

DARLING WALK

Darling Harbour, Sydney

Minimum Building Standard

EA Version Issue A

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Approved:

Bovis Lend Lease (The Contractor) _____ Date: _____

LLIM for DW SPV (The Owner) _____ Date: _____

Lend Lease Development (The Developer) _____ Date: _____

The Tenant _____ Date: _____

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1.0 GENERAL

1.1 Hours of Operations

The building will be designed to be operational 24 hours per day, 7 days per week. The hours of operation for typical business days are anticipated to be *7.00am to 7.00pm* from Monday to Friday, after which time the building security access control system operates to provide entry for authorised personnel access only. After hours air-conditioning will be available on request.

2.0 MECHANICAL

2.2 Outside Design Conditions

Summer: WB: 32°C DB: 23°C WB (Sydney CBD standard)

Winter: 7°C DB

Air handling unit cooling coils serving tenant office areas will be sized to cater for an external design ambient condition of 34.5°C dry bulb, 23.5°C wet bulb. For all other purposes the design ambient condition will be 32°C dry bulb, 23°C wet bulb

2.3 Inside Design Conditions

Office Areas:

Temperature

21.0°C to 24.0°C

Relative Humidity

40 – 60 % RH controlled to eliminate chilled beam condensation

Relative humidity to be controlled to eliminate chilled beam condensation

2.4 Comfort Criteria

- a) PMV between –0.5 and +0.5
- b) Air distribution will provide even, draught free air movement and will be readily amenable to modification to suit partitioning alterations. Air movement will be less than 0.25 m/s in occupied spaces measured 1.0 to 1.5m above floor level.

2.5 Acoustic Criteria

- a) The acoustic environment within the occupied areas of the building will comply with the requirements of AS2107 - Recommended Design Sound Levels and Reverberation Times for Building Interiors and will not exceed the 'satisfactory' level recommended in Table 1 of that Standard. General office areas not to exceed NR 38.
- b) Refer to “Indoor Environment Quality” of ESD Section for additional requirements.

2.6 Filtration

- a) Filtration will satisfy the requirements of AS1324, Type 1, G4, Class A for Prefilters, F5 Class B for final filters.
- b) Air filter gauge, monitored by BMS, on each filter bank will be provided for all filters that handle over 1000l/s.

2.7 Population

Population allowances are:

- a) One person per 10m² NLA for Typical Floors.

- b) in accordance with AS 1668.2 where not specified above.
- c) The minimum outside air provisions shall be not less than 10l/s/ person based on high efficiency air filtration and population density or as required to achieve the nominated ABGR/Green Star Rating.

2.8 Air Conditioning

The base building air-conditioning will be designed and installed to suit the proposed design solution including:

- a) A 100% fresh air cooling system plus chilled beam cooling system to all commercial office floors.
- b) Chilled beams, diffusers, zoning and controls to provide the performance specified.
- c) Central chilled water system with central air handlers; common air handlers for Internal and Perimeter zones; air distribution via swirl diffusers; perimeter zones complete with duct mounted hot water heating coils.
- d) A closed circuit supplementary condenser water loop employing duplicate run and standby pumps will be provided to serve both buildings. Plate heat exchangers with 100% duplicate capacity will connect to the base building condenser water system. The base building condenser water system will be provided with run and standby pumps and sufficient heat rejection capacity to allow one tower to be off-line due to failure or maintenance. Impact to ABGR to be assessed during detailed design.
- e) Central chillers utilising a combination of absorption and electric chillers; Chiller plant capacity to be sized for peak-load load conditions +20%. The chillers will be configured to achieve 50% redundancy in accordance with the PCA definition. Low load refrigeration machine shall be provided to allow operation down to 5% of total installed capacity or 100kw whichever is the lower.
- f) Mechanical ventilation with CO controls and VSD fans will be provided to mechanically ventilated car parking areas.
- g) Ventilation will be provided to switch rooms, substations, store rooms and the like.
- h) Mechanical ventilation will be provided to all bathrooms, toilets, cleaner's rooms and the like.
- i) Tempered, filtered air supply to all occupiable spaces such as Security Rooms, Shower Facilities, Dock Offices in Basements,. Loading docks not included
- j) Heating Hot Water System with a minimum of two boilers and pumps as primary or back up heat source.

2.10 Return/Relief Air

- a) Return/relief air will travel partially through the ceiling void above the perforated ceiling tiles to the core
- b) Return/relief air will also travel from the floors via the atrium to the roof top plant room.
- c) Acoustic cross talk attenuators or return air attenuated boots and special return air grilles will be provided in acoustically rated rooms.

- d) Smoke Management system will be designed to allow the connection of two levels via open tenancy stairs. Three levels can be connected via open tenancy stairs where one of those levels is at a level providing direct egress to a street / open space or where located within an atrium, subject to fire engineered solution demonstrating compliance with the performance provisions of the BCA. Smoke management currently based on BCA 2007 Smoke Control requirements for each building.

