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Rehabilitation of Load Bearing Structures without Dismantle

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Abstract: Civil Engineering Industry is one of the oldest industries which provide a basic infrastructure to all the human beings. Structures can be any kind it can be Historical, Heritage Structure, Residential building, Commercial building or an Industrial building. Every structure has its own service life, and within this servicelife it should stand firmly on its position. Ex- ATajMahal in Agra in India which is one of the oldest structure and a Wonders of the World, and still stand on its position very efficiently. But this not a condition about the today's Structures. The rehabilitation is proposed based on the safe bearing capacity of soil. The safe bearing capacity of soil with 550 kN/m2 is found to be suitable for the good foundation in the case of rehabilitation. The foundation size for the G+2 building is more as compared to the ground storey building and the rehabilitation is more suitable for only ground storey building. The rehabilitation is possible by improving the bearing capacity of the soil by various ways.
Keywords: Rehabilitation, foundation, STAAD and existing building

I. INTRODUCTION

The need to improve the ability of an existing building to withstand seismic forces arises usually from the evidence of damage and poor behaviour during a recent earthquake. It can arise also from calculations or by comparisons with similar buildings that have been damaged in other places. While in the first case the owner can be rather easily convinced to take measures to improve the strength of his building, in the second case dwellers that have much more stringent day-to-day needs are usually reluctant to invest money in the improvement of seismic safety.

The decision as to whether a given building needs to be strengthened and to what degree, must be based on calculations that show if the levels of safety demanded by present codes and recommendations are met. Difficulties in establishing actual strength arise from the considerable uncertainties related with material properties and with the amount of strength deterioration due to age or to damage suffered from previous earthquakes.

II. REVIEW OF LITERATURE

Addala, BHAVAR D et al [1] carried out the work and according to the results of the analysis of the rehabilitated structure, it can be concluded that the methodology followed for the rehabilitation of a typical masonry historical building has proven to be effective. The type and extent of the repairs and interventions performed seems to result in a safe behavior of the rehabilitated structure.

El Gawady M., et al [2] studied that the condition of the building appears to be quite bad and major structural distress is observed in some of the columns and beams of the external walls. Micro Concrete Repairs to R.C.C. Column, Beam, etc.: In terms of to restoration of extensive damages in R.C.C. micro concrete: micro concrete is a very high strength mix design concrete, its factory made product.

Jorge Miguel Proença et al [5] Structural safety of colonial stone masonry buildings is severely jeopardized in most parts of Mexico by earthquakes and by ground subsidence. The situation is particularly severe in Mexico City where subsidence has been aggravated by excessive extraction of underground water. Despite of frequent rehabilitations, cumulative damage caused by differential settlements through the centuries has led many of these structures to a critical condition.

III. MODELING

The modeling is carried out in the STAAD software, mentioned as follows.

1) *Model-I :* G+0 building (SBC=430KN/M^2)
2) *Model-II :* G+1 building (SBC=430KN/M^2)
3) *Model-III :* G+2 building (SBC=430KN/M^2)
4) *Model-IV :* G+0 building (SBC=550KN/M^2)
5) *Model-V :* G+1 building (SBC=550KN/M^2)

