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Cost Analysis of Overhead Tank Foundation with Varying Depth of Soil above Footing

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Abstract: ***In order to obtain the desired head of water, it is frequently required to construct elevated water tank, water tank to be used for storing water to tide over the daily requirements. In the construction of concrete structure for the storage of water and other liquids the imperviousness of concrete is most essential. In the present work, the cost analysis of overhead water tank with considerations of the depth of soil above footing as 800mm, 1000mm, 2000mm, 3000mm, 4000mm, 5000mm, 6000mm, 7000mm, 7500mm & 7775mm is done by using STAAD Pro Software, The Intze water tank is selected for above investigation and the analysis is made for the cost of foundation for different depths. A comparison is made between the depth of footing of Intze type water tank with varying depth of soil above footing, due to static and earthquake loads on structure and results are brought out in terms of cost of the foundation.***

Keywords*: Overhead water tank, Footing, Staad pro V8i, Cost analysis etc.*

I. INTRODUCTION

In order to obtain the desired head of water, it is frequently to construct elevated water tank, a water tank is used for store water to tide over the daily requirement. In the development of the concrete structure for the capacity of water and different fluids, the imperviousness of concrete is most fundamental. The main objective of work is cost analysis of Overhead tank foundation with various depth of soil above footing. The analysis is carried out using STAAD V8i. software. R.C.C structure i.e water tank, for different heights of soil above footing are modelled and analysed for the different combinations of static loading with varying depth of foundation. The comparison is made between the varying depth of soil and the cost of the foundation. The main objective of cost analysis of overhead water tank foundation with varying depth of soil above footing.

Benefits of Overhead Water Tank 1) overhead water tanks of numerous shapes may be used as carrier reservoirs, as balancing tank in water deliver schemes and for replenishing the tanks for numerous functions. 2) RC concrete water towers have wonderful benefits as they're now not suffering from climatic changes, are leak proof, offer extra tension and are adoptable for all shapes

II. METHODOLOGY

Intz water tank structure at particular locations are modelled and analysed for the different combinations of static loading. The comparison is made between the different depths of soil above footing versus cost of foundation.

Case-1: Design and analysis foundation of Intz water tank for depth of soil above footing is 800mm.
Case-2: Design and analysis foundation of Intz water tank for depth of soil above footing is 1000mm.
Case-3: Design and analysis foundation of Intz water tank for depth of soil above footing is 2000mm.
Case-4: Design and analysis foundation of Intz water tank for depth of soil above footing is 3000mm.
Case-5: Design and analysis foundation of Intz water tank for depth of soil above footing is 4000mm.
Case-6: Design and analysis foundation of Intz water tank for depth of soil above footing is 5000mm.
Case-7: Design and analysis foundation of Intz water tank for depth of soil above footing is 6000mm.
Case-8: Design and analysis foundation of Intz water tank for depth of soil above footing is 7000mm.
Case-9: Design and analysis foundation of Intz water tank for depth of soil above footing is 7500mm.
Case-10: Design and analysis foundation of Intz water tank for depth of soil above footing is 7775mm.

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Table No. 1 Description Water Tank	
Storage capacity	18 lac litter
Height of staging	24m
S.B.C	150 kN/m3
Grade of concrete	M20
Grade of steel	Fe415
No. Cross girder	4
Soil Type	Undrained
Unit Weight of Soil	18 kN/m3
Depth of Soil above Footing	800 mm to 7775 mm
Undrained Shear Strength	10 kN/m2
Factor of Safety Against Sliding	1.5
Factor of Safety Against Overturning	1.5
Column Shape	Rectangular
Co-efficient of Friction	0.5

