Department of Health
LEGAL SERVICES

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Tasmanian Government

Right to Information Decision – Public Disclosure Log

Right to Information No.: RTI201920-037

Information Requested

The information requested:

1. Copies of any correspondence between the Department and the Civil Aviation Safety Authority, dated between 1 October 2019 and 4 February 2020, regarding the helipad at the Royal Hobart Hospital.
2. Copies of any documents relating to safety accreditation for the helipad at the Royal Hobart Hospital.
3. Any information, including correspondence, documents and briefing notes, relating to compliance with load limits for the Royal Hobart Hospital's helipad.
4. The number of occasions on which the helipad at the Mersey Community Hospital was used for patient transport between 1 August 2019 and 1 February 2020.

Decision

An initial search was undertaken on the term Helipad to identify all relevant records. The following search terms were used to identify information within the initial Helipad search:

CASA

Civil Aviation Safety Authority

Safety Accreditation

Accreditation

Load Limit

Compliance

My decision for each part of the request:

1. information requested was not in existence on the day the application was made;
2. information requested was not in existence on the day the application was made;
3. disclose the information; and
4. the helipad at Mersey Community Hospital was used six times between 1 August 2019 and 1 February 2020.

Engineering Dynamics

3 Victoria Close
Eltham VIC 3095 (Australia)
ABN:64 082 127 562

Report No: 1778

Date: 27 Sep 2016

Issue: 2

Ref: Tender Package Co015 Vibration Modelling

Prepared for John Holland – Fairbrother Joint Venture
Level 1, 22 Liverpool Street
Hobart Tasmania 7000

Scope of work:

Part I -Building Modelling, Helipad Vibration Isolation evaluation and R value prediction

This scope includes:

- Structural vibration analysis as required to evaluate anticipated vibration transfer through helipad structure based on the nominated 8 – 10 Hz isolator natural frequency proposed by the project acoustic consultant
- Review expected vibration level and propose alternatives for performance (where vibration is determined to be above nominated R value)
- Where feasible propose how R value may be affected by helicopter operations based on a theoretical project helicopter

Part 2 – Design Report

This scope includes:

- Evaluate potential modifications to structure and predicted improvement in vibration level (where applicable)
- Evaluation of level 4 and Level 5 floor slabs for suitability of mounting cameras at locations specified
- General specification of helipad isolator type to enable comparative pricing between helipad equipment providers

Results – Part I

In order to provide information on vibration transfer to the hospital structural steel supports and subsequent vibration imposition to the concrete structure below, the following details form the basis of this preliminary design.

Helipad Information:

Rectangular Aluminium construction with beam over beam type design has been included

Helipad support points – 12 off at column locations between Grids KA - KD and along Grids K2 – K5 (4 x 3 pattern of support)

Helipad Isolators designed to provide a dynamic natural frequency of 8 Hz at a load of Helipad DL + Helicopter MTOM. Each support point is based on individual load distribution (to be clarified once the helipad equipment supplier provides information accordingly). Helicopter loads based on 9000 kg MTOM (maximum take-off mass).

Helipad isolators are based upon pre-compressed isolator design and must include the necessary horizontal and vertical load requirements to meet all regulatory and relevant Australian Standard Requirements.

The following diagram provides typical requirements for Helicopter landing – in accordance with ICAO Heliport Manual 1995 requirements and the following specific details (included general requirement for horizontal and vertical restraint calculation for the isolator. The supplier of the helipad equipment must ensure that the appropriate loads for horizontal, uplift and wind conditions are taken into account in the design of the restraint and isolation.

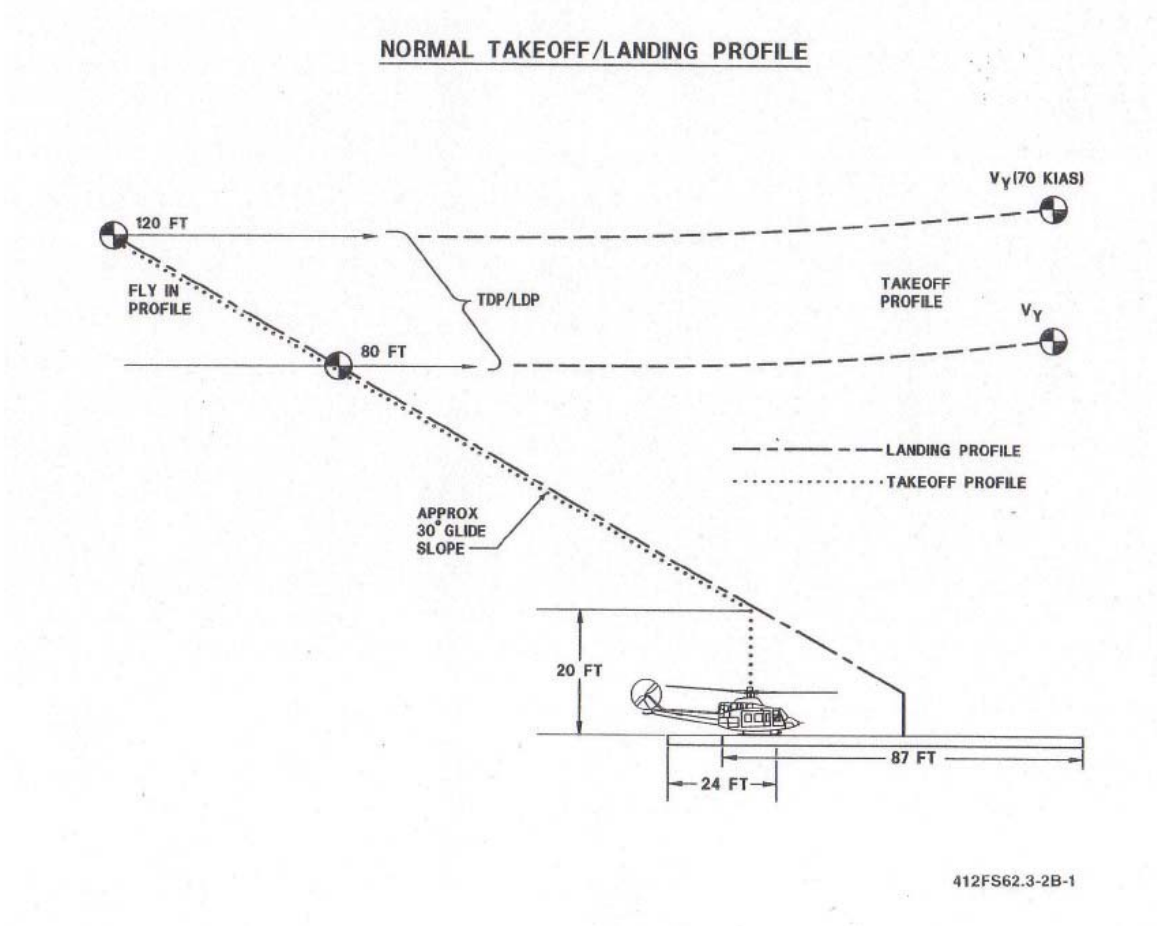


Fig.1 Take-off and Landing Diagram

Reference Document:

ICAO – Heliport Manual 1995 (Doc No. 9261 AN/903)

Fig 2. Typical 8 Hz Helipad Isolator

Compliance with the vibration criteria has been assessed by analysis of vibration transfer to critical areas below the proposed helipad location.

