Client

Multiplex

Long Bay Forensic & Prison Hospitals
Services Enhancement and Expandability Report

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Lincolne Scott Australia Pty Ltd
ABN 47 005 113 468
Level 1 41 McLaren Street
PO Box 6245 North Sydney
New South Wales 2060 Australia
Telephone 61 2 8907 0900
Facsimile 61 2 9957 4127
sydney@lincolnescott.com
lincolnescott.com

Authorised for Issue

Project Leader

Date

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Introduction

This report summarises the basis energy and water management principles proposed to be designed for the Prison and Forensic Hospital development at Long Bay Prison Complex. The basic objectives are to;

- Provide efficiency and flexible design across all services
- Minimise energy usage and wastage – through means of innovative design and plant capacity flexibility
- Monitoring and energy management capability
- Use of in all air conditioning systems and plants.
- Long life and maintainability
- Explore environmental friendly design items where appropriate for the development – ie environmentally friendly refrigerants and oils, solar technologies for hot water.

The above items need to be attained in light of the buildings purpose and design parameters required to be complied with.

1.1 Indoor Environmental Air Quality

Indoor environment air quality is to be provided to an acceptable standard with the following design parameters;

- All habitable areas will contain twenty four hour air conditioning provisions –
- Natural and system ventilation (supply and exhaust) will be provided to applicable areas to code requirements
- Outside air provisions to code requirements through the air conditioning system
- Infiltration to be kept to a minimal considering the closed nature of the building envelope
- Filtration system to remove the salt laden air before entering the air conditioning system
- Natural lighting provisions provided and light switching management – where appropriate

Fresh Air Supply

Outside air requirements to code provisions to all habitable areas.

Natural or system ventilation (supply and exhaust air) to code provisions to required spaces.

Natural Lighting

Natural light to be reviewed and provided where appropriate with artificial lighting and control systems including occupancy sensing and time and switching provisions to provided control and flexibility to usage and minimise energy wastage.

2 Plant Design & Energy and Water Management

2.1 Lighting Control System

Utilisation of lighting control is essential to both the functionality of the hospital and the desire to reduce the energy consumption of the installation.

The primary function of the lighting control system is to eliminate unnecessary illumination of unoccupied areas and to provide both localized and central time clock controlled functions.

Where the integrity of the day to day work practices are not compromised, natural day lighting levels will be optimised by the use of photoelectric cells as part of the lighting control installation.

A number of controls manufacturers can be employed to achieve the switching requirements necessary for this establishment, with the capability for direct interfaces to the BMCS.

2.2 Low Energy Building Design

By ensuring that the design of the building envelope is specifically designed for the climate with which the building is located, the building's services do not have to constantly fight against the external conditions. As a result of this, a low energy building design is being considered which will reduce the energy consumption and running cost of the building's services.

The air conditioning systems are to be designed with the following objectives:

- minimisation of energy use for the selected system,
- minimisation of greenhouse gas emissions without compromising function,
- adequate cooling, heating, humidification and dehumidification where required
- consideration of occupant thermal comfort
- responsible control of HVAC systems
- thermally insulated roofing – minimal R3 insulation
- performance glazing – Minimum performance:
    - U Value: 6.0 or lower,
    - Shading co-efficient: 0.4 or lower
- ventilated ceiling spaces – combination of cross ventilation and roof extraction whirly vents

2.3 Central Chilling & Heating Plant

Chilled water air cooled central plant facilities and gas heating water reticulation for thermal comfort are being designed for the Forensics and Hospital sites with variable delivery to load control to delivered areas. The plant is to being designed with the following objectives:

- Selected for energy efficiency, particularly at part load,
- Configured for optimum efficiency,
- Adequately commissioned and maintained.
- Selection of refrigerants with minimal or no ozone depletion potential

2.4 Lighting Design

New generation tri-phosphor fluorescent lamps (T5) can offer savings greater than 50% in operational energy when compared to mono-phosphor lamps with iron core ballasts. They also offer a better colour balance, use less glass in manufacture, do not contain mercury, have a higher maintained illuminance and the lamp's life is greatly extended, effectively halving the rate of replacement. This clearly has a number of benefits above the energy efficiency agenda.

The efficiencies in energy utilisation basically mean that more light is delivered for less energy. This in turn means less wasted heat which has a further benefit of lower air-conditioning costs.

Light depreciation is also a factor to be considered in the evaluation of efficiency. T5 fluorescent lamps will stay at more or less peak brightness for most of their life. This means a longer "economic", or useful life, remaining a viable source of light for up to four times that of alternative lamps.

Compounded, the above highlighted efficiencies offer the benefits of substantially reduced maintenance and running costs, whilst at the same time producing high quality illumination.

T5 lamps are proposed to be utilised where sensible throughout the facility.

Lighting controls are essential in ensuring the effective utilisation of natural lighting by daylight linking. In addition they have an important role to play in turning lighting off when spaces are unoccupied. All enclosed spaces are to have individual lighting control with both local switching and time clock override via the building monitoring and control system.

Where natural lighting is utilised, lighting controls shall be used to ensure that artificial lighting only operates when required.

2.5 Water-cycle and Wastewater

Water is becoming an increasingly precious natural resource. Within Australia and worldwide, various forms of water conversation methods and schemes are being used to combat water availability problems.

Potable water demand management will be through the following initiatives:

- High efficiency water fixtures utilising minimum of AAA (3A) fittings staff areas and AAAA (4A) fittings to wards and Dual flush toilets.
- Rainwater harvesting collection is proposed with a large rainwater collection tank. Rainwater re-use is proposed for irrigation. The reuse not only helps reduce potable water demand but the collection reduces the stress and impact on stormwater infrastructure.
- Water metering will be provided around the site to allow management of water usage through monitoring the status of water conservation targets.