2.11 Lighting Load

Lighting load will:

- a) Suit actual installation, including ballast heat;
- b) In open office areas lighting load 10W/m²; and
- c) In core areas lighting load 10W/m².

2.12 Equipment Load

Office Areas will be provided with - 15 W/m² NLA for Equipment.

2.13 Out-of-Hours Capability

The Facility will provide:

- a) 24 hours availability of all plant;
- b) capable of independent out-of-hours operation. Minimum of 4 zones per floor plate for after hours operation will be provided in accordance with PCA Grade A for each building.

2.14 Maximum Zone Area Capable of Independent

Thermostatic Control

Maximum size of air-conditioning zones are will be:

- 85m² for Perimeter Zones.
- 120m² for Centre zones.
- Maximum of four chilled beams in one group controlled by one chilled water valve

2.15 Supplementary Condenser Water System – Closed Loop

- a) The supplementary condenser water system will be based on a NLA capacity from every floor to achieve environmental objectives. Design allows 35 W/m² heat rejection for each building – space for tenant cooling towers provided.
- b) Cooling Towers, pumps, heat exchangers and associated valves and controls will be provided with to enable shutdown, failure, maintenance or cleaning without loss of water flow or temperature to the tenant floors.
- c) Two tenant condenser water risers (one in each core) will be provided.
- d) 65mm Ø valved take offs will be provided at each riser on every floor.

- e) Supplementary Condenser Water System will be supported by gas fired Cogen engine plant.
- f) Make up water for cooling towers supplied from blackwater treatment system – storage capacity to be confirmed and subject to design development

2.16 Supplementary Outside Air (dehumidified and cooled)

- a) The Facility will provide for all specific outside air requirements for meeting and training rooms and the like based upon 0.3l/s per sqm with branch ducts on each floor sized at 0.5l/s per sqm. Two risers provided per building in primary core.
- b) A branch duct will be installed for each riser at each floor terminating in clear ceiling space for future connection
- c) Duct will be terminated with motorised OBD with BMS interface and cap
- d) VSD will be provided to the fan. The fan will be capable of delivering the specified air quantity with extra 100Pa pressure drop beyond the cap

2.17 General Exhaust System for Tenant Use

- a) Over and above the base-building provision, two dedicated tenant's general exhaust system will be provided rated at 0.2l/s.m² NLA with capacity for 0.5l/s.m² NLA on any individual floor. Two risers provided per building in primary core
- b) At each floor a branch duct with OBD capped off for future use. The branch will be marked "General Exhaust".

2.18 Kitchen Exhaust

One kitchen exhaust system of 3500 L/sec per building will be provided to serve commercial kitchen within the tenant office space.

3.0 ELECTRICAL

3.1 Main Switchboard

Form 4 construction in compliance with AS3439 of modular construction to facilitate change and expansion. Floor mounted front or back connected sheet metal cubicle type. One Main Switchboard to be provided for each substation. Each MSB to be accommodated separately in a fire rated room. Spare space shall be provided adjacent to each MSB for additional future cubicle expansion of up to 15%.

The MSB shall be rated to the full output of the substation(s) and shall be designed to allow the easy expansion of the MSB busbars to a future cubical.

3.2 Energy Metering

Provision for all facilities and components necessary for the installation of the energy meters by the selected energy provider. Tenant power is to be metered separately from house power and a sufficient number of meters shall be installed to meter all tenancies separately. Tenant Metering is to allow metering up to 2 tenants per floor. Provision for whole floor tenant metering is to be provided

Allowance for all connected loads over 100kVA to be separately metered and interfaced to the BMS or Energy Management System to assist in calculation/reports for ABGR or ESD initiatives.

3.3 Submains

Submains will be sized to accommodate 10% spare capacity.

Neutrals will be designed for 100% of active phase current.

Tenant submains shall be provided at a rate of 60 VA/m² NLA power capacity. A maximum of 4 floors will be supplied from a single rising main.

Fire rated submains cables will be provided to all essential and lift services.

Spatial provision in riser for tenant to run dedicated submains to specified floors and accommodate ATS units.

3.4 Distribution Boards

Distribution boards will be readily accessible, situated within cupboards specifically designed for the purpose. Access will not be from secure areas or chambers.

Two Tenancy distribution boards (incorporating a split chassis) will be provided per floor with a rating of 250Amp per phase, Form 1, 1 pole to 15m².

Distribution boards will be the modular type and incorporate circuit breakers to provide full discrimination.

Distribution boards will be surface mounted front connected circuit breaker type.

Combination RCD / MCBs will be installed for all GPO circuits, appliances and external lighting circuits.

Distribution board to have capacity of 1 pole per 15sqm of NLA.

