

1. ELECTRICAL SERVICES – DESIGN

1.1 GENERAL REQUIREMENTS

The Documentation shall be quantitative, prescriptive and correlated from a full site investigation undertaken by the consultant. Design to best practice and economical priorities. It is not acceptable to indicate that services shall be designed and installed to the requirements of a particular Australian Standard.

All designs are to comply with the BCA, current Australian Standards, Acts, Codes and Regulations applicable to the works, the requirements of the Building Certifier, the requirements of the NT Fire and Rescue Services Authority, the requirements of the PowerWater Corporation and best practice.

Consider power factor correction for larger sites.

Forwarded designs to the Principal at 50%, 75% and 100% documentation stages.

Develop a safety and design report to cover 100% design.

Provide cost estimates for inclusion in the overall project cost estimates.

1.2 ENVIRONMENTAL CONDITIONS

Obtain data from an Australian Bureau of Meteorology source applicable to the project location and insert the applicable details in the sections below.

Consultants shall make themselves aware of the climatic conditions prevailing in the area of the project, especially, but not limited to, severe wind conditions, extreme rainfall events, lightning strikes, flooding, fires, smoke, dust, humidity levels, temperature ranges and irradiation from the sun.

Temperature range [enter value]C to + [enter value]C

Isokeraunic/Isoceraunic Level [enter value] days (Refer to “Lightning Protection” below.)

Humidity is [enter value]

[Enter information as appropriate]

The area is subject to high levels of windborne dust during dry periods.

Drifting smoke from fires in the adjacent regions shall be considered.

Soil resistivity tests from an area in the immediate vicinity of the site will be made available on request.

1.3 ENERGY CONSIDERATIONS

Design for minimum energy consumption.

Consider the following in the design:

- a) Use of motion sensor for low use rooms
- b) Use of fluorescent lighting fitted with electronic ballasts
- c) High efficacy luminaires with preference for LED
- d) Use of LED Emergency and Exit lights
- e) Solar panels in conjunction with PWC supply
- f) Power factor correction

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Where specific measures are taken to reduce energy consumption, provide lifecycle costing of that design.

1.4 DESIGN DRAWINGS

The Drawings and Specifications shall clearly indicate the Scope of Works and shall provide details of all the components to be installed. Specification by brand name is acceptable.

The Architectural Design Drawings (internal and external elevations) shall include the locations of all the electrical accessories; e.g. switches, socket outlets, light fittings, air conditioning controls, access and security keypads and cards readers, door lock override pushbuttons, etc. including mounting heights and critical dimensions.

Provide individual floor plans for each building. No typical drawings for floor plans will be accepted.

1.5 SPECIFICATION

In general, the Design Drawings shall include the information for the type, location, number, connection for all the specified equipment.

The Specification shall be used where necessary to clarify the design intent and to convey technical requirements which are not appropriate to include on the drawings.

Specification by brand name and catalogue number is acceptable, however, the document must clearly state where equivalents may be offered.

Ensure that the specified equipment, fixtures, fittings, cables, conduits etc are suitable for the intended location within the NT and that they are readily available for supply and installation in the intended location within the NT.

1.6 MAXIMUM DEMAND

Provide the Maximum Demand calculations for the Design Review Meetings. Updated maximum demand calculations as necessary during the design process.

1.7 EMERGENCY POWER SUPPLY

Provide the following if an Emergency Power Supply is required.

Design an Emergency Power Supply for the building in compliance with the following Standards.

- Standby Diesel Generator: To AS/NZS3000:2007 Section 7.3 and AS/NZS 3010
- Uninterruptable Power Supply (UPS): To AS 62040.1.1 and AS 62040.1.2

Provide the proposed design to the Principal for approval. Include:

- The design philosophy,
- Essential load Maximum Demand figures and a schedule of the equipment requiring Essential Supply.
- Maximum Demand figures and design calculations for the UPS together with a schedule of the equipment to be connected. Equipment to be confirmed in conjunction with the Principal.

1.8 GENERAL ELECTRICAL SERVICES

Provide the design calculations for maximum demand, voltage drop, fault levels, cable sizing and fault loop impedances.

Determine all the circuit breaker sizes and protection settings. Ensure selectivity between circuit breakers.

Generally allow to run cables on cable trays above the ceiling of the corridors and public access areas. Size trays and their suspension systems to facilitate the installation of additional cable during the design life of the building and whilst the building is in full use.

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In smaller buildings stainless steel or coated galvanised catenary wiring may be utilised for cable support.

Design the cable locations in the walls to the specific requirements of AS/NZS3000.

Ensure all conduits external to the building have a minimum of 50% spare capacity.

Specify all cable sizes on the drawings. If parallel cables are required, only 3 cables shall be connected in parallel.

Seal all enclosures including Distribution boards, junction boxes, cabling racks against the entry of vermin.

Seal all conduit ends to prevent the entry vermin.

Seal all external luminaires against entry of insects.

Seal all building penetrations against wind driven rain, vermin and insects.

Where cables exit an air-conditioned space to an unconditioned space, seal the penetration against ingress of humidity. Vapour barrier to be continuous.

