

SOUTH EAST REGIONAL HOSPITAL

FOR

HEALTH INFRASTRUCTURE – NSW HEALTH

DESIGN REPORT – FOUNDATIONS

Prepared By:

B. J. KING

Director

SCP CONSULTING PTY LTD

ON BEHALF OF

SCP CONSULTING PTY LTD

REPORT NO: 2994 – DR-F

ISSUE A

REVISION	DATE	ORIGINATOR	CHECKED	APPROVED
A	15 AUGUST 2012	BK	PS	BK

1. INTRODUCTION

The proposed new hospital / mental health building will be a concrete framed building, consisting of post-tensioned floor slabs, using one-way slab bands between the concrete columns.

The floors will be laterally braced to resist wind and earthquake forces by lift and stair core walls, and the concrete columns and lift / stair shafts will provide the vertical support.

The intention is to design each of the suspended hospital floor slabs with sufficient flexibility to allow the floor use to be interchanged in the future.

The current proposal is to provide a suspended slab at roof level of the Mental Health building, which is capable of supporting future vertical expansion. There is no intention for vertical expansion to the main hospital building. All future expansion strategies for the hospital building is lateral.

Wherever possible, retaining walls will be deleted and replaced with battered embankments with suspended floor slabs over.

2. DESIGN STANDARDS

The foundation 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 (2011)	Structural Design Actions Part 2 Wind Loads
AS1170.4 (2007)	Earthquake Loads
AS2159	Piling Code
AS3600	Concrete Structures
Building Code of Australia	

3. DESIGN LIFE

The foundations shall be designed to provide adequate performance for a minimum period of 50 years.

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

4. MATERIAL PROPERTIES FOR DESIGN

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

Concrete Strength Grades:	
Bored piers and Pads	40MPa
Footing Beams	32 MPa

5. DESIGN DEAD LOAD ON FOUNDATIONS

5.1 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)

5.2 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, stair flights, planters and landscaped areas, and any imposed dead loads from roof framing, glazing and linings.

SCP will require equipment weights for all areas supporting heavy equipment such as operating rooms, laboratories, imaging and plantrooms. The weights will need to be submitted by the respective services consultants prior to structural design.

5.3 Roof Loads

The roof to the Mental Health is to be framed in post-tensioned reinforced concrete slab. These slabs shall be designed to support future vertical expansion of the building. The roof slab shall be capable of supporting a raised concrete slab, ensuring minimal disruption to the functioning building.

All roof slabs will be covered with a metal deck roof sheeting supported on lightweight framing built off the roof slab.

For the roofs framed in structural steel only (i.e. no roof slab), roof loads shall be evaluated in a systematic fashion as set out in the Pro-Forma at Appendix A of this report. 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 area of the building.

6. DESIGN LIVE LOAD ON FOUNDATIONS

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

Design loads shall be clearly designated on all structural floor plans.

Live Load reductions shall be applied in accordance with AS 1170.1.

SCP will require equipment weights for all areas supporting heavy equipment such as operating rooms, laboratories, imaging and plantrooms. The weights will need to be submitted by the respective services consultants prior to structural design.

7. DESIGN WIND LOAD

Design shall be in accordance with AS1170.2 – 2011 using the parameters set out in the Site Wind Analysis in Appendix C.

Design event for wind shall be 1/2000 for ultimate wind and 1/25 for serviceability wind.

8. EARTHQUAKE

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

Structure	:	4 (ultimate design)	
Importance Level	:	2 (service design)	
Earthquake Design Category	:	III (dynamic analysis)	
Annual Probability of Exceedance	:	1/1500 (ultimate design)	
		1/500 (service design)	
kp	:	1.5 (ultimate design)	
		1.0 (service design)	
Z	:	.09	
Site Sub-soil Class	:	C	
Structure Ductility Factor and Performance Factor	:	$\mu = 2$	Intermediate moment-resisting frames with limited ductile shear walls
		$S_p = .77$	

- Design for lateral loads in accordance with Section 7 of AS1170.4
- Design for vertical loads in accordance with Section 7 of AS1170.4
- Accidental Torsion in accordance Clause 6.6 of AS1170.4

9. FOUNDATION SYSTEM

A geotechnical investigation has been completed by Douglas Partners and a draft report issued dated July 2012. Foundations have been preliminary sized based on recommendations within the report.

Refer to Drawings Numbers _____ attached for the proposed foundation layout.

A cut to fill line exists between grids H and I. For footings along grid J and through to grid O, it is proposed to adopt pad footings proportioned such that they found on low strength rock with 500 kPa bearing.

Footings required at the top of the batter will comprise of bored piers, founded on medium strength rock.

For footings from grid A to I, it is proposed to adopt 900 dia bored piers founded on medium strength rock having a minimum of 3500 kPa base bearing. The design loads will be resisted by end bearing on the medium strength rock plus shaft adhesion to the low strength rock over.

It is intended the piling contractor designs, constructs and certifies the piling system based on design loads provided by SCP Consulting. It will be required that a geotechnical engineer certifies the bearing stratum prior to concrete placement to both pads and bored piers.

APPENDIX A - STEEL ROOF LOADING

ELEMENT DESCRIPTION	ALLOWANCE		
	UNIFORM (KG/SQ.M.)	CONCENTRATED (KGS)	LINE (KG/M)
ROOF SHEETING	5		
PURLINS	5		
INSULATION	3		
NORMAL CEILING 2 Layers 13mm Gyprok and to suit acoustic requirements	20		
ELECTRICAL CABLING	TBA		TBA
LIGHTING	TBA	TBA	
AUDIO		TBA	
MONITORS		TBA	
A/C DUCTING	20 kg/m ² Purlins 10 kg/m ² Rafters		TBA
FAN COIL UNITS		TBA	
EXHAUST UNITS TO ROOF		TBA	
GAS PIPES (including AIR)			TBA
HYDRAULICS PIPES			TBA
SPRINKLERS	5		TBA
CATWALKS/WALKWAYS			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
HOSPITAL WARDS	2 kPa min	1.5 kPa
OPERATING THEATRES *	3 kPa min	2.5 kPa
LABORATORIES *	3 kPa min	1.5 kPa
CAR PARKING	2.5 kPa min	0 kPa
LOADING DOCKS	15 kPa min	1.5 kPa
BACK OF HOUSE/WASTE AREAS	7.5.kPa min	1.5 kPa
STORAGE AREAS	7.5 kPa min	0 kPa
SUBSTATION/SWITCH ROOM	7.5 kPa min	5.0 kPa
AHU PLANT AREAS *	7.5 kPa min	2.5 kPa + B/W
AUDITORIUM	5.0 kPa min	2.5 kPa
BOILER PLANT AREAS *	7.5 kPa min	2.5 kPa + B/W
OFFICE SUITES	3 kPa min	1.5 kPa
PUBLIC SPACE	5.0 kPa min	1.5 kPa
IMAGING AREAS *	5.0 kPa min	1.5 kPa
CONCRETE ROOFS	3.0 kPa	6.0 kPa

Note:

- The design of the structure assumes Lightweight partitions throughout
 - Services allowance = .5 kPa at underside of all slabs
- * Denotes all equipment loads shall be submitted to SCP for assessment.
- Truck Loading Docks to be designed for unlimited repetitions of medium rigid trucks.