IMPACT LOADS ON HELICAL PILES

Helical piles and helical anchors have been used successfully to resist impact loads for a variety of applications. Some examples include explosion proof enclosures for chemical refinery control structures, sports stadiums, NASA launch facilities, and highway vehicle impact barriers.

A photograph showing one of over 300 helical piles being installed for support of a launch pad at Kennedy Space Center is shown in Fig. 1. These helical piles are subject to high impact loads from rocket exhaust during launch activities. Helical piles have been providing support for the launch facility for nearly a decade.

Fig. 1 Installation of Helical Piles at NASA Launch Pad 39B

An example plan from Jacobs Engineering is shown in Fig. 2. The plan utilizes vertical and battered helical piles for support of new blast proof enclosure for a chemical refinery control structure. The fact that helical piles can be easily installed at a batter angle makes them well suited for resistance of lateral impact loads. Battered piles typically can resist much higher lateral loads more economically as compared to vertical piles.

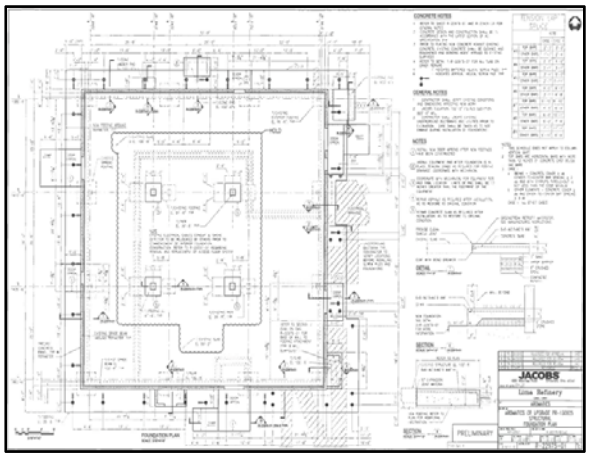

Fig. 2 Example Chemical Refinery Control Structure on Helical Piles

Generally, design of helical piles and helical anchors for impact load resistance is done using pseudo-static techniques. No special provisions are required for helical piles and helical anchors subject to impact loads beyond those provisions used for other types of deep foundations.

As evidence for their impact resistance, helical piles have been tested using PDA analysis which involves impacting the top of pile and recording the dynamic response spectrum similar to driven piles. GRL Engineers, Inc. and others have published on the PDA testing of helical piles (B. White, 2013) (Cannon, 2000). PDA/CAPWAP systems of analysis have been used successfully to measure the static axial capacity of helical piles.

Helical piles and helical anchors also have been used under cyclic impact loads of machinery, equipment, wind, and earthquakes. In order to resist creep under long-term application of cyclic loads, allowable soil stresses for helical pile and helical anchor design should be maintained below 25% of ultimate soil strength (Perko, 2009).

Magnum Piering, Inc.
6082 Schumacher Park Drive
West Chester, OH
http://www.magnumpiering.com

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Works Cited

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