NSW HEALTH

Liverpool Hospital Redevelopment - Stage 2

Infrastructure and Ancillary Hospital Works

Project Application and Environmental Assessment

Appendix K

Engineering Services Building

- Architectural drawings
- Structural Design Brief
- Civil engineering Brief
- Building Services

Prepared by: LFA (Pacific) Pty Ltd
and
Capital Insight Pty Ltd

In conjunction with:

For: Department of Planning
On behalf of : NSW Health

Appendix K

Civil Engineering Brief

LIVERPOOL HOSPITAL REDEVELOPMENT

BOVIS LEND LEASE JOB NO: 115851

STRUCTURAL DESIGN BRIEF
FOR
ENGINEERING SERVICES BUILDING

Prepared By:
P. J. TRICKETT / P. H. SIEWERT
Directors
SCP CONSULTING PTY LTD

ON BEHALF OF

SCP CONSULTING PTY LTD

ISSUE A

REVISION	DATE	ORIGINATOR	CHECKED	APPROVED	REMARKS
A	14 August 2008	PT	PS	PT	FOR REVIEW

1. DESIGN STANDARDS

The structural design shall be in accordance with the latest issue of all relevant Australian Design Standards, Codes and other statutory requirements. As a minimum requirement, the design shall be based on, but not limited to

AS1170.0 (2002)	Structural Design Actions Part 0 General Principles
AS1170.1 (2002)	Structural Design Actions Part 1 Permanent, Imposed and Other Actions
AS1170.2 (2002)	Structural Design Actions Part 2 Wind Loads
AS1170.4 (2007)	Earthquake Loads
AS3600	Concrete Structures
AS3700	Masonry Code
AS4100	Steel Structures
AS4600	Cold-Formed Steel Structures
AS2870	Residential Slabs and Footings – Construction

Building Code of Australia
C & CA Publication "Concrete Industrial Floor and Pavement Design Manual"

2. DESIGN LIFE

The structure elements of the building shall be designed to provide adequate performance for a minimum period of 50 years.

The structural design shall take into consideration the possible changing building uses and the local environmental conditions during the proposed design life.

Material selection, specifications, and detailing of the structural elements shall be such as to provide optimum durability of the structure.

3. MATERIAL PROPERTIES FOR DESIGN

As a guide the following minimum material grades shall be used:

Concrete Strength Grades:	
Bored piers, footings	25 MPa
Slabs On Ground	32 MPa
Structural Steel Grades:	
Rolled sections	300 MPa
Plate and Connection Components	250 MPa
Hollow Sections	350 MPa

4. DESIGN DEAD LOAD

4.1 Unit Weights

Design dead load shall include all self-weight and dead loads of elements. Unit weights shall be in accordance with Appendix A of AS 1170.1 (2002)

4.2 Superimposed Dead Load

Due consideration shall be given to superimposed dead loads due to: partitions, floor finishes and toppings, ceilings and services, racking systems, plant and equipment, hobs and kerbing, perimeter screens and walling, and any imposed dead loads from roof framing, glazing and linings. Reference shall be made to the architectural drawings for the extent and location of these loadings.

4.3 Roof Loads

Roof loads shall be evaluated in a systematic fashion as set out in the Pro-Forma at Appendix A of this Design Brief. Services and Acoustic Consultants are to be requested to supply the necessary loadings to allow completion of the Pro-Forma. A copy of the Pro-Forma shall be included in all calculations and shall be summarised on the roof-marking plan for each building.

Suspended ceilings, major service ducts and pipe work required to be supported by purlins shall be designed and specified to be attached to the webs of the purlins. SCP will require equipment weights for all roof mounted monorails and all other roof mounted mechanical equipment.

5. DESIGN LIVE LOAD

The floor slabs in the specifically designated areas shall be designed for the live loads nominated in Appendix B of this Design Brief.

SCP will require equipment weights for all areas supporting heavy equipment such as forklifts and floor mounted racking.

6. DESIGN WIND LOAD

Design shall be in accordance with AS1170.2 – 2002 using the parameters set out in the Site Wind Analysis in Appendix C.

- Region A2, V_u = 45 m/second
- Terrain Category 3
- Topographic multiplier 1.0
- Shielding multiplier 1.0

7. EARTHQUAKE

Design shall be in accordance with AS1170.4 – Part 4 "Earthquake Loads" (2007) using the following parameters:-

Structural Type	=	I
Acceleration coefficient, a	=	0.08
Site factor, S	=	1
Importance Factor	=	1.0

Structure Design Category A

8. OTHER DESIGN LOADINGS

8.1 Minimum Lateral Loads to Interior Walls

Interior walls and permanent partitions and their fixings and supports, shall be designed to resist all loads to which they are subjected, but not less than a lateral force of 0.25 kPa (working), 0.40 kPa (ultimate) shall be applied perpendicular to the walls.

8.2 Temporary and Construction Loads

The building structures shall be designed to resist all loads imposed during construction. In all instances, the building components in their temporary partly constructed state shall remain structurally stable.

Bovis Lend Lease shall advise the extent of all areas which they require to be designed for additional loads from construction and material storage to suit construction arrangements. (Note: The on-grade internal concrete slabs have not been designed to support cranes erecting structural steel or materials handling machinery such as merlo's.)

8.3 Horizontal Loads to Handrails and Balustrades

All handrails and balustrades shall be designed in accordance with AS1170 Part 1. Where applicable, the design shall include for the effects of crowd loading or impact. Under maximum load conditions, these elements shall deform by following a plastic deformation mechanism.

8.4 Impact of Flooding on Building Structures

According to the SKM "Stormwater and Flooding Assessment Report (November 2007), the Liverpool City Council advised that the 100 year Average Recurrence Interval ARI event is 8.8 m AHD and 10.9 m AHD for the Probable Maximum Flood (PMF) level.

The floor level of the new Engineering Building has been nominated as RL 9.65 which matches the floor level of the existing Central Energy Building. The building has been assessed not to have dynamic lateral loading from the impact of flood debris on the building structure due to the static water flow and the backwater nature of the flood.

9.0 SERVICEABILITY

9.1 Deflection Criteria

Lateral Deflection

Due to wind and earthquake < Height / 500

Vertical Deflection

• Roof	Dead load	span / 250
	Live load	span / 360
	Dead + live load	span / 300
	Wind	span / 360

9.2 Durability

The structure shall be designed giving due consideration to durability and the functionality of the building and its components. All concrete elements shall be designed for the following exposure classifications in accordance with AS3600.

Interior: A1
Exterior : A2

APPENDIX A – ROOF LOADING

	ALLOWANCE		
ELEMENT DESCRIPTION	**UNIFORM (KG/SQ.M.)**	**CONCENTRATED (KGS)**	**LINE (KG/M)**
ROOF SHEETING	5		
PURLINS	5		
INSULATION	3		
NORMAL CEILING 1 Layers 13mm Gyprok and to suit acoustic requirements	10		
LIGHTING	2		
MONORAILS	TBA	TBA	
A/C DUCTING IN OFFICE AREA ONLY	20 kg/m^2 Purlins 10 kg/m^2 Rafters		TBA
FAN COIL UNITS		TBA	
SPRINKLERS	TBA		TBA
ROOF ACCESS SYSTEM ANCHOR LOADS		TBA	
OTHER	TBA	TBA	TBA
ROOF LIVE LOAD (In accordance with AS1170.1)	25 MAX 50 kN	110	

