Robert Bird Group

Structural Report

Tweed Valley Hospital,

Kingscliff, NSW

Lot 11 DP1246853

Issue: 3 – SSD2

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Report Amendment Register

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1.0 Overview

On the 11 June 2019 the Minister for Planning and Public Spaces granted approval for the Concept Proposal and Stage 1 Early and Enabling Works for the new Tweed Valley Hospital (SSD 9575) located at 771 Cudgen Road, Cudgen (Lot 11 DP1246853). All documents relating to this consent can be found on the major project website of DPIE at https://www.planningportal.nsw.gov.au/major-projects/project/10756.

The Environmental Impact Statement (EIS) has been prepared to assist in the State Significant Development (SSD) Stage 2 Application for the Tweed Valley Hospital which will be assessed under Part 4 Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This, along with supporting documentation, provides a clear outline of the Stage 2 Application.

The Tweed Valley Hospital Project broadly consists of:

- Construction of a new Level 5 major regional referral hospital to provide the health services required to meet the needs of the growing population of the Tweed-Byron region (in conjunction with the other hospitals and community health facilities across the region);
- Delivery of the supporting infrastructure required for the Tweed Valley Hospital, including green space and other amenities, roads and car parking, external road upgrades and connections, utilities connections, and other supporting infrastructure.

1.1 Stage 2 Hospital Main Works and Operation

The Stage 2 SSD component seeks consent for the Main Works and Operation of the Tweed Valley Hospital, including:

- **Construction of Main Hospital Building**
  - Main entry and retail area
  - Administration
  - Community health
  - In-Patient units
  - Outpatient clinics and day only units
  - Child and Adolescent Services
  - Intensive Care Unit
  - Mental Health Unit
  - Maternity Unit and Birthing Suites
  - Renal Dialysis
  - Pathology
  - Pharmacy
  - Radiation Oncology as part of integrated Cancer Care
  - Emergency Department
  - Perioperative Services
  - Interventional Cardiology
  - Medical Imaging
  - Mortuary
  - Education, Training, Research
  - Back of House services
  - Rooftop Helipad
- **Construction of Support Buildings, referred to as the 'Health Hub', containing:**
  - Oral Health
  - Community Health
  - Aboriginal Health
  - Administration
  - Education, Training and Research
- **Internal Roads and carparking, including multi-deck parking for staff, patients and visitors;**
- **Construction of a temporary building for the 'Tweed Valley Skills Centre'**
- **External road infrastructure upgrades and main site access**
- **Environmental and wetland rehabilitation, including rehabilitation of existing farm dam as outlined in the Biodiversity Development Assessment Report (BDAR) prepared for the Concept Proposal and Stage 1 works**
- **Site landscaping**
- **Signage**
- **Utility and service works**

The works outlined above comprise five key components, which are subject to various funding allocations and may be delivered independently to each other. Stage 2 has therefore been defined in the following sub-stages[1]:

- Stage 2A – Main Hospital Building complete with supporting roads, services infrastructure and landscaping
- Stage 2B – Main Hospital Building incremental expansion areas
- Stage 2C – Health Hub
- Stage 2D – Tweed Valley Skills Centre
- Stage 2E – Multi-deck car park.

Development consent is sought for the all 5 components of Stage 2 under this SSDA.

Plans for Stage 2 Main Works and Operation are attached in Appendix B of the EIS. Approval of Stage 2 will enable the new Tweed Valley Hospital to be built which will provide a much-needed contemporary health service facilities for the surrounding region.

1.2 Potential Future Expansions

Any subsequent stages or modifications to the proposal would be subject to separate applications as required including the potential future expansion of the facility.

2.0 Introduction

This structural report has been prepared by Robert Bird Group (RBG) for Health Infrastructure, to summarise the structural design works associated with the new Tweed Valley Hospital project.

A new multi-story concrete building is to be constructed centrally to the site located at Lot 11 DP1246853. The new building will feature one Basement level (B1), Lower Ground Floor, Ground level, and typical suspended floors to Level 6. The column grid to the new building is typically spaced at 8.4 metres in each direction, with columns supported on pile foundations socketed into medium strength basalt.

The suspended slabs are proposed to be post-tensioned flat slabs designed to accommodate the requirements in the HI guidelines with respect to vibration performance and future flexibility. Vertical expansion has been accommodated in the design of the Level 6 roofs. Lateral loads are resisted by in-situ concrete stair and lift cores, with the structure designed to Importance Level 4 design return period.

There will also be three new buildings to form an external Health Hub. One building will be single storey and the other two will be double storey.

The structural design will be developed to ensure the adequate functioning of the building structure consistent with the intended use of the project as described in the Engineering Services Guidelines by NSW Health (published on 26 August 2016), and will address the performance requirements of the structure in terms of strength, serviceability (deflection, vibration) and durability.

The RBG structural brief is compliant with the NSW Health guidelines.

2.1 Client Briefing Documentation and NSW Health Guidelines

The following documentation has been provided by Health Infrastructure for this project:

Date	Title	Author
Aug 2016	Engineering Services Guidelines	NSW Health
Oct 2018	Tweed Valley Hospital Project – Project Brief	NSW Health

Where additional briefing information is available or has been updated, the latest information shall be used.

[1] Stages are not listed in chronological order and may be delivered independently to each other

2.2 Geotechnical Reports

The following existing geotechnical reports are available for reference for this project.

Date	Title	Author
Sep 2018	**PRELIMINARY GEOTECHNICAL INVESTIGATION, PROPOSED TWEED VALLEY HOSPITAL Ref: GE18/144-Rev2**	**Morrison Geotechnic**
Dec 2018	**ADDITIONAL GEOTECH INVESTIGATION PROPOSED TWEED VALLEY HOSPITAL Ref: GE18/144-Rev2**	**Morrison Geotechnic**

3.0 Structural Performance Brief

3.1 Design Life

General Requirements of Structural Engineering Design

All structure is to be designed to carry applied loads (vertical and horizontal loads) and to satisfy serviceability criteria, in particular:

- Strength;
- Vibration-performance criteria;
- Deflection limits;
- Durability criteria
- Satisfy all Client user and other stated requirements;
- Architectural and building services requirements;
- Existing buildings and services adjacent to the project site.

The design life adopted for the project is –

Structural Durability - 50 years
Structural Flexibility of Function - 50 years

In order to achieve 50 years design life, the following criteria must be met:

- Concrete;
  - Covers and strengths to be in accordance with the AS/NZS 3600-2018: Concrete Structures & AS 2159-2009: Piling Code.

- Steelwork;
  - A 50-year design life shall be achieved via selection of appropriate protection systems (applied paint systems or similar), coupled with a rigorous maintenance regime of scheduled repainting for structural elements.

- A 50-year functional design life is proposed to be achieved via adoption of:
  - Integral removable floor cover zone to allow additional or relocated set down areas.
  - Predetermined zones for future services risers.
  - Refer section 2.2 Future Flexibility Design for details.

- All new suspended slab areas shall be assessed for vibration as general ward space unless noted otherwise, to meet the future flexibility requirements of the functional brief. This has been achieved by assessing corridor vibration loading throughout the floors.

Maintenance of the Structural Elements

The continued satisfactory performance of the structures designed to the criteria outlined in this report assumes an appropriate and comprehensive maintenance regime specific to those structures will be developed and implemented by the building owner as part of the overall maintenance regime for the facility.

3.2 Future Flexibility Design

To ensure that a 50-year functional design life is achieved in the proposed hospital redevelopment, the structural design of the new clinical services building requires the inclusion of a number of 'future proofing' initiatives:

Sacrificial cover zone

Levels 1 to 5 have generally been designed with an increased cover over reinforcement to allow maximum flexibility with regards to future wet area set-downs. The design allows for 40mm to be removed from the top of the slab and maintain the minimum cover requirements for the reinforcement. (Refer structural drawings for locations).

Note: Any future set-downs will require a re-assessment of the vibration performance of the slab to determine if any additional measures, i.e. introduction steel posts, are required to meet the vibration criteria.

Future Services Risers

All suspended floor plates to be designed with predetermined future service risers (refer structural drawings for locations). The future risers will be identified on the drawings so that they can be cut in the future without the need for strengthening works.

Vibration Response Factors

Levels 2 to 5 have been designed to achieve a maximum response factor (Rf) of 2.0 in the IPUs and 4.0 in the work zones. This provides future flexibility that allows these floors to accommodate operating theatres and future vibration sensitive equipment without the need for any additional structural works. Additionally, operating theatres and other critical zones will be designed for a maximum response factor (Rf) of 1.0.

The level 5 floor plate will be designed to achieve the same vibration performance as the general ward space on levels 2-4. It will also be designed with a higher load capacity so that the floor plate can accommodate an additional level of ward space with a light framed steel roof above in the future, without the need for any strengthening works.

Vertical and Lateral Load Capacity

The vertical structural elements, i.e. foundations, columns and walls will be designed to support the loads created by the future works (refer above).

3.3 Structural Importance Level

The building has been classified as Importance Level 4 to AS 1170.0, for the purposes of wind and earthquake design.

3.4 Applicable Codes and Standards

The structural design of the project is to be completed in accordance with the relevant Australian Standard Codes of Practice including but not limited to the following:

- Building Code of Australia (BCA 2019)
- Engineering Services
- Guidelines NSW Health
- AS/NZS 1170.0 (2002) Structural Design Actions - General Principles
- AS/NZS 1170.1 (2011) Structural Design Actions - Permanent, Imposed & Other Actions
- AS/NZS 1170.2 (2011) Structural Design Actions - Loading Code Wind
- AS 1170.4 (2007) Structural Design Actions - Loading Code Earthquakes
- AS 2159 (2009) Piling Code

- AS/NZS 3600 (2018) Concrete Structures
- AS/NZS 3700 (2018) Masonry Code
- AS/NZS 4100 (1998) Steel Structures

For standards relevant to vibration criteria, please refer Section 2.8.

In addition to the standards listed above, all local service authority requirements will be complied with, including but not limited to –

- Sydney Water Corporation
- Other gas, electricity, water and sewer authorities as relevant to the project

3.5 Vertical Design Loads

The following design loads shall be applied to floor areas on the project for various buildings and spatial usages.

Floor Usage	***Uniform Live Load (kPa)***	***Point Live Load (kN)***	***Superimposed Dead Load (kPa)***	***40mm Sacrificial Topping (kPa)***
Plant Rooms U.N.O	7.5	4.5	2.4	-
Fire Stairs / Stairs	4.0	4.5	0.5	-
Common Areas / Lobbies / Corridors / Circulation Spaces	5.0	1.8	1.8	1.0
Offices	3.0	4.5	1.8	1.0
General Ward Space	3.0	4.5	2.0	1.0
Storage Areas U.N.O	5.0	4.5	1.8	-
Retail	5.0	4.5	1.8	1.0
Cardiology Gym	5.0	3.6	1.8	1.0
Cool Rooms	15 kPa minimum	10.0, maximum	2.0	1.0
Façades (Typical)	N/A	N/A	As calculated in accordance with AS1170.1, refer structural loading plans	-
Balconies	4.0	1.8	2.0	-
Concrete Roof- Non-trafficable	1.0, (200mm ballast allowance)	L4	5.0	-
Shell space future expansion	4.0	4.5	3.0	-
Operating Theatre, X-ray room	3.0	4.5	2.0	1.0
Parking, Driveway & Ramp	2.5	13	0.5	-
Landscape	5		11 (600mm Soil fill)	-
Roof	0.5	1.4	2.5 (10mm screed)	-
Other	as calculated,	as calculated	as calculated	1.0

Superimposed Dead Load

Refer Appendix A for the superimposed dead loading diagrams which illustrate the superimposed dead loads applied to each area of the structure. The design of structure allows for the above listed permanent floor loads superimposed over (and in addition to) the self-weight of the structure (self-weight shall be calculated separately). Where an area is not defined in the above table or in the loading diagram, advice shall be sought from the project manager and reference made to AS/NZS 1170.1.

Live Loadings

Refer Appendix B for the live loading diagrams which illustrate the relevant live loads for each area of the structure. Where an area is not defined in the above table or loading diagram, advice shall be sought from the project manager and reference made to AS/NZS 1170.1. Where loads in this table are in excess of the minimum loadings stated in the Australian Standard, the loadings rated in the above table / loading diagrams shall be adopted.

