.

ON COMPLETION: Remove and replace damaged or defective work. Clean the tiled surface with an appropriate tile-cleaning agent, and polish wall tiles. Leave the whole of the work clean and free from blemishes.

SUBSECTION 151 SUBSTRATE PREPARATION

SUBSTRATES GENERALLY - TILING

DEFINITIONS:
Substrate: The building element to which the tiles are to be adhered.

PREPARATION: Suitably prepare substrates to receive the adhesive, including but not necessarily limited to the following:

- remove oils, greases, retarders, loose material and the like and leave the surface dust free and clean;
- allow sufficient time for initial drying out and shrinkage to take place in cementitious substrates before tiling;
- where tiles are to be adhered to composition boards, ensure the board is suitable for such application and prepare in accordance with the manufacturer's recommendations for tiling;
- prime fibre cement surfaces if required by the fibre cement manufacturer, the adhesive manufacturer or the tile manufacturer.
- provide a screed where necessary to obtain the required falls.

SUBSECTION 580 JUNCTIONS

MOVEMENT JOINT MATERIALS - TILING

FOAMED MATERIALS: (In compressible fillers, backing rods and the like): Closed-cell or impregnated types which do not absorb water.

BOND BREAKING: Back-up materials for sealants, including backing rods and the like, shall not adhere to the sealant, or shall be faced with a non-adhering material.

PRIMING: Unless priming is not recommended by the jointing material manufacturer, apply the appropriate primer to the cleaned joint edges in contact with jointing materials.

SEALANTS: Use sealants of approved manufacture, compatible with the application and service conditions, and of the types specified.

CAULKED JOINTS - TILING

PROVISION: Provide caulked joints as follows:

- at junction of tiled walls;
- at junction of wall tiles with coved vinyl flooring;
- around fixtures interrupting the tile surface, for example pipes, brackets, bolts, nibs, and the like.

SIZE:
Width: 5 mm.
Depth: Equal to the tile thickness.

SEALANT APPLICATION: Fill the joint with an approved sealant and finish neatly flush with the tile surface.

SECTION 553 - RESILIENT FINISHES

SUBSECTION 001 GENERAL

DEFINITIONS - RESILIENT FINISHES

STANDARD: To AS 1884, clause 1.3.

Substrate: The building element to which the finish is to be applied. Includes 'subfloor' as defined in AS 1884 clause 1.3.1.

APPROVED SUB-CONTRACTORS - RESILIENT FINISHES

REQUIREMENT: Obtain specified materials from approved suppliers and have them installed by approved specialist sub-contractors recommended by the materials manufacturers.

INSPECTION - RESILIENT FINISHES

REQUIREMENT: Give 2 working days' notice so that the following may be inspected, as applicable:

- completion of base preparation (before applying base coat or laying sheet);
- surface prior to application of each coat (multi-coat work);
- finished surface before applying sealers or polishes;
- completed installation.

SAMPLES - RESILIENT FINISHES

REQUIREMENT: Submit the samples listed below:

RESILIENT FINISHES: Sufficient samples of each type of finish specified to illustrate the range of available properties complying with the Specification, including colour, texture, degree of lustre, thickness, edge finish, and the like.

ACCESSORIES: Including covings, skirtings, protection strips, and the like: One sample piece of each type, minimum 300 mm long.

JOINTING: A welded joint minimum 300 mm long.

LABELLING: Label each sample, giving brand and product name, manufacturer's code reference (including the code for each coat of multi-coat work), and the like.

TECHNICAL DATA: Submit with each sample the manufacturer's technical data and recommendations for its application in the project, including, where relevant:

- composition, thickness, finish and time between coats for multi-coat work;
- thickness and width of sheet;
- adhesive and jointing method;
- resistance to wear, indentation, chemicals, light, fire, and the like;
- flexibility and bending strength;
- maintenance requirements, short and long term.

HEALTH AND SAFETY - RESILIENT FINISHES

PRECAUTIONS: Before commencing work advise the Superintendent of the precautions proposed to be taken to avoid risks to health and safety and to comply with the relevant statutory requirements. Do not perform any work unless the necessary precautions have been taken.

TESTING GENERALLY - RESILIENT FINISHES

MATERIALS TESTS: Furnish satisfactory evidence in the form of reports from independent testing authorities, that materials referenced to Australian Standards have passed the tests required for compliance with the relevant Standard.

REJECTION: If, during the progress of the Works, materials or workmanship are found by testing or other means to be not in accordance with the Contract, clean off and replace the whole of the relevant executed work.

WARRANTIES - RESILIENT FINISHES

REQUIREMENT: For each type of resilient finish specified, furnish the manufacturer's warranty of the materials and process, and the applicator's warranty of the workmanship and application.

MANUFACTURER'S WARRANTY TERMS: Removal and replacement of all faulty material.

APPLICATOR'S WARRANTY TERMS: Removal and relaying of all faulty work.

WARRANTY PERIOD: 2 years.

SUBSECTION 120 MATERIALS

MATERIALS GENERALLY - RESILIENT FINISHES

IDENTIFICATION: Deliver materials to the site in the manufacturer's original closed or sealed containers or packages legibly marked with the following information where applicable:

- Manufacturer's identification, product brand name, product type, and product reference code and batch number;
- Date of manufacture;
- Material composition and characteristics such as volatility, flash point, light fastness, colour, pattern and the like;
- Dimensions and quantity;
- Handling and installation instructions.

EDGES OF SHEETS: Firm, unchipped, machine-cut accurately to size and square to the face.

ADHESIVES - RESILIENT FINISHES

STANDARD: To AS 1884, clause 1.4.2 and AS 3553.

