

Assessment of an Innovative Double Wall Corrugated-HDPE Manhole Structure

Abstract— Urban waste water management engineering featuring various conveyance and appurtenant structures connected by manholes is a very topical field in the context of increasing urbanism. While traditional manholes were generally made of brick and stone masonry, with the advancement in material science and engineering, new types of manholes have evolved; the double wall corrugated HDPE (DWC-HDPE) pipe system being one of the latest having inspired by the need of increased environmental sustainability, durability and faster construction, which also assists in better traffic management and business activities in the construction site. Despite a very promising solution, very less research has been done in this area of interdisciplinary structural engineering, and their structural behavior is poorly understood. In this paper, a prototype of DWC-HDPE manhole is subjected to vertical and lateral loads followed by an assessment of appropriate earth pressures, and its stress and buckling analysis is conducted. Manual calculations as well as simplified, linearly elastic, numerical modelling using FEM approach are adopted. The analyses results show that all the calculated parameters of the studied manhole structure are within acceptable limits; with the localization of stress occurring around the periphery of the opening. It is found that the intensity of tensile stress is largely dependent upon the discretization of support condition.

Keywords — *Urban waste management, Innovative technologies, Interdisciplinary structural engineering, DWC-HDPE manhole, Stress analysis*