UNIVERSITY *of* TASMANIA

Standard Brief for Infrastructure (Engineering/Building) Services

Infrastructure Services and Development
Version 1.2

Introduction

This document has been produced for use and reference by all persons and parties involved with undertaking built environment works for the University of Tasmania (e.g. Contractors, Consultants, Project Mangers, Facilities Managers, Works / Maintenance Officers).

All effort has been made to simplify or streamline the instructions within this document. Feedback on its content and the areas covered is appreciated and should be directed to Infrastructure Services and Development or provided to the University staff managing the works being undertaken.

In addition to this document, by reference, all design, documentation, and works will comply with the following University guidelines, manuals, policies, and procedures:

- Sustainable Built Environment Designs Policy (minimise waste, maximise efficiency, mandatory ESD report, major building projects identified by the Built Environment and Infrastructure Committee (BEIC) as requiring Green Star certification are designed to attain the maximum Green Star rating practicably achievable, as determined by the Committee)
- Space Management Policy and Space Allocation Guidelines
- Signage Guidelines (specifies the design of all signage)
- As-Installed Data and Information Manual (specifies as-installed requirements with roles and functions as per commissioning briefs and preliminaries)
- Maintainable Asset Forms (asset registration or change forms that must be filled out)
- CCTV Specification Guidelines (a mandatory guideline for the specification of CCTV work)
- Code of Practice – Contractors

Copies of these are available from this website:

https://www.utas.edu.au/infrastructure-services-development/contractors-and-consultants

THIS DOCUMENT SUPERCEEDS ANY SERVICES RELATED REQUIRMENTS OR BRIEFING FROM THE PRIOR DOCUMENT 'UNIVERSTY DESIGN REQUIREMENTS'

ARCHITECTURAL

Design

The architecture of the building shall

- as first and highest requirement minimise the energy required to heat and cool the building by applying passive house principles
- conform with all compliance requirements
- minimise path of travel between different parts of the building, vertically and horizontally
- minimise dependence on artificial light
- maximise flexibility of floor use
- provide firm and accessible pathways for services
- ensure maintainability to preserve the integrity of the building and its architecture
- include modelled climate change impacts (eg increased wind loads and rainfall intensities)
- provide physical security appropriate for the threats, vulnerabilities and risks of the buildings location and its operations. Designed to facilitate clear uncompromised rings of security and employing CPTED where appropriate

Entry

Provide:

- For all buildings, new or existing, not located on the Sandy Bay campus an external key safe near the building entrance on route to the fire indicator panel. Key safe lock to be keyed to Tasmania Fire Service master key only. Cavity to be sized to hold all of the building's relevant access keys (nominally 3). Nominal suitable key safe to be used, *Royce Access Vault RAV570* complete with all required accessories for weather fastness and vandal resistance.

Glazing

Glazing shall:

- be selected to align with passive house principles, generally meeting or exceeding BCA Section J requirements
- not be timber framed unless matching existing (i.e. heritage)
- if awning not open onto paths, ramps or landings such that they obstruct or protrude on pedestrian travel

Provide:

- Aluminium construction with thermal breaking
- Compatible non-ferrous metal working / moving parts
- Factory fitted security lock for accessible sliding windows (e.g. ground floor) to University keying

Avoid:

- Less than 15 year warranty on frame blistering, cracking, peeling or chipping

Roof

- Membrane, tiled and fibreglass roofing systems are not acceptable
- Roof slopes shall not be less than three degrees for metal roofs

- Downpipes shall not be incorporated into structural elements of the building (i.e. columns)
- Designed to support easy installation or inclusion of renewable energy generation or energy efficiency systems (eg photovoltaic or solar hot water)

Provide:

- Trafficable roofs (for inspection and maintenance) of the heaviest gauge for the selected product
- Sumps at box gutter outlets
- Box gutters of 316 stainless steel fabricated to not crevice corrode
- Discharge of overflows clear of the building and pedestrian paths
- Drainage system (downpipes and pipework) free of water noise to occupants
- Gutters, downpipes and overflows designed to cater for climate change adaptation

Avoid:

- Internal box gutters
- Internal downpipes and pipework
- Non-prefabricated or standard products and accessories
- Access from adjoining properties or buildings

Doors

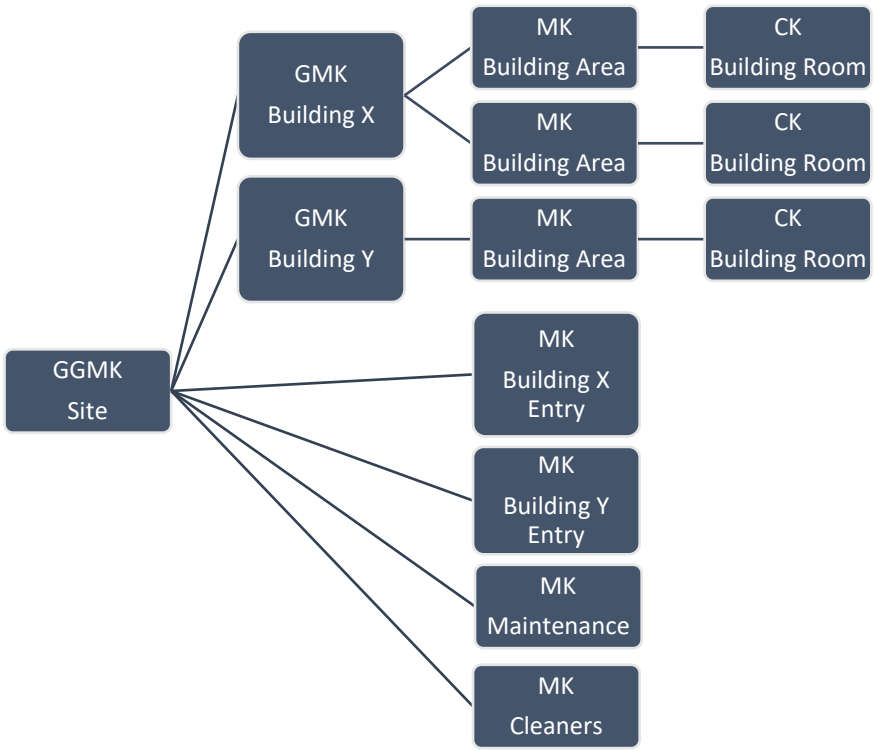
Provide:

