

ROUND READING ROOM - TEMPORARY EXHIBITION SPACE DESIGN STATEMENT FOR THE LISTED BUILDING APPLICATION



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The British Museum, RRR-Project

Lawrence Webster Forrest Ltd (LWF) was commissioned by the British Museum to advise on a fire escape strategy for a proposed temporary exhibition in the Round Reading Room (RRR) of the British Museum. The main aspect requiring investigation has been the means of safely evacuating pedestrians and wheelchair users in event of a fire.

It is the intention that for the time of the exhibition the existing furniture in the RRR will be housed underneath a platform. The platform will be used as exhibition area. Access to the platform will be provided via steps at the cardinal points of the RRR, as well as hoists for access for people with disabilities at the north and south stairs.

To evaluate the evacuation process in case of a fire a timeline comparison of the Available Safe Egress Time and the Required Safe Egress Time (ASET vs. RSET) has been undertaken.

ASET

The "Engineering Tool for Estimating Fire Growth and Smoke Transport – CFAST" has been used to calculate the ASET by assuming a 4.5 MW fire on ground level at the edge of the RRR (next to the platform) as worst case scenario. The results of the CFAST-modelling show that a clear air layer of at least 2.5 m height above platform level, that is necessary for a safe evacuation, can be kept for approximately 12 min after ignition of the fire.

RSET (pedestrians)

Utilising the simplistic occupancy methodology provided in the HSMO "Guide to Fire Precautions in Existing Places of Entertainment and Like Premises" and by discounting one exit that a fire might prevent the occupants from using, the remaining exits from the RRR are capable of evacuating 320 pers./min in total. Referring to the proposed maximum number of visitors (approximately 500 persons) the evacuation of pedestrians from the RRR will take about 100 seconds (1 min 40 s).

The pre-movement-time between the ignition of the fire and the start of evacuation has been assumed as another 60 seconds (details below).

Hence, the RSET amounts to approximately 3 minutes and the proposed number of pedestrians can be evacuated through the available exits within the ASET of 12 minutes.

RSET (wheelchair users)

The number of visitors being in the exhibition space at the same time is to be controlled by timed tickets. Therefore the number of wheelchair users in the exhibition can be limited to a specific number by controlled ticketing as well.

Access and egress for wheelchair users to the platform is provided via hoists, two at the north and two at the south entrance with a capacity of one wheelchair at the same time each. Considering that a fire might prevent the use of one of these entrances / exits, two hoists have been discounted from



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FIRE PROTECTION, ADVICE BY LAWRENCE WEBSTER FORREST (LWF)



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the escape calculations for wheelchair users. Therefore full reliance is made on the two remaining hoists for evacuation.

Considering the operating speed of the hoist as well as the time required for loading and unloading the hoists, a maximum number of 6 persons can be evacuated within the time available for safe egress. The calculations are based on the information provided on the meeting on 21st of June 2006. Assuming an availability of at least two hoists in case of a fire a maximum number of 12 wheelchair users in total are allowable to be on the platform at the same time.

To justify the assumed short pre-movement time in the exhibition area, a high level of fire safety management is to be provided. The high level of fire safety management system must include:

- High specification and automatic fire detection.
- Voice alarm system.
- Good fire prevention and maintenance practice.
- Provision of gallery staff with a high staff / visitors ratio (min of 4 members of staff at all times).
- Well-developed emergency plan based on fire risk assessment.
- Fire safety training for members of staff.

To ensure the operation of the hoists in case of a fire a secondary power supply is to be provided to ensure that they operate even if one of the power sources breaks down or is affected by a fire.

The persons from the RRR evacuate into the Great Court. As the Great Court is used as exhibition space / waiting area / catering area a significant number of persons are assumed to be present within the Great Court, too. For this reason the evacuation process of the Great Court to final exits and into adjacent compartments, that are deemed to be places of safety in case of a fire in the RRR or Great Court, has been considered and evaluated within the evacuation strategy for the RRR as well.

Summary

Through fire engineering analysis, it has been demonstrated that the proposed number of visitors (pedestrians and wheelchair users) can be safely evacuated through the exits of the RRR.

The existing capacities of the escape routes of the museum in combination with the additional provisions for evacuation of people in wheelchairs in the RRR are deemed to be sufficient to ensure a safe evacuation of these areas during the temporary exhibition.

The fire engineering design is based on first principles and utilises accepted design practice and tools for assessment. It is considered that between that the fire engineering approach that has been proposed is adequate to the prevailing risk.



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Report from Lawrence Webster Forrest giving advice on emergency evacuations