

Retrofit Micropiles and SJ350 SmartJacks®

Project: Private Residence
Location: Montrose, CO
Date: August 2015

Challenge:

Excessive vertical movement of the 3,240 square-foot home caused doors and windows to stick and drywall to crack. A geotechnical investigation identified the house had been constructed over residual clays and shale bedrock. The expansive shale formation extended from basement elevation to 30 feet below the basement level footings. The homeowner wished to stabilize the home and lift the structure to create a void of at least four inches between the bottom of the existing footings and the original bearing soils.

Solution:

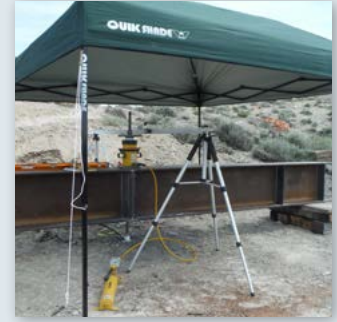
The home would be supported by thirty-two (32) retrofit, grouted micropiles extending to depths below the expansive shale formation. The micropiles were designed to support a working load of 25 kips with a safety factor of 2.5. The micropiles would utilize Foundation Supportworks® Model 288 push pier brackets, external sleeves, and a prescribed, ten-foot length of pier tube around the upper grout column. Two tension load tests were performed in general accordance with the procedures defined in ASTM D3689 to verify capacities with acceptable deflections.

Concrete slabs and patios were removed and an excavation made along the entire perimeter of the foundation. Four-inch-diameter holes were drilled at each of the pier locations to specified depths from 30 to 36 feet below the footings with a rock drill mounted to a mini excavator. Retrofit brackets, external sleeves, and ten feet of pier tube were set at each pier location, and the drilled holes were filled by tremie grouting upwards from the bottom. Solid-bar reinforcement with centralizers was dropped through the bracket and pier tubes to the bottom of the hole. Once the grout had cured the minimum specified time of seven days, hydraulic cylinders were fitted to each of the brackets to uniformly lift the structure. The structure was lifted to within acceptable limits.

Ten (10) SJ350 SmartJacks® (supplemental crawl space support systems) were installed beneath portions of the home to assist during the lifting operations and to provide permanent interior support. Insulation board was installed vertically along the perimeter foundation to prevent backfill materials from filling the newly created voids.

Project Summary

- Structural Engineer:** Lindauer-Dunn, Inc.
- Geotechnical Engineer:** Geotechnical Engineering Group
- Installer:** Foundation Repair of Western Colorado
- Products Installed:** (32) Retrofit Micropiles with Foundation Supportworks® PP288 Bracket Assemblies and Pier Tube, Installed Depths Up to 36 feet, Design Working Compression Load of 25 kips; (10) SJ350 SmartJacks®



Tension test



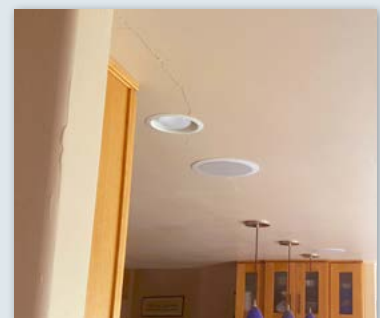
Drilling at micropile location



Grout-filled hole and pier tube



Drywall crack in ceiling (before)



Drywall crack in ceiling (after)