MORRIS-SHEA BRIDGE CO.,INC.
BIRMINGHAM, ALABAMA

Oleander Power Facility
Cocoa Beach, Florida

Design-Build • DeWaal Piles • Load Tests • Cone Pentrometer Tests

DEEP FOUNDATIONS CONTRACTORS SINCE 1969

CONSTRUCTION PERIOD:
TBD

OWNER:
?

CLIENT:
?

STRUCTURAL ENGINEER:
TDB

GEOTECHNICAL ENGINEER:
TBD

SCOPE OF WORK:

DeWaal Piles [550?]

5 compression tests

2 tension tests

4 lateral load tests

Cone Pentrometer Tests [?]

Summary:

The construction of the new Oleander Power Facility in Cocoa Beach, Florida required a deep foundation system. Four turbines, stacks, pipe racks and support structures were to be constructed over very soft silts and clays extending to depths of up to 45 feet below grade. Preliminary recommendations included precast piles or augercast piles. The project base bid foundation ultimately comprised 18-inch augercast piles 75 feet in length, with design loads of 40 tons.

Morris-Shea proposed a DeWaal alternate that was considered to be technically superior to augercast piles, provided cost savings on the order of $200,000 and a schedule advantage of approximately 3 weeks. A comprehensive load test program, combined with drill rig instrumentation and on-site quality control ensured a successful project.

Introduction:

The Oleander Power Plant comprises a total of four turbines, stacks, support equipment structures and pipe racks. A geotechnical evaluation of the project site disclosed a sequence of very soft silts, clays, and clayey silts overlying a shelly sand. The soft silts and clays disclosed shear strengths as low as low as 350 psf.

Due to the occurrence of “weight of hammer” sensitive soils to depths of up to 40 feet, the use of precast or 18-inch augercast piles to depths of 75 to 80 feet were considered within the project geotechnical report. Augercast piles were the base bid option for foundation support.

It was considered by Morris-Shea that a pre cast option was not the most cost effective foundation solution due to the potential for variability in length and resultant pile wastage. Augercast piles were also considered to be potentially problematic due to the risk of excessive grout take within the soft soil profile, and resultant potential integrity issues.

As a result of the above issues, Morris-Shea proposed and subsequently installed a DeWaal pile design-build alternate. The DeWaal alternate resulted in savings of approximately $200,000, in addition to schedule savings on the order of three weeks.

Supplemental Investigation:

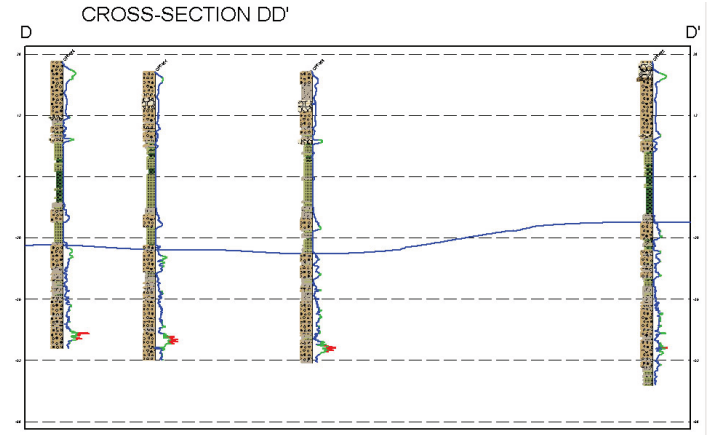
To supplement the existing geotechnical study, Morris-Shea performed an extensive program of cone testing to allow a better evaluation of the soft soils, and variability of the shelly sand bearing layer. A total of 24 cone soundings were performed across the site. Capacity analyses were performed at each location, and the depth required to achieve the design capacity of 40 tons profiled across the site.

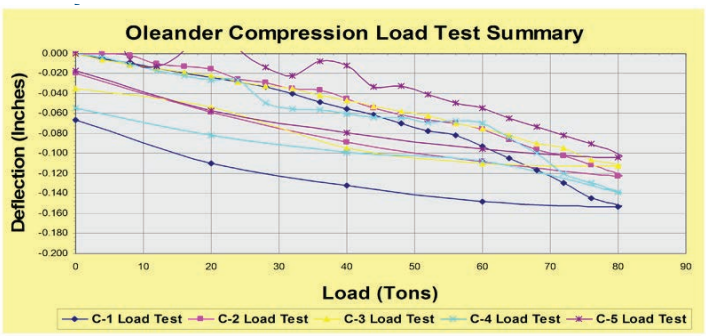
Measurement of cone tip resistance, sleeve friction, pore water pressure, and friction ratio allowed classification of soil type, as shown above. The cone data was also used to accurately predict pile capacity. Traditional Standard Penetration Test (SPT) borings in such sensitive soils can cause soil disturbance and induce high pore pressures which result in misleading correlations of relative density and shear strength.

Cone soundings were performed along the length of each turbine unit allowing an indication of both anticipated depth to the bearing stratum, and potential variability along the unit, and the sensitivity of the soils.

Additional cones were located along pipe racks and at stack locations, giving a comprehensive understanding of the subsurface geology when combined with existing borings.

To assess excess pore pressure dissipation with time, a series of dissipation tests were performed, as shown above. This data enables assessment of wait times prior to static load testing to ensure long term capacities are being determined. Pore pressure dissipation testing also helps set production pile installation spacing.





Production Piles:

A total of approximately 550 piles were installed at an average rate of approximately 28 piles per day. A Hitachi base machine with a high torque mast and hydraulic turntable was used for pile installation. All production piles were installed approximately 3 weeks ahead of schedule.

The use of rig instrumentation to monitor drilling parameters such as depth, torque, drill rate, and pull-down force allowed verification of adequate penetration into the shelly sand bearing layer. In addition, measurement of concrete volume pumped, together with field verification of sufficient concrete head during tool withdrawal helped ensure no integrity issues.

Conclusion:

The use of the DeWaal pile system together with supplemental CPT testing and extensive testing and quality assurance resulted in a successful foundation solution in a potentially problematic soil profile. Cost and schedule advantages were also realized with the DeWaal option.

More Information:

For more information on the Oleander Power Facility Project, Design-Build, DeWaal Piles, CPT Testing, please contact:

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