

Analysis and Design of Beam and Column In Which Beam Behave As A Column And Column Behave As A Beam

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Abstract-Beam is a structure member which act as a flexural member and column is a structure member act as an axial compression member. In different type of structure the behavior of beam and column is changes depends on the condition where the structure is constructed. The structure situated above the ground level in this structure the beam is behave as flexural member and column behave as axial member but in some special cases the structure which is constructed below the ground level the structure is subjected to the heavy earthquake forces and soil pressure in this type of structure beam act as a axial member and column act as a flexural member. . All the earthquake analysis has been done by considering all the parameters (As per IS 1893-2002). Other parameters like shear force, bending moment and deflection of a structure are determined by STAAD PRO v8i.

Keywords-seismic analysis, behavior of beam and column, analysis on STAAD PRO v8i.

I. INTRODUCTION

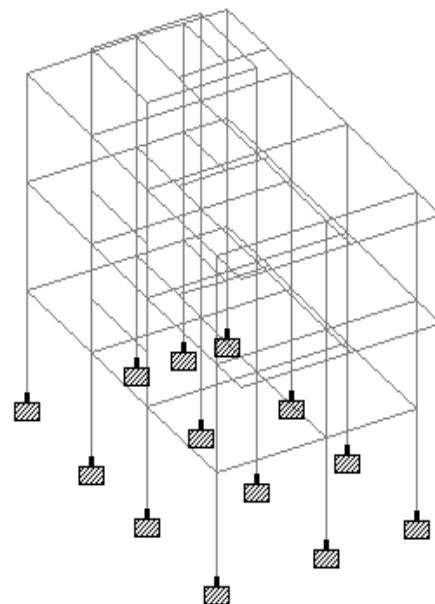
A beam is a structural component that resists the loads applied laterally to the beam's axis. Beam is also called flexural member because beam is behave like a flexural member in the structure. The loads applied to the beam result in the form of reaction forces at the beam's support points. The total effect of all the forces acting on the beam is likely to produce shear forces and bending moments, that in turn induce internal stresses, strains and deflections of the beam. Beams are characterized by their manner of support, profile length, and their material. Beam play very significant role in the structure because beam carry the slab load of the structure, and transfer to the column but in our project the beam is behave like a column, due to soil pressure, soil pressure acting from all direction of underground structure.

Column can be defined as a structural member designed to carry compressive loads (axial load), composed of concrete with an embedded steel frame to provide reinforcement, Column is a axial member. A column is a very important part of the structure. It is like the foot on which a

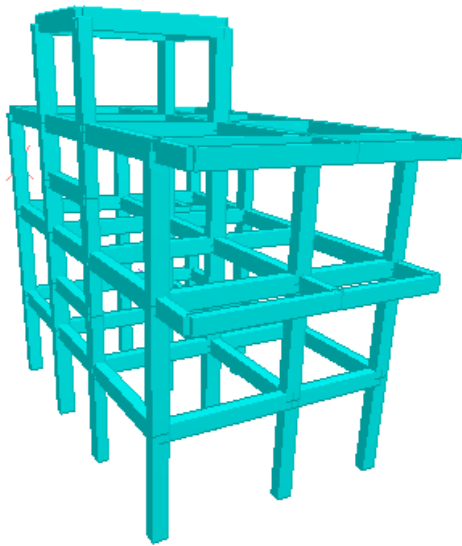
structure stands. It is designed to resist axial and lateral forces and transfer them safely to the footings in the ground, but In our case the structure is underground pumping station which is situated and constructed below the ground due to which the structure subjected to the heavy active earth pressure in this case column behave like a beam due to active soil pressure. This means that axial member behave like a flexural member. Columns support member such as Slabs and beams. Column transfer the load to the footing.

II. OBJECTIVES

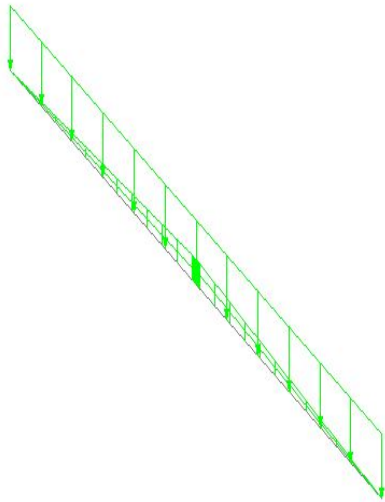
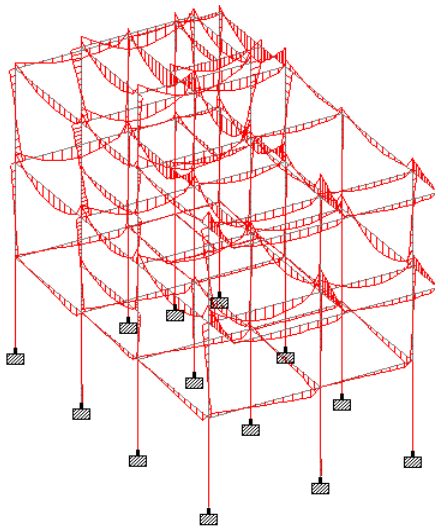
1. The main objective of study is to examine the behavior of underground column and beam different location.
2. The objective is to study the effect of beam and column on various parameters like bending moment, shear force and deflection of a structure.
3. Differentiate the two structures one is above the ground level one is below the ground level and behavior of different component.



