

The University of Queensland - IIT Delhi Academy of Research Joint PhD Project

PROJECT TITLE	DEVELOPING A NEW FOUNDATION SYSTEM FOR LIGHTLY-LOADED BUILDINGS IN EXPANSIVE SOILS
PROJECT CODE	UQIDAR 00199
PROJECT DESCRIPTION	<p>Civil engineering infrastructure facilities experience large-scale damage due to the movement of foundations resting on problematic soils. Documented evidence shows that the existing problems associated with expansive clay is world-wide, having occurred in countries such as, Africa, Australia, India and Unites States as well as regions of Canada. Stalin and Ayothiraman [2000] discussed in detail the various causes of distress/failures in geotechnical structures. Lightly loaded buildings in expansive soils undergo severe distress due swelling and shrinkage caused by seasonal changes. Usually the underreamed piles are used for supporting these buildings in expansive soils (other than ground improvement technique). In Queensland, domestic buildings are frequently built in areas with predominantly expansive soils. Although guidelines are in place on how to deal with these unfavorable ground conditions in many cases damages cannot be avoided. This method, however, is connected to partly replacement of the ground and is therefore costly. Alternatively, underreamed piles can be a cost-effective solution. However, it has been found that the construction of underreamed bulb below the ground water table is difficult and hence the formation of bulb. In view of this, an alternate deep foundation system and its construction sequence/procedures has been conceptually developed. This new foundation system will be designed and required to be tested in the lab and as well as in the field for examining its performance and efficacy of preventing the distress of the structures in expansive soils. The performance of the newly developed foundation system will be compared with the conventional underreamed pile foundation. Characterization of materials, design/development of foundation system and 1-g model experiments will be carried out IIT Delhi. The proposed technique based on new foundation system and underreamed piles can be investigated at the SEDS-UP (Sustainable Engineering Design Scale "UP) Facility in Pinjarra Hills at UQ. The Geotechnical Engineering Centre (GEC) at the School of Civil Engineering operates electromagnetic measurement methods that can be used to monitor changes in both, density and moisture content.</p>
PROJECT OUTCOMES	<p>(1) New foundation system for supporting buildings in expansive soils will be developed (2) Patent will be filed (3) Journals will be published</p>
ADVISORY TEAM	<p>Professor Alexander Scheuermann Civil Engineering, UQ https://researchers.uq.edu.au/researcher/2283</p> <p>Professor Ramanathan Ayothiraman Civil Engineering, IITD http://web.iitd.ernet.in/~araman/</p>
TYPE OF STUDENT	Applications are open to i-students who meet eligibility criteria.
DISCIPLINE BACKGROUND OF STUDENT	Ideally, this project requires students with a background in: B.E./B.Tech./B.Sc. (Civil Engineering); M.E./M.Tech./M.Sc.(Geotechnical Engineering)

IDEAL
CANDIDATE

Essential capabilities: Capable of conducting experimental research

Desirable capabilities: In addition to experimental work, the candidate may have ability to carry out numerical analysis through geotechnical engg. software (PLAXIS/FLAC/ABAQUS)

Expected qualifications (courses, degrees, etc): B.E./B.Tech./B.Sc. (Civil Engineering); M.E./M.Tech./M.Sc.(Geotechnical Engineering)

APPLICATION
PROCESS

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