3.5 Lighting

Generally office lighting is to be high efficiency low brightness fluorescent fittings with multicell semi-specular louvre giving an open plan lighting level of no less than 320 Lux. Fittings are to be compatible with the use of computer screens in office spaces as per the recommendations of AS1680.2.2. Fluorescent fittings shall have T5 triphosphor lamps with high frequency ballasts.

Toilet and other staff utility areas will generally be illuminated with low brightness compact fluorescent downlights. Alternatively fluorescent feature pelmet may be used in amenities areas.

Carpark lighting to AS1680.2.2, and to meet DDA requirements. Lighting to Aust standards to minimise impact on energy consumption

Light fittings and resultant lux levels are to be consistent with the ABGR and Green Star Targets.

3.6 Lighting control

A time scheduling system shall be provided to ensure lighting is switched off after hours. After hours control points are to be provided in two locations on the core near to the lift lobby of each floor.

The lighting control zones shall comply with all requirements of the BCA and Green Star certification.

400sqm switch zones are provided.

PIRs are not included in the base building.

3.7 General Purpose Power

One power outlet per 150m² to be provided on a separate circuit enabling tenants to extend circuits during fitout. These shall be located on columns. All tenancy area GPO's shall be RCD protected.

3.8 Cable Management Provisions

- a) space in electrical riser for the building requirements and future lessee UPS / generator submains;
- b) vertical and horizontal cable pathways sized for 20% increase in number of submain cables to the core perimeter;
- c) separate trays will be provided for ELV services and LV services on all office floors to the core perimeter;
- d) skirting duct and associated conduit access is not provided

3.9 Lightning Protection and Surge Diversion

A lightning protection system will be provided in accordance with AS1768 utilising Reinforcing bars within the structure for down conductors.

- a) Test points will be provided at the lowest level.
- b) The column footings will be utilised providing the correct resistance figures are obtained.

3.10 Emergency & Exit Lighting

Emergency lights will be used, complying with AS 2293.1 and the BCA.

A central computer monitoring system shall be provided for testing, certification and monitoring of the emergency and exit lighting system in all areas.

The systems shall be connected to the essential services power supply in the common house areas and shall be computer monitored.

3.11 Wiring

Cable reticulation will utilise copper conductors. Essential services will be fire rated approved cables.

Non-essential services will be XLPE/PVC or PVC/PVC type.

Submains will be run horizontally and vertically on tray or ladder as appropriate utilising ceiling spaces and risers. Where XLPE/PVC or PVC/PVC cables are used, they will be multi-core for sizes up to 50mm².

- PVC/PVC in accessible concealed spaces.

Surface mounted conduits will be provided to non-rendered solid block walls and plant rooms.

3.12 Standby Power

As this development is located on the Energy Australia CBD triplex network, there is no statutory requirement to provide standby generators.

Standby Power via the Co-generation plant will be provided to support the following items:

- Lifts - 50% 1 per bank
- Emergency service other than lifts – 100%
- Tenant supplementary loop – 100%
- Provision for peak load lopping using standby power
- As the cogeneration plant is gas fired no fuel storage is included.

The generator shall be interfaced with the base building, building management system for monitoring and fault conditions.

A spatial provision shall be made for the future installation of a tenant generator system capable of supporting 100% of the building load. The base building system should be capable of being modified to accommodate this requirement.

4.0 SECURITY

4.1 Access Control System

A proximity card security system is to be provided. Access control is to be provided on the boom gate entry to the car park, main building entry, each lift car (dual readers), loading dock, major plant rooms, dockmaster, security, all perimeter doors, shower rooms and cleaner's change rooms.

Conduits will be provided in the fire stairs for future tenant installation of proximity card access control to allow re-entry on each level.

Access control shall be on a floor by floor basis for lifts.

Provide an intercom system to external card reader entries to the building.

Intercommunications to fire stairs will be provided as required by the BCA.

Reed switches to be provided to all fire stair doors, perimeter doors, plant room doors, electrical and communication riser rooms and access controlled doors.

A security card system is to be such that tenants who wish to install their own security system can do so without compromising the need for only one card for all access to the building.

The security system is to be such to allow integration and settings to be changed by way of remote modems

No provision is included for tenant cards or keys.

The system will have the ability to produce photo identification cards.

No security cabling shall reticulate through public spaces unprotected. Steel conduit or cast-in conduits shall be used to protect cables in public spaces.

Provide an alarm monitoring and reporting system to receive and report all events locally and remotely.

Proximity cards to be photo ID printable and the necessary software, hardware and printer for this function to be provided.

Access control system to have a minimum of 20% spare capacity at each control panel, for connection of additional points.

Access control system to be scalable to allow future connection of additional tenant systems.

Access control database to be capable of being interfaced with a compatible tenant database for ease of card distribution and control.

Access control system must be able to support multiple site codes.

Access control system must support anti-passback function.

Door hardware and locks on external doors to be tamper resistant.

