

CFA Piles
Oxy Elk Hills
Bakersfield, CA



MALCOLM
Deep Foundations

CONSTRUCTION PERIOD

February 2011 to July 2011

CLIENT

Owner: Occidental of Elk Hills, Inc.
General Contractor: CB&I Inc.

SERVICES

CFA Piles

225 EA – 18 IN Diameter

822 EA – 24 IN Diameter

464 Pile Integrity Tests (PIT)

Benefits of CFA Piles

- Allows for schedule compression through increased productivity compared to traditional drilled shafts.
- Allows pile construction in unstable soils with high ground water level.
- Continuous flight auger does not require casing or drilling slurry to stabilize the bore hole.

Project Overview

The Elk Hills Field, located in Kern County 25 miles east of Bakersfield and 100 miles north of Los Angeles, is one of the United States largest natural gas and oil producing fields. The project called for a new Cryogenic Gas Plant and Fractionation Facility to be built on a former pipe storage yard, near existing gas and oil processing facilities. The new foundations will support a variety of structures including pipe racks, vertical vessels, compressor shelters, air coolers, fuel storage tanks and operation control facilities scattered across the 400 ft by 1,500 ft rectangular site. CFA piles (also called Auger Cast piles) of 18 and 24 inches in diameter were chosen for the site due to the sandy subsurface conditions.

CONTACT MALCOLM

This job was managed by our Northern California Division in Hayward, California.

For a complete list of office locations and technologies, visit Malcolmdrilling.com



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Construction Details

CFA piles are constructed by drilling a continuous flight auger into the ground to desired depth. Grout is then pumped through the auger stem into the hole as the auger is extracted. Reinforcing steel is wet set into the hole before the initial set of the grout. A Bauer RTG 23S equipped with a 65 FT auger was used to install all piles. Drill depths ranged from 20 to 60 FT with an average of 35 FT. Every pile received a rebar cage in lengths of 20 to 25 FT, and in certain areas a full length center bar was added to increase tension capacity of the pile. The project was divided into two phases. The first phase with 430 piles had wide open access with no obstructions and high production rates. For Phase 2 (617 piles) many separate concrete footings had to be constructed, restricting access for many of the piles and pile production decreased accordingly.



Ground Conditions

Conditions at the site consisted of sandy clay, silty to clayey sand and well-graded to poorly-graded sand. The majority of the cohesionless material was dense to very dense, with the silts and clays being hard. Throughout the site, layers of loose to medium dense cohesionless material were present in the upper 15 FT of the piles. The loose ground conditions led to higher grout takes than expected but by phase 2 adjustments in the concrete mix and installation procedures were made to limit grout loss.

Quality Control

Utilizing the drilling rigs automatic monitoring system, a pile report was created for every pile installed which documented actual pile depth, concrete volume, penetration rate, withdrawal rate, drill time, grout time and pull revolutions. In addition, Pile Integrity Testing (PIT) was used to verify the pile integrity. The design called for 100% of piles to be PIT tested however when the 320 piles tested in phase 1 all came back acceptable, testing was reduced to 25% of remaining piles in phase 2. All piles tested on the job were approved which satisfied all contract requirements.



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