



DID YOU KNOW?

One of the tallest buildings in the world is in Dubai, UAE, and its foundations have been tested with the Pile Driving Analyzer®.



Newsletter No. 90 - April, 2019

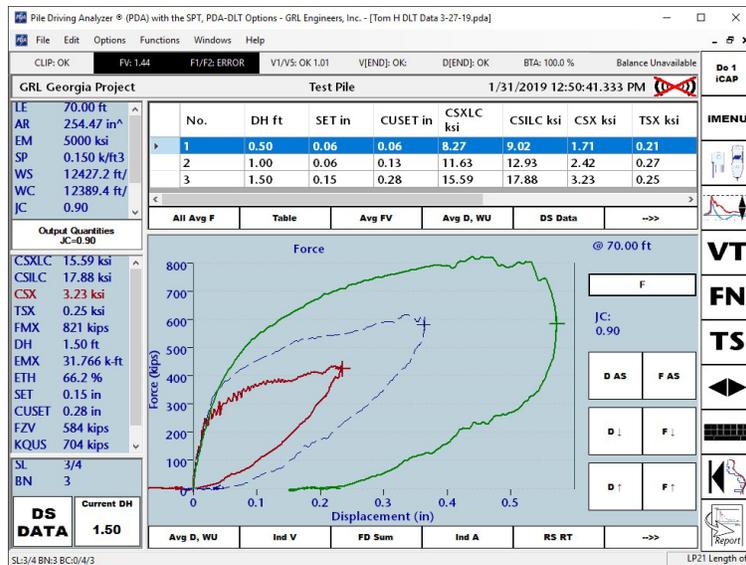
Use of the PDA-DLT Software on Drilled Shaft Foundations by Ryan C. Allin, P.E. and Tom Hyatt, P.E.

Dynamic testing was initially developed as a means of reliably to determine the static resistance of a driven pile during installation. This is used in lieu of a static load test, which requires significant time and money, or the use of driving formulae, which has been proven to be unreliable. Dynamic testing also has been used as a reliable means to test drilled and bored foundations for over 40 years, and are typically referred to as a Dynamic Load Test or DLT.

While the Pile Driving Analyzer® (PDA) has been used to collect and analyze data on different drilled foundations (drilled shafts/bored piles, ACIP/CFA piles, helical piles, etc.), the PDA software has until recently been optimized to analyze driven pile foundations. Last year however, Pile Dynamics, Inc. released the Pile Dynamics Analyzer – Dynamic Load Tester (PDA-DLT) system and associated software, which is specifically designed for high strain dynamic testing of drilled pile foundations. The PDA-DLT allows for multiple configurations of force measurement (such as a force transducer), while evaluating bearing capacity, structural integrity, foundation stresses, and tabulates data over the few blows applied to a drilled foundation.



GRL's APPLE system and force transducer being used to perform a dynamic load test



The PDA-DLT software allows for real-time assessment of Force vs. Displacement as well as a cumulative summary table

A typical limitation of data collection is obtaining an accurate force measurement. Normally, a pile is instrumented at a minimum of two diameters down from the pile top. Although this is generally not a problem for driven piles, it may become a serious issue for a large diameter drilled shaft. The use of a force transducer alleviates this issue, allowing for the force measurement to be taken on a steel transducer placed atop the shaft. This limits the need for excessive build-up or excavation. The PDA-DLT software can model the changes in materials and be used to calculate pile stresses.

Tom Hyatt, P.E., of the GRL Engineers' Georgia office, recently used the Dynamic Load Test (DLT) system for a contracted APPLE Load Testing project. The project required that the seven production Augered Cast-In-Place (ACIP) piles be dynamically proof load tested to a minimum geotechnical resistance of 200 tons (400 kips), without overstressing or incurring excessive permanent settlement of the foundations. The foundations were tested by applying two to three drops, ranging in heights from six inches (152mm) to 1.5 feet (457mm).

The new features in the PDA-DLT system and software allowed the engineer to easily input the required information for the load cell that was used for testing, as well as the pile property information. After each impact, the permanent set was measured and input directly into the PDA-DLT software. Following the testing's conclusion, the engineer could quickly determine the cumulative set for all of the impacts. Additionally, the PDA-DLT software generates a Force vs. Displacement curve which allowed the engineer to use engineering judgment and determine whether additional impacts were required or if the desired load had been reached.