SUBSECTION 138 MATERIALS - SHEET

SAFETY FLOORING - RESILIENT FINISHES

MATERIAL: Floor finishes indicated as "safety flooring" finish to be a plasticised vinyl sheet combining silicon carbide grains and quartz aggregates, Altro Safety Flooring "Impressionist 25" or equal approved.

THICKNESS: 2.5 mm.

JOINTING AND INSTALLATION: See sub-section SAFETY FLOORING INSTALLATION - RESILIENT FINISHES.

SUBSECTION 140 WORKMANSHIP

SUBSTRATE PREPARATION - RESILIENT FINISHES

STANDARD: To AS 1884 Section 2.

CONCRETE SUBSTRATES:
Test for Dryness: (To AS 1884 Appendix A): As required for the particular application.

Finish: Confer with the specialist sub-contractor of each finish to determine the nature of surface required prior to pouring slabs and ensure the finished slab meets that requirement.

Surface: To AS 1884 clause 2.1.1.3. Take such corrective action as may be necessary to achieve the specified tolerances, or provide a trowelled underlay to AS 1884 clause 1.4.3.

Repairs: Remove protrusions and fill concave imperfections: To AS 1884 clause 2.1.1.4 and as specified in 'SURFACE REPAIR - CONCRETE'.

Etching: Acid etch concrete surfaces to receive epoxy base coats with a solution of hydrochloric acid and water in equal parts, applied at 0.5 litres per square metre. After reaction, wash concrete and allow to dry.

FIXING CONDITIONS - RESILIENT FINISHES

STANDARD: To AS 1884 Section 3.

- RESILIENT FINISHES

GENERALLY: Keep the surface clean as the work proceeds. Clean the finished surface by appropriate methods, as recommended by the resilient finish manufacturer where applicable. Leave the finished surface clean on completion.

PROTECTION - RESILIENT FINISHES

GENERALLY: Keep traffic off finished work until bonding has set or for 24 hours after laying, whichever period is the longer. Do not allow water in contact with the finish for 7 days. Leave the finish undamaged on completion.

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

SUBSECTION 143 INSTALLATION

SAFETY FLOORING INSTALLATION - RESILIENT FINISHES

SUB-CONTRACTOR: Have the work carried out by specialist tradesmen recommended by the manufacturer.

INSTALLATION: Use only adhesives recommended by the manufacturer for the particular application. Lay sheets to falls to floor wastes where shown on Drawings. Carry out the installation in accordance with the manufacturer's recommendations.

JOINTING: Form joints by hot welding as specified in 'WELDED JOINTS - RESILIENT FINISHES'.

Carry sheeting into outlets and fix as detailed by manufacturer. Seal at junctions with other materials with 'Altromastic' special sealing compound.

COVING: Carry sheet 125 mm up wall to form coved skirting (100 mm visible). Use 'Altro' cove former to form even radius at floor/wall junction.

FINISHING: Allow 48 hours to dry. Sweep clean and scrub with commercial grade floor cleaner in accordance with the manufacturer's recommendations.

WELDED JOINTS - RESILIENT FINISHES

HEAT WELDING: After fixing, groove the seams with a grooving tool and weld joints with matching filler rod and hot air welding gun. When the weld rod has cooled, trim off flush. All to be in accordance with the recommendations of the manufacturer of the resilient finish.

COLD WELDING: Chemically weld the joint as recommended by the manufacturer of the resilient finish. Leave join clean and level.

SUBSECTION 159 MAINTENANCE

MAINTENANCE RECOMMENDATIONS - RESILIENT FINISHES

CONTRACT MAINTENANCE: Prior to Practical Completion of the Contract, comply with AS 1884, Section 4, and the resilient finish manufacturer's recommendations for the care and maintenance of the completed finish.

MAINTENANCE MANUAL: Provide a maintenance manual containing a technical specification of the resilient finishes installations and setting out the manufacturers' recommendations, for their use, care and maintenance. Include the names and addresses of the suppliers and manufacturers of each component.

Inclusion: Include the maintenance manual in the Building Maintenance Manual as specified in 'BUILDING MAINTENANCE MANUAL - PRELIMINARIES'.

SUBSECTION 480 JUNCTION DETAILS

EDGE STRIP - RESILIENT FINISHES

SHEET: Unless otherwise specified, provide a PVC cover strip at junctions between different floor finishes and as protection strips to exposed edges of sheet. Where junctions occur in doorways, make the junction directly beneath the closed door.

PVC Cover Strip: Feather-edge strip matching the floor finish, fixed with contact adhesive.

SUBSECTION 490 TRIM

COVES - RESILIENT FINISHES

SOLID BACKING: Provide a solid backing for coves to be formed in the resilient finish material with a radius not less than 25 mm.

SECTION 570 - PAINTING

SUBSECTION 001 GENERAL

GPC STANDARDS - PAINTING

GPC: The Government Paint Committee (GPC) is a duly constituted authority representing both federal and state governments and their instrumentalities for the purpose of specifying standards for paint materials and listing approved products.

PAINT SYSTEM NUMBERS: Paint types specified in paint systems or protective coating systems by GPC specification numbers shall conform to the appropriate GPC specification.

RECORD OF SUPPLY: Provide a manufacturer's 'Record of Supply' complying with GPC-D-131 with each batch of paint over 20 litres supplied subsequently throughout the Contract.

DEFINITIONS - PAINTING

STANDARD: To AS 2310 unless otherwise specified.

SAMPLES - PAINTING

COATED SAMPLE: Before commencing painting, provide, on a representative portion of substrate(s), 1 m^2 samples of the total coating system which meets the specified requirements for colour, gloss and texture. The sample shall include examples of casing beads and taped and set joints and edges to linings. Coating system physical properties shall also be examined in accordance with AS 1580 at this stage if considered necessary by the Superintendent.

Location: On site in location as approved.

TESTS - PAINTING

STANDARD: To AS 1580 and ASTM G62, as applicable.