These areas are outlined below.

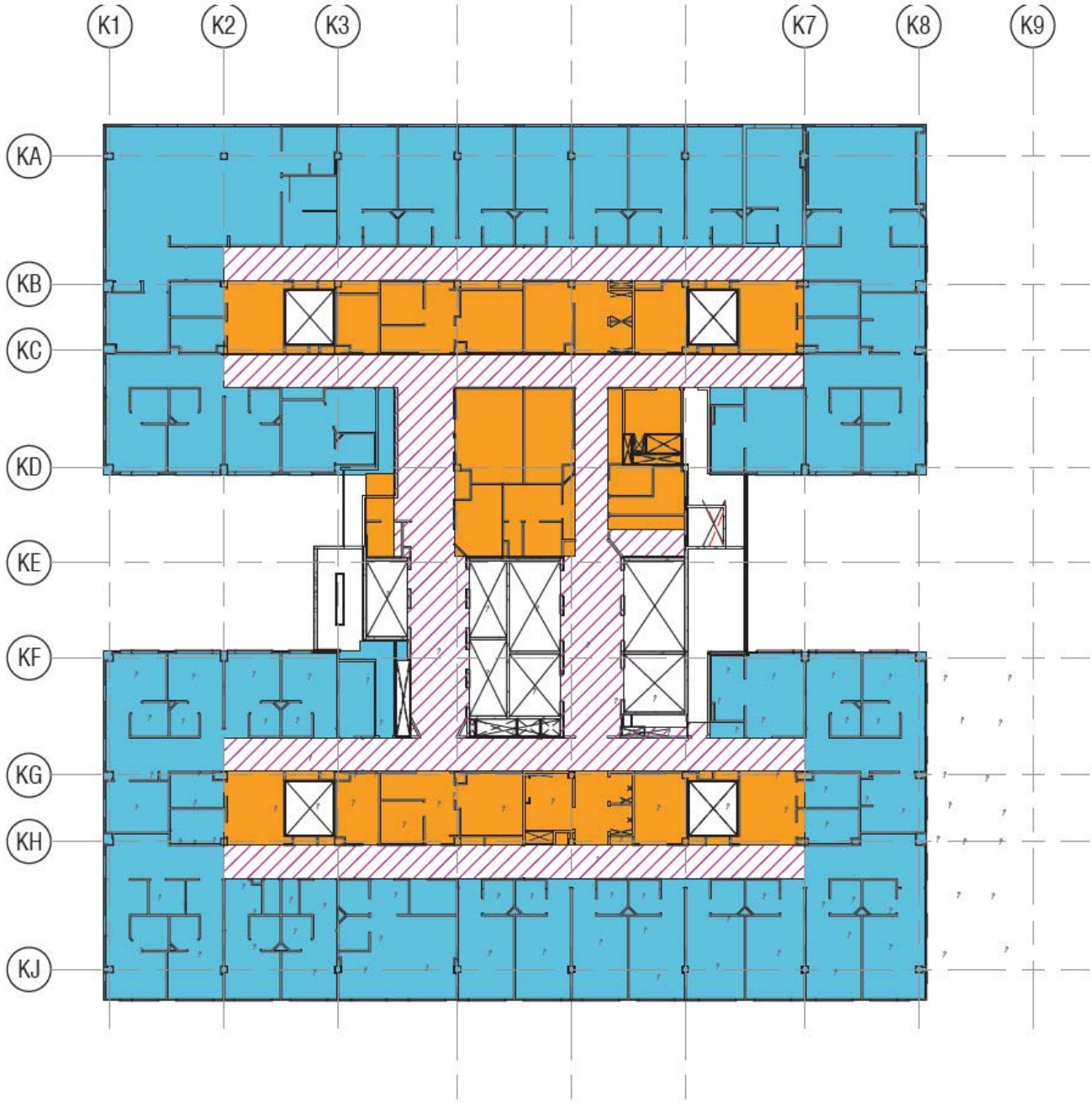
Critical Area for Analysis – Immediately below Helipad Location (Grids K1- K4 and KA – KC)

VIBRATION CRITERIA

- WARDS
- OFFICES/CONSULTING
- OPERATING THEATRES - TYPE 1 (R = 0.25)
- OPERATING THEATRES - TYPE 2 (R = 0.50)
- CORRIDORS/FAST WALKING ZONE
- PLANT

Office/consulting areas, multiplier R = 4.0
Wards, multiplier R = 2.0 (Day), R = 1.4 (Night)
Operating Theatres—Type 1, multiplier R = 0.25
Operating Theatres—Type 2, multiplier R = 0.5

Next most critical area for analysis:



LEVEL 10 VIBRATION CRITERIA PLAN

VIBRATION CRITERIA

- WARDS
- OFFICES/CONSULTING
- OPERATING THEATRES - TYPE 1 (R = 0.25)
- OPERATING THEATRES - TYPE 2 (R = 0.50)
- CORRIDORS/FAST WALKING ZONE
- PLANT

