

INVESTIGATE THE APPLICABILITY OF THE FIXED BASE AND RETAINING WALL TYPE STRUCTURAL ARRANGEMENTS IN THE CONSTRUCTION OF GROUND WATER RESERVOIRS

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Ground water reservoirs are vastly used in water supply schemes for water storage. Both fixed base and retaining wall type structural arrangements are used in those without any basis, where mostly the selected arrangement will depend on the preference and the experience of the design engineer. The aim of this study is to develop a framework to select a proper structural arrangement for ground water reservoirs depending on the wall height and the capacity of the tank for an economical design with adequate structural capacity. Objectives of this research are analysing the ground water reservoirs with fixed base and retaining wall type base, designing structural components using available design standards and comparing results considering reservoir capacity and wall height. Most common rectangular shaped ground water reservoir capacities in Sri Lanka were studied. Finite Element Modelling (FEM) and theoretical analysis were used to study the structural behaviour of ground water reservoirs, and spread sheets were used to design structural components. Results obtained from this study were compared with an existing ground water reservoir. It was evident from the results that fixed base type arrangement is economical for all the wall heights of reservoirs having capacity up to 225 m³. For capacities between 225 m³ to 2000 m³, retaining wall type arrangement is economical for wall heights up to about 7 m, while fixed base type arrangement is economical for wall heights beyond 7 m. Overall, retaining wall type arrangement becomes economical for larger wall heights when the capacity increases. According to results presented in this paper, it is evident that selection of the base type (fixed base or the retaining wall type base) in a water retaining structure should be carefully done by considering the tank capacity and the wall height. Since this research was done for a length to width ratio of 1, further research should be done for different length to width ratios to check the validity of these conclusions. Further, this research was carried out using BS standards as the design practice. Therefore, this research can be extended using Eurocode to check the possibility of further optimisation of both structural arrangements.

Keywords: Fixed base, Retaining wall type arrangement, Ground water reservoir, Tank capacity

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