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APPLYING THE CONCEPT OF POST TENSIONING IN HYBRID BUILDING BY USING ETABS

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ABSTRACT— prestressed beam is defined as beam that had internal stresses introduce to counteract to the degree desire, the tensile stresses that will be imposed in service. The stress is usually imposed by tendons of individual hard-drawn wires, cables of hard-drawn wires, or bars of high strength alloy steel. Compressive stresses can be introduced either by pre-tensioning or by post-tensioning. The current paper emphasizes on prestressed design of pre cast beam considering various stage, lifting stage, erection stage. The paper also enclosed the various losses that takes place during prestress and after prestressing.

Keywords – Prestressing, precast beam, post tensioning.

I. INTRODUCTION

Construction Industry deals with constructing various building structures, such as residential apartments, commercial buildings, offices, malls, etc. Now-a-days the construction industry has developed very fast and has undergone vast technological advancements in the field of construction processes. Generally two types of buildings RC Framed building & Hybrid building that usually comprises of structural elements like slab, beam, column and footings. The connections between these elements are one of the major concerns in transferring the loads safely from slab to beam to column to footings. A typical RC Framed Building has ordinary moment resisting beam column connection made up of regular rebar reinforcement having grades like Fe 415 & Fe500. A Hybrid building is usually made up of different techniques implemented in construction such as precast - pre-tensioned or post-tensioned beams, "Post-Tensioned" Moment Resisting Beam Column Connections" etc.

II. REVIEW OF LITERATURE

Boskey Vishal Bahoria and Dhananjay K. Parbat The post-tensioning method is now a day 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 must 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 the application of design procedure an office building is considered as a case study. The plan of the office building (G+4) is considered. This building is designed by considering four cases with different floor systems. The quantities of reinforcing steel, post stressing steel, concrete required for the slab, beam and column is calculated for the same and are presented in tabular form. Along with this total cost of the building per square meter is found and comparison of all the four cases with respect to cost is done.

Y. H. Luo and A. J. Durrani In analyzing flat-slab buildings for gravity and lateral loading, the same effective slab width is used at both interior and exterior slab-column connections. Tests of slab-column connections have clearly shown the moment-transfer mechanism at interior connections to be distinctly different than the one at exterior connections. The effective slab width and stiffness of the exterior connections is therefore significantly different from those of the interior connections. Recognition of this fact is important in accurately predicting the lateral drift and unbalanced moments at connections in flat-slab buildings. The equivalent beam model for slabs at exterior slab-column connections is presented. Based on test results of 41 exterior connections, the ultimate moment-transfer capacity is found to be a combination of the torsional capacity of the slab edge and flexural capacity of the slab portion framing into the front face of the column. The test results also show the actual torsional capacity of the spandrel beam or slab edge at exterior connections to be considerably larger than the theoretical capacity calculated as an isolated beam. An equivalent beam model is proposed for exterior connections that gives a better prediction of the unbalanced moment at connections and lateral drift of flat-slab buildings.

Jong-Wha , Bai The effectiveness of seismic retrofitting applied to enhance seismic performance was assessed for a five-story reinforced concrete (RC) flat-slab building structure in the central United States. In addition to this, an assessment of seismic fragility that relates the probability of exceeding a performance level to the earthquake intensity was conducted. The response of the structure was predicted using nonlinear static and dynamic analyses with synthetic ground motion records for the central U.S. region. In addition, two analytical approaches for nonlinear response analysis were compared. FEMA 356 (ASCE 2000) criteria were used to evaluate the seismic performance of the case study building. Two approaches of FEMA 356 were used for seismic evaluation: global-level and member-level using three performance levels (Immediate Occupancy, Life Safety and Collapse Prevention). In addition to these limit states, punching shear drift limits were also considered to establish an upper bound drift capacity limit for collapse prevention. Based on the seismic evaluation results, three possible retrofit techniques were applied to improve the seismic performance of the structure, including addition of shear walls, addition of RC column jackets, and confinement of the column plastic hinge zones using externally bonded steel plates. Finally, fragility relationships were developed for the existing and retrofitted structure using several performance levels. Fragility curves for the retrofitted structure were compared with those for the un-retrofitted structure. For various performance levels to assess the fragility curves, FEMA global drift limits were compared with the drift limits based on the FEMA member-level criteria. In addition to this, performance levels which were based on additional quantitative limits were also considered and compared with FEMA drift limits.

III. LITERATURE OUTCOME

From the literature study carried out, The structure is design based on the ETABS which provide adequate strength, serviceability, and durability besides economy. The displacement, shear force, bending moment variation has been shown. If any beam fails, the dimensions of beam and column should be changed and reinforcement detailing can be produced.

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