4.2 CCTV Surveillance

A digital colour CCTV monitoring system is to be provided with cameras monitoring the following areas:

- Ground floor lift lobby area
- To the perimeter of the ground floor
- Car park and building entries
- Loading dock and entry
- Other common areas such as external paved/garden areas

Cameras shall be provided for surveillance purposes with control from the building security room.

Internal lighting must meet minimum requirements of the selected CCTV cameras. Additionally, to that required by other services, transition lighting must be provided at the entry and egress points to both the car park and loading dock.

Digital CCTV recording equipment shall be provided to allow recording of four weeks of events at the rate of 12 frames per second and be capable of displaying all cameras in real time. Compression format shall be MJPEG or MPEG4.

CCTV footage shall be capable of being streamed to off site surveillance facilities.

Surveillance signage shall be placed in appropriate locations throughout the building.

The CCTV system must support software and hardware partitioning.

CCTV cameras shall be minimum 520 TV line resolution.

All feeds from camera's shall have the ability to be fed to tenant head-end equipment location by installation of cabling and splitters from the base building image recording equipment location.

Security network cabling shall not pass through public spaces unprotected. Steel conduit shall be used to protect cables in public spaces.

5.0 COMMUNICATIONS

5.1 Infrastructure

The communications services provisions shall be sized adequately to carry today's as well as cater for future high bandwidth services. Provisions shall allow for the availability of multiple carriers with fibre optic WAN services.

Lead-in conduits shall be provided with 100% spare capacity from two diverse building entry points to two BD in geographically distinct locations.

Two Building Distributor rooms shall be provided in diverse locations within the building.

Two dedicated, secured communications risers for tenants shall be provided in diverse locations within the building core. Risers to be continuous on each typical floor.

Space provisions on roof and line of sight provision for satellite or microwave dish or other tenant installed communications infrastructure.

5.2 Voice Block Cabling

Base building voice block cabling of minimum 1 per person per 10m² is to be provided from the dual BD rooms, to an IDF on each floor, located in a riser cupboard

A central MATV system for broadcast FTA and in-house signal with capacity for extension to serve tenancy areas on every floor. The MATV system is to provide produce picture and sound where the impairment to any parameter will not be worse than grade 4 on the 5 grade impairment scale.

Provide an audio intercom to each fire stair door for remote re-entry approval requirements (also achieves BCA compliance).

Provide an audio/video intercom system an external card reader/ entries to the building, back to the security room

Provision for satellite and microwave dishes shall be available as dedicated space on the roof with clear view of northern sky.

Provide 2x conduit runs to a freestanding kiosk in the ground floor foyer from an accessible riser. Cupboard or services room, for future provision of tenant data cabling. Provide 1x conduit run and 10A DGPO to this location for power requirements.

5.3 Optic Fibre

Optic fibre will be provided to the site at the discretion of Telstra. Installation of optic fibre for tenant use will be the responsibility of the tenant.

5.4 Mobile Phone Coverage

Mobile phone coverage is excluded and will be provided by the tenant.

5.5 Pay TV

The cost of this installation is excluded and will be provided by the tenant.

6.0 HYDRAULICS

6.1 Authorities, Standards & Codes

Hydraulic services will be designed to comply with the latest requirements of the following authorities and codes:

- The Building Code of Australia
- The Sydney Water Corporation
- NSW Fire Brigade.
- Australian Light & Gas Company.
- AS 3500 National Plumbing Code
- AS 5601 - Gas Code
- NSW Code of Practice
- All other Codes & Standards required by the above

6.2 Water Services

13.2.1 Water Metering

Sydney Water owned and read meters will be installed as follows;

- One (1) Potable Water Meter
- One (1) Hydrant Booster Bypass Meter
- One (1) Sprinkler Booster Bypass Meter

Additionally Client owned and read meters (all water meters to be pulse read and wired back to the BMCS) shall be installed as follows, in conjunction with Greenstar criteria WAT-2

- Water meters to read potable and Fire Services water consumption at property boundary
- Water meters to read water consumption for cooling towers
- Water meters for recycled water use in the loading dock
- Water meters to read recycled water consumption for the landscape watering
- Water meters for total non-potable water use for toilets, 1 per floor.
- Water meter to read water consumption of domestic hot water
- Water meter connection to read water consumption by tenancies
- Water meters to DCW to amenities; 1 per floor.

6.2.2 Cold Water

Potable Water

Cold water will be reticulated throughout the project. All risers and individual zones will have isolation valves.

Cold water dual variable speed pressure pumps will be provided to pressurise the cold water to the building.

The cold water to the basement will be supplied with mains pressure.

Provisional cold water connection points will be available on each floor for tenant connection at the core, plus at any provisional stack location. Capacities of water supply and storage will be sized for peak demand plus 30%.

Non-Potable Water

Non-Potable water will be supplied to the toilets, cooling towers and the irrigation provision surrounding the building.

Dual recycled water pressure pumps will be provided to pressurise the recycled water to the building.

6.2.3 Hot Water

The hot water system will be located in the roof plant room. An insulated hot water circulation system will be provided throughout each building with hot water circulation pumps.

