Heave Distress of a Manufacturing Building

D.D. Overton¹, K.C. Chao², & J.D. Nelson³


ABSTRACT

A manufacturing facility located in the Front Range area of Colorado was constructed in 1991 and 1992. It was founded on 18 to 42-in. (46 to 107-cm) diameter piers with depths of 23 ft (7.0 m). The bottoms of the piers are approximately 44 ft (13.4 m) below exterior final grade. Movement of the piers and structural floors was initially observed during construction and prior to the occupancy of the building in January 1993. Individual piers had heaved as much as 11 in. (28 cm) within the first six years of being constructed. A geotechnical investigation was performed to predict the maximum pier movement. Analyses based on pier heave prediction methods predicted a maximum final pier heave of about 14 in. (36 cm). This agreed well with values obtained by extrapolation of measured data. The results of the investigation were used by the building owner to assist in making informed decisions regarding the maintenance, usability, and longevity of the building.

¹ Principal Geotechnical Engineer, Tetra Tech, Inc., 3801 Automation Way, Suite 100, Fort Collins, Colorado, USA 80525
² Senior Geotechnical Engineer, Tetra Tech, Inc., 3801 Automation Way, Suite 100, Fort Collins, Colorado, USA 80525
³ Professor Emeritus, Colorado State University and Principal Geotechnical Engineer, Tetra Tech, Inc., 3801 Automation Way, Suite 100, Fort Collins, Colorado, USA 80525