International Journal of Research in Engineering, Science and Management
Volume-2, Issue-7, July-2019
www.ijresm.com | ISSN (Online): 2581-5792

Effect of Dynamic Load on Footing

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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 represent for the behaviour of footing under dynamic load by providing angle shaped footing. With the help of this paper I want to reduce an abnormal behaviour of footing under dynamic load. This paper is very helpful for study of footing 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*: Enter key words or phrases in alphabetical order, separated by commas.**

1. Introduction

Every structure consists of two parts superstructure and sub-structure. Super structure transmit its load to the sub-structure i.e. foundation and then ultimately load is transferred to the soil. So foundation is very important part which needs to consideration for designing. For designing the Foundation, the bearing capacity and settlement study of shallow footing is a subject which needs consideration and the foundation must be safe for both the usual static as well for the dynamic loads. In addition to vertical axial loads, the footing of structure are often subjected to loads caused by earthquake, earth pressure, wind, water, etc. and therefore, the design of foundation needs special consideration compared to the static case. When all the forces come in combinations with the static forces makes the foundation subjected to eccentric loading and due to this eccentric loading, the two edges settle by different amount causing the footing to tilt and then the pressure below the footing does not remain uniform. The method of foundation design requires that they must possess sufficient safety against failure and settlement must be kept within the tolerable limit. By limiting the total settlements, differential settlements and any subsequent distresses the structure ensured to be safe. These requirements are depend on the bearing capacity and compressibility of soil. So the design of foundation requires adequate knowledge of settlement of footing and their tilt.
The footing may settle due to following reasons:

- The static load.
- The vibration produced by machine foundation.
- The vibration produced by heavily loaded vehicle.
- By seismic excitation.
- By wind load or sudden loading.
- By water wave on seashore structure.

The performance of conventional footing under static load is acceptable but in case of dynamic load tilting of footing and uneven settlement occurs. The tilt of footing under static load is minimized by angle shaped footing but in case of dynamic loading it increases due to its unsymmetrical geometry. In the present study we have observed the behavior of square T-shaped footing under dynamic loading as well as static loading.

A. Dynamic load

Foundations are subjected to both static as well as dynamic load. Static loads are those that are gradually applied to the structure for a longer duration of time at a constant place. Whereas the load is said to be dynamic if the force that changes in magnitude, direction or sense in much lesser time interval or it has continuous variation with time, this is difficult to measure, analyze and estimate compared to static case. Dynamic loads are very much dependent on time and do not have a specific magnitude and direction, whereas static loads are not time dependent.

B. Effects of dynamic load

1. Settlement of footing.
2. Tilting of footing.
3. Horizontal displacements of footing.

C. Dynamic response of footing

Response is the deformation behavior of a structure associated with a particular loading. Dynamic response is the deformation pattern related with the application of dynamic forces. In case of dynamic load, response of the structure is also time dependent and hence varies with time. Dynamic response is usually measured in terms of deformation (displacement or rotation), velocity and acceleration. In the design process for foundation, the bearing capacity calculations are normally restricted to monotonic or static loads. Dynamic response of footing depends on several factors such as the shape and size of foundation, depth of foundation, static and dynamic force level and the type and extent of soil below the foundation.

D. Angle shaped footing

The settlement of footing caused by the reduction in bearing capacity of soil, the bearing capacity of soil depends on different loading and soil strength parameters (cohesion, friction angle, and surface surcharge and self-weight). One of

the reasons of reduction in bearing capacity of soil is due to eccentric loading in shallow footing. Many researchers concluded that the eccentrically loaded footing reduces bearing capacity of soil. No check for tilting has been discovered so far. Mahiyar H. K. has introduced angle shaped footing which gives zero tilt in eccentrically loaded condition. Edge column in most of the cases are subjected to moment along longitudinal axis. This bending develop the tilting of angle shape footing, also even if the footings are subjected to axial loads they may be located near the property line subjected to axial load in case of static nature of load.

Table 1
Aspect ratio and required reinforcement

Aspect Ratio	Zone	Number of Stories	Required Reinforcement	
			Conventional Footing (Kg)	T-Shaped Footing (Vol.)
20x40	2	10	38.39	30.81
		15	54.53	46.2
		26	122.35	103.98
20x60	2	10	36.53	30.92
		15	54.6	46.26
		26	122.35	103.98
20x80	2	10	36.53	30.92
		15	51.51	43.64
		26	120.67	102.63
20x100	2	10	36.53	30.92
		15	41.79	35.39
		26	106.73	90.64

2. Conclusion

This paper presented an overview on effect of dynamic load on footing

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