Seismic Protection in Geotechnical Engineering

By

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Abstract
Ideally, an earthquake resistant design should ensure that earthquakes, regardless of their size and location, cause negligible or no damage. To achieve this, base isolation and other structural control systems are being developed to reduce seismic structural response, thus minimizing damage. In seismic isolation, the aim is to reduce the earthquake energy transmitted to a structure by placing the structural columns on mechanical isolators. However, conventional seismic base isolation can be quite expensive to implement and maintain, and therefore, to date, only important structures have been furnished with these systems.

The speaker will present summaries of three research projects that have the aim of developing innovative techniques for providing seismic protection to structures through ground and foundation modifications. The first technique is referred to as **Foundation Isolation**, in which a smooth geosynthetic composite liner is placed underneath building foundations to absorb earthquake energy through sliding along the geosynthetic interfaces. The second is referred to as **Soil Isolation**, in which a geosynthetic liner is placed within a soil profile at some depth below the foundation of a structure. The third technique aims at preventing building damages due to liquefaction by inducing partial degree of saturation (IPS) within a potentially liquefiable soil deposit. Shaker table test results and videos will be presented to demonstrate the technical feasibility of the seismic protection techniques developed.

Bio
Dr. Yegian, College of Engineering Distinguished Professor in the Department of Civil and Environmental Engineering joined Northeastern University in 1976 after completing his doctoral work at the Massachusetts Institute of Technology. He served as department chair from 1984 until 2001. He is widely published and noted for his work in Geotechnical Earthquake Engineering, geosynthetics, seismic vulnerability of bridges, and lessons learned from destructive earthquakes. His research has been supported by grants from the National Science Foundation and industry sponsors. Nationally, he has served in leadership positions on many technical committees, and has organized various conferences. He has served as a seismic consultant on many large projects including buildings, power plants, LNG tanks, dams, landfills, and new and historic bridges, including the Brooklyn Bridge. He is a Registered Professional Engineer in the Commonwealth of Massachusetts. Dr. Yegian received the Robert D. Klein Distinguished Scholar Award at Northeastern University in 1992, received the University's Teaching Excellence Award in 1995, and is a Fellow of the American Society of Civil Engineers.