REQUIRED TESTS: Tests shall be carried out by the Government Chemical Laboratory or a NATA laboratory registered to carry out the required tests. The costs of testing shall be borne by the Principal. Co-operate with the Superintendent in the testing of wet and dry film thickness.

REJECTION: Materials which fail to meet the requirements of the Health Act, the Department of Administrative Services, the GPC, or the manufacturer shall be removed from the site and any paintwork already executed with these paints shall be removed and the surfaces recoated with approved paints, free of cost to the Principal. Costs of additional tests and samples will be paid by the Contractor.

MATERIALS USED - PAINTING

INCLUSION: Include the brand name and type of paint, used for each paint system, in the Building Maintenance Manual, as specified in 'BUILDING MAINTENANCE MANUAL - PRELIMINARIES'.

INSPECTION - PAINTING

NOTICE: Give 2 working days' notice so that inspection of work may be made at the following stages:

- Completion of preparation of surfaces;
- After application of prime or sealer coats;
- After application of undercoat;
- After application of each subsequent coat.

SUBSECTION 120 MATERIALS

MATERIALS GENERALLY - PAINTING

PAINT MATERIALS: Use only premium quality lines from approved manufacturers. The containers of materials specified by GPC numbers shall be labelled as such by the manufacturer.

PROPRIETARY MATERIALS: Notify the proposed brand of paint and paint line prior to placing orders. Change neither the brand nor the paint line without approval.

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

DELIVERY: Deliver paints to the Site in the manufacturer's labelled and unopened containers.

FREEDOM FROM TOXIC INGREDIENTS: Paint shall not be a Schedule 1 paint within the meaning of, and in specified human contact areas prohibited by, the Uniform Paint Standard.

THINNERS: Use only the type and quantity recommended by the paint manufacturer.

TINTING BY MANUFACTURER: Colour tinting shall be by the manufacturer unless otherwise approved.

TINTING BY CONTRACTOR: Add tinters or stainers only if approved, and only if in accordance with the manufacturer's recommendations as to type, quality and tinting formula, and provided the tinting produces the required colour without detriment to the durability or aesthetic performance of the product.

PUTTY: Oil-based or polymeric based. Putty may be stained to match the colour of the substrate.

COLOUR SELECTION - PAINTING

SELECTION: Colour selections are included in the 'SCHEDULE OF COLOURS' in the Specification.

GLOSS LEVEL - PAINTING

DEFINITIONS: 'Flat', 'low-gloss' 'semi-gloss' 'gloss' and 'full-gloss': To AS 2310, and AS 2311, clause 4.1.

PRIMERS, SEALERS, UNDERCOATS - PAINTING

REQUIREMENT: Ensure that primers, sealers and undercoats are suitable for the substrate and compatible with the finish coat and each other.

SUBSECTION 140 WORKMANSHIP

WORKMANSHIP GENERALLY - PAINTING

ORDER OF WORK: Unless otherwise specified, before commencing to paint, complete the work of all other trades as far as is practicable within the area to be painted, except for installation of fittings and laying flooring materials.

PAINTING CONDITIONS: Do not paint in dusty conditions, or otherwise unsuitable weather. Do not paint when the relative humidity exceeds 85%, or when the surface temperature of the substrate is less than 10 degrees C or more than 50 degrees C, unless the paint is suitable and recommended for such conditions.

PROTECTION: Before painting in any section of the Works, clean the area out and protect it against dust entry. Use drop sheets and masking wherever necessary to protect finished work or other surfaces liable to damage during painting. Repair or replace any accessories or surfaces that are damaged directly or indirectly as a result of painting.

MOVABLE FITTINGS: Remove door furniture, switch plates, light fittings and the like and replace on completion of painting.

LIGHT LEVELS: During preparation of surfaces, painting, and inspection, maintain light levels such that the luminance (photometric brightness) of the surface is at least equal to that produced under daylight and/or maximum permanent artificial illumination conditions.

VENTILATION: Adequately ventilate the areas in which painting is being carried out.

PAINT STORAGE AND WASTE DISPOSAL: Store and prepare paint and related materials in the area assigned by the Superintendent. Take necessary precautions to prevent fire and accumulation of solvent fumes. Remove paint-soiled rags, waste, and the like at the end of each day's work or store in airtight metal containers under water. Remove empty cans and other debris arising out of the painting work from the site upon completion of work.

PAINT PREPARATION: Mix and apply paint in accordance with the manufacturer's recommendations. Do not mix paint in areas or on surfaces liable to damage from spillage.

TOUCH UP: Clean off marks, paint spots and stains throughout, restoring damaged surfaces to their original condition. Where necessary for aesthetic reasons, touch up damaged paint work or misses only with the paint batch used in the original application.

EQUIPMENT - PAINTING

STANDARDS: To AS 2311 Section 6 and AS 2312 Section 8 as applicable.

SPRAY EQUIPMENT: Use appropriate and properly maintained conventional or airless spray equipment of such capacity as to satisfactorily atomise the paint being applied when fitted with the correct nozzle/tip assembly, without having to thin beyond the maximum amount recommended by the manufacturer. The air supply shall be free from oil, water and other contaminants.

DROP SHEETS: Use drop sheets of adequate size and thickness to prevent marking of areas requiring protection.

'WET PAINT' WARNING: Place notices conspicuously and do not remove until paint is dry, unless approval is given and precautions are taken to deny access to all but painting staff.

APPLICATION - PAINTING

STANDARDS: To AS 2311 Section 6 and AS 2312 Section 8 as applicable.

PROCEDURE: Apply paint and related materials in accordance with the manufacturer's recommendations. Cut in between different finishing coats neatly in straight lines unless otherwise specified. Allow each coat to harden for the drying time (or time between coats) recommended by the manufacturer.

