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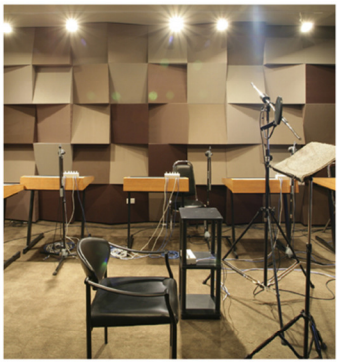

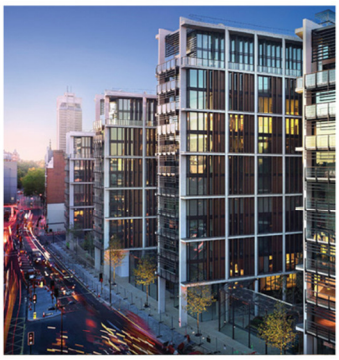

REPORT AS8175.180727.R1

UCLH PROTON BEAM THERAPY UNIT

CONDITION 26
VIBRATION MITIGATION SCHEME

Prepared: 27 July 2018

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List of Attachments

1.0 INTRODUCTION

Planning approval has been granted by Camden Council for the Phase 4 Proton Beam Therapy Unit upon the Former Odeon site and Rosenheim Building site (application ref. 2013/8192/P). Condition 26 of the consent requires submission of details for a scheme of vibration mitigation developed to safeguard the amenities of the adjoining premises and the area.

Bouygues UK has instructed Clarke Saunders to advise on the requirements and specification of such a scheme.

This report describes the methods by which vibration transmission will be controlled to reasonable levels within adjoining and nearby buildings.

2.0 CAMDEN REQUIREMENTS

Condition 26 of the consent reads as follows:

> *Prior to the laying of the first slab above ground level, a scheme for vibration mitigation shall be submitted to and approved by the local planning authority in writing and the buildings shall not be occupied until completed fully in accordance with such scheme as will have been approved.*

The condition has been set in observance of the requirements of policies CS5 and CS7 of the London Borough of Camden Local Development Framework Core Strategy and policy DP26 of the London Borough of Camden Local Development Framework.

None of the policies CS5, CS7 or DP26 provide guidance of acceptable levels of vibration within occupied buildings.

It is noted, however, that section 28.4 of Camden's Local Development Framework sets upper limits for vibration upon residential sites adjacent to railways and roads in terms of vibration dose value (VDV) of 0.2 to 0.4m/s$^{1.75}$ during day and evening, and 0.13m/s$^{1.75}$ during night-time periods.

3.0 SENSITIVE RECEPORS

The development site is bounded to the west and south by Paramount Court, with the Jeremy Bentham public house at the southern end of the Huntley Street wing. Both have dwellings on their upper levels and share party walls with the Beam Therapy building.

Maple House lies to the north of the site, on the north side of Grafton Way and also has dwellings on its upper floors.

4.0 EXISTING LEVELS OF VIBRATION

The active tunnels of the Northern and Victoria underground lines pass by the site to the west, with Warren Street station located around 100m to the north west.

Surveys of groundborne vibration on the site have shown pre-existing levels of VDV less than $0.04m/s^{1.75}$ during daytime and night-time periods.

Pre-development levels of vibration were, therefore, around one-quarter of the advised limits, or lower.

It is likely that similar levels of vibration are experienced within Paramount Court and Maple House.

5.0 SCHEME OF VIBRATION CONTROL

5.1 VIBRATION SOURCES

Vibration sources within the Beam Therapy Units are likely to be limited to reciprocating building services plant, such as chillers, pumps, large fans, etc. and lift motors. The majority of the air handling plant is to be located at Basement Level B2 and on its mezzanine. Air-cooled chiller plant, ancillary fans and smaller handling units, generator and CHP will be located at roof level.

5.2 VIBRATION ISOLATION

So as to control tactile vibration and structure-borne noise within the building to the stringent levels required by UCL[1], all plant is to be fitted with high-efficiency vibration isolators, as detailed in schedule AS8175/AVM-1. Please refer to Appendix A.

The performance requirements set out in this schedule have been derived following good practice in order to achieve minimum 95% vibration isolation efficiency from rooftop plant and 90% from basement plant, as appropriate for critical applications.

The specifications are expected to render vibration levels within building structures to below-tactile levels, corresponding to VDV of less than $0.1m/s^{1.75}$.