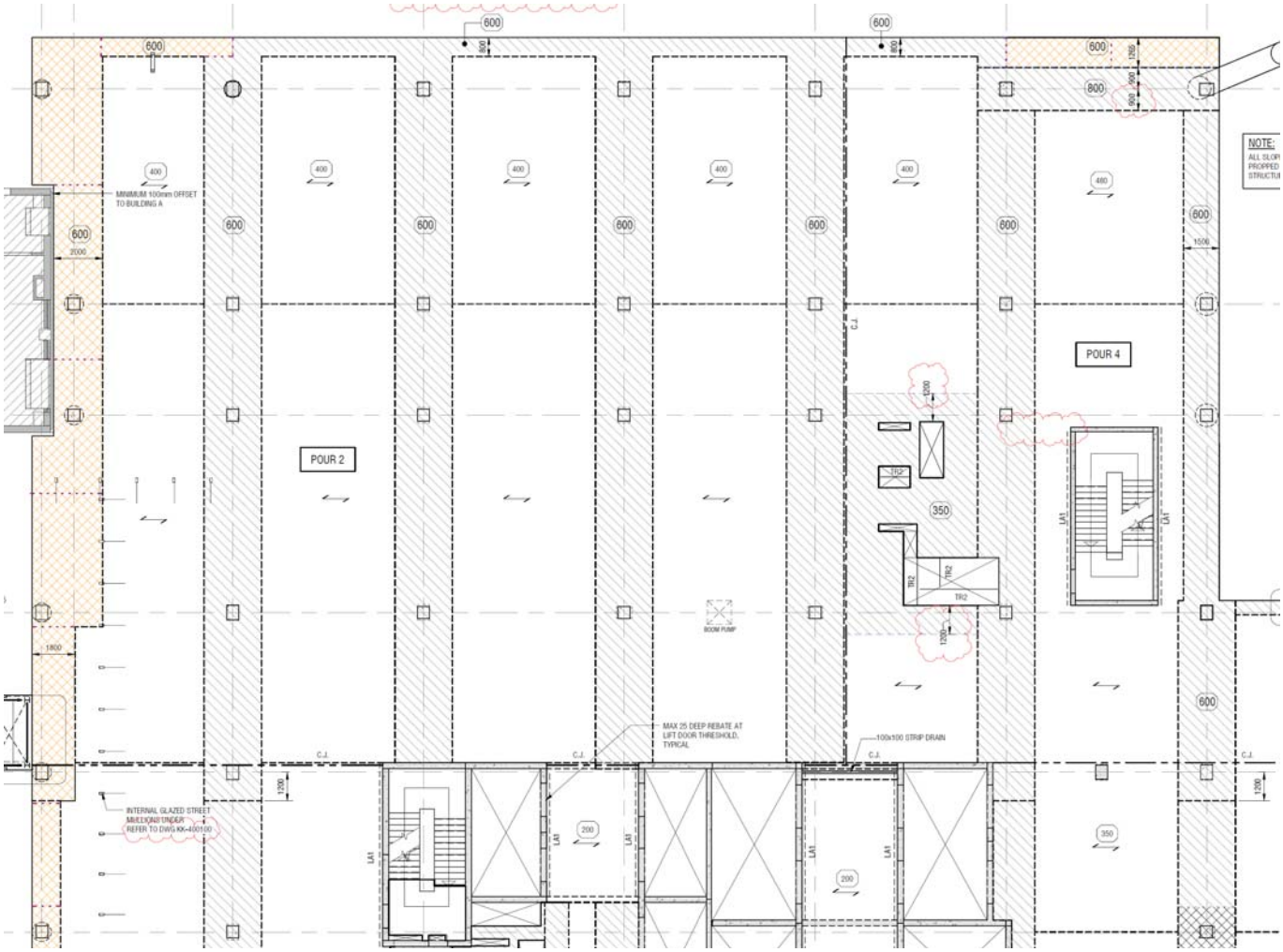
Office/consulting areas, multiplier R = 4.0
Wards, multiplier R = 2.0 (Day), R = 1.4 (Night)
Operating Theatres—Type 1, multiplier R = 0.25
Operating Theatres—Type 2, multiplier R = 0.5

LEVEL 5 VIBRATION CRITERIA PLAN

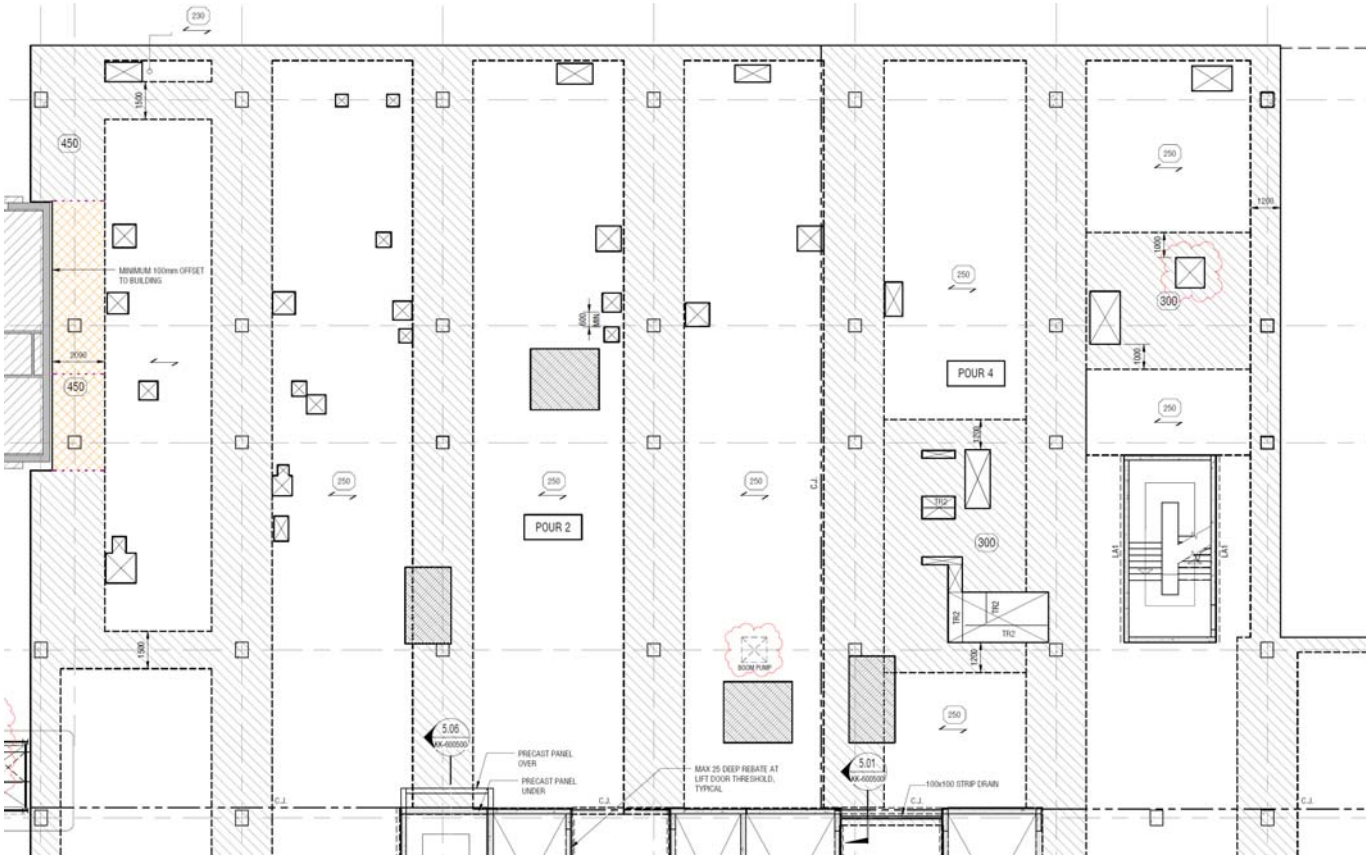
VIBRATION CRITERIA

- WARDS
- OFFICES/CONSULTING
- OPERATING THEATRES - TYPE 1 (R = 0.25)
- OPERATING THEATRES - TYPE 2 (R = 0.50)
- CORRIDORS/FAST WALKING ZONE
- PLANT