SPRAY PAINTING: Spray painting will be permitted only where expressly specified.

SANDING: Where recommended by the manufacturer, sand between coats from top to bottom and dust down before recoating.

TINTED UNDERCOATS: Except for stains and other clear or translucent finishes each coating shall be of a noticeably different tint from the preceding coat with each coat approaching more closely the finished colour.

NUMBER OF COATS: If more coats, than are specified, are necessary for the following purposes:
- thinned prime or seal coats on porous surfaces consistent with the paint manufacturer's recommendations;
- finishing coats to achieve required colour, opacity, texture or film thickness;

and/or tinted undercoats are used; then they shall be at the Contractor's expense.

FINISH: Ensure each coat of paint is uniform in colour, gloss, thickness and texture and free of runs, sags, blisters, or other discontinuities. The standard of workmanship with regard to final colour, gloss and texture shall match the sample area specified in SAMPLES - PAINTING.

SUBSECTION 530 SUBSTRATES

SUBSTRATE PREPARATION - PAINTING

STANDARDS: To AS 2311 Sections 2 and 3, and AS 2312 Section 5, as applicable.

GENERALLY: Prepare substrates to receive the systems specified. Procedures shall include, but not necessarily be limited to, the following:

Cleaning: Clean down and remove oil, grease and loose foreign matter, including laitance, efflorescence, moss, lichen, mould, mildew, dirt and corrosion products, in a manner which causes neither undue damage to the substrate nor damage to, or contamination of, the surroundings.

Glossy surfaces: Adequately scuff and/or solvent or chemically etch as appropriate to provide satisfactory adhesion for subsequent paint coats.

Filling: Fill cracks and holes with fillers, sealants or grouting cements as appropriate for the finishing system and substrate, and sand smooth. Where surfaces are filled or repaired, ensure the texture and alignment of the repair matches the adjacent surfaces.

Drying: Unless otherwise specified, ensure that surfaces are cured and dry before painting commences.

Recontamination: Apply the first coat of paint immediately after cleaning and before contamination of the substrate can occur. Where contamination of intermediate coats occurs, clean in accordance with the coating manufacturer's recommendations and to the Superintendent's approval immediately prior to over-coating.

PREVIOUSLY PAINTED SURFACES - PAINTING

STANDARDS: To AS 2311, Section 7 or AS 2312 Section 10, as applicable.

METAL SURFACES GENERALLY - PAINTING

METHODS: To AS 1627, as appropriate to the requirements of this Specification.

IRON AND STEEL SURFACES - PAINTING

GENERALLY: Remove weld spatter, slag, burrs, or any other objectionable surface irregularities.

DEGREASING: To AS 1627 Part 1, by solvent or alkaline cleaning.

HAND OR POWER TOOL CLEANING: To AS 1627 Part 2 or Part 7. Provide a final surface at least equal to preparation grade 'St2' of AS 1627 Part 9.

BLAST CLEANING: To AS 1627 part 4, to the class specified in the specified protective treatment. Provide a surface roughness appropriate for the specified treatment.

HOT DIPPED GALVANISED STEELWORK - PAINTING

DEGREASING: To AS 1627 Part 1, by solvent or alkaline cleaning prior to painting.

MASONRY AND CEMENTITIOUS SURFACES - PAINTING

CONCRETE AND MASONRY: Before application to very smooth concrete, brick or masonry, acid etch, grind, or abrasive blast the surface as appropriate to provide a suitable key for the subsequently applied coating and to remove laitance. Remove loose friable matter before filling surface discontinuities.

FILLING: Fill cracks and pin holes in concrete and blockwork with epoxy or polyester filler and sand smooth.

Filling is to include those areas of Type 2 concrete finish which are to be painted such as columns.

TIMBER SURFACES - PAINTING

DEFECTS: Cut out large resinous knots and decayed areas, and replace with sound timber. Remove any defective putty and punch nails. Spot prime small knots, cracks, open joints, holes and bare timber with specified wood primer.

FILLING: Fill as necessary with polymeric fillers or oil based putty which, in the case of clear or lightly pigmented finishes, shall match the substrate. Use appropriate inert filler if the finish is a two-pack epoxy or polyurethane.

SANDING: Lightly sand dressed surfaces in the direction of the wood grain with appropriate grade 'free cut paper' and remove powdery deposits.

MOISTURE CONTENT OF SUBSTRATE: To AS 2311 clause 3.2.5 at time of priming. Test the substrate with a moisture meter if required.

PRIMING BEFORE FIXING: Apply one coat of wood primer to the back of external fascia boards, timber door and window frames, associated trims and glazing beads before fixing in position. Paint top and bottom of doors as specified in 'APPLICATION - PAINTING'.

SUBSECTION 540 PAINT SYSTEMS

PAINTING SCHEDULE - PAINTING

REQUIREMENT: Where a surface is required to be painted, paint with the following paint systems with the order and number of coats as specified in the relevant paint system in the 'PAINT SYSTEMS' Subsection:-

(Steel surfaces exposed to view under roofed areas but outside enclosed rooms are considered to be EXTERNAL)

EXTERNAL

Location:	Surface:	Paint System:
Walls	Blockwork	GLOSS LATEX: EXTERIOR
Columns	Concrete	GLOSS LATEX: EXTERIOR
Fascia and barge cladding, soffit linings	Fibre cement	FLAT OR LOW GLOSS LATEX: EXTERIOR
Exposed roof/awning framing,including covered links	Timber	FLAT OR LOW GLOSS LATEX: EXTERIOR
Awning barges	Timber	GLOSS LATEX: EXTERIOR
All surfaces of external flush doors	Plywood	FULL GLOSS, SOLVENT-BORNE: EXTERIOR
Weldmesh, crimp mesh & pipe gates	Galvanized steel	HOT DIP GALVANISED NOT PAINTED
Downpipes and heads	Fibre Reinforced Cement	FULL GLOSS, SOLVENT-BORNE: EXTERIOR
External cover moulds	Timber	FULL GLOSS, SOLVENT-BORNE: EXTERIOR
Infill over mesh gate	Timber	FULL GLOSS, SOLVENT-BORNE: EXTERIOR
Metalwork fittings & sundry metalwork items	Galvanized steel	HOT DIP GALVANISED NOT PAINTED