- Automatic sliding glass door(s) to front/main entry (minimum 1500mm clear opening) of heavy duty or commercial grade controlled by a keyed multi-function control switch providing Auto / Exit / Open / Lock selection. Keying of switch to be to the Automatic Doors keying for the building.
- Airlocks as large as practicable for main entries
- Solid core perimeter doors of 38mm thickness minimum, hinged outwards with three stainless steel fixed pin hinges and lockable unless exit only and keyed to the External Doors keying for the building.
- Locks (if required) fitted on, or near, central height of doors
- Free handle exit
- Monitored electric mortice locks with key override for all electric locking mechanisms unless electromagnetic locks are required
- Lever type handles only not closer than 40mm to the door stop or jamb or any jamb moulding
- Surface mounted door closers for all doors with electronic access control
- All doors shall be a minimum of 900 mm clear opening or greater as required.
- Glazed doors with wide stile and bottom rail deep
- View panels for solid core doors, where located in a major thoroughfares, corridors and junctions, meeting and seminar rooms, teaching spaces, laboratories, interview/consultation rooms. Note academic offices can be consultation rooms
- External door frames fabricated from galvanised steel or aluminium
- Doors (other than fire doors) shall be of solid core constructions faced with marine ply.
- Painting or finishing / sealing include top and bottom
- Door furniture and fittings of a suitable commercial grade.

Keying

Provide:

- For existing sites keying to existing site systems
- For new sites, Gen6, Protec2 or BiLock inline with the following:



- For any substation or lift access key to the existing state-wide system
- For any node/communication/security node room key to the existing southern or northern keying system

Avoid:

- Locks on individual office doors. Occupants are to utilise secure joinery or furniture.

Do not:

- Cross key with existing systems

AUDIO VISUAL

UTAS Contact and Representative: Brad Boron

https://www.utas.edu.au/it/communication-technologies/standards

Provide and Install:

- Installations to be in accordance with UTAS AV standards.
- Inclusions for digital signage, in-room control systems, meeting rooms, teaching space and personal video conferencing such as personal offices.
- Hearing augmentation in accordance with Australian standards.
- Rooms and access should be DDA compliant
- Installation of all screens to be in accordance with viewing guidelines as per the AETM standards.
- Room booking systems/tablets as per UTAS AV Standards.
- Consultation for space requirements must take place with users of new spaces, and spaces designed in accordance with their requirements in alignment to UTAS standard room designs.
- Any AV integrator needs to be able to provide 4-hour onsite response time during DLP or throughout ongoing room maintenance period.
- For Video conference components in AV spaces, they must be covered by manufacturer direct support and maintenance as well as purchased by the UTAS preferred supplier.
- Source code for all control systems (AMX or Crestron) must be provided to UTAS at the end of the commissioning process. Source code will be owned by UTAS for future maintenance, upgrades and or replication.

COMMUNICATIONS

UTAS Contact and Representative: Andrew Fenney-Walch

https://www.utas.edu.au/it/communication-technologies/standards

Provide :

General

- All telecommunications cabling is to comply with the current version of the University of Tasmania's Telecommunications Cabling Specification and Standard.
- All telecommunications cabling is to be installed by a Panduit Certified Installer, is to comply with the Panduit installation guidelines and shall obtain a Panduit 25 year Certification Plus System Warranty.
- Horizontal cabling for permanent links shall be Category 6.
- Building Backbone cables shall be at a minimum OM3 multimode optical fibre.
- Campus Backbone cables shall be single mode optical fibre with at least 24 fibre cores per cable (to be specified by IT Services for EACH project).
- UTAS Wireless Access Points (WAPs) are Power over Ethernet (PoE) devices requiring 2 x data outlets only. Data outlets for WAPs are to be installed on a 10m grid and with final locations for devices to be determined at the time of deployment.
- All University sites are to have NBN termination in the main comms room.
- Mobile phone antenna augmentation systems to be considered as required.

Comms Rooms

- Communications Rooms shall be sized to meet the known requirements of specific equipment, which can be calculated based on the total number of data outlets to be installed at the site. Equipment shall be installed in compliance with the UTAS standard floor plan and rack layouts.

Rack/Floor Layout Solution	Number of TOs	Max. Outlets	Min. room area (mm)
Single rack	50 - 384	288	3000 * 2000
Dual rack	250 – 576	480	3000 * 3000
Triple rack	500 – 1152	1008	3000 * 4000
Quad rack	1000 – 1728	1536	3000 * 5000

- Total number of data outlets to be allocated depending on usage requirements.