TBA – TO BE ADVISED BY RELEVANT CONSULTANT

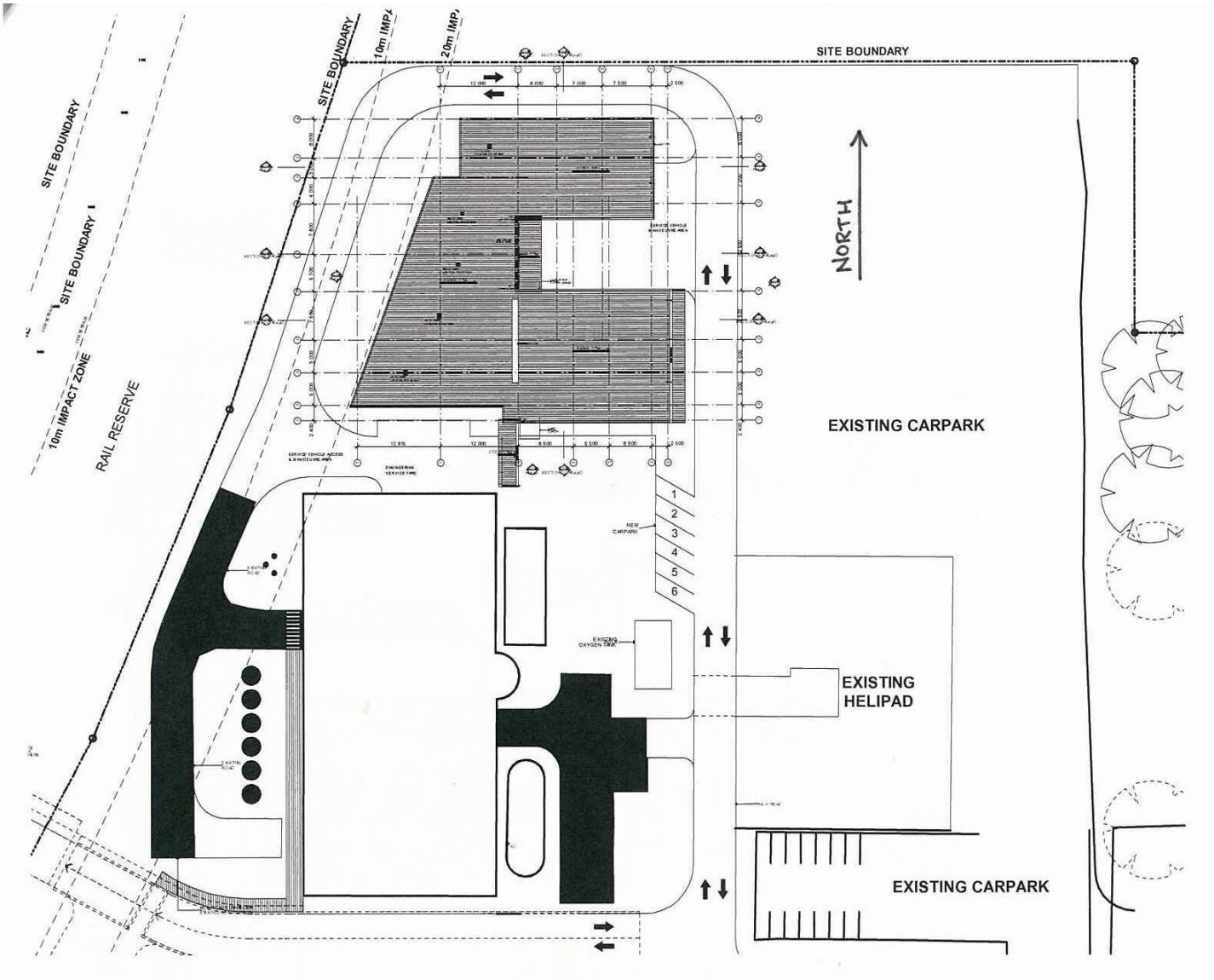
APPENDIX B -FLOOR LOADS

BUILDING COMPONENT	LIVE LOAD	SUPERIMPOSED DEAD LOADS
OFFICES	3.0 kPa	1.0 kPa
AMENITIES	2.0 kPa	1.0 kPa
WORKSHOP AREAS	7.5 kPa	--
STORAGE AREAS	10 kPa	--
LOADING DOCKS	15 kPa min	1.5 kPa

Note:

- Lightweight partitions throughout in offices and amenities
- All toppings no greater than 50 mm thick in amenities
- Lightweight Façade Load – 3 kN / m
- Design traffic loading in truck loading dock of 5 x 10^6 ESA's (equivalent standard axles) having a maximum single axle load of 8 tonnes and tandem axle of 14 tonnes

APPENDIX C – SITE WIND ANALYSIS



Region		A2
Ultimate Limit State V_u		45 m/s
Wind Direction Multipliers	N NE E	0.95
	S SE	0.95
	SW W NW	1.00
Terrain Category		3
Shielding Multipliers	–	1.0
Topographic Multiplier	–	1.0

APPENDIX D

LIVERPOOL HOSPITAL REDEVELOPMENT

SCHEDULE OF CONCRETE MIXES

Mix Design	Location	Grade MPa	Cement Type	Fly Ash Allowable 25% Maximum	Silica Fume	Max. Shrinkage At 56 Days Micro Strain	Max. Aggregate Size (mm)	Super Plasticiser	F'cat 4 Days (MPa)	Max. Slump At Batching mm	Low Heat Character -istics	Water Proof Agent
1	• Mass Concrete (Pads) • Blinding Concrete	S15	GP	25%	Nil	750	20	Nil	N/A	80	N/A	N/A
2a	• Bored Piers	S32	GP	25%	Nil	750	20	Nil	N/A	80	N/A	N/A
2b	• Pad Footings • Strip Footings	S25	GP GP	25%	Nil	750	20	Nil	N/A	80	N/A	N/A
3	• Slab on Ground – Light Duty	S25	SL	25%	Nil	550	20	Yes	N/A	40	N/A	N/A
4	Post-tensioned Slabs Summer & Winter mixes to be Submitted Separately	4a S32 4b S40	SL	10%	Nil	650	20	Nil	22	80	N/A	N/A
5	• Reinforced Slabs / Stairs • Retaining Walls	S32	SL	25%	Nil	650	20	Nil	N/A	80	N/A	N/A
6	Core Walls / Lift Walls	S32	SL	25%	Nil	750	20	Yes	N/A	80	N/A	N/A
7	Slab on Ground – Heavy Duty	S32	SL	25%	Nil	550	20	Yes	N/A	40	N/A	N/A
8	Columns (Normal)	S40	GP	25%	Nil	750	20	Nil	N/A	80	N/A	N/A
9	Carpark Ramps/Pile Caps	S40	SL	25%	Nil	650	20	Nil	N/A	80	N/A	N/A
10a	Columns (High Strength)	S50	GP	25%	Nil	750	20	Nil	N/A	80	N/A	N/A
10b	Columns (High Strength)	S65	GP	20%	Nil	750	20	Nil	N/A	80	N/A	N/A
10c	Columns (High Strength)	S80	GP	20%	Nil	750	20	Nil	N/A	80	N/A	N/A
11	Blockwork Core Fill	S20	GP	25%	Nil	N/A	10	Nil	N/A	230	N/A	N/A
12	Shotcrete	S32	GP	25%	Yes	750	10	Nil	N/A	60	N/A	N/A
13	Lift Overrun Pit	S32	SL	25%	Nil	750	20	Nil	N/A	80	N/A	N/A
14	Roadway Slabs	S40	SL	10%	Nil	600	20	Nil	22	80	N/A	N/A
15	Loading Docks	S40	SL	10%	Nil	600	20	Nil	22	80	N/A	Xypex

APPENDIX E – FIRE RATINGS

SUMMARY OF BUILDING USE AND CLASSIFICATION

Building Use	Warehouse and Offices
Building Classification	Class 7b and 5
Type of Construction required	C

FIRE RESISTANCE OF BUILDING ELEMENTS

- Steel Columns : FRL -- / -- / --
- Steel Framed Roof : FRL -- / -- / --

FIRE RESISTANCE OF BUILDING ELEMENTS

Building element	**Class of building – FRL: (in minutes)** ***Structural adequacy/Integrity/insulation***	
	5	**7b**
EXTERNAL WALL (including any column and other building element incorporated therein) or other external building element, where the distance from any *fire-source feature* to which it is exposed is--		
Less than 1.5 m	90 / 90 / 90	90 / 90 / 90
1.5 to less than 3 m	60 / 60 / 60	60 / 60 / 60
3 m or more	-- / -- / --	-- / -- / --
EXTERNAL COLUMN not incorporated in an *external wall,* where the distance from a *fire-source feature* to which it is exposed is--		
Less than 1.5 m	90 / -- / --	90 / -- / --
1.5 to less than 3 m	60 / -- / --	60 / -- / --
3 m or more	-- / -- / --	-- / -- / --
COMMON WALLS AND FIRE WALLS--	90 / 90 / 90	90 / 90 / 90
INTERNAL WALLS--		
Bounding *public corridors,* public lobbies and the like--	-- / -- / --	-- / -- / --
Between or bounding *sole-occupancy units*--	-- / -- / --	-- / -- / --
Bounding a stair if *required* to be rated--	60 / 60 / 60	60 / 60 / 60
ROOF	-- / -- / --	-- / -- / --