3.6 Earthquake Loads

The following earthquake design criteria in accordance with AS1170.4 (2007) and NCC (2016) are to be adopted: –

Factor	Adopted Value
Hazard Factor	0.09
Site Subsoil Class	C_e
Building Importance Level	4
Annual Probability of Exceedance	1:1500
Probability Factor k_p	1.5
Earthquake Design Category	EDC III

3.7 Wind Loads

The building will be designed for wind loads in accordance with the relevant Australian Standards for the following parameters: -

Factor	Adopted Value
Region	B
Terrain Category	2
Building Importance Level	4
Annual Probabilities of Exceedance	Ultimate 1:2000 Service 1:25
Basic Wind Velocities – V_{2000} V_{100} V_{20}	 63m/s 48m/s 38m/s
M_s	1.0
M_t	1.0
M_d	1.0

It is not considered necessary that a detailed structural wind study to be carried out. Studies of cladding pressures and wind environmental effects may be required.

Glazing shall be articulated as necessary to provide allowance for structural mullions and wind beams to support minor awnings and architectural louvres.

3.8 Deflection Criteria

Structural elements are to be designed to achieve deflection control in accordance with the criteria set out in the table below –

Structural Element	Deflection Type	Limit
Overall building structure	Lateral sway due to permissible wind load	height/500
	Lateral sway due to ultimate earthquake loads	interstorey drift limit of height/500
Floor slabs – spans (no sensitive partitions)	Long-term incremental deflection	span/250 or 25mm whichever is less
Floor slabs – spans (with sensitive partitions)	Long-term incremental deflection	span/500 or 25mm whichever is less
Floor slabs – cantilevers (no sensitive partitions)	Long-term incremental deflection	cantilever/125 or 25mm whichever is less
Floor slabs – cantilevers (with sensitive partitions)	Long-term incremental deflection	cantilever/250 or 25mm whichever is less
Transfer beams	Long-term incremental deflection	span/1000 or 10mm, whichever is less

3.9 Vibration Criteria

Vibration performance for the structural elements of the project has been selected to address the effects of vibration on: -

- Structural adequacy / durability
- Regenerated noise / acoustic performance
- Perception / comfort of building occupants
- Performance of sensitive equipment / processes

Relevant Codes and Standards

- SCI P354: Design of Floors for Vibration: A New Approach, Steel Construction Institute (2009, Revised)
- CCIP-016: A Design Guide for Footfall Induced Vibration of Structures, The Concrete Centre (2006)
- Comparison of Possible Hospital Floor Structures with Respect to NHS Vibration Criteria, The Concrete Centre (2004)
- BS 6472.1 Guideline to Evaluation of Human Exposure to Vibration in Buildings
- 130559-BON-CIV-RPT-006: Tweed Valley Hospital Development Design Report, Civil & Structural – Issued for 100% Concept Design (Revision D), Bonacci Group
- TN290: Vibration Design of Concrete Floors for Serviceability, AdaptSOFT, 2008
- Engineering Services Guidelines Health Infrastructure NSW

Application of Relevant Vibration Criteria

Refer Appendix C for floor vibration design response factor diagrams that identify the adopted response factor criteria for each floor plate. The vibration thickness for modelling purposes is considered to equal the total slab thickness (i.e. includes the sacrificial cover zones and architectural set-downs where necessary), refer figure 2.8.1 below.

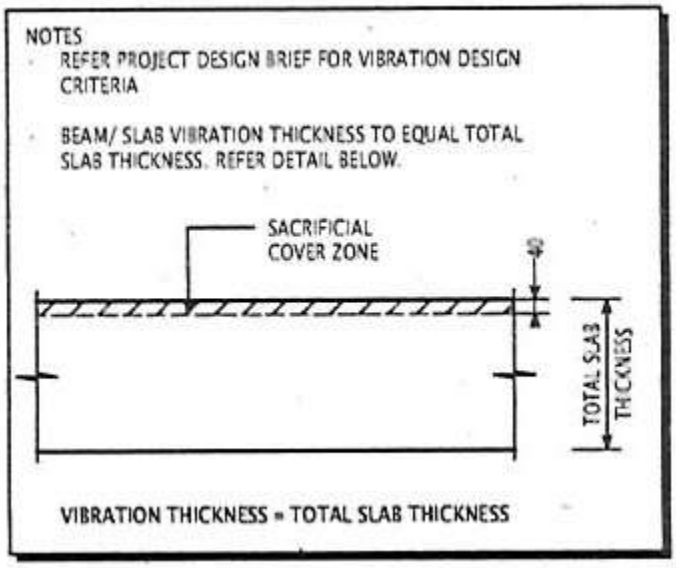


Figure 2.8.1 Vibration Thickness Diagram

The critical considerations and/or factors in determining the criteria are:

- Identification of the vibration sources.
- The impact of the vibration on the vibration receiver.
- The required dynamic characteristics of the structure and the resultant design consequences and cost (i.e. the mass, stiffness and damping of the floor structure).

In most instances, the critical vibration source considered in the structural design of the Clinical Services Building is vibration induced by human walking. The definition of human walking adopted for the structural design is one, 76 kg person, walking at 132 steps per minute, corresponding to a foot fall frequency of 2.2 Hz.

Structural Element	**Deflection Type**	**Limit**
Percentage of Damping	3%	For fully fitted out and furnished floors in normal use
Applied Live Load	10% of nominal live load	-
Dynamic Modulus of Elasticity	38,000 MPa	-
Walking Pace Frequency	1.0 to 2.2 Hz	-
Static Force Exerted by an 'Average Person'	746 N	76 kg x 9.81 m/s2
Number of Modes to be Considered	All modes up to minimum 15 Hz	-

The building floor system must be designed so that the vibration effects of human walking are kept to within an agreed set of criteria relevant to the usage of the floor area under consideration. These have been taken from CCIP-016 and are reproduced below:

Criterion curve	Max. velocity level* µm/sec (RMS)	Detail size** microns	Description of use
Workshop (ISO2631 and BS6472) *R* = 8, ASHRAE J	800	N/A	Distinctly perciptible vibration. Appropriate to workshops and non-sensitive areas.
Office (ISO2631 and BS6472) *R* = 4, ASHRAE I	400	N/A	Perceptible vibration. Appropriate to offices and non-sensitive areas.
Residential day (ISO2631 and BS6472) *R* = 2, ASHRAE H	200	75	Barely perceptible vibration. Appropriate to sleep areas in most instances. Probably adequate for computer equipment, probe test equipment and low-power (to 20X) microscopes.
Operating theatre (ISO2631 and BS6472) *R* = 1, ASHRAE F	100	25	Threshold of perception. Suitable for sensitive sleep areas. Suitable in most instances for microscopes to 100X and for other equipment of low sensitivity.
VC-A (BBN-A or ASHRAE E) *R* = 0.5	50	8	Adequate in most instances for optical microscopes to 100X, microbalances, optical balances, proximity and projection aligners, etc.
VC-B (BBN-B or ASHRAE D) *R* = 0.25	25	3	An appropriate standard for optical microscopes to 1000X, inspection and lithography equipment (including steppers) to 3 micron line widths.
VC-C (BBN-C or ASHRAE C) *R* = 0.125	12.5	1	A good standard for most lithography and inspection equipment to 1-micron detail size.
VC-D (BBN-D or ASHRAE B) *R* = 0.0625	6	0.3	Suitable in most instances for the most demanding equipment including electron microscopes (TEMs and SEMs) and E-Beam systems, operating to the limits of their capability.
VC-E (BBN-E or ASHRAE A) *R* = 0.03125	3	0.1	A difficult criterion to achieve in most instances. Assumed to be adequate for the most demanding of sensitive systems including long path, laser-based, small target systems and other systems requiring extraordinary dynamic stability.

Notes
* As measured in one-third octave bands of frequency over the frequency range 8 to 100 Hz.
** The detail size refers to the line widths for microelectronics fabrication, the particle(cell) size for medical and pharmaceutical research, etc. the values given take into account the observation that the vibration requirements of many items depend upon the detail size of the process.

The excitation points, e, and the response points, r, are chosen to produce the maximum response to the floor. This usually occurs when the excitation point, e, and the response point, r, will occur at the same point – a conservative assumption.

The precast and lightweight facade has been assumed to provide vertical restraint to the perimeter of internal and external floor slabs for the purposes of vibration analysis. Note, full height glazing (both articulated and non-articulated) has been assumed to not provide any restraint for the purposes of vibration analysis.

For vibration analysis, the mesh size used is considered sufficient if the elements can be doubled without significantly changing the frequency. RBG have adopted a 500x500mm mesh size for vibration assessment.

RBG have adopted a floor system using standard formwork for construction. This allows for the floor plate to be designed with consistent section properties in all directions for vibration analysis. If non-standard formwork is to be used for construction (i.e. bondek etc.), the floor plate section properties will vary in each direction and therefore will need to be reassessed.

3.10 Fire Resistance

Structural elements are to be designed in accordance with the Building Code of Australia and the

relevant Australian Standards to satisfy the required FRL levels for fire. These levels will be advised by the Principal Certifying Authority for the project.

3.11 Crack Control in Concrete Elements

The effects of thermal movement and shrinkage must be allowed for in the structural design. Structural concrete elements are to be designed to maintain serviceability and visual adequacy (i.e. generally a minor degree of crack control, moderate degree of crack control for areas with 'brittle' finishes as per AS3600) via movement controls including but not limited to –

- construction joints
- pour strips
- grouted dowel joints
- slip joints
- expansion joints
- other detailing as deemed necessary

3.12 Safety in Design

Safety in Design reviews on all structural elements will be completed at the following milestones in the course of the project –

- prior to issue of structural trade packages for tender
- prior to issue of structural drawings "For Construction"

3.13 Durability

Concrete: -

Exposure Classifications:

Internal	General	A1
	Plant room and soffits of slabs over plant rooms	B1
	Basements generally	A1
External	All external areas	B1

Steel: -

The surface treatments to exposed steelwork will be as per the required architectural finish and determined by the architect.

All external steelwork shall be hot dipped galvanised unless noted otherwise.

3.14 Sustainability

Sustainability is an important requirement for this building in particular and to developments in general undertaken by Health Infrastructure. Appian Group has issued sustainability guidelines which will be monitored in conjunction with the ESD Consultant.

4.0 Structural Concept Summary

4.1 Excavation Methodology, Shoring and Retention Systems

Site Information

The proposed development is located in Kingscliff and includes one Basement level (B1), Lower Ground Floor and Ground level. All the above floors are part suspended and part slab on grade and the verticals are supported by foundations starting at each of these levels.

Retention System and Basement Excavation

Based on the topography of the site earthworks should take account of the sloping terrain and be limited to cuts and fills. The option of temporary and permanent battered excavations is feasible but dependent on the excavation location in relation to the existing roads, boundary lines and other infrastructure. For Maximum safe batter angles for the different materials encountered on site are indicated in Table 7 of Geotechnical report.

It is expected that the clays and weathered basalt will not be self-supporting therefore retaining walls and permanent batters will to be utilised to avoid the potential issues with long term performance of waterproofing systems.
Where space constraints prevent the use of battered or benched excavations the use of temporary retention systems is likely to be required for excavations exceeding approximately 1.0m to 2.0m. The temporary lateral support will be designed prior to the commencement of excavation.

Refer to the Civil Infrastructure drawings (C-2 series) for the scope of works that is to be provided under that contract.

It is anticipated that due to the topography, the lower levels of the building are to be excavated into the northern slope of the site and the intent to utilise cut material as filling for building platforms.

All exposed permanent batters should have appropriate drainage and properly maintained vegetation to reduce the occurrence of surface erosion and scour by impingent rainfall. Upslope runoff should also be directed away from the batters limiting the ingress of water into the fill. The surface water should not be allowed to discharge directly across the batters and surface drains must be constructed and located behind the crests of all batters and benches.

Groundwater Control – During Construction

No significant groundwater issues are expected to be encountered in excavations under normal weather conditions in the slightly elevated cut areas of the site.

The bore log indicated that the groundwater was encountered in deep boreholes BH1, BH6, BH7, BH25, BH29, BH43 and BH45 to BH55 only at depths ranging between 6.5m and 14.9m below the existing ground surface. No groundwater was encountered in any of the shallow boreholes which extended to depths ranging up to 4.5m below the existing ground surface. On this basis, it is likely that groundwater would only be encountered below a level of approximately RL14.0m within the footprint of the proposed hospital building.

The Geotech report indicates that the seepages may be encountered at the natural soil/weathered rock interface, especially following rainfall events. The presence and depth to groundwater is dependent on rainfall, subsurface material and permeability, integrity of in-ground services, and the proximity to, type and density of vegetation.

For Groundwater Depths and Levels refer table 3 of Geotechnical report by Morrisons Geotechnic.

4.2 Foundations

Generally, the subsurface conditions comprised 3 different strata. The upper layer between 0.8m and 3.6m is formed of silty clays. This overlies a layer of material which is highly variable and comprises bands of low strength basalt, high to very high strength basalt and clays. Below this variable layer very high strength fresh basalt was encountered as per the bore logs. Having studied the option of providing both Raft and Pile foundation. It is noted that there is a lot of cut into the rock which could potentially increase construction time and will influence final construction methodology.

