

PROJECT DESCRIPTION

PROJECT: Bridge Testing Program -- Research Project for Utah DOT

LOCATION: Salt Lake City, Utah

RESEARCH TEAM: *University of Utah:* Structural Engineering Department
University of Utah: Geotechnical Engineering Department
GEOPIER Contractor: Geopier Foundation Company - Northwest

OWNER: Utah Department of Transportation (UDOT)



DESCRIPTION:

Under research grants funded through the NSF, FHWA, UDOT, and the University of Utah, two bridge bents were tested to practical failure under cyclic lateral loading conditions simulating an earthquake. Ramped Aggregate Pier® (RAP) were used to provide compression, uplift and moment resistance for the reaction frame footings.

In conjunction with the lateral load tests on the bridge bents, major research was undertaken for the design of the RAP elements supporting the reaction frame. RAP's of 3', 6', 9' 12' and 15' lengths were load tested to failure in both compression and tension. Geotechnical instruments were installed within the RAP's at various depth increments as well within the matrix soils adjacent to the piers to monitor vertical and horizontal stresses during the testing. Similar instrumentation was installed in the Rap's that were ultimately constructed for the reaction frame. Also, piezometers were installed in the matrix soils between piers to monitor pore water pressures during the cyclic testing of the bridge bents.

Prior to the RAP installation, each test site and both reaction frame sites were explored and evaluated by means of drilled borings, Borehole Shear tests, Stepped Blade tests, and Cone Penetrometer Tests. Stepped Blade tests were also conducted following Geopier construction to evaluate horizontal stress buildup.

The Geopier® System research revealed that, for soft silt and clay sediments such as occur in the Salt Lake area, ultimate uplift loads of at least 175 kips and compression loads of at least 150 kips can be achieved with 15' long 36" diameter Geopiers. Additional conclusions relative to actual stress that develop within RAP's and within the adjacent matrix soils are being developed as the voluminous geotechnical instrumentation data is reduced.

For updated information on this research project, refer to the Web page at "geopier.com".

REFERENCE: Dr. Evert Lawton, Ph.D.,P.E.
University of Utah
Geotechnical Department
(801) 585-3947

Dr. Steven Bartlett, Ph.D.,P.E.
Research Project Manager
Utah State DOT
(801) 965-4115