

## SECTION 29

### WET FIRE SERVICES

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1	9 April 2013	Multitech for JCU	First Edition
2	30 September 2013	Manager, Infrastructure Services	Revised with JCU comments

## **29.0 WET FIRE SERVICES**

### **29.1 INTENT OF THE JAMES COOK UNIVERSITY DESIGN GUIDELINES**

James Cook University was established to pursue and encourage study and research, especially in subjects of importance to the people of the tropics. James Cook University is Queensland's second oldest university and through its research, graduates and industry links, is a major driver of economic growth and social change in northern Queensland.

Staff and students of JCU use its unique locations to conduct nationally significant and internationally-recognised research in areas such as marine sciences, biodiversity, tropical ecology and environments, global warming, tourism and in tropical medicine and public health care in underserved populations. Its network of specialist centres, institutes and research stations span a wide geographic area from marine islands to the outback and the students come from many backgrounds, promoting a rich cultural and experiential diversity on campus.

These design guidelines are the minimum acceptable standard and have been developed to ensure that projects delivered by JCU comply with the University's vision, are appropriate for the unique tropical environments and incorporate the lessons learnt from previous projects. The Deputy Director – Planning and Development is responsible to ensure these Design Guidelines achieve the best design outcomes for JCU.

### **29.2 COMPLIANCE AND APPROVALS**

#### **29.2.1 Compliance Requirements**

All design and works are to comply with the latest versions of all Australian National, Queensland State, legislation and standards, as well as local council/authority requirements. Further details are provided in Section 29.5

All other sections of these Guidelines are to be read for completeness as this document has been developed as a section of a suite of documents.

Where there is a discrepancy between requirements, legislation and regulation to take precedent over these Guidelines.

#### **29.2.2 Non-Conformance Approvals**

All project team members (for example Consultants, D&C Contractors, Principal Consultants, Internal/External project managers, subcontractors etc.) are responsible for delivering the project in accordance with the project brief, these guidelines, user group information and other contractual documents.

Where there are sound engineering reasons to deviate from these documents, a written non-conformance request is to be submitted to the Deputy Director – Planning and Development via the JCU Project Manager.

This could apply when the project involve aspects, scope, technologies, locations or other applications that are not specifically briefed or covered by the Design Guidelines, the non-conformance request will include clear information on:

- Technical Aspect that is not covered
- A range of options to address the issue
- Time and costs implications for each option
- Effect of the aspect on the design and on other trades

- Effects on users, maintenance, access, life of plant, energy efficiency, cost
- Effects on future re-allocation of the space / system etc.
- Recommended solution to the issue

A Non-Conformance register is to be maintained by the Consultant and the details of each request plus the outcome are to be recorded.

Before departures in design intent are approved for the successful consulting engineer, detailed energy modelling against the NABERS' scheme shall be required. Departures shall prove there is an advantage to JCU in terms of energy savings and operating cost savings.

### **29.2.3 Design Approvals**

Irrespective of directions received from JCU, the Consultant remains fully responsible for the design solution developed.

All designs done for and on behalf of JCU require RPEQ certification, unless approved by the Manager, Infrastructure Services.

Form 15 Design Certification is to be obtained.

### **29.2.4 NCC Version to Apply**

Confirm with JCU's Project Manager which version of the National Construction Code (NCC) that is applicable to the works.

### **29.2.5 Site Infrastructure Connection Approvals**

The Manager, Infrastructure Services is responsible for approval of all connections to existing infrastructure, including the mains and fire water reticulation.

## **29.3 DESIGN PROCESS REQUIREMENTS**

### **29.3.1 Roles and Responsibilities**

JCU does not wish to be separated from the design process, regardless of whether the project is traditionally delivered, delivered through Managing Contractor, D&C contractor or other.

#### **29.3.1.1 Traditional Delivery**

Where traditional delivery is chosen, the framework may be through a Principal Consultant (such as an Architect or Project Manager), or direct to JCU.

The Principal Consultant is to arrange workshops with the JCU Deputy Director – Planning and Development, Manager, Infrastructure Services, Manager, Asset Strategy and Maintenance and other technical staff as directed by these managers from initiation of schematic design.

#### **29.3.1.2 Managing Contractor Framework**

Arrange workshops and information issues throughout the design process with the JCU Deputy Director – Planning and Development, Manager, Infrastructure Services, Manager, Asset Strategy and Maintenance and other technical staff as directed by these managers (through the Managing Contractor and JCU's Project Manager).