Based on section 14, Cl. 14.2 of Morrisons report indicates preference for deep foundations and suggest that dimensions for shallow foundations must be increased (doubled) to deal with inconsistent rock strength. Bored piles or CFA grout injected piles founding in the basalt rock is found to be suitable for reducing the differential settlement.

Though the option of using pile foundation is suited, owing to the varying geology and significant difference in the strength of the material below the founding level possibility of using combination of piles and pad footings is considered.

Based on the borehole log and the ground profile, possibility of using pad footings at locations where Very High, High, Medium strength rock are encountered is considered and, in few cases, at locations where Low and medium strength rock are found refer Appendix D for details

It is observed that there are areas where corridors similar to the one connecting the lift core at level B1 are present, these areas present difficulty in getting the piling rig to the required location. Considering pad footings are these areas may be beneficial.

Due to varying Geology where interbedded layers of Extreme (EX), Distinctly (DW) and Slightly (SW) weathered rock is found, using date related to Medium strength rock will be considered. At locations where layers of the low and medium strength rock are encountered, Low strength rock sub grade modules will be considered.

Typically for Medium strength rock is found to have bearing capacities or 1250kPa and sub grade modules of 200kPa/mm; For low strength rock the bearing capacity of 500 kPa and subgrade modulus of 100kpa/mm may be considered based on Table 10, Section 14 of Geotechnical report.

Where the footings for the proposed structures found in different materials, consideration should be given to designing the structure to accommodate the possible differential settlements. The geotechnical report further specifies that when adopting the parameters for the encountered materials shown in the Tables 10 above, there must be a minimum 2B (where B is width of footing) of the design foundation material present below the design foundation level for the footings.

Preliminary piling layout and a combination of pile and pad footing layout at each level along with concept sizing of piles and pad foundations may be found in Appendix D.

4.3 Vertical Support and Structural Grids

Vertical support of the floor slabs is provided by a series of concrete columns, with reinforced concrete walls forming selected lift and stair cores, and major services risers.

The column grid has been selected to -

- maximise floor slab spans
- integrate with the modular room layout of the hospital wards
- minimises the total number of columns required, giving maximum flexibility to the floor plate design for potential future “churn” or adaptive re-use

4.4 Floor Systems

Basement Level

The foundation at Basement level is pile foundations. The slab at these levels will be a reinforced concrete slab-on-grade.

Lower Ground Level

The suspended floor slab will be a post-tensioned concrete flat slab system (no drop caps), supported by concrete columns and walls.

Slab thicknesses will remain generally consistent across the floor plate with local heavier zones in some end spans. However, reinforcement & post-tensioning will vary depending on the usage of the slab area.

The foundation in the remaining area is to be pile footings with a reinforced slab-on-grade.

Levels 1-6

The suspended floor slabs will be a post-tensioned concrete flat slab system (no drop caps), supported by concrete columns and walls.

Slab thicknesses will remain generally consistent across the floor plate with local heavier zones in some end spans. However, reinforcement & post-tensioning will vary depending on the usage of the slab area.

Level 6-7 - Plant Areas and Roof

The roof will comprise of a post-tensioned concrete slab system (no drop caps), supported by concrete columns and walls.

Slab thicknesses, reinforcement and post-tensioning will vary depending on the usage of the slab area.

4.5 Lateral Load-Resisting System

The lateral load-resisting system for the building consists of –

- reinforced concrete lift cores
- reinforced concrete stair cores
- reinforced concrete shear walls

Where required, ground anchors or tension piles will be utilised to ensure the overall lateral stability of the structure, and adequate transfer of wind, earthquake and robustness loads into the supporting foundation material.

4.6 Steel structures

Steel structures including plant, selected platforms and enclosures, roofs, hospital street roof, etc.

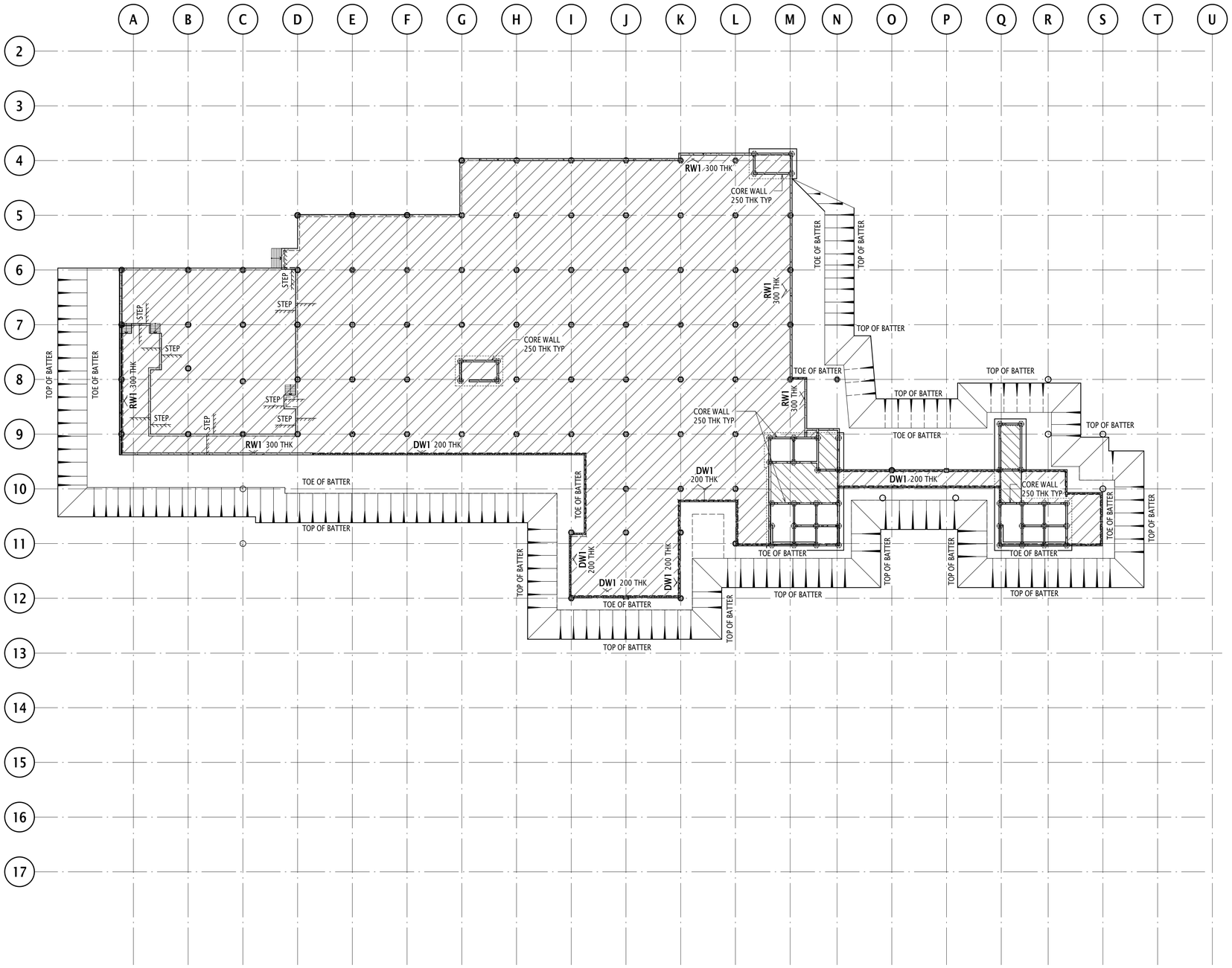
- Allow to coordinate the various sub-contractors and their details
- Steelwork details (eg cast in bolts, shear keys etc) with the concrete details
- Façade cast-in elements with the concrete details (eg, post-tensioning anchorages)

4.7 Other

- Precast Concrete Elements:
    - Specification is by Architect and Façade Engineer
    - Allow for coordination with cast-in / drilled in fixings
- Façade Elements:
    - Specification is by Architect and Façade Engineer
    - Allow for coordination with cast-in / drilled in fixings
- Balustrade Elements:
    - Specification is by Architect and Façade Engineer
    - Allow for coordination with cast-in / drilled in fixings

Appendix A

Structural drawings coordinated to 30-5-19 Architectural



BASEMENT 1 OVERALL GENERAL ARRANGEMENT PLAN

SCALE 1 : 350

SLAB TO BE 200 SOG UNO

ALL CORE WALLS TO BE 250 THK UNO

NOTE:

ALLOW FOR 200 SOG TO BE POURED ON VAPOUR BARRIER OVER 80mm SAND
BLINDED LAYER OF 20mm SINGLE SIZE GRANULAR FILL - IF ROCK STRATA NOT REACHED,
THIS IS TO BE POURED OVER WELL COMPACTED ENGINEERED FILL.

GENERAL ARRANGEMENT LEGEND:

- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES DINCEL WALL UNDER
- DENOTES DINCEL WALL OVER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- T.M.J. — DENOTES TEMPORARY MOVEMENT JOINT
- HATCH DENOTES SLAB ON GROUND
- HATCH DENOTES 200 THK BONDEK SLAB ON BLOCK WALLS

NOTE: REFER ARCHITECTS DRAWINGS FOR ALL STEPS AND FALLS IN SLABS

TOE OF BATTER
TOP OF BATTER

DESIGN LOADS:

REFER TO LOADING PLANS
REFER TO VIBRATION PLANS

COLUMN SIZES :

COLUMNS	INTERNAL COLUMNS	EXTERNAL COLUMNS
BASEMENT TO U/S L02	600x600	500x500
L02 TO U/S L05	500x500	400x400
L05 TO ROOF	400x400	400x400

CONCRETE NOTES :

-REFER NOTES ON COVER SHEET
-MIN CONC. STRENGTH AT 28 DAYS

LOCATION	f'c
COLUMNS	
BASEMENT TO U/S L01	65
L01 TO U/S L04	50
L04 TO ROOF	40
RETAINING DINCEL WALLS	25

REINFORCEMENT RATES:

-REFER NOTES ON COVER SHEET

LOCATION	RATE
CORE WALLS	TBC
SHEAR WALLS	TBC
RETAINING WALLS	TBC
-BUILDING UNDER CROFT	TBC
-EXTERNAL	TBC
COLUMNS	TBC
SLAB	TBC
-REO	TBC
-PT	TBC

Rev	Revision Description	By	App	Date
01	ISSUED FOR INFORMATION	KP	SH	23.05.19

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS
REFER TO GENERAL NOTES UNLESS NOTED OTHERWISE

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Client

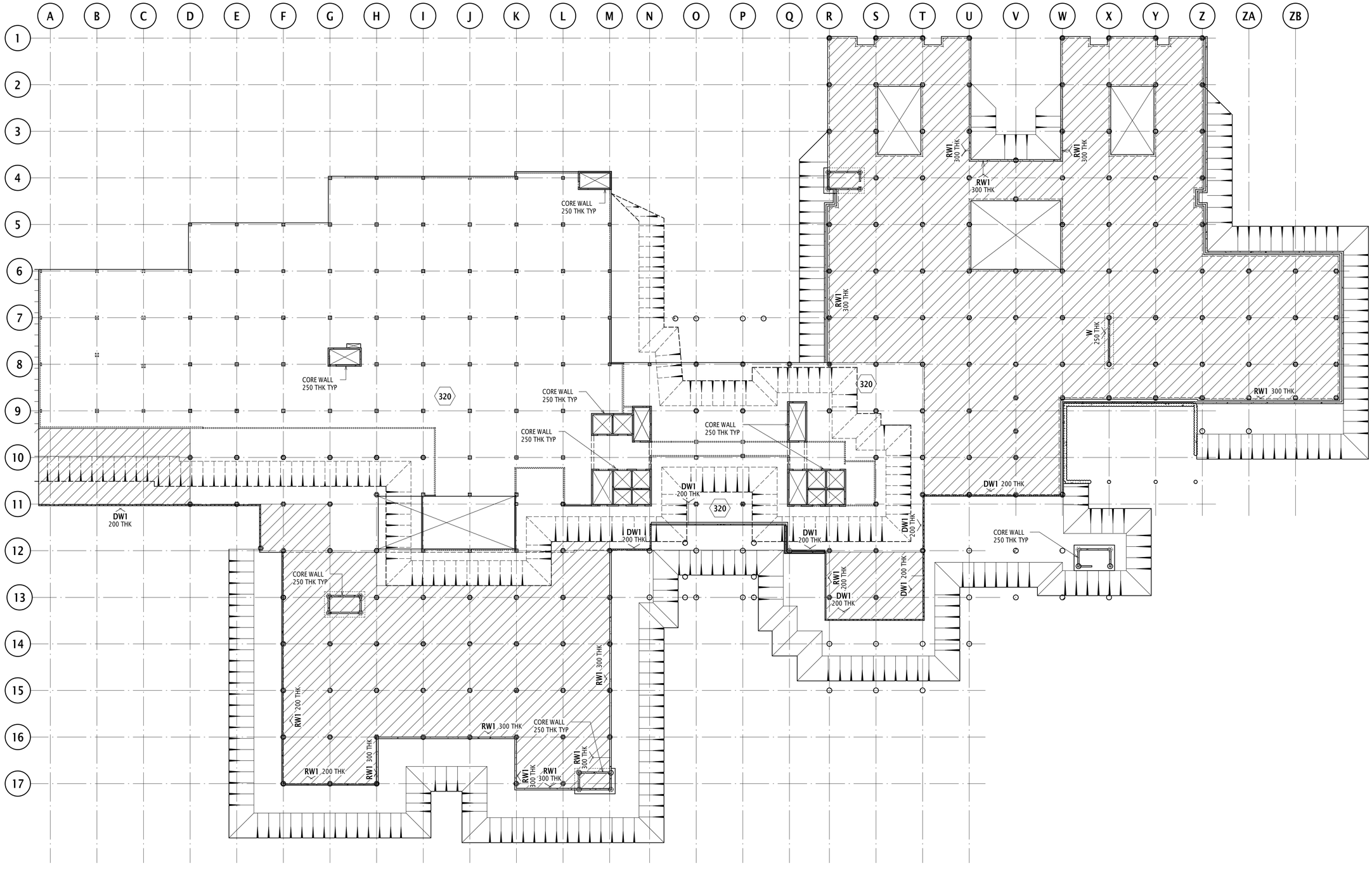
Title: BASEMENT 1 - OVERALL GENERAL ARRANGEMENT PLAN