6.2 STRUCTURAL DRAWING REGISTER

DRAWING DELIVERABLES

Stage 1 – Schematic Design

Reproduce CAD drawings that have been developed to date, refine the design as required and develop 3D structural analysis model scale 1:200 or 1:100, indicating the general foundation and structural framing requirements (including options). These drawings will contain indicative rates and sizes to develop an order of cost. The sketch drawings will include:

- Slab on ground plans
- Foundation plans and details
- Suspended concrete outlines and reinforcement rates (conventional and post-tensioning)
- Steel framing plans and elevations (as required)

Stage 2 – Development Concept

These drawings will be at scale 1:200 or 1:100, indicating the general foundation structural framing requirements and basic construction details. These drawings will contain firmer material rates and sizes in order for the cost planners to develop a "Contract Price". The drawings will include:

- Slab on ground plans
- Foundation plans and details
- Suspended concrete framing plans
- Concrete strengths and reinforcement rates (conventional and post-tensioning)
- Typical sections
- Steel framing plans and elevations

Stage 3 – Design Development For Tender and For Construction

These drawings will be CAD generated at a scale of 1:100 for plans and 1:20 for details. They will consist of sufficient plans and details for Submission of Building Plans for authority approval, issue documents to contractors for tender and for construction. The drawings will include:

- Finalised framing plans
- Finalised foundation plans and details
- Column schedule and sizes
- Concrete outlines
- Reinforcement plans
- Concrete sections
- Post-tensioning plans
- Lift and Stair Details
- Structural steel framing plans
- Structural steel elevations
- Structural steel details
- Masonry details
- Façade support details

ESTIMATED NO. OF STRUCTURAL DRAWINGS

Milestone 1 : New Clinical Services Block

Footings / Shoring	10	Drawings
Basement Slabs and Details	8	Drawings
Ground Floor Slab and Details	35	Drawings
Level 1 Slab and Details	35	Drawings
Level 2 Slab and Details	35	Drawings
Level 3 Slab and Details	35	Drawings
Level 4 Slab and Details	35	Drawings
Level 5 Slab and Details	30	Drawings
Level 6 Slab and Details	30	Drawings
Level 7 Slab and Details	8	Drawings
Roof Steelwork	16	Drawings
Lift / Stair Cores	5	Drawings
Façade Steelwork	9	Drawings
Column Schedule	5	Drawings
Stair Details	4	Drawings
Miscellaneous	10	Drawings
TOTAL	280	Drawings

Milestone 5 : Expansion to the New Every Plant

Footing Plan and Details	3	Drawings
Ground Floor Slab and Details	2	Drawings
Stair and Column Details	2	Drawings
First Floor Slab and Details	8	Drawings
Level 2 Slab and Details	4	Drawings
Roof Steelwork	6	Drawings
Miscellaneous	1	Drawings
TOTAL	26	Drawings

Appendix K

Civil Engineering Brief

CIVIL ENGINEERING BRIEF

For

MILESTONES 5 & 6 (CONCURRENT WORKS)
LIVERPOOL HOSPITAL REDEVELOPMENT

REPORT NO. R00218.A

REVISION A

AUGUST 2008

PROJECT DETAILS

Property Address: Liverpool Hospital
Elizabeth St, Liverpool, NSW

Development Proposal: Milestones 5 & 6 (Concurrent Works)
Liverpool Hospital Redevelopment

REPORT CERTIFICATION

Report prepared by:

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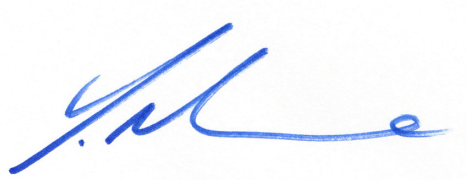

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DOCUMENT CONTROL

REVISION	ISSUE DATE	ISSUED TO	ISSUED FOR
A			

TABLE OF CONTENTS

1. INTRODUCTION

1.1. General

This engineering report has been prepared to supplement the proposed Project Application for Concurrent Works (Milestones 5 and 6) to the Department of Planning.

This report addresses civil engineering design aspects of the re-development, including geometric road design, on-grade car parks, pavement, site grading, stormwater, water quality controls, and other works external works associated with the hospital re-development.

1.2. Design Standards and Codes

The concurrent works will be designed in accordance with the latest issue of all relevant design standards, codes and other statutory and authority requirements. As a minimum requirement, the design will be based on but not limited to:

- Liverpool City Council's Guidelines for Engineering Works for Subdivisions and Developments – Part 1 (Design)
- Liverpool City Council's Guidelines for Engineering Works for Subdivisions and Developments – Part 2 (Construction)
- Managing Urban Stormwater: Soils and Construction Manual
- Australian Rainfall & Runoff
- Australian Water Quality Runoff
- AS 3500.3 Stormwater Drainage
- AS 2890.1 Off Street Car Parking
- AS 1428.1 Design for Access and Mobility
- AS 2890.2 Commercial Parking Facilities
- AS 1742 Manual of Uniform Traffic Control Devices
- New South Wales Roads & Traffic Authority (RTA) – Road Design Guides
- New South Wales Roads & Traffic Authority (RTA) Traffic Control at Worksites manual
- AustRoads - *Guide to Traffic Engineering Practice*

- Austroads – Pavement Design, A Guide to the Structural Design of Road Pavements
- Austroads – Pavement Design for Light Traffic: Supplement to Austroads Pavement Design Guide

2. THE DESIGN BRIEF

2.1. Bulk Earthworks and Retaining Walls

Bulk earthworks will be designed to achieve as close to a balanced cut to fill as practical given the final building and road levels.

Retaining walls and batter slopes (permanent and temporary) will be designed based on the recommendations contained with the project's geotechnical report.

2.2. Accesses and Carparks

Design and document the new external roads (within the hospital site) adopting the approved masterplan arrangement but revised so that the road geometry generally complies with Liverpool Council's standard and roundabout geometry to generally comply with Austroads standards.

Roads and carpark areas will be designed to comply with the requirements of Council, AS2890.1 Off Street Parking Facilities and AS2890.2 Commercial Parking Facilities.

Swept turning paths of Heavy Rigid Vehicle (HRV) have been applied in the design of the roads. No Articulated Vehicles (AV) are considered in the design.

Design and document traffic control staging plans will be prepared in accordance with the RTA's Traffic Control at Worksites manual, as part of the civil works design. This will allow staging of the construction works while maintaining vehicular access to hospital facilities during construction of the civil works.

2.3. Pedestrian Walkways and Site Grading

The external work also includes design and documentation of the proposed pedestrian walkways and footways within the hospital site. Locations and surface treatments of these features are as per the plans prepared by architect and landscape architect.

Design of these footpaths will be in accordance with AS 1428.1 – Design for access and Mobility and in consideration of disable access requirements. The grading of the site will also to ensure that the areas are adequately drained.

The work also includes design and documentation of pedestrian control staging plans in accordance with the RTA's Traffic Control at Worksites

manual, as part of the civil works design. This will allow staging of the construction works while maintaining pedestrian access to hospital facilities during construction of the civil works.

2.4. Pavement Design

Flexible (Asphaltic Concrete) pavements are proposed for the road and carpark areas. Rigid (Concrete) pavements will be considered for ramps and other areas with regular heavy vehicle activity and turning movements.

Other pavement types such as pavers and decorative finish as proposed by the architect will be structurally design to withstand the designated traffic loadings.

All pavement thicknesses will be designed in accordance with Austroads – Pavement Design, A Guide to the Structural Design of Road Pavements including the supplementary guide; as appropriate, and in conjunction with the recommendations contained within the project's geotechnical report.

Pavements will be designed for the following loadings and design life:

	Equivalent Standard Axles (ESA's)	Design Life (Years)
Road – Light Traffic (Flexible Pavement)	5×10^5	20
Road – Heavy Traffic (Rigid Pavement)	2×10^6	40
Carpark (Flexible Pavement)	1×10^5	20

2.5. Stormwater Drainage

Stormwater drainage for the site will be designed to collect and convey stormwater drainage via a conventional piped stormwater drainage system for storm events up to and including a 1 in 20 year Average Recurrence Interval (ARI) storm event.

