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Steel Required in Angle Shaped Footing in Different Earth Quake Zone

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***Abstract*: There are two type of load static and dynamic load, to analysis behaviour of footing under static load is easy but in case of dynamic load it is very difficult so this paper represents for the behaviour of footing under dynamic load by providing angle shaped footing and analysis the quantity of steel in different earthquake zone. With the help of this paper I want to analysis quantity of steel in different sesmic zone. This paper is very helpful for study of footing to analysis the quantity of steel under different seismic zone. Foundations under different seismic zone (2,3,4 and 5) and the different aspect ratio (20mX40m, 20mX60m, 20mX60m, 20mX80m, 20mX100m) and different height of high rise buildings.**

***Keywords*: angle shaped footing, earth quake zone**

1. Introduction

Like Angle Shaped the T - Shaped footings are provided with vertical projection located beneath the center of footing. The projection is the integral part of footing as in case of angle shaped footings. The T-Shaped is a footing shape used to improve the bearing capacity of shallow footings against both static and dynamic loads. In addition to the vertical settlement, footings may also be affected from both horizontal displacements (and sliding) and/or rotation (or overturning) which are reasons that can reduce the ultimate bearing capacity and increase the settlement. The vertical insertion of the proposed rigid T-Shaped footing into the soil provides considerable resistance against both sliding and overturning, had enough to regain the reduction in bearing capacity and the increase in settlement.

The test results indicates that the ultimate bearing capacity of the T Shaped footing can be appreciably increased by soil confinement under axial load as well under dynamic load. It has been observed that such a confinement resists the lateral displacement of the soil underneath the footing, leading to a significant decrease in the vertical settlement and hence improving the ultimate bearing capacity. Different multi storey building G +10 G+15 G+26 are taken for comparative studies of foundation system for different seismic zones, different aspect ratio.

Table 1
Steel Required for Zone 2 S.B.C 250 Kn/m² at Corner

Aspect Ratio	Zone	Number of Stories	Required Reinforcement	
			Conventional Footing (Kg)	T-Shaped Footing (Vol.)
20x40	2	10	953.23	911.32
		15	1438.69	1320.82
		26	3832.73	3344.38
20x60	2	10	956.65	912.7
		15	1447.73	1328.47
		26	3832.73	3344.38
20x80	2	10	956.3	911.8
		15	1447.73	1328.47
		26	3832.73	3344.38
20x100	2	10	953.5	911.3
		15	1447.73	1328.47
		26	3832.73	3344.38

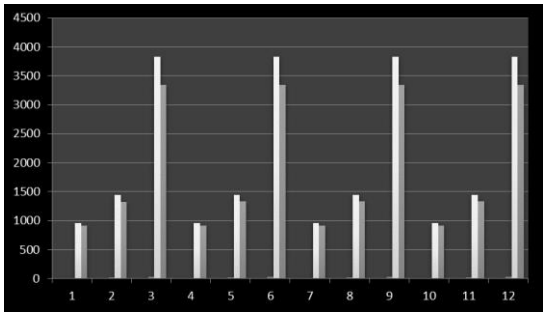

Fig. 1. Steel required for zone 2 S.B.C 250 Kn/m² at corner

Table 2
Steel Required for Zone 3 S.B.C 250 Kn/m² at Corner

Aspect Ratio	Zone	Number of Stories	Required Reinforcement	
			Conventional Footing (Kg)	T-Shaped Footing (Vol.)
20x40	3	10	953.23	911.32
		15	1437.69	1321.842
		26	3832.73	3344.38
20x60	3	10	956.32	912.12
		15	1447.73	1328.47
		26	3832.73	3343.38
20x80	3	10	954.5	911.98
		15	1446.43	1328.47
		26	3832.73	3344.38
20x100	3	10	953.7	911.01
		15	1447.73	1329.47
		26	3832.73	3344.38

