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Analysis and Desing of Post Tension by Using Safe Software

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ABSTRACT

This Project presents Structural analysis and design of post-tensioning the slabs in the structures in order to achieve economy, efficiency, quicker construction and lower lifetime cost of the structure. Because Post-Tensioning enhances concrete strength under both compressive and tensile stresses. Post-tensioning tendons are installed in a parabolic profile prior to placing the concrete and later stressed to a specified concrete strength. This process introduces compressive force in the concrete and this stress is counterbalanced by loads coming on it. Thus the benefits are substantial. Post-tensioning is used in the structural elements to meet the challenges that other design methods simply cannot. The reduction in concrete in thinner concrete members is approximately 20%, in other sizes may be more and Rebar in slabs is reduced by 60% to 75%. Due to decrease in the sizes of the structural elements, there by dead loads, thus reduction in rebar and concrete required in conventional way design. Improved crack control and waterproofing properties. Longer spans and fewer columns give greater flexibility in floor slabs arrangements. Lower overall maintenance and lifecycle costs of the structure. Reduced building height also results in energy savings, especially for work-places based buildings' use the SAFE software for the Design of PT slabs for this project. SAFE the Structural analysis and design software product of CSI Software Company of USA. And generally SAFE is used for structural design of the PT Slabs and also for conventional other slab types and also for some types of footings including Raft footings.

KEYWORDS :

Introduction

When Eugene Freyssinet developed and patented the technique of prestressing concrete in 1928 he little realized the applications to which his invention would be put in future years. Spectacular growth in the use of prestressed concrete took place after the Second World War with the material used to repair and reconstruct bridges in Europe. It is now an accepted Civil Engineering constructimaterial. The A.C.I. Committee on Prestressed Concrete gives one of the most apt descriptions Of post tensioned concrete. Prestressed Concrete is concrete in which there have been introduced internal forces of such magnitude and distribution that the forces resulting from given external loadings are counteracted to a desirable degree'. In post-tensioning we obtain several distinct advantages:

Safe software: The post-tensioning method is now a day's increasing widely, due to its application. By using post-tensioning method one can design the most economic and the safe design. While using this method more precautions has to be made for shear and deflection criteria for the slabs. The design of post-tensioned flat slab can be done by using load balancing and equivalent frame method. For my project a sample plan of an office building ground floor hall is considered. I used safe analysis and design software from the CSI software company USA. This safe software is used for analysis and design of slabs (pt-slabs, ribbed slabs, drop slabs, waffle slabs etc.) And footings of various types.SAFE are the ultimate tool for designing concrete floor and foundation systems. From framing layout all the way through to detail drawing production, SAFE integrates every aspect of the engineering design process in one easy and intuitive environment. SAFE provides unmatched benefits to the engineer with its truly unique combination of power, comprehensive capabilities, and ease-of-use. Laying out models is quick and efficient with the sophisticated drawing tools, or use one of the import options to bring in data from CAD, spreadsheet, or database programs. Slabs or foundations can be of any shape, and can include edges shaped with circular and spine curves . Analysis results

Table: Sum sof Reactions, Part 1 of 2

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OutputCase	GlobalFX	GlobalFY	GlobalFZ	GlobalMX	GlobalMY	GlobalMZ
	kN	kN	kN	kN-m	kN-m	kN-m
DEAD	-8.258E-09	5.074E-08	18782.898	233800.0000	-434400	6.279E-07
LIVE	-4.082E-09	2.478E-08	5624.995	70310.0000	-126600	3.073E-07
PT-TRANSFER	-1.144E-09	1.636E-08	-1.701E-08	-4.214E-07	4.778E-07	9.660E-08
DEAD LOAD	-9.402E-09	6.710E-08	18782.898	233800.0000	-434400	7.245E-07
LIVE LOAD	-5.227E-09	4.114E-08	5624.99	70310.0000	-126600	4.039E-07

post tension slab

CONCLUSION:

There is a definite trend towards large spans in buildings due to the fact that there is now more emphasis on providing large uninterrupted floor space which can result in higher rental returns. Post-tensioning is an economical way of achieving these larger spans. For spans 7.5 metres and over, post-tensioning will certainly be economic and, as the spans increase, so do the savings.The most significant factor affecting the cost of slab system

post-tensioning is the tendon length. Other factors create a scatter of results leading to an upper and lower bound. Not with standing this, it is always advisable to obtain budget prices from a post-tensioning supplier.

The main structural schemes available are the flat plate, flat slab and banded slab, with the latter generally leading to the most cost-efficient structure. However, other factors such as floor to floor heights, services, etc., must be taken into account in the selection of the floor structure. For high rise construction and highly repetitive floor plates, the use of more specialized structural schemes is appropriate with emphasis on systems formwork.It is not uncommon for post-tensioning to be rejected in certain types of building project due to a perceived lack of flexibility. However, tendons are usually spaced sufficiently far apart to allow penetrations of reasonable size to be made later, without cutting through the tendons. Should it be necessary to cut tendons this can easily be achieved using well established methods.

SCOPE OF THE PROJECT: The scope of this report includes all of the forces produced by post-tensioning, especially those in anchorage zones and regions of tendon curvature. The emphasis is on standard buildings and bridges utilizing either bonded or unbounded tendons, but the basic principles are also applicable to external tendons, stay cable anchorages and large rock or soil anchors. The post-tensioning supplier and installer shall furnish all labor, materials, services and equipment required to produce a complete post-tensioned structural system. The work shall include the following items:

1. Furnishing all post-tensioning materials including prestressing steel, anchorages, wedges, pocket formers, couplers, plates, support bars, chairs, tendon enclosures, and bursting reinforcement.
2. Placing of all items listed above.
3. Performing all post-tensioning operations including stressing, anchoring, trimming, encapsulating tendon anchors, and grouting pockets.
4. Cooperating with the Owner's Testing Laboratory in their function of recording and reporting tendon elongation and tension applied to the prestressing steel.
5. Performing all engineering required to fully design a post-tensioning system that complies with the final force and tendon profiles as shown on the structural drawings and to prepare complete shop drawings and field placing drawings.

REFERENCES

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