

Project Summary

Vibro Systems

Vibro Concrete Columns & Vibro Replacement Stone Columns

State Road 10 Over San Pablo Creek Jacksonville, FL

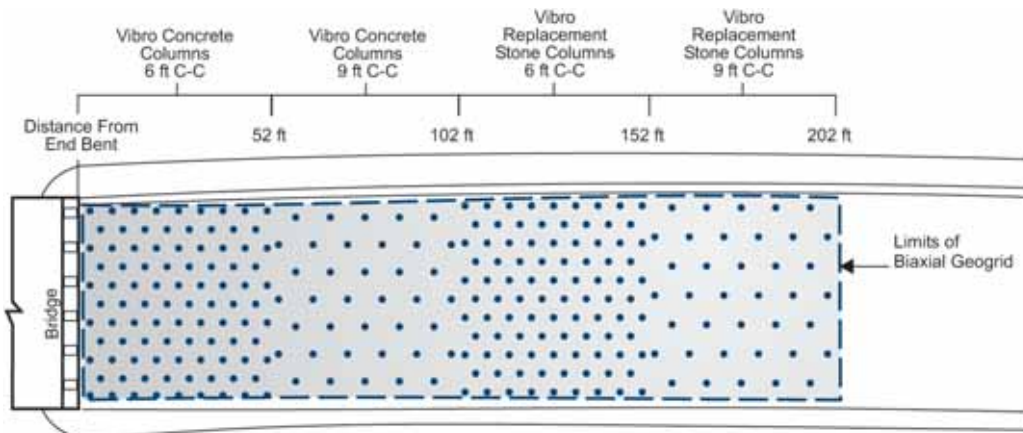
Vibro Systems solve a wide range of static, dynamic, and seismic foundation problems using depth vibrators to densify and/or reinforce the soils in situ. For the Florida Department of Transportation (FDOT) State Road 10 Project over San Pablo Creek, Hayward Baker combined Vibro Systems to achieve the necessary support of an embankment approach leading to a pile-supported bridge.

The planned embankment's location immediately adjacent to the existing road, and a subsurface five foot stratum of peat were cause for concern. Because of the peat stratum, a slope stability analysis indicated an insufficient factor of safety. Additionally, a reoccurring bump would develop at the juncture of the settling embankment and the rigid pile-supported bridge. Excavation of the peat without causing the existing road to settle would be challenging and costly.

To ensure that a smooth transition would be attained between the pile-supported bridge and the new embankment, FDOT required minimal embankment settlement adjacent to the bridge, and an increasing allowable settlement with distance from the bridge.



Vibro Concrete Column equipment mounted on a crawler crane.



Varying the technique and spacing provided a smooth transition from the embankment bridge to the pile-supported.

Project Summary

State Road 10, *continued...*

A Solution by Combination

To achieve the desired smooth transition, Hayward Baker proposed the solution of a combination of Vibro Concrete Columns (VCC) and Vibro Replacement (VR) Stone Columns. VCCs are best suited to transfer loads through soft and/or organic layers to an underlying granular stratum. The VCC technique would provide a stiffer foundation. VR Stone Columns, effective over a wide range of soils, would provide the transition between the VCCs and the untreated embankment areas.

By varying the spacing of the VCCs and VR Stone Columns, the desired smooth transition could be produced between the pile-supported bridge and the soil-supported embankment.

Project Scope

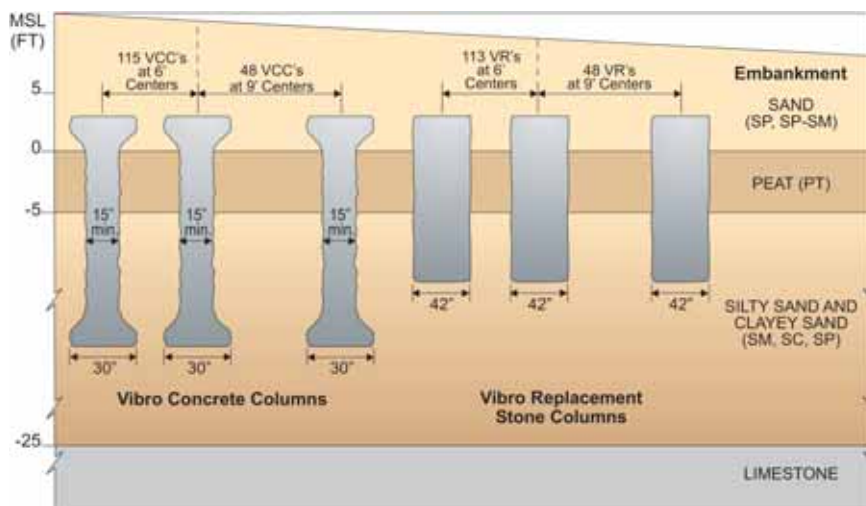
The 163, 15-inch diameter VCCs were constructed with expanded bases and tops, bearing at a depth of 20 feet. When founded in frictional soils, an expanded VCC base typically increases bearing capacity.

The 161, 42-inch diameter VR Stone Columns were constructed to bear at a depth of 14 feet.

Two layers of biaxial geogrid separated by a 12-inch layer of sand were placed over the VCC and VR areas to produce a more uniform support for the embankment.

Conclusion

The combination of these Vibro techniques not only produced a smooth transition from the settling embankment to the pile-supported bridge, but also saved time and money by not requiring excavation of the peat. Vibro systems offer a technically proven and cost-effective alternative to deep foundations, allowing a variety of structures to be supported on shallow spread footings.



VCCs were installed beneath the embankment near the pile-supported bridge, where allowable settlements were lowest. Farther from the bridge where allowable settlements were less restrictive, VR Stone Columns were installed.

Owner

Florida Department of Transportation

Engineer

Professional Service Industries, Orlando, FL

Hayward Baker Locations

Atlanta 770-442-1801	Greensboro 336-668-0884	Nashville 615-883-6445	Seattle 206-223-1732
Baltimore 410-551-1980	Houston 281-668-1870	New York City 201-489-1700	Syracuse 315-834-6603
Chicago 630-339-4300	Kansas City 913-390-0085	Providence 401-334-2565	Tampa 813-884-3441
Dallas/Ft. Worth 817-753-7000	Knoxville 865-966-0294	St. Louis 314-802-2920	Vancouver 604-294-4845
Denver 303-469-1136	Los Angeles 805-933-1331	San Diego 760-839-2870	
Fort Lauderdale 954-977-8117	Minneapolis 952-851-5500	San Francisco 925-825-5056	