

VIBRATION PREDICTION AND CONTROL

sponsored by CMS Danskin

WSP

Paddington Square, London

WINNER

The project used innovative and complex numerical modelling to assess potential changes in vibration levels due to the redevelopment of Royal Mail Group buildings next to Paddington Station. The project is the demolition of buildings, and the construction of a 17-storey commercial building resting on a podium which is to be connected, via tunnels, to the Underground station.

The complex nature of the underground rail network, which includes numerous curved tunnels and trains travelling at different speeds, meant that the project presented unprecedented challenges. Cutting-edge vibration modelling techniques were used to investigate how changes to the ground conditions would affect vibration propagation, and advanced the understanding and application of those modelling techniques in the process, in order to apply them to the specific constraints and challenges posed by the project. The approach has been accepted by

Westminster City Council (WCC) and can be applied to future projects to identify issues and inform mitigation measures prior to construction, allowing developers and design teams to be proactive with respect to potential vibration impacts.

The judges recognised the work required to create two numerical 3D models of existing and future conditions, including co-operation with the software developers to enable it to be used for curved tunnels taking into account the change in travelling speed associated with trains departing or arriving at a station. Collaboration with other members of the project team, contributed to success in discharging the planning condition in relation to vibration. It was good to see a solution that avoided the need for vibration mitigation. The judges consider that it goes beyond existing good practice and could be applied internationally for future projects.

HIGHLY COMMENDED

Hoare Lea

Great Sankey Neighbourhood Hub, Warrington

The project is a dementia-friendly community hub which provides a range of cultural, health and wellbeing services. To facilitate the arrangement of a ground floor library and first floor public gymnasium, it was essential to ensure that the structure had sufficient provision to mitigate noise and vibration generated by the activities within the gym. The scale of mitigation required was a challenge

in balancing acoustic performance and structural dynamics solely using prediction methodologies. A unique method for the prediction of structure-borne noise and vibration from heavy-impact generating gym equipment was developed. A detailed prediction model allowed a virtual acoustic prototype of mitigation floating floors to be developed which can be extended to other fields of application for impact control.

The judges noted that this pioneering approach and constant stake-holder, contractor and architectural engagement

ensured that the final design was not only fit for purpose but optimised within the constraints of the scheme. The judges also noted that the predicted values were validated by testing, allowing some last-minute changes to the floor finishes from the gym to further improve performance, making this project a technical success. This has great potential for future use and provides a new way to produce predictions of noise and vibration levels within structures that are also subject to complex force inputs.

COMMENDED

Bickerdike Allen Partners

Royal Opera House Open Up, London

The Royal Opera House (ROH) Open Up development project required an innovative system using structure-borne vibration measurements to monitor noise that could affect its operations. The project has seen a significant amount of structural interventions carried out within

the existing building. The auditorium within ROH remained open for regular scheduled performances during the entire demolition and construction process. The associated noise had to be sufficiently controlled to allow continuing use of the auditorium and also a large number of rehearsal performance spaces where quiet conditions are paramount and essential to daily activities.

The judges recognised that this project explored new ways of monitoring noise in sensitive spaces where traditional measurement methodologies could not be used. There was good collaboration with the design team, construction team and the client which met the challenge of allowing performances to keep going. It was a highly complex project delivered to the satisfaction of the client.

