ABSTRACT
The Pinellas County Department of Solid Waste Operations owns and operates the Bridgeway Acres (BWA) Landfill in Pinellas County, Florida, the most densely populated county in the state. The BWA facility includes a waste-to-energy facility (WTE), a Class I (MSW) landfill, and a non-processable materials landfill, all encompassed within a subsurface cutoff wall. The cutoff wall and naturally occurring clay units beneath the site serve as the liner system for the disposal facilities. The wall is constructed of bentonite slurry and extends approximately 25 feet below land surface where it keys into the top of the clay confining system. This system includes a carbonate clay underlain by a more dense green clay.

The County and the Florida Department of Transportation (FDOT) are developing roadway improvements on the northern perimeter of the BWA facility. Upon consultation with the Florida Department of Environmental Protection (FDEP) it was determined that the cutoff wall must be relocated away from the area of roadway construction. The desired option was to relocate the wall to the inside of the original wall and remediate the soil and groundwater between the old and new walls. Pinellas County engaged SCS Engineers (SCS) to manage the design, permitting, and construction of the relocation of the cutoff wall.

Design and construction of the new wall presented several challenges:

• The new wall has to be built within a 15-foot wide strip between a busy highway and the BWA leachate storage pond.

• Construction should minimize impacts to traffic flow on the adjacent highway to the extent possible.

• The geologic conditions in the area of the new wall are highly variable and the confining unit may be deeper than typical cutoff wall technology can achieve within the space available.

• The cutoff wall design must be coordinated with the ongoing FDOT roadway and bridge design.

• The project schedule required by the FDOT is more aggressive than traditional permitting and construction schedules could meet.

• FDEP typically exercises a conservative approach to approval of new or innovative technologies.

Based on the above constraints, SCS set forth a plan to determine available technologies to install a cutoff wall under various criteria and implemented a detailed geotechnical investigation of the proposed slurry wall alignment. Upon conclusion of the geotechnical investigation, SCS was able to select the technology approach needed for the wall design. This included one-
pass slurry wall construction integrated with vinyl sheet pile.

PROJECT BACKGROUND
The Pinellas County Bridgeway Acres (BWA) Landfill includes an area of approximately 765 acres. Within this area are a waste to energy facility, Class I and Class III landfills, and a 65 acre leachate storage pond (Pond A). The entire site is enclosed by a subsurface cutoff wall constructed using traditional slurry wall technology. The slurry wall forms a hydraulic barrier to lateral movement of ground water. Slurry walls are considered an effective containment method if the hydraulic gradient is maintained in an inward direction; that is, the groundwater level outside the wall must be higher than the water level inside the wall. At the BWA facility a network of piezometer pairs is used to monitor the gradient across the wall on a monthly basis.

The Florida Department of Transportation (FDOT) began planning for a new major limited access highway segment (State Road (SR) 692) in the median of an existing divided highway, 118th Avenue, located on the northern boundary of the BWA facility. A portion of the BWA slurry wall is located within this median as shown on Figure 1. The FDOT was concerned about assuming liability for a slurry wall beneath its roadway. FDOT met with the Florida Department of Environmental Protection (FDEP) and Pinellas County officials to discuss the issues surrounding the proposed SR 692 project. The FDEP also expressed concern over the location of the wall beneath a major highway with extremely limited access to the wall or areas immediately adjacent to the wall. The FDOT performed an alternatives analysis that was reviewed by the County that indicated the most technically and economically feasible approach to address FDOT’s project concerns was to relocate the existing wall to the south of the east bound lanes of 118th Ave.

Currently the proposed wall realignment is planned to proceed along the south side of the east-bound lanes of 118th Avenue North beginning at the existing slurry wall at the point where it crosses 118th east of 34th Street North (Figure 1). The realignment will proceed west to the northwest corner of Pond A where the realignment will connect to the existing slurry wall where it crosses back under 118th. The proposed SR 692 overpass will cross the realignment along an approximately 400-foot section of the realignment near its east end.

Pinellas County charged SCS Engineers (SCS) with the task of designing the new cutoff wall segment. The following requirements were set for this project:

- The design must be acceptable to the FDEP, including provisions for maintaining and monitoring the inward hydraulic gradient.
- The design must be within the original conceptual construction budget presented to the County by FDOT.
- The design should minimize impacts to traffic flow for 118th during construction.
- The design must be coordinated with the FDOT highway design including an overpass that will cross over the new wall alignment.
- Construction of the new wall must be completed within 16 months from initiation of the design effort.

In order to address the aggressive schedule constraints of the project SCS initiated design efforts simultaneously with geotechnical subsurface investigations.

REVIEW OF AVAILABLE TECHNOLOGIES
One of the first steps in the design process was to perform a review of available technologies for the installation of environmental cutoff walls that would meet all of the design criteria. Criteria used to assess potential designs included:

- Overall cost.
- Ease and reliability of installation.
- Rate of installation.
- Depth of installation.
- Permeability of finished barrier.
- Minimum work area required for installation.

Based on the above criteria, four types of barrier walls were reviewed including conventional slurry wall construction, one-pass slurry walls, vinyl sheet pile walls, and HDPE curtain walls.

Traditional Slurry Wall Installation:
SCS included traditional slurry wall installation in the evaluation because it represents the baseline technology for environmental cutoff wall installations. This method was previously used at the BWA. Traditional slurry wall construction typically involves excavation of a narrow (30 inches wide) trench using a hydraulic excavator. The trench is held open by keeping it surcharged with a thick bentonite slurry mixture. Slurry is continuously added to the trench as the excavation progresses. Once excavated to the required depth, the soils removed from the trench