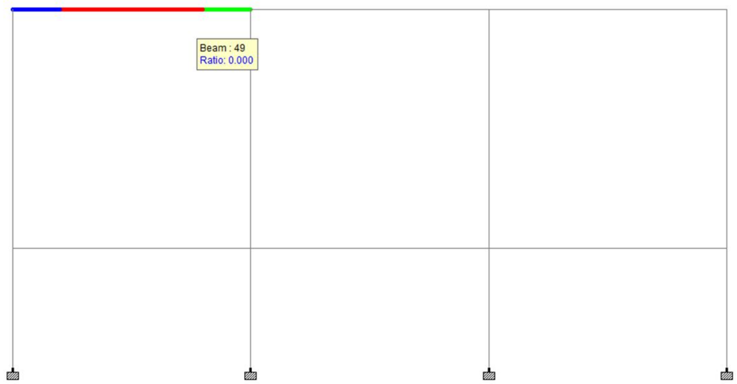

Fig. No.1: Elevation of model-I

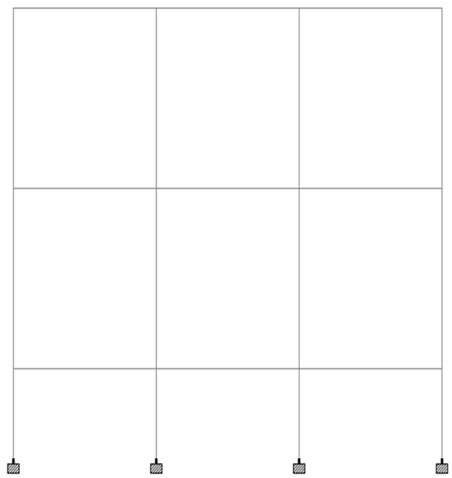

Fig. No.2: Elevation of model-II

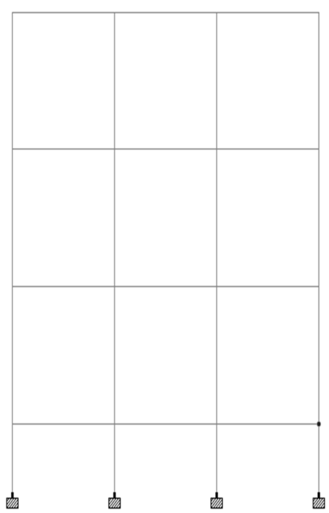

Fig. No.3: Elevation of model-III

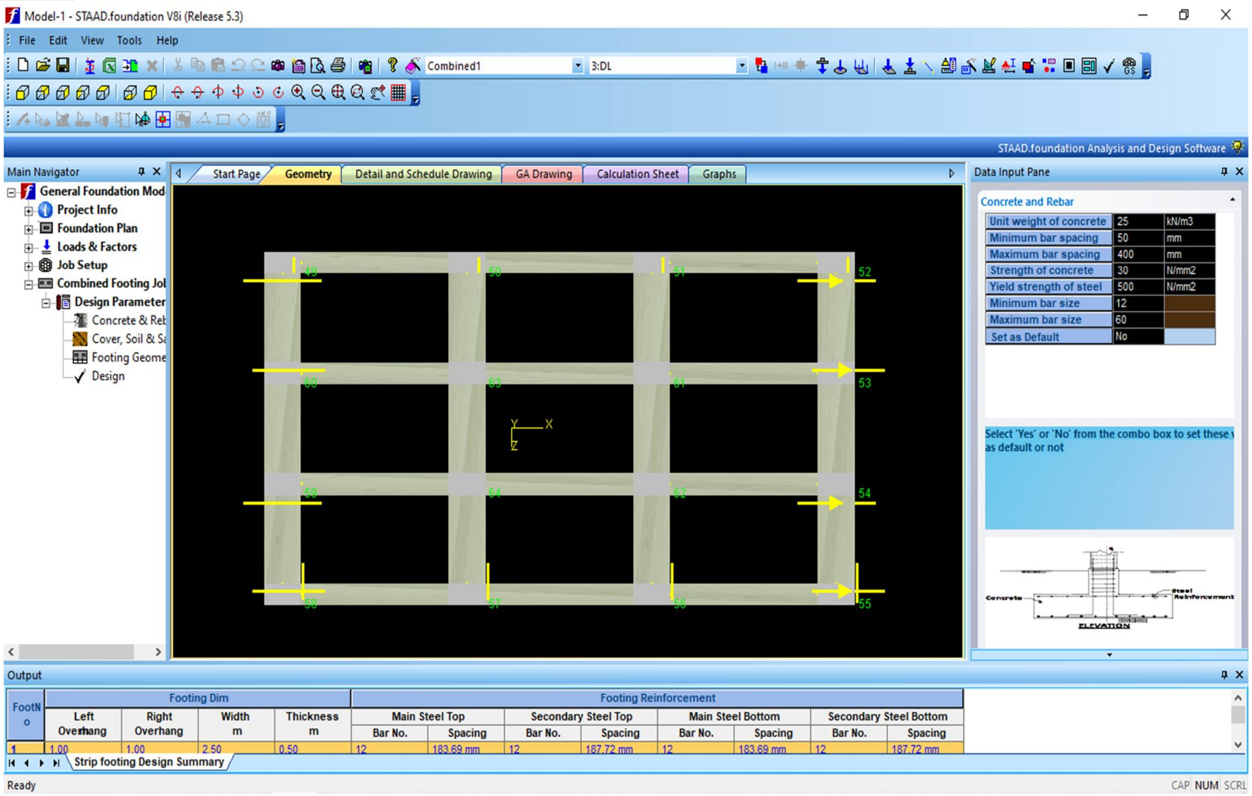

Fig. No.4: Plan of Combined Footing

IV. RESULTS

The analysis is carried out in STAAD software and the results in terms of shear force, bending moment and other parameter is obtained as follows.

Table No. 1: Footing geometry of model-I

Footing No.	Left Overhang (m)	Right Overhang (m)	Length (m)	Width (m)	Thickness (m)
1	0.500	0.500	10.000	1.000	0.200
2	0.500	0.500	10.000	1.000	0.200
3	0.500	0.500	10.000	1.000	0.200
4	0.500	0.500	10.000	1.000	0.200
5	0.500	0.500	10.000	1.000	0.200
6	0.500	0.500	10.000	1.000	0.200
7	0.500	0.500	10.000	1.000	0.200
8	0.500	0.500	10.000	1.000	0.200

Table no.2: Footing reinforcement for model-I

Footing No.	Footing Reinforcement			
-	Main Steel Top	Main Steel Bottom	Secondary Steel Top	Secondary Steel Bottom
1	Ø12 @ 125 mm c/c	Ø12 @ 400 mm c/c	Ø12 @ 400 mm c/c	Ø12 @ 400 mm c/c
2	Ø12 @ 95 mm c/c	Ø12 @ 400 mm c/c	Ø12 @ 400 mm c/c	Ø12 @ 400 mm c/c
3	Ø12 @ 95 mm c/c	Ø12 @ 400 mm c/c	Ø12 @ 400 mm c/c	Ø12 @ 400 mm c/c
4	Ø12 @ 125 mm c/c	Ø12 @ 400 mm c/c	Ø12 @ 400 mm c/c	Ø12 @ 400 mm c/c
5	Ø12 @ 125 mm c/c	Ø12 @ 400 mm c/c	Ø12 @ 400 mm c/c	Ø12 @ 400 mm c/c