3D-View Of Structure

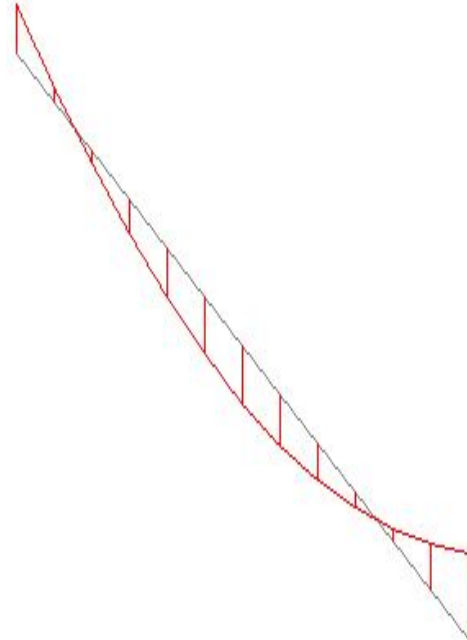


3D-Rendered View

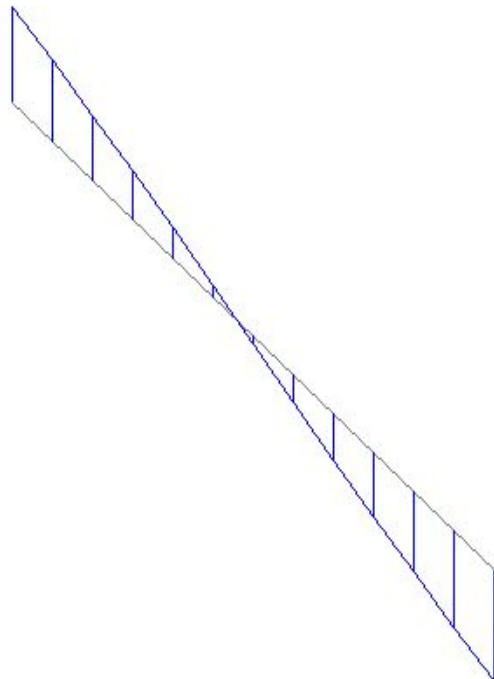


Structure subjected to the load beam behave, like flexural member and column behave like axial member. This structure is situated above the ground level.

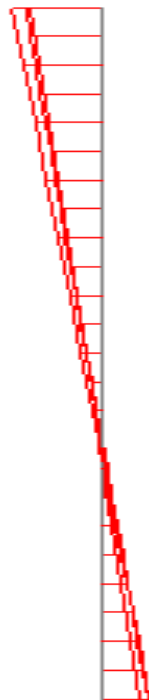
Normal beam which behave like a flexural member, the structure situated above the ground level



Bending moment diagram of beam

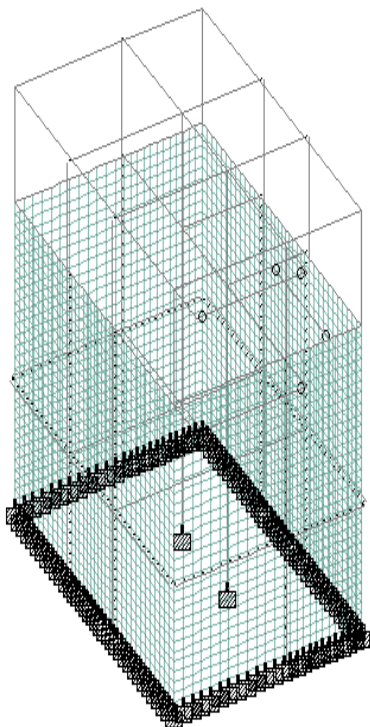


Shear force diagram of beam.

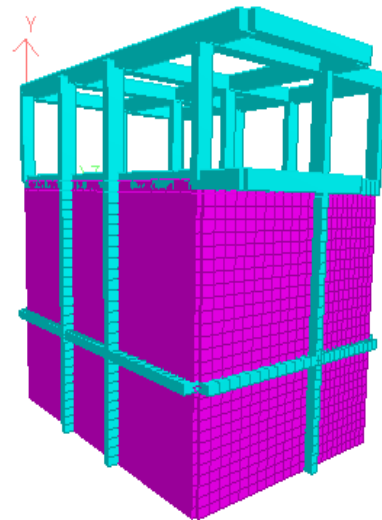


Column behave like a axial member

The underground pumping station which, subjected to heavy earth pressure, due to which the behavior of beam and column changes, for this structure seismic analysis is done.