Project: TWEED VALLEY HOSPITAL

Scale at A1	1:350	Drawn	K.PETROVSKI
Design Checker	S.HAWDON	Date	Feb 2019
Designer	R.RAMACHANDRA	Approved	M.HARDING
Job Number	19005		

NOT FOR CONSTRUCTION

Drawing Number: RBG-ST-DWG-MHB-80B1000
Revision: 01



LOWER GROUND OVERALL GENERAL ARRANGEMENT PLAN

SCALE 1 : 350

SLAB TO BE 200 SOG UNO

ALL CORE WALLS TO BE 250 THK UNO

NOTE:

ALLOW FOR 200 SOG TO BE POURED ON VAPOUR BARRIER OVER 80mm SAND BLINDED LAYER OF 20mm SINGLE SIZE GRANULAR FILL - IF ROCK STRATA NOT REACHED, THIS IS TO BE POURED OVER WELL COMPACTED ENGINEERED FILL.

GENERAL ARRANGEMENT LEGEND:

- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES DINCEL WALL UNDER
- DENOTES DINCEL WALL OVER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- T.M.J. — DENOTES TEMPORARY MOVEMENT JOINT
- HATCH DENOTES SLAB ON GROUND
- HATCH DENOTES 200 THK BONDEK SLAB ON BLOCK WALLS

NOTE: REFER ARCHITECTS DRAWINGS FOR ALL STEPS AND FALLS IN SLABS

TOE OF BATTER

TOP OF BATTER

DESIGN LOADS:

REFER TO LOADING PLANS
REFER TO VIBRATION PLANS

COLUMN SIZES :

COLUMNS	INTERNAL COLUMNS	EXTERNAL COLUMNS
BASEMENT TO U/S L02	600x600	500x500
L02 TO U/S L05	500x500	400x400
L05 TO ROOF	400x400	400x400

CONCRETE NOTES :

-REFER NOTES ON COVER SHEET
-MIN CONC. STRENGTH AT 28 DAYS

LOCATION	f'c
COLUMNS	
BASEMENT TO U/S L01	65
L01 TO U/S L04	50
L04 TO ROOF	40
RETAINING DINCEL WALLS	25

REINFORCEMENT RATES:

-REFER NOTES ON COVER SHEET

LOCATION	RATE
CORE WALLS	TBC
SHEAR WALLS	TBC
RETAINING WALLS	TBC
-BUILDING UNDER CROFT	TBC
-EXTERNAL	TBC
COLUMNS	TBC
SLAB	TBC
-REO	TBC
-PT	TBC

NOTES:

1. SLAB THICKNESSES ARE PRELIMINARY AND SUBJECT TO REVIEW, CONSULTANT DESIGN AND VIBRATION ANALYSIS
2. TEMPORARY MOVEMENT JOINTS SHOWN NDICATIVELY. TMJ AND CJ LOCATIONS TBC

Rev	Revision Description	By	App	Date
01	ISSUED FOR INFORMATION	KP	SH	23.05.19

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Client

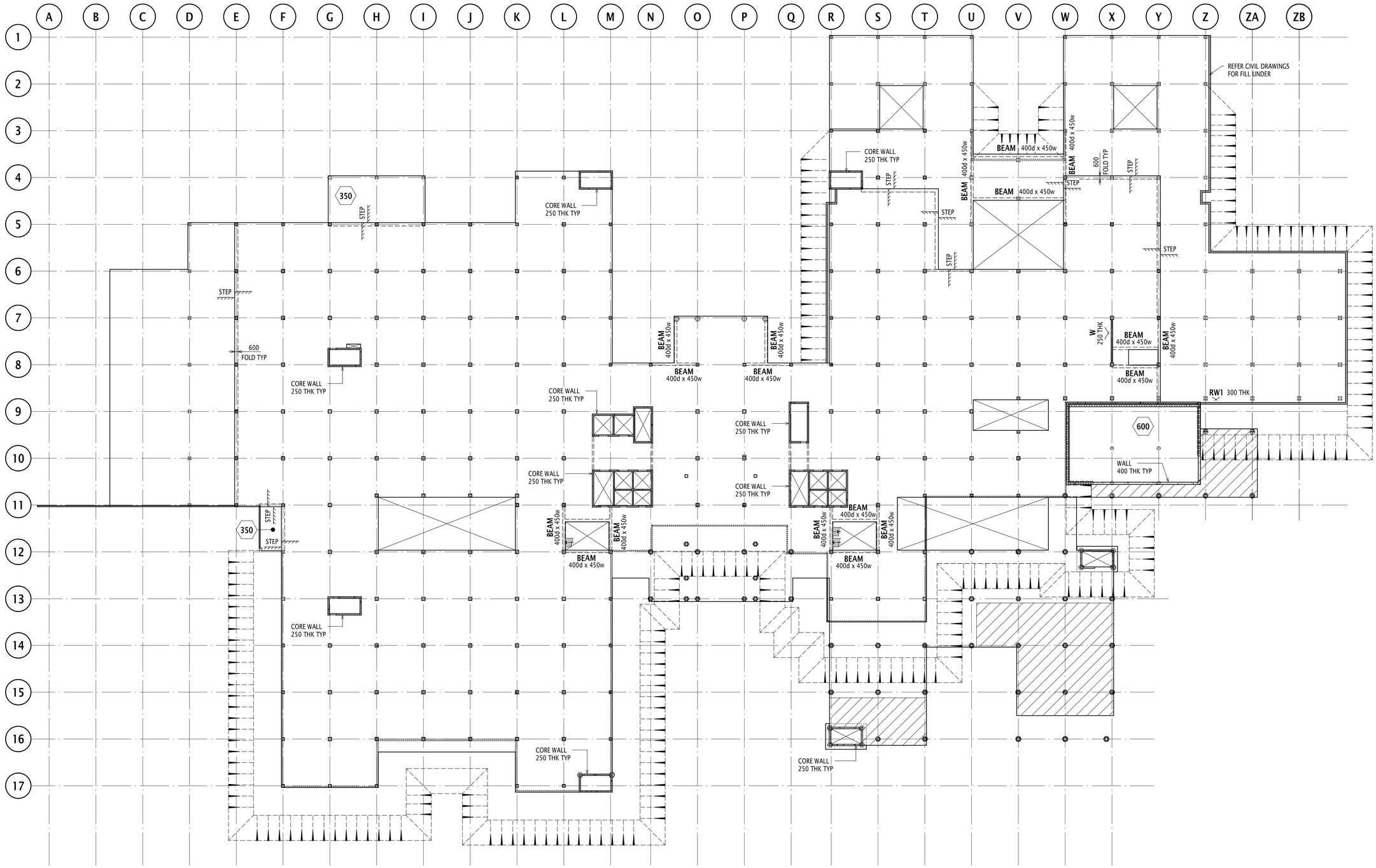
Title
LOWER GROUND - OVERALL GENERAL ARRANGEMENT PLAN

Project
TWEED VALLEY HOSPITAL

Scale at A1 1:350
Drawn K.PETROVSKI
Design Checker S.HAWDON
Date Feb 2019
Designer R.RAMACHANDRA
Approved M.HARDING
Job Number 19005

NOT FOR CONSTRUCTION

Drawing Number RBG-ST-DWG-MHB-80LG000
Revision 01



GENERAL ARRANGEMENT LEGEND:

- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES DINCEL WALL UNDER
- DENOTES DINCEL WALL OVER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- T.M.J. — DENOTES TEMPORARY MOVEMENT JOINT
- HATCH DENOTES SLAB ON GROUND
- HATCH DENOTES 200 THK BONDEK SLAB ON BLOCK WALLS

NOTE: REFER ARCHITECTS DRAWINGS FOR ALL STEPS AND FALLS IN SLABS

- TOE OF BATTER
- TOP OF BATTER

DESIGN LOADS:
REFER TO LOADING PLANS
REFER TO VIBRATION PLANS

COLUMN SIZES :

COLUMNS	INTERNAL COLUMNS	EXTERNAL COLUMNS
BASEMENT TO U/S L02	600x600	500x500
L02 TO U/S L05	500x500	400x400
L05 TO ROOF	400x400	400x400

CONCRETE NOTES :

-REFER NOTES ON COVER SHEET
-MIN CONC. STRENGTH AT 28 DAYS

LOCATION	f'c
COLUMNS	
BASEMENT TO U/S L01	65
L01 TO U/S L04	50
L04 TO ROOF	40
RETAINING DINCEL WALLS	25

REINFORCEMENT RATES:

-REFER NOTES ON COVER SHEET

LOCATION	RATE
CORE WALLS	TBC
SHEAR WALLS	TBC
RETAINING WALLS	TBC
-BUILDING UNDER CROFT	TBC
-EXTERNAL	TBC
COLUMNS	TBC
SLAB	TBC
-REO	TBC
-PT	TBC

NOTES:

1. SLAB THICKNESSES ARE PRELIMINARY AND SUBJECT TO REVIEW, CONSULTANT DESIGN AND VIBRATION ANALYSIS
2. TEMPORARY MOVEMENT JOINTS SHOWN NDICATIVELY. TMJ AND CJ LOCATIONS TBC

GROUND OVERALL GENERAL ARRANGEMENT PLAN

SCALE 1 : 350

SLAB TO BE 320 THICK UNO

ALL CORE WALLS TO BE 250 THK UNO

NOTE:

ALLOW FOR 200 SOG TO BE POURED ON VAPOUR BARRIER OVER 80mm SAND BLINDED LAYER OF 20mm SINGLE SIZE GRANULAR FILL - IF ROCK STRATA NOT REACHED, THIS IS TO BE POURED OVER WELL COMPACTED ENGINEERED FILL.