Device	Number of outlets (each)
WAPs	2
Staff Workstation	2-3
Student Lab	1
Help Phone (handset)	2
Room Booking tablet	2

- Where there is more than one floor, Communications Rooms should be located vertically one above the other.
- New sites to allow for redundant dark fibre connections and power feeds, terminated in two separate Communications Rooms.
- Communications Rooms will have no building exterior doors or exterior windows. If external windows must be present (existing buildings only), they will be insulated, furred out and enclosed with drywall board.
- Lighting shall ensure an average luminance of 500 lux on a horizontal plane 1000 mm above the finished floor surface.
- All Communications Rooms shall have a flat level floor and be provided with anti-static treated vinyl floor covering. Carpet shall NOT to be permitted under any circumstances.
- Two separate power supply circuits shall be provided to serve the Telecommunications Space with dedicated industrial style captive plugs and sockets (minimum 15A power - to be specified by ITS depending on equipment load).
- Communications Rooms shall be maintained at a temperature below 30 degrees Celsius.
- Access to Telecommunications Spaces shall be restricted to ITS Staff who need to maintain the infrastructure of the room. The preferred entry control method is the UTAS Proximity Access Control System.
- Where Proximity Access Control is not available, doors to Telecommunications Rooms shall be fitted with a cylinder lock and single keyed with the approved ITS Communications Room Key.
- Allowances may need to be made for the installation of AV/VC equipment in the comms rooms.

Rack Layouts & Equipment

- All equipment racks and layouts must comply with the UTAS standard rack layout and will be refined by IT Services for EACH project.
- UTAS has nominated equipment vendors and products that must be used in any cabling installation.
- All structured cabling system products are to be Panduit.
- All active network equipment (switches, UPS, WAPs), will be specified by IT Services for EACH project.

MECHANICAL SERVICES

Design Conditions

- Outside design temperatures and other ambient conditions are to be based on AIRAH DA09 as a minimum. Critical conditions (i.e. greater maximum and lower minimum temperatures) must be applied to cater for climate change.
- Indoor design temperature 22°C and relative humidity 40 - 60%

Systems

Provide:

- For refurbishment, extension & augmentation of existing systems or renewal. If replacement required, then in-line with this section
- For new education and research buildings or refurbishment over approx. 1,000m2 hydronic systems (i.e. thermal plant, use of AHUs, ducted / room FCU's, active beams, convectors, etc.)
- For new education and research buildings under approx. 1,000m2 variable refrigerant / packaged systems
- For multi-residential buildings, split systems in shared living areas (e.g. lounge) and electric heating in bedrooms
- Constant flow systems (ducted air & hydronic) with suitable by-pass or by-passes
- Standby / duty pumps for hydronic main reticulation
- Minimum 50/50 thermal plant for hydronic systems (i.e. two items of plant, each sized for 50% of maximum demand)
- For critical controlled environment spaces (e.g. animal holding) an N+1 system (i.e. full standby / duty of all components, or duplicate systems)

Avoid:

- Variable flow systems (ducted air & hydronic) unless they can remain fully balanced under all conditions and additionally for air systems satisfy noise and comfort requirements

Plant Selection

Provide:

- Fans with 4 pole or greater motors
- Split & packaged air conditioning systems with variable output to match load (e.g. variable speed compressors)
- Roof mounted fans/cowls and weather louvers complete with birdwire/vermin mesh
- Thermal plant matched to the load range to reduce storage/inertia required

For external plant, insulation, fixings and finishes:

- Only weatherproof that are specially designed and recommended by the manufacturer for external use
- If located within 1km of sea / ocean, treated to avoid corrosion (e.g. blygold for coils)

Avoid:

- Plant that requires special acoustic treatment and attenuation to meet Acoustic Requirements
- Exposed wall / window mounted exhaust fans

Consider:

- Use of plant with natural refrigerants (drop in / replacement type or blends) if supported by plant manufacturer and of common make/model

Plant location, configuration, accessibility and security

Provide:

- Plant room position and layout facilitating maintenance and removal of plant and equipment within room
- Capability to ventilate plant room with refrigerant plant to meet natural refrigerant safety requirements
- Access, maintenance and operating space not less than that recommended by the equipment manufacturer
- Firm air supply and rejection paths for condensers for optimum performance and no short cycling
- For plant that is concealed in ceiling spaces, locate in readily accessible locations not work spaces
- Access doors and hatches to plant rooms or plant in circulation spaces (i.e. not via work spaces) and keyed to the maintenance key for that building
- Acoustic treatment of plant rooms as necessary for noise control
- Minimised vibration transmission by having equipment balanced and resiliently, mounted or suspended with anti-vibration mounts for vibration isolation

Avoid:

- Using plant rooms or ceiling spaces as plenums for return or fresh air (e.g. full duct air paths)
- External switchboards / control panels

External plant shall:

- Have major items of plant grouped and screed when visible form street sight- lines or in open spaces
- Have plant acoustically treated and selected where necessary to prevent all annoyance to neighbours

Roof mounted external plant shall:

- Limit use of the portable ladder to serve not more than 2.5 m heights
- Be provided with a proprietary walkway across the roof and around condensers / condensing unit (unless within a walled plant platform) so that tradesmen do not walk on metal deck roof sheeting
- Where grouped, be located on a structurally engineered platform, preferably walled with perforated sheets, louvers or similar that does not cause excessive stress, deflection or vibration of the roof or main structure or noise transmission to the internal space and be sized to allow access to all sides of plant. Prefabricated platforms, e.g. *Con-form* are acceptable

