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Differential Study of Reinforced Cement Concrete Slab and Post-tensioned Slab

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Abstract:- A building which is proposed to construct using PT slabs is more efficient and provides the advantage of longer span with durability, reduced cracks and deflection when compared to RCC slabs. The primary objective of this comparative study of RCC slab and PT slab is to prove that PT slabs are better in technical, economical and utility aspect when compared to RCC slabs. The RCC slabs are vulnerable to punching shear at the intersection point of slab and column which is one of the major failure in RCC slabs where as in the case of PT slabs drop caps are provided to prevent the punching shear failure. The RCC slabs are provided with reinforcement and the tendons are provided in PT slabs. The another objective of this study is to gain sufficient knowledge about PT slabs and to prove that PT slabs are cost efficient, timesaving and the quantity of materials used in construction can be reduced. Since, RCC slabs are time consuming, material consuming and uneconomical.

Keywords:- *PT Slabs , RCC Slabs , Tendons , Punching Shear, Flexural Failure, Deflection , Drop Caps.*

I. INTRODUCTION

Post tensioned slabs are widely used in many countries than conventional RCC slabs. The floor system plays a vital role in overall cost of the structure; hence PT slabs provides quality of the construction at affordable cost and time saving. PT slabs are seismic resistant, so it is widely used in earthquake prone regions to with stand seismic forces The post-stressing methodologies has been practiced from olden days. The examples are shrink fitting of metal tires on wooden wheels in temple cars. Now a days, multi-storied building are constructed with the help of PT slabs namely bridge, decks, girders etc.

II. SLABS

A. RCC slab-

The RCC slab is a two-way reinforced concrete slab that usually does not have beams and girders, and the loads are transferred directly to the supporting concrete columns Particularly on pad foundation and wheel loads. RCC labs are resistant to fire. RCC slabs are well known for its robustness. RCC slabs provide thermal mass to the building. RCC slabs exhibit better sound control.

B.Post-tensioned slab-

Post-tensioned slabs are typically RCC slabs, band beams and slabs or ribbed slabs.PT slabs offer the thinnest slab type, as concrete is worked to its strengths, mostly being kept in compression. PT slab is more preferable because of its utility, technical and economic benefits.

II. MAJOR PROBLEMS IN RCC SLAB

Slab column connection does not have the rigidity of the beam column joint. The possibility of the column punching through the slab is because of the shear concentration round the column. Deflections are large because of lesser depth of slab.

A. Technical Failure Modes of Rcc Slabs -

The most common failure mode of RCC slab is punching shear failure. Punching shear is a brittle failure mode in RCC slabs. Punching shear failure is witnessed at the intersection points of slab and column in a structure. this point is more vulnerable to punching shear. When the total shear exceeds the shear resistance of the slab ,the slab will be pushed down around the column or the column is being punched through the slab.Some examples are occurrence of concentrated loads on as labor column .No proper designing of drop panels and column leads to punching shear failure.

B. Preventive measures-

Increasing the thickness of the slab in a structure, where as increasing the column thickness which affects the aesthetic appearance. Provide slab with shear reinforcement. Providing shear reinforcement makes the slab both structurally and economically efficient. Providing drop caps to the column resists the punching shear, because the drop cap acts as beam and avoid the load directly acting upon the column, which prevents the punching shear failure.

C. Technical aspect of Post-tensioned slab-

- Thickness of the slab can be reduced.
- Beams can be avoided.
- Optimum time required for the completion of the project.
- Odd beams and columns can be connected easily. So connectivity is efficient.
- Future extension of the beam and column is possible.

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D. Economical Aspect -

- Concrete can be reduced by25% when compared to the conventional concrete.
  - There bar can be reduced by65% when compared to conventional bar.

III. CONCLUSION

- As we compare the PT slab and RCC slab the PT slab is preferable because it control the Long term deflection, cost and time.
- It control the crack of slab and beams.
- PT slab are durable and provide better serviceability.
- PT slab are safe from punching shear failure since drop caps are provided at slab-column joints.
- PT slabs are seismic resistant, so it is preferred in earthquake prone regions.
- Available in longer spans.

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