Thermostatic mixing valves will be provided to all ablution facilities to provide warm water to the required temperatures.

TMV's shall not be located in the ceiling, but be located in cupboards or behind removable panels.

Hot water shall be generated via the co-generation plant with gas fired hot water heaters providing back-up.

6.3 Sewer Drainage and Sanitary Plumbing

A new sewer connection is proposed on the site from the Sydney Water sewer main.

Provide adequate tenancy waste stacks sized and located within each of the cores to accommodate the installation of tenancy fitout features such as breakout and hub areas, tea rooms and the like. In addition to the stacks contained within the core, a third stack will be provided on the floor plate adjacent to the atrium in each building. Refer to Appendix G which illustrates extended coverage for additional centrally located tenancy sewer stack.

6.4 Stormwater Drainage System

The surface stormwater drainage system for the building will connect to the authority owned stormwater network.

A subsoil drainage system will be provided throughout the carpark and basement levels. Subsoil drainage pit will be installed and fitted with dual subsoil drainage pumps which pump subsoil water to the stormwater drainage system.

The stormwater drainage system will be sized for 1 in 100-year rainfall intensity. The over flow system will be sized for a rainfall intensity in excess of the 1 in 100 years.

All internal suspended waste and downpipe drains shall be wrapped with acoustic insulation or be acoustically rated APR pipe to minimise the transfer of noise from water running through the systems.

6.5 Natural Gas System

A gas supply will be provided to serve the mechanical services central heating requirements and the domestic water heating requirements, with capacity for additional loads from retail outlets and a tenant kitchen.

Provisional gas points will be made available on each level for tenant connection.

The gas service will be provided with a main regulator that reduces the pressure to 5 kPa for building distribution.

A central Gas Meter room will be provided

6.6 Sanitary Ware And Taps

Generally the Sanitary ware and tapware will be selected by the Architects.

As a performance guide line the following applies

- c) WELS 5 star tapware, WELS 4 star fixtures, WELS 4 star shower roses
- d) Dual flush toilets utilising recycled water (4.5/3 litre flush units are currently proposed subject to design development)
- e) Waterless urinals
- f) All tapware in public areas to be fitted with Anti Vandal handles and outlets

6.7 Grease Waste System

Provide a sanitary plumbing and grease waste system to conform with AS3500, to serve café areas within the building.

A separate dedicated grease arrestor system will be provided by McDonalds.

One grease stack should be provided for tenants use. A 3000litre grease arrestor shall be provided with provision for a grease waste connection to each floor.

6.8 Labelling

Appropriate access and labelling shall be provided for all concealed fixtures and fittings.

7.0 FIRE SERVICES

7.1 Authorities, Standards & Codes

Fire services will be designed to comply with the latest requirements of the following authorities, standards and codes:

- NSW Fire Brigade.
- Sydney Water.
- AS 1670 Fire Detection and Alarm Systems
- AS 1668 - Part 1 Smoke Management
- AS 1851 Maintenance of Fire Protection Equipment
- AS 2118 Automatic Fire Sprinklers
- AS 2419 Fire Hydrant Installations
- AS 2441 Fire Hose Reel Installation
- AS 3000 Wiring Rules
- AS 4118 Fire Sprinklers
- Building Code of Australia
- All other Codes & Standards required by the above
- Performance Based Fire Engineered Solutions, which modify current Statutory Authority requirements.

The latest revision of each of the above will be used.

7.2 Generally

The scope of works for the Fire Services includes all materials, fittings and equipment as required for the complete fire protection installation;

The following Fire Systems will be provided:

- Automatic Fire Sprinklers
- Automatic Smoke Detection and Alarms System in association with Essential Smoke Control System in accordance with AS 1670 and AS 1668.1 as required.
- Emergency Warning and Intercommunication Systems
- Fire Extinguishers

7.3 Automatic Sprinkler System

The building will be protected by an automatic sprinkler installation to AS2118.

Specifically –

- Grade 1 Water supply
- Fire Brigade Booster valve assembly.
- Anti tamper monitoring of fire services isolation valves.
- Valved on a floor by floor basis

7.3.1 Pipework and Fittings

All sprinkler service piping shall be in accordance with AS 1074 and AS 4118-2.1 suitable for screwed, roll grooved or welding jointing.

7.3.2 Sprinkler Heads

Sprinkler heads shall be of appropriate temperature rating for positions and of a pattern compliant with AS2118 and shall be suitably arranged on the distributing pipework. Sprinklers located in ceilings will generally be semi-recessed heads with two piece white escutcheon plates. Sprinklers in building entry lobbies and lift lobbies may be fully flush heads with white cover plates. Sprinklers in plant and carpark areas will be exposed brass heads. All sprinkler heads to be glass bulb type unless notified otherwise.

Flexible droppers shall be provided.

