Engineering
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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).

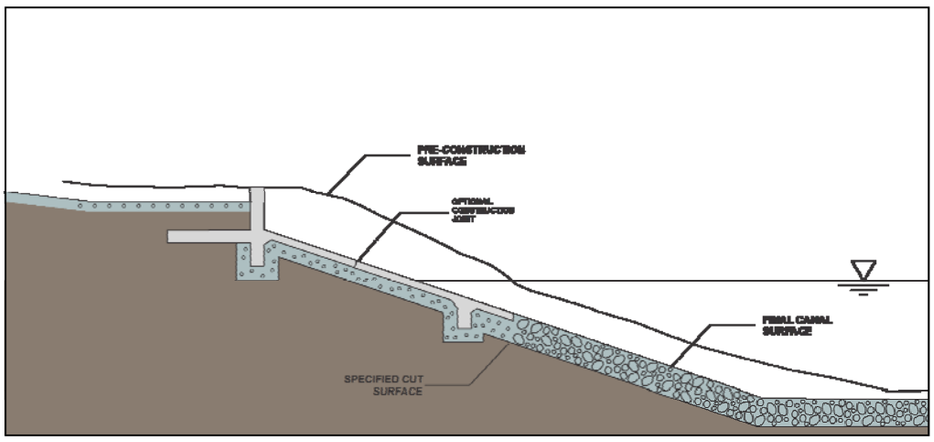

FIGURE 1: CANAL IMPROVEMENT TO BE CONSTRUCTED

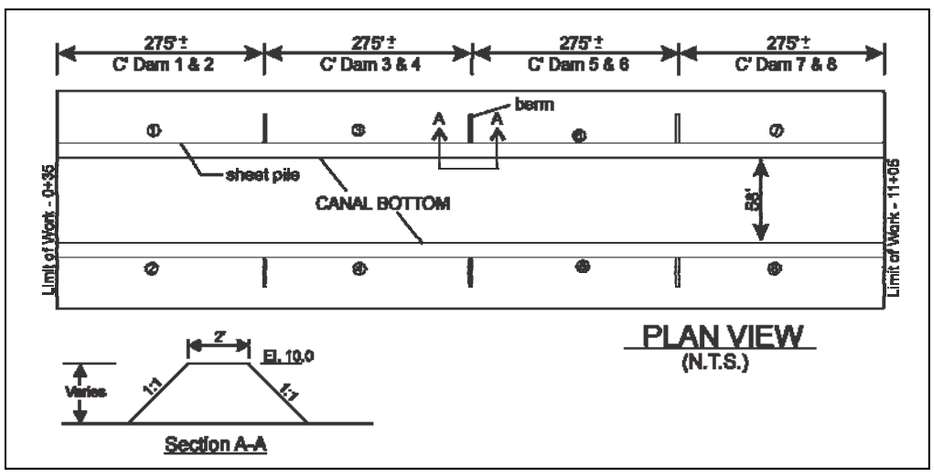

FIGURE 2: COFFERDAMS PLANNED TO BE CONSTRUCTED TO INSTALL CONCRETE APRON ON SLOPE

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 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.

FIGURE 3: FAILED CANAL BANK DURING CANAL

(continued on back)

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.

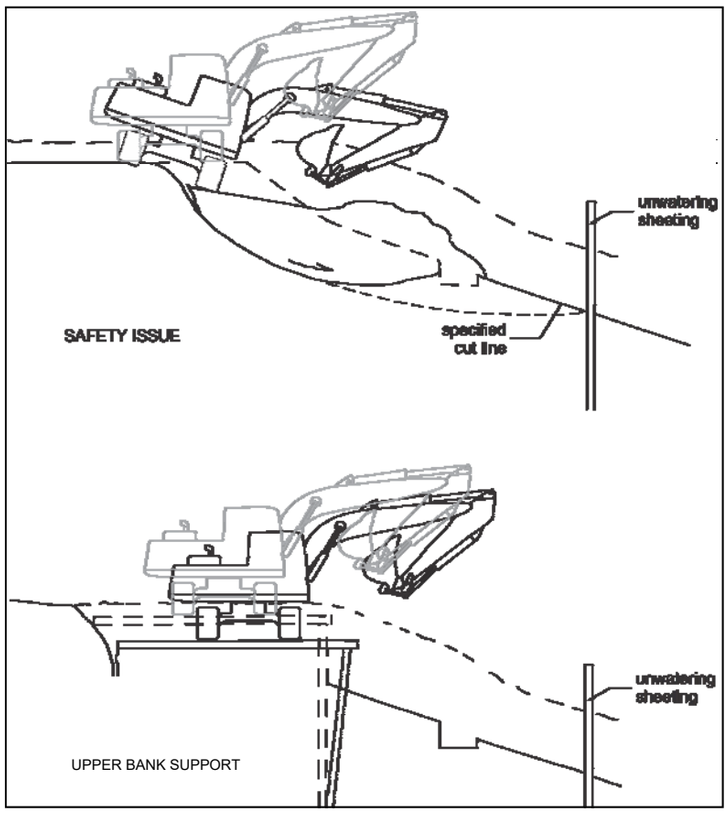

FIGURE 4: SAFETY CONCERN OVER UPPER BANK IN STABILITY AND INSTALLED SUPPORT TO ADDRESS THE ISSUE

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

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.

Other Engineering UPDATES of Interest:

UPDATE 17: Landslide During Land Development

UPDATE 26: Construction Slide Causes Significant Delay and Added Costs

UPDATE 7: Soil Provides Poor Road Construction Support

ABOUT MEA: Marino Engineering Associates, Inc. focuses on engineering research, practice and expert evaluations and is licensed in 25 states in the U.S. Our projects primarily have an emphasis on Geotechnical Engineering, however, we also have significant experience in projects involving transportation, subsidence engineering, laboratory testing, training, and geophysical exploration. Gennaro G. Marino, Ph.D., P.E., D.GE is president and principal engineer of Marino Engineering Associates, Inc., and has been a licensed professional engineer since 1984. To obtain additional information on MEA, one can also visit our website at www.meacorporation.com.

FOR MORE INFORMATION: There is a significant amount of additional information that is available on the above subject. For more information, please contact MEA at the address listed below.

MARINO ENGINEERING ASSOCIATES, INC.
1370 MCCAUSLAND AVENUE, ST. LOUIS, MISSOURI 63117
PH: 314.833.3189 FAX: 314.833.3448
http://www.meacorporation.com