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A STUDY ON
HIGHER ORDER LOAD ANALYSIS AND D ESIGN OF COMBINED F OOTING USING STADD FOUNDATION

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ABSTRACT

As we know the foundation is the most important member of the building and a precise analysis of footing will result in more safe and economic design. In the present study the comparison of analysis of combined rectangular footing using Rigid (conventional) Method and Finite Element Analysis of combine footing using Winkler Model by using stadd pro is carried out, masonry or concrete a structure which carries the entire load from superstructure and it will distribute the load on soil bellow it. The strength, stability & support of structure are fully dependent on foundation. If some parts of superstructure fail, then repairs, modifications, additions & alterations are possible to save the structure, but in case of foundation failure it is much difficult and very costly.

INTRODUCTION:

Our project is based on the design and analysis of multi-storied building with combined footing design. Analysis is done through using the STADD-PRO .Notation adopted through out the project is same as in IS-456-2000 .Using software analysis for structural design is becoming more prevalent across the industry due to increasing technological resources. This project served as an investigation of foundation design alternatives and the feasibility of STAAD foundation as a design aid for engineers at Stantec Consulting Ltd. Both design optimization and accuracy were tested against hand calculations in accordance with Indian code in order to identify the proficiencies and shortcomings of the software which were documented in a user tips manual.

A structure can be defined as a body which can resist the applied loads without appreciable deformations. Civil engineering structures are created to serve some specific functions like human habitation, transportation, bridges, storage etc. in a safe and economical way. A structure is an assemblage of individual elements like pinned elements (truss elements), beam element, column, shear wall slab cable or arch. Structural engineering is concerned with the planning, designing and the construction of structures. Structure analysis involves the

determination of the forces and displacements of the structures or components of a structure. Design process involves the selection and detailing of the components that make up the structural system. The main object of reinforced concrete design is to achieve a structure that will result in a safe economical solution.

STATEMENT OF THE PROJECT:

1. Utility of building: Residential building
2. No of storeys: G+7
3. No.of staircases: 7 no's
4. Shape of the building: rectangular
5. Type of construction: R.C.C framed structure
6. Type of walls: brick wall
7. Type of Footing : Combined footing GEOMETRI C DETAILS:

Ground floor	:3.0M
Floor height	:3.0M
Height of plinth	:1.5M from below foundation
Depth of foundation	: 500MM

MATERIAL DETAILS:

Concrete Grade	: M25
All steel grade	: 415 grade
Type of steel bars	: HYSD
Bearing capacity of Soil	: >180 KN/M2

DESIGN PRINCIPLE, ASSUMPTION AND NOTATION ASSUMED
The notation adopted throughout the work is same as in IS 456-2000

Using partial safety factors for loads in accordance with clause 36.4 of IS 456-2000

Partial safety factor for material in accordance with clause 36.4.2 IS456-2000 is taken as 1.5 for concrete and 1.15 for steel

Using partial safety factors in accordance with clause 36.4 of IS 456-2000

combination of load

(D.L+L.L) 1.5

(D.L +L.L+W.L) 1.2

Density of materials used:

MATERIAL	DENSITY

1. Plain concrete	24.0 kn /m3
2. Reinforced	25.0 k /m3
3. Flooring material (c.m)	20.0kn/m3
4. Brick masonry	19.0kn/m3
5. Fly ash	5.0kn/m3

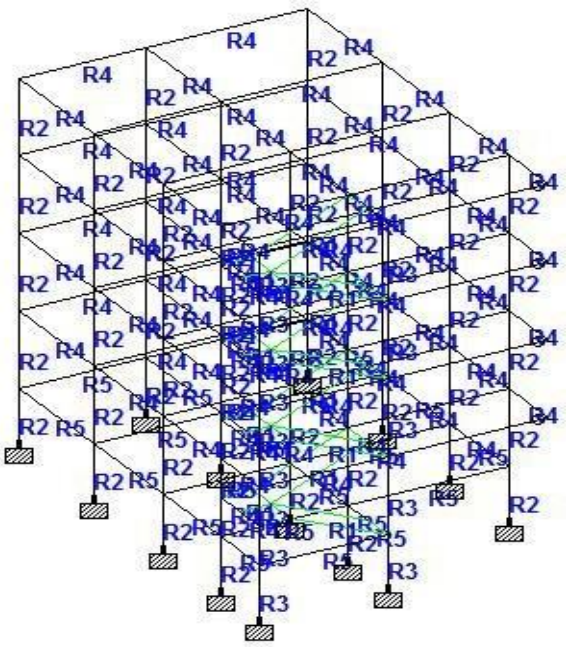
Structural design:

For slab, depth is 125 mm provided. For beams, after calculations are done. the dimensions of beam is 230*530mm factored load on beam is 15.87kn/m

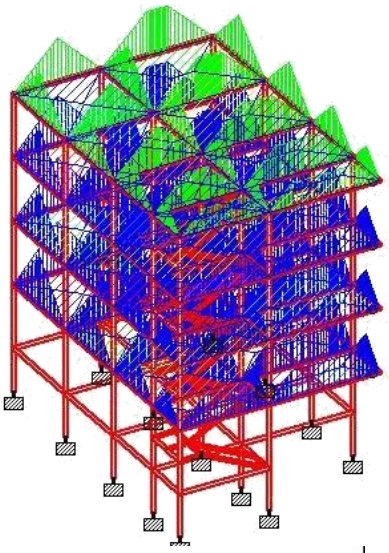
Shape of column is rectangular

For columns, the dimension of column is 300*600mm Factored load on column 1090.10kn

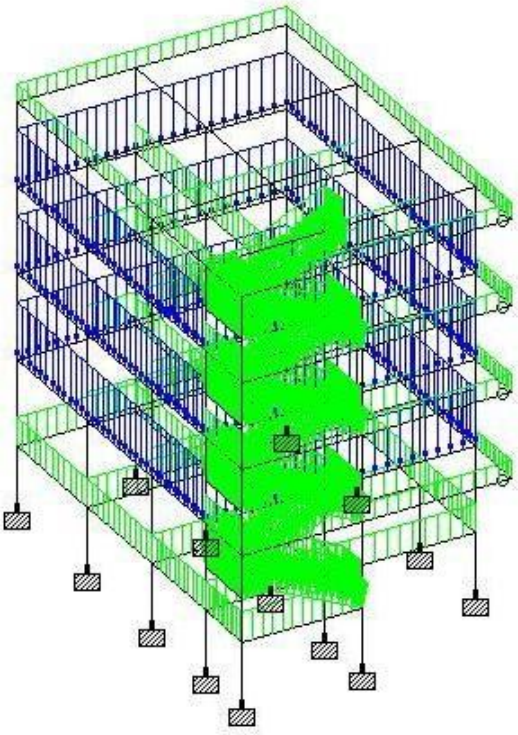
For footings, the bearing capacity of soil is 175kn/m2 To provide the dimensions of footing is 12.5m*2.7m



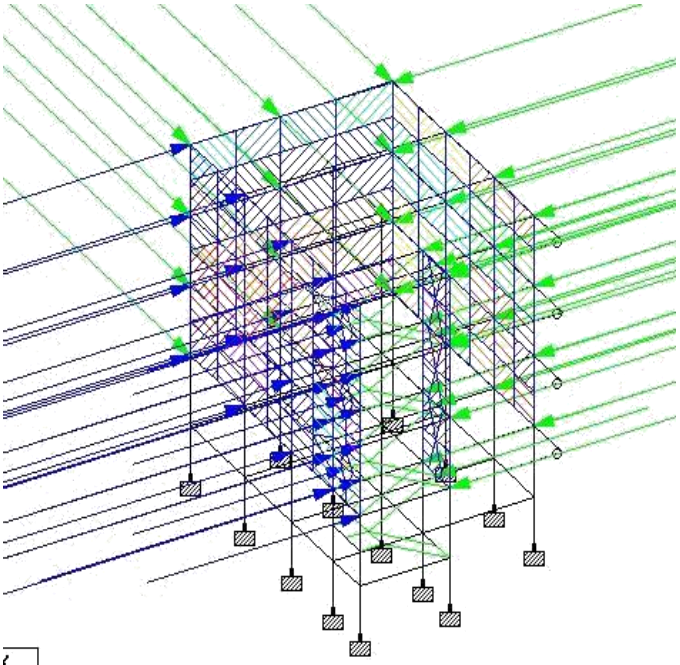
Assign the properties of structures:



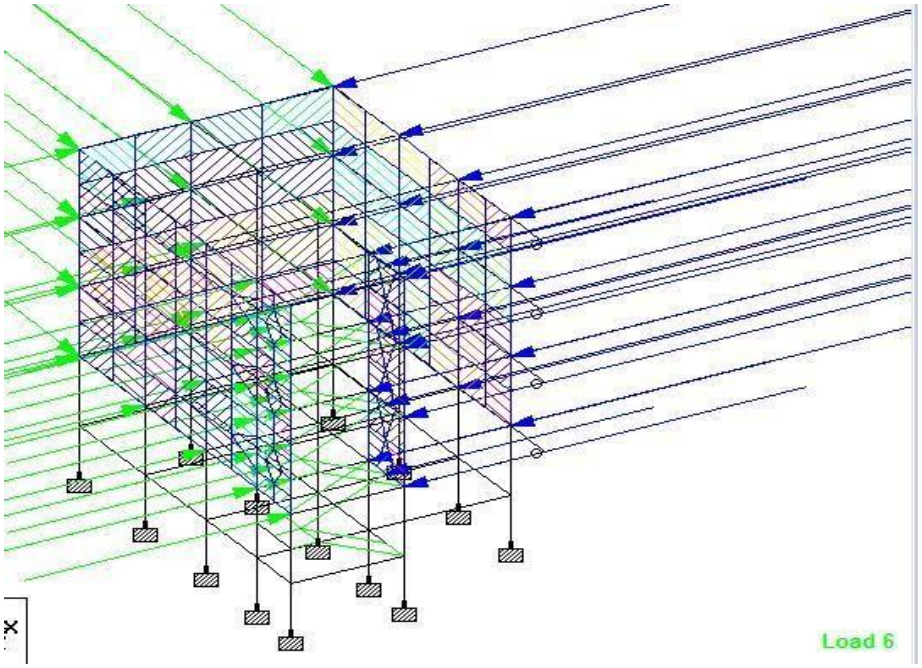
ASSIGN LOADS ON THE SLAB



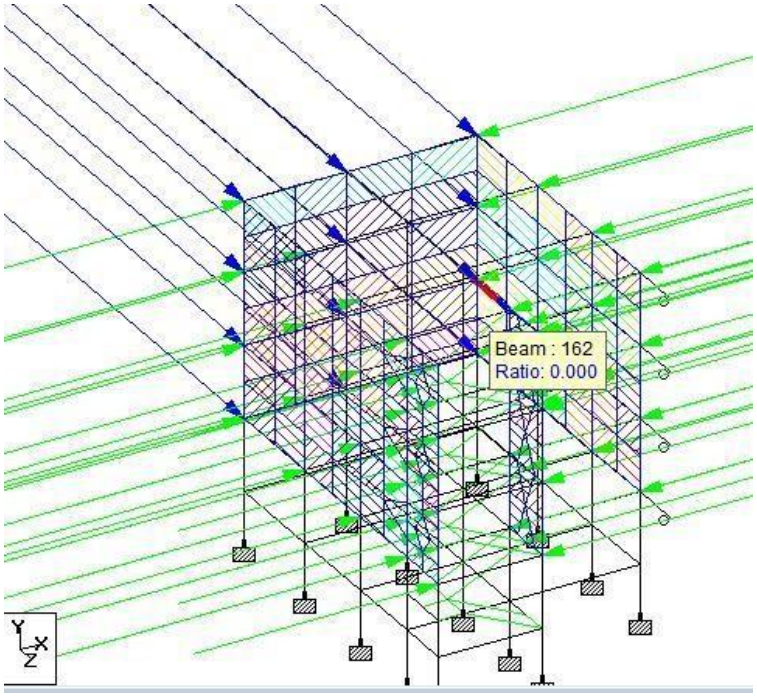
LOAD ASSIGN ON THE WALLS:



assign wind load on the structures (x+ve direction) :



