S·C·P CONSULTING PTY LTD
CIVIL AND STRUCTURAL
ENGINEERS

www.scpconsult.com.au ABN 80 003 076 024
LEVEL 2 - DANCHEN HOUSE, 507 KENT STREET SYDNEY
PO BOX A2002 SYDNEY SOUTH NSW 1235 AUSTRALIA
EMAIL ADDRESS - mail@scpconsult.com.au
TEL (02)9267 9312 FAX (02)9261 5871

DIRECTORS
PJ TRICKETT, BE(Hons), Dip Tech, MIE Aust, CPEng
BJ KING, BE, NZCE, MIE Aust, CPEng
P SIEWERT, BE(Hons), MIE Aust, CPEng
D TEMPLETON, BE(Hons), MIE Aust, CPEng, RPEQ

SOUTH EAST REGIONAL HOSPITAL

FOR

HEALTH INFRASTRUCTURE – NSW HEALTH

STRUCTURAL DESIGN REPORT

Prepared By:
B. J. KING
Director
SCP CONSULTING PTY LTD

ON BEHALF OF

SCP CONSULTING PTY LTD

REPORT NO: 2994 – SDR

REVISION	DATE	ORIGINATOR	CHECKED	APPROVED
FINAL	21 NOVEMBER 2012	BK	PS	

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 by lift and stair core walls, and the concrete columns and lift / stair shafts 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 with a lightweight steel roof over. The concrete roof slabs over Mental Health, Ambulatory and the IPU fingers, will be designed such that it is capable of supporting future vertical expansion.

Wherever possible, retaining walls will be deleted and replaced with battered embankments with suspended floor slabs over, thus minimising the potential of water ingress into the building.

2. 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 (2011)	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
Building Code of Australia	
BS 6472 : 2008	Evaluation to Human exposure to vibration in buildings
AS 2670.1 – 2001	Whole Body Vibration
AS 2670.2 – 1990	Continuous and shock induced vibration

A Design Guide for Footfall induced vibration of structures – M. Wilford and P. Young (2006)
Predicting footfall – Induced Vibrations – Ungar et al (2004)

3. DESIGN LIFE

The structural 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.

4. MATERIAL PROPERTIES FOR DESIGN

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

Concrete Strength Grades:	
Bored piers, footings	32 MPa, 40MPa
Reinforced floors, columns, walls	32 MPa, 40 MPa, 50 MPa, 80 MPa
Post-tensioned floors	32 MPa and 22 MPa at 5 days

Structural Steel Grades:	
Rolled sections	300 MPa
Plate and Connection Components	250 MPa
Hollow Sections	350 MPa

5. DESIGN DEAD LOAD

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, escalators and stair flights, planters and landscaped areas, 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.

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, Ambulatory and IPU fingers 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 over Mental Health shall be capable of supporting a raised concrete slab, ensuring minimal disruption to the functioning building. The roof slabs over Ambulatory and IPU hinges shall be capable of supporting a clinical floor with a lightweight steel roof over.

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

The structural framing shall make allowance for potential services risers down to the plantroom.

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 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 area of the 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.

6. 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.

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 plant rooms. 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.

The design of façade elements and their connections to the structure shall make provision for all local peak wind pressures effects, calculated using AS 1170.2 local pressure factors.

Projecting canopies and awnings, particularly at street level shall be designed to resist the wind forces using the method nominated in AS1170.2 (2011).

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	:	Ce	
Structure Ductility Factor and Performance Factor	:	$\mu = 3$ Sp = .67	Intermediate moment-resisting frames with limited ductile shear walls

- Design for lateral loads in accordance with Section 7 of AS 1170.4
- Design for vertical loads in accordance with Section 7 of AS 1170.4
- Accidental Torsion in accordance Clause 6.6 of AS 1170.4
- Design Load Cases

Case 1	DL+.3LL +1.0+Feqh(x)+.3Feqh(y)+1.0Feqv(x)+.3Feqv(y)+/-.1btorsion(x)+.3(+/-.lb torsion(y))
Case 2	DL+.3LL +.30Feqh(x)+1.0Feqh(y) +.30Feqv(x)+1.0 Feqv(y)+/-.3(.lb torsion(x))+/-.lb torsion(y)
Case 3	DL+.3LL +1.0 Feqh (x) +.30 Feqh(y)-1.0Feqv(x)-.3Feqv(y) +/- .lbtorsion(x) +.3(+/-.lbtorsion (y))
Case 4	DL+.3LL +.30Feqh(x) +1.0Feqh(y) - .30Feqv(y) -1.0 Feqv(y) +/-3(.lbtorsion(x)) +/- .lbtorsion(y)
Case 5	DL+.3LL +1.0 Feqh(x) +.30 Feqh(y) +/- .lbtorsion(x) +/- .3(.lbtorsion(y))
Case 6	DL.3LL +.30 Feqh(x) +_1.0Feqh(y) +/- .3(.lbtorsion (x)) +/- .lbtorsion (y)
Case 7	DL+.3LL +1.0+Feqh(x)-.3Feqh(y)+1.0Feqv(x)+.3Feqv(y)+/-.1btorsion(x)+.3(+/-.lb torsion(y))
Case 8	DL+.3LL +.30Feqh(x)-1.0Feqh(y) +.30Feqv(x)+1.0 Feqv(y)+/-.3(.lb torsion(x))+/-.lb torsion(y)
Case 9	DL+.3LL +1.0 Feqh (x) -.30 Feqh(y)-1.0Feqv(x)-.3Feqv(y) +/- .lbtorsion(x) +.3(+/-.lbtorsion (y))
Case 10	DL+.3LL +.30Feqh(x) -1.0Feqh(y) - .30Feqv(y) -1.0 Feqv(y) +/-3(.lbtorsion(x)) +/- .lbtorsion(y)
Case 11	DL+.3LL +1.0 Feqh(x) -.30 Feqh(y) +/- .lbtorsion(x) +/- .3(.lbtorsion(y))
Case 12	DL+.3LL +.30 Feqh(x) -1.0Feqh(y) +/- .3(.lbtorsion (x)) +/- .lbtorsion (y)

- Allowable interstorey drift : .015H
- Pounding to be calculated based on deflections determined in accordance with Clause 6.7.2
- $\Delta eq = \Delta$ elastic x μ/Sp

- The structure will need to be designed for ultimate eg forces and elastic eg forces
- All walls and components shall be designed for Earthquake pressures and loads in accordance with Section 8
- Structure will need to be detailed as on intermediate moment resisting frame.

9. OTHER DESIGN LOADINGS

9.1 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.

All walls should be designed for Earthquake forces as per AS 1170.4 – 2007.

9.2 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.

A minimum construction live load of 2.0 kPa shall be adopted.

The Builder 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.

9.3 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.

10. FOUNDATIONS

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 Drawing Number 2994 – SK1001 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.