Ground mounted plant (unless singular) shall:

- Where accessible from public areas, be provided with a lockable enclosure (keyed to the maintenance key for the building)
- On a concrete plinth not less than 150mm above surrounding ground level

Air supply and removal

Provide for all ducted systems:

- Air distribution / diffusion that accommodates the cooling and heating loads without causing discomfort as per ASHRAE 55 or EN-15251 or ISO 7730.
- Internal air inlets and outlets (diffusers, grilles, registers, etc) with removable core, insulated plenum / cushion head box and suitable balancing damper
- Suitable balancing dampers on all flexible and hard duct take offs
- Ducted return and relief/spill air

Avoid:

- Air boots
- Under sizing ceiling to ceiling air transfer

Do not:

- Provide open intake or discharge ductwork, cover with vermin proof mesh as minimum

Zoning

Provide:

- Appropriate thermal zoning to simultaneously meet the indoor design conditions based on the outdoor design conditions
- Individual zoning for spaces with mixed or different occupancies (i.e. individual zones for, teaching spaces, laboratories, and meeting rooms)

Mechanical Services Switchboards & Controller Panels

- All switchboards / control panels to be enclosed in plant rooms and keyed to L&F 92268 or lockable cupboards keyed to maintenance keying for the building
- Painted orange
- Spare switchboard capacity and poles for appropriate future installations (e.g. 25%)
- Electrical meter IP connected with pulse counting inputs, Modbus gateway capability, and on-board logging compatible with UTAS EMS, unless fed by an MSSB that has a meter
- UTAS EMS is Power Monitoring Expert, provided by Azzo Pty Ltd, liaise with them for metering design and further details
- Provide data outlets for controllers and meters housed within it to ITS requirements
- Provide an Auto, Manual, Off selector switch for each item of plant and equipment controlled by that switchboard / controller panel
- Provide green for run and red for fault indicator lamps for each item of plant and equipment controlled by that switchboard / controller panel

Outside Air

- The outside air supply for all ducted air conditioning systems including combined heat and vent systems shall be sized for economy cycle
- Systems for only outdoor air (mech vent) supply should be sized 50% larger than the minimum required unless either providing dedicated makeup air for an exhaust system or outside air for a single room and must use heat recovery for tempering unless incompatible with the spill/exhaust air (i.e. kitchen exhaust hood, fume cupboard)
- Provide sufficient relief, either by exhaust systems or spill air paths for introduced outside air completed with backdraft protection

- Unless fan assisted, spill air that is incorporated into return air paths or systems shall reduce (and stop if required) flow of return air to supply air fans. I.e. Spill air paths shall not create an outdoor air intake path and rely on backdraft protection to avoid it
- Provide minimum 16°C air on for DX coils when heating in ducted units or systems with outdoor air supply

Acoustic Requirements

- Plant & systems are to be designed to minimise noise levels in the building, (other than plant rooms or unoccupied rooms), not exceeding noise levels as prescribed in *AS 2107* or elsewhere prescribed in this document (e.g. audio visual or room specific requirements)

Control & Monitoring

General:

- The UTAS BMS is *Honeywell Enterprise Buildings Integrator* (EBI), provided by *Honeywell* Tasmania. This enterprise system shall be used for all BMS based HVAC control.

- The UTAS Energy Management System (EMS) is *Power Monitoring Expert*, provided by *Azzo Pty Ltd*, liaise with them for metering design, requirements and further details

- BMS configuration e.g. IP & BACnet addressing, graphics, navigation, point naming, alarm settings, scheduling, etc. shall be as per the University's Building Management System Configuration Manual.

- Upon restoration of a power loss / fire alarm all plant and equipment must automatically and sequentially revert to the operational mode before the power failure or fire alarm occurred.

Default Set Points:

- For CO2 based ventilation 450ppm min, 650ppm max or alternatively 200ppm above ambient CO2
- For circulation, open areas and offices variable 21 to 24 degrees linear ramp based on outdoor air temperature of 16 to 29 degrees. Each zone to have its own ramp set points.
- For meeting rooms, teaching spaces and labs 21 degrees

Temperature Control in Occupied / Habitable Spaces:

- Spaces time scheduled, either for pre-conditioning or scheduled occupancy. Spaces typically with scheduled occupancy (automatically) are lecture theatres, teaching spaces, meeting rooms, video conference rooms, laboratories. Spaces typically with pre-conditioning time schedule are offices and circulation/open spaces if conditioned
- Optimised start so space is at temperature set point when time schedule starts
- If occupancy detection to be provided or installed within the zone, setback or up dependant on mode of 2 degrees if unoccupied during time scheduled operation
- Non-time scheduled operation via sensor with integral push button, if occupancy detection to be provided or installed then deactivate when unoccupied otherwise deactivate after few hours
- Pushing activation button on sensor when plant is operating is to deactivate it serving just that zone

Outdoor Air Control:

- Provide demand based control, such that the mechanical ventilation will operate achieve the set point, i.e. irrespective of time schedule or temperature control if CO2 setpoint is exceeded then mechanical ventilation will operate to meet the set point

Exhaust Systems:

- For toilets, unless part of overall building air balancing (i.e. running when outdoor air plant does) operate when lighting does with run-on timer, unless directly controlled by the occupancy detection

Node, Network, Communications Rooms:

- Provide temperature monitoring and alarm on UTAS BMS
- Provide cooling plant monitoring and fault alarm on UTAS BMS
- Cooling is to not de-activate on fire alarm
- Cooling is to resume upon restoration of power supply
- On/off control shall only be local, within the room
- Provide fault output from the air conditioning unit to the Security AACS

Sensors:

- Use temperature sensors with integral user set point adjustment (+/- 2 degree), temp display, push button for zone activation and LED for run indication. User adjustment disabled initially by BMS but can be enabled via graphics
- Outdoor air sensors are to be shielded from radiation, either by location or using an appropriate sensor / weather station

Hydronic Reticulation:

- Meter thermal output of plant and electricity/gas input on UTAS EMS

Ambient Conditions:

- Each building is have and utilise a single outdoor air temperature for monitoring ambient air temperature
- Dependant on the systems to be installed and control strategy, provide singular humidity, pressure, CO2, solar radiation sensing of ambient conditions for the building

Alarming:

- Unless 24 hour 7 day operated i.e. not controlled, alarms from plant/equipment and for systems shall only be generated when the plant/equipment/system is to be operating (e.g. out of pressure range or temperature alarms are not generated unless system or plant / equipment is running).
- Alarm for plant fault or out of condition, for constant or low temperature rooms must be input the security system for monitoring. As direction connection as possible is preferred (e.g. directly from cool/freezer room controller) and wired to be fail safe, e.g. open circuit generates alarm.

For Plant, Equipment & Systems:

- Provide BMS control, monitoring and alarming for the various plant, equipment and systems as tabled.

Item	Control	Monitoring	Alarm
Fan	On, Off	On, Off, Failure (flow or CT sensor)	On Failure
Electric Duct Heater	On, Off, % output, Air off set point	On, Off, Hi-Limit, Air off temp, Air on temp	Hi-Limit trip Air off set point not being met
Solenoid / Motorised Valve or Damper	Position (0-100%)	Position (0-100%)	
Ducted Heating / Cooling Coil	Air off set point	Air off temp, Air on temp	Air off set point not being met
Variable Speed Drive	On, Off, Speed (0-100%)	On, Off, Speed (0-100%), Fault	On Fault
Pump	On, Off	On, Off, Failure (flow or CT sensor)	On Failure
Thermal Plant	On, Off, supply temp set point	On, Off, fault, input temperature, output temperature	On Fault, Set point not being met
Heat Exchanger		Primary and secondary supply and return temps	
Multiple Split Systems (HLI only)	Points as per control strategy	Each unit; on, off, mode, fault	On Fault
Single Split (locally controlled)		Fault	On Fault
Packaged AC unit	On, off, mode, air off set point	On, off, mode, air on, air off, fault	On Fault
Outdoor Air System	CO2 ppm set point	Outdoor CO2 ppm Zone CO2 ppm	CO2 ppm set point exceeded
Variable Flow Hydronic System	Set points as per design control strategy	Differential flow & return pressure at supply pump and each end of line	

Consider:

- Use of air sampling systems for CO2 sensing

- Self-adjusting optimised start periods (e.g. recording initial conditions and the time period to meet set point then applying that time period when initial conditions occur)
- Nonlinear set point ramps, e.g. multiple input controller PMV calculation for automatic set point / system adjustments
- Electricity demand response controls (load shedding)
- Use of analytics for verifying functionality and performing building tuning

Do Not:

- Use any communication protocols for the BMS other than BACnet and Modbus (i.e. do not use LonWorks, Zigbee, etc.).
- Provide any sub IP networks, i.e. all IP devices are to be on the University BMS VLAN, no sub IP network for control systems will be allowed nor VPN tunnels for remote access or communications
- Use Modbus protocol for control. Only use Modbus for monitoring (and if BACnet is not available)

Commissioning

- Contractor to engage Azzo Ptd Ltd for testing and commissioning of metering onto UTAS EMS and Honeywell for testing and commissioning of BMS controls

FIRE SERVICES

General

- Provide fire services in accordance with NCC and TFS (Tasmanian Fire Service)
- Hose reels should be located within dedicated cupboards and flush with wall they are located in
- Buildings not requiring fire detection or protection by the NCC shall be fitted with mains powered smoke or thermal alarms as appropriate and connected to the University's security system
- All fire panel ASE devices in Tasmania must incorporate a University supplied sim card to route all fire signals though the University owned concentrators
- FCDIE (aka FIP) are to be integrated to the University's security system at high level to monitor alarms, faults and isolations. Ensure panel has an appropriate output, such as ASCII over RS232 / RS485 via dedicated output or printer port
- All fire detectors shall be self-indicating
- Sprinkler systems should be designed with consideration of testing and maintenance in regards to valve sets and zoning
- External hydrant shall be double head and with isolating valve for servicing. All hydrants to use Storz quick connection hermaphrodite coupling in-line with TFS requirements. DIN or NEN standard compliant forged Storz 65mm adaptor fitted with a standard (delivery) washer rated to 1800kPa working pressure and 2400kPa burst pressure

ELECTRICAL & SECURITY SERVICES

Supply

- For existing supplies, advise the University and TasNetwork of any reasonable expected increases in demand. Existing demand figures can be supplied if metered to determine increases in load

Provide:

- For new supplies for buildings or sites of 5,000m2 or more a high voltage connection point and private external pad mounted substation. Liaise with the University to determine supply capacity required
- A ring main where multiple University substations
- For new supplies for buildings or sites under 5,000m2 an LV supply from TasNetworks