INTERNAL

Location:	Surface:	Paint System:
Walls	Blockwork	SEMI-GLOSS LATEX: INTERIOR
Columns	Concrete	SEMI-GLOSS LATEX: INTERIOR
Ceilings and bulkheads (except shower rooms)	Plasterboard	FLAT LATEX: INTERIOR
Ceilings to areas with showers.	Plasterboard	FULL GLOSS, SOLVENT-BORNE: INTERIOR
Ceiling manholes	Plywood	FULL GLOSS, SOLVENT-BORNE: INTERIOR
Door frames	Galvanized steel	FULL GLOSS, SOLVENT-BORNE: INTERIOR
Flush doors and panels over	Plywood & hardboard	FULL GLOSS, SOLVENT-BORNE: INTERIOR
Joinery fittings noted on Drawings as 'poly' & 'clear poly' finish	Timber	TWO PACK POLYURETHANE CLEAR: INTERIOR
Sundry timber trim	Timber	FULL GLOSS, SOLVENT-BORNE: INTERIOR

PAINT SYSTEMS GENERALLY - PAINTING

SCOPE OF SUBSECTION: The clauses in this Subsection specify paint systems other than systems for the protection of iron and steel against exterior atmospheric corrosion and similar aggressive environments, which are specified in the 'STRUCTURAL STEEL' Section. The clauses specify the number and order of coats, and the paint type for each coat, for the respective substrates to which the system is applicable.

TITLES: Each paint system is referred to in the 'PAINTING SCHEDULE' and elsewhere in the Specification by its clause title.

PAINT TYPES: The paint types are specified by the GPC specification numbers.

GPC CODING - PAINTING

GPC NUMBERS: The following is a table of GPC specification numbers corresponding to the paint types:

Paint Type:	GPC Specification Number:
Full gloss paint, solvent borne: interior	E-15/3
Full gloss paint, solvent borne: interior	E-15/4
Full gloss paint, solvent borne: exterior	E-50
Low gloss latex: exterior	L-26/3
Flat latex: interior	L-26/4
Semi gloss latex: interior	L-27
Gloss latex: exterior	L-28/1
Metal primer aluminium	P-3
Metal primer iron and steel	P-32
Metal primer for zinc coated surfaces	P-13/4
Wood primer, solvent borne	P-18/1
MET-L-ETCH primer or equal approved	P-35/2
Wood primer, solvent borne: exterior	P-52
Concrete and masonry sealer	S-17/1
Wallboard and plaster sealer	S-17/2
Undercoat paint, solvent borne: interior	U-16/1
Undercoat paint, solvent borne: exterior	U-51

FLAT LATEX: INTERIOR - PAINTING

SUBSTRATE:	1st Coat:	2nd Coat:	3rd Coat:
Plasterboard	S-17/2	L-26/4	L-26/4
Aluminium	P-3	L-26/4	L-26/4

SEMI-GLOSS LATEX: INTERIOR - PAINTING

SUBSTRATE:	1st Coat:	2nd Coat:	3rd Coat:
Concrete	S-17/2	L-27	L-27
Blockwork	BF	L-27	L-27 BF=Approved Block Filler
Fibre cement	S-17/2	L-27	L-27

FLAT OR LOW GLOSS LATEX: EXTERIOR - PAINTING

SUBSTRATE:	1st Coat:	2nd Coat:	3rd Coat:
Fibre cement	S-17/1	L-26/3	L-26/3
Timber	P-18/1	L-26/3	L-26/3

GLOSS LATEX: EXTERIOR - PAINTING

SUBSTRATE:	1st Coat:	2nd Coat:	3rd Coat:	4th Coat:
Concrete, blockwork & fibre cement	L-28/1	L-28/1	L-28/1	
Iron & steel	P-32	P-32	L-28/1	L-28/1
Galvanized	P-13/4	L-28/1	L-28/1	

FULL GLOSS, SOLVENT-BORNE: INTERIOR - PAINTING

SUBSTRATE:	1st Coat:	2nd Coat:	3rd Coat:
Iron & steel	P-32	U-16/1	E-15/4
Galvanized	P-35/2	U-16/1	E-15/4
Aluminium	P-3	U-16/1	E-15/4
Timber	P-18/1	U-16/1	E-15/4
Hardboard, unprimed	P-18/1	U-16/1	E-15/4
Plasterboard	S-17/2	U-16/1	E-15/4

FULL GLOSS, SOLVENT-BORNE: EXTERIOR - PAINTING

SUBSTRATE:	1st Coat:	2nd Coat:	3rd Coat:	4th Coat:
Iron & steel	P-32	P-32	U-51	E-50
Aluminium	P-3	U-51	E-50	E-50
Hot dipped galvanised steel, galvanized steel & aluminium/zinc coated steel	P-35/2	U-51	E-50	
Timber	P-52	U-51	E-50	E-50
Fibre reinforced cement	S-17/1	U-51	E-50	

SECTION 720 - DRAINAGE

SUBSECTION 001 GENERAL

SCOPE - DRAINAGE

OUTLINE DESCRIPTION: This section applies to all drainage work forming the whole, or part of, the works, including subsoil and stormwater drainage, sewer drainage, pumping systems and sewage treatment, industrial waste systems, and associated items such as pits, gullies, culverts, gutters, etc.