11. SUSPENDED FLOOR SYSTEMS

The floor system chosen for the proposed new Hospital/Mental Health Building will be post-tensioned slabs using one-way slab bands. The slab bands are typically 2100 wide x 450 mm deep while slabs vary from 200 to 220 mm thick. Refer to Drawing Numbers 2994 – SK2001, SK3001, SK4001 and SK5001 attached.

The thicknesses allow for an integral topping of 40 mm thickness. Reinforcement and post-tension ducts will have 65 mm top cover to allow future flexibility and the ability to provide new setdowns without impacting the reinforcement and post-tensioning.

The floor slabs were considered using a strict dynamic response requirement (R=1) to allow for full flexibility in planning and future use. This strict dynamic design dictated minimum structural sizes.

12. VERTICAL LOAD BEARING & LATERAL RESISTANCE STRUCTURES

Vertical gravity loads are transferred to the pile and pad footings through columns, and lift and stair core walls.

Lateral resistance to earthquake forces, and to a lesser extent, wind forces, is by the lift and stair core walls. Compression forces at the base of the walls will be resisted by piles, and tension forces will also be resisted by piles in tension.

13. ROOF STRUCTURES

Roof structures generally consist of post-tensioned suspended slabs with structural steel frames and metal cladding over. The slabs will be designed so they are capable of supporting a future floor.

The roof structure over the level 03 plant room will consist of structural steel framing and metal cladding. Refer Drawing Number 2994 – SK6001 attached.

14. SERVICEABILITY

14.1 Vibration Effects

Vibration due to plant should not be structurally critical or unacceptable to occupants. SCP assumes all plant to be base isolated on spring and damper mounts.

Floors shall be designed to ensure that they comply with the recommended acceleration and velocity limits in the relevant Standards. SCP will use the R factor method outlined in Annex A of AS 2670.2 and Appendix A of BS 6472.

SCP proposes to design all floors dynamic assessment for an R factor = 1.0, ensuring maximum building flexibility.

Hospital Use:-

Zone 1 – Sensitive Equipment
Max accelerations and velocities to be supplied by the equipment specifier, nominal R factor = 1.0

Zone 2 – Operating Theatres
R factor = 1.0

Zone 3 – Clinical Wards
Night:- R Factor = 1.4
Day:- R Factor = 2.0

Mental Health Use:-

Zone 4 – Normal office areas, public space, waiting areas, consultation rooms (without critical equipment)
R factor = 4

Generally, the vibration zoning can be described as follows:

Zone 1 – Areas for sensitive equipment, this should include any areas where there will be MRI's, CT scans etc that are usually affected by floor vibration.

Zone 2 – Areas such as operating theatres where important procedures are taking place and vibration is limited so that it cannot be senses by staff inside the theatre.

Zone 1 and 2 areas may be interchangeable subject to acoustic advice from an accredited acoustic consultant, as they have the same limits.

Zone 3 – Areas where vibration at night is to be limited so that patients lying horizontally cannot feel the bed shake as a result of staff walking near them.

When large groups are moving around the wards (usually during the daytime), some vibration may be felt, but this would be limited.

Zone 4 – Normal / General areas where admin, consultation, waiting room and any other normal activity takes place where some vibration can be felt and tolerated. These floors are to be designed like normal office type floors where vibration is not critical to everyday function. Most likely, vibration will not even be felt at all unless someone is sitting still and there is a large group of people walking nearby.

All dynamic assessment will be made based on 2 people walking moderately, each weighing 70 kg and walking out of phase.

14.2 Deflection Limits

The following floor deflection limits shall apply unless more stringent deflection limits are required for special conditions:

General Floors	
Incremental deflection	<span/500
Total long term deflection	<span/250, or 25mm
Roof Structures (Concrete)	
Total long term deflection	<span/250, or 25mm
Compactus Areas (Concrete)	
Incremental long term deflection	<span/500

14.3 Lateral Drift

Serviceability levels shall be designed and constructed to limit inter-storey lateral drift of the storey height such that the integrity of all connected building elements are maintained.

In particular the effects of lateral drift needs to be addressed in the performance of the façade system.

Maximum allowable lateral and interstorey drift to be .015H.

14.4 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 : B1

15 BUILDING JOINTS

Differential displacement and movements between building joints shall be evaluated and joint detailed shall be such as to accommodate the movement.

As a minimum, calculations shall allow for combinations for the following:

- Axial shortening
- Concrete creep
- Concrete shrinkage
- Loading Differentials
- Thermal differentials and temperature gradients
- Building sway effects
- Seismic movements and pounding

Joints in tiling, terrazzo and granolithic topping floor finishes shall be coordinated with slab construction joint locations to be determined in consultation with project design team.

16 PENETRATIONS AND SERVICES RISERS

The design of the structure shall, as far as practicable, avoid the need for post construction penetrations. Known services and mechanical penetrations are to be coordinated with the relevant services consultants and the architect and clearly indicated on the structural drawings.

The post tensioned slab bands have been designed to incorporate a single 300 x 600 penetration at the internal columns. This penetration has sufficient space to accommodate future services.

All future penetrations and fixings for surface mounted equipment in both the slab and the slab bands shall be approved by SCP Consulting before installation. (Note:- This is to avoid cutting tendons. No large penetrations are permitted in the slab bands. Large penetrations in post tensioned slabs will require strengthening as per conventionally reinforced slabs).

17 SPECIAL DESIGN CONSIDERATIONS

- 100% column stiffness shall be used when analysing floor slab systems.
- Where possible stage post-tensioning shall not be specified and tendons using 7 or less strands shall be used.
- Relevant live loads and structural member fire-ratings shall be shown on structural drawings.
- The building structures shall be designed with sufficient capacity to support building maintenance requirements, including roof harness fixing points where required.
- SCP will require a floor vibration assessment report for all sensitive areas such as operating theatres, imaging and plantrooms.

  The report shall be undertaken by an expert vibration consultant to determine the level of vibration velocity and accelerations as a result of structural vibrations arising from normal occupant use.
- 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.
- All earthing requirements for lightning protection to the building to be advised and detailed by the electrical consultant.

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	3 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.

An acoustic vibration assessment shall also be undertaken.

- Truck Loading Docks to be designed for unlimited repetitions of medium rigid trucks.