7.3.4 Hazard Rating

The classification and hazard rating for the building area:

The car park	Ordinary Hazard II.
Retail	Ordinary Hazard III
Commercial Offices	Light Hazard

7.4 Fire Detection System

7.4.1 Fire Indicating Panels

The fire indicator panel/fire control panels shall be compatible with the addressable smoke detection system to be provided and will be located the Fire Control Room. A mimic panel will be provided in the building lobby. The system will interface with the following –

- Addressable smoke detection system
- Mechanical ventilation and smoke control system
- Fire sprinkler system monitoring (as applicable)
- Emergency Warning and Intercommunication Systems
- BMCS for monitoring purposes only.
- The FIP shall provide 25 % space capacity and be capable of receiving additional inputs for tenant installed systems such as MASDS or sub-FIP's.

7.4.2 Smoke Detectors

Ceiling mounted photo optical smoke detectors and probe type photo optical sampling detectors shall be addressable analogue. Probe type detectors shall be complete with detector housing and PVC sampling probes.

7.4.3 Wiring

All wiring shall be in accordance with the requirements of AS 3000, AS 1668.1-1998 and AS 1670.1-2004.

7.5 Emergency Warning and Intercommunication Systems

An EWIS system shall be provided.

The evacuation tones from the emergency warning system shall exceed by a minimum of 10dB the noisiest background sound pressure level within all areas of the building. The weighted sound pressure levels shall not be less than 65dB and not more than 105dB. Strobe light alarm shall provide alarm in areas with a higher than normal ambient noise eg plant rooms

The system shall also provide a public address facility that will allow emergency announcements throughout the facility during evacuation or testing of the system.

7.5.1 Master Emergency Control Panel

A master emergency control panel shall be incorporated with the Fire Indicator Panel.

7.5.2 Loudspeakers

Two types of speakers shall be used where appropriate:

Carpark and Plantrooms – Round type reflex horn type speakers. They shall be weatherproof and have the following adjustable sound output.

False Ceilings – 100mm round recessed panel high fidelity cone speakers.

All loudspeakers shall be adjusted for sound output in accordance with AS 1670.4.

7.5.3 Visible Warning Signals

In plantrooms and Lift Motor Room where the maximum ambient noise level exceeds 90dBa, Visible Warning Signals shall be strobe type flashing visible amber and red warning signals.

7.5 Fire Extinguishers

Fire extinguishers shall be provided in accordance with Table E1.6 of BCA 2004 throughout the building. Portable Fire Extinguishers shall be located within fire hydrant/hose reel cupboards, adjacent electrical switchboards and within plantrooms, to enable trained building personnel to provide rapid response to a fire. The fire extinguishers shall be of the type suitable for the environment in which they are installed. They will be rechargeable, hand operated and suitably identified.

7.6 Fire Hydrant And Fire Hose Reel System

Fire Hydrants will be located in the required Fire Stair landings to gain full coverage.

Fire Hose Reels will be generally within 4 metres of required Fire Exits for the fire hose reels in the building.

The fire hydrant and hose reel system shall be designed and installed such that the building and fitout can achieve full compliance if each floor were to be fitted out at 1 workstation per sqm in a grid pattern with no high walls or partitions, without the need for additional hydrants or hose reels.

7.7 Fire Services Test Water Reclamation

The water used in regular fire services testing shall be recovered and reused for non-potable uses within the building.

7.8 Retail

The retail area will be provided with the following base provisions to allow retail tenants to connect and extend these services. The retail tenant fitout works is excluded from the base building scope.

Exposed skeletal sprinkler protection shall be provided in each tenancy to open plan, with additional outlet paps provided to allow connection by future fitout by others.

Hydrants and Hose Reels will not be provided within the tenancies, however, connection points for hose reels within larger tenancies will be available pending Fire Engineering and Fire Brigade requirements.

The Smoke Detection and Evacuation Systems will provide interface points within each tenancy to allow future connection of detection and alarm devices as may be required by the specific design of each tenancy.

8.0 LIFTS

8.1 Overview

All lifts will be designed to fully comply with all the current requirements of the SAA Lift Code AS1735, Workcover Authority, OHS 2001 & the Building Code of Australia (BCA).

All lifts will incorporate facilities for disabled persons, fire brigade operation & one lift in each building will accommodate an ambulance stretcher.

All lifts will feature variable voltage, variable frequency & microprocessor control technology. This combination provides energy efficient, safe, reliable & quiet long-term lift operation.

Automated audible announcement of floor arrival shall be provided.

