Structural Analysis and Design of Foundation for G+5ResidentialBuilding by Using Software's

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***Abstract*- Lower base of a structure is a very supreme part as it links the main body superstructure to the earth. That lower base is known as foundation. In this report we are going to discuss about the types of foundations used in construction industry.**

When it comes to built a structure it is very crucial to construct a firm base which holds the superstructure in all climatic conditions without collapsing or decaying. It is very important to know which type of foundation is essential to use in a particular superstructure, which materials are more suitable, which designs should be used. If any in appropriate material is used for foundation of structure then high risk is involved of collapsing of the structure.

***Keywords*- Foundation, superstructure, durable, eco-friendly, base, collapsing.**

I. INTRODUCTION

FOUNDATION:

Foundation is the lowest integral part of any civil structure that is in direct contact with the soil which transfers loads from the structure to thesoil safely.

TYPES OF FOUNDATIONS:

Following are different types of foundations used in construction:

1. Shallow Foundation

a. Individual footing or isolated footing
b. Combined footing
c. Strip foundation
d. Raft or mat foundation

2. Deep Foundation

a. Pile foundation
b. Drilled Shafts or caissons

PURPOSE:

Foundations are provided for all load carrying structure for following purposes:

- Foundations are the main reason behind the stability of any structure. The stronger is the foundation, more stable is the structure.
- The proper design and construction of foundations provide a proper surface for the development of the substructure in a proper level and over a firm bed.
- Specially designed foundation helps in avoiding the lateral movements of the supporting material.
- A proper foundation distributes load on to the surface of the bed uniformly. This uniform transfer helps in avoiding unequal settlement of the building. Differential settlement is an undesirable building effect.
- The foundation serves the purpose of completely distributing the load from the structure over a large base area and then to the soil underneath. This load transferred to the soil should be within the allowable bearing capacity of the soil.
- Foundation structures undergo soil-structure interaction. Therefore, the behavior of foundation structures depends on the properties of structural materials and soil. Determination of properties of soil of different types itself is a specialized topic of geotechnical engineering.

II. LITERATURE REVIEW

Meyerhof (1974) (Meyerhof equation for soil bearing capacity)

The study was based on the ultimate bearing capacity of circular and strip footing resting on sub-soils having two layers of different cases of dense and on soft clay and looses and on stiff clay. Bearing capacity ratio of clay to sand, friction angle, shape and depth of foundation are the main factors which have an influence over sand layer thickness below the footing. For circular= 0.6and Sq=1. Footing upper limits of S.

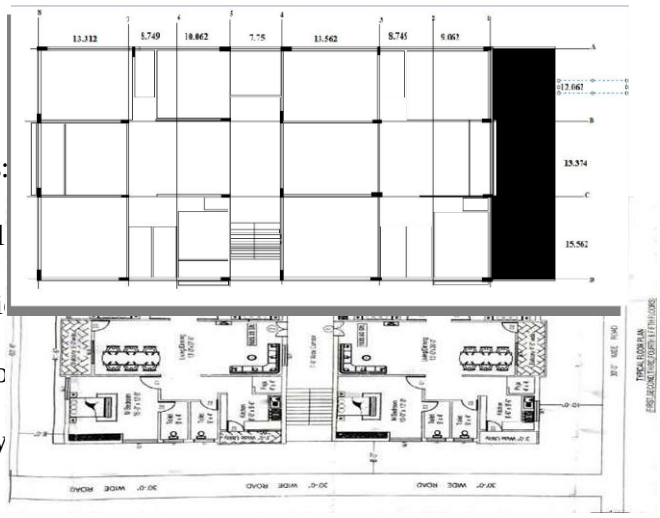
Rahaman (1981) (Investigation of soil strength under different coefficient)

Study was carried out for understanding the problem of the bearing capacity and settlement by using Circular footing on sand bed. Shear strength, Frictional angle, relative density (Dr) of sand, and surcharge effect on bearing capacity and settlement are investigated. Maximum vertical strain occurs at 0.5 to 0.6 times the diameter of footing, depth increase with decrease in density of sand. Radial deformation increase from centre of the footing to a maximum value at a distance of 0.75 times the diameter and then started decreasing.

III. METHODOLOGY

- Plan
- SBC of soil (safe bearing capacity)
- Modeling of structure in software
- Load assessment
- Analysis of structure
- Extracting analysis report from software
- Designing foundation

Plan-



Load types:
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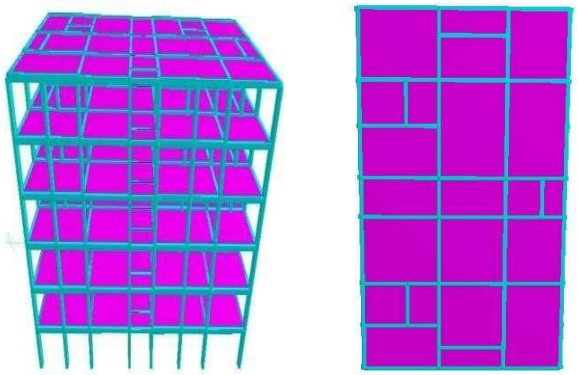
i. eismi
ii. ind lo
2. ravity
i.