APPENDIX C – SITE WIND ANALYSIS

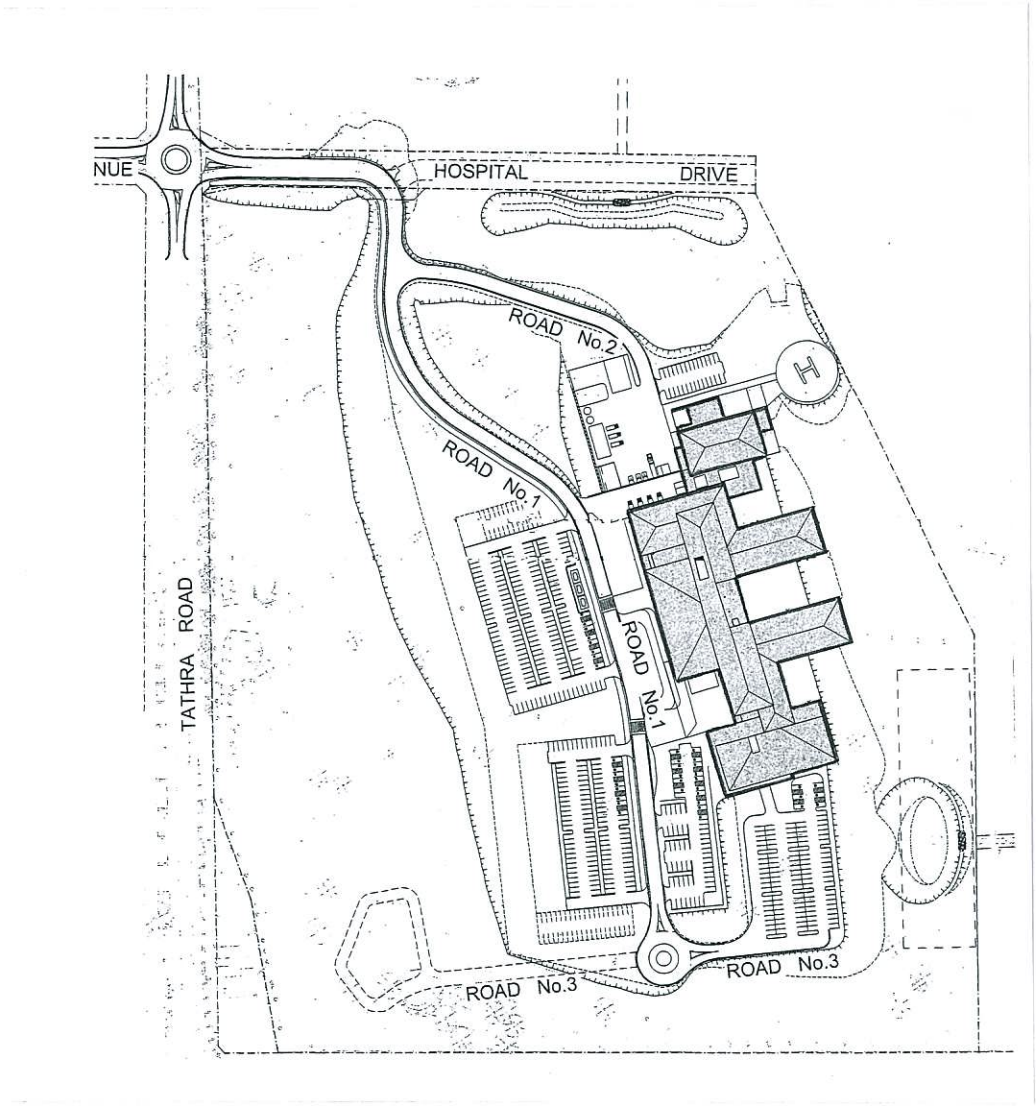
Importance Level = 4 (Buildings designed to contain large number of people)

Annual Probability Exceedence : 1 in 2000 – ultimate

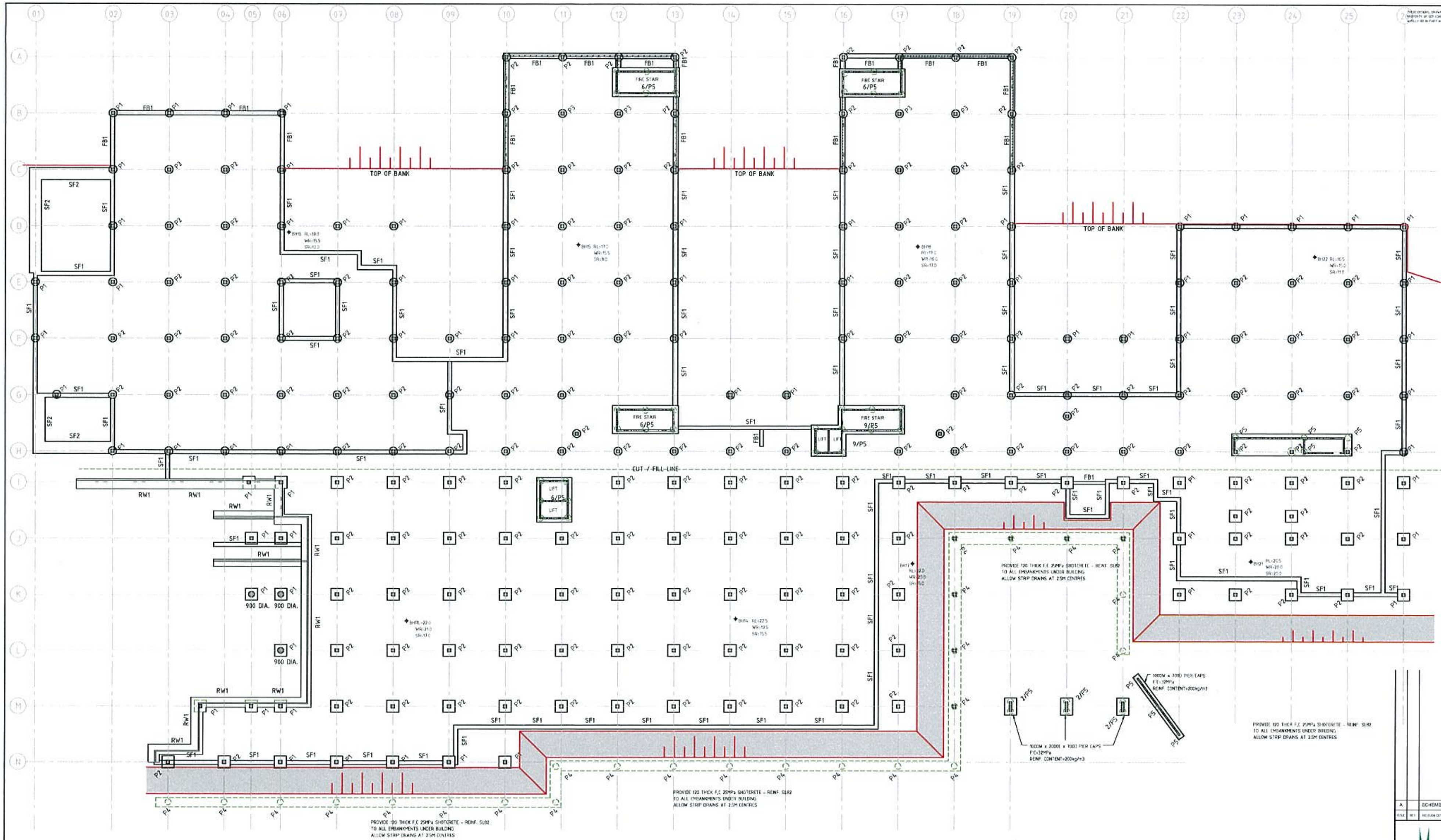
Region : A2 1 in 25 – serviceability

V2000 – ultimate limit state = 48 m/s

V25 – serviceability limit state = 37 m/s



Wind Direction multipliers	N NE E	1.0
	S SE	1.0
	SW W NW	1.00
Terrain Categories	faces of buildings	2
Shielding Multipliers	– 1.00	