8.2 Minimum Lift Performance

The lifts will be designed to meet the following criteria:

Criteria	Office Carpark Shuttle	Office Passenger	Office Shared Goods / Passenger	Public Carpark Lifts	Retail Goods Lift
Floors served:	G+ B2+B3	L1 to L8	B2 to Roof	G + B2 to B4	G + B2
No of lifts - North Building:	1 No	7 No	1 No		1 No
No of lifts - South Building:	1 No	7 No	1No	2 No	
Car size provided:	13 person	21 person	21 person	17 person	17 person
Rated load:	1000kg	1600kg	1600kg	1275kg	1275kg
Speed:	1.0m/s	1.6m/s	1.6m/s	1.6m/s	1.0m/s
Handling Capacity %:	> or = 13%	> or = 14%	> or = 14%	N/A	N/A
Waiting Interval:	< or = 50 sec	< or = 30 sec	< or = 30 sec	N/A	N/A
Population density:	1:12	1:12	1:12	N/A	N/A
Lift loading	<80%	<80%	<80%	N/A	N/A

8.3 Lift Type

All lifts shall be electric gearless traction - Machine Room Less (MRL).

Doors shall be two-panel horizontal centre opening with a clear minimum opening width of 1100mm.

8.4 Lift finishes

- Floor finish to be carpet, vinyl or similar durable finish.
- Ceiling to be laminated board.
- Wall finishes to comprise of mirrored and/or colourback glass, and textured metallic finishes.
- Carpark and Retail Goods Lifts will incorporate textured stainless steel finishes.
- Handrail to be finished stainless steel.
- Internal doors to be finished stainless steel.
- Lighting to comprise of recessed energy efficient downlights or concealed fluorescent battens.
- Car indicator panel shall be monochromatic LCD flush mounted in finished stainless steel surround
- Hands-free emergency communication.
- Disabled facilities to code requirements.

8.5 Security Interface

Proximity card readers (2) in each lift car.

8.6 Controls

Controls shall be microprocessor based and shall incorporate remote monitoring facilities for both performance and maintenance requirements.

The following features shall be provided:

- Load weighting for load bypass and anti-nuisance
- Advanced door opening
- After hours security shutdown of individual cars
- Emergency power operation of one lift under diesel power
- The installation shall make provision for in-site screen based supervisory facilities.
- The lift control system shall be connected to the BMCS to monitor the following:
 - Running
 - Stopped
 - Failed
 - Alarm signal

9.0 BUILDING AUTOMATION SYSTEM

9.1 General

A workstation shall be provided for the management, control and monitoring of the building services and systems serving the building. The BMS will be based on a number of intelligent, stand alone controllers interconnected via a communications bus and administered by an operator workstation.

The BMS will be a fully integrated building automation system, incorporating direct digital control (DDC) for the complete building services including energy management, temperature control, equipment monitoring and control.

All materials and equipment used in the BMS will be standard components, regularly manufactured for this and/or other systems and not custom designed for this project.

The system will be of proven manufacture with a substantial history in Australia and comprehensive service back-up in Sydney.

The system shall be BAC Net open protocol.

The BMS will monitor the following:

- Lifts – high level monitoring;
- Security and access control - fault monitoring;
- Standby power– monitoring of operation and faults;
- Energy systems – interface for energy consumption and analysis;
- Mechanical systems – full control;
- Fire protection systems – monitoring of general fire trip to building; and
- Water usage – monitoring for energy consumption analysis.

The BMS will include:

- Stop, start, status and alarm for all fans, pumps, cooling towers and equipment;
- Chiller controls including optimisation;
- Modulation of all variable speed drives and monitoring of their realtime status and set point;
- Realtime air and water temperature monitoring and indication for all systems and individual for all zones;
- On-floor push buttons or telephone dial up service to activate out of hours air conditioning;
- kWh metering for all switchboard energy meters; pulsing sub-meters in each switchboard for loads greater than 100kVA
- kW demand metering at main switchboards;

- CO monitoring and control of carpark ventilation systems;
- Lighting systems time schedule control;
- Hydraulics systems monitoring, including measurement of water consumption;
- Simultaneous operator workstation access;
- Digital control of the air-conditioning and mechanical ventilation systems;
- Integration with lighting control, security, lift and vertical transportation systems, and fire systems; fire and security interface shall be high-level.
- Monitoring of the status of lifts, fire protection systems, hydraulic systems, UPS electricity supply and standby generators;
- Software facilities for trend logging;
- Raise alarms for failure of plant and equipment for all building services;
- Software routines for:
 - demand monitoring;
 - time event scheduling;
 - start/stop time optimisation;
 - duty cycle control;
 - night setback program;
 - event initiated program;
 - dial up facility using phone touchtone prompts for after hours air-conditioning and lighting control;
 - hydraulics requirements for pump and plant monitoring and water usage reporting;
 - metering of occupancy hours of specific areas to allow calculation of normalised energy use based on standard operating hours for the ABGR certification;
 - specific monitoring and reporting against base performance criteria for energy metering and reporting,
 - specific monitoring and reporting against base performance criteria for water usage reporting.
 - Alarm notification system via SMS and email.
 - SNMP output capability for connection to tenant IT systems.

The system will allow dialling out over telephone lines to monitor and control the building automation system.

