CHANCE®

UNDERPINNING ANCHORING REPORT

A CASE HISTORY

Project:
VGO Pump Station in Tye, Texas
Pride Refining, Inc.
Abilene, Texas

Engineer:
William Fowler, P.E.
Tippett & Gee
Abilene, Texas

Underpinning Contractor:
Hargrave & Hargrave, Inc.
Wylie, Texas

Job Description:

A steel fuel-storage tank (120-ft.-dia., 50 ft. high) on a reinforced-concrete ring-beam foundation had differential settlement of 1½" to 2½". This movement caused deflection in the tank side walls and deterioration of an interior seal which leaked volatile fumes.

Pride Refining wanted to stabilize the concrete ring by following Tippett & Gee's recommendations to use Chance HELICAL PIER® Foundation Systems anchors. The ring beam measures 4 ft. high, 1½ ft. wide and is 3 ft. below grade.

Live loads are applied cyclically on a daily basis.

Dead Load	1,000 psf
Live Load	1,300 psf
Total Load	**2,300 psf**

Average differential settlement was recorded at 2.1 inches.

Testing:
Geotechnical information was provided by Trinity Engineering Testing Corp., Dallas, Texas.

Soil Borings

Depth	Soil Description
1 ft.	Reddish Brown/Brown Fat Clay
2 ½ ft.	Reddish/Brown Fat Clay
5 ft.	Reddish-Brown Shaly Fat Clay

The plasticity of the Shaly Fat Clay is LL @ 57, PL @ 24 and PI @ 33 with (-) 200 sieve values @ 74%. The in situ moisture content varies from 17 to 25% with an average of 20%. The unconfined compressive strength of one test is 2.26 tsf.

A high water table of 1.0 ft. produced 0.1 gallon/minute which would fill a 5-in. hole 20-ft. deep to within 1 ft. of the surface in three hours, or approximately 1 ft. of water per nine minutes.

Blow Counts

Depth	N-Values
5 ft.	17
10 ft.	44
15 ft.	74
20 ft.	68

Anchors

To test on site, an anchor was installed to a torque of 4,000 ft.-lb. using an Eskridge 10,000 ft.-lb. installer head monitored by a shear-pin torque indicator with 500 ft.-lb. pins. Eight pins were sheared at 11½ ft. depth and nine pins were used to reach the 12-ft. test depth. A compression-test beam was erected over the test anchor using four reaction anchors. A calibrated 60-ton hollow-ram jack was used to apply load to the test anchor. The total deflection recorded was ½ inch.

Procedures:

Chance foundation anchors were specified for their ability to install quickly and produce the needed capacity in the high water table. Live-load capacity was used in the anchor calculations. Chance SS150 (1½"-square shaft), twin-helix (8"- and 10"-diameters) anchors were chosen for their high-torsional ratings. Chance Standard-Duty Bracket C150-0121 was specified for this stabilization project. Anode protection was added by attaching the 1/0 copper strand pigtail to the brackets by the Cadweld system.

The ring beam was excavated and surfaced on the side and bottom to fit the bracket. Each anchor was installed to a minimum torque of 4,000 ft.-lb. Many of the 47 anchors had to be installed to 6,000 ft.-lb. to reach the job depth specified by the engineer. An 18,000-lb. load was applied to seat each bracket.

Metal wedge shims between the concrete ring beam and the metal tank walls were used to bring the tank back to level. Including backfill and clean-up, work began at 7:30 a.m. and was completed at 3:00 p.m. the next day.