		PIER LENGTH - FOUNDED IN MEDIUM / STRONG ROCK									PAD SIZE - FOUNDED IN WEAK ROCK
PIER	LOAD	GRID A	GRID B	GRID C, AA	GRID D, BB	GRID E, CC	GRID F, DD	GRID G, EE	GRID H, FF	GRID I, GG	GRID J TO GRID 0
P1	2400kN	5.0m	-	10.5m	10.0m	9.5m	9.0m	8.5m	8.5m	7.5m	2200 x 2200 x 9000 - 110 kg/m3
P2	3600kN	6.0m	6.0m	11.5m	11.0m	10.5m	10.0m	9.5m	9.0m	8.5m	2800 x 2800 x 9000 - 110 kg/m3
P3	4500kN	-	7.0m	-	-	-	-	-	-	-	-
P4	2400kN	-	-	-	-	-	-	-	-	-	7.0M LONG PIERS
P5	2400kN		7.0m	-	-	-	-	9.5m	-	9.0m	-

ALL PIERS TO BE 900 DIA., F'C 40MPa AND REINFORCEMENT CONTENT OF 80kg/m3
CONTRACTOR TO REFER TO GEOTECH REPORT TO DETERMINE NEED FOR PIER LINERS IN WEAK ROCK
FOR SD COSTINGS ALLOW TEMPORARY OR SACRIFICIAL LINERS FOR 50% OF THE LENGTH OF THE BORED PIERS

FB1 FOOTING BEAM
600W x 600D
F'C 32MPa
REINF. CONTENT 240 kg/m3

SF1 STRIP FOOTING
350W x 500D
F'C 25MPa
REINF. CONTENT 80 kg/m3

SF2 STRIP FOOTING
1800W x 400D
F'C 25MPa
REINF. CONTENT 80 kg/m3
WITH 200 R.C BLOCK WALL OVER x 6.2m HIGH
N16-200 V & N16-400 H

RW1 RETAINING WALL
800W x 3000 BASE
F'C 25MPa
REINF. CONTENT 110 kg/m3
WITH 200 R.C BLOCK WALL
N12-200 V & N12-400 H

ISSUE	REV	REVISION DESCRIPTION	DATE
A		SCHEME DESIGN	07.09.2012

S·C·P

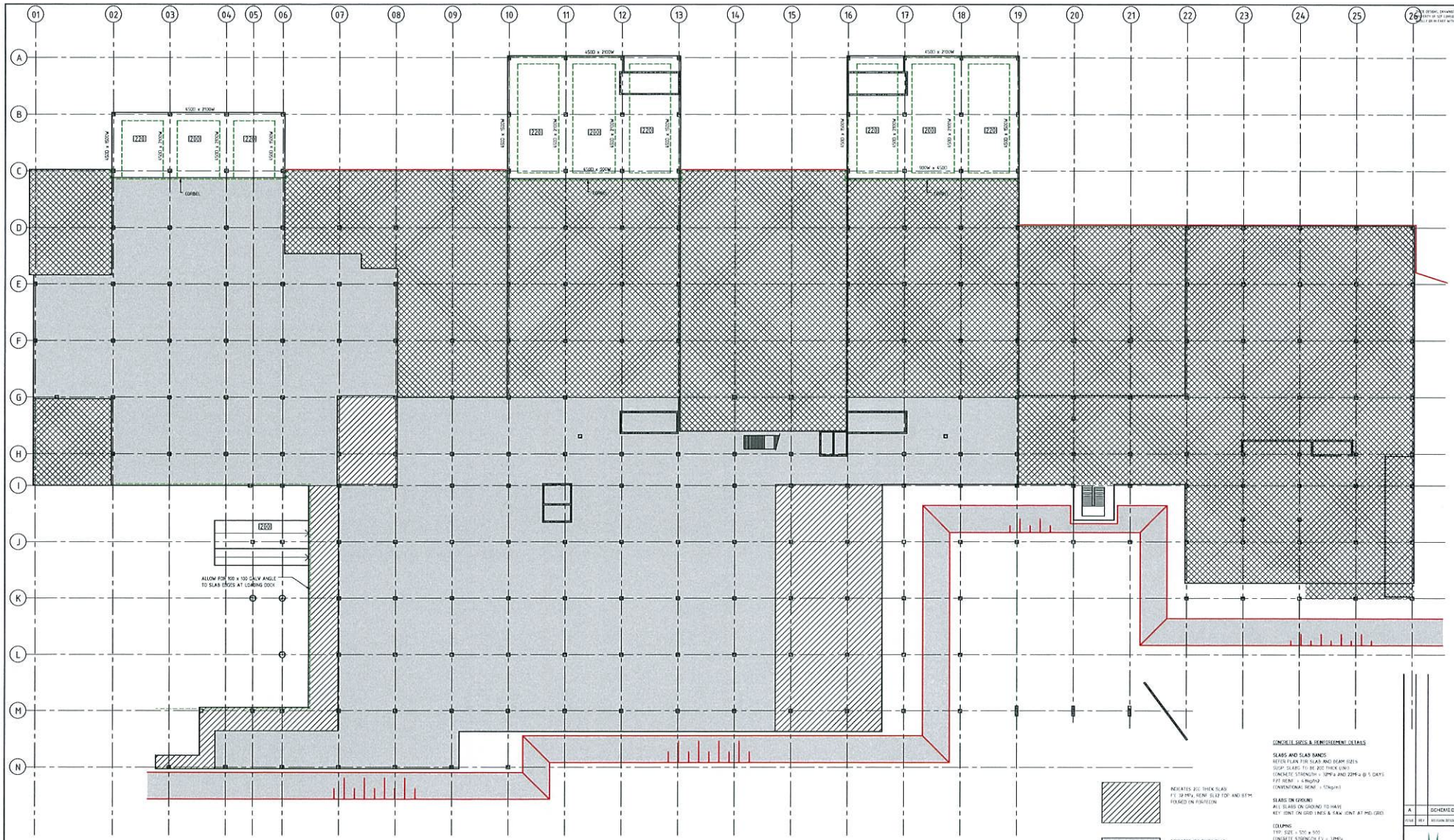
CLIENT: NSW GOVERNMENT Health Infrastructure

PROJECT: SOUTH EAST REGIONAL HOSPITAL

TITLE: FOOTING PLAN

SCALE	DRAWN	DESIGNED	APPROVED	DATE
1:200	K.S.	B.K.		