#### **29.3.1.3 Communication Arrangements**

All communication with JCU is to be via the JCU Project Manager. Minutes of any design

review meetings etc. are to be provided to all participants via the JCU Project Manager.

### 29.3.2 Interfaces with Other Disciplines

Ensure that all works necessary for the complete installation and successful operation are advised to other consultants and specified as interface with other engineering disciplines, professions or specialists.

Ensure that information required to accurately design the services is obtained from other consultants as required. Additional information is available in section 29.5.3

### 29.3.3 Schematic Design (SD) Report / Design Review

The Schematic Design (SD) report will give a high level understanding to University of the requirements for the project.

#### 29.3.3.1 Report Content

- The drawing numbers and revisions the SD report is based upon e.g. Architectural, As Installed drawings etc.
- A detailed list of the wet fire scope of works for the project
- A detailed list of the applicable standards, regulations and local authority requirements that the project has to conform to
- Where existing plant is being utilised, whether this plant is being used, replaced, refurbished etc. with indication of associated issues and costs.
- A high level description of the method of servicing the various spaces in the project
- List of Ecological Sustainable Development (ESD) opportunities
- Non-Conformance Register listing any deviations from Legislation, Standards, Codes, Guidelines or Project Brief.
- List of Assumptions, Boundaries (battery limits or tie-in points) and Specific Exclusions
- Proposed Drawing Register and Deliverables List
- Layout drawings showing existing site conditions for all services, any interfaces, connections and easements with existing services and structures, including proposed services corridor/trenches, depths, flow direction and invert levels of existing services within the site.
- Results of any Flow and Pressure testing on water main/s adjacent to the site and any requirements for pumps and tanks to supplement the mains water supply
- Results of consultation with the local QFRS officer and what their requirements will be for the project
- A detailed description of any required water supply requirements including any required booster pumps and number thereof
- A detailed description of any required water storage requirement arrangements
- A drawing proving that the wet fire systems proposed will work i.e. showing water supply points, pipework sizing and required flows for the most remote hydrants or area of operation
- Provide a report on the wet fire services design intent including site connections, metering, backflow prevention, insulation, signage etc
- Detail the labelling and identification requirements for the project
- Investment Decision Report including Cost (Capex and Opex) and Schedule estimates, Lifecycle costs and indicating any areas of risk to the project delivery. This document to be resubmitted based on feedback from the SD review and approved by the JCU Deputy Director – Planning and Development prior to commencement of Detailed Design.

- Where option analysis was included, a recommendation on the option to take forward with supporting information/decision criteria.
- Outcomes and recommendations for safety in design, and design risk assessment workshops particularly responding to (or addressing) design elements which will affect fire safety.
- List of proposed design development activities/milestone schedule and deliverables

#### 29.3.3.2 Submission Format

This information is to be submitted to the JCU Project Manager as an A4 colour PDF file with A3 drawing attachments, in hard and electronic format. The Consultant may be requested to deliver a presentation (in person or via VC) to JCU stakeholders and decision makers.

#### 29.3.3.3 Design Review

Submit SD drawings / report and non-conformance register to JCU's Project Manager in full size hard copies (1) and on CD for a full design review in accordance with the project schedule, allow a minimum of 2 weeks for design review.

Inform the JCU's Project Manager as soon as possible if the drawings are going to be delayed for any reason.

Following receipt of the design review comments from JCU, respond formally with

- Acknowledgement that changes will be actioned, and
- List any areas where the design review comments require additional discussion and proposed manner of resolution.

### 29.3.4 Developed Design (DD) Report / Design Review

The DD report will provide more detail on the design for the accepted option and design approaches.