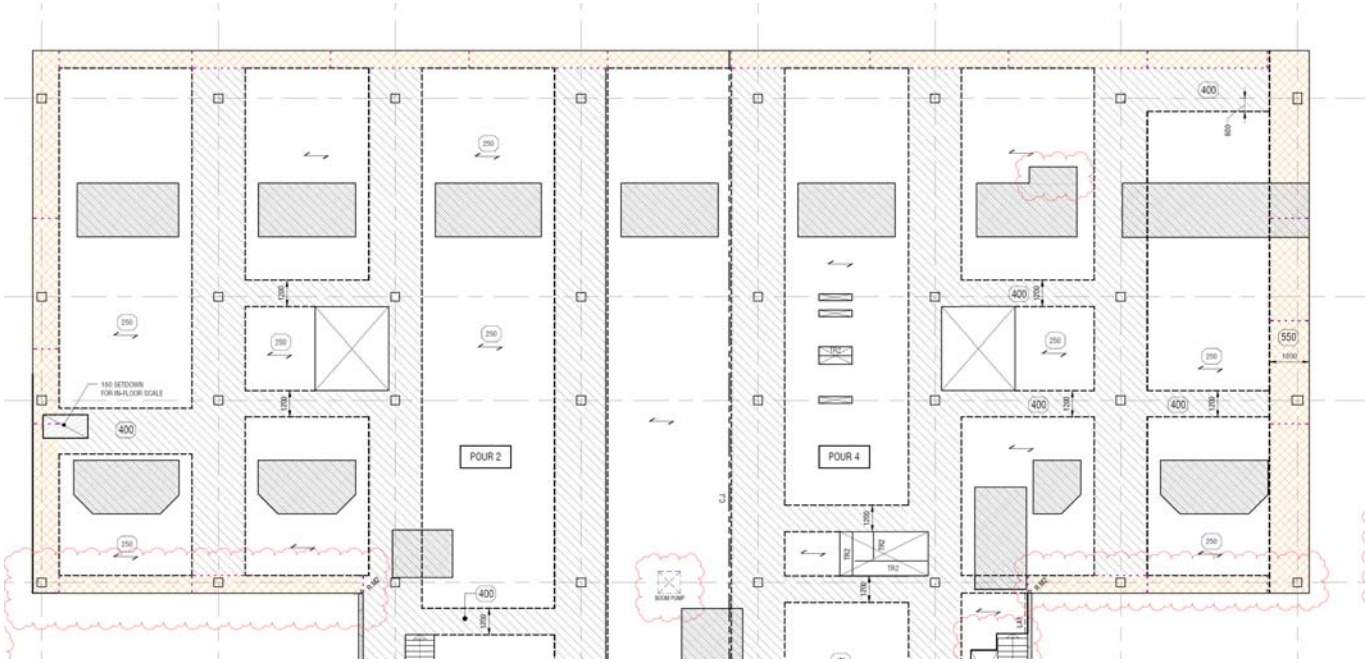
Office/consulting areas, multiplier R = 4.0
Wards, multiplier R = 2.0 (Day), R = 1.4 (Night)
Operating Theatres—Type 1, multiplier R = 0.25
Operating Theatres—Type 2, multiplier R = 0.5



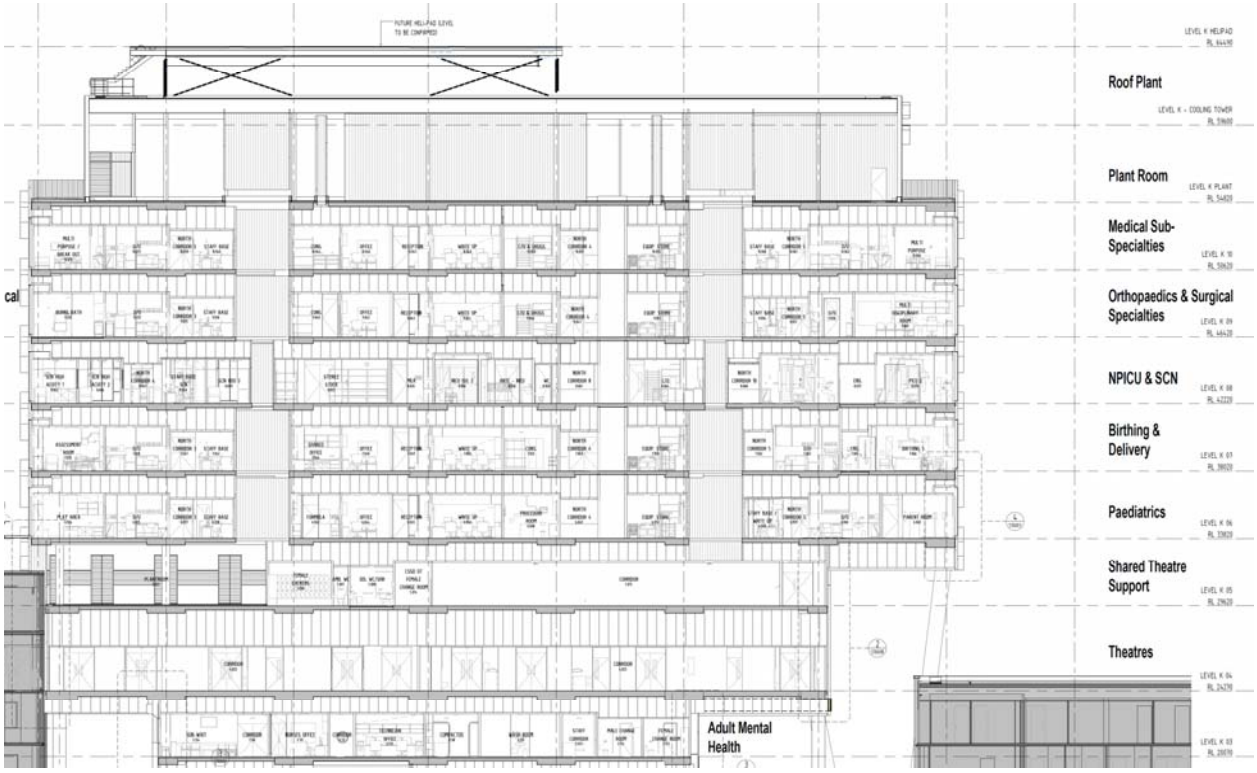
Level 4 Floor / Beam Construction included in Model and Analysis



Level 5 Floor / Beam Construction included in Model and Analysis



Level 10 Floor / Beam Construction included in Model and Analysis



Part Building Section (included to illustrate proximity of theatres at level 4 to helipad)

Part Building Model and Analysis Description

A model of the building structure, support steel (at Plantroom level) and helipad was completed from the Tender issue documents provided.

Floor natural frequencies along with floor response were evaluated in order to determine transfer of vibration between helipad and structure below.

All modelling of concrete floors is based on conventional formwork type construction (not metal tray formwork) with two layer reinforcing – both directions.