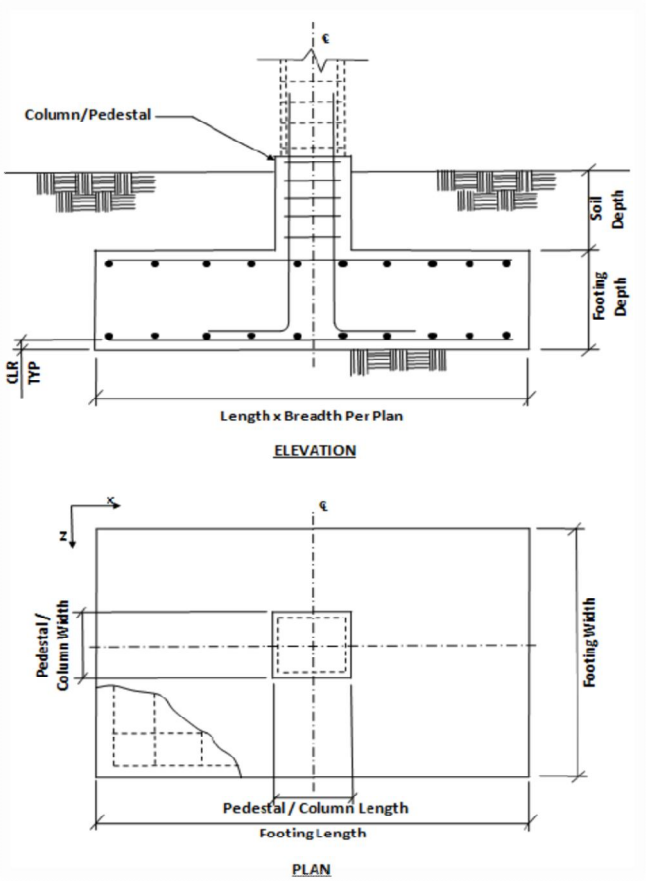

Figure 1 Foundation detail of water tank

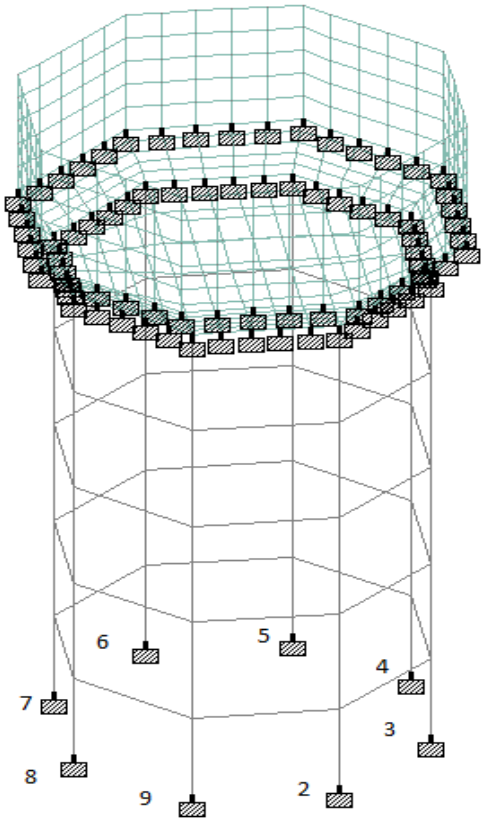

Figure 2 2D Model of Intz Water tank

III.RESULT & DISCUSSION

Quantitative analysis done for various item with vary the depth of soil above footing, which affect the cost of foundation. The study examines the performance of Intz water tank foundation. The different cases were studied for foundation with varying depth of soil