PROJECT NUMBER	DRAWING NUMBER	ISSUE
2994	SK1001	A



INDICATES 220 THICK SLAB F'C 50 MPa, REINF SLAB TOP AND BTM FOUNDED ON FORTECON

INDICATES 150 THICK SLAB F'C 32 MPa, REINF SLAB TOP FOUNDED ON FORTECON

REMAINING SLABS 120 THICK F'C 32 MPa, REINF SLAB TOP FOUNDED ON FORTECON

REFER TO CIVIL ENGINEERS DRAWINGS FOR SUB-GRADE PREPARATION & SUB-SOIL DRAINS.

CONCRETE SIZES & REINFORCEMENT DETAILS

SLABS AND SLAB BANDS
REFER PLAN FOR SLAB AND BEAM SIZES
SOG* SLABS TO BE 200 THICK (UNO)
CONCRETE STRENGTH = 32MPa AND 22MPa @ 5 DAYS
F/T RENF. = 4.9kg/m²
CONVENTIONAL RENF. = 12kg/m²

SLABS ON GROUND
ALL SLABS ON GROUND TO HAVE KEY JOINT ON GRID LINES & SAW JOINT AT MID GRID

COLUMNS
TYP. SIZE = 550 x 550
CONCRETE STRENGTH F'c = 32MPa
REINFORCEMENT CONTENT = 200 kg/m³

SIZE WHERE NOTED = 900 DIA.
CONCRETE STRENGTH F'c = 50MPa
REINFORCEMENT CONTENT = 280 kg/m³

FOR COLUMNS GREATER THAN ONE STOREY HIGH
SIZE = 650 x 650
CONCRETE STRENGTH F'c = 40 MPa
REINFORCEMENT CONTENT = 260kg/m³

LIFT AND STAIR WALLS
ALL WALLS 200 THICK
CONCRETE STRENGTH = 32MPa
REINF. CONTENT = 180 kg/m³

BASE SLAB
400 THICK
CONCRETE STRENGTH = 32MPa
REINF. CONTENT = 180 kg/m³
ALLOW RANDOM ROCK ANCHORS PER BASE

STAIRS
ALL STAIRS 250 THICK THROAT
REINF. CONTENT = 110 kg/m³

MASONRY WALLS
ALLOW 100x50x3.0 RHS WALL STIFFENER AT 1.5m CENTRES TO ALL MASONRY WALLS IN HOSPITAL & MENTAL HEALTH (NON FIRE RATED WALLS)
20m CTS. FIRE RATED WALLS.

REV	DESCRIPTION	DATE
A	SCHEME DESIGN	07.09.2012

s·c·p

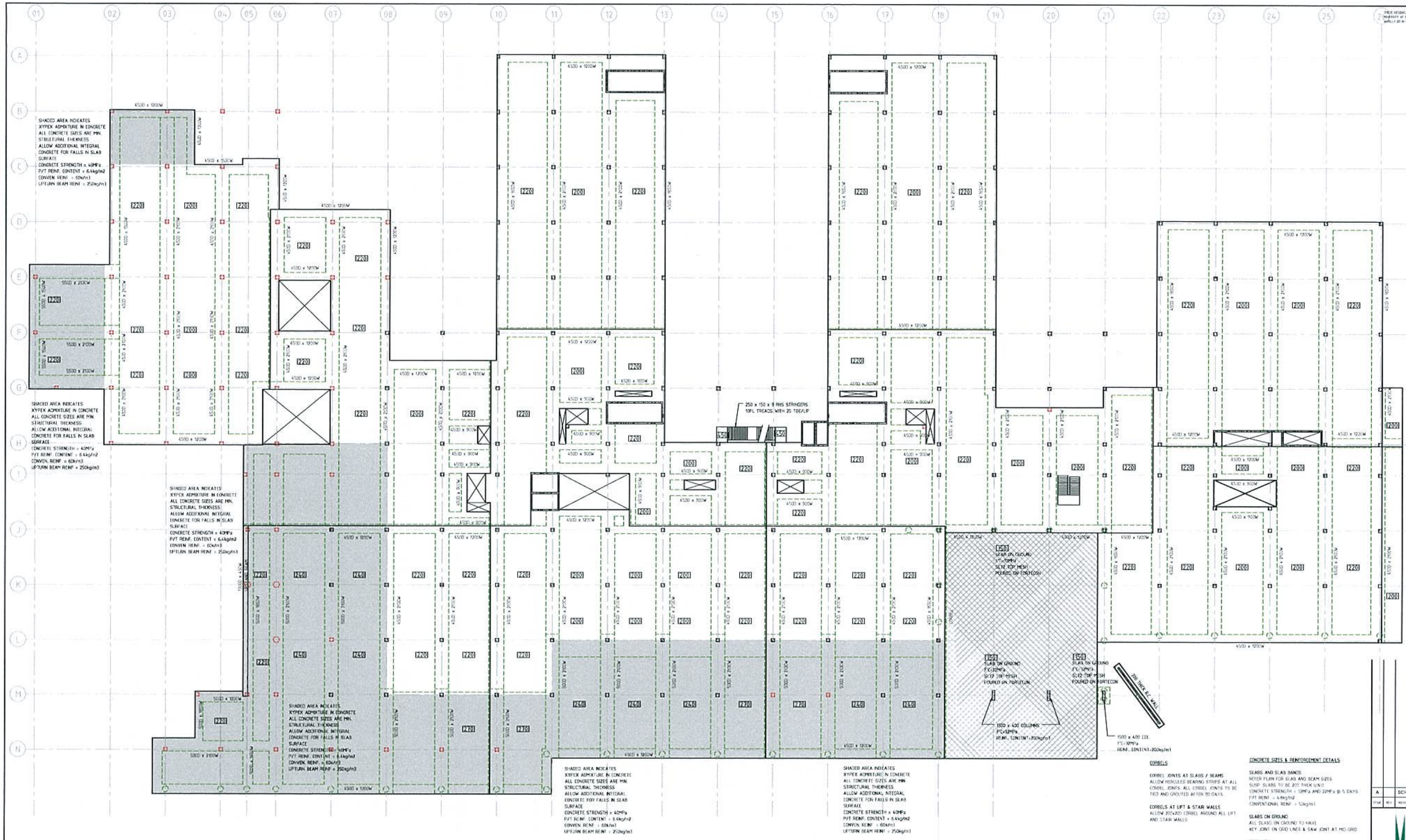
CLIENT
NSW GOVERNMENT Health Infrastructure

PROJECT
SOUTH EAST REGIONAL HOSPITAL

TITLE
LEVEL 00

SCALE (A1)	DRAWN	DESIGNED	APPROVED	DATE
1:200	K.S.	B.K.		