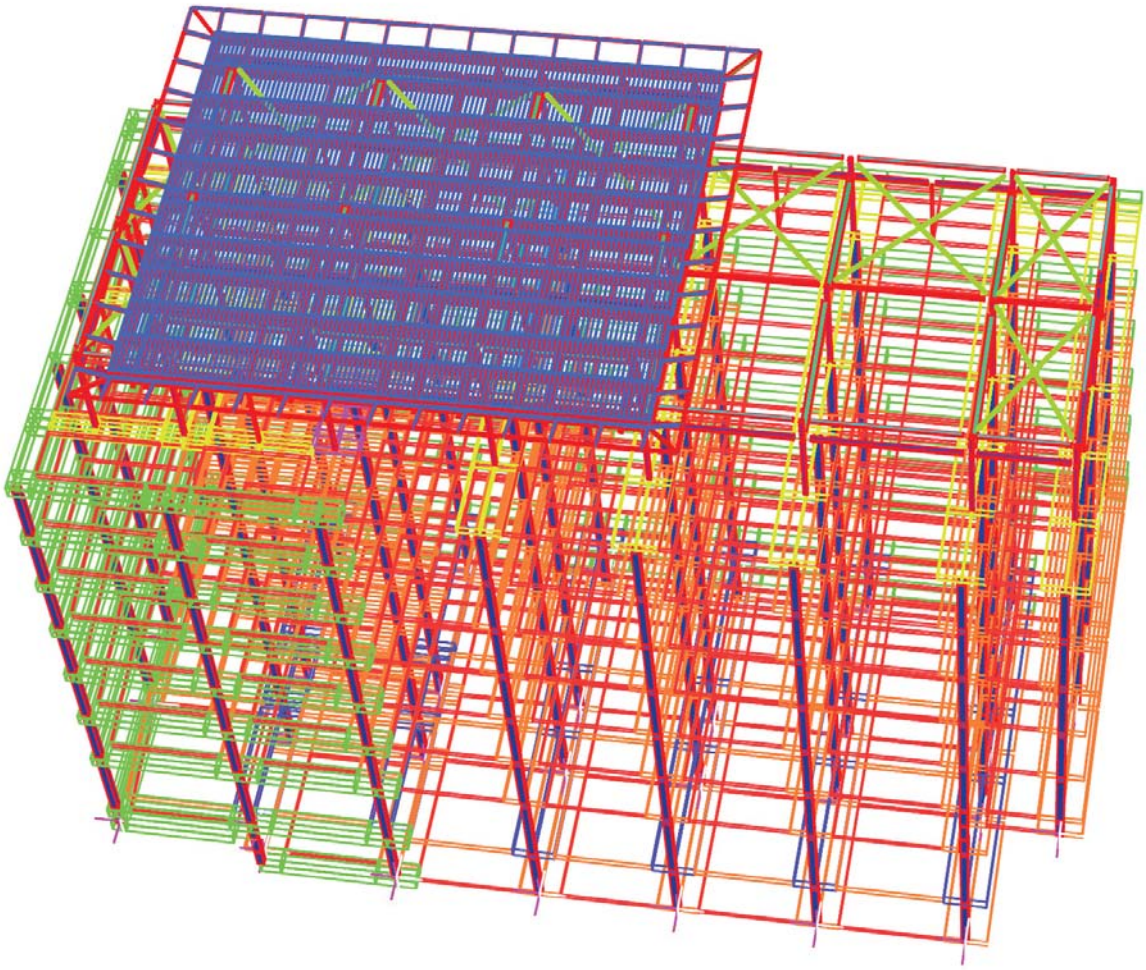


Fig.3 Section of Model indicating relation of helipad to sensitive areas at Level 4 & Level 5 (based on Structural drawing and steelwork drawing ST-DWG-KB12-2012200 Rev 9

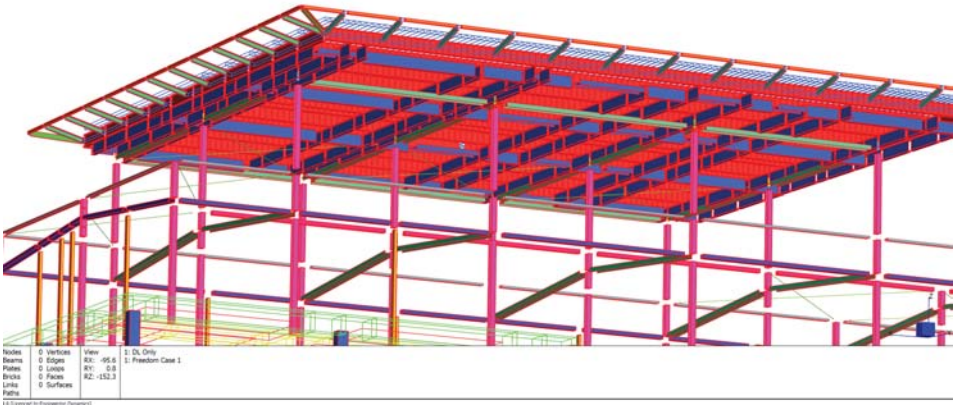
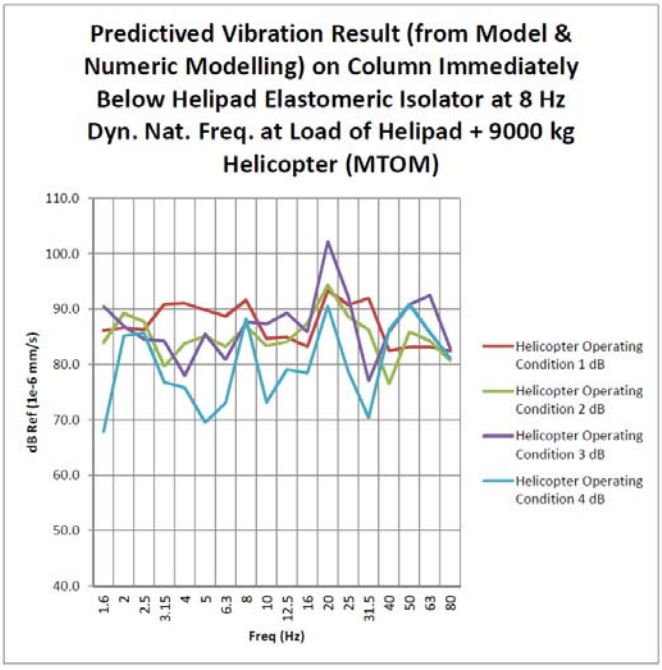


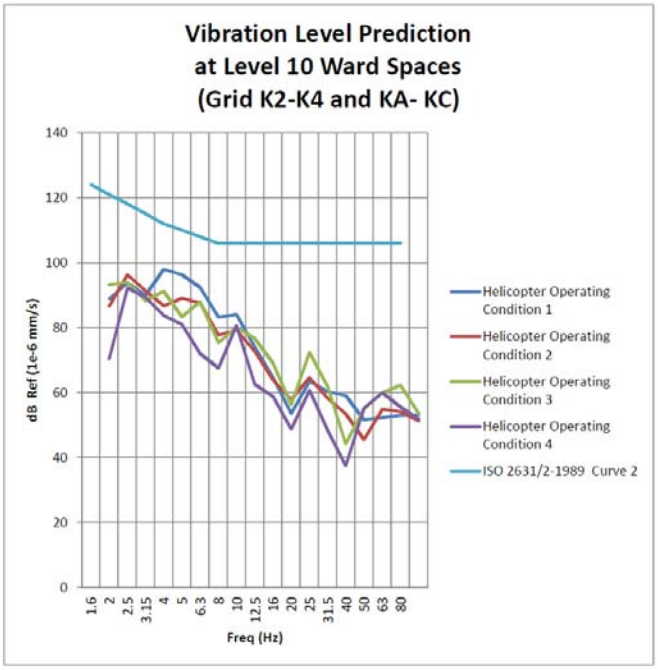
Fig.4 Helipad Detail shown (with modelled elastomeric bearing shown as yellow spring)