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Table No.3: Calculated Pressures at Four Corners of model-II

Load Case	Pressure at corner 1 (q_1) (kN/m^2)	Pressure at corner 2 (q_2) (kN/m^2)	Pressure at corner 3 (q_3) (kN/m^2)	Pressure at corner 4 (q_4) (kN/m^2)	Area of footing in uplift (A_u) (sq. m)
3	**22.5839**	22.5839	24.5568	24.5568	0.000
3	22.5839	**22.5839**	24.5568	24.5568	0.000
3	22.5839	22.5839	**24.5568**	24.5568	0.000
3	22.5839	22.5839	24.5568	**24.5568**	0.000

Table No. 4: Footing Geometry for model-III

Footing No.	Left Overhang (m)	Right Overhang (m)	Length (m)	Width (m)	Thickness (m)
1	0.500	0.500	10.000	1.000	0.250
2	0.500	0.500	10.000	1.000	0.250
3	0.500	0.500	10.000	1.000	0.250
4	0.500	0.500	10.000	1.000	0.250
5	0.500	0.500	10.000	1.000	0.250
6	0.500	0.500	10.000	1.000	0.250
7	0.500	0.500	10.000	1.000	0.250
8	0.500	0.500	10.000	1.000	0.250

Table NO.5: Applied Loads - Service Stress Level for model-IV

Applied Loads - Service Stress Level					
LC	Axial (kN)	Shear X (kN)	Shear Z (kN)	Moment X (kNm)	Moment Z (kNm)
-					
Column Number : 49					
3	57.360	-0.851	-0.822	-0.309	0.353
-					
Column Number : 60					
3	68.645	-0.851	0.045	0.030	0.353
-					
Column Number : 59					
3	68.645	-0.851	-0.045	-0.030	0.353
-					
Column Number : 58					
3	57.360	-0.851	0.822	0.309	0.353