Rev	Revision Description	By	App	Date
01	ISSUED FOR INFORMATION	KP	SH	23.05.19

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Client

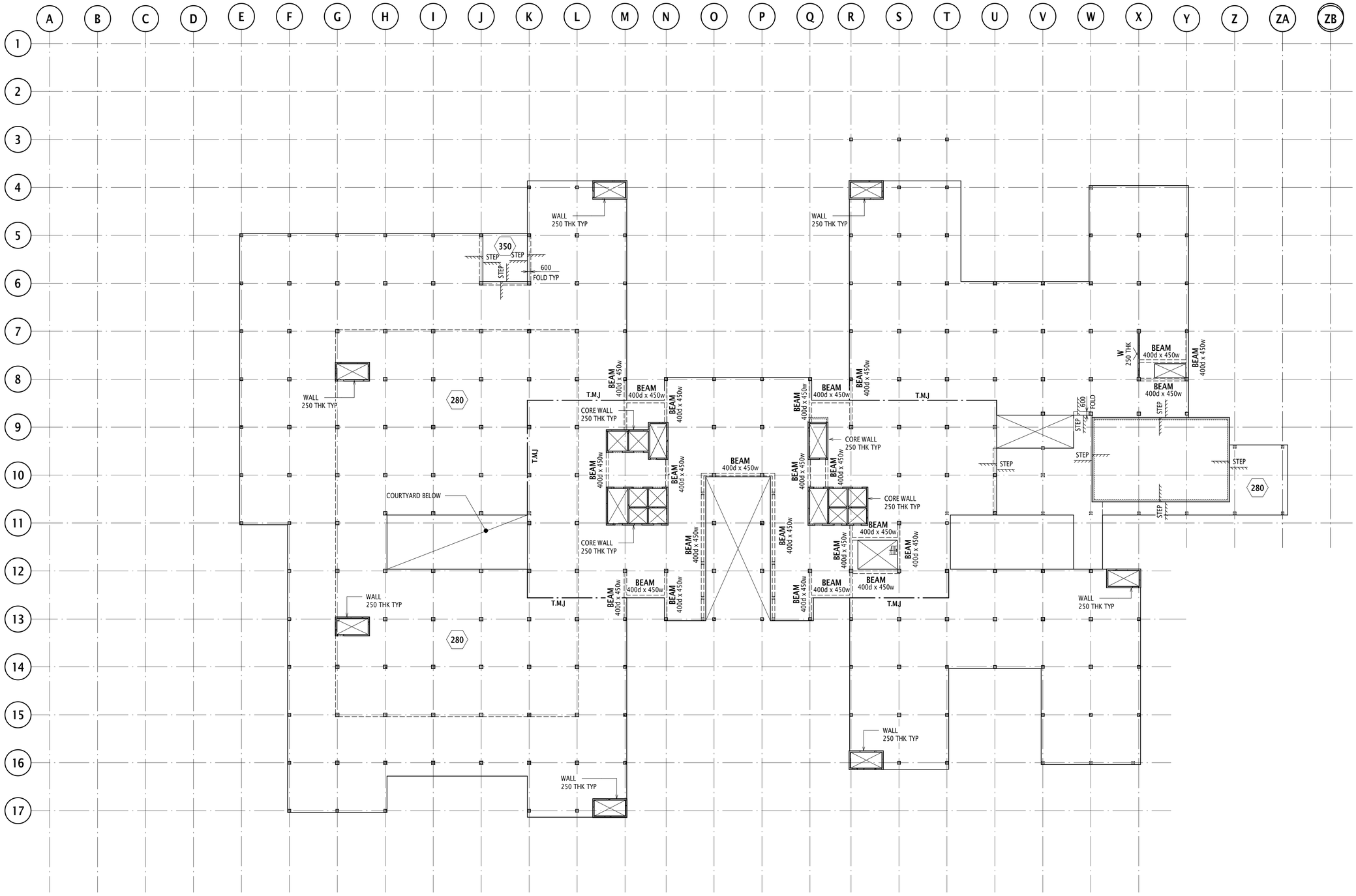
Title
GROUND LEVEL - OVERALL GENERAL ARRANGEMENT PLAN

Project
TWEED VALLEY HOSPITAL

Scale at A1	Drawn	Design Checker
1:350	K.PETROVSKI	S.HAWDON
Date	Designer	Approved
Feb 2019	R.RAMACHANDRA	M.HARDING
		Job Number 19005

NOT FOR CONSTRUCTION

Drawing Number: RBG-ST-DWG-MHB-8000000
Revision: 01



GENERAL ARRANGEMENT LEGEND:

- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES DINCEL WALL UNDER
- DENOTES DINCEL WALL OVER
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- T.M.J. — DENOTES TEMPORARY MOVEMENT JOINT
- HATCH DENOTES SLAB ON GROUND
- HATCH DENOTES 200 THK BONDEK SLAB ON BLOCK WALLS

NOTE: REFER ARCHITECTS DRAWINGS FOR ALL STEPS AND FALLS IN SLABS

DESIGN LOADS:

REFER TO LOADING PLANS
REFER TO VIBRATION PLANS

COLUMN SIZES :

COLUMNS	INTERNAL COLUMNS	EXTERNAL COLUMNS
BASEMENT TO U/S L02	600x600	500x500
L02 TO U/S L05	500x500	400x400
L05 TO ROOF	400x400	400x400

CONCRETE NOTES :

-REFER NOTES ON COVER SHEET
-MIN CONC. STRENGTH AT 28 DAYS

LOCATION	f'c
COLUMNS	
BASEMENT TO U/S L01	65
L01 TO U/S L04	50
L04 TO ROOF	40
RETAINING DINCEL WALLS	25

REINFORCEMENT RATES:

-REFER NOTES ON COVER SHEET

LOCATION	RATE
CORE WALLS	TBC
SHEAR WALLS	TBC
RETAINING WALLS	TBC
-BUILDING UNDER CROFT	TBC
-EXTERNAL	TBC
COLUMNS	TBC
SLAB	TBC
-REO	TBC
-PT	TBC

NOTES:

1. SLAB THICKNESSES ARE PRELIMINARY AND SUBJECT TO REVIEW, CONSULTANT DESIGN AND VIBRATION ANALYSIS
2. TEMPORARY MOVEMENT JOINTS SHOWN NDICATIVELY. TMJ AND CJ LOCATIONS TBC

LEVEL 01 OVERALL GENERAL ARRANGEMENT PLAN

SCALE 1 : 350

SLAB TO BE 320 THICK UNO

ALL CORE WALLS TO BE 250 THK UNO

Rev	Revision Description	By	App	Date
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Client

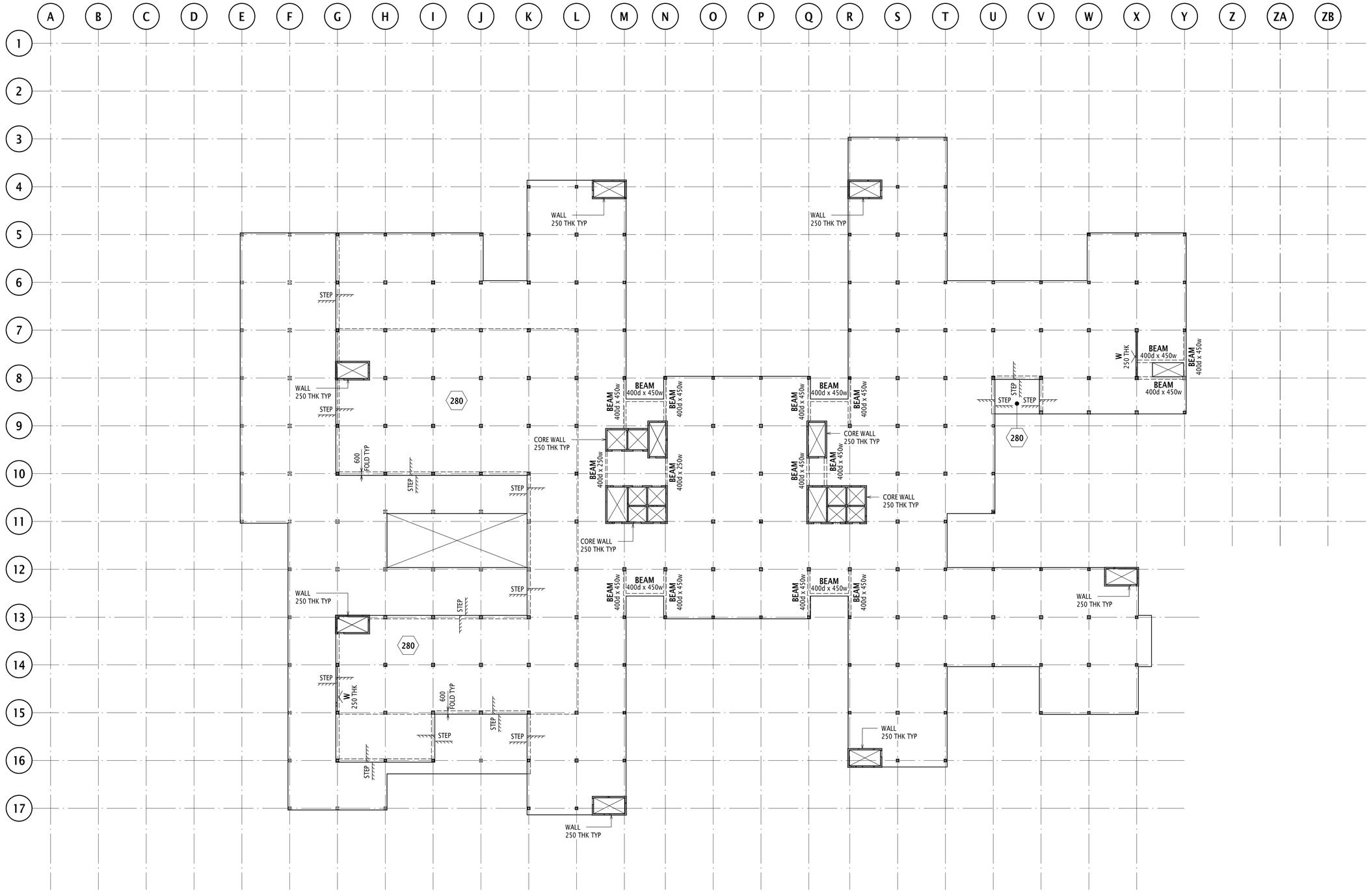
Title
LEVEL 01 - OVERALL GENERAL ARRANGEMENT PLAN

Project
TWEED VALLEY HOSPITAL

Scale at A1 1:350	Drawn K.PETROVSKI	Design Checker S.HAWDON
Date Feb 2019	Designer R.RAMACHANDRA	Approved M.HARDING
		Job Number 19005

NOT FOR CONSTRUCTION

Drawing Number RBG-ST-DWG-MHB-8001000
Revision 01



GENERAL ARRANGEMENT LEGEND:

- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES DINCEL WALL UNDER
- DENOTES DINCEL WALL OVER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- T.M.J. — DENOTES TEMPORARY MOVEMENT JOINT
- HATCH DENOTES SLAB ON GROUND
- HATCH DENOTES 200 THK BONDEK SLAB ON BLOCK WALLS

NOTE: REFER ARCHITECTS DRAWINGS FOR ALL STEPS AND FALLS IN SLABS

DESIGN LOADS:

REFER TO LOADING PLANS
REFER TO VIBRATION PLANS

COLUMN SIZES :

COLUMNS	INTERNAL COLUMNS	EXTERNAL COLUMNS
BASEMENT TO U/S L02	600x600	500x500
L02 TO U/S L05	500x500	400x400
L05 TO ROOF	400x400	400x400

CONCRETE NOTES :

-REFER NOTES ON COVER SHEET
-MIN CONC. STRENGTH AT 28 DAYS

LOCATION	f'c
COLUMNS	
BASEMENT TO U/S L01	65
L01 TO U/S L04	50
L04 TO ROOF	40
RETAINING DINCEL WALLS	25

REINFORCEMENT RATES:

-REFER NOTES ON COVER SHEET

LOCATION	RATE
CORE WALLS	TBC
SHEAR WALLS	TBC
RETAINING WALLS	TBC
-BUILDING UNDER CROFT	TBC
-EXTERNAL	TBC
COLUMNS	TBC
SLAB	TBC
-REO	TBC
-PT	TBC

NOTES:

1. SLAB THICKNESSES ARE PRELIMINARY AND SUBJECT TO REVIEW, CONSULTANT DESIGN AND VIBRATION ANALYSIS
2. TEMPORARY MOVEMENT JOINTS SHOWN NDICATIVELY. TMJ AND CJ LOCATIONS TBC