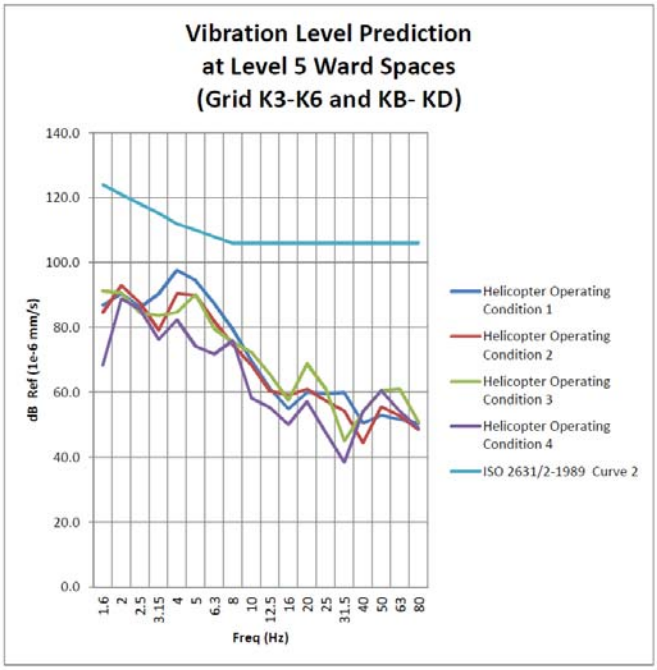
Results of Analysis

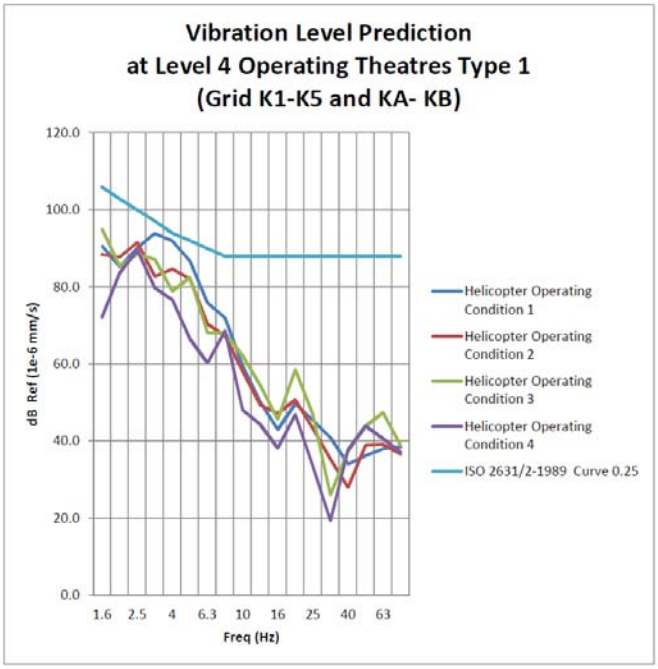
(All based on Isolator achieving 8 Hz (Dynamic Natural Frequency) at the specified load).
Method of analysis includes spectral response of structure to landing and take- off vibration measurements conducted at previous hospital sites.
Various conditions including hard landing, idle and take off conditions are included (as shown on the graphs below).
Vibration reduction figures for 8 Hz dynamic natural frequency isolator are based on measurements taken immediately above and below isolator on previous hospital projects with 8 Hz Dynamic Natural Frequency at load of structure and helicopter MTOM. The vibration level measured immediately below isolator has been imposed to top of steel columns (without inclusion of loss through steel structure) as the final details for connection and helipad

structure are generic (and subject to change – dependent upon the design by the helipad equipment provider).









Summary of Results

The predicted results for floor vibration at Level 4, Level 5 and Level 10 (are below the project criteria set by AECOM Design Development Report AR-REP-00237 Dated June 2015 and are therefore seen as acceptable, based on the specification provided. (Isolator dynamic natural frequency of 8 Hz at a load of Helipad DL + Helicopter MTOM)

In addition, consideration should be given to providing an isolated connection between the steel connections at Plant room level horizontally to limit the transfer horizontally between the steelwork supporting the helipad and adjacent members.

1. Helipad Isolator Specification

A quantity of 12 isolators is required for this project. The specific design and manufacturing requirements are listed below.

Isolator must be designed to meet the specified loads (as specified earlier in this report.)

In order to avoid conflict with determined natural frequencies, along with multiples of lowest rotation speed of helicopter on Helideck, the dynamic natural frequency for the isolator should be less than 8.0 Hz.

All uplift and vertical restraint devices must incorporate rubber impact pads to avoid metal to metal contact.

In order to achieve satisfactory service load (under a range of loads), isolators shall be designed to meet the specified natural frequency under the specified load for each support position (as determined upon analysis by the helipad supplier). Isolator type and position should be clearly marked on each isolator prior to deliver to site.

Dynamic test result (as measured with NATA calibrated test equipment) must be reported for each isolator in order to demonstrate compliance with the isolation performance requirements of this report).

Each Isolator and housing shall be load tested to 150% of vertical load to demonstrate compliance with this report. Results of load / deflection and dynamic testing shall be submitted to John Holland for review prior to delivery.

The isolator / housing must support both DL and vertical load requirements as specified above without failure or metal to metal contact. Each isolator housing must be manufactured in accordance with AS4100 and relevant sections of AS1554 (Structural Steel Welding). Each housing should be constructed of plate steel in accordance with requirements of AS3678-1990, and subsequently hot dip galvanised to AS4680 -2006. Each isolator must be preloaded to avoid excessive movement during helicopter operations.

Design of restrained isolator (including all fasteners and masonry anchoring) must incorporate attachment to Steel columns as shown on drawing ST-DWG-KB12-201200.

Part 2 – Evaluate potential modifications to structure and predicted improvement in vibration level (where applicable)

The analysis included in this section is primarily based upon the determination of vibration response of level 4 and level 5 slabs to local vibration sources such as footfall. Results in the part I reflect analysis of transfer path and vibration level prediction for helicopter operations.

In relation to the evaluation of level 4 and Level 5 floor slabs for suitability of mounting cameras at locations specified

Level 4 slab (400mm thick concrete slab with 600mm (2400 wide) band beams) will provide a more stable base for mounting camera equipment.

The level 5 slab has a lower natural frequency and provides more vertical movement and vibration due to any anticipated footfall in adjacent corridors.

The level 5 floor acceleration level is approximately1.8 x the level predicted at level 4 (based on the same vibration excitation level).

Level 4 & Level 5 Analysis Results:

In order to assess suitability of mounting camera equipment to floors, the characteristics of each level has been predicted using FEA modelling.