AUTHORITIES AND APPROVALS - DRAINAGE

AUTHORITIES: The public and other authorities whose requirements shall apply to the work of this section in accordance with the General Conditions, and the ordinances, regulations, by-laws and the like specifying those requirements, shall include the Local Authority for the area in which the work is to be carried out.

APPROVALS: The documents evidencing approval of such authorities, which are to be surrendered before the Certificate or Notice of Practical Completion is issued, shall include the authority's official certificate of completion.

AUTHORITY'S MARK: Pipes, fittings, accessories and the like used in the Works shall bear approval marks where and as required by the regulatory authority.

WORKS BY AUTHORITY: If the responsible authority, pursuant to statutory powers vested in it, elects to perform or supply part of the Works, or to inspect or test the works during the course of construction, make the necessary arrangements with the authority and pay and bear the fees payable in connection therewith.

WORK OUTSIDE SITE - DRAINAGE

REQUIREMENT: Make necessary arrangements with adjoining property owners and the relevant authorities.

DRAWINGS AND DIMENSIONS - DRAINAGE

DIAGRAMMATIC LAYOUTS: Drawings showing pipework layouts are diagrammatic only. Before commencing work, verify the exact positions of fixtures, plant, appliances and the like to which the pipework is to be connected.

VARIATION DRAWINGS: If it is proposed to change the installation from that shown on the Drawings, or if a change is required by a regulatory authority, prepare and submit a variation drawing showing the proposed change, and obtain prior approval.

AS-CONSTRUCTED DRAWINGS - DRAINAGE

REQUIREMENT: Prepare progressively throughout the Works, and furnish to the Superintendent before the Date for Practical Completion, 'as-constructed' drawings of the sewerage and drainage installations, to the same scales and on the same sized standard sheets as the Contract Drawings, showing the locations of pipes and fittings, including inspection openings, cleaning eyes, pits, control valves, and the like, and the depths of underground pipework. Give co-ordinate dimensions where applicable.

TRANSPARENCIES: The Principal shall supply a set of reproducible transparencies of the relevant Contract Drawings to the Contractor as the basis for this work.

INSPECTION - DRAINAGE

REQUIREMENT: Give sufficient notice and pay all fees due to the inspecting Authority as and when required so that inspection may be made of the following stages:

- Trenches excavated and ready for pipe bedding.
- Work ready for specified testing.
- Underground or enclosed work ready to be covered up or concealed.

REQUIRED NOTICE: Unless otherwise specified, not less than:

- 4 working hours for on-site inspecting personnel,
- one working day for off-site inspecting personnel,
- 2 working days prior to testing.

EXISTING SERVICES - DRAINAGE

ALTERATIONS: Deal with existing services as necessary to complete the work specified in this Section.

INTERRUPTION: Obtain approval before interrupting an existing service, and perform the work in accordance with an approved program, so that the duration and number of interruptions is reduced to a minimum.

SUPPORTING EXISTING WORK: If an existing service or structure, which is to be retained, crosses a new trench, provide in the new trench a permanent support to that service or structure, such as by compacted granular material, for shallow depths, or concrete plug of 20 MPa minimum strength where the support depth exceeds 1.8 metres.

SUBSECTION 074 TESTING

MATERIALS TESTING - DRAINAGE

CERTIFICATE: Where required, provide test certificates prepared by an independent testing authority to show that materials comply with the relevant standards.

PIPEWORK TESTING - DRAINAGE

REQUIREMENT: Supply apparatus and materials necessary for, and carry out either a Hydrostatic Test or Air Test required by the Specification or regulatory authorities in the presence of the Superintendent and the authorised representative for the relevant authority for the service under test.

CONCEALED WORK: Do not cover or conceal underground or enclosed work until it has been inspected and tested, in sections where necessary, to the approval of the Superintendent and the relevant authority. Leave pipe joints exposed to enable observation during the tests.

uPVC PIPEWORK: Ensure solvent cement joints have been cured for at least 24 hours before testing.

HYDROSTATIC TESTS: Fill the pipework with water or air and test at the pressure and for the duration stated in 'HYDROSTATIC TEST TABLES - DRAINAGE', unless otherwise overridden by regulatory authority requirements.

AIR TESTS: Test in accordance with By-Law 156 of the Standard Sewerage By-Laws.

MANHOLES AND INSPECTION CHAMBERS: Test for water tightness in accordance with By-Law 156 of the Standard Sewerage By-Laws unless otherwise approved.

Rejection: Pipework is liable to rejection if water or air loss exceeds the limit permitted by the relevant test.

MIRROR TEST: Upon satisfactory completion of hydrostatic testing, the Superintendent shall mirror test the pipework for visual evidence of straight alignment and flush internal jointing.

HYDROSTATIC TEST TABLES - DRAINAGE

SEWER PIPELINES: Test to the following table at a maximum test head of 1 m above ground level at the highest point being tested. The maximum head being tested shall not exceed 3 m.

TYPE OF PIPE	DIAMETER mm	TEST PERIOD	MAX WATER LOSS per 30 metre length of drain
Vitrified Clay	100	60 minutes	1.5 litres
Vitrified Clay	150	60 minutes	2.25 litres
All Other Types	All	15 minutes	No loss permitted

SUBSECTION 120 MATERIALS

PIPE BEDDING MATERIAL - DRAINAGE

TYPE: Granular material shall be used for the pipework or part of the pipework application unless otherwise specified.

GRANULAR MATERIAL: Use clean sharp washed river sand or clean unweathered hard basaltic or sedimentary crushed rock, free of salt, clay or organic contaminants and with a minimum of 85% passing the 2.36 mm sieve and not more than 15% passing the 0.075 mm sieve.

CEMENT MORTAR BEDDING: 1 portland cement: 4 sand.

CONCRETE BEDDING: Not less than 15 MPa.

