UNCONTROLLED FILLS AND RAMMED AGGREGATE PIER® (RAP) ELEMENTS

Uncontrolled fill materials encountered during a geotechnical engineering exploration or during construction present unique challenges unlike issues associated with naturally-occurring soil deposits. Soft clay, peat, loose sand, and hard highly plastic clay can all be characterized reasonably well by proper exploration and testing techniques, knowledge of geologic conditions, and local experience. However, by definition, uncontrolled fills can range from compacted engineered fills where no construction records exist, to a heterogeneous mix of soil types, organics, cobbles, boulders, construction debris, building rubble, trash, industrial waste, and contaminants. In some limited cases, properly engineered fills can be sampled and tested and their shear strength and compressibility determined for design purposes. However, no practical amount of exploration and testing can be attempted to try to characterize the shear strength and compressibility for the wide range of deleterious materials found in most uncontrolled fills. No stress history can be determined. No amount of experience can be applied. As a result, in order to mitigate the risk of a bearing failure or excess settlement, geotechnical engineers have typically recommended that these unacceptable fills be excavated completely and replaced with engineered materials.

RAP elements provide a solution to the unknown natural and potential hazards associated with design and construction over uncontrolled fills and the use of the system eliminates the issues associated with mass excavation and disposal of unacceptable and potential hazardous soil and materials (often times at or below the ground water level). Knowing the engineering characteristics of the RAP system to be used and designing the system to completely penetrate all of the uncontrolled fills encountered during the exploration provides the designers with confidence that the fill materials acting as a matrix for the RAP elements can allow the RAP elements to safely support footings, mats, or slabs and control settlements. This approach of designing the RAP system to completely penetrate the unacceptable fills is similar to overexcavation and replacement in that the concerns about foundation performance are practically eliminated when all of the materials are either improved in placed or removed. However, the RAP system presents the advantages of time savings, cost savings, limiting costs associated with attempting to mass excavate at or below the ground water level, and limiting costs of off-site material disposal. The regional RAP design/build firm GeoStructures (540-751-5000) should be contacted for additional information.