

STRUCTURAL INTERVENTIONS AT KENSINGTON PALACE

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Abstract

In March 2012 Kensington Palace one of the most important historic building in the history of the British monarchy was reopened to the public by Queen Elisabeth II. Between 2010 and 2012 the palace has undergone a £12m redevelopment. Kensington Palace is a Scheduled Ancient Monument and Grade I listed building that has been a royal residence since the end of 17th century and holds rooms of special historic interest. However, over previous decades the palace attracted few visitors considering its location and significance. Therefore the main objective was to make it as accessible as reasonably possible for the broader public. The main difficulty in undertaking this task was associated with the requirement of preserving historic fabric whilst upgrading functionality and programme to meet modern standards. This necessitated alteration of selected areas, installation of passenger lift and requirement to address concurrent legislation. The aim of the paper is to analyse the proposed scheme in light of technical requirements relating to access to and use of buildings. In assistance the original documents submitted for planning permission by John Simpson Architects, Historic Royal Palaces' annual reviews formed the base of this paper. The regeneration scheme proved to be successful as after completion HRP noted significant increase in visitors' numbers. As a result this project is an interesting insight of design criteria on how to balance potential impact on historic fabric.

Streszczenie

W marcu 2012 roku Kensington Palace, jeden z najważniejszych obiektów zabytkowych w historii brytyjskiej monarchii, został ponownie udostępniony zwiedzającym przez Elżbietę II. W latach 2010 – 2012 pałac poddano przebudowie o wartości kosztorysowej 12 milionów funtów. Kensington Palace był królewską rezydencją od XVII w., posiada status Anient Schedule Monument i zabytku klasy I. Pomimo historycznego znaczenia i lokalizacji pałac przyciągał niewielką liczbę zwiedzających. Głównym celem stało się więc uczynienie go w jak największym stopniu dostępnym. Zasadniczą trudność tego zadania wynikała z konieczności zachowania historycznej tkanki i jednoczesnej aktualizacji programu funkcjonalno-użytkowego. Przedsięwzięcie to wiązało się z potrzebą modyfikacji wyselekcjonowanych stref, montażu windy osobowej i uwzględnieniu koincydencyjnych przepisów. Celem artykułu jest analiza dokonanych przekształceń adaptacyjno-modernizacyjnych pałacu w świetle obowiązujących przepisów dotyczących dostępności oraz użytkowania budynków. Do przedmiotowych badań wykorzystano następujące materiały źródłowe: dokumenty będące podstawą uzyskanego pozwolenia na budowę przez John Simpson Architects oraz roczne raporty Historic Royal Palaces. Zaproponowane przekształcenia okazały się znacznym sukcesem, ponieważ po zakończeniu prac HRP odnotowało znaczący wzrost frekwencji. W rezultacie projekt ten jest interesującym studium kryteriów projektowych, które pozwalają zrównoważyć oddziaływanie na historyczną tkankę.

Keywords: Kensington Palace; London, Scheduled Ancient Monument; Listed Building; Regeneration; Royal residence museum; Hyde Park.



Figure 1.
Kensington Palace view from the Broad Walk in Hyde Park
(author's archive)

1. INTRODUCTION

The main objective in undertaking this scheme was to make Kensington Palace as accessible as practically possible maintaining sustainable management of this significant place (Fig. 1). This would prevent the marginalising of the palace, enable the use of the building of its full potential and take advantage of its location (Fig. 2). The proposed alterations to the use of the palace meant that the building had to comply with Building Regulations. These are not legally binding and consist of set of standards for how buildings must be constructed to achieve a minimum level of acceptable performance.



Figure 2.
Location of Kensington Palace on the western border of Hyde Park (source: Google Earth)

2. INTERVENTIONS IN HISTORIC FABRIC

The affected areas by the new design scheme by John Simpson Architects were to be kept to a minimum and were confined to selected areas located mainly on the ground floor [1], [2]. These consisted of a new approach to the building, a new one-storey extension at the east façade of the North Range, a glass roof over the White Court, a new corridor in the Princesses' Court Arcade and the installation of a passenger lift (Fig. 3).