Consider :

- Use of load profiles from the University for similar buildings as AS3000 can greatly overestimate demand, typically by 40-60%. Spare capacity is required (nominally 20%) but significant overinvestment in infrastructure should be avoided
- Use of busbar distribution rather than submain cables for multi-story buildings with greater than 15 switchboards
- Voltage supply and drop, achieving 220V min and 240V max for devices on end of sub circuits

Substations

Provide:

- Schneider transformer and switchgear
- Schneider VIP protection relays
- For substations with multiple transformers, parallel operation capability for uninterrupted supply during maintenance or component outage. I.e. mirror TX's with equal kVA and impedances and connected via an intermediate LV board complete with bus tie

Avoid:

- Internal substations

Metering

General:

- The UTAS Energy Management System (EMS) is *Power Monitoring Expert*, provided by *Azzo Pty Ltd*, liaise with them for metering systems design, requirements and further details
- All communications to the EMS are to be Modbus over IP via the University's secure network. No VPN tunnels or the like will be accepted for communications.

Provide:

- For new retailer meters (i.e. NMI registered, connection point) Modbus output connected to the UTAS EMS. Nominated metering provider is *Powermetric*.

- Metering for new or extensively furbished buildings and tenancies with floor area over 1,500m2 to NABERS requirements in-line with the Commercial Building Disclosure Scheme. Separate metering of Lighting, Power, HVAC, Lifts and DHW
- Metering of generators (diesel, petrol, solar, wind, etc.)
- Metering of tenancies
- NMI approved meters and appropriate CT's for tenancy meters
- Meters or metering devices with on-board logging and backfill to the EMS
- Commissioning and validation of metering to NABERS or CIBSE standard
- Addition and configuration of meters on the EMS complete with consumption and demand dashboards for building total and building service breakdown and any other customised reports, dashboards or infographics as required by the project

Consider :

- Dual gateway meters where BMS and EMS require power and energy information

Main switchboard (MSB)

Provide:

- Spare capacity for future demand, i.e. initial installation to use only 75% of main switchboard electrical capacity and space
- Painted storm grey or similar
- All locks keyed to L&F 92268
- Suitable surge protection with fault indication/alarm
- Form and construction of the MSB shall avoid shutdown for any addition or removal of sub mains
- Located in a dedicated fire rated room with smoke detection
- Submain/circuit schedule pocket/holder
- Appropriate discrimination

Consider:

- If emergency/backup supplies are required and if so, provide emergency supply chassis

Distribution boards

Provide:

- Spare capacity for future demand, i.e. initial installation to use only 60% of switchboard electrical capacity and space
- Painted storm grey or similar
- All locks keyed to L&F 92268
- Circuit schedule pocket/holder
- Appropriate discrimination
- Located in a cupboard directly accessible from circulation space (e.g. corridor/foyer) and adjacent a services/cabling riser or within an electrical services riser

Consider:

- Phase balancing of hardwired appliances and likely plug loads

Electrical Power

General:

- Provide general Purpose Outlets (GPOs) as designated throughout this document
- Above bench GPOs for desks/workstations or the like should be with integral USB power modules (e.g. replaceable)
- Provide cleaners outlets throughout, generally within circulation spaces and within rooms that are beyond a 15m reach of the nearest cleaners GPO
- Provide Level 2 electric vehicle charging stations as required by the project complete with Type 1 and Type 2 compatible socket, RFID reader, OCPP connectivity via 3G and metering integrated to the UTAS EMS
- Permanently and clearly label all GPOs with switchboard ID and circuit number

GPO colours:

- Beige for non-protected outlets (e.g. cleaners) within protected areas (e.g. body protected) and labelled accordingly
- Red for backup/emergency powered

Avoid:

- Using soft wiring solution GPOs

Do Not:

- Provide GPOs with integral RCD protection. Only sub-circuit RCD protection is to be used
- Use significant quantities of uncommon or expensive plates (e.g. non Clipsal 2000 series or the like)

Generation, Backup and Storage

General:

- All electricity generation, backup and storage is to be designed and installed in accordance with applicable Australian Standards.
- Unless a singular appliance/equipment supply, connect all non-grid electricity supplies to the MSB.
- If generation is capable of exporting beyond the building, provide storage such that it does not

Provide:

- Backup electricity supply with 8 hour run time for controlled environments (research cool/freezer rooms, fridges, freezers, constant temperature, animal holding). Provide external generator connection point for any non-refuel capable backup systems.

Provide for PV systems:

- Only Photo Voltaic panels from manufacturers within the top 5 of the Silicon Valley Toxics Coalition Solar Scorecard (currently *SunPower, SolarWorld, Trina, Aleo,* and *Jinko*)
- Panel optimisation if any shading
- Panel and system monitoring integrated to the UTAS EMS with email alerts for system faults

Provide for diesel generators:

- Output to security system for generator start and fault if available
- Monitoring of emergency stop button on security system, if not locked and keyed to generator control access door key

Provide for uninterruptable power systems supplying essential services chassis or multiple appliances/equipment:

- System monitoring integrated to the UTAS EMS with email alerts for system faults
- Bypass to enable system maintenance or replacement

Provide for storage systems providing demand response:

- System monitoring via the UTAS EMS with email alerts for system faults
- Specified demand control set point on UTAS EMS
- Forecasted demand control set point by UTAS EMS
- Integration to UTAS BMS for demand response of HVAC
- Demand response algorithm approved by the University