Table No. 6: Footing Reinforcement details for model-V

Footing No.	Footing Reinforcement			
-	Main Steel Top	Main Steel Bottom	Secondary Steel Top	Secondary Steel Bottom
1	Ø10 @ 95 mm c/c	Ø10 @ 400 mm c/c	Ø10 @ 400 mm c/c	Ø10 @ 400 mm c/c
2	Ø10 @ 65 mm c/c	Ø10 @ 400 mm c/c	Ø10 @ 400 mm c/c	Ø10 @ 400 mm c/c
3	Ø10 @ 65 mm c/c	Ø10 @ 400 mm c/c	Ø10 @ 400 mm c/c	Ø10 @ 400 mm c/c
4	Ø10 @ 95 mm c/c	Ø10 @ 400 mm c/c	Ø10 @ 400 mm c/c	Ø10 @ 400 mm c/c
5	Ø10 @ 85 mm c/c	Ø10 @ 400 mm c/c	Ø10 @ 400 mm c/c	Ø10 @ 400 mm c/c

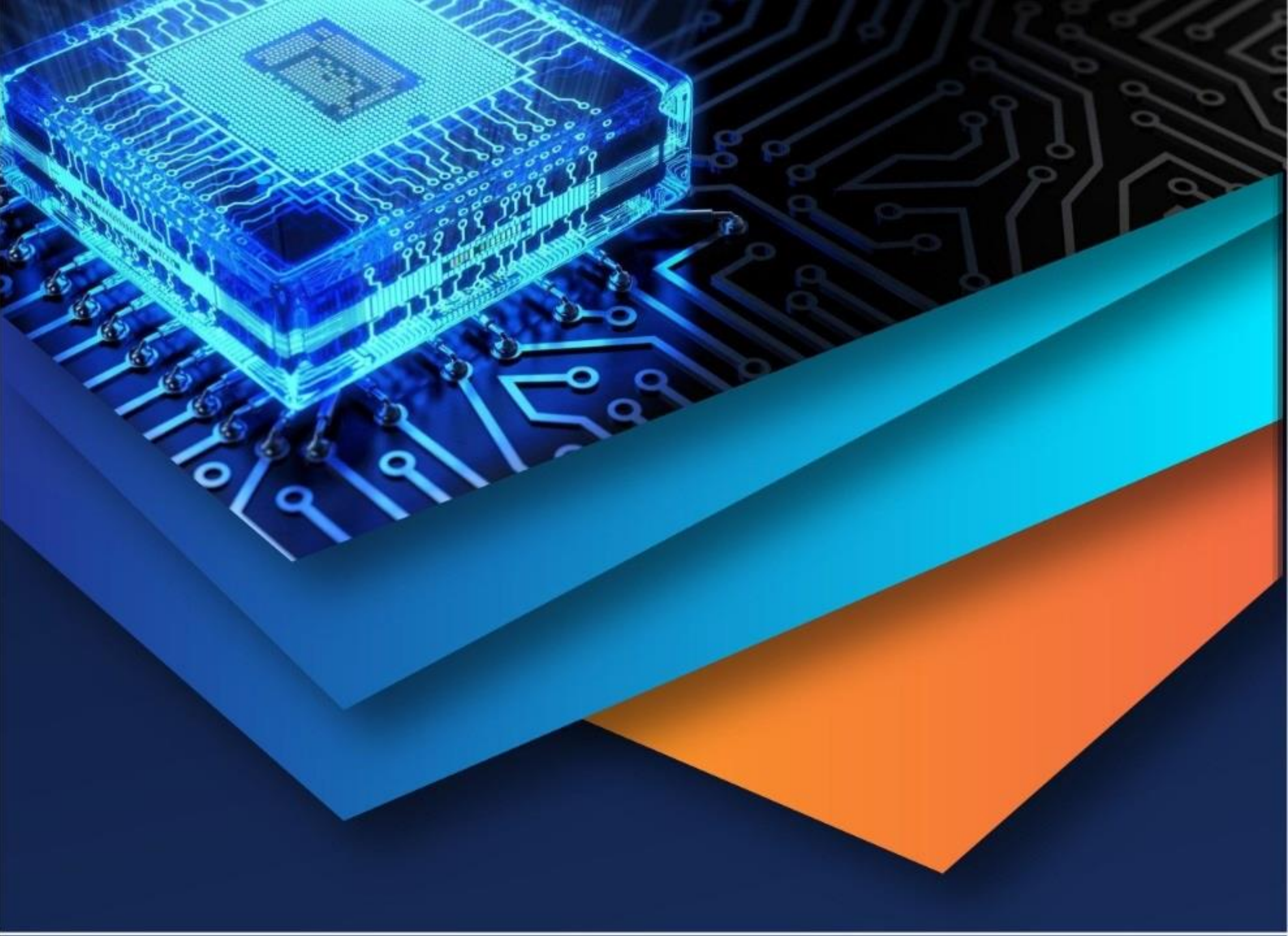
V. CONCLUSION

The conclusions from the above study are as follows:

A. The rehabilitation is proposed based on the safe bearing capacity of soil
B. The safe bearing capacity of soil with 550 kN/m2 is found to be suitable for the good foundation in the case of rehabilitation
C. The foundation size for the G+2 building is more as compared to the ground storey building and the rehabilitation is more suitable for only ground storey building.
D. The rehabilitation is possible by improving the bearing capacity of the soil by various ways

REFERENCE

[1] BHAVAR DADASAHEB “Retrofitting of Existing RCC Buildings by Method of Jacketing” Vol. 1, Issue: 5, June: 2013 (IJRMEET) ISSN: 2320-6586
[2] El Gawady M., Lestuzzi P., Badoux M., A Review of Conventional Seismic Retrofitting Techniques for URM. 13th Internat. Brick a. Block Masonry Conf., Amsterdam, July 4-7, 9, 2004, 1-9.
[3] Guney OZCEBE “REHABILITATION OF EXISTING REINFORCED CONCRETE STRUCTURES USING CFRP FABRICS” 13th World Conference on Earthquake Engineering Vancouver, B.C., Canada August 1-6, 2004 Paper No. 1393
[4] J. Bhattacharjee “REPAIR, REHABILITATION &RETROFITTING OF RCC FOR SUSTAINABLE DEVELOPMENT WITH CASE STUDIES” Civil Engineering and Urban Planning: An International Journal (CiVEJ) Vol.3, No.2, June 2016
