

ANATOMY OF CANAL GEO-CONSTRUCTION DIFFICULTIES

PROJECT

MEA was selected to investigate a project dealing with the improvement of the canal system in the New Orleans area. The canal improvement involved widening of the canal and lining the canal bottom with stone and the sides with a concrete apron. Along the crest canal a short floodwall was to be constructed. The basic design is shown in Figure 1. Construction of this 1,150 ft long canal improvement was to be done while the canal remained in operation.

One of the methods specified under the contract to install the concrete apron was to create cofferdams in order to unwater areas along the canal bank. The cofferdam would be created by driving sheetpiling in the lower part of the canal slope with earthen berms at each end of the piling to create the enclosure. This is the method chosen by the contractor to perform the work. The contractor considered that eight, ± 275 ft long cofferdams would need to be constructed (See Figure 2).

PROBLEM

In the initial stages of construction the contractor began excavating the canal bottom in order to install the required geotextile and stone. While performing this work in subaqueous conditions, the canal slopes began to fail (See Figure 3). Because of the unstable conditions

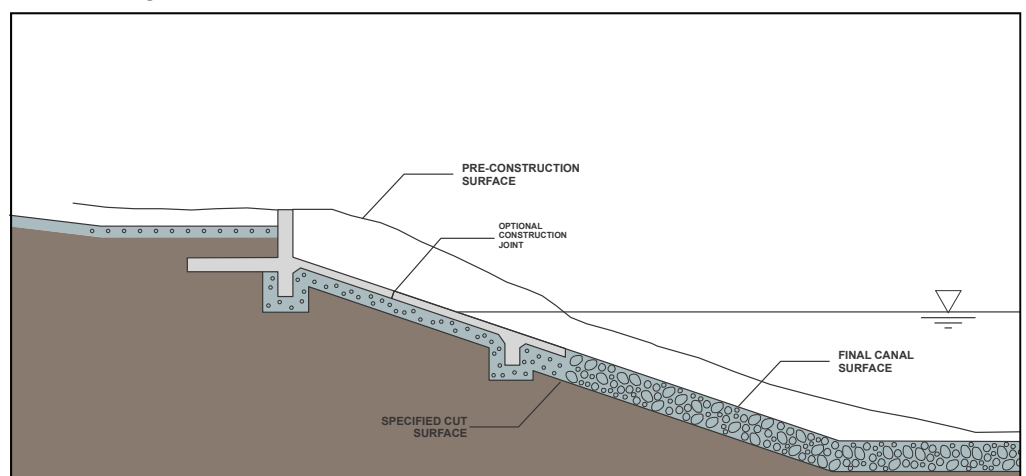


FIGURE 1: CANAL IMPROVEMENT TO BE CONSTRUCTED

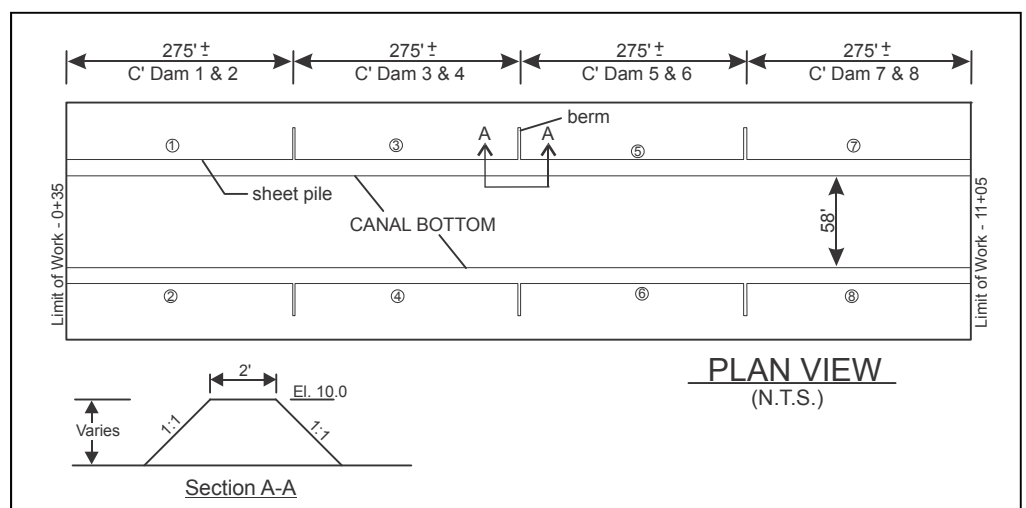


FIGURE 2: COFFERDAMS PLANNED TO BE CONSTRUCTED TO INSTALL CONCRETE APRON ON SLOPE



FIGURE 3: FAILED CANAL BANK DURING CANAL BOTTOM CONSTRUCTION

worker safety became an issue, and given that the failure occurred underwater, conditions would only become more adverse once the canal slope was dewatered to install the apron concrete (See Figure 4). This concern resulted in the contractor installing pile supported mats to the equipment on the top of the bank (See Figure 4). Also, because of the instability, even with the use of this upper bank support, the contractor shortened the length of the cofferdams to reduce the exposure to adverse conditions (See Figures 4 and 5). As a consequence, considerably more time and effort was required to complete the project.