PROJECT NUMBER	DRAWING NUMBER	ISSUE
2994	SK2001	A



CORBELS

CORBEL JOINTS AT SLABS / BEAMS
ALLOW HERCULES BEARING STRIPS AT ALL CORBEL JOINTS. ALL CORBEL JOINTS TO BE TIED AND GROUTED AFTER 90 DAYS

CORBELS AT LIFT & STAIR WALLS
ALLOW 200x200 CORBEL AROUND ALL LIFT AND STAIR WALLS

CONCRETE SIZES & REINFORCEMENT DETAILS

SLABS AND SLAB BANDS
REFER PLAN FOR SLAB AND BEAM SIZES
SUSP. SLABS TO BE 200 THICK U.N.O
CONCRETE STRENGTH = 12MPa AND 22MPa @ 5 DAYS
P/T REINF. = 4.8kg/m2
CONVENTIONAL REINF. = 50kg/m3

SLABS ON GROUND
ALL SLABS ON GROUND TO HAVE
KEY JOINT ON GRID LINES & SAW JOINT AT MID-GRID

COLUMNS
TYP. SIZE = 500 x 500
CONCRETE STRENGTH F'c = 32MPa
REINFORCEMENT CONTENT = 260 kg/m3

SIZE WHERE NOTED = 900 DIA
CONCRETE STRENGTH F'c = 50MPa
REINFORCEMENT CONTENT = 280 kg/m3

FOR COLUMNS GREATER THAN ONE STOREY HIGH
SIZE = 600 x 600
CONCRETE STRENGTH F'c = 40 MPa
REINFORCMENT CONTENT = 280kg/m3

LIFT AND STAIR WALLS
ALL WALLS 200 THICK
CONCRETE STRENGTH = 32MPa
REINF. CONTENT = 180 kg/m3
BASE SLAB
400 THICK
CONCRETE STRENGTH = 32MPa
REINF. CONTENT = 180 kg/m3
ALLOW 8x400kN ROCK ANCHORS PER BASE
STAIRS
ALL STAIRS 200 THICK THROAT
REINF. CONTENT = 110 kg/m3

MASONRY WALLS
ALLOW 100x50x5.0 RHS WALL STIFFENER AT 3.5m CENTRES TO ALL MASONRY WALLS IN HOSPITAL & MENTAL HEALTH (NON FIRE RATED WALLS)
2.8m CTS FIRE RATED WALLS

ISSUE	REV	REVISION DESCRIPTION	DATE
A		SCHEME DESIGN	07.09.2012

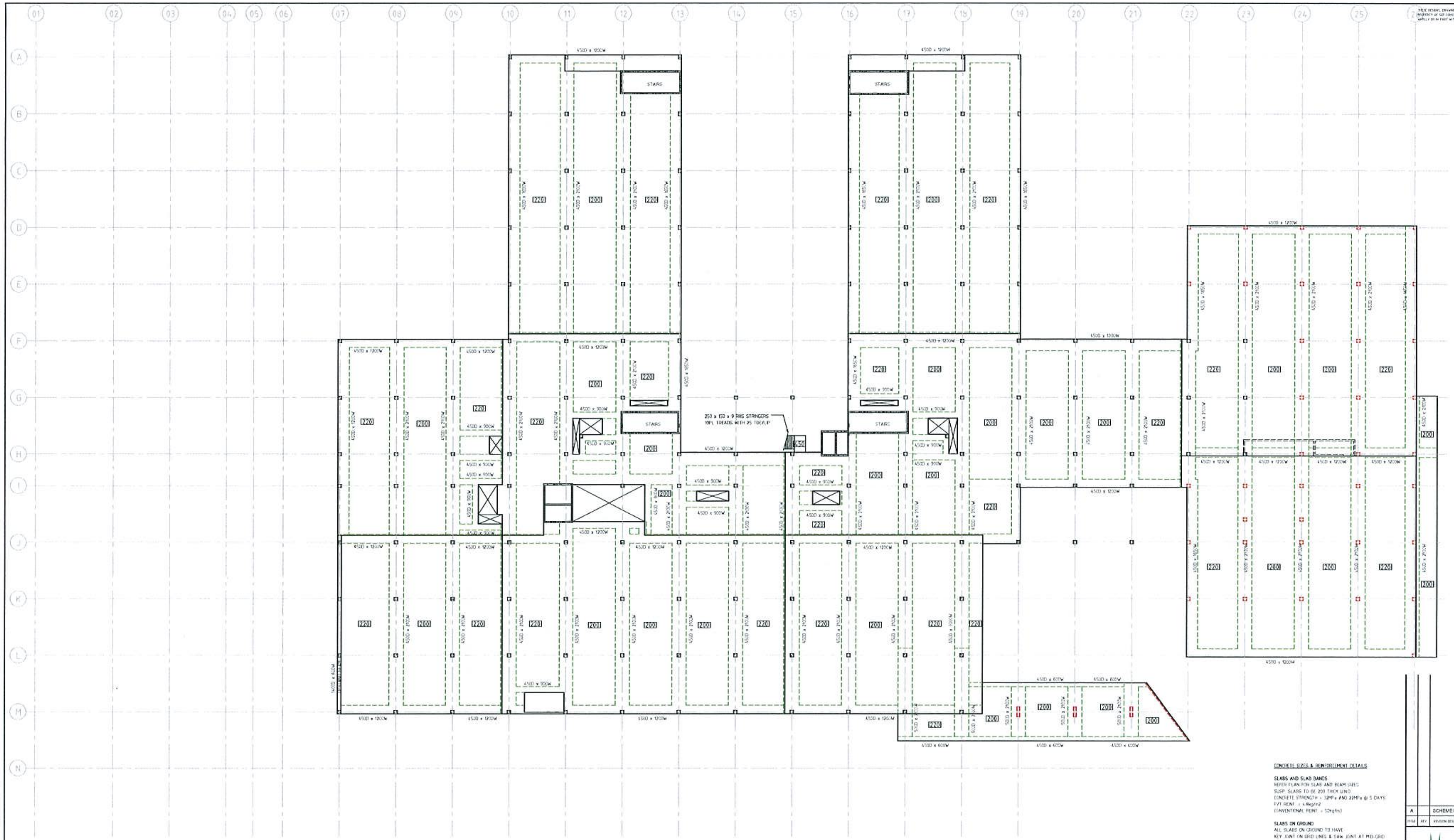
CLIENT: NSW GOVERNMENT Health Infrastructure

PROJECT: SOUTH EAST REGIONAL HOSPITAL

TITLE: LEVEL 01

SCALE (A1)	DRAWN	DESIGNED	APPROVED	DATE
1:200	K.S.	B.K.		