#### 29.3.4.1 Report Content

- Full return brief for the wet fire services including the materials and plumbing systems to be used
- The drawing numbers and revisions the DD report is based upon e.g. Architectural, As Installed drawings etc.
- Provide detailed information of all existing site services, their re-use, refurbishment, relocation or removal
- Detail on design approach for each type of system / area etc.
- Report on the wet fire service design including site connections, metering, backflow prevention, insulation, signage etc.
- Provide a detailed description of the wet fire services design including the required flows and pressures for the various services
- Provide a detailed description and wet fire services sizing calculations of the design for the project including water storage requirements, safety equipment, etc.
- Provide Hyena calculations proving that the wet fire system will perform
- In each case options investigated, reasons or supporting information for design choices,
- Detail on loads and consumptions to existing services, including mains water
- Statement on how the existing services will be impacted by these additional loads and any specify any required upgrades
- Detail the labelling and identification requirements for the project
- Updated site water schematic, showing positions of all new valves

- Drawing Register and Deliverables list
- All IFC drawings and design calculations
- Updated and finalised Investment Decision Report including Cost (Capex and Opex) and Schedule estimates, Lifecycle costs and indicating any areas of risk to the project delivery. This document to be resubmitted based on feedback from the DD review and approved by the JCU Deputy Director – Planning and Development prior to commencement of Construction.
- Updated outcomes and recommendations for safety in design, and design risk assessment workshops particularly responding to (or addressing) design elements which will limit liability under mould issues in HVAC systems, temperature control and upper limit humidity control
- Finalised recommendations for preventative maintenance and list of critical spares on proposed equipment
- Risk Matrix for design methodology (i.e. n+1 where necessary)
- Areas of risk to the project during construction and commissioning
- List of construction activities/milestone schedule and deliverables, including construction and commissioning hold point/inspection/witness/approvals.

#### 29.3.4.2 Submission Format

This information is to be submitted to the JCU Project Manager as an A4 colour PDF file with A3 drawing attachments, in hard and electronic format. The Consultant may be requested to deliver a presentation (in person or via VC) to JCU stakeholders and decision makers.

#### 29.3.4.3 Supporting Documentation

- Maximum 1:500 site services drawings – e.g. water mains, showing tie-in points to existing
- Maximum 1:100 Floor Plans
- Maximum 1:100 Sprinkler Head Layout Reflected Ceiling Plans
- Maximum 1:50 inserts on plans
- Maximum 1:50 Details
- Updated JCU mains water schematic

#### 29.3.4.4 Design Review

Submit DD drawings / report and non-conformance register to JCU's Project Manager in full size hard copies (1) and on CD for a full design review in accordance with the project schedule, allow a minimum of 2 weeks for design review.

Inform the JCU's Project Manager as soon as possible if the drawings are going to be delayed for any reason.

Following receipt of the design review comments from JCU, respond formally with

- Acknowledgement that changes will be actioned, and
- List any areas where the design review comments require additional discussion and proposed manner of resolution.

#### 29.3.4.5 Developed Design JCU RPEQ Certification Schedule

This table shall be completed by the DD Design Engineer as below, or as modified by the Manager, Infrastructure Services, and submitted for confirmation.

<b>Project</b>		_____
<b>Project Number</b>		_____
<b>Date</b>		_____
<b>Company</b>		_____
<b>RPEQ Design Engineer</b>		_____
RPEQ Licence Number		_____
Building Area	sqm	_____
Calculated Building Peak Fire Water Flow Demand	l/s	_____
Calculated 24 hr Systems Peak Fire Water Flow Demand	l/s	_____
Wet Fire Services Estimated Capital Investment	\$ (ex GST)	_____
Total number of Sprinklers	No. Off	_____
Any other plant and equipment requiring routine inspections	No. Off	_____
<b>Manager Infrastructure Services</b>		
Schematic Design & Report Approved	YES / NO	_____
Does the SD Report include Life Cycle Costing	YES / NO	_____
Developed Design & Report Approved	YES / NO	_____
Construction Documentation Approved	YES / NO	_____
All specific design elements are included in the design	YES / NO	_____

### 29.3.5 Construction Contract Document Requirements

### 29.3.6 Specification Requirements

A concise, project specific specification shall be produced that

- Clearly identifies the scope of works
- Clearly identifies the project nature
- Clearly identifies Interfaces with other disciplines
- Calls into effect the requirements of codes, standards, legislation etc.
- Calls into effect the requirements of these guidelines
- Does not contain excessive or spurious references to unrelated projects or unrequired works.
- Includes all performance requirements
- Includes schedules of all equipment requirements, capacities etc.
- Requires relevant price breakup information from the contractor
- Requires contractor confirmation of equipment, scope, documentation etc.
- Calls up required service, maintenance details etc. in an acceptable Operating and Maintenance Manual format complete with preventative maintenance schedules.

#### 29.3.6.1 Drawing and Documentation requirements

Both Issued for Tender (IFT) and Issued for Construction (IFC) drawing and documentation will be required.