Consider:

- Input and mains voltage to ensure overvoltage (greater than 250V) supply does not occur

Lighting

Provide:

- As few differing luminaire types as practical for a single building
- Only luminaires that are supported by local agents
- Occupancy/absence detectors with dual output for HVAC (BMS) use
- Direct controlling sensors/detectors and switches
- External lighting compliant with AS/NZS 1158. All fittings used externally shall be weatherproof, sealed against entry by insects and vermin and be designed with adequate heat dissipation to avoid damage and discolouration to the body, glass and lamp.
- Lighting in accessible duct risers, service cupboards and for external balconies, verandas, stairways and doors

Provide for areas requiring compliance with AS1680:

- Lighting designed with good uniformity for ceiling and working planes (0.7 or more) and not exceeding required lux levels by more than 25%
- Lighting with low brightness and glare control diffusers to prevent discomfort

Controls:

- For spaces without natural lighting, occupancy detection on with manual override off
- For spaces with natural light, daylight harvesting (on/off or dimming), manual on and absence detection off
- For spaces with presentation audio-visual systems, control as per the above and external control input via Dynalite programmable lighting controller. Refer to AV standards/requirements for scene/program requirements
- For external lighting PE-Cell
- For external façade lighting, or the like, PE-Cell master and time clock. Preference for BMS to provide time clock function.

For LED lighting that is to comply with AS1680 provide only luminaires that:

- Are supported by an LM 79 certified photometric test
- Have an IES LM-80 testing report for the LED lamp, module or array

- Had an in situ temperature measurement test for the luminaire (in 25 degree operating conditions) with recorded case temperature
- Have colour rendering of Ra80 or greater
- Confirm to all relevant tests and parts of AS/NZS 60598.1, AN/NZS CISPR 15:2011 and IEC/PAS 62722-2-1
- Drivers certifying compliance with AS/NZS 61347.1 and AS/NZS IEC 61347.2.13
- Have LED boards and drivers that are removable/upgradeable (e.g. Zhaga or manufacturer guaranteed)
- McAdams ellipse rating of 4 McAdams SDCM's or lower.

Consider:

- Existing lighting and consistency of the building or site
- *Steinel* occupancy detectors
- *WE-EF* external lighting

Avoid:

- Bollard light fittings
- Programmable lighting control systems

Exit and Emergency Lighting

Provide:

- In addition to NCC requirements, emergency lighting in teaching rooms, laboratories, switchboard and node rooms, every room or space to which there is public access and toilets
- Fittings with minimum 5 year warranty and are self-testing

Consider:

- Manufacturers that provide online electronic log books and mobile device applications for logging of test results

Lightning protection

Provide:

- A lightning protection system where required by *AS 1768*

Consider:

- Risk to electromagnetic sensitive research equipment from electrical distribution and building structure

Security Services

CCTV, access control, alarms and security infrastructure is to be designed in consultation with the University's Security Technical Officer, extending the existing *Gallagher* Alarm Access Control System (AACS) and *Geutebruck* Video Management System (VMS)

Closed Circuit Television (CCTV)

Provide:

- CCTV compliant with the University's CCTV Specification Guidelines

- Coverage of all entry / exit points at each ring of security (access control point)
- Complete coverage of car parking, external assembly or thoroughfares and internal public assembly areas

Consider:

- Use of analytics for access control and intruder detection via integration with the AACS
- Analytics for occupant counting / detection

Electronic Access Control

Provide electronic access control for:

- All main entry doors
- Node rooms
- Laboratories
- Computer Rooms
- Teaching Spaces
- Other rooms/doors as determined by the project
- Elevator floor control as determined by the project

Provide:

- *Gallagher T series multi-tech* readers with backing plates as required
- Self-containing *Gallagher* dual cabinets complete with 8 Amp power supply, 4 off. 7AH 12VDC batteries and internally mounted power outlet and data outlet. *Gallagher* HBUS/IO accessory cabinets are permitted when wired directly to and powered by a dual cabinet
- Release of doors upon fire alarm / sprinkler system activation
- Fail secure mechanisms unless required to be fail safe by the BCA (i.e. only internal fire isolated exit doors due to possible re-entry)
- Monitored electric mortice locks with key override for all electric locking mechanisms unless electromagnetic holders are required
- White break glass alarm only adjacent electromagnetic held doors for breaking of power to the holder
- Green 'push to exit' button for egress through doors that are not free handle exit (e.g. automatic sliding doors)
- Wiring of access controlled automatic doors via their key switch to make the access control system the master (i.e. when key switch is in auto, the door will automatically open and close unless the access control system closes it)
- Updated graphics and programming to approval of the University's Security Technical Officer within *Gallagher Command Centre*.