LEVEL 02 OVERALL GENERAL ARRANGEMENT PLAN

SCALE 1 : 350

SLAB TO BE 320 THICK UNO

ALL CORE WALLS TO BE 250 THK UNO

Rev	Revision Description	By	App	Date
01	ISSUED FOR INFORMATION	KP	SH	23.05.19

Rev	Revision Description	By	App	Date

Structural, Civil & Construction Engineering Consultant

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Client

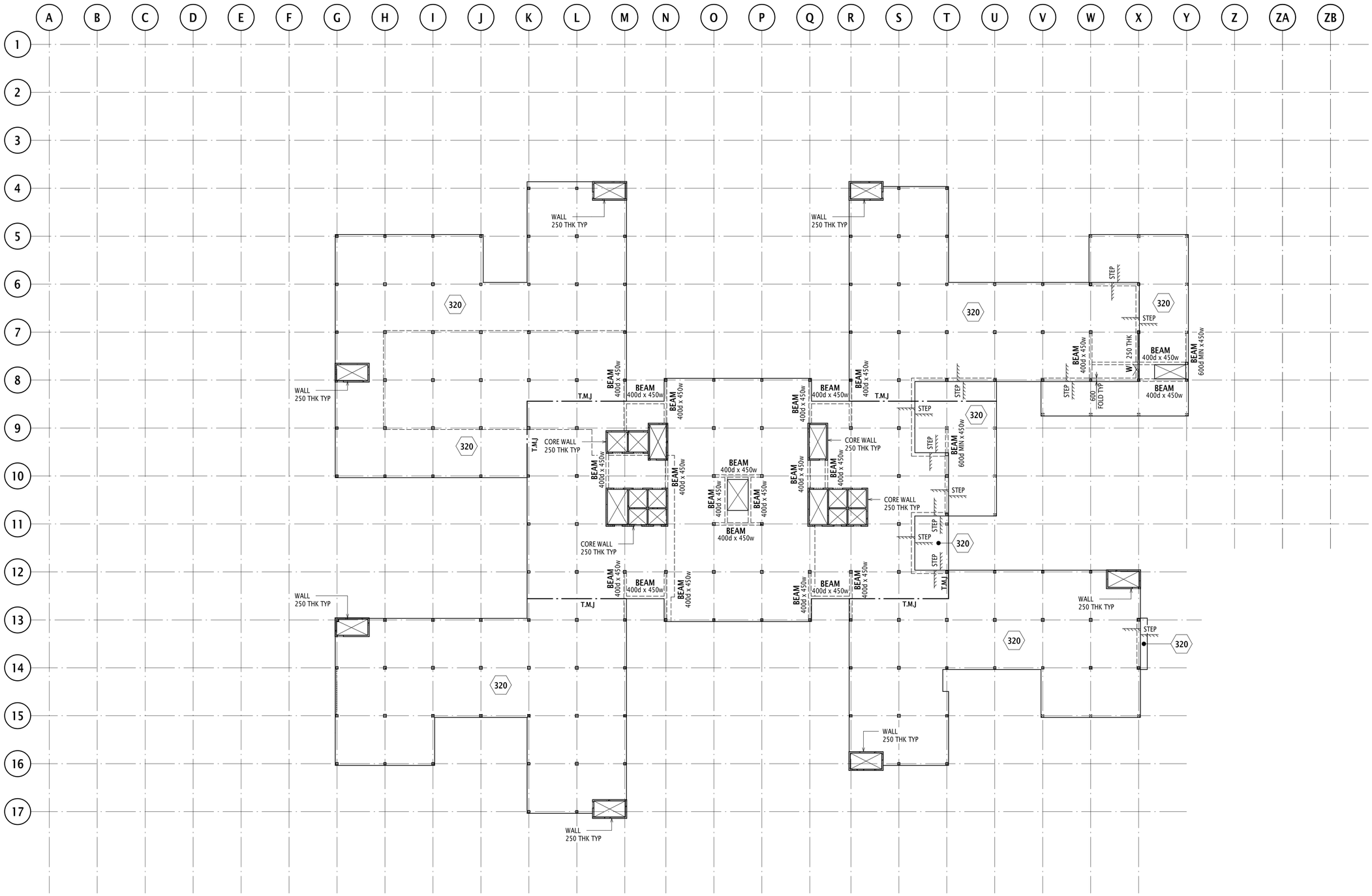
Title
LEVEL 02 - OVERALL GENERAL ARRANGEMENT PLAN

Project
TWEED VALLEY HOSPITAL

Scale at A1	Drawn	Design Checker
1:350	K.PETROVSKI	S.HAWDON
Date	Designer	Approved
Feb 2019	R.RAMACHANDRA	M.HARDING
		Job Number 19005

NOT FOR CONSTRUCTION

Drawing Number: RBG-ST-DWG-MHB-8002000
Revision: 01



LEVEL 03 OVERALL GENERAL ARRANGEMENT PLAN

SCALE 1 : 350

SLAB TO BE 280 THCIK UNO

ALL CORE WALLS TO BE 250 THK UNO

GENERAL ARRANGEMENT LEGEND:

- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES DINCEL WALL UNDER
- DENOTES DINCEL WALL OVER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- T.M.J. — DENOTES TEMPORARY MOVEMENT JOINT
- HATCH DENOTES SLAB ON GROUND
- HATCH DENOTES 200 THK BONDEK SLAB ON BLOCK WALLS

NOTE: REFER ARCHITECTS DRAWINGS FOR ALL STEPS AND FALLS IN SLABS

DESIGN LOADS:

REFER TO LOADING PLANS
REFER TO VIBRATION PLANS

COLUMN SIZES :

COLUMNS	INTERNAL COLUMNS	EXTERNAL COLUMNS
BASEMENT TO U/S L02	600x600	500x500
L02 TO U/S L05	500x500	400x400
L05 TO ROOF	400x400	400x400

CONCRETE NOTES :

-REFER NOTES ON COVER SHEET
-MIN CONC. STRENGTH AT 28 DAYS

LOCATION	f'c
COLUMNS	
BASEMENT TO U/S L01	65
L01 TO U/S L04	50
L04 TO ROOF	40
RETAINING DINCEL WALLS	25

REINFORCEMENT RATES:

-REFER NOTES ON COVER SHEET

LOCATION	RATE
CORE WALLS	200kg/m³
SHEAR WALLS	180kg/³
RETAINING WALLS	
-BUILDING UNDER CROFT	100kg/³
-EXTERNAL	150kg/m³
COLUMNS	?
SLAB	
-REO	50kg/m²
-PT	5.4kg/m²

NOTES:

1. SLAB THICKNESSES ARE PRELIMINARY AND SUBJECT TO REVIEW, CONSULTANT DESIGN AND VIBRATION ANALYSIS
2. TEMPORARY MOVEMENT JOINTS SHOWN NDICATIVELY. TMJ AND CJ LOCATIONS TBC

Rev	Revision Description	By	App	Date
01	ISSUED FOR INFORMATION	KP	SH	23.05.19

Structural, Civil & Construction Engineering Consultant

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Client

Title
LEVEL 03 - OVERALL GENERAL ARRANGEMENT PLAN

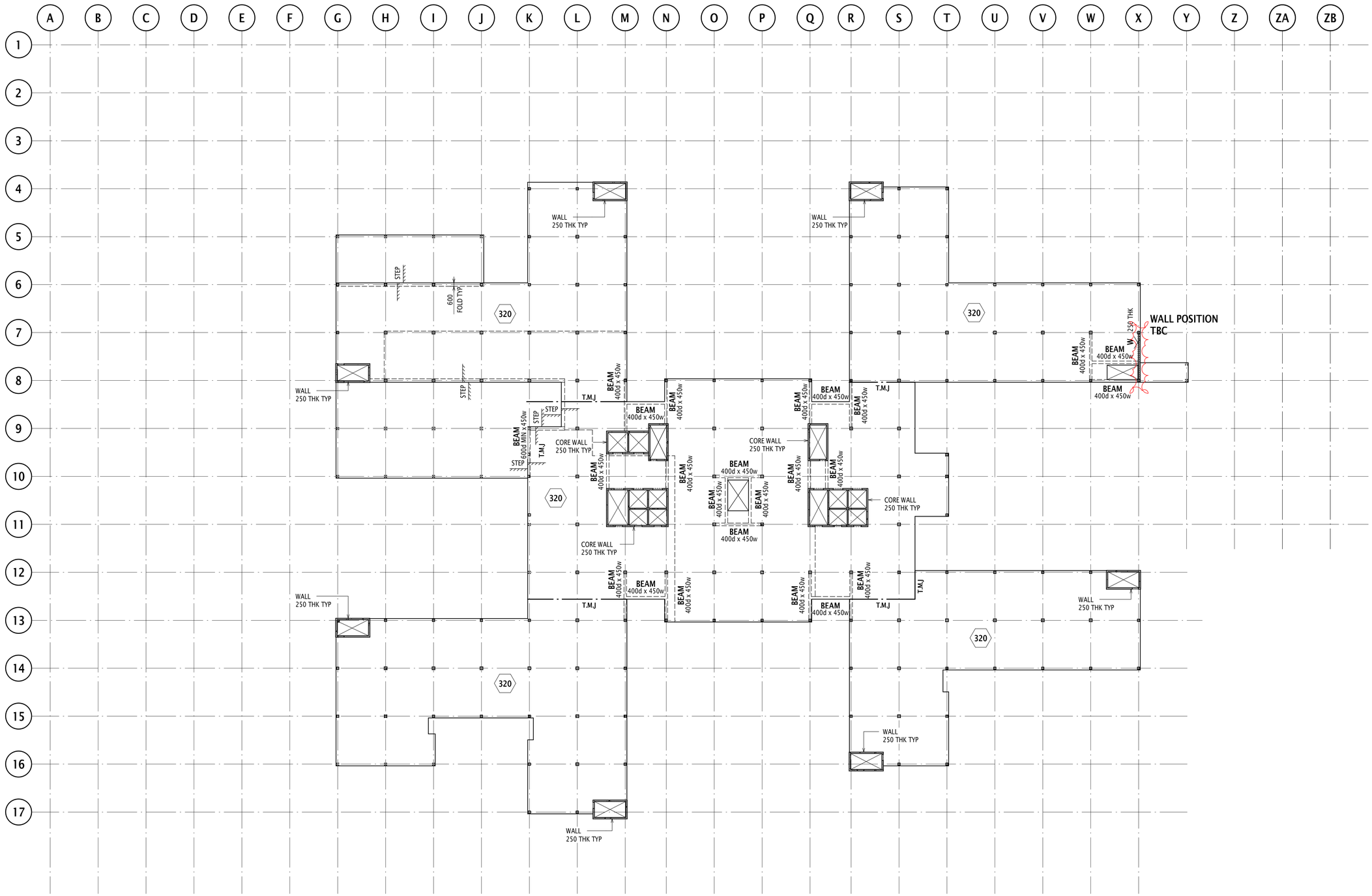
Project
TWEED VALLEY HOSPITAL

Scale at A1 1:350	Drawn K.PETROVSKI	Design Checker S.HAWDON
Date Feb 2019	Designer R.RAMACHANDRA	Approved M.HARDING
		Job Number 19005

NOT FOR CONSTRUCTION

Drawing Number RBG-ST-DWG-MHB-8003000

Revision 01



GENERAL ARRANGEMENT LEGEND:

- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES DINCEL WALL UNDER
- DENOTES DINCEL WALL OVER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- T.M.J. — DENOTES TEMPORARY MOVEMENT JOINT
- HATCH DENOTES SLAB ON GROUND
- HATCH DENOTES 200 THK BONDEK SLAB ON BLOCK WALLS

NOTE: REFER ARCHITECTS DRAWINGS FOR ALL STEPS AND FALLS IN SLABS

DESIGN LOADS:

REFER TO LOADING PLANS
REFER TO VIBRATION PLANS

COLUMN SIZES :

COLUMNS	INTERNAL COLUMNS	EXTERNAL COLUMNS
BASEMENT TO U/S L02	600x600	500x500
L02 TO U/S L05	500x500	400x400
L05 TO ROOF	400x400	400x400

CONCRETE NOTES :

-REFER NOTES ON COVER SHEET
-MIN CONC. STRENGTH AT 28 DAYS

LOCATION	f'c
COLUMNS	
BASEMENT TO U/S L01	65
L01 TO U/S L04	50
L04 TO ROOF	40
RETAINING DINCEL WALLS	25

REINFORCEMENT RATES:

-REFER NOTES ON COVER SHEET

LOCATION	RATE
CORE WALLS	TBC
SHEAR WALLS	TBC
RETAINING WALLS	TBC
-BUILDING UNDER CROFT	TBC
-EXTERNAL	TBC
COLUMNS	TBC
SLAB	TBC
-REO	TBC
-PT	TBC

NOTES:

1. SLAB THICKNESSES ARE PRELIMINARY AND SUBJECT TO REVIEW, CONSULTANT DESIGN AND VIBRATION ANALYSIS
2. TEMPORARY MOVEMENT JOINTS SHOWN NDICATIVELY. TMJ AND CJ LOCATIONS TBC