Drawings shall conform to section 34. Ensure:



- Use JCU Title block and include JCU Drawing Number (obtain from JCU Drawing register)
- All fonts and colours to be legible at A3 print colour or black and white
- Use Australian English throughout all documents
- Clearly identify the scope of works
- Are clear and legible and easily read
- Provide sections, elevations and the like to indicate heights, etc. Generally a minimum of two sections shall be provided for any project to enable the contractor to determine the work heights, co-ordination etc.
- Provide details for specific items such as pumps, tanks, meter & booster assemblies, sprinkler valve arrangements etc.
- Include piped services schematics
- Include mains water schematics

#### 29.3.6.2 Number of Copies

Unless briefed / agreed otherwise, the contract documents shall be provided in electronic (.pdf and native) format and in hard copy as follows:

- Three full sized hardcopies of all drawings
- Three bound copies of specifications in A4

### 29.3.7 Handover Requirements

#### 29.3.7.1 Requirements for Commissioning

The wet fire services designer will provide a detailed set out of the methodology for commissioning by the contractor in the draft wet fire specification prior to tender.

The commissioning section of the wet fire specification shall include:

- The methodology for the comprehensive commissioning of wet fire equipment and systems that will ensure that the as-designed performance, functionality and reliability of the equipment and systems are proven and documented prior to project "practical completion".
- The requirement to provide all commissioning data and test results for the wet fire installation at least 7 days prior to witness testing by JCU Manager, Infrastructure Services or Manager, Asset Strategy and Maintenance for review by the JCU appointed Consultant hydraulic engineer.
- Cause & effect matrix for the equipment & system being operated including wet fire services system interface relevant to other systems.
- Pre-start and start-up check sheets

Provide Form 16 and any other certification required for the works.

#### 29.3.7.2 Witnessing

Following commissioning, undertake a witness inspection of the operation. Ensure that the Consulting Engineer and JCU Manager, Asset Strategy and Maintenance (or representative) and QFRS are present.

As a minimum, prove to their satisfaction:

- The fire pump operates as required.
- The required flows and pressures are achieved in the wet fire systems

Rectify any defects identified. Should re-inspection be required, the cost of consultants reinspections will be deleted from the contract sum.

#### 29.3.7.3 Records to be provided

Within 3 weeks of practical completion provide

- All commissioning data as finalised
- Defects lists signed out and complete
- Certification of any Fire Penetrations etc
- Commissioning sheets for any specialised equipment (e.g. fume cupboards, HEPA tests, Chiller commissioning, etc.)

#### 29.3.7.4 Defects Liability

The Defects Liability period shall be a minimum of 12 months from the date of Practical completion or acceptance of the systems by the Manager, Asset Strategy and Maintenance or representative. The Manager, Asset Strategy and Maintenance may require longer periods of warranty for key/critical equipment and this should be tested on a project specific basis.

During this period the contractor must attend to and rectify all faults, defects etc. at their cost including all parts, labour, commissioning and associated costs. Should an item repeatedly fail during this period, JCU may require warranty in relation to that item to apply from the date of latest repair / replacement.

#### 29.3.7.5 Maintenance Requirements

All construction/ installation contracts shall allow for the performance of regular preventive maintenance of the works during the period of the defects liability period inclusive of all consumables.

Such maintenance shall be in accordance with the manufacturer's instructions and the requirements of the Work Health and Safety Act, Standards or other applicable regulations, legislation, or codes of practice.

With respect to any wet fire services, maintenance shall be carried out not less frequently than monthly.

Life safety systems shall be maintained and recorded as a minimum to relevant requirements (e.g. AS1851)

Maintenance records to be forwarded to the Manager, Property Services/Cairns Operations, as appropriate, within 5 days of completion of maintenance.

#### 29.3.7.6 Operating and Maintenance Manuals

Operating and maintenance manuals must be issued as Preliminary prior to Practical Completion. Any amendments must be made and manuals issued within three weeks of Practical completion. Manuals must include as a minimum:

- Concise English description of the installation as a whole
- Concise English description of the each system
- Concise English description of BMS system and controls,
- Concise English description of the Fire Mode Operation of systems
- Equipment list for all wet fire equipment and systems
- Supplier / Support list for all wet fire equipment
- Manufacturer's Literature for all wet fire equipment

- List of recommended critical spares
- List of Contractors and Subcontractors
- List of As-Constructed drawings
- All finalised commissioning data
- Form 16
- Recommended Service and Maintenance procedures
- Service and Maintenance Schedule
- Fault finding and reporting procedures
- Emergency Contacts
- Defects lists signed out and complete

Provide THREE hard copies of all manuals and “As Constructed” drawings plus electronic (.pdf and native) copies of all documents and drawings.