MORTAR JOINTING MATERIAL - DRAINAGE

PROPORTIONS: Jointing material for rigid joints in concrete and vitrified clay pipe: 1 portland cement: 2 sand.

RUBBER JOINT RINGS - DRAINAGE

STANDARD: To AS 1646, with root growth inhibitor to Appendix C.

Ring Hardness: Within the 41 - 50 range of Table 3.1.

For Vitrified Clay Pipes: To AS 1693.

LUBRICANTS: Vegetable-based, non-toxic lubricants may be used for installing rubber rings.

SUBSECTION 140 WORKMANSHIP

EXCAVATION - DRAINAGE

SPECIFICATION REFERENCE: General open-trench excavation is specified in 'SERVICE TRENCHES - GROUNDWORKS'.

UNSTABLE FOUNDATIONS - DRAINAGE

SPECIFICATION REFERENCE: 'BAD GROUND - GROUNDWORKS' shall apply to trench floors discovered to be unsuitable for pipe bedding unless stabilized.

GRADIENTS - DRAINAGE

REQUIREMENT: Unless shown otherwise on the drawings, lay sewer drains to the gradients complying with the Sewerage and Water Supply Act, and in any case not less than the following:

Pipe dia. (mm):	Gradient
100 mm	1 in 60
150 mm	1 in 80
225 mm	1 in 90

PIPELAYING - DRAINAGE

GENERALLY: Lay pipelines to uniform gradients falling to the outlets, straight between required changes of direction, properly supported, with watertight joints aligned flush at internal surfaces, and with spigot ends pointed in the direction of flow. Provide the necessary fittings and accessories, including junctions, branches, inspection and cleaning openings, expansion joints, and the like.

TOLERANCES: Place pipelines within the following maximum tolerances:

	Angular Deviation from Required Alignment:	Displacement from Required Alignment:
Horizontal:	1 in 300	15 mm
Vertical:	1 in 500	5 mm

Conditions: Tolerances stated above are conditional on falls to outlets being maintained, straight sections passing the mirror test, and no part of a pipeline being at less than the required gradient.

JOINTING: Jointing methods for particular pipework systems are specified in the PIPEWORK Subsection.

Mortar Jointing: Clean and dampen the jointing surfaces, and pack the joint with freshly mixed mortar jointing material. Finish the external joint surface neatly with a steel trowel.

INSPECTION OPENINGS: Provide inspection openings as required by the regulatory authority, and in any case so that each straight length of sewer line can be inspected in at least one direction. Seal the openings with purpose-made covers fixed by a jointing method appropriate to the pipework. Raise the openings to surface level.

Rubber Ring Jointed Covers: If covers to inspection openings or blanked-off ends of lines are jointed by the rubber ring method, provide non-corrosive metal spring clips to hold them in place.

CAPPING OFF: During construction, temporarily seal open ends of sewerage drain pipes to prevent the entry of foreign matter and liquid into the pipe systems (including while other trades perform their work). Leave unfinished work in a safe condition and protect against damage or loss through any cause whatsoever.

CLEANING OUT: Flush the pipeline with clean water and leave it clean and free from debris on completion.

PIPELINE IDENTIFICATION: Lay a detectable strip or plastic tape in the trench after pipelaying, testing and initial backfilling.

UNDERGROUND INSTALLATION - DRAINAGE

STANDARDS:
Vitrified Clay Pipe Systems: To AS CA56.
Concrete Pipe Systems: To AS 3725.

PIPE BEDDING: Unless otherwise specified bed the pipework on a continuous underlay of pipe bedding material, compacted if granular, of minimum thickness after compaction as required by the relevant standard, but in any case not less than 75 mm. Grade the bedding evenly to the required gradient of the pipework.

CHASES: Form chases where necessary to prevent sockets, flanges or the like from bearing on the trench bottom or the bedding. Fill and compact the chases with granular bedding material after the laying and testing of the pipes.

SIDE SUPPORT AND OVERLAY: Fill to not less than 150 mm above the top of the pipes. Compact in layers of not more than 150 mm loose thickness without damage to the pipework.

COMPACTION: To AS 1289.

Granular Bedding: As specified for Cohesionless material in clauses referenced by 'BACKFILLING SERVICE TRENCHES - GROUNDWORKS'.

BACKFILLING ABOVE OVERLAY: Specified in 'BACKFILLING SERVICE TRENCHES - GROUNDWORKS'.

ANCHORAGES - DRAINAGE

ANCHOR BLOCKS: On steep slopes install anchorages in the form of lateral or longitudinal anchor blocks of not less than 20 MPa concrete in accordance with By-Law 150(5) of the Sewerage and Water Supply Act unless otherwise specified.

Lateral Anchor Blocks: Bear against the full diameter of the pipe for a length equal to not less than the pipe diameter, with a thrust bearing against the excavation of not less than 0.25 m^2.

BEDDING FITTINGS - DRAINAGE

CONCRETE BEDDING; In the pipework for sewerage, bed fittings, including junctions, traps, gullies and the like, on concrete bedding not less than
15 MPa, 100 mm thick, 450 mm long, and the width of the trench.

FLEXIBLE JOINTS: For sewer provide two flexible joints within
600 mm of an inspection chamber or block or concrete surround or similar structure.

STORMWATER: For stormwater drains other than trunk mains, provide short lengths (not more than 600 mm) of flexibly jointed pipe on each side of concreted fittings, pits, manholes, and the like.

CONNECTIONS TO EXISTING - DRAINAGE

REQUIREMENT: Connect new pipelines to existing drains as follows:

TO AUTHORITY'S MAIN: As required by the regulatory authority. If the authority elects to perform the work, comply with WORKS BY AUTHORITY in 'AUTHORITIES AND APPROVALS - DRAINAGE'.

