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The British Museum First Emperor Exhibition

Method Statement for the Delivery of the Mechanical and Electrical Engineering Services Installations, prepared in support of the Listed Building Application

Mechanical Engineering Services

A mechanical ventilation and partial air conditioning system is proposed to meet the following objectives:

- To maintain temperature and relative humidity conditions at a suitable level for the historic fabric and for existing books.
- To maintain comfortable conditions for visitors.
- To provide an adequate site of fresh air exchange for the anticipated number of visitors.

The principle that has been adopted is to retain existing provisions and to supplement them where necessary. In this way there will be no interference with the historic fabric or furniture and any supplementary items can easily be removed at the end of the exhibition.

Conditioned fresh air will continue to be supplied through the Reading Room desks into the void between the Reading Room floor and the temporary mezzanine floor. Some temporary modifications are proposed to the recent air handling plant and ductwork in "The Spider" below.

Some temporary air handling plant will be located on the Reading Room floor. The furniture and the floor will be well protected from accidental damage as a precautionary measure. The temporary plant will supply a mixture of conditioned fresh air, from existing plant, and re-circulated air, from the exhibition space, into the raised access floor void of the mezzanine.

High induction "swirl" diffusers will be integrated into the temporary floor to supply air to the space above.

A supplementary chiller will be provided mounted externally on the roof of the Sector D Energy Centre. This location has already been prepared to receive an additional chiller adjacent existing units.

Insulated flexible hoses will be used to convey chilled water between the chiller and temporary plant. The hoses and any other temporary services such as cables will be routed through former or existing

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openings in the Reading Room floor which will be made good on removal. No new penetrations are proposed.

Electrical Engineering Services

It is proposed that the existing low voltage electrical distribution system that serves the Round Reading Room will be extended to provide power for the exhibition. This will be achieved by installing new sub-main cables from existing fuseboards located in the "Spider" beneath the Reading Room. The new sub-main cables will be routed through existing builderswork holes that rise through the floor of the Reading Room into desks at Level 2 above, and will serve new lighting and power distribution boards from which the exhibition and its associated services will be powered.

It is anticipated that the exhibition fit out contractor will derive lighting and power circuits from these new distribution boards, routing the new wiring beneath the new temporary platform and rising through the platform to serve display cases or high level lighting.

New lighting will be provided beneath the platform to enable safe access to the resultant void for both installation and maintenance purposes. This will take the form of fluorescent batten type luminaries, fixed to the underside of the platform and fed from the new lighting and power distribution boards. The luminaries will be fitted with robust wire gaurds to minimise the risk of lamp breakages in the relatively low space that will be created.

Lighting will also be provided on the stairs and ramps that serve the new exhibition platform, using luminaries selected for their architectural qualities, again mounted off the platform and fed from the new distribution boards.

The existing general lighting in the Reading Room, provided by uplighters at high level, will be retained.

The existing automatic fire detection system in the Reading Room will be retained. It will be enhanced by adding further manual call points adjacent new formed exit points from the space. Additionally, automatic fire detection systems, in the form of aspirating detectors, will be installed below the platform to protect the space formed by it's construction. All new equipment and associated wiring will be fixed from the new platform construction.

New voice alarm speakers will be provided mounted on temporary columns or display cases above the platform as well as below the platform. Again, all new equipment and associated wiring will be fixed from the new platform construction.

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The existing emergency lighting system in the Reading Room will be retained. It will be enhanced by adding further escape signs adjacent new formed exit points from the space and by adding further emergency lighting to the ramps and staircases. Further luminaries will also be provided within the exhibition space, to suit the layout and density of the exhibition itself. This requirement will be met by installing luminaries on temporary columns or display cases in order to meet the requirements of BS5266. Additionally, emergency lighting will be provided below the platform to protect the space formed by it's construction. All new equipment and associated wiring will be fixed from the new platform construction.

New electrical supplies will be provided for 4 No. platform lifts from the distribution fuseboards in the Spider below in much the same manner as described for the general lighting and power distribution systems. The lifts will incorporate local battery backup systems enabling a degree of continued operation in the event of a mains power failure.

All works to the electrical services will be completely reversible and will not cause damage to the historic fabric of the Reading Room, it's surrounds or it's contents.



0699/301/AT

British Museum Round Reading Room - First Emperor Feasibility Study Structural Note on existing floor structure

Introduction

1. This note summarises the structural engineering issues on the feasibility of placing a temporary exhibition floor on the existing Round Reading Room floor structure. This forms part of a feasibility study that Purcell Miller Tritton are preparing for the British Museum. The notes are based on a desk study and observations made during visits to site. No physical opening up works have been carried out to date. These notes should be read in conjunction with drawings 699/301/10 to 14.

The Existing Floor Structure

- 2. The floor dates from 1857, forming part of the design for the Round Reading Room by Sydney Smirke.
- 3. The lower part of the floor structure comprises brick barrel vaulting that spans between load-bearing walls within the 'Spider', which forms the basement space below the Round Reading Room (see drawings 10 and 11). The arrangement of these walls is not entirely repetitive but is principally defined by 18 corridors that are set out radially within the Spider, as shown on drawings 10 and 12. During a recent visit to the Spider, a brick had been removed in two locations within the vaulting and this showed the vaulting to be a half-brick thick (i.e. about 100mm).
- 4. As regards the upper part of the floor structure, the evidence is growing towards the view that most of the floor above the vaulting consists of mass concrete and a screed finish. The main sources of information supporting this view are as follows:
 - A) Purcell Miller Tritton's Conservation Plan dated 2006 mentions a concrete floor. Purcell Miller Tritton have confirmed this reference comes from a previous British Museum Conservation Plan which quotes:

"The floor was raised on brick arches filled out with Portland cement, smoothed over with Bellman's Parian cement."

and

"The floor was constructed of 'camptulicon' – a mixture of rubber, gutta percha and cork on a canvas backing....The floor was relaid with cork carpeting in 1907."