Consultants shall provide a statement that maintenance manuals and as constructed drawings are correct to the best of their knowledge.

## **29.4 WET FIRE SERVICES DESIGN AND EQUIPMENT REQUIREMENTS**

### **29.4.1 Design for project and future**

A holistic approach shall be taken to any new or refurbishment design and the effect on the existing campus services and buildings shall be well understood.

All designs must consider how the project specific requirements and any additional areas served by systems serving the project areas (e.g. mains water reticulation etc.) will impact on the existing services, possible future fitouts / reworking of the project area, and future expansion such as master plan items, items advised etc. These impacts are to be clearly articulated in the design documentation.

Generally allow for 10-20% expansion in load within the infrastructure serving major projects, stand alone buildings and the like. This expansion capability must be provided in:

- Control panels (generally provide spare space for an additional 10% controls or 1 whole controller – whichever is greater)

All hydraulic penetrations in building fabric to be finished with chrome wall or floor flanges and the penetration shall achieve the required fire rating for that part of the building. Water services in buildings located within structural concrete slabs are to be designed to be fully retrievable.

### **29.4.2 Design for Tropical Areas**

JCU’s campuses are located in a tropical environment. Particular care is required to ensure necessary measures are taken to prevent the formation of condensate on external or internal surfaces such as, pipework, ceilings, walls, windows etc. The design must deter the potential for growth of mould.

In particular, ensure that cold bridges are avoided. Ensure that all other parties are aware of the measures required to prevent condensation forming (e.g. on windows, building facades etc.)

The design team shall work together to minimise moisture migration into buildings which can lead to adverse effects and lower energy efficiency of air conditioning system. Provide advice to other members of the design team regarding the location and requirement for vapour barriers, insulation requirements for building elements relating to the hydraulic services requirements.

#### **29.4.3 Design for Cyclone Prone Areas**

JCU's campuses are located in a cyclone prone environment. Particular care is required to ensure necessary measures are taken to ensure that all plant, equipment etc. (particularly external plant) is securely fixed, of suitably rated cyclone area construction and constructed in a manner to withstand such events.

#### **29.4.4 Corrosion Prevention and Protection**

JCU campuses are generally located in coastal areas. The prevention of corrosion must be considered in the design. Plant should be located under cover in plantrooms. Exposed plant should be avoided (except external condensing units, chillers and the like where included in the design).

External exhausts etc. should be constructed of non-corroding elements (PVC / Stainless steel etc.). Fixings should be stainless steel. Dissimilar metals should be electrically separated.

Pay particular attention to elements such as switchboards, control panels etc. which should be stainless steel where exposed to weather.

Identify additional service recommendations to mitigate or minimise corrosion where the particulars of the installation may produce corrosion in the installation.

#### **29.4.5 Equipment Quality and Support**

All equipment and components shall have a proven track record of operation in Queensland and be of high quality and reliability, readily available, with a Queensland based agent for service / spare parts, with sufficient stock of spares to support JCU's operation.

Critical Spares requirements shall be listed in Operating and Maintenance Manuals.

#### **29.4.6 Design for Maintenance**

Ongoing service and maintenance must be facilitated in the installation. Measures at least will provide minimum service access spaces, easily workable arrangements, clear unencumbered walkways of minimum 1200mm.

In all cases mandatory clear access for electrical switchboards and the like is to be provided.

Where roof areas must be accessed for maintenance, suitable stairs, walkways, railings, fall protection measures etc. are to be provided. Take reasonable steps to minimise the amount of equipment etc. requiring servicing from roof areas. Roof mounted supply and exhaust fans are not permitted.

#### **29.4.7 AQIS / OGTR / Authorities**

Where AQIS / OGTR / Federal Drug Administration or other requirements apply, the designer must fully address these requirements, and provide all information to allow JCU to inform these bodies and pass certification.

