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COST VARIATION OF OVERHEAD TANK FOUNDATION WITH VARYING BRACING DISTANCES

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Abstract: ***Analysis of Overhead is done as per IS 1893 & determining the cost variation of foundation by varying the distance between bracing system in various earthquake zones.***
In the present work the water tank may hold the 18 lac liter water and height of staging is 24m, and the cost analysis of overhead water tank with required depth of soil above footing is 4000mm and consideration of Distance between the height of bracing are 1000mm, 2000mm, 3000mm, 4000mm, 5000mm, 6000mm, 7000mm, 8000mm, 9000mm and 10,000mm in various earthquake zones(zone II, zone III, zone IV, zone V) is done by using STAAD PRO V8i software. For the above investigation & cost analysis of foundation we have considered Intze type water tank .

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

1. INTRODUCTION

In all the civil engineering construction, the cost of foundation plays a vital role to decide the feasibility of the project. Around 20%-30% budget is exhausted in foundation work.

The main objective of work is cost analysis of overhead tank foundation with the various differences between the heights of bracing. The analysis is carried out by using STAAD pro V8i. software. R.C.C structure i.e. water tank, for required height of soil above footing is 4000mm are modeled and analyzed for the different combination of static loading with varying the height of bracing. The comparison is made between the distance between the height of bracing and the cost of foundation. The main objective of cost analysis of overhead water tank foundation with varying the height of bracing.

Benefits of overhead water tank: 1) overhead water tank delivers water pressure to all the processes, moderately at a constant level. This water pressure depends on the distance of the tank from the ground and the progression being fed. 2) overhead water tanks of numerous shapes may be used as reservoir, as balancing tank in water deliver schemes and for replenishing the tanks for numerous functions.

2. METHODOLOGY

Intze water tank structure at particular locations are modeled and analyzed for the different combinations of static loading and in the different zones (zone II, zone III, zone IV, zone V). the comparison is made between the distance between the height of bracing versus the cost of foundation. The required depth of soil above footing is 4000mm.

Case-1: Design and analysis foundation of Intze water tank for distance between the height of bracing is 1000mm.
Case-2: Design and analysis foundation of Intze water tank for distance between the height of bracing is 2000mm.
Case-3: Design and analysis foundation of Intze water tank for distance between the height of bracing is 3000mm.
Case-4: Design and analysis foundation of Intze water tank for distance between the height of bracing is 4000mm.
Case-5: Design and analysis foundation of Intze water tank for distance between the height of bracing is 5000mm.
Case-6: Design and analysis foundation of Intze water tank for distance between the height of bracing is 6000mm.
Case-7: Design and analysis foundation of Intze water tank for distance between the height of bracing is 7000mm.
Case-8: Design and analysis foundation of Intze water tank for distance between the height of bracing is 8000mm.
Case-9: Design and analysis foundation of Intze water tank for distance between the height of bracing is 9000mm.
Case-10: Design and analysis foundation of Intze water tank for distance between the height of bracing is 1000

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	1 to 10
Soil type	Undrained
Unit Weight of Soil	18 KN/m3
Depth of soil above footing	4000mm
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