PROJECT NUMBER	DRAWING NUMBER	ISSUE
2994	SK3001	A



CONCRETE SIZES & REINFORCEMENT DETAILS

SLABS AND SLAB BANDS
REFER PLAN FOR SLAB AND BEAM SIZES
SUSP. SLABS TO BE 200 THICK U.N.O.
CONCRETE STRENGTH = 32MPa AND 22MPa @ 5 DAYS
P/T REINF. = 4.8kg/m2
CONVENTIONAL REINF. = 52kg/m3

SLABS ON GROUND
ALL SLABS ON GROUND TO HAVE
KEY JOINT ON GRID LINES & SAW JOINT AT MID-GRID

COLUMNS
TYP. SIZE = 500 x 500
CONCRETE STRENGTH F'c = 32MPa
REINFORCEMENT CONTENT = 260 kg/m3

SIZE WHERE NOTED = 500 DIA
CONCRETE STRENGTH F'c = 50MPa
REINFORCEMENT CONTENT = 280 kg/m3

FOR COLUMNS GREATER THAN ONE STOREY HIGH
SIZE = 420 x 600
CONCRETE STRENGTH F'c = 40 MPa
REINFORCEMENT CONTENT = 260kg/m3

LIFT AND STAIR WALLS
ALL WALLS 200 THICK
CONCRETE STRENGTH = 32MPa
REINF. CONTENT = 180 kg/m3
BASE SLAB
400 THICK
CONCRETE STRENGTH = 32MPa
REINF. CONTENT = 180 kg/m3
ALLOW 8x400kN ROCK ANCHORS PER BASE
STAIRS
ALL STAIRS 200 THICK THROAT
REINF. CONTENT = 120 kg/m3

MASONRY WALLS
ALLOW 100x50x5.0 RHS WALL STIFFENER
AT 3.5m CENTRES TO ALL MASONRY WALLS
IN HOSPITAL & MENTAL HEALTH (NON FIRE RATED WALLS)
2.8m CTS FIRE RATED WALLS

ISSUE	REV	REVISION DESCRIPTION	DATE
A		SCHEME DESIGN	07.09.2012

S·C·P

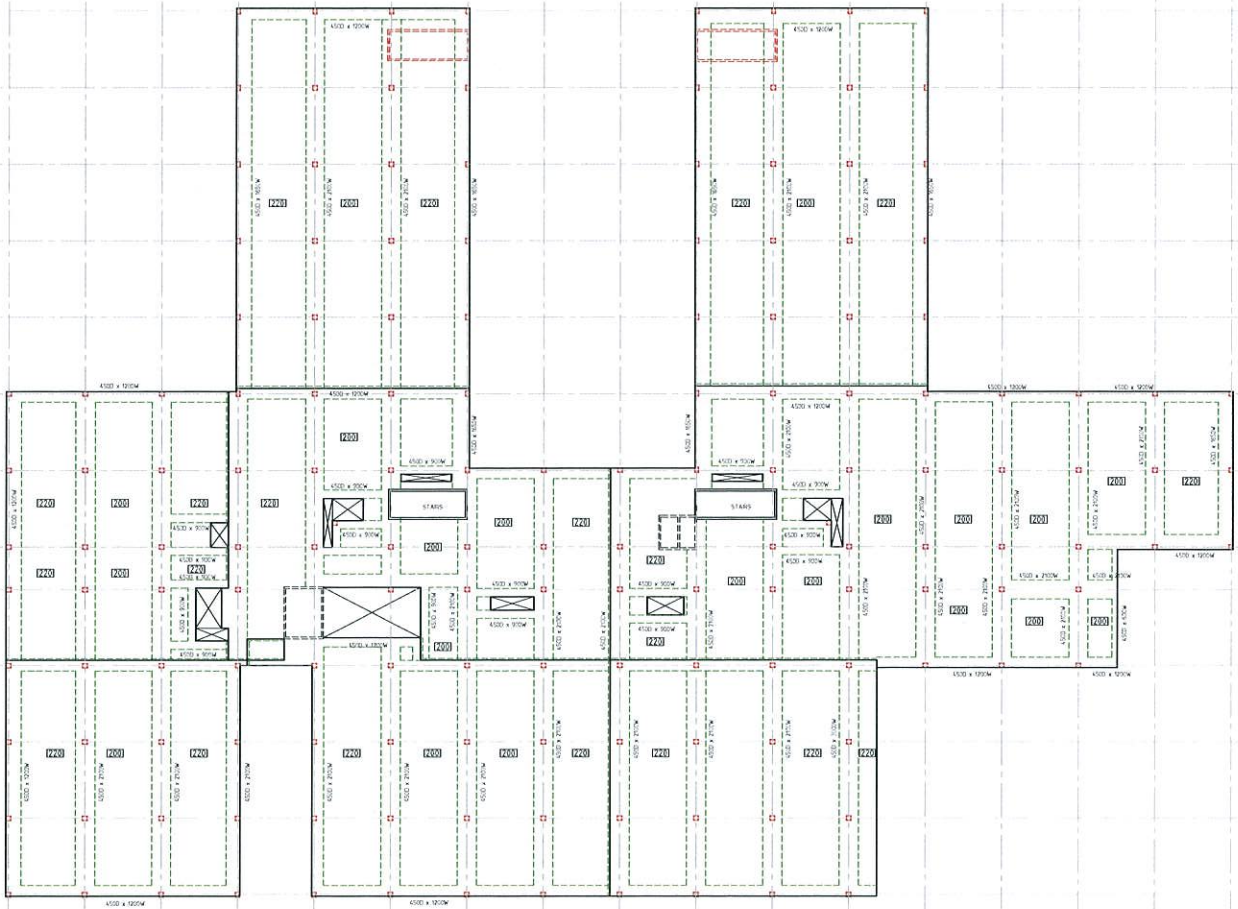
CLIENT: NSW GOVERNMENT Health Infrastructure

PROJECT: SOUTH EAST REGIONAL HOSPITAL

TITLE: LEVEL 02

SCALE @A1	DRAWN	DESIGNED	APPROVED	DATE
1:200	K.S.	B.K.		