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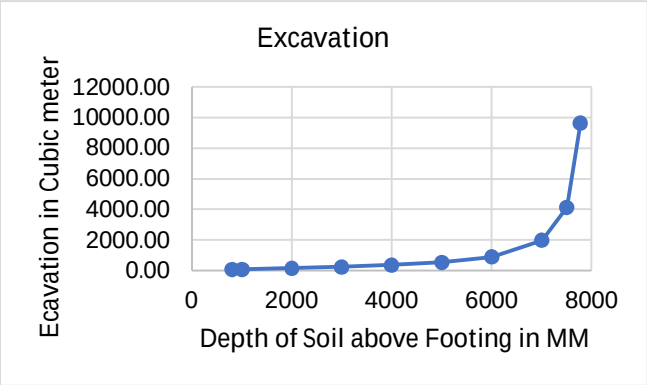
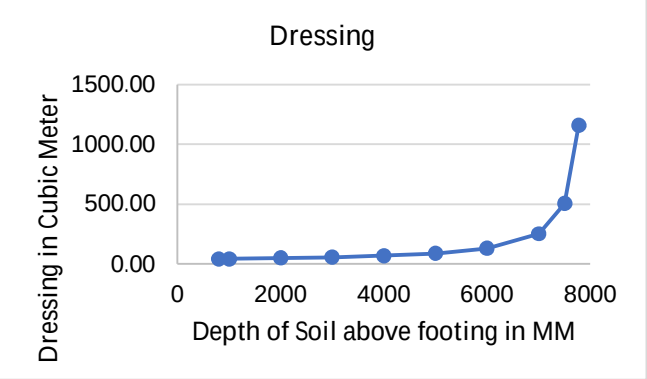
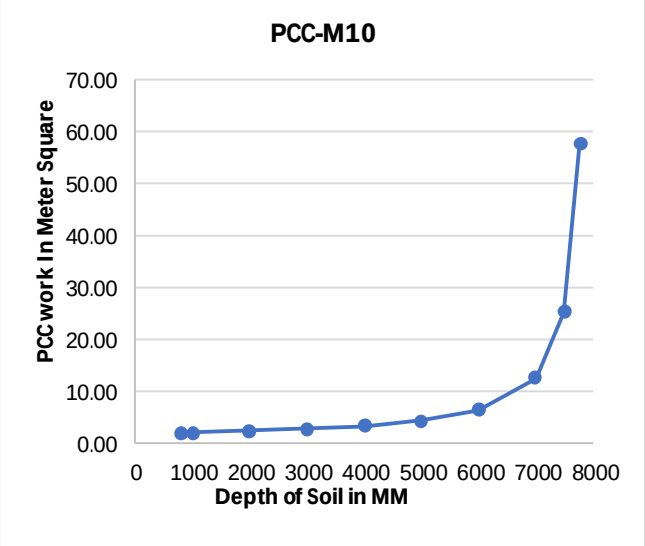
above footing. As it is discussed earlier, the foundation of any structure is most important part which controlling the cost of the structure and structure become economical. In present study, the varying depth of soil above footing of intz water tank foundation and cost of the foundation compared. To study the cost of foundation and the structure, the estimate of foundation with varying depth of soil above footing are worked out and are presented in table. The results presented in chart discussed briefly