Details of isolation mounts proposed by the mechanical/electrical subcontractor have been provided to Bouygues for review. These proposals, sent in conjunction to this report, are compliant with the specification schedule.

[1] The BREEAM assessment of the building requires internal acoustic conditions to comply with *Health and Technical Memorandum (HTM) 08-01: Acoustics*

Vibration isolation mounts for the chillers, CHP and generator will be provided with the plant. Mount selections will be verified as being appropriate to meet the project and planning requirements prior to their acceptance.

5.3 VIBRATION TRANSMISSION

The main structures of the Beam Therapy building comprise in-situ concrete slabs of 400mm thickness. The mass of these slabs renders them resistant to vibration and, hence, its onward transmission.

Whilst there will be some structural connection between the Beam Therapy building and Paramount Court/Jeremy Bentham public house, the risk of onward transmission of vibration is very low. Amplification of vibration during propagation is highly unlikely, such that any transmitted vibration is not expected to be tactile within adjoining buildings, nor is it expected to generate VDV in excess of $0.13m/s^{1.75}$, as deemed acceptable by Camden.

6.0 CONCLUSION

Specifications have been provided for the performance of vibration isolation mounts to be used in the installation of building services plant in the Phase 4 Proton Beam Therapy Unit development at the site of the former Odeon cinema and Rosenheim Building. The specifications have been developed to meet the requirements of Health and Technical Memorandum (HTM) 08-01: *Acoustics* and are, therefore, considered appropriate to mitigate vibration transfer into adjoining buildings.

A compliant technical submittal has been provided by the mechanical & electrical subcontractor for mounts to be fitted to general plant.

Mounts selections for the chillers, generator and CHP have yet to be advised. These will be verified as being appropriate to meet the project and planning requirements prior to their acceptance.

It is, therefore, expected that correct installation of these mounts will control vibration from the plant to satisfy the requirements of Condition 26.

Matt Sugden

Matt Sugden MIOA

CLARKE SAUNDERS ASSOCIATES

AS8175 UCLH PROTON BEAM THERAPY UNIT

APPENDIX A

SCHEDULE AS8175/AVM-1

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ANTI-VIBRATION MOUNTINGS SCHEDULE

UCLH Phase 4 PBT

Ref:	A8175/AVM- 1	Revision:	*0*	Date:	8-Nov-16	Engineer	*MS*	No. of per set	No. of sets
AVM Ref.	**Plant Description**	**Location**		**Mounting Code**	**Base Code**	**Unit Weight (kg)**	**Static Deflection (mm)**		
1	Chillers	Roof		A	A/B	-	≥25mm	Supplier design	5
2	CHP	Roof		A/B	A/B	-	≥40mm	Supplier design	1
3	AHU[i]	Roof		D	A	-	≥4mm	As required	2
4	Pumps/pressurisation units[ii]	Roof		A/B	C	-	≥25mm	As required	As required
5	Emergency Generators	Roof		Manufacturer design to achieve 98% isolation efficiency					
6	SEF08A/08B, SEF 09A/09B	Roof		B/E	-	-	≥20mm	As required	4
7	Smoke fans	Roof		B/E	-	-	≥15mm	As required	As required
8	Heat Pumps/Medical Gas Plant	Roof		C	-		≥10mm	As required	As required
9	Boilers	Roof		D	-	-	≥3mm	As required	2
10	AHU[iii]	B2/M2		D	A	-	≥4mm	As required	As required
11	CHW pumps[ii]	B2/M2		B	C	-	≥20mm	As required	As required
11	Booster pumps[ii]	B2/M2		B	C	-	≥25mm	As required	As required
12	Compressors	B2/M2		C	A/B	-	≥10mm	As required	As required
13	Fans	B2/M2		B/E	-	-	≥15mm	As required	As required

[i] Minimum 20mm deflection steel spring isolators fitted internally to fan by supplier

[ii] Pipework will require flexible connectors and be supported from 25mm deflection hangers (with rubber 'noise-stop' pads) for minimum distance of 100 pipe diameters from pumps.

[iii] Minimum 15mm deflection steel spring isolators fitted internally to fan by supplier

Mounting Code and Description
A : Caged steel spring
B : Open steel spring
C : Neoprene-in-shear
D : Neoprene Pad
E : Hangers with steel springs
F : Hangers with neoprene springs
/R: Restraining or positioning device

Base Code and Description
A : A.V. Rails
B : Steel frame base
C : Concrete inertia base (steel springs)
D : Concrete inertia base (neoprene pads or mounts)