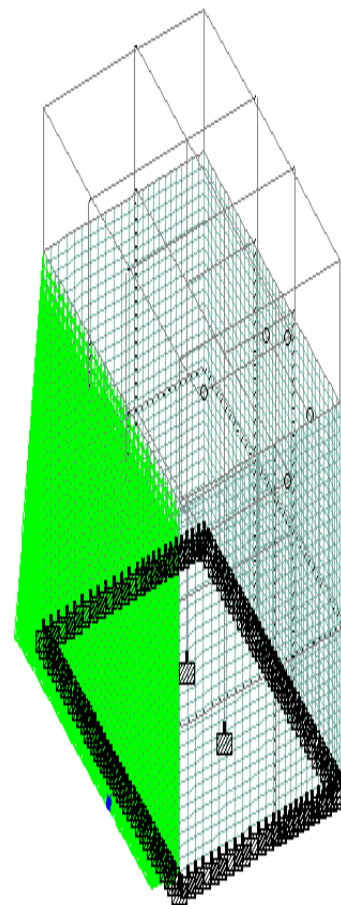


3D-View Of Station (Fig:-1)

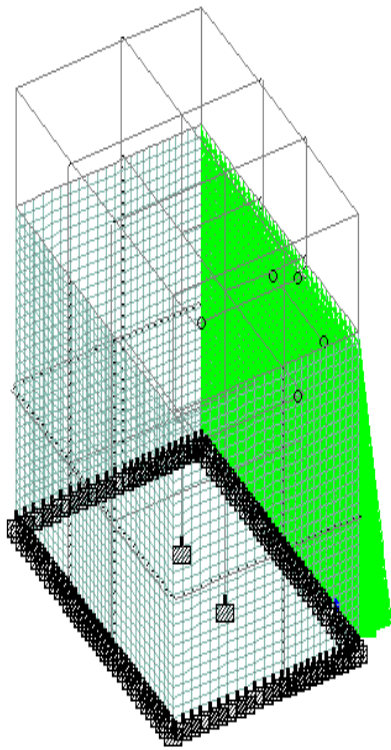


3D-Rendered View (Fig:-2)

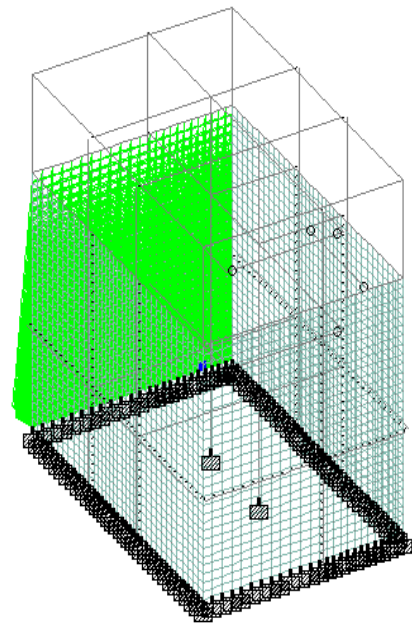
The active earth pressure which is acting on the underground retaining wall, The active earth pressure acting on the different direction on the retaining wall .Which determine by the below diagram.



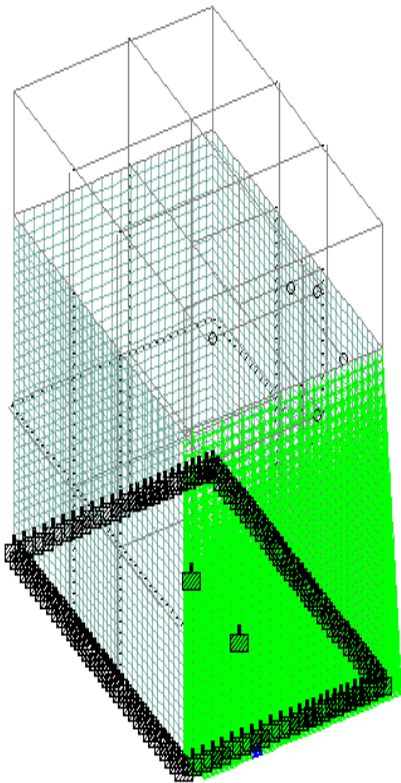
Lateral soil press in +x direction (FIG:-3)