Graph 1 Depth of soil Above Footing Vs Excavation



Graph 2 Depth of soil Above Footing Vs Dressing



Graph 3 Depth of soil Above Footing Vs PCC

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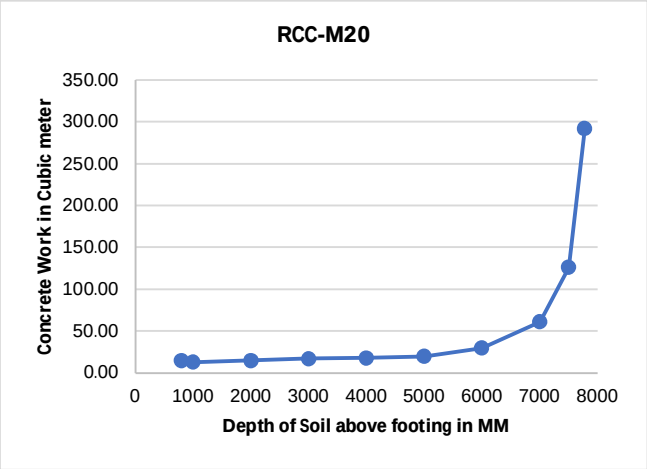
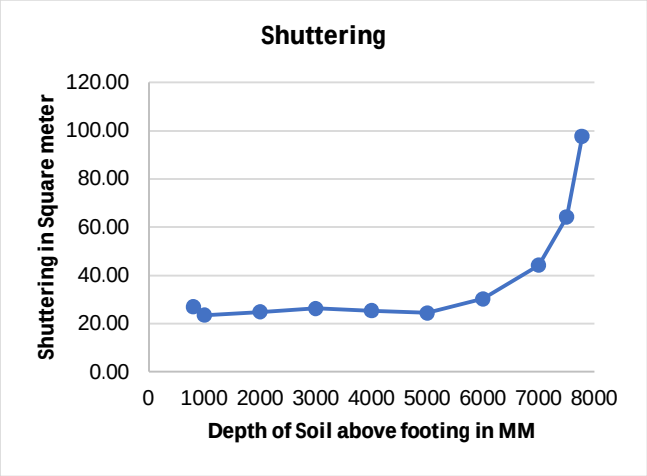
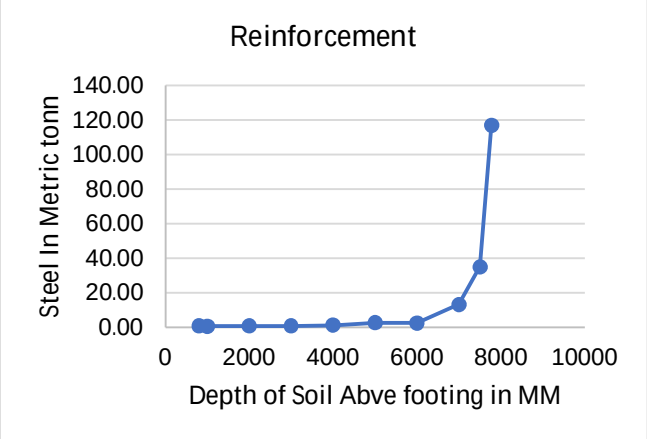


Graph 4 Depth of soil Above Footing Vs RCC



Graph 5 Depth of soil Above Footing Vs Shuttering



Graph 6 Depth of soil Above Footing Vs Steel

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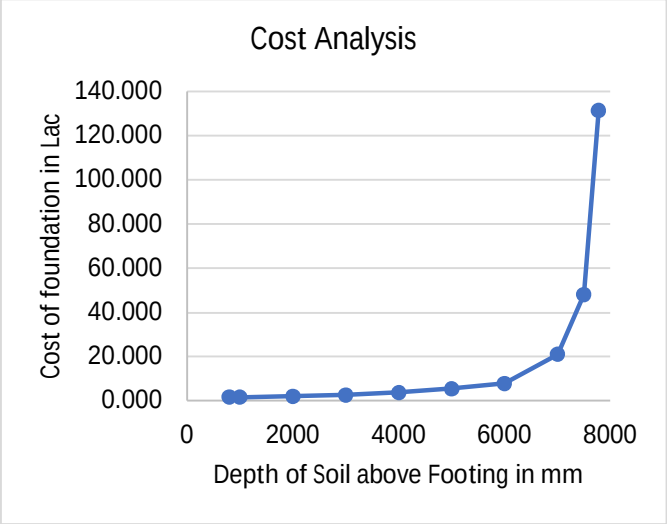

Graph **7** Depth of soil Above Footing Vs Cost of foundation

IV. CONCLUSION

Intz overhead water tank foundation with varying the depth of soil above the footing carried out and the following conclusions are drawn from the study based on cost impact:

A. Cost of foundation decreases by 8.11% in increasing the depth of soil above foundation by 1.0m
B. Cost of foundation increases gradually with the depth of soil above foundation up to 3.0m with the percentage of 37.07%
C. Further increase in the depth of soil above foundation by 4.0m enhances the cost by 53.45%.
D. The cost impact drastically changes 98.704% as we increase the depth of foundation by 7.775m
E. To maintain the economy, we shall restrict the depth of soil above foundation by 4.0m.
F. End bearing pile foundation shall be designed for this particular case to optimize the foundation design.

