City of Doral
Public Works Department

South Florida Branch - American Public Works Association
Scholarship and Awards Program Nomination

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City of Doral Canal Bank Stabilization Program

The City of Doral is located in the western-central portion of Miami-Dade County and encompasses approximately 15 square miles with a population of approximately 46,000. There are approximately 11.3 miles of canals maintained/operated by the City, which include Dressels Canal, Northline Canal, and C-2 Extension Canal. The limit of Dressels Canal within the municipal boundary extends from SR-821 Florida’s Turnpike at NW 58 Street to SR-826 Palmetto Expressway at NW 41 Street. Northline Canal is located along NW 25 Street and also extends from SR-821 to SR-826. C-2 Extension Canal is located along NW 117 Avenue between NW 25 Street and NW 58 Street.

Canals maintained/operated by the City have exposed canal slopes that are somewhat erratic in terms of width, slope angle, vegetative cover, and erosion. The level of canal bank erosion of these canals varies throughout the City.

Throughout the years the canal flow worsened by natural disasters caused severe erosion on some areas of the canals to a point where public properties such as public roads were close to being compromised. This created a safety issue as well as an aesthetic problem. The Severely eroded canal banks require some level of canal bank stabilization to avoid potential damage to adjacent properties, reduce sedimentation of the canal cross-section, minimize potential safety hazards created by steep canal banks, and improve aesthetics of the canal bank.

On May 14, 2008 ADA Engineering, Inc. submitted the Canal Feasibility Study Report (CFSR), in which a study was done to document the existing conditions of the canal banks maintained by the City, identify potential needs for stabilization, recommend conceptual methods for stabilizing the canal slopes in areas that require remedial action, and summarize planning-level costs for stabilization of slopes. The study considered canal cross sections obtained at 17 representative canal locations. The results of this geologic reconnaissance were utilized to classify and categorize the canal system in terms of severity of erosion and potential need for stabilization. Several canal bank stabilization methods were considered for armoring the slopes against surficial erosion as well as improving the aesthetic appearance of the banks.

The method chosen for the stabilization was the Geoweb system. This geosynthetic product consists of open cells that can be filled with concrete or gravel to cover and protect canal slopes. The geoweb is
placed and stretched over the slope, anchored to grade using short lengths of steel rebar, then filled as appropriate to limit erosion. The two types of geoweb chosen for this project were the sloping stabilization system and the stacking stabilization system as shown below.

**Figure 1 - Sloping Canal Bank Stabilization**

![Diagram of sloping canal bank stabilization](image1)

**Figure 2 - Stacking Canal Bank Stabilization**

![Diagram of stacking canal bank stabilization](image2)
As part of the Canal Bank Stabilization Program the construction of a pedestrian/bike shared path was incorporated to the project as considered on the City’s Bikeway Network Plan. This path will focus on improving multimodal transportation throughout the City by providing the complete street concept were all users have a designated space on the public right-of-way as well as serving as a residents’ recreational option. The two projects combined result in environmental and social benefits improving residents’ quality of life in general.

The Canal Bank Stabilization Program has been adopted as a 10 year program with an approximate total cost of $14,000,000, considering a maximum expenditure of approximately $2,000,000 per year. In 2011 the Program was reduced to a 6 year program as a consequence of proper management and acquired grants. Program is budgeted from the Stormwater Utility, and was originally funded only by storm water fees collected until an agreement was made on June 28, 2011 with the Natural Resources Conservation Society (NRCS), in which $1,800,000 were granted for the stabilization of canal portions within Year II and Year III of the Program. In January 2012 another grant was acquired from NRCS in which $1,000,000 were granted to complete the remaining portion of Year III not included on the previous grant. The execution of the Canal Bank Stabilization Program falls under the Stormwater Utility Manager, which is the only City staff within the Stormwater Utility Division. Design of Year I and II was done by ADA Engineering and Construction Engineering and Inspection (CEI) was done by A&P Consulting, Transportation Engineers. Design of Year III was done by AECOM and currently AECOM is working in the design of Year IV of the Program as well as CEI for Year III. During the construction period, the CEI firm is present at all times on site, recording the daily work load with a daily construction report. This report includes the daily activities, total working personnel on site, equipment used and daily pictures.

Before the construction phase commenced, the City approached each community adjacent to each canal section to inform and discuss the Project goals. In cases were the proposed pedestrian/bike shared path needed to be constructed in the canal maintenance easement, an Easement Agreement was made with the community. With this Agreement the City takes ownership of the maintenance responsibility of the easement also giving property owners the option to install a chain link fence along the property to protect and isolate the property from the path. The City met with several communities and addressed all of the communities’ associations concerns.

In September 2010 Years I and II were awarded to Gonzalez & Sons Equipment, Inc. (G&S) for an amount not to exceed of $3,937,817. Year I consists of the stabilization of the C-2 Extension Canal located at NW 117 Ave. from NW 25th St. to NW 34th St., and from NW 50th St. to NW 58th St., plus the installation of a shared used pedestrian/bike path along the canal banks, and the stabilization of the Northline Canal located at NW 25th St., from NW 109th Ave. to NW 107th Ave. Year II consists of the stabilization and installation of the shared pedestrian/bike path on the C-2 Extension Canal on NW 117th Ave. from NW 34th St. to NW 50th St., and on the Dressels Canal on NW 58th St. from NW 107th Ave. to NW 109th Ave. Year III consists of the stabilization and installation of the shared pedestrian/bike path on the Northline Canal at NW 25th St. from NW 99 Ave. to NW 107 Ave., and on the Dressels Canal at NW 58th St. from NW 112 Ave. to NW 117th Ave.
In order to protect the environment, an erosion and sedimentation control plan was prepared. Silt fence was installed along the canals, floating turbidity barriers were placed at the end of each canal section and proper storm drain inlet protection was installed. During the course of Year II an alligator was removed from the site by state agencies.

Year I started in September 2010 and was finally accepted in June 2011. Year II was completed in December 2011. Each section had duration of 180 days. Time extension were awarded on both years due to unforeseen conditions, were the shelf in some areas was reconstructed, and in some instances constructed, in order to create a solid base or toe for the support of the geoweb stabilization system. Al this had to be done without compromising the canals original cross section design. Both phases were completed under budget and on schedule due to proper management and construction techniques. During this period not even one accident was reported as a consequence of good housekeeping, proper management of the heavy equipment and following all OSHA standards, such as the use of personal protective equipment (PPE). A weekly safety meeting is conducted on site by the Contractor to remind employees of proper operation techniques. Currently Year III is under construction with an anticipated completion date of December 2012.

This alternative way for stabilizing canal banks was recognized in the Erosion Control Magazine September/October 2011 edition, were two pages of a six page article were dedicated to the City of Doral Canal Banks Stabilization Project.