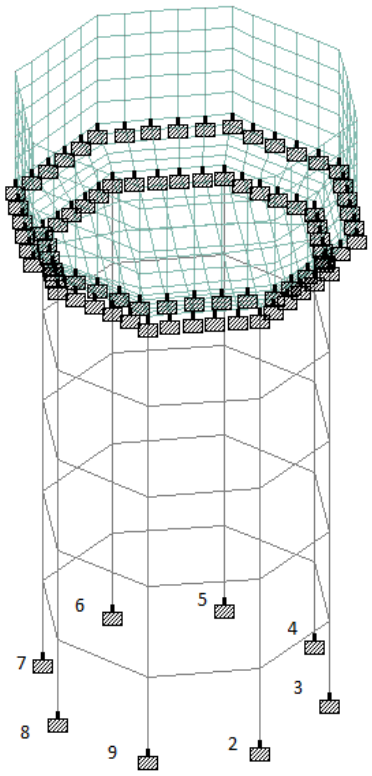


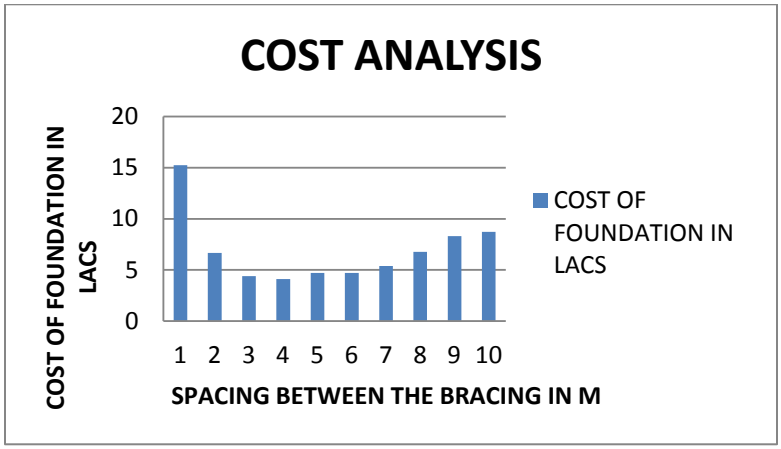
Figure 1 2D Model of Intz Water tank

III. RESULT & DISCUSSION

Quantitative analysis done for various item with vary the difference between height of bracing, which affect the cost of foundation. The study examine the performance of Intz water tank foundation. The different cases were studied for foundation with varying height of bracing between two cross girders in different zones. 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 difference between height of bracing of intz water tank foundation and cost of the foundation compared & the depth of soil above footing is 4000mm. to study the cost of foundation and the structure, the estimate of foundation with varying height of bracing are worked out in different zone are presented in table. The result presented in chart discussed briefly

1: ZONE II

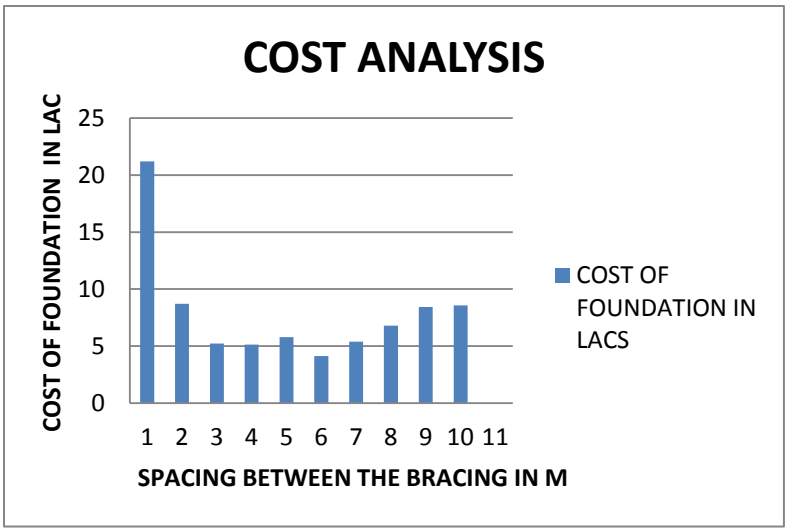
ZONE II	
SPACING BETWEEN THE BRACING	COST OF FOUNDATION IN LACS
1	15.24
2	6.67
3	4.39
4	4.12
5	4.7
6	4.7
7	5.38
8	6.77
9	8.32
10	8.73