ASSIGN WIND LOAD ON THE STRUCTURES (X-VE DIRECTION) :



ASSIGN WIND LOAD ON THE STRUCTURES (Z +VE DIRECTION) :

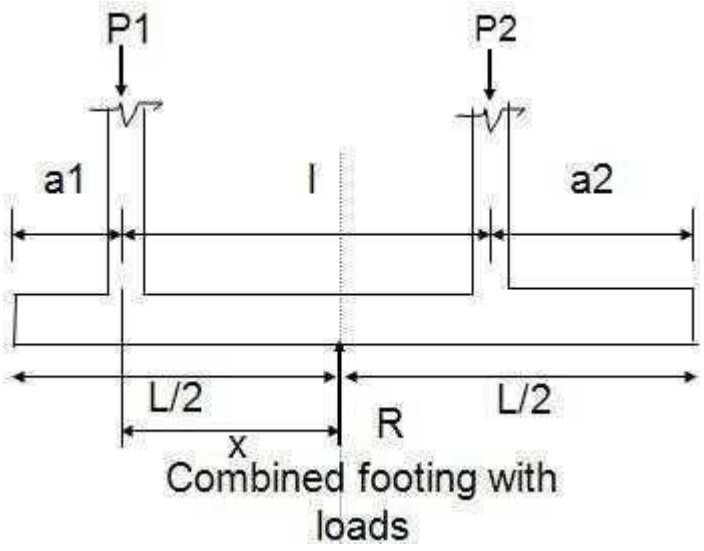
COMBINED FOOTING

The function of a footing or a foundation is to transmit the load form the structure to the underlying soil. The choice of suitable type of footing depends on the depth at which the bearing strata lay, the soil condition and the type of superstructure.

Combined footing

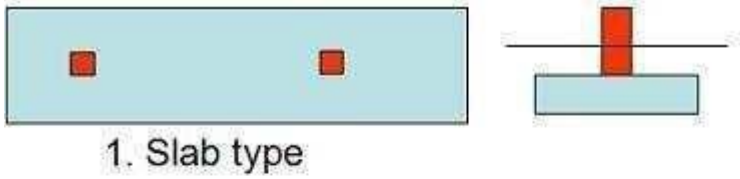
Whenever two or more columns in a straight line are carried on a single spread footing, it is called a combined footing. Isolated footings for each column are generally the economical. Combined footings are provided only when it is absolutely necessary, as

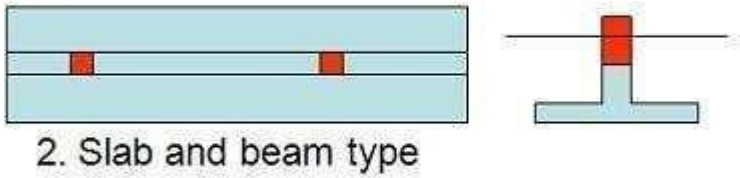
1. When two columns are close together, causing overlap of adjacent isolated footings
2. Where soil bearing capacity is low, causing overlap of adjacent isolated footings
3. Proximity of building line or existing building or sewer, adjacent to a building column.

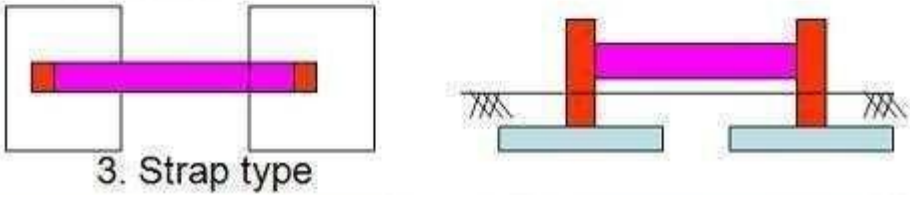


COMBINED FOOTING WITH LOADS

Types of Combined Footing:







TYPES OF SLAB AND BEAM

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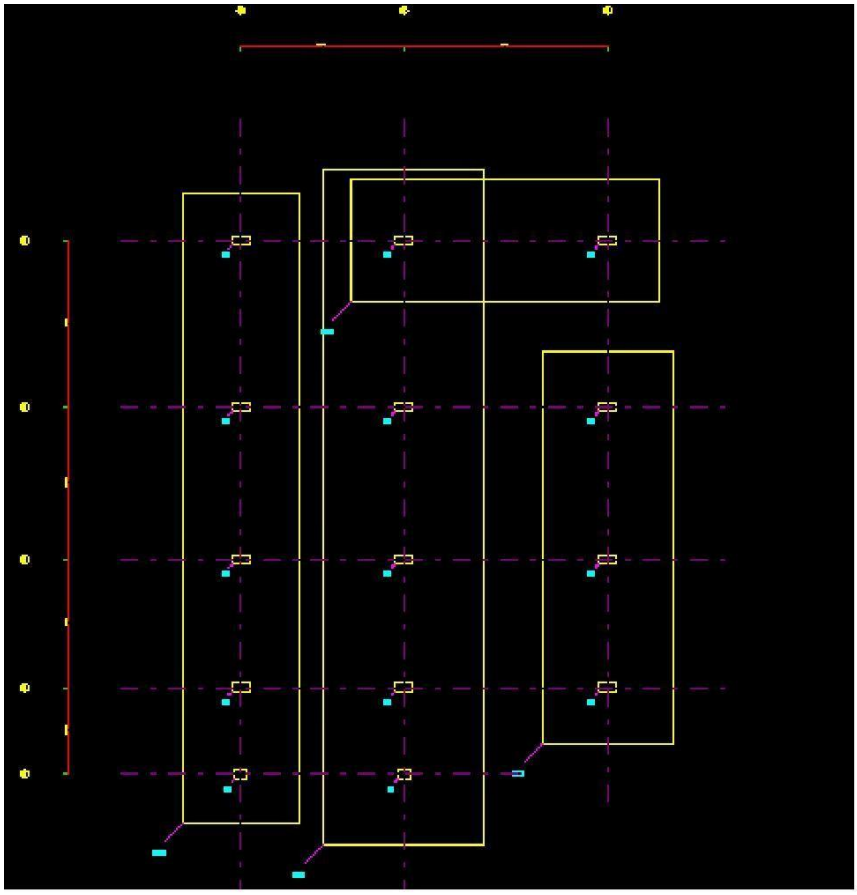
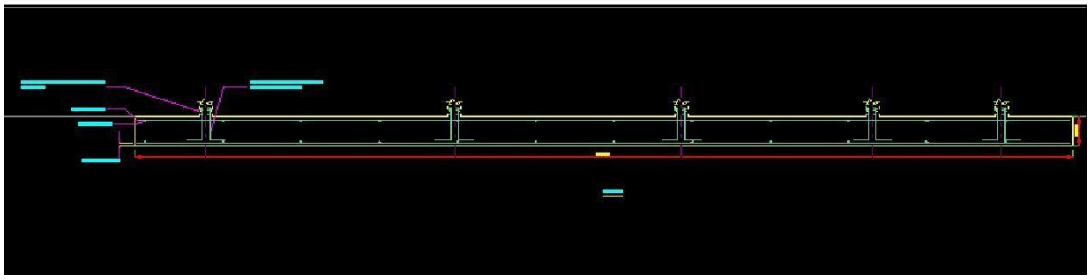
Foundation Layout





FOUNDATION LAY OUT

CONCLUSIONS &FUTURE SCOPE

- The design of beam, column, combined footing and staircase are done in limit state method which is safe at control of deflection and in all aspects
- Using staad.pro & stadd foundation software, the design consideration has been taken as per the is codes. The design is safe in all conditions
- On comparison with drawing, manual design and the geometrical model using staad.pro the area of AST required for the beam, column, footing and slab are comparatively similar to that of the requirement

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