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- B) Where the two bricks in the vaulting had been removed, concrete was seen immediately above.
- C) Recent conversations with Graham Allen, the Clerk of Works at the British Museum. Graham has confirmed the carpets within the Round Reading Room were lifted as part of the Great Court Project in the late 1990s and this exposed a screed floor. This is consistent with the description in the conservation plan.
- 5. The survey drawings suggest the thickness of the floor is only about 180mm at the crown of the vaulting. This seems mean given the robustness of the rest of the structure of the Round Reading Room, which Sydney Smirke designed.
- 6. Where there is a raised podium centrally within the Round Reading Room, and which ramps down to the general floor level at the north end, the floor construction above the vaulting appears to comprise raised stone pavers supported on brick sleeper walls. This is apparent from the Spider.
- 7. It therefore seems there are two types of floor to the Round Reading Room above the vaulting: over most of the floor space there is a mass concrete fill; and where the raised podium and ramp exist, suspended stone pavers are supported off brick sleeper walls over the vaulting. A summary of the likely floor build up where the mass concrete fill appears to exist is shown on drawing 12.
- 8. Given no drawings of the existing floor build up have been uncovered, there remains a very small risk that the floor structure is not as is currently assumed. It is therefore prudent to allow for drilling some very small diameter holes in to the floors from below to confirm the floor build up as part of the next stage of the project.

How the floor has been loaded historically

- 9. To help assess the acceptable floor loads that can be imposed by a temporary exhibition a review of the how the existing floor has been loaded historically has been carried out. This is summarised on drawing 12.
- 10. Considering Smirke's original concept, he designed the Round Reading Room to be used essentially as a library. The earliest known published guidance on imposed loads came in the Encyclopaedia of Architecture in 1881 which suggests public halls where people could congregate should be designed for an imposed load of 128lbs/sq foot (i.e. about 6.1kN/m²). It seems likely that Smirke used a figure close to this.
- 11. The Round Reading Room has been used as a library since it was constructed in 1857, with short periods when it has been out of use for refurbishment. The floor however does not appear to have been used for storing large volumes of books and so the imposed load on the floors has probably not exceeded 3.0kN/m².
- 12. The latest refurbishment of the Round Reading Room occurred during the late 1990s when the internal finishes were redecorated as part of the Great Court Project. These

works involved the erection of an access scaffold, designed by SGB. The drawings and calculations that SGB prepared have been reviewed and these show the scaffold generated point loads below the uprights of up to 16kN (about 1.6tonnes). The uprights were placed on steel beams that spread the load on to the lines of the load bearing walls below to prevent the floor being punctured by these concentrated loads.

Implications for the Proposed Temporary Exhibition

- The current proposal is to create a temporary exhibition space on a raised temporary lightweight floor structure that will sit above the level of the desks of the Round 13. Reading Room. This is to enable the desks to be retained in position during the exhibition. The temporary floor structure will be supported off posts that need to sit on the existing Round Reading Room floor.
- In overall terms, allowing for a dead load of 1.0kN/m² for the temporary structure plus 5.0kN/m² for imposed loading from the exhibits and visitors to the exhibition, the 14. loads will be acceptable on the existing floor structure. The key issue structurally is how the loads from the temporary exhibition floor get transferred in to the existing structure.
- Given the relatively mean thickness of the vaulted structure and mass concrete fill that appears to exist, the floor is not able to support significant point loads. Point loads of 15. up to 3kN appear to be appropriate but no more, as shown on drawing 13. Given the posts supporting the temporary exhibition will probably generate loads in the region of 20 to 30kN, this raises two options of how the loads can be supported.
 - Position the temporary floor props on the lines of the load bearing walls under. Given the arrangement of the load bearing walls is not Option 1: entirely repetitive and they are set out to approximately a radial pattern, this approach is likely to mean the temporary stage structure will need to be especially adapted. Some form of timber spreader would be needed on the existing floor to spreader the loads locally.
 - Introduce more substantial spreaders, such as steel beams, across the floor to enable a more regular grid to the temporary floor props. Option 2:

With both these options there are three separate layers of structure to consider: 16. The temporary lightweight floor structure i.

- The spreaders ii.
- The existing floor structure iii.

As the third level is fixed, only the first and second levels of structure can be influenced by the design. The lightweight floor will form a much more substantial part of the works, both in extent and cost, and so it may be more appropriate to adopt option 2. This is illustrated on drawing 14 and is something that needs exploring further as the design develops.

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BRITISH MUSEUM: ROUND READING ROOM

PROTECTION TO ENTRANCE ROUTE BY CONISTON - METHOD STATEMENT

METHOD STATEMENT

Receiving deliveries of materials into the Round Reading Room:

- All delivery slots will be pre-booked and arranged with the BM.
- Deliveries are only expected to be made in the mornings before the public are given access to the Museum.
- All goods required for the Round Reading Room will be delivered and transported through the front main entrance (see attached dwg).

Access routes to Round Reading Room and Spider:

- Prior to vehicles arriving at the Museum the access route will be fully protected.
- The floor will be covered with a soft textile material then an access route will be established with 18mm plywood.
- All doorways and adjacent building fabric will be protected with bubble wrap and clad with freestanding, pre-formed, timber and plywood hoarding panels.
- Materials will only be transported using soft (pneumatic) wheeled trolleys.
- After each delivery, and before the public are given access into the Museum, all protection materials will be lifted and the area fully swept clean.

DECENVE D 27 FEB 2007