TO PITS AND MANHOLES: As specified in 'PIT CONSTRUCTION - DRAINAGE'.

TO EXISTING PIPELINES LESS THAN 300 mm: Remove an appropriate length of the existing pipeline and insert a new slope junction and new pipework consistent with the existing pipeline.

TO EXISTING PIPELINES 300 mm OR LARGER: The connection of any size branch line into an existing line 300 mm or greater diameter may only be undertaken by the construction of an inspection chamber unless shown otherwise on the Drawings.

Inspection Chamber: Provide an inspection chamber to new branch drains greater than 100 mm.

TO STREET GUTTER: (Stormwater lines where shown): Enter the pipe into an opening made in the kerb, to finish flush with the kerb face, and seal by pointing in 1 cement: 3 sand. Restore the kerb and pavement as necessary, to match existing.

VITRIFIED CLAY PIPEWORK - DRAINAGE

PIPES AND FITTINGS: To AS 1741, suitable for the jointing method specified.

Grade: (100 and 150 mm sizes):		A
Class:	Sizes under 300 mm:	Y
	Sizes 300 mm and over:	
	- if under road pavements:	Y
	- elsewhere:	X

JOINTING METHODS:
Flexible Jointing: To AS 1693, using rubber rings.

Rigid Joints: Spigot and socket joints caulked with mortar jointing material.

PIPELINE CONSTRUCTION: To AS CA56.

CONCRETE PIPEWORK - DRAINAGE

PIPES: To AS 1342, suitable for the jointing method specified.

Class:	100 and 150 mm sizes:	C (unreinforced).
	Sizes over 150 mm:	X unless otherwise specified.

JOINTING METHODS:
Flexible Joints: Using rubber rings.

Rigid Joints: Spigot and socket joints or rebated joints to AS 1342, Appendix A, caulked with mortar jointing material.

FIBRE CEMENT PIPEWORK - DRAINAGE

PIPES AND FITTINGS: Manufactured from a mixture of portland cement, silica and cellulose fibre, autoclave cured after forming, free from defects resulting from faulty materials and manufacture, such as cracks wider than 0.1 mm, dents or bulges exceeding 3 mm in depth or height or twice the wall thickness in length, and the like.

Permissible Variations in Diameter: To AS 1342 Table 3.1.

Class: S, X, Y, or Z to AS 1342, as determined by load testing to AS 1342, Appendix B, by the three-edge bearing method. Furnish the manufacturer's certificate showing that the pipes meet the load test requirements.

Marking: To AS 1342, clause 2.6.

JOINTING METHODS:

Rebated Joint: Machine mated surfaces giving a close fit and flush exterior.

Adcol joint: Plain spigot and Adcol socket.

Rubber Ring Joint: Spigot and socket joint incorporating a rubber V ring.

SUBSECTION 714 SUMPS, GULLIES, PITS

PIT CONSTRUCTION - DRAINAGE

REQUIREMENT: Construct pits, sumps, manholes, tanks, wells and the like as shown on the Drawings unless otherwise specified.

PREFABRICATED CONCRETE:
Sewerage Work: unless specifically indicated on the Drawings, the use of precast manholes is limited to trunk sewerage where only a single inlet and outlet are involved and there is no possibility of a future connection being required. The use of precast inspection chambers is not permitted unless specifically scheduled.

Trunk Stormwater: the use of prefabricated manholes and gullies in stormwater drainage work may be permitted provided that walls of spun precast section are not less than 60 mm thick.

Floors: to precast manhole systems may be cast or prefabricated. All holes through precast walls shall be cored with an approved cutting method and not broken out.

COVERS: Specified in 'PIT COVERS - DRAINAGE'. Rebate the top of the pit walls to suit the cover frame or provide a precast rebated surround, and grout the frame into the rebate with infill concrete.

Levels: Top level of cover or grating, including frame:

- In paved areas, flush with the paving surface
- In landscaped areas, 25 mm above finished surface
- Gratings taking surface water runoff: As necessary to receive the runoff without ponding.

PIPE CONNECTIONS: Build inlet and outlet pipes into the pit walls during construc tion. In existing pits, make openings of the correct size and pack the joint around the pipe to the full thickness of the wall with 1:3 mortar.

Subsoil Drain Connections: The location of subsoil drain connections are shown on the Landscaping Drawings.

PIPE CHANNELS: When pipe channels are required in pit floors, form the channel to the full depth of the pipe.

PIT COVERS - DRAINAGE

REQUIREMENT: Provide each pit with a pit cover as shown on the drawings, of a size appropriate to the pit.

FLOOR WASTES - DRAINAGE

SPECIFICATION REFERENCE: 'FLOOR WASTES - SANITARY PLUMBING'.

DISCONNECTOR TRAPS - DRAINAGE

REQUIREMENT: Provide disconnector traps (including gully traps and boundary traps) of the same material as the pipework.

COVERS:
Gully Traps: Cast iron grating.

Boundary Traps: Sealed inspection cover.

SUBSECTION 721 SEWERAGE

SEWER SYSTEM - DRAINAGE

EXTENT: Lay sewer drains to the disposal outlet or system shown on the Drawings or specified.

CONNECTIONS TO FIXTURES: Make connections to sanitary fixtures by a jointing method appropriate to the pipework and the fixture.

VENTS: Specified in 'SOIL AND WASTE SYSTEMS - SANITARY PLUMBING'.

SUBSECTION 722 STORMWATER

STORMWATER SYSTEM - DRAINAGE

EXTENT: Lay stormwater drains to the outlets shown on the Drawings or specified.

DOWNPIPE CONNECTIONS: Turn up the drain branch pipeline with a suitable bend to meet the downpipe, to finish 50 mm above finished ground or pavement surface. Jointing to downpipe is specified in the 'ROOFING' Section.