[5] Jorge Miguel Proença, António Sousa Gago & Ana V. Costa, “Strengthening of masonry wall load bearing structures with reinforced plastering mortar solution”, WCEE, LISBOA, 2012.
[6] Kaya S.M., Inventory of Repair and Strengthening Methods with Iron and Steel. M.Sc. Diss. in Adv. Masters in Structural Anal. of Monum. and Histor. Constr. at Techn. Univ. of Catalonia, 10, 2009, 79-89.
[7] Kaya S.M., Inventory of Repair and Strengthening Methods with Iron and Steel. M.Sc. Diss. in Adv. Masters in Structural Anal. of Monum. and Histor. Constr. at Techn. Univ. of Catalonia, 10, 2009, 79-89.
[8] Krish R. Villaitramani” PREFABRICATED CONSTRUCTION FOR MASS HOUSING IN MUMBAI” International Journal of Innovative Research in Advanced Engineering (IJIRAE) ISSN: 2349-2163 Volume 1 Issue 9 (October 2014)
[9] Krish R. Villaitramani” PREFABRICATED CONSTRUCTION FOR MASS HOUSING IN MUMBAI” International Journal of Innovative Research in Advanced Engineering (IJIRAE) ISSN: 2349-2163 Volume 1 Issue 9 (October 2014)
[10] Krish R. Villaitramani” PREFABRICATED CONSTRUCTION FOR MASS HOUSING IN MUMBAI” International Journal of Innovative Research in Advanced Engineering (IJIRAE) ISSN: 2349-2163 Volume 1 Issue 9 (October 2014)
[11] Mahmoudi M., Ebadi F., Seismic Rehabilitation of Unreinforced Masonry Buildings Using Pipe Bracing System. Proc. of the 14th Europ. Conf. on Earthquake Engng., Ohrid, Rep. of Macedonia, 5, 2010, 1-5.
[12] P. B. Oni “Performance Based Evaluation of Shear Walled RCC Building by Pushover Analysis” International Journal of Modern Engineering Research (IJMER).



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