Provision will be made for the safe conveyance of storms via overland flow paths for storm events up to the 1 in 100 year ARI storm event.

Adequate freeboard will be provided within the overland flowpaths to allow some protection from overland flows generated from storm events larger than a 1 in 100 year ARI event.

Stormwater pollution control devices will be incorporated into the site stormwater drainage system to assist with the removal of sediment, oils and hydrocarbons from stormwater runoff from the road and carpark areas.

2.6. Flooding

A Section 149 Flood Certificate has been applied for with Liverpool Council to verify that the Georges River flood levels that SKM's report "Liverpool Hospital Redevelopment Stage 2 – Stormwater & Flooding Assessment Report (5 November 2007)" stated are appropriate and consistent with Council's flood information for the hospital site.

It was confirmed that the following are the flood levels at the Liverpool Hospital Site:

- Probable Maximum Flood (PMF) RL 10.9 (AHD)
- 1 in 100 ARI Flood (1%AEP Flood) RL 8.8 (AHD)

Finished floor levels for all proposed buildings will be reviewed to confirm that they are sufficiently higher (i.e. adequate freeboard) than either the PMF or 1%AEP Flood as appropriate as per the recommendations made in SKM's report "Liverpool Hospital Redevelopment Stage 2 – Stormwater & Flooding Assessment Report (5 November 2007)"

All openings to basement and undercroft areas will be reviewed and the external civil works will be designed to sufficient reduced levels, providing bunding, to ensure that these areas are protected from inundation during flood events.

The civil engineering design will consider the effects of the proposed development on existing flood regimes within the catchment. A review of the available flood studies, flood plain risk management plans and other literature will be conducted in the design and if considered appropriate, compensatory measures will be recommended and provided for within the design to minimise (i) loss of flood storage and (ii) changes to flood levels and velocities within the catchment.

2.7. Sediment and Erosion Control

Temporary sediment and erosion control measures will be designed to be incorporated into the construction works and sequencing of the project to ensure that the proposed construction activities on site to not pollute local drainage systems nor have a detrimental effect on downstream waterways.

Appendix K
Building Services

LIVERPOOL HOSPITAL REDEVELOPMENT

Stage 2.1

PROJECT APPLICATION – BUILDING SERVICES

Milestone 5 and 6

- REV 2
- September 2008

LIVERPOOL HOSPITAL REDEVELOPMENT

Stage 2.1

PROJECT APPLICATION – BUILDING SERVICES

Milestone 5 and 6

- REV 2
- September 2008

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Contents

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Name of project:	Liverpool Hospital Redevelopment Stage 2.1
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EXECUTIVE SUMMARY

Liverpool Hospital is a major tertiary, referral and teaching facility under the South West Area Health Service and must remain operational at all times.

The Services to be provided for Milestone 5 and 6 include but are not limited to:

- Electrical Services;
- Communication Services;
- Building Control and Security Services;
- Fire alarm and warning systems;
- Mechanical Services;
- Hydraulic Services;
- Fire Protection Services;
- Automatic Fire Detection and Alarm Systems;

STANDARDS/GUIDELINES

The engineering services shall be designed with reference to the following:

- The NSW Health Engineering Services Guidelines TS11 2005;
- Relevant Australian Standards;
- The Building Code of Australia;
- Government Department's Regulations.

Authorities and Councils such as:

- The requirements of relevant Local Councils;;
- Sydney Water Corporation;
- Integral Energy;
- NSW Fire brigades;
- Environmental Protection Authority.

Mechanical Services

The office areas of the Engineering Building will be air conditioned by a VRV (Variable refrigerant volume) air cooled system with the condensing unit located on the north side of the building. Outside air will be provided in accordance with AS1668.2-1991.

The workshop areas will be naturally ventilated and provided with heating in winter via wall radiators.

The Engineering Building will be provided with toilet exhaust, welding bay exhaust and paint shop/sign writing room exhaust in accordance with AS1668.2-1991.

Hydraulic Services

Sewer - The proposed sanitary drainage shall discharge into the existing drainage pipe work outside the existing Engineering Building, located on the south side of the development.

Sanitary Plumbing - The system will be installed in accordance with AS 3500.2 – 2003, and the NSW Code of Practice 2006. Materials will be Poly Ethylene and / or cast iron tube and fittings.

Potable Cold Water - The proposed potable cold water will be connected to the existing site infrastructure of the existing Engineering Building and reticulated to all fixtures and equipment that requires cold water. The system will be installed in accordance with AS 3500.2 – 2003, and the NSW Code of Practice 2006. Materials for pies up to 20mm will be cross linked polyethylene (Pe-X) and type 3 polypropylene (type 3 PP-R) tube and fittings for pipes 25mm and over.

Hot and Warm Water Systems - The proposed potable hot water will be generated by means of boilers and heat exchangers and reticulates to all fixtures and equipment that requires hot water.

Fire Services

The New Engineering Building has been designed to the deem to satisfy requirements of BCA2008.

Fire alarm & smoke detection system to the New Engineering Building.

The New Engineering Building will have a Building Occupant Warning System to alert occupants of the entire building.

Fire hydrants & fire hose reels have been provided to meet BCA & Australian Standards requirements to both buildings.

A comprehensive set of fire safety management and evacuation plans will be developed which are consistent with all fire and life safety protection equipment to be installed and EPA regulations relating to OH&S and fire safety.

Electrical

The power supply to the Engineering Building will be derived within facility and carpark.

The main switchboard for the Engineering Building and external lighting will be balanced as best possible on each individual mains supply and distribution of boards.

The sizing of sub-mains will be based on both maximum demand and voltage drop, to comply with the requirements of the relevant standards.

Lighting and power circuits within each area shall be protected from the distribution boards. All distribution boards are fitted with the appropriate circuit breakers to control the circuits nominated, each chassis to have a minimum of 30% spare capacity.

Distribution board for the external lighting will be heavy duty panelboard IP66 rated enclosed in 316 stainless steel cabinet. All external lighting control shall be housed within external distribution board cupboard.

External lighting shall generally comprise long life metal halide HID lamps in vandal resistant luminaires. Low glare luminaires shall be used to ensure that safety and amenity are maintained.

The external lighting shall meet the requirements of the AS4485.1 and AS1158.3.1

An emergency and exit lighting system complying with AS2293 shall be installed throughout the engineering building. All emergency lights shall be of the non maintained type and exit lights shall be of the sustained type.

Environmental Sustainable Design

Energy efficiency is addressed by considering mechanical systems, controls and light fittings and lighting controls that meet the functional/ maintenance requirements while operating efficiently.

Water conservation is addressed by reducing potable water consumption. Additionally, to minimise irrigation needs, it is recommended that where possible native plants are selected and subsoil drip irrigation system with automatic timers are installed.

It is recommended that hospital implements a recycling and waste policy to comprehensively address all waste streams and all aspects of waste management i.e. recycling, safe handling and disposal and staff training.

Communication Services

All telecommunications services cabling infrastructure shall be structured end-to-end and certified Category 6 cabling infrastructure installed by certified cabling contractors. The installed structured cabling system shall be in accordance with relevant Specifications for Structured Cabling Systems and implemented in accordance with AS3080, AS3084 and 3085 recommendations.

INTRODUCTION

Liverpool Hospital is a major tertiary, referral and teaching facility under the South West Area Health Service and must remain operational at all times.

The extent of new works and refurbishment works for Liverpool Hospital Stage 2.1 are described in other sections of this document. Engineering services should be installed, modified, upgraded to suit the development.

Disruption to engineering services should be avoided, where not possible shutdowns should be approved by the Hospital executive then coordinated through the hospital transition coordinator and the Project Director team.

Mechanical Services

STANDARDS AND REGULATIONS

The mechanical services will be designed in accordance with the recommendations of the following standards:

- Mechanical ventilation and air conditioning: To AS 1668.1 1998 and AS 1668.2 1991 and the Fire Engineers report;
- Microbial control: To AS/NZS 3666.1;
- New South Wales Local Government Act;
- Building Code of Australia 2008;
- Safety and occupational health: The requirements of the New South Wales Work Cover Authority and New South Wales Occupational Health and Safety Act;

MECHANICAL SERVICES SYSTEMS

The proposed mechanical services systems for the new Engineering Building will consist of the following plant:

- VRV (variable refrigerant volume) air cooled system;
- Radiators in the workshops
- Roof ventilators (whirly birds) located on roof to induce air flow through low level openings;
- Toilet, welding room, paint/sign writing room exhaust systems.
- Ducted vacuum system for the carpentary workshop
- Interface into the main Building Management system of the hospital

SMOKE MANAGEMENT SYSTEMS

- In the event of a fire, the mechanical services will shut down on a general fire trip as per the DLA BCA report.