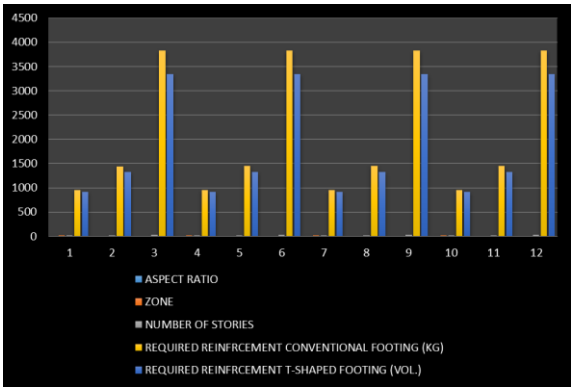

Fig. 2. Steel required for Zone 3 S.B.C 250 kn/m² at corner

Table 3
Steel Required for Zone 4 S.B.C 250 Kn/m² at Corner

Aspect Ratio	Zone	Number of Stories	Required Reinforcement	
			Conventional Footing (Kg)	T-Shaped Footing (Vol.)
20x40	4	10	954.6	911.65
		15	1416.82	1302.34
		26	3578.32	3129.34
20x60	4	10	957.61	914.2
		15	1445.47	1326.56
		26	3598.98	3146.81
20x80	4	10	956.86	913.56
		15	1441.7	1323.37
		26	3620.85	3165.29
20x100	4	10	955.35	912.29
		15	1435.67	1318.27
		26	3559.02	3113.03

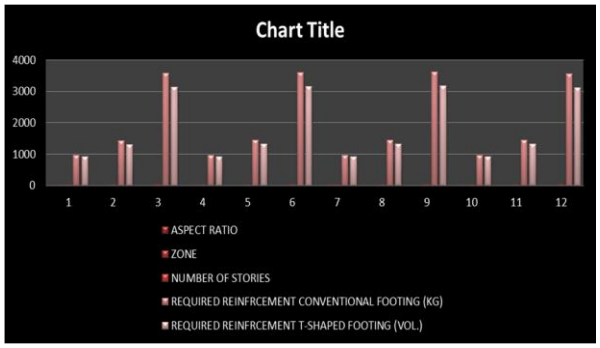

Fig. 3. Steel Required for Zone 4 S.B.C 250 Kn/m² at Corner

Table 4
Steel Required for Zone 5 S.B.C 250 Kn/m² at Corner

Aspect Ratio	Zone	Number pf Stories	Required Reinforcement	
			Conventional Footing (Kg)	T-Shaped Footing (Vol.)
20x40	5	10	864.11	835.17
		15	1434.16	1317
		26	3581.64	3132.15
20x60	5	10	867.13	837.72
		15	1443.96	1325.28
		26	3642.72	3183.77
20x80	5	10	868.64	838.99
		15	1428.88	1312.54
		26	3629.14	3172.3
20x100	5	10	871.65	841.54
		15	1357.25	1251.911
		26	3619.34	3164.02

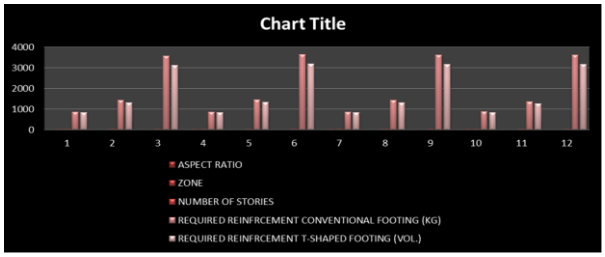

Fig. 4. Steel Required for Zone 5 S.B.C 250 Kn/m² at Corner

Table 5
Steel required for Zone 2 S.B.C 250 kn/m² at middle

Aspect Ratio	Zone	Number of Stories	Required Reinforcement	
			Conventional Footing (Kg)	T-Shaped Footing (Vol.)
20x40	2	10	1439.44	1321.46
		15	2156.52	1927.57
		26	4838.61	4194.6
20x60	2	10	1444.72	1325.92
		15	2159.54	1930.12
		26	4838.61	4194.6
20x80	2	10	1444.72	1325.92
		15	2037.41	1826.81
		26	4776.03	4141.7
20x100	2	10	1444.72	1325.92
		15	1652.83	1501.83
		26	4221.06	3672.61

