Kneller Hall School

Twickenham

Dukes Education

Condition Report

STRUCTURAL / CIVIL ENGINEERING

L221004-AKSW-ZZ-XX-RP-S-0010

08/09/2022

Revision	Description	By	Checked/Approved	Date
P01	First Issue	AA	AJS	08/09/2022

Kneller Hall School, Twickenham – Structural condition of existing buildings

1.0 Introduction

1.1 AKSWard was instructed by Dukes Education to provide a structural condition survey in support of the planning application for the Kneller Hall site, Twickenham.

1.2 A review has been carried out of previous condition surveys and reports. Inspections were conducted by AKSWard team between March and August 2022. Limited opening up works have been carried out by ACS contractors. A Geo-environmental investigation prepared by Soil Consultants dated 5th July 2022 has been carried to assess ground conditions and contamination.

1.3 Previous reports reviewed include:

1. Jones Lang LaSalle IP, Condition Survey Report | Kneller Hall, Royal Military School of Music, Kneller Road, Twickenham, TW2 7DN| Dec.2020.
2. Jones Lang LaSalle IP, Condition Survey Report | Kneller Hall Guard House, Royal Military School of Music, Kneller Road, Twickenham, TW2 7DN | Dec.2020.
3. Jones Lang LaSalle IP, Condition Survey Report | Practice Hall, Royal Military School of Music, Kneller Road, Twickenham, TW2 7DN | Dec.2020.
4. McAndrew Martin, Structural Appraisal Report On Third Floor Sergeants Mess Annexe Royal Military School Of Music Kneller Hall Twickenham TW2 7DU | Mar. 2014
5. WSP, Technical Note 1 | Kneller Hall site visit report | Nov. 2021
6. WSP, Technical Note 2 | Practice Hall site visit report | Nov. 2021
7. WSP, Technical Note 3 | Guards Room site visit report | Nov. 2021

1.4 This condition survey was collated by Ahmed Alihasan BSc MSc and reviewed by Adam Sisson MEng CEng MIStructE.

2.0 Description

2.1 Previously the home of the Royal Military School of Music (RMSM) and Royal Corps of Army Music (RCAM) for almost 170 years, the MOD left the site in August 2021.

2.2 This report will cover the three listed buildings on the site: Kneller Hall Main Building, the Guards House, and the Band Practice Hall all of which have been categorised as grade II listed buildings.

2.3 The applicant, Dukes Education, proposes to establish a new independent secondary school on the site, including use of the listed buildings.

2.4 This report has been compiled to comment on the structural condition of the listed buildings and make recommendations for remediation as appropriate.

3.0 Observations

3.1 Kneller Hall Main Building

Originally constructed in circa 1710, Kneller Hall is thought to have been largely re-constructed and extended in the mid 19th century. The building comprises three-storeys plus a partial basement, with the west wing of the building four storeys. The building is constructed load bearing masonry, with timber floors and brick elevations with decorative stonework in the neo-Jacobean style. The roof is assumed to be of timber construction. A modern single storey extension has been constructed to the rear of the west wing.

The building is generally in good structural condition considering its age. Where opening-up work has revealed floor joists, no signs of degradation have been observed. It should be noted that the roof structure has not been inspected.

Cracking to masonry walls has been observed to the upper floors of the west wing. These walls do not continue down through the building and appear to be blockwork partitions constructed off the timber floors. In some locations, movement gauges have been installed across cracks. Based on the dates noted on the walls adjacent to these, they appear to have been installed approximately 5 years ago and show between 0 and 3mm of movement.

In the basement deterioration to render indicative of water ingress is evident (Jones Lang LaSalle IP, Condition Survey Report - Kneller Hall, 2020).

3.2 Guards House

The Guards House is located adjacent to Kneller Hall building near the entrance to the site. The building is a two-storey structure and was constructed in the mid 19th century. The construction is load bearing masonry with timber joist first floor and tiled pitched roof. Internally, inclined steel angles can be seen below the upper floor ceiling, assumed to be part of a roof support truss.

The building is generally in good structural condition considering its age.

A brick arch above one of the windows at the rear single storey room has failed and cracking can be seen extending from the bottom corner of the window below. There are signs that the adjacent drainage pipe may not have been functioning adequately in staining on the brickwork.

Water ingress is noted near the plant room (Jones Lang LaSalle IP, Condition Survey Report - Kneller Hall Guard House, 2020).

3.3 Band Practice Hall

The Band Practice Hall is a single storey building located just behind the Guards house. The building was constructed early 20th century with solid brick walls and timber pitched roof supported by trusses. The building has been extended to the south with a single storey toilet block constructed mid 20th century. A basement plant roof is located below the rear part of the building, accessed by an external stair.

The building is generally in fair condition, however, there are significant defects to some elements as noted below.

Past remedial work is visible in the form of external piers on the truss lines to both sides of the building. A record drawing from the 1970 shows that the piers are concrete encased steels (back-to-back channels) which anchor remedial ties to the trusses. The concrete encasement to the piers is showing signs of spalling in some locations. Concrete to the top of one of the piers was removed in order to inspect the steel which, in this location, were not significantly corroded.