The selected method of analysis is:

Determination of floor deflection under self-weight, floor natural frequency, floor stiffness, and modal mass. Harmonic analysis of footfall at Midspan in a central floor position has been completed to indicate vibration transfer to adjacent areas (including the Operating Theatres Type 1 & 2 (with floor criteria Response values of 0.25 and 0.5 respectively)

These results are shown as floor acceleration levels (Peak which then can be compared with the RMS criteria level by dividing by 1.41 (approximately).

A summary of these results is provided below:

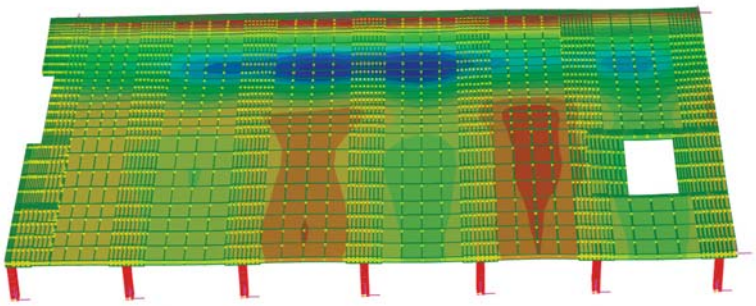


Fig 5. Level 4 Floor Natural Frequency – 12.4 Hz (1st Mode)

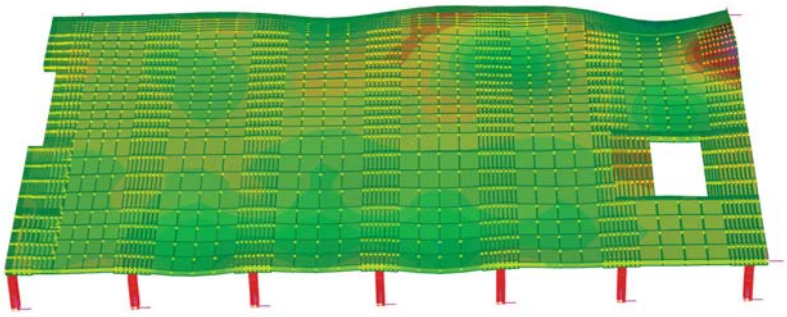


Fig 6.Level 4 Floor 2nd Mode – 19.4 Hz

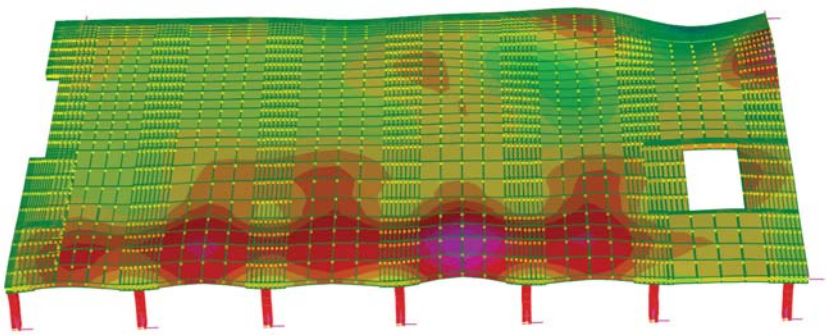


Fig 7.Level 4 Floor 3rd Mode – 19.5 Hz

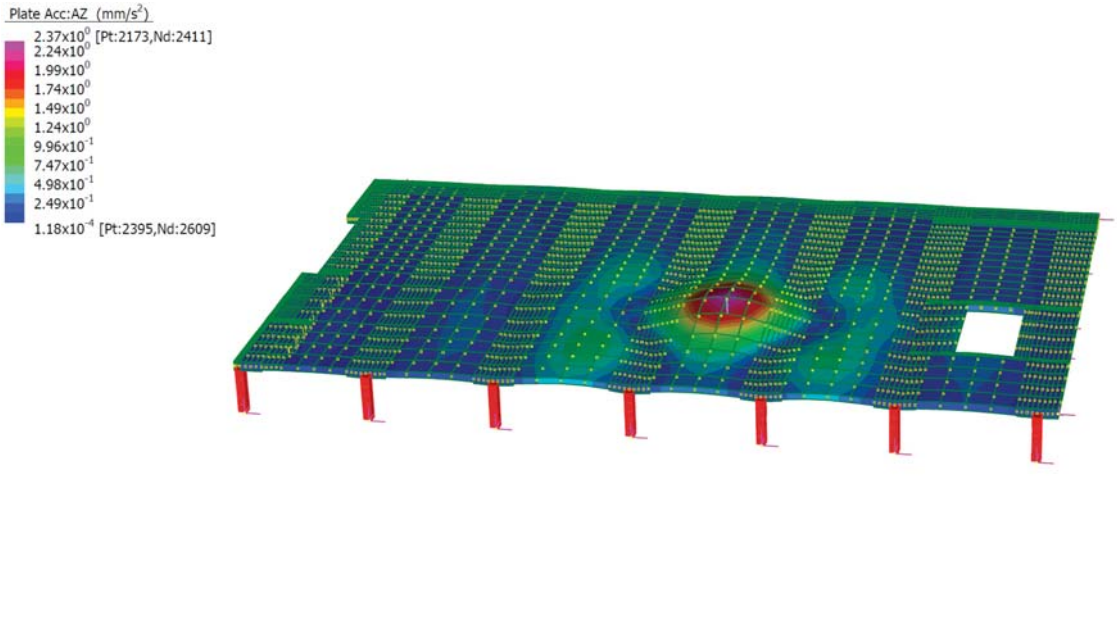


Fig. 8 Level 4 Harmonic Response Analysis at Critical Area (Operating Theatre Locations) (for footfall excitation at corridor location at Midspan location – as shown in pink areas for this diagram) (Peak Acceleration mm/s^2)