CAUSE

MEA determined that the instability discussed above was the result of overloading of the banks from canal excavation, unwatering and construction loads. The specifications, however, provided no limitation to any of these factors or sequence of work. Yet the engineer performed no investigation to determine whether or not the work was feasible, given the method of construction provided in the plans and specifications. In this case, the owner/engineer considered such a feasibility study during design as an unnecessary effort and left it to the contractor to accomplish the work. In this case, the contractor had much less engineering background to assess the viability of the specified methodology. Despite requiring no engineering submittals, the engineer's response to the difficulties the qualified contractor was having was "means and methods are the responsibility of the contractor".

LESSON LEARNED

MEA determined that given the circumstances of this project, the engineer, in developing the plans and specifications, should have answered the question as to whether or not the work, the anticipated means and methods were feasible, and under what restrictions it should be performed.

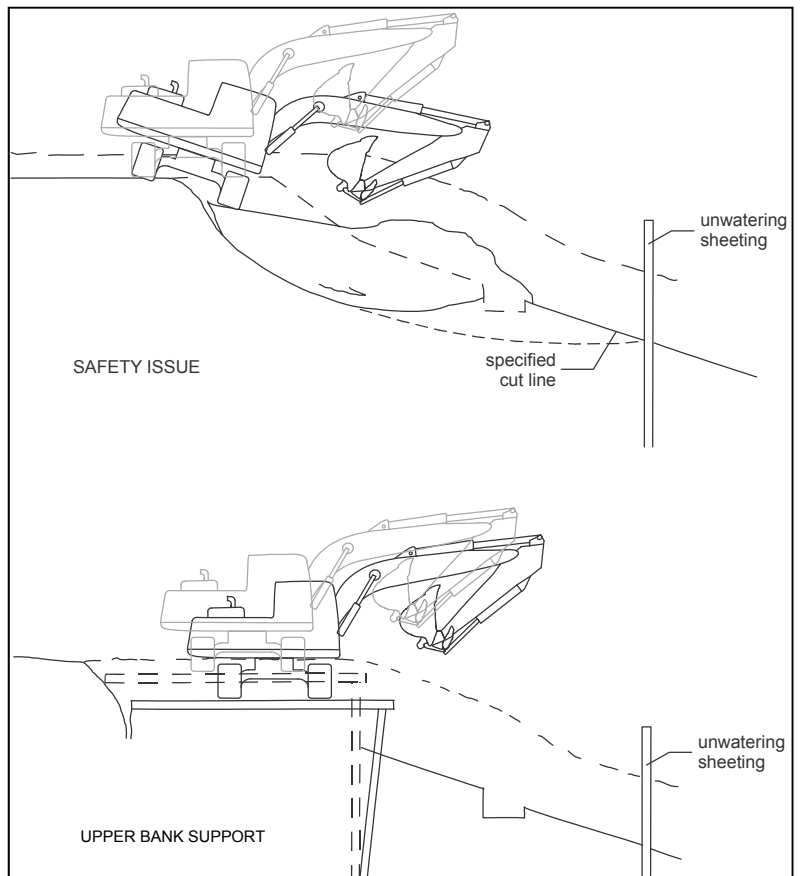


FIGURE 4: SAFETY CONCERN OVER UPPER BANK IN STABILITY AND INSTALLED SUPPORT TO ADDRESS THE ISSUE

MEA NEWS



The American Society of Civil Engineers (ASCE), Central Illinois Section, recently recognized Gennaro G. Marino, Ph. D., P.E., the founder of Marino Engineering Associates, Inc. (MEA) with its 2011 Civil Engineer of the Year award. In 2010, MEA was selected as first runner up for the ASCE Central Illinois Section, Civil Engineering Project of the Year.



FIGURE 5: EQUIPMENT SUPPORT MOVED DOWNWARD AND OUTWARD DURING DRY SLOPE CONSTRUCTION

ABOUT MARINO ENGINEERING ASSOCIATES, INC.

Marino Engineering Associates, Inc. is an expert in Forensic Geotechnical and Pavement Engineering, with 31 years of service. MEA's staff provides services including failure analysis, code compliance, trial exhibit preparation, expert witness services and laboratory testing. MEA's staff engineers have authored over 90 publications on related topics and have worked on Geotechnical and Pavement Forensic projects throughout the continental United States.

Located in the Midwest, MEA's clients include government, public agencies, private businesses, and insurance companies who have presented a variety of challenging and interesting projects that have included mine subsidence, complex foundation conditions, underground structures, specialized earthquake damage and evaluation training, damage investigations of pavement and structures, subsurface investigations, specialized laboratory testing, and construction difficulties.

ADDITIONAL COPIES

If you know of someone who would like to receive a copy of Engineering Update, please let us know.

FOR MORE INFORMATION

There is a significant amount of additional information available on the subject. For more information please contact Dr. Marino at the address listed below, or e-mail gmarino@meacorporation.com



MARINO ENGINEERING ASSOCIATES, INC.

1101 E. COLORADO AVE., URBANA, ILLINOIS 61801
PH: 217.384.2288, 888.384.2209 FAX: 217.384.2291
<http://www.meacorporation.com>