LEVEL 04 OVERALL GENERAL ARRANGEMENT PLAN

SCALE 1 : 350

SLAB TO BE 280 THICK UNO

ALL CORE WALLS TO BE 250 THK UNO

Rev	Revision Description	By	App	Date
01	ISSUED FOR INFORMATION	KP	SH	23.05.19

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ACN 010 580 248

Client

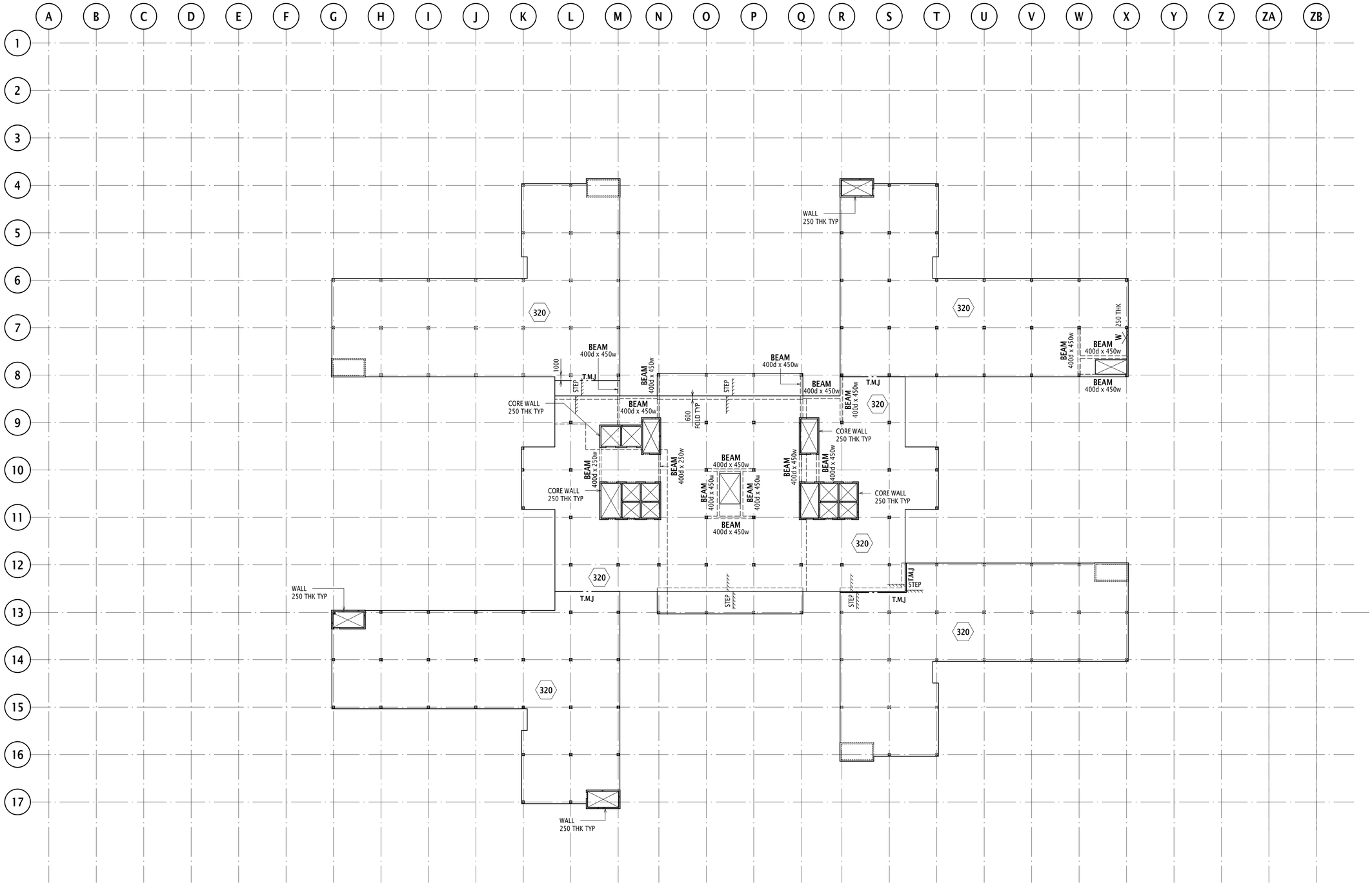
Title
LEVEL 04 - OVERALL GENERAL ARRANGEMENT PLAN

Project
TWEED VALLEY HOSPITAL

Scale at A1	Drawn	Design Checker
1:350	K.PETROVSKI	S.HAWDON
Date	Designer	Approved
Feb 2019	R.RAMACHANDRA	M.HARDING
		Job Number 19005

NOT FOR CONSTRUCTION

Drawing Number: RBG-ST-DWG-MHB-8004000
Revision: 01



LEVEL 05 OVERALL GENERAL ARRANGEMENT PLAN

SCALE 1 : 350

SLAB TO BE 280 THICK UNO

ALL CORE WALLS TO BE 250 THK UNO

GENERAL ARRANGEMENT LEGEND:

- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES DINCEL WALL UNDER
- DENOTES DINCEL WALL OVER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- T.M.J. — DENOTES TEMPORARY MOVEMENT JOINT
- HATCH DENOTES SLAB ON GROUND
- HATCH DENOTES 200 THK BONDEK SLAB ON BLOCK WALLS

NOTE: REFER ARCHITECTS DRAWINGS FOR ALL STEPS AND FALLS IN SLABS

DESIGN LOADS:

REFER TO LOADING PLANS
REFER TO VIBRATION PLANS

COLUMN SIZES :

COLUMNS	INTERNAL COLUMNS	EXTERNAL COLUMNS
BASEMENT TO U/S L02	600x600	500x500
L02 TO U/S L05	500x500	400x400
L05 TO ROOF	400x400	400x400

CONCRETE NOTES :

-REFER NOTES ON COVER SHEET
-MIN CONC. STRENGTH AT 28 DAYS

LOCATION	f'c
COLUMNS	
BASEMENT TO U/S L01	65
L01 TO U/S L04	50
L04 TO ROOF	40
RETAINING DINCEL WALLS	25

REINFORCEMENT RATES:

-REFER NOTES ON COVER SHEET

LOCATION	RATE
CORE WALLS	TBC
SHEAR WALLS	TBC
RETAINING WALLS	TBC
-BUILDING UNDER CROFT	TBC
-EXTERNAL	TBC
COLUMNS	TBC
SLAB	TBC
-REO	TBC
-PT	TBC

NOTES:

1. SLAB THICKNESSES ARE PRELIMINARY AND SUBJECT TO REVIEW, CONSULTANT DESIGN AND VIBRATION ANALYSIS
2. TEMPORARY MOVEMENT JOINTS SHOWN NDICATIVELY. TMJ AND CJ LOCATIONS TBC

Rev	Revision Description	By	App	Date
01	ISSUED FOR INFORMATION	KP	SH	23.05.19

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS
REFER TO GENERAL NOTES UNLESS NOTED OTHERWISE

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Client

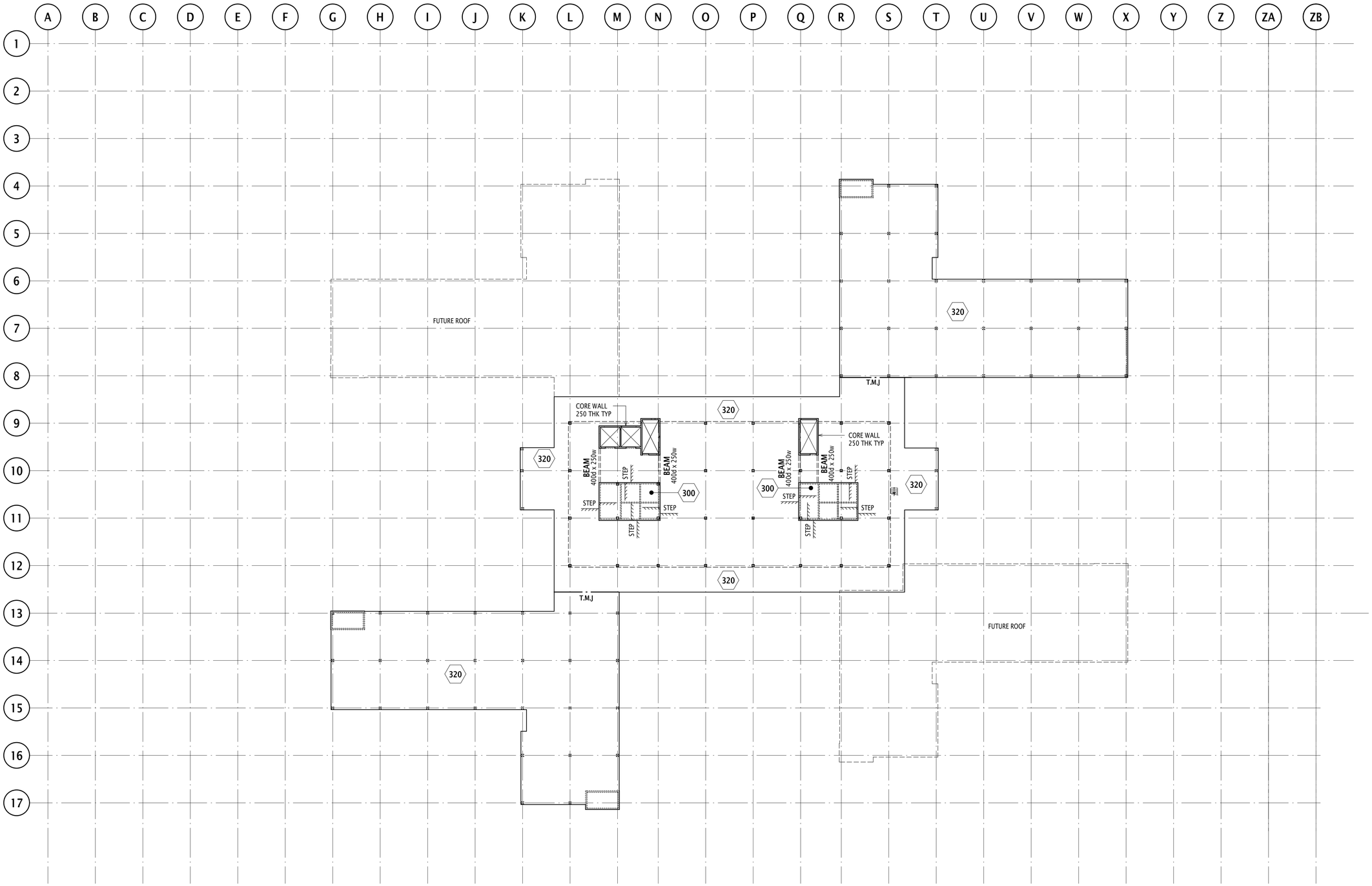
Title
LEVEL 05 - OVERALL GENERAL ARRANGEMENT PLAN

Project
TWEED VALLEY HOSPITAL

Scale at A1	Drawn	Design Checker
1:350	K.PETROVSKI	S.HAWDON
Date	Designer	Approved
May 2019	R.RAMACHANDRA	M.HARDING
		Job Number 19005

NOT FOR CONSTRUCTION

Drawing Number: RBG-ST-DWG-MHB-8005000
Revision: 01



GENERAL ARRANGEMENT LEGEND:

- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES DINCEL WALL UNDER
- DENOTES DINCEL WALL OVER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- T.M.J. — DENOTES TEMPORARY MOVEMENT JOINT
- HATCH DENOTES SLAB ON GROUND
- HATCH DENOTES 200 THK BONDEK SLAB ON BLOCK WALLS

NOTE: REFER ARCHITECTS DRAWINGS FOR ALL STEPS AND FALLS IN SLABS

DESIGN LOADS:

REFER TO LOADING PLANS
REFER TO VIBRATION PLANS

COLUMN SIZES :

COLUMNS	INTERNAL COLUMNS	EXTERNAL COLUMNS
BASEMENT TO U/S L02	600x600	500x500
L02 TO U/S L05	500x500	400x400
L05 TO ROOF	400x400	400x400

CONCRETE NOTES :

-REFER NOTES ON COVER SHEET
-MIN CONC. STRENGTH AT 28 DAYS

LOCATION	f'c
COLUMNS	
BASEMENT TO U/S L01	65
L01 TO U/S L04	50
L04 TO ROOF	40
RETAINING DINCEL WALLS	25

REINFORCEMENT RATES:

-REFER NOTES ON COVER SHEET

LOCATION	RATE
CORE WALLS	200kg/m³
SHEAR WALLS	180kg/³
RETAINING WALLS	
-BUILDING UNDER CROFT	100kg/³
-EXTERNAL	150kg/m³
COLUMNS	?
SLAB	
-REO	50kg/m²
-PT	5.4kg/m²

NOTES:

1. SLAB THICKNESSES ARE PRELIMINARY AND SUBJECT TO REVIEW, CONSULTANT DESIGN AND VIBRATION ANALYSIS
2. TEMPORARY MOVEMENT JOINTS SHOWN NDICATIVELY. TMJ AND CJ LOCATIONS TBC