The structure shows evidence of significant movement as there is a large vertical crack to the rear elevation and a large diagonal crack to the internal dividing wall. These cracks appear to emanate from the interface with the basement wall. Evidence of multiple attempts to repair the crack in the rear elevation can be observed, however, none of these have been successful.

The sit investigation report states that the foundations to this structure do not appear to be functioning adequately and appear to be founded on relatively weak soils.

4.0 Discussion

4.1 Kneller Hall Main Building

The blockwork partition walls appear to be supported by the timber floors. It is likely that the floors have deflected under the weight of the masonry and that this has lead to the cracking in the walls. The relatively low movement shown by the movement gauges over a long period of time indicated that the movements are not progressing significantly.

Water ingress to the basement is likely to be due to failed or inadequate waterproofing.

4.2 Guards House

Repair to the failed arch is not thought to be feasible using steel brick ties as there is no masonry above the arch.

Water ingress could be due to inappropriate detailing, failed roofing or non-functioning rainwater goods.

4.3 Band Practice Hall

The existing remedial works (ties and piers) are likely to have been installed in order to prevent spread of the trusses, with the external piers anchoring the ties and, possibly, reinforcing the masonry walls. Although the steel within the piers exposed as part of the opening-up works was not significantly corroded, the spalling would indicate that corrosion may be progressing to lower parts of the piers.

The foundations to the building are not performing adequately across the building. The cracking is likely to be caused by differential settlement between the basement and the adjacent areas, the basement structure likely founded on stronger ground then the adjacent foundations.

5.0 Remedial works & recommendations

5.1 General

- Roofing and weatherproofing to historic buildings are to be maintained in order to prevent water ingress. Any leaks detected are to be investigated and repaired as soon as practical in order to avoid degradation to structural elements.
- Rainwater goods are to be kept clean/clear and adequately maintained in order to ensure water is effectively shed from the building.
- A CCTV drainage survey has been carried out and has identified maintenance required to the drainage system. Below ground drainage is to be adequately maintained in order to ensure continued functionality. Defective drains can cause softening of the subgrade under foundations and so cause building movements leading to cracking.
- The site investigation reported noted that cohesive material is present in the ground. Any proposed tree planting is to be considered in relation to possible impact on building foundations and ground floors. Proposed trees are to be located at an adequate distance from the existing buildings in order to minimise the risk of desiccation affecting the buildings.

5.2 Kneller Hall Main Building

- Masonry walls that are built off timber joist floors and that show signs of cracking to be removed. Any replacement or new internal walls should be of lightweight construction (e.g. stud).
- Access to be gained to roof void and timber roof structure inspected for signs of degradation.
- Waterproofing specialist to examine basement and make recommendations for controlling moisture ingress.

5.3 Guards House

- Failed brick arch to be reconstructed or replaced with a proprietary steel lintel and brick reinstated.
- Cracking to masonry to be repaired.
- Rainwater goods and roofing to be inspected and cleared/repaired as appropriate.

5.4 Band Practice Hall

- Underpinning to be carried out to building to prevent further settlement of the foundations. Either traditional mass concrete underpinning to sound, natural ground; or a piled underpinning system (mini-piles/screw piles) adequately fixed to the existing foundations to support the structure.
- Once foundations have been stabilised, the cracking to the masonry should be repaired.
- Spalling concrete encasement to the remedial piers to be removed and the steel inspected for corrosion. Any corrosion to be removed by mechanical means and concrete encasement reinstated with a corrosion inhibited cementitious repair mortar. Alternatively, concrete encasement can be removed entirely and an alternative form of corrosion protection suitable for external steel applied.

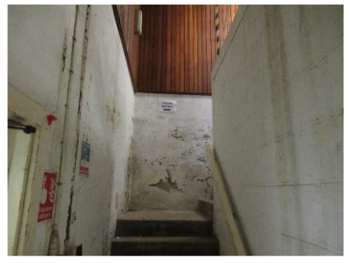

Photo 1 Water damage to right side basement stair in the main Kneller Hall west wing building (Photo taken from *Jones Lang LaSalle IP, Condition Survey Report - Kneller Hall Guard House, 2020)*

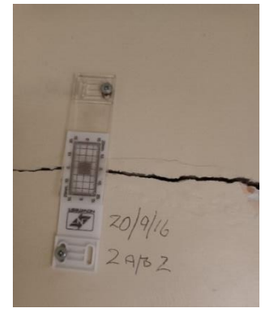

Photo 2 Movement gauge showing minimal further movement to one of the solid walls at level 3 Kneller Hall main house (west wing)

Photo 3 Opening up works showing existing floor joists at the first floor in the Guards House

Photo 4 Failed Brick Arch above sash window at the rear storage room in the Guards House

Photo 5 Remedial piers formed of encased steels (back-to-back channels) which anchor remedial ties to the trusses in the Bank Practice Hall

Photo 6 Significant vertical crack to the external gable wall at the rear of the Band Practice Hall