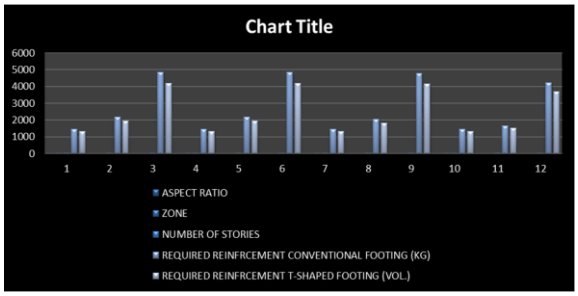

Fig. 5. Steel required for Zone 2 S.B.C 250 Kn/m² at middle

Table 6
Steel required for Zone 3 S.B.C 250 Kn/m² at middle

Aspect Ratio	Zone	Number of Stories	Required Reinforcement	
			Conventional Footing (Kg)	T-Shaped Footing (Vol.)
20x40	3	10	1447.73	1328.47
		15	2153.51	1925.02
		26	4765.47	4132.78
20x60	3	10	1448.49	1329.11
		15	2156.52	1927.57
		26	4765.47	4132.78
20x80	3	10	1380.63	1271.75
		15	2034.37	1927.57
		26	4765.47	4132.78
20x100	3	10	1093.34	1028.92
		15	1645.29	1495.45
		26	4765.47	4132.78

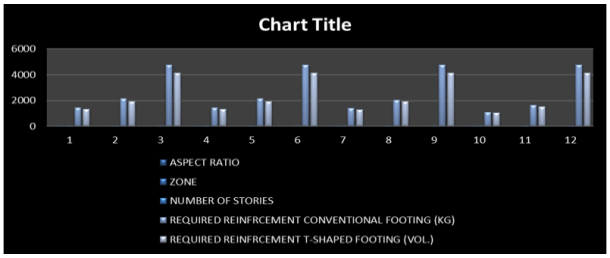

Fig. 6. Steel required for Zone 3 S.B.C 250 Kn/m² at middle

Table 7
Steel required for Zone 4 S.B.C 250 Kn/m² at middle

Aspect Ratio	Zone	Number of Stories	Required Reinforcement	
			Conventional Footing (Kg)	T-Shaped Footing (Vol.)
20x40	4	10	1452.26	1332.3
		15	2116.56	1893.79
		26	4719.47	4093.9
20x60	4	10	1453.01	1332.93
		15	2115.05	1892.52
		26	4795.63	4158.27
20x80	4	10	1380.63	1271.75
		15	1992.9	1789.27
		26	4795.63	4158.27
20x100	4	10	1097.86	1032.74
		15	1992.9	1789.27
		26	3451.19	3021.89

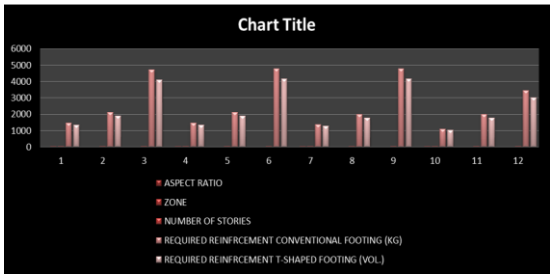

Fig. 7. Steel required for Zone 4 S.B.C 250 Kn/m² at middle

Table 8
Steel required for Zone 5 S.B.C 250 Kn/m² at middle

Aspect Ratio	Zone	Number of Stories	Required Reinforcement	
			Conventional Footing (Kg)	T-Shaped Footing (Vol.)
20x40	5	10	1438.69	1320.82
		15	2123.35	1899.53
		26	4833.33	4190.14
20x60	5	10	1438.69	1320.82
		15	2126.36	1902.08
		26	4810.71	4171.02
20x80	5	10	1366.3	1259.64
		15	2004.96	1799.47
		26	4408.81	3831.31
20x100	5	10	1084.29	1021.27
		15	1617.39	1471.87
		26	3495.68	3059.49

2. Conclusion

This paper presented a study on steel required in angle shaped footing in different earth quake zone.

References

[1] https://science.howstuffworks.com/engineering/structural/earthquake-resistant-buildings4.htm