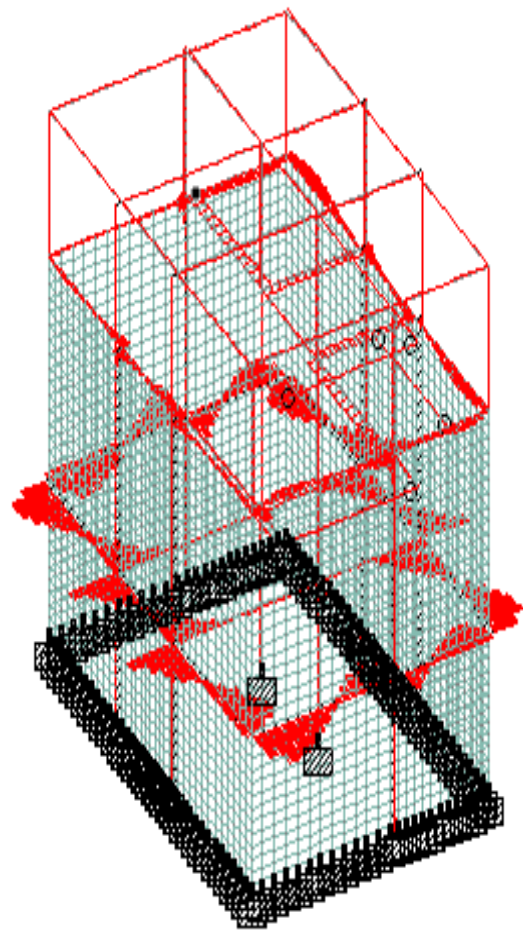
Lateral soil press in +x direction (FIG:-3)



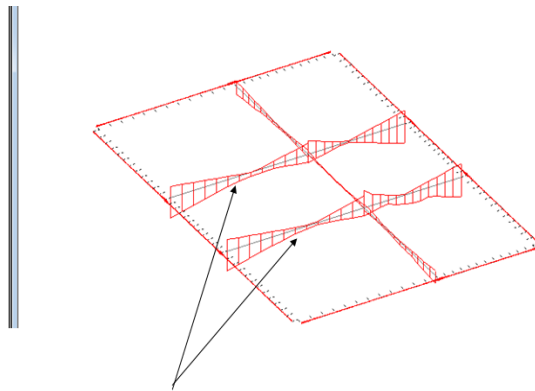
Lateral soil press in +z direction (FIG:-3)



Lateral soil press in +z direction (FIG:-3)



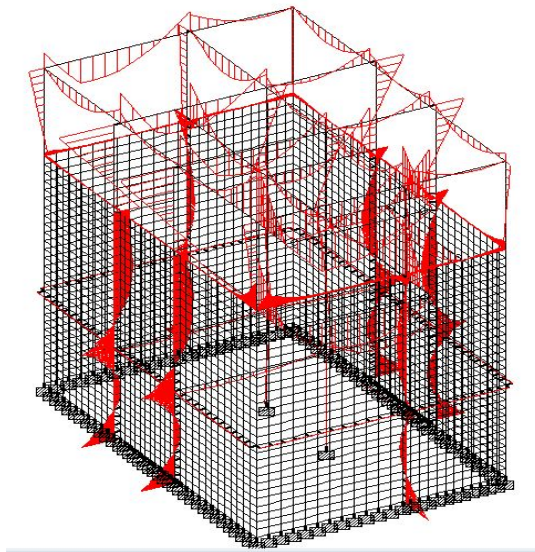
Easily analyze and identify the behavior of beam which is act as column (axial member)



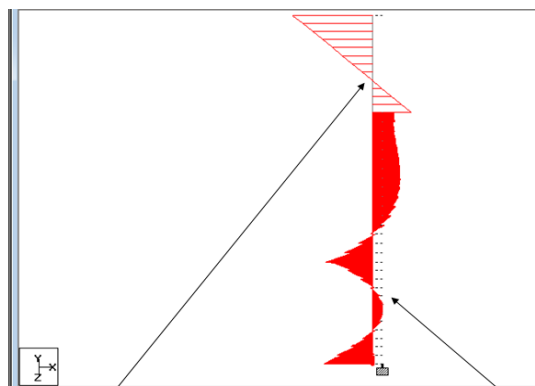
Behavior of beams as axial compression member due to lateral soil pressure.

The periphery beams are acting as flexural members.

The behavior of beam is act as column (axial member)



Easily analyze and identify the behavior of column act as beam (flexural member)



Behavior of column as a flexural member (i.e acting as a beam) when there is lateral soil pressure

Behavior of column as axial compression member from vertically downward load.

The behavior of column is act as beam (flexural member)

III. CONCLUSION

The results show that the all structural elements behave according to force acting/applied on the structure.(the column behaving as beam and beam behaving as column).

So the detailing of such members becomes tremendously important, so that there is no confusion on site. The earth pressure is very high at below the ground so that behaving phenomenon is change of column and beam.

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