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RESEARCH DIRECTIONS

Protecting Building Foundations

Dr Samanthika Liyanapathirana and Associate Professor Chin Leo, of the School of Engineering have been awarded an Australian Research Council Discovery grant to investigate protective measures used to mitigate damage of existing buildings during major urban construction activities.

‘The demand for construction of high-rise residential and industrial buildings in dense urban areas has increased significantly in many cities around the world and we have witnessed the collapse of buildings as a result of ground movements caused by new construction activities’, says Dr Liyanapathirana. ‘Geotechnical engineers undertaking construction activities in urban areas need more effective strategies to protect nearby structures. A particular challenge is faced in many cities as they are located in coastal regions with soft soils. Construction activities in these regions inevitably create significant ground movements which can lead to severe damage to foundations of adjacent existing buildings.’

The current practice is to use intercepting walls or protective trenches to mitigate the side effects of any new construction activity. The most common types of walls are either steel sheet pile, which can cause ground movement and/or allow moisture seepage; or reinforced concrete walls, the cost of which is often prohibitive. This project will investigate protective measures that could be added to the engineer’s repertoire.

The research team will use a more economical composite deep cement mixed columns to reduce ground movements and use expanded polystyrene (EPS) geofoam, which is compressible, to reduce the pressure on walls. EPS geofoam will also be used as a fill material in trenches to lessen the vibrations generated by construction activities.

The team will compute the influence of construction side effects on existing foundations and the degree of protection provided by these new measures.

This research will provide economical and efficient engineering strategies for use by geotechnical engineers to protect buildings and prevent injuries during urban construction. As a result, delays and litigation associated with construction will be minimised. New guidelines and improved practices will increase the international competitiveness and export potential of the Australian construction industry.

Project Title: Application of EPS geofoam and deep cement mixed columns for protection of existing foundations during urban construction
Funding has been set at: $183,000 over 3 years
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