

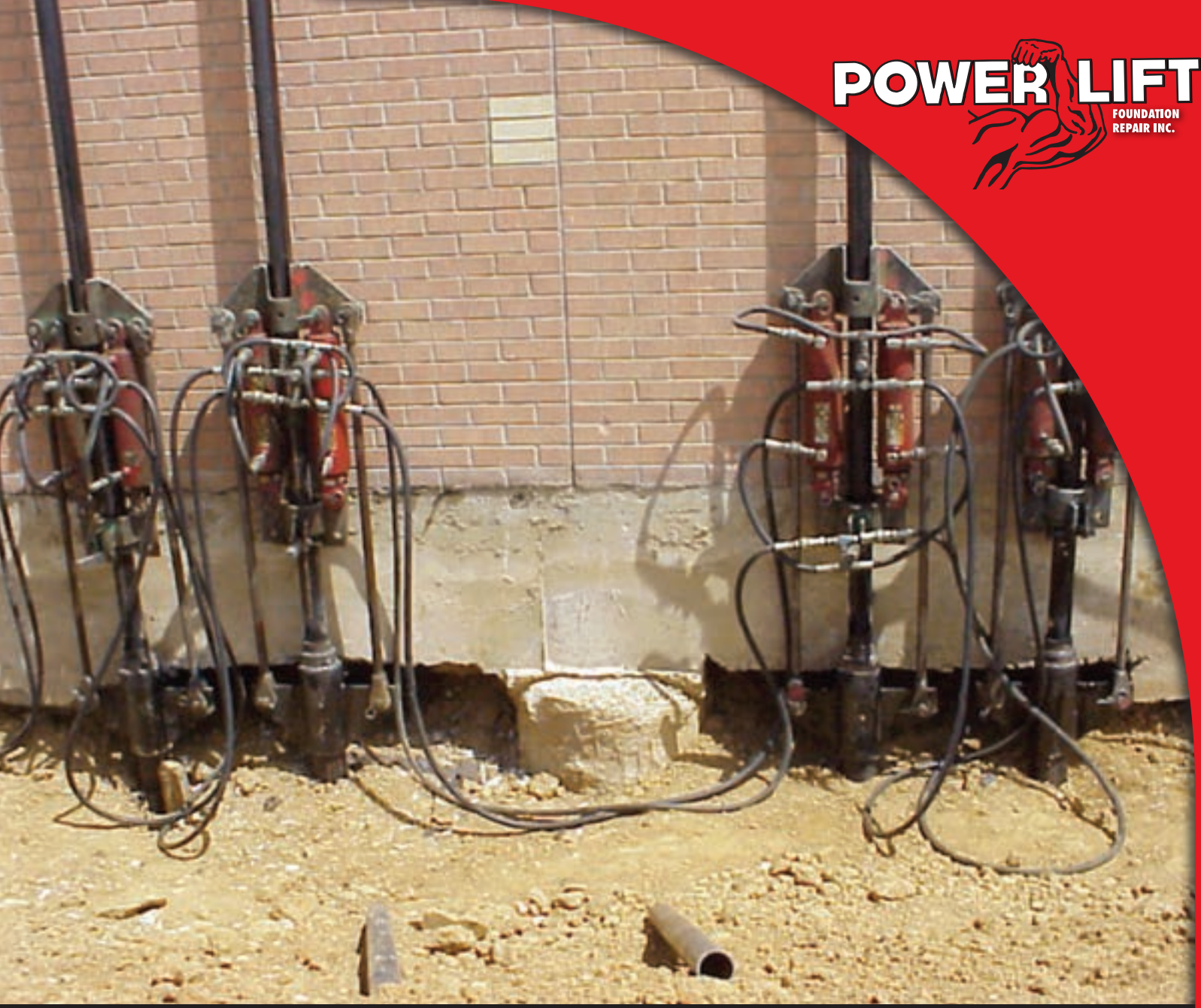
EOR: Thornton-Tomasettie | Pat Coleman (972) 387-8393
General Contractor: Harrison, Walker & Harper, LP | Jim Hunt (903) 785-1653
Specialty Engineer: Cutler-Gallaway Services, Inc. | Earl Cutler (210) 496-3326
Completion Date: September, 2002 | Contract Amount: \$679,322.00
Maximum Column Load: 302 kips

PROJECT SUMMARY Ennis Intermediate School

Project Description: Before construction was completed, substantial movement of the building had occurred. Litigation began prior to contract closeout. The structure had experienced movement in excess of 12" at the time work was undertaken, when the building was just 4 years old. The movement was wide spread and was affecting most all areas of the 45,000 sf middle school.

Subsurface Conditions: Extensive investigation determined the structure was suffering from substantial heave. The site consisted of highly expansive clay soils to depths of 40' - 45'. The original structural design called for over excavation to a depth of 7' and replacement of removed soil with select fill. Next, drilled shafts with bells were installed at a





PROJECT SUMMARY — Ennis Intermediate School *(CONTINUED)*



depth of 15' below grade. The shafts were designed to support suspended grade beams cast on carton void forms. Testing determined that deep seated heave was occurring which was actually lifting the drilled shafts, in turn lifting the perimeter grade beams. The heave resulted due to no provisions being made to drain the select fill.

Power Lift entered a design/build contract with the construction manager, Harrison, Walker & Harper, LP, to develop a solution for the ongoing perimeter heave. Due to the magnitude of the problem, it was decided a complete re-support of the perimeter foundation would be necessary. The re-support focused on the installation of driven steel piles and abandonment of the existing drilled shafts.



PROJECT SUMMARY — Ennis Intermediate School (*CONTINUED*)

Design Details: Small diameter driven steel piles were selected as the underpinning elements due to the strong likelihood for additional soil swelling. The slender steel shafts would provide the end bearing needed to carry the heavy loads if they were founded in the shale formation + 45' below grade. But, due to the small surface area, soil adhesion would not likely produce uplift of the steel piles if sufficient load was placed on the piles. Power Lift provided specialty engineering for the project through an association with Cutler-Gallaway Services, Inc., San Antonio, TX.

Earl Cutler, P.E., analyzed the structural loads and the building's design and formulated an underpinning system utilizing Power Lift's proprietary hydraulically driven steel piles. Nearly 400 piles were installed to re-support the entire perimeter foundation of the building. Column loads varied from 24 kips to 302 kips in the gymnasium area. After pile installation, the original drilled shafts were severed and the foundation adjusted as required utilizing Power Lift's synchronized jacking equipment.