Hydraulic Services

STANDARDS AND REGULATIONS

- AS3500.1 -4 National Plumbing Code all parts;
- AS2845 Water Supply Backflow Prevention Devices and Atmospheric vacuum breakers;
- AS 5601 Australian Gas Installation Code
- NSW Code of Practice (Plumbing and Drainage);
- Local Council Regulations and Development approval conditions;
- New South Wales Local Government Act;
- Building Code of Australia 2008
- Safety and occupational health: The requirements of the New South Wales Work Cover Authority and New South Wales Occupational Health and Safety Act.

HYDRAULIC SERVICES OVERVIEW

The hydraulic services generally consist of the following:

- Sewer, sanitary plumbing and drainage
- Domestic cold water reticulation
- Domestic hot water reticulation
- Natural gas reticulation

SCOPE OF WORK

The hydraulic services design philosophy for the Liverpool Hospital project is as follows

- Drainage of fixtures and fittings from the Engineering Building to be connected to the existing sewer pipe work of the existing CEB.
- Cold water for new fixtures and fittings in the Engineering Building to be connected to the existing cold water supply of the existing CEB.
- Hot water for the Engineering Building to be generated by means of gas fuelled hot water units.
- There will be no provision for trade waste in the extension of the Engineering Building.

SEWER, SANITARY PLUMBING

Sewer

The proposed sanitary drainage shall discharge into the existing drainage pipe work outside the existing Engineering Building, located on the south side of the development.

Sanitary Plumbing

The system will be installed in accordance with AS 3500.2 – 2003, and the NSW Code of Practice 2006. Materials will be Poly Ethylene and / or cast iron tube and fittings.

HOT / WARM & COLD WATER AND NON-POTABLE WATER (NPCW) SUPPLIES

Potable Cold Water

The proposed potable cold water will be connected to the existing site infrastructure of the existing Engineering Building and reticulated to all fixtures and equipment that requires cold water. Fixtures and equipment that may present a source of contamination will be fitted with a backflow prevention device suitable for the hazard rating of the procedure. The system will be installed in accordance with AS 3500.2 – 2003, and the NSW Code of Practice 2006. Materials for pies up to 20mm will be cross linked polyethylene (Pe-X) and type 3 polypropylene (type 3 PP-R) tube and fittings for pipes 25mm and over.

Hot Water Systems

The proposed potable hot water will be generated by means of boilers and heat exchangers and reticulates to all fixtures and equipment that requires hot water.

Water temperatures will be controlled by thermostatic mixing valves (TMV) to the requirements as scheduled in AS 3500.4 2003 and as tabled below.

AREA	TEMPERATURE
General Reticulation and Kitchen Fixtures	$>60^0$C
Fixtures in Ablution Areas	$<50^0$C
Fixtures for People with Disabilities	$<43^0$C

The system will be installed in accordance with AS 3500.4 – 2003, and the NSW Code of Practice 2006. Materials for pies up to 20mm will be cross linked polyethylene (x-pe) and type 3 polypropylene (type 3 ppr) tube and fittings for pipes 25mm and over.

DESIGN CRITERIA FOR HYDRAULIC SERVICES

- Earth Quake Code
- AS3500 – National Plumbing Code all parts
- NSW Department of Health AMMS assets management system
- NSW Health Memorandum of approved warm water systems
- Gas Code
- NSW Code of Practice (Plumbing and Drainage)
- New South Wales Local Government Act
- Building Code of Australia 2008
- NSW Health Department Engineering Services and Sustainable Development Guidelines: TS11 2005
- Safety and occupational health: The requirements of the New South Wales Work Cover Authority and New South Wales Occupational Health and Safety Act
- Additional fire services requirements: NSW Fire Brigade and Council of Fire and Accident Underwriters of Australia.
- The requirements of all authorities having jurisdiction over the site.

Fire Services

STANDARDS AND REGULATIONS

The fire and life safety services will be designed with the guidelines and recommendations of the following standards:

- AS 1670.1 – Fire detection, warning, control and intercom systems - System design, installation and commissioning;
- AS 4428.1– Fire detection, warning, control and intercom systems – control and Indicating Equipment;
- AS/NZS 1668.1 – The use of ventilation and air conditioning in buildings - Fire and smoke control in multi-compartment buildings;
- AS 3000 – Electrical installations (known as the Australian/New Zealand Wiring Rules);
- AS 2419.1 – Fire hydrant installations;
- AS 2441 – Installation of fire hose reels;
- AS 2444 – Portable fire extinguishers;
- AS 2941 – Fixed fire protection installations – Pumpset systems;
- AS1851 – Maintenance of Fire Protection Equipment;
- AS 1530.4 & AS 4072.1 Passive Fire
- New South Wales Local Government Act;
- Building Code of Australia 2008;
- EP&A Regulation 2000
- Safety and occupational health: The requirements of the New South Wales Work Cover Authority, New South Wales Occupational Health and Safety Act 2000 and New South Wales Occupational Health and Safety Regulation 2001;
- BCA report prepared by Davis Langdon Australia
- NSW Health Engineering Services and Sustainability Development Guidelines, Technical Services TS11 2005

FIRE SERVICES OVERVIEW

The scope of works for the Milestone 5 New Central Energy Building consists of the following essential services throughout the building.

- Automatic fire alarm & smoke detection system;
- Building Occupant Warning System;
- Fire hydrants;

- Fire hose reels;
- Fire extinguishers;
- Passive fire stopping systems;
- Automatic fail safe devices;
- Smoke hazard management control.

The works will be completed in a single stage within the proposed project programme.

FIRE DETECTION AND ALARM SYSTEM

A smoke detection & alarm system will be installed to the Engineering Building to BCA2008 Part E2.2, AS1670.1 – 2004, AS1668.1 – 1998 requirements & will incorporate the following:

- New addressable Sub Fire Indicator Panel and Fire Fan Control Panel located in the entry lobby on the Ground Floor.
- Addressable photo optical type smoke detectors will be used throughout most areas. Heat detectors will be used in areas not suitable areas for smoke detectors. Smoke detection will be provided with the mechanical systems for smoke hazard management.
- Alarm verification up to 30 seconds delay for smoke detectors.

BUILDING OCCUPANT WARNING SYSTEM (BOWS)

A building occupant warning system (BOWS) will be installed to the entire New Central Energy Building to BCA2008 Part E2.2 and AS1670.1 – 2004 requirements & will incorporate the following:

- Cone type speakers located within ceilings, horn speakers within exposed areas, strobe type visual indicators where required.
- The system will be powered from the Central Energy Building sub FIP and shall initiate evacuation tones throughout all areas following a fire alarm.

FIRE HYDRANTS

Fire hydrants will be installed to the Engineering Building to BCA2008 Part E1.3 and AS2419.1 – 2005 requirements & will incorporate the following:

- External fire hydrants shall be installed to protect the New Engineering Building.
- A diesel booster pump shall be installed to provide the necessary design pressure and flow.

FIRE HOSE REELS

Fire hose reels will be installed to the Engineering Building to comply with BCA2008 Part E1.4 and AS2441 – 2005. Hose reels will be located within 4.0 m of exits.

FIRE EXTINGUISHES

Fire extinguishers will be installed to the Engineering Building to comply with BCA2008 Part E1.6 & E1.10 and AS2444 – 2001 requirements.

PASSIVE FIRE PROTECTION

All fire services passing through any walls, floors and ceilings required to have a fire resistance level (FRL) rating will be sealed with approved passive fire protection systems to satisfy BCA2008 Part C3.15 and Spec C3.15, AS1530.4 and AS4072.1 requirements.

FIRE SAFETY MANAGEMENT

A comprehensive set of fire safety management and evacuation plans will be developed which are consistent with all fire and life safety protection equipment to be installed and EPA regulations relating to OH&S and fire safety. AS3745 would be used as a guide.