Soil Bearing Capacity-

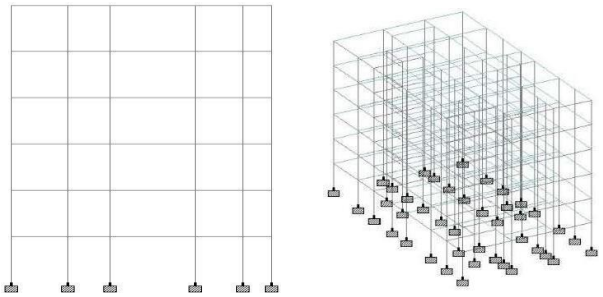
- Safe bearing capacity can be theoretically defined as the permissible load the soil can withstand such that it neither fails in shear norexceeds permissible settlement limit.
- Units of safe bearing capacity of soil is kN/m^2 orkip/ft^2 .

Modeling structure in software-

3D Models :



2D Models:



Loadings-

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ii.
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3. L
oad Combinations
i. S
uto load combination

W
Seismic Load are calculated as per codalprovision of IS 1893 part-I-2002

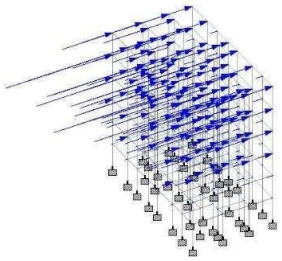
G
Wind Load are calc lated as per codal

D
provision of IS 875 part-III

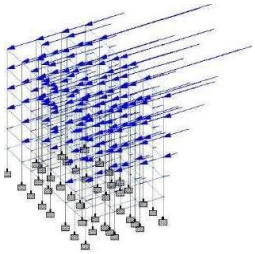
Dead Load are calculated as per codalprovision of IS 875 part-I

Live Load are calculated as per codalprovision of IS 875 part-II

Seismic loads:



SL X+



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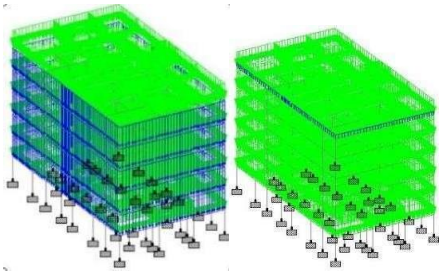
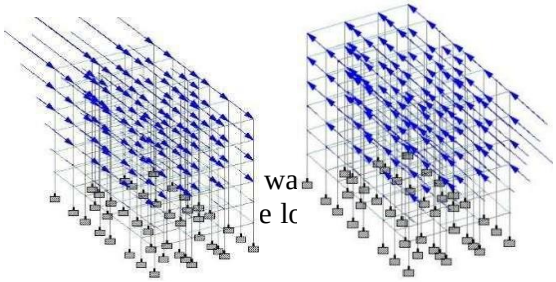


Outer wall load

Parapet wall load



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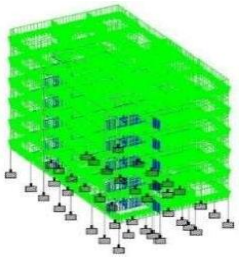
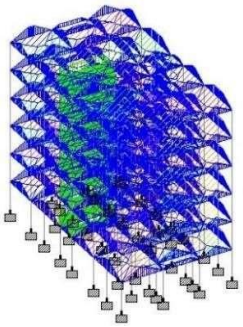
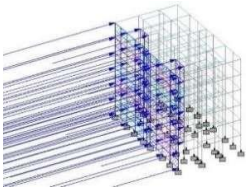
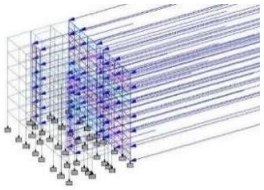




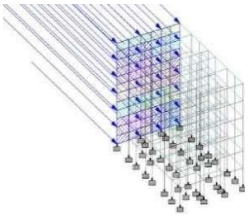
SL Z+ SL Z-

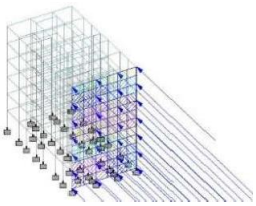
Wind loads:





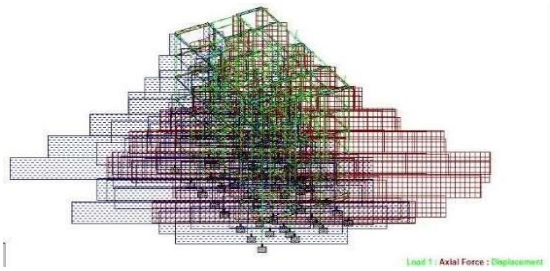
WL X+ WL X-

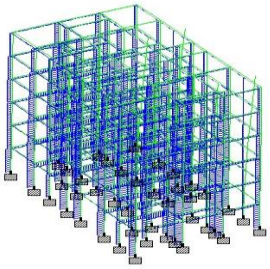


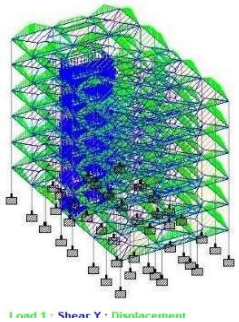


WL Z+ WL Z-

Floor loadShear force:

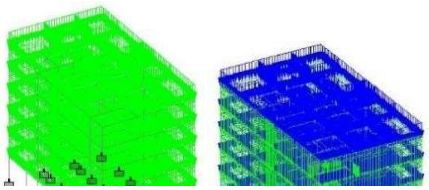


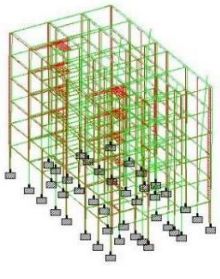




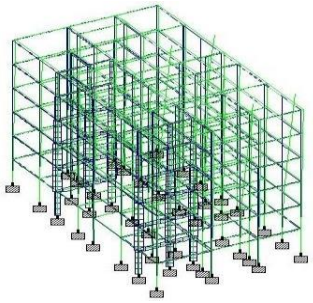
Stair case load
Dead Loads:

Self - weight Floor load
Shear force in X direction

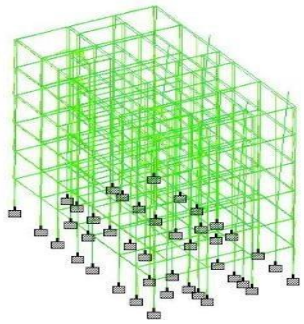




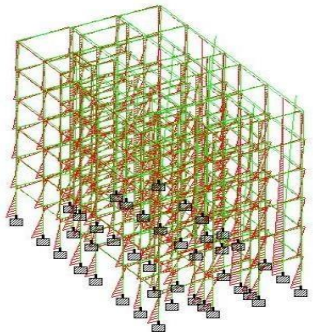
Shear force in Z directionBending Moment:



Bending moment in X direction



Bending moment in Y direction



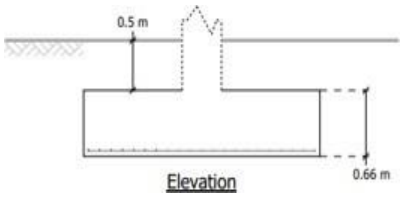
Bending moment in Z direction

IV. FOOTINGS

Isolated footing-

The isolated footing is used to support individual columns. They can be either of steeped type or have projections in the concrete base. In the case of heavily loaded columns, steel reinforcement is provided in both the directions in a concrete bed.

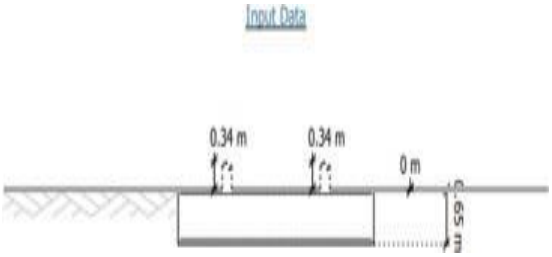
Generally, a 15cm offset is provided on all sides of the concrete bed. In the case of brick masonry columns, an offset of 5cm is provided also on all the four sides in regular layers. When the footing of concrete maybe a slab, steeped or slope type.



Combined footing-

Whenever two or more columns in a straight line are carried on a single spread footing, it is called a combined footing. Isolated footings for each column are generally the economical. Combined footings are provided only when it is absolutely necessary, as

1. When two columns are close together, causing overlap of adjacent isolated footing.
2. Where soil bearing capacity is low, causing overlap of adjacent isolated footings.
3. Proximity of building line or existing building or sewer, adjacent to a building column.



V. CONCULSION

1) Building plan was developed in AUTOCAD with required dimensions.
2) The structural model was developed in STAAD.PRO and STAAD. Foundation forexecution of design and analysis.
3) Foundation is a most essential part of a Structure for its Stability, durability and toWithstand.
4) We can see that the values found from STAADare generally in agreement to the values in the IS Code.
5) Foundation for the structure is designed in Software and analyzed.
6) Foundation is designed prior in software to Know the output of the structure i.e., Stability, Reinforcement etc.
7) Software's are the tools that are used for designing the structure. Software requires less
8) Manpower and gives the required results.
9) Finally, all the output results are calculated in MS Excel.
10) The are of steel reinforcement required for

foundation design showed 9% less in STAAD.Foundation when compared to MS EXCEL calculation.

VI. REFERENCE

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