Graph 1 Spacing between the bracing Vs cost

2: ZONE III

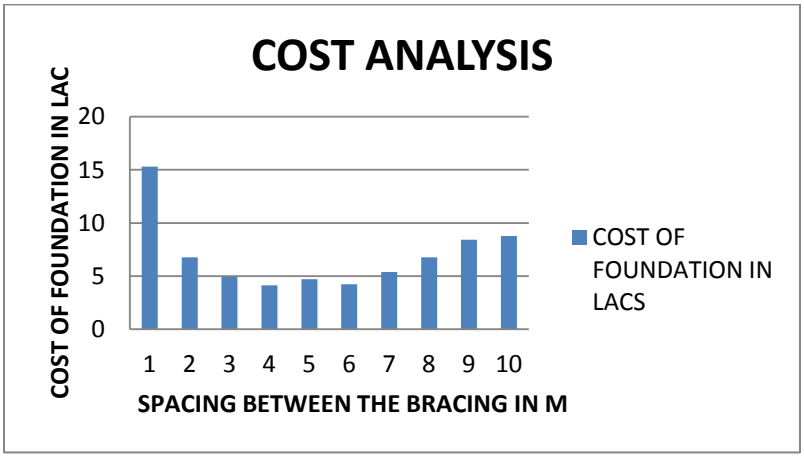
ZONE III	
SPACING BETWEEN THE BRACING	COST OF FOUNDATION IN LACS
1	21.2
2	8.71
3	5.22
4	5.14
5	5.78
6	4.13
7	5.39
8	6.8
9	8.43
10	8.58



Graph 2 Spacing between the bracing Vs cost

3: ZONE IV

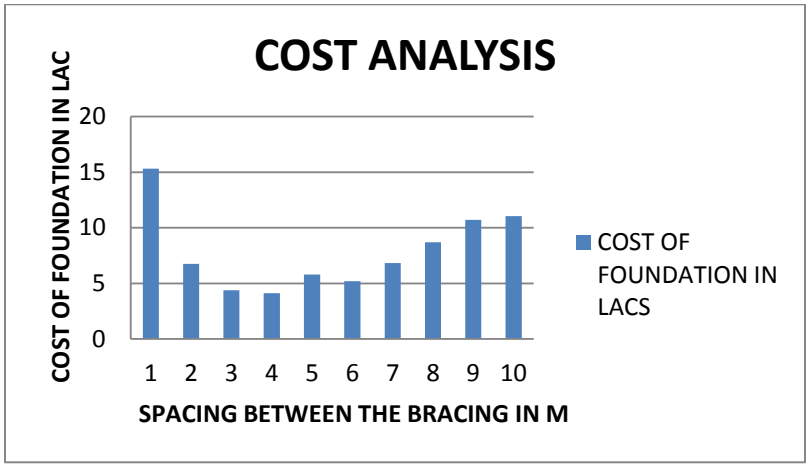
ZONE IV	
SPACING BETWEEN THE BRACING	COST OF FOUNDATION IN LACS
1	15.31
2	6.77
3	4.93
4	4.13
5	4.7
6	4.22
7	5.39
8	6.77
9	8.43
10	8.78



Graph 3 Spacing between the bracing Vs cost

4: ZONE V

ZONE V	
SPACING BETWEEN THE BRACING	COST OF FOUNDATION IN LACS
1	15.31
2	6.77
3	4.39
4	4.13
5	5.8
6	5.19
7	6.83
8	8.71
9	10.72
10	11.05



Graph 4 Spacing between the bracing Vs cost

IV. CONCLUSION

Cost analysis of Intz Overhead water tank foundation is carried out by varying the difference between the height of bracing in earthquake zone No.2,3,4 & 5, the following conclusion are drawn from the study based on cost impact.

A. To maintain the economy in foundation the bracing shall be in the range of 4m, in earth quake Zone No. II, IV & V respectively
B. In Earthquake Zone No.III, Economic spacing of bracing will be in the range of 6m.
C. In Earth Quake Zone II, If Spacing between the bracing is increased by 4m to 10m and decreased by 4m to 1m, the percentage cost is increased by 111.89% & 269.90 % respectively.
D. In Earth Quake Zone III, If Spacing between the bracing is increased by 6m to 10m and decreased by 6m to 1m, the percentage cost is increased by 107.75% & 413.32 % respectively.
E. In Earth Quake Zone IV, If Spacing between the bracing is increased by 4m to 10m and decreased by 4m to 1m, the percentage cost is increased by 112.59% & 270.70 % respectively.
F. In Earth Quake Zone V, If Spacing between the bracing is increased by 4m to 10m and decreased by 4m to 1m, the percentage cost is increased by 167.55% & 270.70 % respectively.

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