

PERMEABLE BARRIER

Caisson Cell Construction Dover Air Force Base

Case History, No. 18

Date: October 18, 1998

Purpose

To install a demonstration field pilot scale permeable barrier system for the Environics Directorate of Armstrong Laboratory. The goals of the demonstration were:

- To evaluate two different reactive media in a permeable barrier for in situ treatment of groundwater contaminated with chlorinated solvents.
- To demonstrate the advantages of the installation of deep treatment gates by using a steel caisson construction methodology.

Background

Dover AFB is always pro-active and supportive of innovative environmental technologies; therefore, the base has offered its Area 5 for this demonstration. Area 5 was suitable for the permeable barrier because it has a deep aquifer significantly contaminated by chlorinated solvents and underlying this aquifer there is a competent clay aquitard

Construction Summary

Gate Construction

Treatment gates were constructed to contain two different media, granular iron and granular pyrite. Two 8 foot diameter caissons were installed to provide watertight shoring for the excavation. A 5 foot diameter, hydraulic powered auger was used to excavate the caissons. Prefabricated treatment cassettes were used to create different compartments within the caisson and permit installation of monitoring devices. The cassettes were lowered into the caissons and the reactive media and filter media placed in their respective compartments (Figure 1).



Figure 1. Cassette Installation in Caisson

Funnel Construction

Waterloo Barrier® WZ75 steel sheet piling was used to build the funnel sections of the system. This system ensured a competent connection between the gates and the funnels due to the sealable cavity on the sheet piling and the WZ75 section on the gates. WBS 301 sealant, a high strength and low permeability cementitious grout, was used to seal the interlocks of the Waterloo Barrier® WZ75 steel sheet piling (Figure 2).



Figure 2. Barrier Wall Alignment

Advantages

- The Waterloo Barrier® provides low permeability funnel section.
- Accurate placement of reactive media and monitoring devices.
- High quality and reliable connection between funnel and gates.
- Increased safety by eliminating confined space entry.
- Generation of minimal contaminated waste such as soil and water.
- Required minimal construction working area.
- Allows an excellent quality control/quality assurance program to be implemented.
- Flexible in accommodating existing underground utilities such as water lines, storm sewer lines, gas lines, etc.

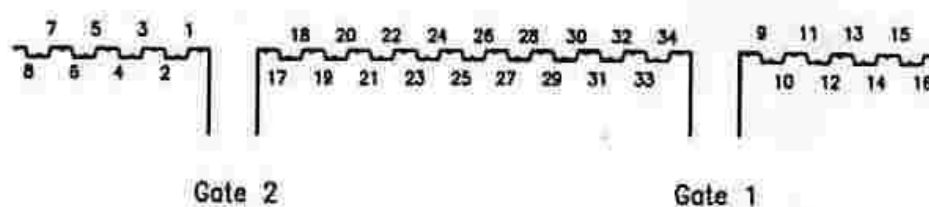


Figure 3. Layout of System

SITE SUMMARY

Funnel: 2,880 sf of WZ75, Waterloo Barrier® Sheet Piling.

Gates: Two - 8 foot diameter caissons to a depth of 40 feet

Media: Granular Iron and Granular Pyrite

Sealant: WBS 301 cementitious grout

Start: November 17, 1997

Finish: January 14, 1998

Consultant: Batelle, Columbus, Ohio

Location: Dover AFB, Dover, Delaware

C3 Environmental Limited, A Member of The C³ Group of Companies,

Phone: 519-648-3611

e mail: c3enviro@c3group.com

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350 Woolwich Street South

Breslau, ON N0B 1M0

Fax: 519-648-3505