Environmental Research, Technology Demonstration and Conference Project

ECF Project:	ECF 2021-134
Project Title:	Towards sustainable and negative carbon footprint deep cement mixing for reclamation in Hong Kong
Principal Investigator:	Dr Clarence Edward Choi, Department of Civil Engineering, The University of Hong Kong
Total Approved Grant:	$500,000
Duration:	1/1/2023 to 31/12/2024
Project Status/Remarks:	On-going
Project Scope:	Reclamation appears to be a viable option to address the land shortage issue in Hong Kong. Recently, deep cement mixing (DCM) was successfully used to reclaim the Third Runway for the Hong Kong International Airport. Despite the success, overseas experience (e.g., Japan, Korea) based on fundamentally different soils and loading conditions were used in Hong Kong without any rational basis. This led to the installation of excess DCM columns, which requires large volumes of cement and generates excess spoil. More importantly, cement production is one of the most significant sources of carbon emissions in the world. Evidently, there is room to optimise the existing deep-mixing practice to ensure sustainable and carbon-friendly reclamation. In this project, a new experimental deep-mixing device will be developed to mix local problematic soil (i.e., Marine Deposits) with lime, which is a carbon negative binder. The treated soil from the experiments will be used to conduct routine geotechnical tests to obtain design strength and stiffness parameters. Geotechnical parameters will serve as input for 3D finite element method analysis to optimise the area ratio of deep mixed columns to problematic soil. Design guidance and quality control targets for future reclamations (e.g., Lantau Tomorrow Vision) will be provided.
Summary of the Findings/Outcomes:	To be available upon completion of the project