#### **29.4.8 Arrangement of Services**

Take particular care with arrangement of services and ensure full co-ordination of the project. A particular requirement is the separation of mechanical services from electrical services. Ensure any mechanical plant which can cause condensation or water damage is not located above or in the same riser as the electrical services.

#### **29.4.9 Locating Existing Services**

All existing services for the project shall be identified and confirmed onsite in accordance with the requirements identified through JCU's Permit to Work system.

#### **29.4.10 Safety in Design**

Safety in design must be incorporated into the design of all new plant, buildings etc. In addition to legislated and briefed requirements, work closely with JCU Project Manager and keep the Deputy Director – Planning and Development, Manager, Infrastructure Services and Manager, Asset Strategy and Maintenance fully informed of installation, service and maintenance and access requirements.

Particular care must be taken to ensure that safe installation and service is inherent in the design. Generally any requirement for the use of Personal Protective Equipment (PPE) or protective measures (fall restraint systems etc.) should be avoided by design.

#### **29.4.11 Noise & Vibration Control**

Prior to finalising the design, provide an overall strategy for vibration isolation to all equipment with moving parts to the Deputy Director – Planning and Development for review and approval.

Pipework shall not be rigidly mounted to building structure. Ensure that hangers are arranged to accommodate thermal expansion, transient loads and conditions whilst maintaining isolation.

#### **29.4.12 Specific Design Requirements**

JCU owns, operates and maintains all infrastructure services and all academic buildings on and within the campuses. The RPEQ consulting engineer shall take a long term investment and maintenance decision strategy when designing the systems.

The water supply for fire services shall be designed such they include a dedicated water service to the building isolated by double check valves located in an accessible approved position.

Wet fire services design shall include the requirement for a full campus water mains flow and pressure test specific to the project site, prior to the design of any wet fire service. Flow and pressure testing results should be verified by the installing contractor prior to the commencement of works.

Where required water storage tanks design shall meet the requirements of AS2419.1 & AS2118.1 respectively.

Within the wet fire services design; the location, colour and construction of water storage tanks shall be approved by the Deputy Director – Planning and Development, the Building Surveyor and QFRS prior to design finalisation.

Where on-site water storage is required, the design shall ensure that the 'effective' capacity of the storage guarantees the total system/s demand for the required system/s duration.

Water storage tank configuration design shall be such that during maintenance at least 50% capacity is available for use at all times.

#### **29.4.13 Fire Hydrants, Hose Reels and Booster Pumps**

This information is given in Section 24, Hydraulic Services, of these Design Guidelines. Section 24 is to be read in conjunction with this section (Section 29).

#### 29.4.14 Fire Sprinkler Services

All fire sprinkler services shall be designed in accordance with the National Construction Code Part E1.5, Specification E1.5 & all applicable parts of AS2118.

Unless otherwise specified by the Deputy Director – Planning and Development, fire sprinkler systems shall be ‘wet pipe’ systems.

The configuration of the various services shall be in accordance with the following;

Fire Sprinkler services:

- Residential Buildings AS2118.4
- All other areas AS2118.1
- Combined hydrant and sprinkler services AS2118.6

Fire sprinkler system design shall include a requirement for full Hyena hydraulic calculations to be submitted and reviewed by the Deputy Director – Planning and Development prior to systems installation.

All fire sprinkler services design shall include provisions to allow for routine testing in accordance with the requirements of AS1851.

The designing consultant shall ensure that before commencing any installations, Fire Services Contractors shall provide evidence to the Deputy Director – Planning and Development that they are duly registered with the Fire Protection Contractors Registration Board of Queensland, and have such licences as required by State legislation.

Designs should ensure that all wet fire services, hydrant, hose reel & sprinkler be certified and tagged by a certified fire services equipment installer.

Wet fire services shall be designed such that preventative maintenance can be carried out in accordance with AS1851. Consideration shall be given to the availability of system consumables, replacement pipe, fittings, valves and any other item required.

The fire sprinkler system design should ensure that upon system completion the installing contractor shall provide 3 hardcover maintenance manuals with all technical information, maintenance and testing programs, all warranties and hard copies of drawings.

Fire sprinkler services design shall be such that nothing about the way plant is designed when erected or installed makes it unsafe for the end user and furthermore ensuring that nothing about the way plant is commissioned makes it unsafe for the end user.

The consultant shall specify that the Fire Service Key required for all door locks and key switches shall be keyed to the 003 fire service key only.