PROJECT NUMBER	DRAWING NUMBER	ISSUE
2994	SK4001	A



CONCRETE SIZES & REINFORCEMENT DETAILS

SLABS AND SLAB BANDS
REFER PLAN FOR SLAB AND BEAM SIZES
SUSP. SLABS TO BE 200 THICK U.N.O.
CONCRETE STRENGTH = 32MPa AND 32MPa @ 5 DAYS
FVT RENT. = 4.8kg/m2
CONVENTIONAL RENT. = 5kg/m3

SLABS ON GROUND
ALL SLABS ON GROUND TO HAVE
KEY JOINT ON GRID LINES & SAW JOINT AT MID-GRID

COLUMNS
TYP. SIZE = 500 x 500
CONCRETE STRENGTH (F'c) = 32MPa
REINFORCEMENT CONTENT = 250 kg/m3

SIZE WHERE NOTED = 900 DIA
CONCRETE STRENGTH (F'c) = 50MPa
REINFORCEMENT CONTENT = 290 kg/m3

FOR COLUMNS GREATER THAN ONE STOREY HIGH
SIZE = 450 x 600
CONCRETE STRENGTH (F'c) = 40 MPa
REINFORCEMENT CONTENT = 290kg/m3

LIFT AND STAIR WALLS
ALL WALLS 250 THICK
CONCRETE STRENGTH = 32MPa
REINF. CONTENT = 180 kg/m3
BASE SLAB
400 THICK
CONCRETE STRENGTH = 32MPa
REINF. CONTENT = 180 kg/m3
ALLOW 9x4DOWN ROCK ANCHORS PER BASE
STAIRS
ALL STAIRS 200 THICK THROAT
REINF. CONTENT = 120 kg/m3

MASONRY WALLS
ALLOW 90WIDE RHS WALL STIFFENER
AT 3.5m CENTRES TO ALL MASONRY WALLS
IN HOSPITAL & MENTAL HEALTH (NON FIRE
RATED WALLS).
2.8m CTS FIRE RATED WALLS

A	SCHEME DESIGN	07.09.2012
ISSUE	REVISION DESCRIPTION	DATE

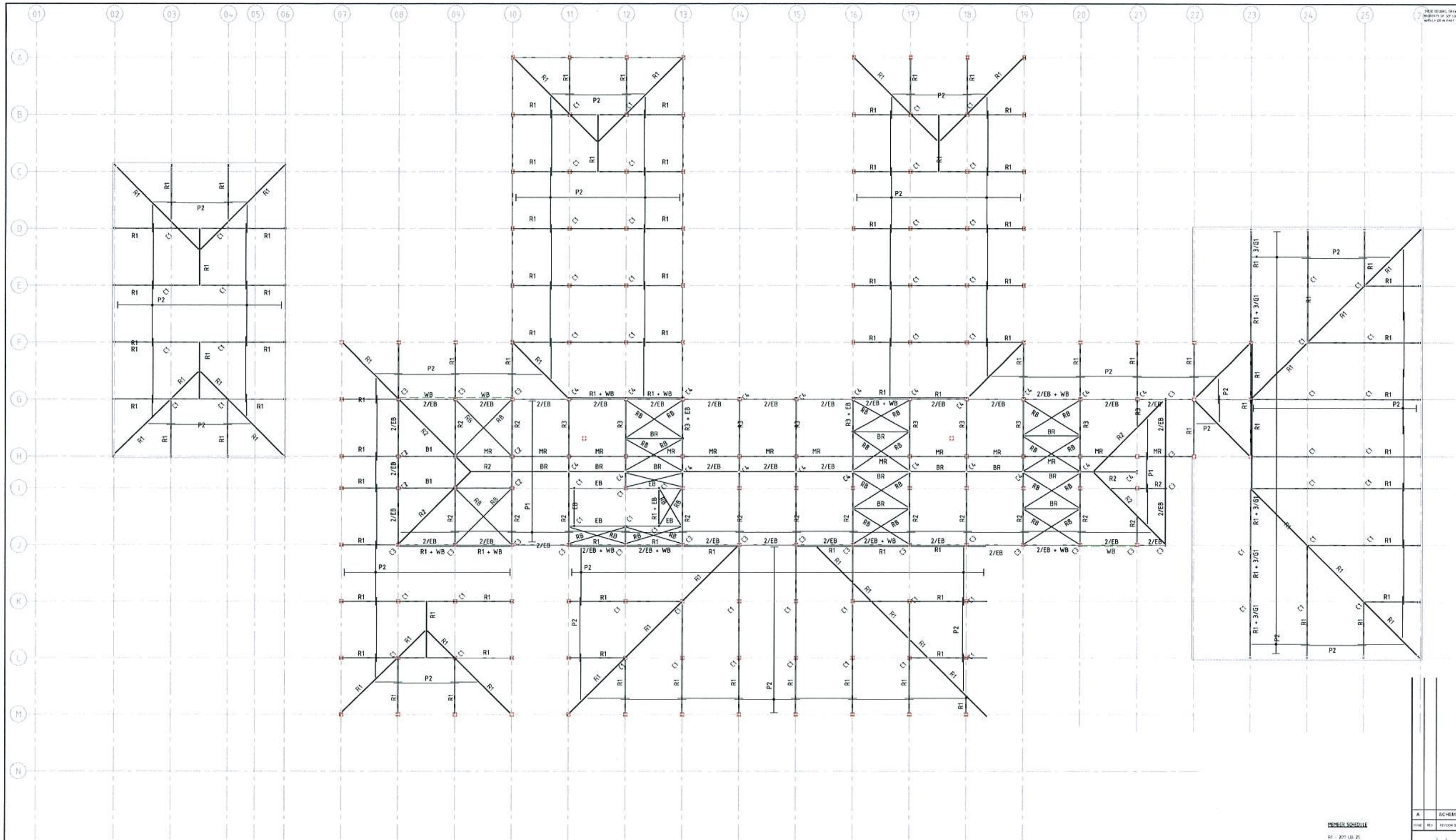
CLIENT
NSW GOVERNMENT Health Infrastructure

PROJECT
SOUTH EAST REGIONAL HOSPITAL

TITLE
LEVEL 03

SCALE (A1)	DRAWN	DESIGNED	APPROVED	DATE
1:200	K.S.	B.K.		

PROJECT NUMBER	DRAWING NUMBER	ISSUE
2994	SK5001	A



MEMBER SCHEDULE

R1 - 200 UB 25
R2 - 360 UB 45
R3 - 460 UB 74

C1 - 200 UB 25
C2 - 610 UB 101
C3 - 360 UB 51
C4 - 460 UB 74

B1 - 610 UB 101
WB - 75 x 6EA BRACE
RB - 75 x 6EA BRACE
BR - 140 OD x 3.5 CHS
G1 - C20019 WITH 2 ROWS BRIDGING
P1 - Z20019 WITH 2 ROWS BRIDGING
P2 - Z20024 WITH 2 ROWS BRIDGING

ISSUE	REV	REVISION DESCRIPTION	DATE
A		SCHEME DESIGN	07.09.2012

S•C•P

CLIENT
NSW GOVERNMENT | Health Infrastructure

PROJECT
SOUTH EAST REGIONAL HOSPITAL

TITLE
ROOF FRAMING PLAN

SCALE (A0)	DRAWN	DESIGNED	APPROVED	DATE
1:200	K.S.	B.K.		

PROJECT NUMBER	DRAWING NUMBER	ISSUE
2994	SK6001	A