Consider:

- Use of secondary cost efficient access control systems (i.e. *Salto, Aperio*) fully integrated with the AACS for more extensive electronic access control (e.g. office doors)
- Locking and unlocking via single and double swipe (reading) of access card
- Arming and disarming of intruder areas via single and double swipe (reading) of access card
- Integrations of the AACS and VMS for event monitoring

Do not:

- Use electric strikes

Alarms

Provide alarming for:

- Access toilets duress, complete with small blue strobe above the toilet entry door
- Reception duress, of twin button type located under/behind the counter
- Any wireless duress buttons required to connect to the *Gallagher* panel as individual inputs via *Inovonics* wireless duress buttons or similar. Any wireless duress system is required to be operational in all areas of the works space in the building
- Research fridge, freezer, cool and freezer room fault outputs, wired to be fail safe and individually monitored
- Automated External Defibrillator (AED) cabinet opening
- If intruder detection is required, provide PIR motion detectors, reed switches, perimeter alarms and/or glass break alarms as required for the situation
- Intruder detection for tenancies with zone arming via combined *Gallagher T series* Alarm Terminal/Card Reader Alarm Terminal

Provide (if not already for access control):

- Self-containing *Gallagher* dual cabinets complete with 8 Amp power supply, 4 off. 7AH 12VDC batteries and internally mounted power outlet and data outlet. *Gallagher* HBUS/IO accessory cabinets are permitted when wired directly to and powered by a dual cabinet
- Updated graphics and programming to approval of the University's Security Technical Officer within *Gallagher Command Centre*

Cabling

- All cables must be neatly terminated and clearly identified on both ends.
- All wiring shall be securely concealed where possible.
- All cables and cabling methods are to be specified and installed as per the manufacturers requirements

HYDRAULIC SERVICES

General

- The UTAS Energy Management (and metering) System is Power Monitoring Expert, provided by Azzo Pty Ltd, liaise with them for metering design, requirements and further details

Provide:

- For water supply, sufficient isolation valves to isolate each level, ablution area and valve/device train (i.e. facilitate removal of backflow or tempering devices)
- For isolation valves with lever handles, arrange so they point in the direction of flow when open and 90 degrees to it when closed

Consider:

- Increased rainfall intensity due to climate change in design of stormwater capture and flows.

Cold Water Supply

Provide :

- Domestic cold water supply metering for the building via the UTAS EMS
- Hose cock taps near mechanical plant that requires periodic cleaning

Hot Water

Provide :

- Domestic hot water supply (cold water input) metering for the building via UTAS EMS
- Metering of electrical input to domestic hot water via UTAS EMS
- For central systems, heat pump type or evacuated tube solar systems with electric boosting suitably controlled or configured for minimal energy consumption
- Expansion relief (prior to check valve) on cold water supply to water heating systems to minimise heated water loss. Only safety relief (not general expansion relief) shall be used on hot water cylinders

Consider:

- For recirculation systems with reasonable pipework loss, higher levels of insulation or circulation through the entire system i.e. at the cold water supply point to maximise use of heat pump or solar prior to electric boosting
- Electricity demand response control of DHW system via UTAS BMS
- UTAS BMS monitoring of DHW plant faults or failures
- Time scheduled or occupancy based control of DHW reticulation pumps

Avoid:

- Dead legs in reticulation

Sanitary and Sewer

Provide :

- At least one floor drain in the vicinity of wash basins and each mechanical plantroom with hydronic plant
- Drainage in plant and electrical rooms that contain sprinklers

Avoid:

- Dead legs in reticulation
- Use of automatic air admittance valves

VERTICAL TRANSPORTATION

Lifts

General

Provide :

- Lift services suitable for good quality commercial office accommodation and which, demonstrate proven reliability and performance
- Vertical lift access to all levels of the building including the basement (if provided) and roof / plant room.
- Fully DA compliant passenger lifts, including braille and voice annunciation
- For buildings with 6 levels or less 1m/s speed
- Dry or wet sump in lift well (useful for pumping out lift shaft from floods/sprinkler activation)
- Hands free 4G or similar mobile connect help phone, programmed to call University Security
- Default rest on the 2nd floor or higher, not 1st floor (avoids car damage in case of shaft or foyer flooding)

LANDSCAPING

Provide:

- Wherever absent, 100-150mm of quality top soil to all landscaped areas to avoid planting directly into building spoil/rubble.
- 150mm of mulch to all garden beds of a suitable type given the prevailing site conditions e.g. do not use lightweight fine bark mulch in areas of heavy winds etc.
- Suitable "Falls" or drainage to all landscaped areas to avoid water-logging of low lying areas.
- Suitable garden bed edging to contain mulch and garden bed materials
- Wherever grass/turf abuts the building walls construct a 400mm wide concrete mowing strip along the perimeter of the building envelope to avoid damage to walls and windows during brush-cutting and mowing operations.
- Programmable water wise irrigation system to all landscaped areas
- Drought tolerant, low maintenance plant species (preferentially Tasmanian endemics or Australian) suitable to the prevailing micro-climate
- Safe access points to elevated landscaped areas to avoid the need for boom lifts etc. during routine grounds maintenance
- Anchor points/edge protection to elevated landscaped areas to allow for safe maintenance

Avoid:

- Avoid windows extending to within 300mm of ground level wherever grass/turf that requires maintenance is abutting, to avoid breakages during mowing operations.
- Creating elevated landscaped areas in positions that provide poor maintenance access.
- Creating areas of over 20 degrees of slope that require mowing.
- The planting of medium to large tree species within the proximity of building envelopes. Trees should be planted a distance from the building of no less than the radius of the expected mature canopy size of the particular species.
- The planting of tree/plant species next to pathways, carparks and hardstand areas that have the ability to deposit seed pods that constitute a slip/trip hazard, e.g. gum nuts, acorns etc.
- The planting of long leafed "Strappy plants" within a distance of pathways that will allow the mature sized foliage to droop onto the path surface creating a trip hazard
- The planting of species that are considered toxic
- The planting of species that have spiny or sharp foliage capable of creating an injury
- The planting of species that will impact on or encroach upon security camera sightlines.
- The planting of species that will require regular trimming/ hedging.