

Taking ground engineering to a deeper level



TECHNICAL REFERENCE



SELA 22

Southeast Louisiana Project

Jefferson Ave. Canal II,
New Orleans, LA

Elliptical JG



Owner: U.S. ARMY CORPS OF ENGINEERS

Contractor: CAJUN Constructors

Engineer: Burk-Kleinpeter; Rahman & Associates; AECOM; Urban Systems

2013-01

As part of the **Southeast Louisiana** (SELA) drainage program designed to reduce flood damages in the City of New Orleans and surrounding parishes, the SELA-22 project entailed the construction of a concrete covered canal along Jefferson Avenue and Prytania Street. The scope of the required soil improvement was to replace the soil between, and below, two parallel lines of sheet piles with a soil-cement mass to eliminate under-seepage, thus creating a so called bottom plug, providing structural support for the concrete box culvert. Additional purposes of the soil treatment were to reduce engineering challenges and constructability issues. In fact, it allowed the General Contractor to work in a dry and stable environment for the entirety of their subsequent operations (*excavation, cast-in-place, etc.*), and only required the installation of one level of bracing, as opposed to the traditional retaining systems commonly used in the past in the New Orleans area, where at least two levels of bracing had been required for similar excavation depths. The U.S. Army Corps of Engineers (USACE), New Orleans District, selected the jet grouting technology for the construction of the bottom plug to a maximum depth of approximately 40 ft., and for a total length of approximately one mile.

The specialty geotechnical contractor proposed to accomplish the task utilizing their proprietary and innovative elliptical bi-fluid jet grout technology. The great benefit this technology offers is the possibility of significantly reducing the overlap between adjacent columns, and consequently decreasing the overall number of installations, ultimately saving approximately 40% on the number of columns and the production times.

About 2,400 elliptical jet grout columns were installed in a very challenging environment, especially under a logistical point of view (*urban areas*), and in unusual soil conditions (*sensitive and soft clays, plastic clays*).

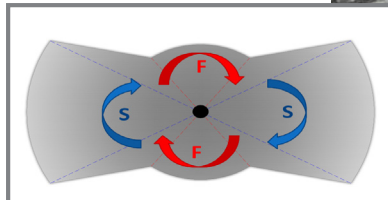
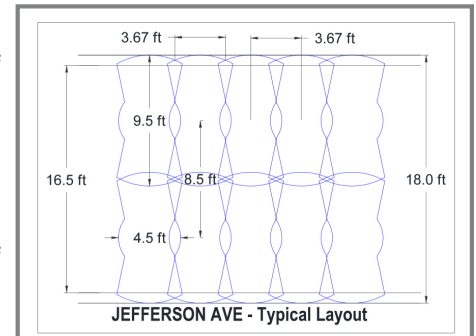
Bi-fluid jet grouting technology was selected for the construction of the bottom plug. In particular, based on the different logistical conformation of the Project and the different design criteria, two distinct geometries of the improvement were required:

- 1) Along **Jefferson Avenue** (*north-south alignment*) the block of improved soils was designed to be 21.5 ft. thick, and 18.0 ft. wide;
- 2) Along **Prytania Street** (*east-west alignment*) the block of improved soil was designed to be 18.5 ft. thick, and 11.5 ft. wide.

Total horizontal length of over 5,000 ft. and an overall gross improvement volume of approximately 75,000 cy. The project design required a 100% area replacement ratio. Quality of the end product was to be checked by means of continuous coring to be executed on 5% of the installed columns. At intervals of 3.0 ft. of vertical treatment, soil-cement mixture was to be tested for unconfined compressive strength (UCS) and hydraulic conductivity (HC) and the 28-days results needed to comply with the minimum design criteria of 100 PSI and 1x10-6 cm/s respectively. The elliptical jet grouting solution

proposed for the SELA-22 in Uptown New Orleans proved to be efficient and effective in resolving the constructability and engineering challenges it had been designed for. Notwithstanding this was the first time this technology was used in the U.S., and in particular in mostly cohesive soils, it showed high reliability and outstanding quality of the final product.

Upon completion of production, within schedule and budget, over 2,400 columns were installed and remedial work necessary only in a very limited number of occurrences.



Elliptical jet grouting	
Gross treated volume:	75,300 CY
JG elements:	2400
Max depth:	40 ft
Binder used:	21,500 ton

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