Fire sprinkler control valve assemblies design shall ensure that they are located within a secure enclosure and fitted with anti-tamper devices to prevent unwanted system activation. Fire sprinkler control valve assemblies shall be located in an AS2118.1 compliant location readily accessible to the attending authority and additionally approved by the Deputy Director – Planning and Development, Building Surveyor and the QFRS prior to design finalisation.

All block plans must be provided as engraved traffolyte type and at least A2 (594 x 420mm) in size as a minimum.

All fire sprinkler designs shall nominate the required system duties as a basis for the system performance testing in accordance with the requirements of AS1851.1. All commissioning testings shall be performed in the presence of the Deputy Director – Planning and Development, or nominated representative and all testing results shall be provided to the Deputy Director – Planning and Development prior to inspection and approval by the QFRS. Following the completion of the performance testing the QFRS Community Safety Inspection Officers will conduct their proving tests as a process in the final certification of the systems.

Fire sprinkler systems shall be designed and installed such that system activation is relayed to the QFRS or designated third party monitoring service.

The fire sprinkler service design shall include only SSL pressure switches, installation of other equipment of equal or superior standard shall only be used after the approval of the Deputy Director – Planning and Development has been obtained.

#### **29.4.15 Insulation**

In all cases pipe insulation is to comply with the requirements of the NCC latest edition Section J for thermal properties for the relevant climate zone.

#### **29.4.16 Interfaces with BMS**

Allow for in the design all required interfaces from hydraulic equipment & control panels to JCU's BMS, as specified in JCU Design Guideline Section 23. This includes:

- All Water Meters
- Pumps – signals for pump run/stop, pump fail & high/low level alarms

#### **29.4.17 Metering**

Water metering will be provided to all new buildings or to buildings undergoing refurbishment or extensions. The meters shall be an electric digital full flow meter and be capable to be connected to Special Applications - Laboratories

JCU has PC2 and PC3 laboratories on campus which are significantly controlled spaces. Ensure strict compliance with all Codes, Certifying bodies, regulators etc. Ensure that close communication is maintained from the instigation of the project to fully understand the operative requirements.

#### **29.4.18 Identification of Equipment / Services**

Confirm the plant numbering sequence with JCU Deputy Director – Planning and Development prior to Contract Documentation. Prefix equipment with building number.

All items of equipment must be suitably identified with Traffolyte labels.

### **29.5 USEFUL INFORMATION**

#### **29.5.1 National and State Legislation / Standards / Codes**

As a minimum, the latest revisions or version of

- National Construction Code (revision as determined above)
- All applicable standards
- Queensland Development Codes
- Environmental Protection Act, Regulations
- Work Health and Safety Act
- JCU requirements as the local electricity provider

- QLD Electrical Safety Act and Regulations
- QLD Plumbing and Waste Water Code
- The Plumbing Code of Australia
- The Plumbing and Drainage Act
- The Plumbing and Drainage Regulations
- The Standard Plumbing and Drainage Regulations
- Local Authority's Plumbing and Drainage Department
- JCU requirements as the local infrastructure owners
- QFRS
- These Design Guidelines
- JCU Policies and Procedures
- Any other regulation or local authority requirements applicable to the works

### **29.5.2 Discipline Specific Standards**

#### **GENERAL**

AS2419.1	Fire hydrant installations
AS2941	Fixed fire protection installations – Pumpset systems
AS2304	Water storage tanks for fire protection systems
AS2441	Installation of fire hose reels
AS2118.1	Automatics fire sprinkler systems: General requirements
AS2118.4	Automatics fire sprinkler systems: Residential
AS2118.6	Automatics fire sprinkler systems: Combined sprinkler & hydrant

#### **MAINTENANCE**

AS 1851	Maintenance of fire protection systems & equipment
AS 1851.2	Maintenance of fire protection equipment - Fire hose reels
AS 1851.3	Maintenance of fire protection equipment - Automatic fire sprinkler system.
AS 1851.4	Maintenance of fire protection equipment - Fire hydrant installations