DESIGN CRITERIA FOR FIRE AND LIFE SAFETY SERVICES

System	Standards	Criteria
Automatic Fire Detection and Alarm System	BCA 2008 Part E2.2 and Specification E2.2a AS 1670.1, AS 1668.1	To comply with BCA2008 and Crown Project Application Conditions.
Automatic Fail - Safe Devices	BCA 2008 Part D 2.21	To comply with BCA2008 and Crown Project Application Conditions.
Building Occupant Warning System	BCA 2008 Part E2.2 and Specification E2.2a AS 1670.1	To comply with BCA2008 and Crown Project Application Conditions.
Fire Hydrants	BCA 2008 Part E1.3 AS 2419.1	To comply with BCA2008 and Crown Project Application Conditions.
Fire Hose Reels	BCA 2008 Part E1.4 AS 2441	To comply with BCA2008 and Crown Project Application Conditions.
Portable fire extinguishers	BCA 2008 Part E1.6 & E1.10 AS 2444	To comply with BCA2008 and Crown Project Application Conditions.
Passive Fire Protection	BCA 2008 Part C3.15 and Specification C3.15 AS 1530.4 AS 4072.1	To comply with BCA2008 and Crown Project Application Conditions.

Electrical

STANDARDS AND REGULATIONS

The design and construction shall be in accordance with the current issues and amendments of the Building Code of Australia and all relevant Australian Standards and the requirements of all Authorities having jurisdiction over the project.

The following nominated standards have particular relevance for compliance on this project:

- The New South Wales Health Department – Engineering Guidelines TS11 2005;
- AS/NZS 3000.2000 - SAA Wiring Rules;
- Service Rules, Regulations and Requirements of relevant electrical supply authority;
- NSW Service and Installation Rules;
- The requirements of the Australian Telecommunications Commission;
- AS 2202, parts 1-5, Intruder Alarm systems;
- AS 2293 “Emergency Lighting to Buildings”;
- AS 1680 – Interior Lighting;
- AS1158.3.1 – Lighting for public spaces (Category P)
- New South Wales Local Government Act;
- Building Code of Australia;
- Safety and occupational health: The requirements of the New South Wales Work Cover Authority and New South Wales Occupational Health and Safety Act.

ELECTRICAL SUPPLY

Energy Provider: Internal Hospital Private Electricity

The electrical supply characteristics of the power supply to the site are:

- 415V 50 Hz within the Engineering building facility and new carpark;
- MEN earthing throughout;
- The fault level at the point of supply to the main switchboard is50 kA.

SUB-MAINS AND DISTRIBUTION BOARDS

Sub-mains

Sub-mains will be divided into three categories as defined as following:

Category A – Essential Services

- Fire Services;
- Fire Detection and Alarms;
- EWIS;

Note: All the above supplies will utilise fire rated cables such as Radox and / or Firestop.

General Services

- General lighting and power throughout areas not included above;
- General mechanical plant, which is separate from the requirements for Category A systems;
- Offices, Administration;
- Hydraulics Services.

Note: All above supplies will not use fire rated cable

The sizing of sub-mains will be based on both maximum demand and voltage drop, to comply with the requirements of the relevant standards.

Distribution boards

Lighting and power circuits within each area shall be protected from the distribution boards located in electrical cupboards.

All distribution boards are fitted with the appropriate circuit breakers to control the circuits nominated, each chassis to have a minimum of 30% spare capacity.

EXTERNAL DISTRIBUTION (CARPARK)

Distribution board for the external lighting will be heavy duty panelboard IP66 rated enclosed in 316 stainless steel cabinet. External distribution shall be mounted on 300mm concrete plinth. All external lighting control shall be housed within external distribution board cupboard

GENERAL POWER OUTLETS

The number and configuration of power outlets shall be as defined in AS3000. All outlets shall be labelled to indicate the distribution board and circuit breaker of origin. An extra gang on all switches / GPO with a “proprietary slip in” insert shall be the method of labelling.

RCD protection is required to all general purpose power outlets.

All circuits shall be protected by means of a 30mA earth leakage circuit breaker (RCD).

Cable Tray and General Wiring

Cable tray will be installed throughout the new works within cable risers / cupboards and for horizontal floor cabling (located in the ceiling voids). All to have a minimum of 30% spare capacity.

Separate cable trays in the above general locations shall be installed for the following services:

Lighting and Power Cable Trays:

- Electrical non essential sub-mains
- Electrical essential sub-mains

Communications and Miscellaneous Services Cable Trays:

- Communications backbone cabling for copper and fibre optic services
- Fire and Safety Services
- Security
- BMS

Cable trays in main cupboards shall be admiralty pattern hot dipped galvanised type.

Cable support system for horizontal distribution of services in the ceiling space shall be equal to RAMSET – FASTRAK and the model selected for the specific service to be installed (ie light duty for voice/data and heavy duty for lighting and power services).

LIGHTING

The general and specific lighting layouts will be designed in accordance with a number of lighting standards as part of detailed design as follows:

AS 1680 Part 1and TS 11	-	General lighting levels;
AS 1680 Part 2 and TS 11	-	Specific lighting levels.

Lamps / Fluorescent Lamps

Linear Fluorescent Lamps

Group B Areas

Utilisation of K19 prismatic diffusers, the fluorescent lamps will be T8 (20mm dia), triphosphor with a colour temperature of 4000°k and a Colour Rendering index (Ra) of at least 84. With electronic ballast

The use of the new T5 (16mm diameter), triphosphor tube will be restricted due to the high surface brightness of the tube and the associated glare that it creates when used with prismatic diffusers.

Compact Fluorescent Lamps

Compact fluorescent lamps will be used in conjunction with down lights and specific fluorescent luminaires, the range of which shall be as follows:

Up to 26 watt	TC/D type
36, 40 & 50 watt	TC/L type

The colour temperature of these lamps will be 4000°k with Ra of 84.

Metal Halide Lamps

Metal Halide lamps will be used for external lighting using posttop luminaires. Lamp wattage shall be 70W and above.

Incandescent Lamps

These are generally discouraged and it is not expected to use these lamps due to their poor light output, high energy use and very limited lamp life.

LIGHTING CONTROL

The provision of local lighting control and other energy saving techniques shall be employed to minimise energy usage throughout the proposed hospital fitout.

EMERGENCY LIGHTING

An emergency and exit lighting system complying with AS2293 shall be installed throughout the building. All emergency lights shall be of the non maintained type and exit lights shall be of the su stained type.

The system to be used throughout the new Engineering Building shall be stand-alone.

EXTERNAL LIGHTING

External lighting shall generally comprise long life metal halide HID lamps in vandal resistant luminaires. Low glare luminaires shall be used to ensure that safety and amenity are maintained.

The external lighting shall meet the requirements of the AS4485.1.

EXTERNAL LIGHTING CONTROL

The switching of external security lighting shall be by contactors controlled by photo electric switches. Local over-ride facilities shall be provided for maintenance.

The photo electric switches shall be mounted above the roof line in easily accessible locations, clear of any obstructions that may affect their operation.

LIGHTNING PROTECTION

Lightning protection will be a Faraday cage type installation.

VALUE ADDED STRATEGIES

Energy management associated with the electrical services will basically cover areas as follows:

- Lighting control
- The use of energy efficient luminaires, lamps and control gear

Energy Efficient Luminaires

All luminaires will be fitted with electronic control gear to provide the most energy efficient means of operation.

Lamps will be selected for their energy efficient operation. The use of the T5 fluorescent lamp will be utilised as stated previously; this lamp is rated at 28 watts compared with the T8 lamp rated at 36 watts.

ESD (Environmentally Sustainable Design)

THERMAL EFFICIENCY

The Engineering Building façade is designed in accordance with the energy performance requirements of the Building Code of Australia.

ENERGY EFFICIENCY

The office areas of the Engineering Building will be air conditioned by a VRV (Variable refrigerant volume) air cooled system with the condensing unit located on the north side of the building.

A combination of T5 and T8 lighting will be provided based on the functional requirement.

RECYCLING AND WASTE

Waste sorting facilities e.g. cardboard recycling and compacting facilities, waste holding areas for different waste stream have been provided with access to collection services.

It is recommended that a waste management policy is adopted during the operation for the Engineering Building. It is recommended that an operational waste management plan is devised based on this policy directive.