LEVEL 06 OVERALL GENERAL ARRANGEMENT PLAN

SCALE 1 : 350

SLAB TO BE 280 THICK UNO

ALL CORE WALLS TO BE 250 THK UNO

Rev	Revision Description	By	App	Date
01	ISSUED FOR INFORMATION	KP	SH	23.05.19

Rev	Revision Description	By	App	Date

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Client

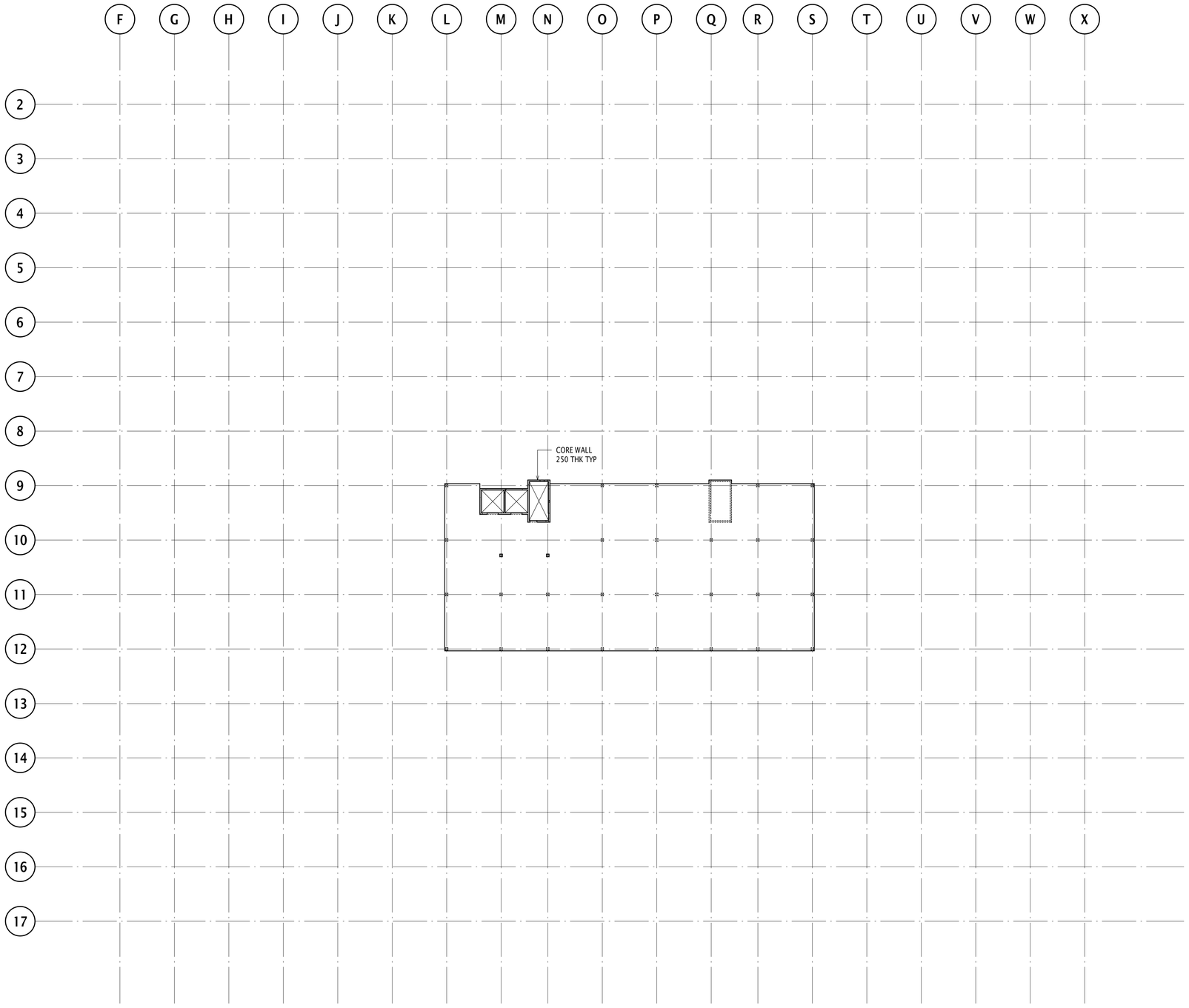
Title
LEVEL 06 - OVERALL GENERAL ARRANGEMENT PLAN

Project
TWEED VALLEY HOSPITAL

Scale at A1	Drawn	Design Checker
1:350	K.PETROVSKI	S.HAWDON
Date	Designer	Approved
Feb 2019	R.RAMACHANDRA	M.HARDING
		Job Number 19005

NOT FOR CONSTRUCTION

Drawing Number	Revision
RBG-ST-DWG-MHB-8006000	01



LEVEL 07 OVERALL GENERAL ARRANGEMENT PLAN

SCALE 1 : 350

SLAB TO BE 280 UNO

ALL CORE WALLS TO BE 250 THK UNO

GENERAL ARRANGEMENT LEGEND:

- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES DINCEL WALL UNDER
- DENOTES DINCEL WALL OVER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- T.M.J. — DENOTES TEMPORARY MOVEMENT JOINT
- HATCH DENOTES SLAB ON GROUND
- HATCH DENOTES 200 THK BONDEK SLAB ON BLOCK WALLS

NOTE: REFER ARCHITECTS DRAWINGS FOR ALL STEPS AND FALLS IN SLABS

DESIGN LOADS:

REFER TO LOADING PLANS
REFER TO VIBRATION PLANS

COLUMN SIZES :

COLUMNS	INTERNAL COLUMNS	EXTERNAL COLUMNS
BASEMENT TO U/S L02	600x600	500x500
L02 TO U/S L05	500x500	400x400
L05 TO ROOF	400x400	400x400

CONCRETE NOTES :

-REFER NOTES ON COVER SHEET
-MIN CONC. STRENGTH AT 28 DAYS

LOCATION	f'c
COLUMNS	
BASEMENT TO U/S L01	65
L01 TO U/S L04	50
L04 TO ROOF	40
RETAINING DINCEL WALLS	25

REINFORCEMENT RATES:

-REFER NOTES ON COVER SHEET

LOCATION	RATE
CORE WALLS	TBC
SHEAR WALLS	TBC
RETAINING WALLS	TBC
-BUILDING UNDER CROFT	TBC
-EXTERNAL	TBC
COLUMNS	TBC
SLAB	TBC
-REO	TBC
-PT	TBC

NOTES:

1. SLAB THICKNESSES ARE PRELIMINARY AND SUBJECT TO REVIEW, CONSULTANT DESIGN AND VIBRATION ANALYSIS
2. TEMPORARY MOVEMENT JOINTS SHOWN NDICATIVELY. TMJ AND CJ LOCATIONS TBC

Rev	Revision Description	By	App	Date
01	ISSUED FOR INFORMATION	KP	SH	23.05.19

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REFER TO GENERAL NOTES UNLESS NOTED OTHERWISE

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Client

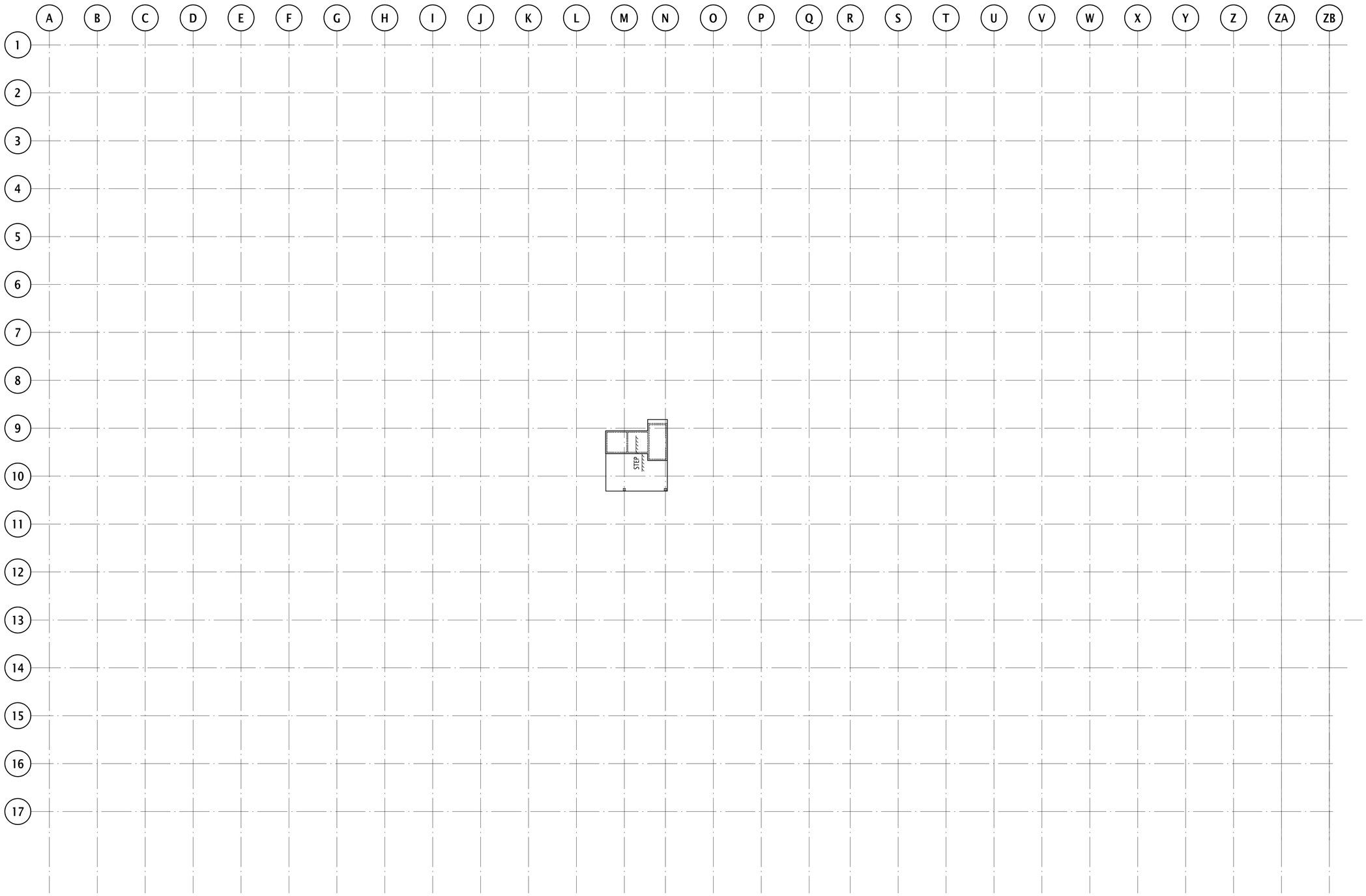
Title
LEVEL 07 - OVERALL GENERAL ARRANGEMENT PLAN

Project
TWEED VALLEY HOSPITAL

Scale at A1: 1:350
Drawn: K.PETROVSKI
Design Checker: S.HAWDON
Date: Feb 2019
Designer: R.RAMACHANDRA
Approved: M.HARDING
Job Number: 19005

NOT FOR CONSTRUCTION

Drawing Number: RBG-ST-DWG-MHB-8007000
Revision: 01



GENERAL ARRANGEMENT LEGEND:

- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES DINCEL WALL UNDER
- DENOTES DINCEL WALL OVER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- T.M.J. — DENOTES TEMPORARY MOVEMENT JOINT
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NOTE: REFER ARCHITECTS DRAWINGS FOR ALL STEPS AND FALLS IN SLABS

DESIGN LOADS:

REFER TO LOADING PLANS
REFER TO VIBRATION PLANS

COLUMN SIZES :

COLUMNS	INTERNAL COLUMNS	EXTERNAL COLUMNS
BASEMENT TO U/S L02	600x600	500x500
L02 TO U/S L05	500x500	400x400
L05 TO ROOF	400x400	400x400

CONCRETE NOTES :

-REFER NOTES ON COVER SHEET
-MIN CONC. STRENGTH AT 28 DAYS

LOCATION	f'c
COLUMNS	
BASEMENT TO U/S L01	65
L01 TO U/S L04	50
L04 TO ROOF	40
RETAINING DINCEL WALLS	25

REINFORCEMENT RATES:

-REFER NOTES ON COVER SHEET

LOCATION	RATE
CORE WALLS	TBC
SHEAR WALLS	TBC
RETAINING WALLS	TBC
-BUILDING UNDER CROFT	TBC
-EXTERNAL	TBC
COLUMNS	TBC
SLAB	TBC
-REO	TBC
-PT	TBC

LEVEL 08 OVERALL GENERAL ARRANGEMENT PLAN

SCALE 1 : 350
SLAB TO BE 250 THICK UNO

Rev	Revision Description	By	App	Date
01	ISSUED FOR INFORMATION	KP	SH	23.05.19

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Client

Title
LEVEL 08 - OVERALL
GENERAL ARRANGEMENT PLAN

Project
TWEED VALLEY HOSPITAL

Scale at A1: 1:350
Drawn: K.PETROVSKI
Design Checker: S.HAWDON
Date: May 2019
Designer: R.RAMACHANDRA
Approved: M.HARDING
Job Number: 19005

NOT FOR CONSTRUCTION

Drawing Number: RBG-ST-DWG-MHB-8008000
Revision: 01

Sydney Office

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