#### **OTHER**

AS 1074	Steel tubes and tubular for ordinary service
AS 1432	Copper tubes for plumbing, gasfitting and drainage applications
AS 1579	Arc welded steel pipes and fittings for water and wastewater.
AS 1674	Safety in welding and allied processes
AS 2053	Non-metallic conduits and fittings
AS 3000	Electrical installations - Buildings, structures and premises
AS 3008.1	Electrical installations - Selection of cables
AS 4041	Pressure piping
AS/NZS 4087	Metallic flanges for water works
AS/NZS 1167	Silver or copper phosphorous brazing alloys
AS/NZS 3718	Copper alloy screw-down pattern taps
AS 1628	Metallic gate, globe and non-return valves
AS 2638	Gate valves for waterworks purposes
AS 1345	Identification of the contents of pipes, conduits and ducts
AS 1431	Copper tubes for plumbing, gasfitting and drainage applications
AS 1432	Copper tubes for plumbing, gas fitting and drainage applications
AS/NZS 4680	Hot-dipped galvanizing
AS/NZS 4792	Hot-dipped galvanizing
AS 1055	Acoustics - Description and measurement of environment noise
AS 1170.4	Minimum design loads on structures
AS 1210	Pressure vessels
AS 1318	Industrial safety colour code
AS 1530	Methods of fire tests on building materials, components and structures



AS 1657	Fixed platforms, walkways, stairways and ladders — Design, construction and installation
AS 1775	Low voltage switchgear and control gear
AS2982	Laboratory Design and Construction
AS 3000	SAA Wiring Rules
AS 3666	Air-handling and water systems of buildings - Microbial control
AS 4041	Australian Standard Pressure Piping

Regardless of the above, any applicable standard is to be considered in the design. The term “AS” shall also refer to “AS/NZS”.

Any divergence from the above or other required provisions is to be listed on the Non-Conformance Register.

### 29.5.3 Interfaces

Further to 29.3.2, as a minimum:

#### 29.5.3.1 General

Ensure that all works necessary for the complete installation and successful operation are arranged with other trades. Ensure also that information required to accurately design the wet fire services is obtained from other trades as required (eg: architectural fire wall details)

As a minimum:

#### 29.5.3.2 Architectural Services

- Plant room sizing (plan and height)
- Gross floor area sizes
- Reflected ceiling plans
- Duct and pipe special requirements and proposed zones
- Rising levels, finished surface levels & finished floor levels
- Riser spaces
- Access panel sizes and locations
- Service clearances
- Penetrations & fire collars
- Location of fire walls, doors, shutters etc
- Bunding requirements
- Location of bollards
- Location & dimensions of bulkheads
- Preferred location of meter assemblies, booster assemblies, fire pump rooms and fire water tanks
- Location of termination of vents and exhausts
- Heights of any racking style storage arrangements

#### 29.5.3.3 Mechanical Engineering

- Requirements for natural/mechanical ventilation of fire pump rooms and sprinkler valve rooms.

#### 29.5.3.4 Electrical Engineering

- Requirements for supplies (location, termination, size, phases) to all wet fire equipment
- Requirements for FIP interfaces & fire alarm indication inside and outside buildings

- Requirements for plant room, fire pump room and external plant deck lighting and service power points
- Requirements for data points for connection to BMS controls e.g. fire pump run
- Requirements for fire pumps and equipment and interface with FIP including audible and visual alarms

#### 29.5.3.5 Acoustic Engineering

- Obtain the Acoustic report if relevant and address requirements for hydraulics
- Provide information of sound power / pressure & vibration and nature of devices
- Confirm internal and external noise constraints and design thereto

#### 29.5.3.6 Structural Engineering

- Location of plant including masses, any additional special items such as dynamic load etc
- Size and mass of exhaust flues, requirements for stays and guy wire fixing points
- Special fixings as may be required
- Location of penetrations
- Location, depth and width of footings for co-ordination with pipes
- Requirements for above or below ground fire tanks
- Requirements for fire tanks located within or on the structure and weights

#### 29.5.3.7 Geotechnical Engineering

- Location and types of soil conditions i.e. highly re-active

#### 29.5.3.8 Hazardous Areas Design

- Review the Hazardous Area Classification for the space and address any hydraulic equipment Requirements e.g. location of electric hot water units
- Where required, arrange for electrical design for Hazardous Areas
- Where potentially flammable or explosive liquids, gases, vapours or dusts are advised, advise the Deputy Director – Planning and Development of such presence and confirm whether a Hazardous Area Classification is required

#### 29.5.3.9 Hydraulic Engineering

- Demarcation between hydraulics and wet fire systems
- Location and sizes of water connections for fire services
- Location and sizes of drains for the testing of the wet fire services