

### Challenge:

GRL Engineers, Inc. (GRL) was contracted by the Florida Department of Transportation (FDOT) through ECS Florida, LLC in 2019 to perform [dynamic pile testing](#) and related services. GRL was the project Dynamic Testing Engineer (DTE) for the 26 bridges on 10.5 miles of new multi-lane limited access toll roadway to State Road 23, which is part of the First Coast Expressway. This \$229-million project is part of the overall \$1.5 billion 46 miles long project which is the result of a partnership between the FDOT and Florida's Turnpike Enterprise. The overall project will create a new regional evacuation route, direct access connection from I-10 to I-95, and to help alleviate traffic congestion on SR 23.

### Method:

Prior to construction, [GRLWEAP pile drivability studies](#) were performed for initial hammer system selection. Using a Pile Driving Analyzer® (PDA), GRL engineers monitored pile driving onsite and provided real-time recommendations regarding hammer system performance, pile driving stresses and integrity, and driving resistance and load bearing capacity. [CAPWAP](#) and refined GRLWEAP analyses were performed to establish production pile driving criteria. Some locations utilized 100% PDA pile testing.

Challenges were encountered with pile drivability and geotechnical conditions at some of the bridge locations. Near the end of initial driving the prestressed concrete, 24-inch square piles experienced high elastic soil rebound. Although the piles encountered “practical refusal” blow counts (i.e., 20 blows/inch) the data indicated relatively low static load bearing capacity and high pile tension driving stresses. Since the situation did not allow for the development of a typical pile driving criteria, GRL and the Client decided to Implement 100% PDA testing which allowed for complete monitoring and control of pile drivability. Restrike testing was performed to assess and account for time effects (soil setup) on long-term pile load bearing capacity.

### Results:

Shown below are plots of results from an initial driving and restrike tests. During the project, FDOT performed an audit; and found no deficiencies. To learn more about GRL Engineers, visit [www.grlengineers.com](http://www.grlengineers.com) or email us at [info@grlengineers.com](mailto:info@grlengineers.com).

### Project Members

**Client:** ECS/FDOT

**Owner:** FDOT

**CEI:** HNTB

**Location:** Clay County, Florida

### GRL Services

- PDA Pile Testing
- GRLWEAP® Wave Equation Analyses
- CAPWAP® Data Analyses
- Production Piles Recommendations

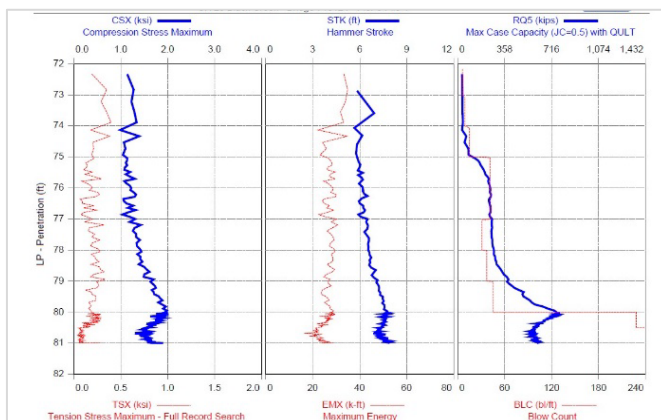


Figure 1: Driving results taken from initial drive

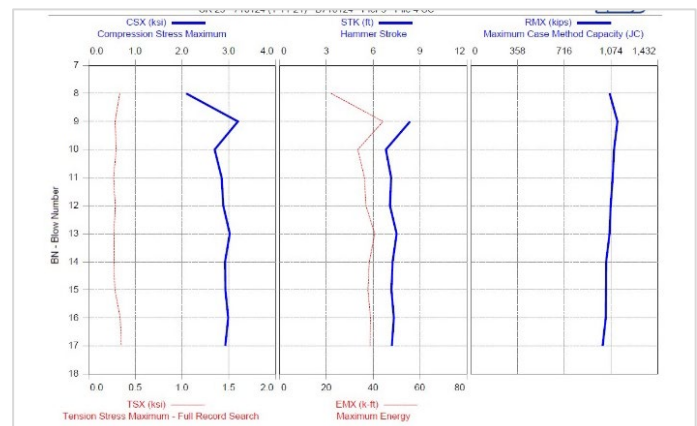


Figure 2: Driving results from the setcheck