Figure 3.
Historic development of Kensington Palace (source: author based on historical data)

2.1. Designing an inviting approach to the building

The sequence of the new approach to the palace runs from the Broad Walk in Hyde Park past the statue of Queen Victoria to the East Front where the visitors' entrance and new loggia are located. The existing railings along the park's thoroughfare were removed connecting it to the park. The eastern gardens' levels were lowered to create 2 parallel shallow slopes of a gradient that does not exceed 1:20 and provides level access to the loggia and into the palace. The surface of the north and south promenades was constructed in resin bonded gravel. This material was used to minimise the hazard of slipping and to assist wheelchair users at the entrance zone to the museum [3], [4] (Fig. 4).



Figure 4.
The view of new approach to visitors' entrance at east façade
(source: author's archives)

2.2. New entrance implementation

The new adjacent cast iron entrance loggia was designed to minimise its impact on the historic fabric. It was positioned as close as possible to the façade and it is an independent structure to prevent any damage. The works in this area included removing part of the existing horizontal band of render to reveal the original brickwork. The remainder of the existing render on either side of building projection was painted to look like brick (Fig. 5). The entrance to the palace originally consisted of 3 sets of French windows that were replaced with new double glazed doors. Due to the restricted width of the historic openings, the minimum effective clear width for double leaf doors could not be achieved. Therefore, main doors were to be power-operated to assist those of impaired mobility as an alternative solution [3], [4].



Figure 5.
New cast iron loggia adjacent to East Front of Kensington Palace
(source: author's archive)

2.3. Construction of the new extension

An additional entrance to the palace is also possible through a new extension to the east side of the North Range via 2 sets of French doors which are 1890 mm wide when both leafs are open. Stone thresholds are designed to allow for easy access and additionally provide a high contrast between the interior and exterior floor surfaces for those who are visually impaired (Fig. 6). The new link also retained the original higher ground level on the north side of the area allowing for access to 1st floor. This is where the new temporary exhibition rooms are located and available via a 1362 mm wide existing metal bridge over the well. The step at the door was replaced with a ramp of 1:20 gradient and original handrails retained [3], [4].



Figure 6.
New extension and courtyard to the north of East Front
(source: author's archive)

2.4. Regeneration of White Court

The smallest courtyard known as White Court which was created in 1695 with the addition of South Front by Christopher Wren was also affected by alterations. In order to ensure a better use for this confined and narrow space a glass roof was installed to cover it (Fig. 7). The steel structure was fixed to rebuilt parapets to minimise damage to elevations and to make it watertight. The rooms around would still receive natural light and the space could be ventilated via louvres so the heat gain could be controlled. The existing floor level of this area was raised to eliminate steps so the new room was fully accessible.

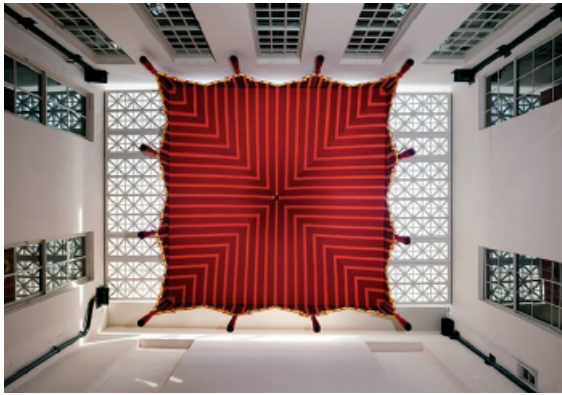


Figure 7.
New glass ceiling structure in the White Court (source:
author's archive)

2.5. Construction of a new corridor

The proposed scheme meant that Princesses' Court Arcade had to be created based on a lost historic feature. The existing and previously blocked door openings in the north-east corner of the vestibule and beyond were re-opened. The existing modern 20th century partitions and first floor slab at the end of the arcade by William Kent were removed to install a new stair consisting of 18 continuous risers for a going of less than 350 mm as agreed with the building control officer. The maximum height of a riser is 170 mm and steps are carpeted for those, who are visually impaired [3], [4].

