



UNITED STATES

WPXI Channel 11 Pittsburgh, PA



Owner
WPXI

Engineer
Geo-Mechanics, Inc

General contractor
Mascaro Construction Company, LP

Dates of work
2006/05 2006/06

Main figures

Dynamic compaction
40000 ft²

Description

This project was developed on a construction spoil fill site located along I-279 in the northern part of Pittsburgh, Pennsylvania. Ground improvement was needed to support a two story building and satellite dish farm totalling an area of about 40,000 square feet. Maximum column loads ranged from 40 to 200 kips. The building was constructed using a slab-on-grade and spread footings approach. The fill at the site originated from the construction of I-279, where excavated rock and soil were dumped in a valley located at the now current WPXI building location.

The initial design called for the building to be placed on drilled shaft foundations. Removal and replacement of the fill was not practical due to the depth that the fill extended. A ground improvement approach of dynamic compaction (DC) was ultimately suggested by the owner's engineer and was determined to be most economical.

Ground conditions

The proposed building site was underlain by up to 35 feet of loose soil and rock fill. The fill material was heterogeneous both in composition and in-situ density. It varied in composition from fine-grained silty clay with some rock fragments and construction debris to predominantly coarse-grained rock fragments in a matrix of silty sand and clay. Based on the standard penetration test resistance values (SPT-N values), the fill was medium dense to dense. However, it was recognized that some of the higher blow counts may have been attributed to the presence of larger boulders and may erroneously have suggested higher densities. Accordingly, the fill had the potential for experiencing large differential settlements with time. The fill layer was deemed not suitable to support a slab-on-grade and spread footings structure.

Solution

The DC approach at the WPXI site required 3,468 prints distributed across the building footprint. The compaction was achieved by using a 15-ton weight dropped from a height of 70 feet to densify the underlying fill and soils through the generation of high-energy waves. The construction took less than three weeks, saving significant time as well.

To construct a new television studio on a reclaimed construction spoil dump site, the underlying fill need to be improved to prevent future settlement. Menard proposed an economical solution to use dynamic compaction to densify the fill.