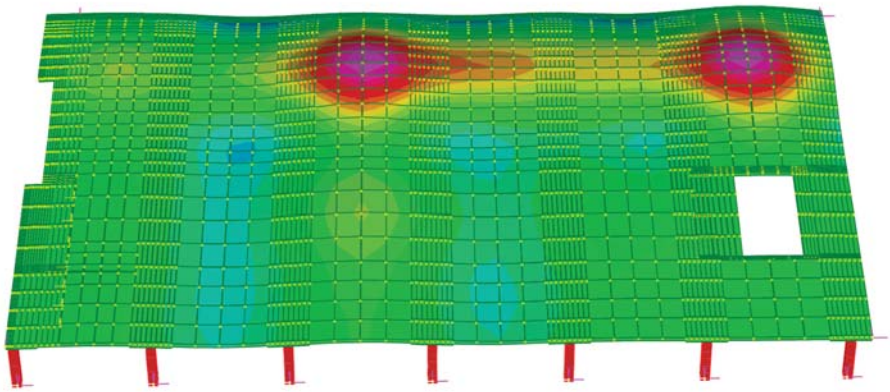


Fig 9.Level 5 Floor 1st Mode – 9.5 Hz

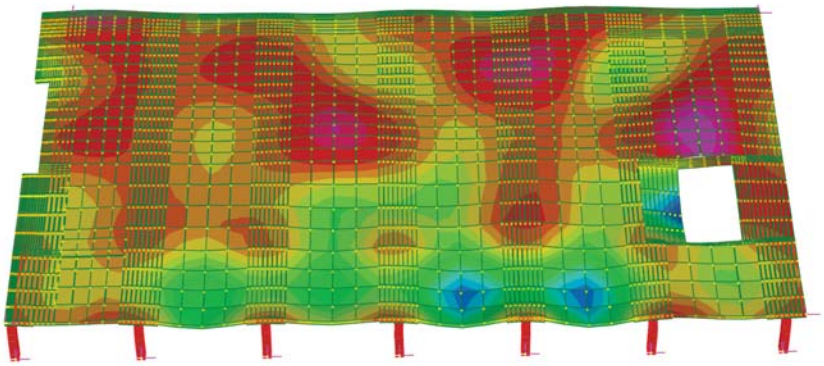


Fig 10 .Level 5 Floor 2nd Mode – 15.5 Hz

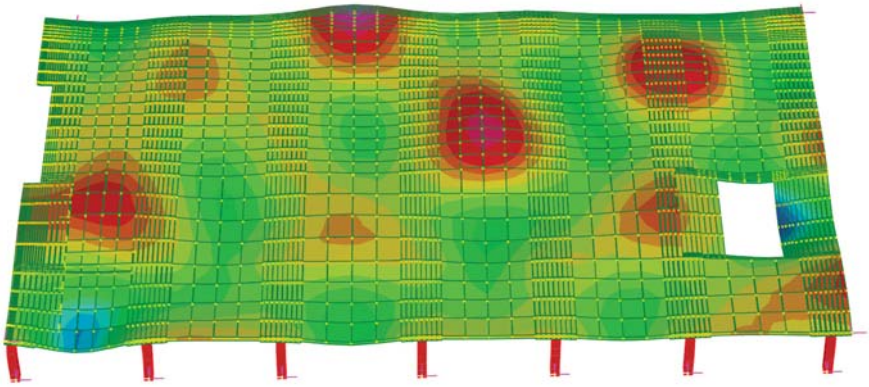


Fig 11 .Level 5 Floor 3rd Mode – 15.7 Hz

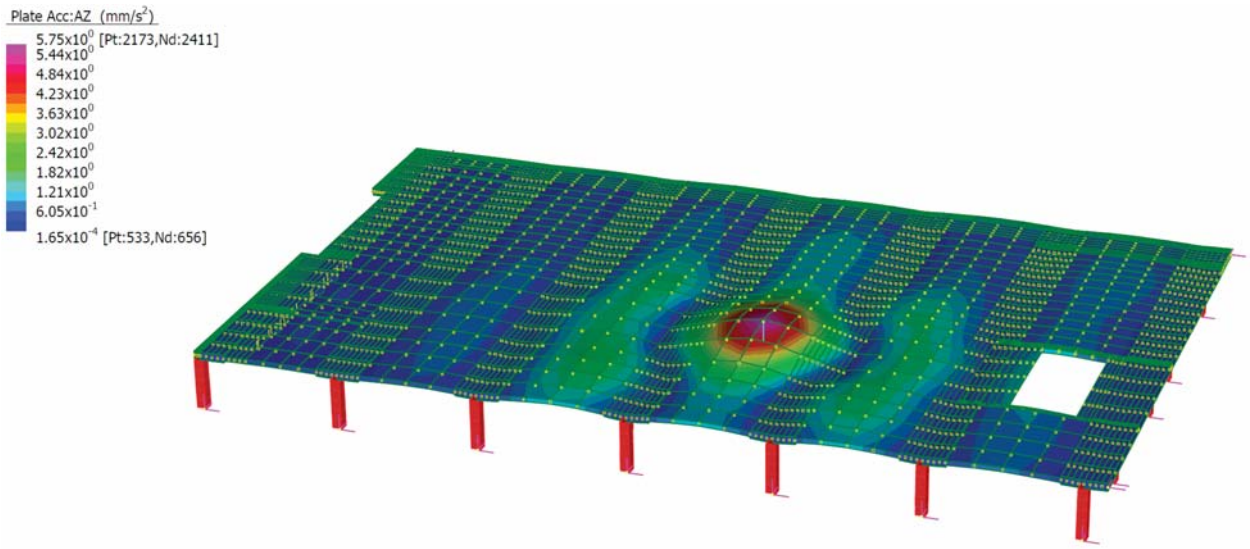


Fig 12. Level 5 Harmonic Response Analysis above Critical Area (Operating Theatre Locations) (for footfall excitation at corridor location at Midspan location – as shown in pink areas for this diagram)
(Peak Acceleration mm/s^2

	Base Curve	Base Curve	0.50 Base Curve	0.25 Base Curve
Freq (Hz)	**RMS Acceleration m/s^2**	**RMS Acceleration mm/s^2**	**RMS Acceleration mm/s^2**	**RMS Acceleration mm/s^2**
1.00	0.01	10	5	2.5
1.25	0.0089	8.9	4.45	2.225
1.6	0.008	8	4	2
2	0.007	7	3.5	1.75
2.5	0.0063	6.3	3.15	1.575
3.15	0.0057	5.7	2.85	1.425
4	0.005	5	2.5	1.25
5	0.005	5	2.5	1.25
6.3	0.005	5	2.5	1.25
8	0.005	5	2.5	1.25
10	0.0063	6.3	3.15	1.575
12.5	0.0078	7.8	3.9	1.95
16	0.01	10	5	2.5
20	0.0125	12.5	6.25	3.125
25	0.0156	15.6	7.8	3.9
31.5	0.0197	19.7	9.85	4.925
40	0.025	25	12.5	6.25
50	0.0313	31.3	15.65	7.825
63	0.0394	39.4	19.7	9.85
80	0.05	50	25	12.5

Vibration Criteria for Comparison with Modelling Results

Executive Summary

Engineering Dynamics has completed an analysis of a helipad isolation system for the Royal Hobart Hospital Helideck which provides an anticipated low vibration level (less than the specified R values in AECOM Design Development Report AR-REP-00237 Dated June 2015) to floors below the helipad structure (levels 10 – 1).

The ISO 2631/2 standard is equivalent to AS2670.2:1990 Evaluation of human exposure to whole body vibration – Continuous and shock induced vibration in buildings (1 to 80 Hz).

The vibration analysis for Level 5 and level 4 mounting for cameras provides strong evidence to support the mounting of cameras to level 4 due to the increased thickness of floor and band beams.

A comparison of results of floor excitation at level 4 indicates that the current design is likely to meet the 0.25 Criteria as specified. The level of vibration predicted does not indicate reducing the beam / slab thickness will provide certainty in achieving the criteria.

The location of camera equipment is optimal at band beam locations (if feasible). The exact requirements for camera vibration maximum peak or RMS levels have not been specified.