Design and Construction of Circular and Vertical Prestressed Concrete Digester Tanks, Atotonilco (México)

José Manuel DURO
MSc. Civil Engineer
TYPSA
Madrid, SPAIN
jmduro@typsa.es

Jose M. Duro, born in 1975, works for TYPSA Consulting Engineers & Arquitects since 2007 in the Structures Department.

Eduardo TORRALBA
MSc. Civil Engineer
TYPSA
Madrid, SPAIN
etorralba@typsa.es

Eduardo Toralba, born in 1983, works for TYPSA Consulting Engineers & Arquitects since 2007 in the Structures Department.

Álvaro DEL CUVILLO
MSc. Civil Engineer
TYPSA
Madrid, SPAIN
adelcuvillo@typsa.es

Álvaro del Cuvillo, born in 1965, works for TYPSA Consulting Engineers & Arquitects since 2003 in the Structures Department.

Summary

This paper discusses the design and construction processes of the 15 000 m^3 post-tensioned concrete digesters of the Atotonilco Water Treatment Plant in Mexico. It introduces the project with a brief description of the Plant, which is the biggest in the world, and focuses on the structural challenges faced by the engineers during the design and construction phases, and what was done to resolve these issues regarding the tanks.

The design and construction of circular prestressed concrete structures for liquid storage using tendons requires specialized engineering knowledge and experience. This challenging design was solved by a double post-tensioned system placed into the wall, both circumferential and vertical, which assures the structural integrity of the tank under the design loads, compatible with the desired fast methods of construction for the 30 digesters of the Plant.

Keywords: water treatment plant, digester, post-tensioning, sliding formwork.

1. Introduction

Atotonilco Waste Water Treatment Plant is part of a Program established in 2007 by the Mexican Government and the National Water Commission (CONAGUA) to achieve the water sustainability in the Valley of Mexico. The programme´s main objectives are to transform sewage into clean water, suitable for irrigating agricultural lands, and to recharge the overexploited aquifers in the central region of the country [1].

Fig. 1: Aerial View of the Atotonilco WWTP

This Plant (figure 1), once completed, will have capacity to treat 60% of the wastewater from the metropolitan areas of Mexico City, which has over 20 million residents. Its construction will increase the agricultural potential of the Tula Valley of Hidalgo in 80 000 ha due to the use, for irrigation, of the obtained water. The treatment will take place through a Conventional Processes Train (TPC) during the dry season, with a capacity of 35 m^3/s. In the rainy season, the Chemical Process Train (TPQ) will be additionally used to treat the surplus water, supporting an increase of the processed volume up to 42 m^3/s.

The plant will use the energy content

https://doi.org/10.2749/222137814814068959