2.6. Passenger lift installation

Three possible locations were identified where the historic fabric would be least compromised [1], [2]. The first at the Blue Stair in the North Range (A), the second at the corner of the south-east pavilion (B) and the third at the north-west corner of the White Court (C). The first scheme, combining locations A and C, proved incompatible with the ground floor's circulation patterns. A roof extension would have had to have been erected in location A, which would have disrupted rooms in the Queen's Apartment. The lift would have had to be accompanied by a safe refuge adjacent to a stair, which would have had to be compartmented [5]. Location C also proved complicated as no space was available on the 2nd floor for a refuge area except in the adjacent room with a lantern. A second scheme using locations A and B was then examined. Location B was very difficult in terms of circulation patterns on the ground floor. It meant that the existing stairs by John Nash in the north-west pavilion would have required

structural reinforcement for use as an evacuation stair. Its handrails were incorrect height and not able to deal with crowd loadings in public buildings [6]. Additionally, the narrow winders of the stair would have made it extremely difficult to use as an evacuation stair in the event of a fire. Therefore, further less sensitive areas around White Court were investigated at C1, C2 and C3 locations. These were also discarded due to lack of space for refuge area, the danger of affecting original windows and loss of original floors.

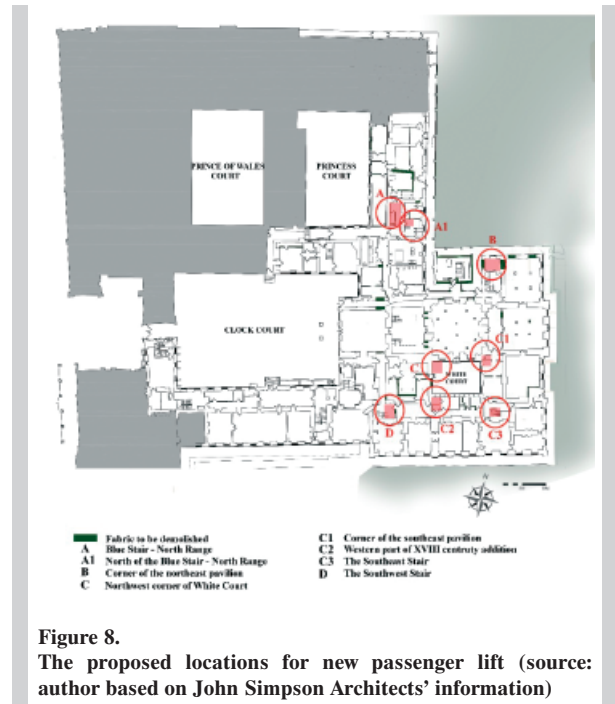


Figure 8.
The proposed locations for new passenger lift (source:
author based on John Simpson Architects' information)

Lastly position D was examined as a possible siting for a lift (Fig. 8). The advantage of this space was that there was no need for a new adjacent stair as the King's Stair could be used and would also provide space for a refuge. No further fire compartmentation works were needed because this area had previously been upgraded for Princess Margaret. The lift allowed access to the first floor of the main palace and likewise to the King's and Queen's Apartments on the second floor. It also worked better in terms of the ground floor circulation pattern. However, there was a heritage cost associated with the removal of a 19th century stair, glazed partition and relocation of original doors all by John Nash. The new lift car measures 1725 x 1680 mm and has the capacity for 17 people. The lift door opens on one side on the first floor and on two sides on the second floor into the lift lobbies clad in mirrors [3], [4].

Table 1.**Advantages and disadvantages of installation of the passenger lift in Kensington Palace**

Location		Advantages	Disadvantages
A	Blue Stairs	Access to 1 st floor of North Range and to Queen's State Apartments / sufficient space to insert new stairs;	Queen's private rooms affected / an extension to single story arcade required / original window by Wren / pay boundary would be crossed multiple times on ground floor causing congestion /
B	Northeast pavilion	access to 1 st floor of the main palace and King's State Apartments / close proximity of stone stairs by Nash	Nash stairs requires to be reinforced structurally / new stairs would block windows in Red Saloon and Cupola Room /
C	White Court	Access can be created without affecting rooms of special interest / sufficient space to insert new stairs / access to 1 st floor of the main palace and King's State Apartments	Loss of historic fabric in room on the 2 nd floor – FR upgrade required / 18 th century windows to be replaced / upgrade of White Court windows (26) to meet required FR (early 18 th century)
C1	Southeast pavilion	Less sensitive area / access to 1 st floor of the main palace and King's State Apartments	Upgrade of historic windows (6) to meet required FR / loss of the original floors by Wren/
C2	18 th Century addition	Less sensitive area / access to 1 st floor of the main palace and King's State Apartments	Upgrade of historic windows (15) to meet required FR / loss of floors inserted by Kent / loss of fabric stairs and doors to southeast stairwell / not practical for evacuation
C3	Southeast Stairwell	Less sensitive area / access to 1 st floor of the main palace and King's State Apartments	Loss of Nash stairs / insertion of new stairs meant loss of historic windows / not practical for evacuation
D	Southwest stairwell	access to 1 st floor of the main palace / access to King's and Queen's State Apartments / close proximity of King's Stair (existing escape route) / re-using fire separation installed for flat 1A / keeps clear uncongested circulation pattern on ground floor / confined area – installation of lift does not affect surrounding rooms	Removal of 19 th century stairs by Nash / removal of original screen and door sets by Nash