9.2 Networking Communications

The BMS will network operator workstations and stand-alone DDC Controllers. The network architecture will consist of two levels, a high performance peer-to-peer network and DDC controller specific local area networks with access being totally transparent to the user when accessing data or developing control programs.

The BMS will allow the co-existence of new DDC Controllers with existing DDC controllers in the same network without the use of gateways or protocol converters.

All operator devices either network resident or connected via dial-up modems will have the ability to access all point status and application report data or execute control functions for any and all other devices via the peer to peer network. No hardware or software limits will be imposed on the number of devices with global access to the network data at any time.

9.3 Controllers

DDC Controllers will be stand-alone, multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies and input/output point modules. Controller size will be sufficient to fully meet the requirements of the project. Each controller will support a minimum of two (2) LAN Device Networks.

Each DDC Controller will have sufficient memory to support its own operating system and databases, including:

- Control processes;
- Energy management applications;
- Alarm management applications including custom alarm messages for each alarm for each point in the system;
- Historical/trend data for points specified;
- Maintenance support applications;
- Operator I/O;
- Dial-up communications; and
- Manual over-ride monitoring.

DDC Controllers will provide a minimum two RS-232C serial data communication ports for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop devices without interrupting the normal operation of permanently connected modems, printers or terminals.

In the event of the loss of normal power, there will be an orderly shutdown of all DDC Controllers to prevent the loss of database or operating system software. Non-volatile memory will be incorporated for all critical controller configuration data and battery backup will be provided to support the realtime clock and all volatile memory for a minimum of 72 hours.

Upon restoration of normal power, the DDC Controller will automatically resume full operation without manual intervention.

Should MC Controller memory be lost for any reason, the user will have the capability of reloading the MC Controller via the local RS-232C port, via telephone line dial-in or from a network workstation.

A separate MC Controller for each AHU will be provided. It is intended that each unique system be provided with its own resident MC Controller.

MC Controllers will have the ability to perform any of the following energy management routines:

- Time-of-day scheduling, calendar-based scheduling, holiday scheduling, temporary schedule overrides, Start-Stop time optimisation and automatic daylight;
- Savings Time Switchover and Night setback control;
- Enthalpy switchover (economiser), peak demand limiting and temperature-compensated duty-cycling.

Field panels shall have a minimum of 10% spare capacity to allow future system connection.

9.4 Application Specific Controllers

Each MC Controller will be able to extend its performance and capacity through the use of remote application specific controllers (ASCs) through LAN Device Networks.

Each ASC will operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC will be a microprocessor-Based, multi-tasking, real-time digital control processor.

9.5 Portable Operator's Terminal (POT)

Industry standard, commercially available portable operator terminals will be provided with LCD display and a full-featured keyboard. The POT will be handheld and plug directly into all DDC Controllers and ASC Controllers.

9.6 Personal Computer Operator Workstation Hardware

One (1) personal computer operator workstation will be provided for command entry, information management, network alarm management and database management functions. All real-time control function will be resident in the DDC Controllers to facilitate greater fault tolerance and reliability.

The workstation will comprise 17" flat screen technology monitor; IBM Compatible PC with minimum 512 MB RAM, 3.2GHz Intel processor, 250 GB hard drive, 3.5" disk drive, CD/DVD Read/Write drive; colour printer' equivalent to Canon S820.

9.7 Workstation Operator Interface

Operator workstation interface software will minimise operator training through the use of English language prompting, English language point identification and industry standard PC application software. The software will provide the following functionality:

- Graphical viewing and control of environment;
- Scheduling and override of building operations;

- Collection and analysis of historical data and dynamic data (trend plot);
- Definition and construction of dynamic colour graphic displays;
- Editing, programming, storage and downloading of controller databases.

A graphical user interface will be provided which minimises the use of keyboard through the use of "point and click" approach to menu selection.

The software will provide a multi-tasking type environment that allows the user to run several applications simultaneously. The operator will be able to work in Microsoft Word, Excel, and other Windows Based software packages, which concurrently annunciate online BMS alarms and monitoring information.

The graphical interface will depict the system being viewed in a schematic form representing the system physically as it is installed.

9.8 After Hours Operation

After hours air-conditioning will be activated to a local zone by dial up facility.

On after hours calls the associated air handling unit(s) and chilled beams will start and run automatically for a programmable period. This duration will have a default time of one (1) hour.

Lights will operate from a centrally located push button for an adjustable period with a default time of twenty (20) minutes.

9.9 Cleaners Operation

The lift lobby card reader on each floor will be used by the cleaners to activate the following:

- Air conditioning to run on economy cycle or ventilation only if outdoor conditions are not suitable; and
- Lighting to switch on full for the floor for a preset time. This will flash as for after hours use to allow the cleaners to restart the timing.

9.10 UPS Power

All BMS equipment will be on UPS power for a minimum autonomy period of 30-minutes.

9.11 Remote Access

Provide remote access via a web browser interface, with up to 2 licenses.