According to policy document, some of the recommended strategies for the effective management of waste are[1]:

- Waste management committees, plans and waste audits
- Waste minimisation, avoidance, segregation, recycling and re-use
- Waste labelling and containment
- Proper waste handling, storage and transport
- Correct waste treatment / disposal
- Staff training and education

[1] Waste Management Guidelines, Department of Health NSW. August 1998

Communications/Security Systems

OBJECTIVES

Telecommunication systems shall be provided throughout the Engineering Building as required by the user groups.

The project shall include the provision of the following services:

- Telephone services.
- Data services.

COMMUNICATION SYSTEM

All telecommunications services cabling infrastructure shall be structured end-to-end and certified Category 6 cabling infrastructure installed by certified cabling contractors. The installed structured cabling system shall be in accordance with relevant Specifications for Structured Cabling Systems and implemented in accordance with AS3080, AS3084 and 3085 recommendations.

All structured cabling telecommunication outlets, patch panels, cabinets, racks and cables shall be systematically and permanently labelled in accordance with the relevant standards.

Telecommunication/Data Outlets

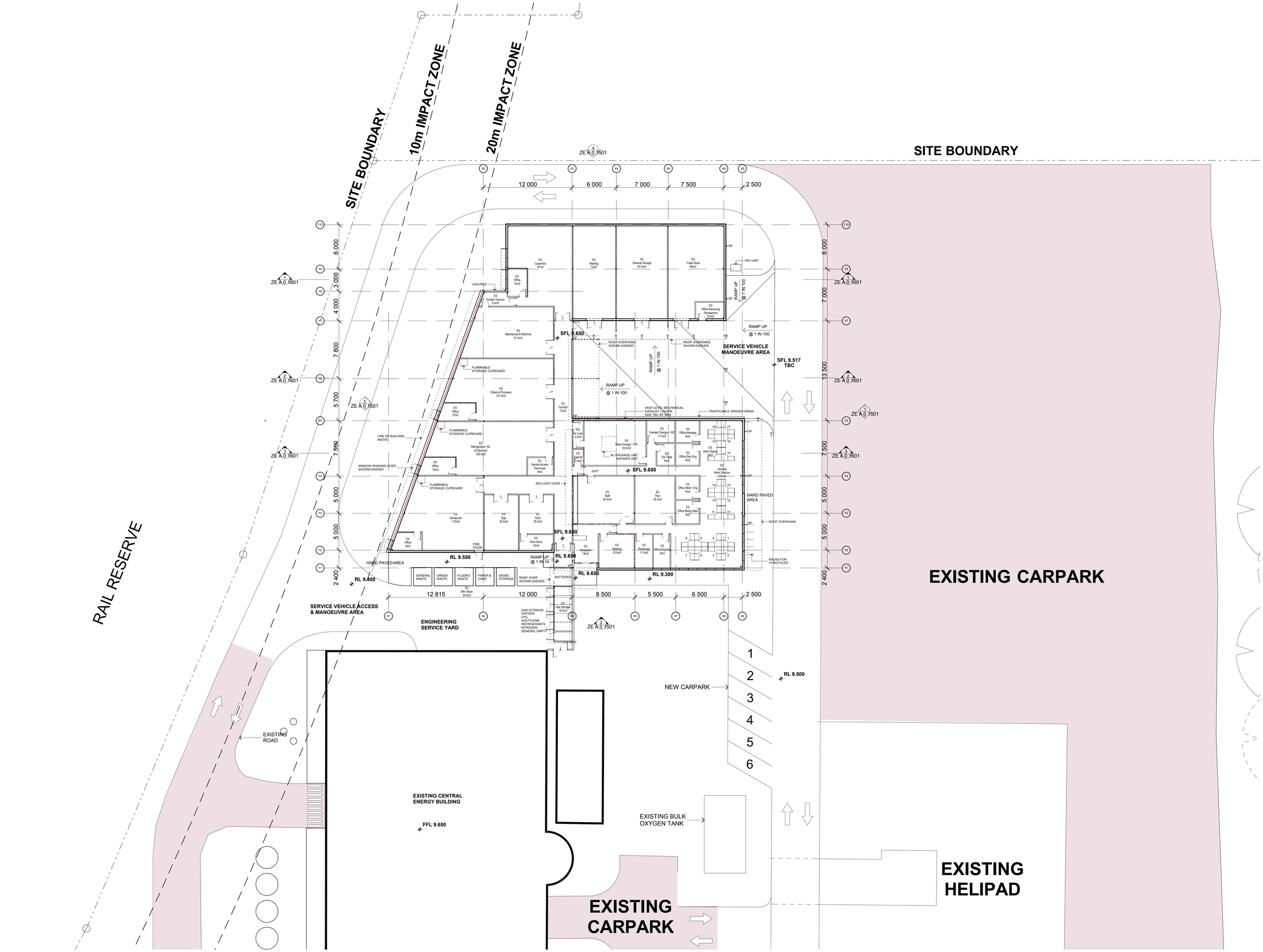
All telecommunication/data outlets shall be Category 6 RJ45 type. Outlets shall be provided as detailed in the room data sheets to locations as nominated by the user group.

Appendix K

Architectural Drawings

October 2008

Prepared by: Rice Daubney



1 PLAN
GROUND FLOOR

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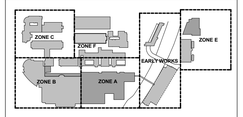
PROJECT NORTH



KEY PLAN

LEGEND

DP	DOWN PIPE
RB	REMOVEABLE BOLLARD
B	FIXED BOLLARD
VRV	VARIABLE REFRIGIRATED VOLUMN

WALL TYPES

- ONE HOUR FIRE RATED WALL
- REINFORCED BLOCKWORK WALLS BETWEEN WORKSHOPS
- STUD WALL

DISCLAIMER

NUMBERS & LOCATION OF STRUCTURE COLUMNS TBC BY SCP

No.	DATE	REVISION / ISSUE DETAILS
E	07.08.08	ISSUE FOR COSTING
D	24.07.08	GENERAL PLANNING CHANGES AS IDENTIFIED BY USER GROUP
C	16.07.08	SCHEMATIC DESIGN RE-ISSUE
B	08.07.08	FOR CO-ORDINATION
A	25.06.08	ISSSUED FOR SCHEMATIC DESIGN
01	20.06.08	FOR CO-ORDINATION
00	05.06.08	ZERO SET ISSUE - FOR CO-ORDINATION

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PROJECT:
LIVERPOOL HOSPITAL REDEVELOPMENT
STAGE 2.1
ELIZABETH STREET
LIVERPOOL, NSW, 2170