The PDA-DLT allows for up to 16 channels of data acquisition with eight WiFi boxes, and any combination of strains and accelerometers. Smart Sensors are compatible with any PDA-DLT mode, WiFi, wireless or cabled, eliminating the need to input sensor calibration into the PDA tablet.

For additional information on this project or the PDA-DLT, please contact info@pile.com.

Valley View Bridge Project Underway

The addition of a third structure, between the two existing bridge structures, carrying I-480 over the Cuyahoga River Valley near Cleveland, Ohio, required high pier loads and very deep foundations. The design-build team on the Valley View Bridge Project opted to perform an extensive design-phase pile load test program to take advantage of the incredible amount of soil set-up available in the generally silty-clay soils of the Cuyahoga River Valley. The test program included the installation of 24, 18" (457mm) diameter closed ended pipe piles, each of which would receive short and long term restrikes. Long term restrikes, typically between 36 and 57 days after driving, were performed using GRL's 28 ton APPLE drop hammer. In addition, three static load tests were performed. The 1000 ton static load tests included 12 to 15 embedded strain gages to evaluate the load transfer along the length of the piles. GRL was contracted to perform the dynamic and static load testing, design the instrumentation for the static load test, and evaluate the data.



GRL Engineer testing the Valley View Bridge using the Pile Driving Analyzer® (PDA)

Results of the test program indicated long term pile capacities between four and ten times the pile capacity at the end of driving. The quantified soil set-up was incorporated into the final design, which along with production pile testing results, was used to develop depth dependent driving criteria. The design-phase pile test program allowed for the production piles to be installed with a relatively small pile hammer and to reach optimal depths for the required capacity. The result was cost savings that far exceeded the cost of the pile load test program.

GRL Engineers Welcomes (Back) Bill Chambers

William (Bill) Chambers has rejoined GRL Engineers as a Senior Engineer. Bill brings 28 years of experience, to the GRL San Francisco Regional office from Australia. In 1990, Bill received his Bachelor of Engineering degree from Queensland University of Technology. He originally worked for the GRL Cleveland office from October 2001 to December 2003. In 2008, Bill founded a dynamic pile testing firm, Ngamo Dynamics Pty, and operated as the firm's managing director until January 2016. Since 2016, Bill has worked as a chief estimator, a project manager, a piling engineer, and a senior project engineer for various Australian firms.

He is a registered professional engineer in Queensland. Contact Bill at bchambers@grlengineers.com.

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Upcoming Events

Complete list of events available at www.pile.com/pile-events/

May

- 01-03: **SuperPile '19** Seattle, WA
- 06-09: **43rd Southwest Geotechnical Engineering Conference** Baton Rouge, LA

June

- 04-06: **SEFE'9** San Pablo, Brazil

July

- 09-12: **PDCA 22nd Annual International Conference and Expo** Orlando, Florida
- 14-18: **ADSC Summer Meeting 2019** Hilton Head, SC

August

- 06: **Webinar: Static Load Testing Instrumentation** with Van Komurka ([Link to register](#))

September

- 11: **Seminar: Deep Foundation Integrity Testing and Wave Equation Analysis** in Cleveland, OH ([Link to register](#))
- 12-13: **Workshop: High Strain Dynamic Foundation Testing Workshop and Proficiency Test** in Cleveland, OH ([Link to register](#))
- 17: **Webinar: Quality Control of Drilled Deep Foundations** with Seth Robertson (Details forthcoming)
- 24: **Webinar: New Features in the Next Version of GRLWEAP** with Brent Robinson (Details forthcoming)
- 29: **GEO St. John's** Newfoundland and Labrador, Canada

October

- 15-18: **44th Annual Conference on Deep Foundations** Chicago, IL

November

- 11: **Workshop: State of Practice- Quality Control of Deep Foundations** in Miami, FL ([Link to register](#))
- 13: **Workshop: State of Practice- Quality Control of Deep Foundations** in Tallahassee, FL ([Link to register](#))
- 15: **Workshop: State of Practice- Quality Control of Deep Foundations Workshop and Proficiency Test** in New Orleans, LA ([Link to register](#))



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