



PROJECT PROFILE

Liberia Silos

Condition Assessment | Tokadeh, Liberia



CLIENT

Odebrecht, on behalf of Arcelor Mittal

BACKGROUND

Two concrete silos that transferred iron ore material mined from the legendary Mimba mines in Liberia survived a ten-year civil war. One silo, located in the Atlantic coast at the Buchanan Port, is a one-bin structure 42 feet in diameter and 100 feet tall. The Tokedah silo is a two-bin structure with its supporting structure straddling railroad tracks; the bins are 30 feet in diameter and 120 feet tall. The structures were built in 1962. The Port silo is being considered for restoration and reuse as originally intended. For the foreseeable future, the Tokadeh silo will continue storing iron ore.

WJE was retained to investigate the structural condition of the silos in regards to their intended future use. WJE applied nondestructive evaluation (NDE) methods to perform the majority of the investigation and supplemented it with materials testing to verify the original design.

SOLUTION

Using cranes to access the upper sections of the silos, WJE engineers utilized NDE methods, including ground-penetrating radar, impact-echo (IE) testing, and visual and sounding surveys, to assess the conditions of the structures. Materials evaluations of concrete strength, chloride content, and petrography as well as reinforcing steel tensile strength and chemical composition were also conducted. The engineers calibrated the GPR and IE equipment at drilled holes and exploratory openings made at cracked areas and at areas exhibiting signs of corrosion.

WJE engineers verified that the as-built construction met and exceeded the design details shown on the original structural drawings and identified minor amounts of cracking in the Port silo as well as significant, but not critical, cracking in the Tokadeh silo. WJE recommended repairs, and precautions were prepared for the silos.