Sealant must be fire rated if through a fire rated wall.

Electrical floor plans must have circuit identification relevant to the switchboard single line drawings.

No proprietary equipment or programs to be nominated for BMS, fire security, generation or mechanical control systems.

Lighting and GPO circuit loads must not exceed 75% of circuit breaker capacity.

Nylon jacket for all underground mains cables.

1.9 SOFTWARE OWNERSHIP AND ACCESS

General

It is a fundamental requirement of the project that all controls and associated software systems are provided without any restrictions to cause the department to be committed to specific manufacturers or controls system integrators / suppliers. All passwords and access rights / responsibilities, inclusive of access / change rights to the base controls programming, shall be passed in full to the department prior to completion of the project.

Ownership

At the date of practical completion, transfer ownership of all software and supporting documentation produced under this contract to the facility manager.

Rights to modify

Assign to the facility manager unrestricted rights to employ any person or organisation to operate, modify or replace the software. Include in these rights all password access, software and documentation (eg, development and testing packages) necessary to achieve this.

Software upgrades

Supply and install all software upgrades, revisions and the like issued by the manufacturers up to the end of the Defects Liability Period.

1.10 FIRE RATED CABLES

Fire rated cables shall be fixed to cable support systems with stainless steel cable ties.

Cable support systems for fire rated cables, including fixings to structural elements, shall be certified for performance in fire conditions.

Cable support systems for fire rated cables shall be fixed to fire rated structural elements.

Otherwise use conduits with concrete encasement to provide the required fire rating.

1.11 DISTRIBUTION BOARDS

Boards shall be full metal boards with lockable doors and hinged escutcheons.

Ensure that there is a minimum of 30% spare poles in each Board.

RCD protection shall be by individual, single pole width RCD/CBs

Proprietary Distribution Boards are preferred.

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All Legends shall be supplied on computer disc in “Microsoft Word” format.

Provide a single line diagram for each switchboard inclusive of circuit identification, all cable sizes and surge protection. Include within design sufficient room for cable terminations.

1.12 CONDUITS

Ensure that conduits carrying multiple circuits are sized with spare capacity.

Long runs of dedicated conduits shall be appropriately sized to reduce the risk of damaging the cables during installation.

1.13 LIGHTING

Provide a schedule of any specific lamps to be used. Luminaires which require specific lamps shall be permanently labelled on a surface, clearly visible to the Maintenance Personnel, indicating specific lamp requirements and the lamp description.

If requested by the Principal, provide copies of all lighting calculations and Isolux diagrams for all artificially illuminated areas, both internal and external to the building.

Preference for LED light fittings over discharge light fittings on all external lighting including carpark lighting, area lighting and high use sporting arenas. Provide the maintenance factors and lamp depreciation factors used in the calculations.

1.14 EXIT AND EMERGENCY LIGHTING

Provide exit and emergency lighting in accordance with the requirements of the BCA and AS2293.

Consider providing additional lighting in critical areas (to assist the facility occupiers/users during any period of loss of normal power supply).

1.15 LIGHTNING PROTECTION

Provide calculations and lightning protection proposals appropriate for the Isokeraunic/Isoceraunic levels of the site for approval by the Principal prior to inclusion in the Design.

Main switchboards must have 200ka and distribution boards 50ka surge protection devices.

1.16 METERING

Provide electronic “smart” meters in each Distribution Board. Where the installation incorporates a new or existing BMS system connect the meters into the BMS system to facilitate the monitoring of the magnitude and pattern of energy consumption.

1.17 SPACE FOR EQUIPMENT

Ensure sufficient space allowed for the installation and maintenance of all the electrical services infrastructure. eg, communications racks, distribution boards, mechanical services control panels, nurse call equipment, fire indicator panels, emergency lighting monitoring equipment etc.

1.18 FIRE DETECTION AND PROTECTION

Design fire detection and alarm systems, including occupancy warning systems, in accordance with the BCA , AS 1670 and all other relevant Australian Standards. During the design process consider any/all special circumstances of the building, its structure and its location.

Indicate on the drawings the location, type and number of all detectors and alarm devices including concealed detectors where applicable.

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1.19 COMMUNICATIONS REQUIREMENTS

Communications requirements to be in conformance with:

- All relevant Australian Standards
- NT government Data and Voice Cabling Standard available at: http://www.nt.gov.au/dcis/info_tech/ict_policy_strategy.shtml

Identify the need for 6A UTP or 6A F/UTP for specific sites at design stage.

On Department of Education (DOE) projects, comply with the latest DOE ICT requirements for schools.

The number of lead-in conduits to be considered at design stage to provide access for NBN and multiple providers.

1.20 DEPARTMENT OF HEALTH SPECIFIC REQUIREMENTS

A complete design to be completed for all body and cardiac protected areas to comply with AS3003 inclusive of schematic diagrams to detail cardiac earthing systems. All body and cardiac protected areas to be certified by a Bio-Medical Engineer or qualified trained personnel with the correct calibrated equipment. Areas need to be identified for Cyanosis lighting requirements.

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