3. ADJUSTMENTS TO ELEMENTS OF INTERNAL COMMUNICATION

The width of main routes and associated approach zones were in accordance with current legislation. Also the effective width of the existing historic internal doors was in most cases greater than a minimum of 750 mm. In order to assist visitors all doors on public routes were to be open during the admission hours including internal fire doors that are held open by automatic fire detection (AFD) power system [3], [4]. Ramps and sloping floors were introduced in the Stone Hall and Princesses' Court Arcade. A temporary ramp is being used on the 2nd floor where a step between Stone Stair and the North Range exists. The back of house areas where offices and staff areas are located were much less able to accommodate improvements because of the many level changes of the original floor (Fig. 9).



Figure 9.
The proposed ground floor layout (source: author based on John Simpson Architects' information)

4. ADJUSTMENTS ENFORCED BY CURRENT FIRE PROTECTION REQUIREMENTS

The uniformed warders were to be present on all public routes and equipped with at least two fire strategies to help guide visitors in case of emergency as no fire signage is present on available visitors' routes. However, public areas located on the ground floor required combined emergency lighting and exit signs as the risk of panic had to be minimised and sustainable evacuation provided [2], [7]. An assisted evacuation strategy was required for the refuge spaces adjacent to the lift. If a fire were to break out within the compartment where the lift is installed, the entire space would need to be evacuated. All of those who required assistance would be directed to the top of the Queen's Stairs to be helped manually. A maximum of 10 wheelchair users were allowed to be admitted so requirement of proving manual help within 60 minutes could be achieved.

5. ENERGY IMPROVEMENTS TO THE MONUMENT

The original design includes the installation of a geothermal heat pump that would be located in the garden. In order for the main building to benefit from this historic fabric would have had to be compromised which was not acceptable. The high cost of equipment balanced against the potential achievable improvements and potential adverse damage of historic fabric resulted in the rejection of this solution by HRP [1], [2]. However, in recent years the royal family has become involved in promoting energy saving policies. This has resulted in the installation of solar panels in Kensington Palace and the addition of thermal insulation to the Orangery.

6. CONCLUSION

1. Kensington Palace is a Scheduled Ancient Monument and Grade I Listed building of significant historic importance for the history of the British monarchy. However, it attracted few visitors so the main objective was to open it to a broader public by making it as accessible as possible.
2. The accessibility was improved by creation of an inviting approach directly from Hyde Park and new visitor's entrance accompanied by loggia. Further alterations involved the White Court, construction of a new corridor – the Princesses' Arcade Court

and erection of an extension which led to improvement of the ground floor circulation. The key factor for improving access was the installation of passenger lift that connected to the main palace, William III and Mary II State Apartments and state rooms built for George I.

3. The proposed alterations to use of the palace meant that the building had to comply with current Building Regulations. These related to a set of standards set out in the current legislation.
4. The regeneration of Kensington Palace was a significant success. The implementation of the proposed scheme allowed for this historic monument to become accessible for the broader public. Since Kensington Palace was reopened HRP noted approximately 66% increase in visitor numbers.
5. In case of undertaking any future regeneration alterations of the palace it is strongly advised to balance the potential impact on the historic fabric. It is proposed to continue the pattern of historical development of the building in order to unify composition and architectural form as whole. This in turn will guarantee to achieve desirable preservation and enhancement of historical and aesthetic values of Kensington Palace

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