DRAWING TITLE:
ZONE E
GENERAL ARRANGEMENT PLANS
GROUND

SCALE:	DATE:	CHECKED:
AS SHOWN	18.03.08	AH

PROJECT NUMBER:	DRAWING NUMBER:	ISSUE:
08501	ZE A G 1101	E

SCHEMATIC DESIGN

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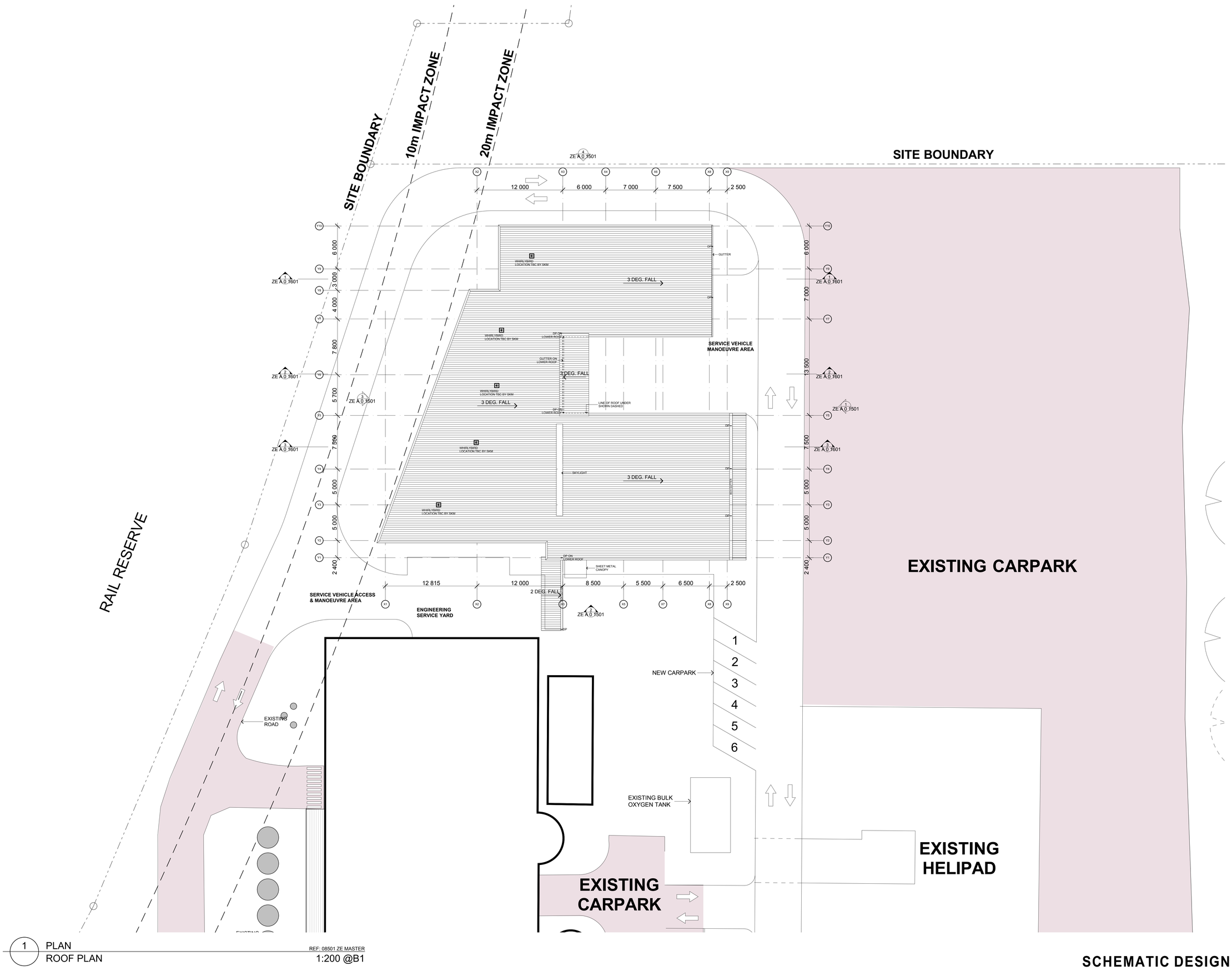

1 PLAN
ROOF PLAN

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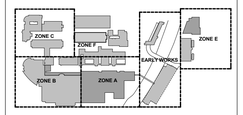
SCHEMATIC DESIGN

PROJECT NORTH



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PROJECT:
LIVERPOOL HOSPITAL REDEVELOPMENT
STAGE 2.1
ELIZABETH STREET
LIVERPOOL, NSW, 2170

DRAWING TITLE:
ZONE E
GENERAL ARRANGEMENT PLANS
ROOF

SCALE:	DATE:	CHECKED:
AS SHOWN	18.03.08	AH
PROJECT NUMBER:	DRAWING NUMBER:	ISSUE:
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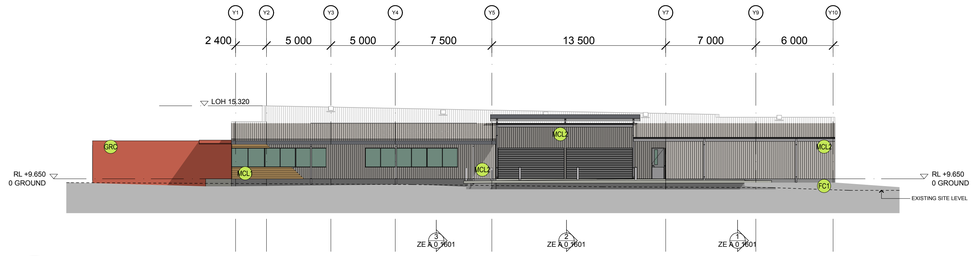

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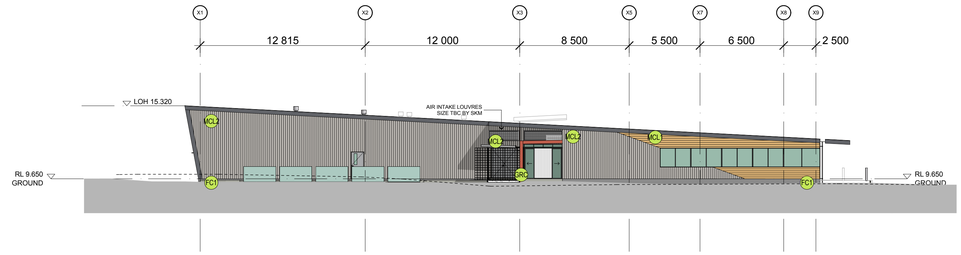

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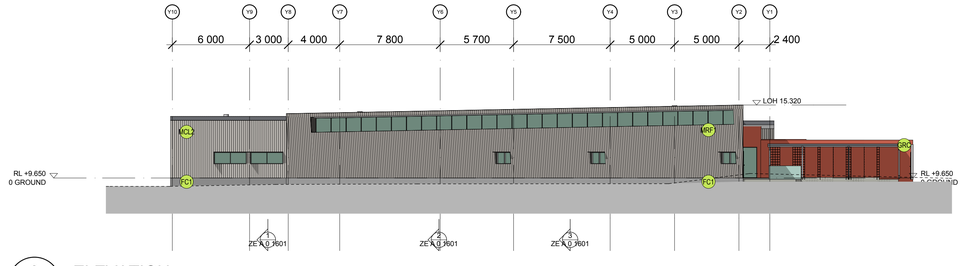
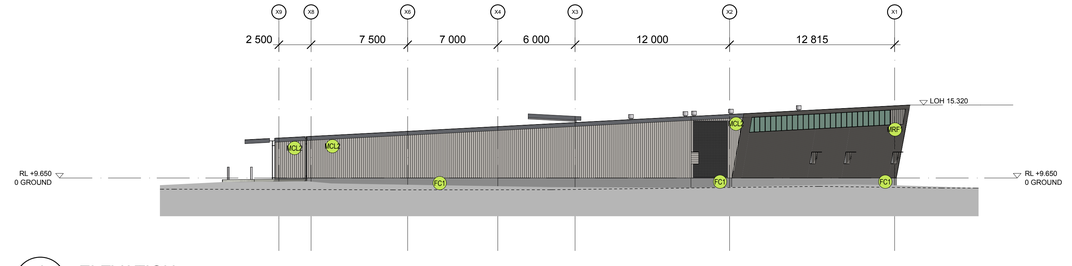


3 ELEVATION
WEST ELEVATION
REF: 08501 ZE MASTER
1:200 @B1



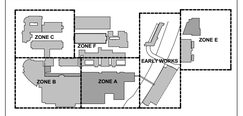
4 ELEVATION
NORTH ELEVATION
REF: 08501 ZE MASTER
1:200 @B1

Materials

- MCL1 Profiled Metal Cladding - Horizontal Orange (Robertson Hurricane Rib)
- MCL2 Profiled Metal Cladding - Vertical Citi (Robertson Hurricane Rib)
- SR2 "Rieder" Fibre C - Red
- FC1 Fibre Cement
- GLR Glazed Roof
- MRF Metal Roof Sheet (BlueScope Lysaght Brownbuilt)

SCHEMATIC DESIGN

PROJECT NORTH



KEY PLAN

No.	DATE	REVISION / ISSUE DETAILS
C	07.08.08	ISSUE FOR COSTING
B	16.07.08	SCHEMATIC DESIGN RE-ISSUE
A	08.07.08	FOR CO-ORDINATION
00	05.06.08	ZERO SET ISSUE - FOR CO-ORDINATION

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PROJECT:
LIVERPOOL HOSPITAL REDEVELOPMENT
STAGE 2.1
ELIZABETH STREET
LIVERPOOL, NSW, 2170

DRAWING TITLE:
ZONE E
ELEVATIONS
E/S/W/N ELEVATIONS

SCALE:	DATE:	CHECKED:
AS SHOWN	18.03.08	AH
PROJECT NUMBER:	DRAWING NUMBER:	ISSUE:
08501	ZE A 0 1501	C

NOT FOR CONSTRUCTION

B1 A1 A2 A3 A4

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