Engineering
UPDATE©
MEA MARINO ENGINEERING ASSOCIATES, INC. • Issue 18

INVESTIGATION AND REPAIR OF A FAILED OLYMPIC POOL

FIGURE 1 VERY LARGE BUBBLE IN THE FLOOR LINER WHICH GREW OUT OF THE WATER DURING THE OPERATION OF THE POOL

From the beginning of the operation of the Olympic Pool in Tennessee there were signs of trouble. The water in the pool would not clear up, the pool liner had bubbles which appeared to grow over time, and the pool floor needed constant vacuuming. Initial thoughts by the contractor who constructed the pool was that filtration plumbing, which was installed below the pool floor, contained a significant amount of construction debris which was making its way into the pool. As the pool continued to operate, the blisters in the liner grew, which was speculated to be the result of a high groundwater table. Eventually one of these bubbles became so large that it rose above the water surface. To deflate this now very significant liner bubble, it was punctured spewing soil and water (see Figure 1).

With all the confusion and various theories on what caused this just constructed Olympic pool to fail, MEA was selected to perform an independent forensic investigation.

From a borehole camera inspection it was discovered that there was a significant fracturing of the sub-floor plumbing. The fracturing was concentrated at the connector of the rise pipe and header (see Figure 2). Also from manometer survey and photographic information it was established that the pool floor and wall had settled. Normally, such pool settlement would not affect the

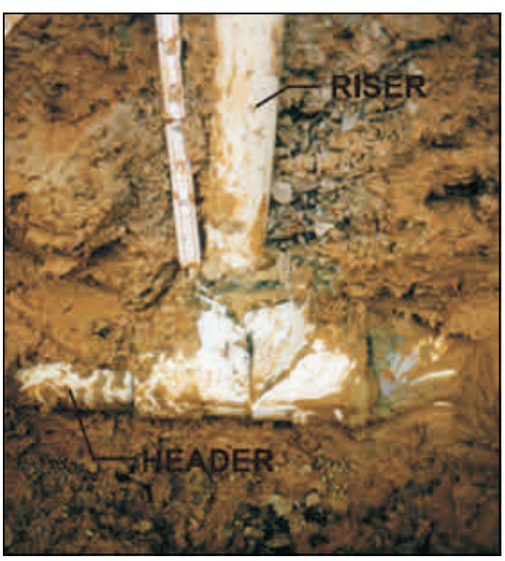
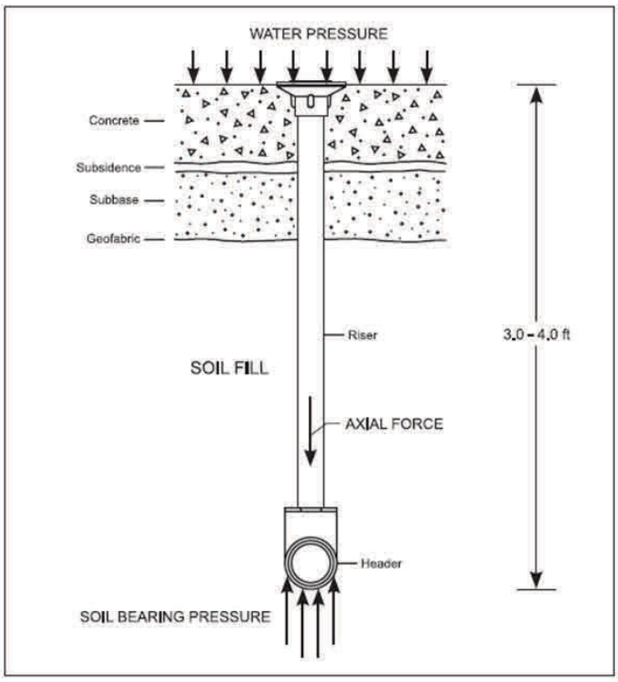


FIGURE 2 TYPICAL FRACTURING FOUND AT THE RISER/HEADER CONNECTION



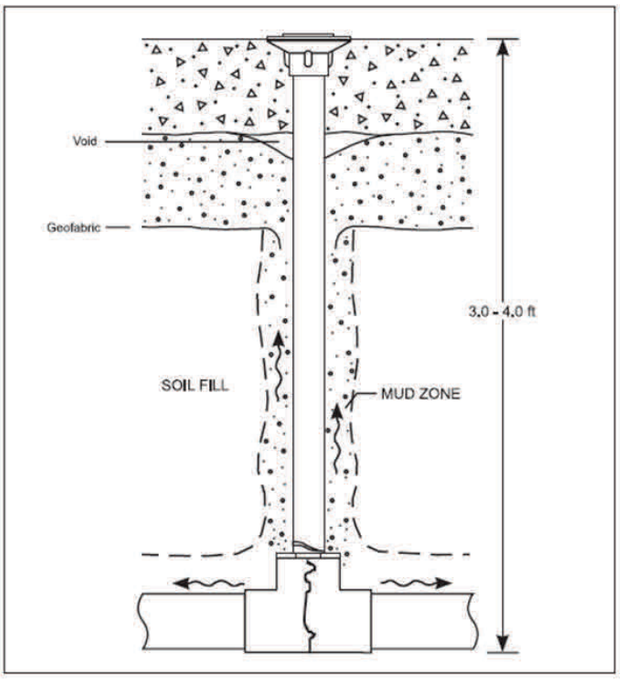


FIGURE 3 LOADING CONDITIONS ON THE WATER FILTRATION RISER/HEADER SYSTEM AND RESULTING DAMAGE

operation of the pool but the pool floor plumbing was particularly sensitive to compressibility of the fill as the PVC floor plumbing system consisted of about a 3 ft. riser pipe connected to a header pipe (see Figure 3). The system in effect acted as a concrete slab supported by load columns (PVC risers) which were in turn supported by footings (PVC header tees). After drilling and sampling the sub-soils and performing tests in their laboratory, MEA determined that the fill installed beneath the pool floor and wall was improperly placed and caused the pipe failures. Based on this testing and analysis it was further determined that this pipe system would not have failed if the soil fill was compacted to specifications. MEA laboratory tests demonstrated under these placement conditions that the soil was not sufficiently compressible.

Although some had recommended removal and replacement of the entire pool structure, MEA determined the foundation for in-place pool walls could be repaired by pressure grouting under MEA monitoring. This resulted in a savings of several hundred thousand dollars for the owner. The floor subsoil was removed and replaced, as well as the slab and associated plumbing.

Other Engineering UPDATES of Interest:

UPDATE 8: Geotechnical Investigation of Building Damage

UPDATE 7: Soil Provides Poor Road Construction Support

UPDATE 9: Hard Excavation Dispute

ABOUT MEA: Marino Engineering Associates, Inc. focuses on engineering research, practice and expert evaluations and is licensed in 24 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 Dr. Marino at the address listed below.

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