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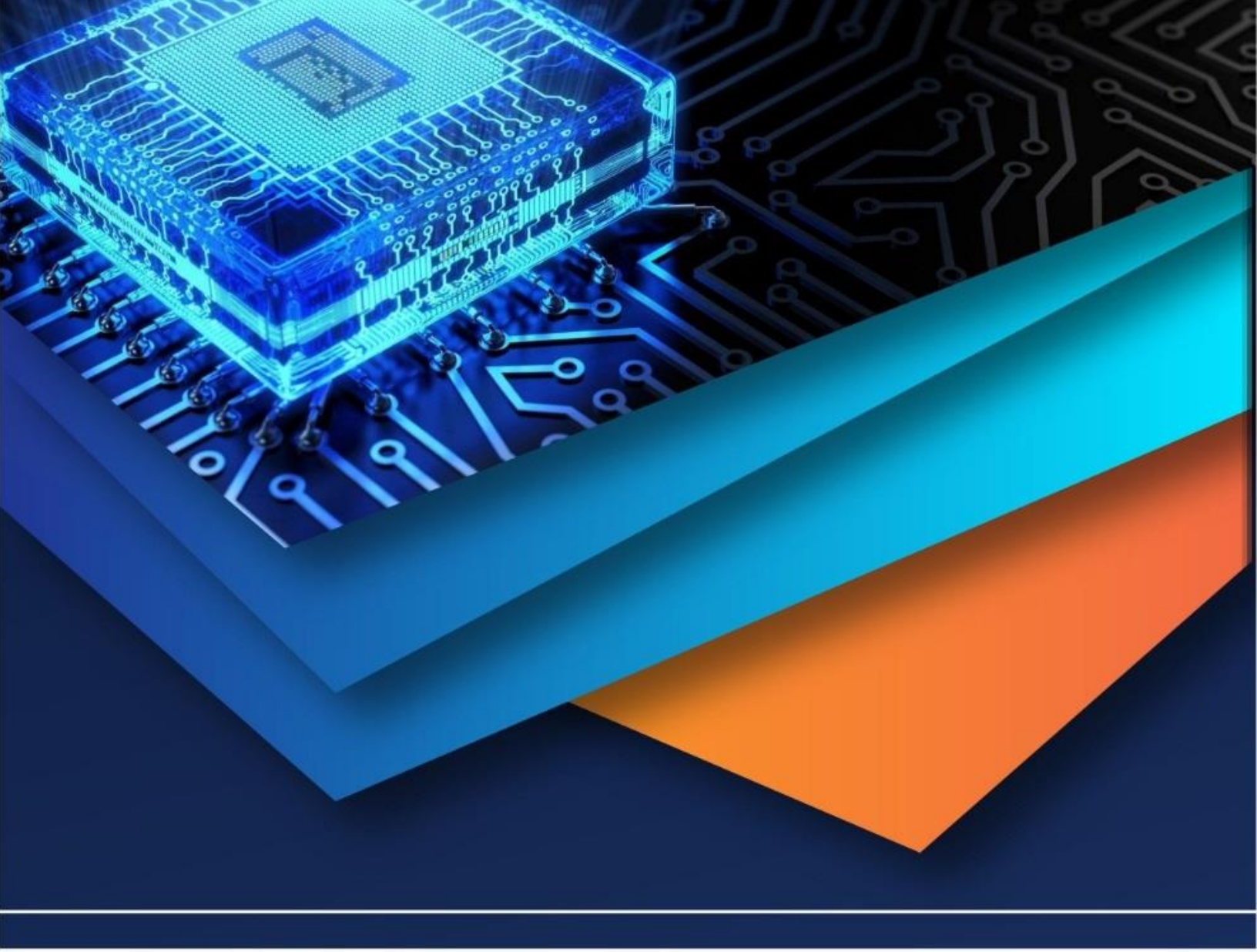

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