THESIS

BEHAVIOR OF FLAT PLATES WITH LARGE OPENING IN COLUMN STRIP

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The behavior of flat plate with large opening in column strip was investigated in this study. The size of rectangular openings was varied greater than the size permitted by the building code and standard of ACI and EIT. The three locations of the openings in column strip were openings at interior column and located at interior side, the opening at interior column and located at exterior side and the openings at edge column. The flat plate models were nine square panels comprised of three by three equal width panels supported by sixteen square columns without any capitals and drop panels. The flat plates with varied size of openings at one-tenth, one-fifth, three-tenths, and two-fifths of the width of column strip and subjected to uniform distributed loads were analyzed and investigated for the change of stress resultants by use of finite element software program.

The size of opening was most affected to the stress resultants when the openings expanded in parallel direction of the face of the column when the width of opening was equal to two-fifths of the width of column strip. For the opening at interior column and interior panel, the percentage of maximum bending moment change increased to 35% and maximum shear stress increased rapidly to 72%. For the opening at interior column and exterior panel, the percentage of maximum bending moment change increased to 32%, and maximum shear stress increased rapidly to 83%. For the expanded opening at edge column, the bending moment was reduced and changed direction of bending from negative to positive. The maximum bending moment was reduced to 69% but maximum shear stress increased to 101%.

For the openings at all edge column by critical size, the maximum bending moment at corner and interior column were increased 23% and 22% respectively but at edge column it was reduced to 43%. Maximum shear stress, at corner and interior column were increased 21% and 26% respectively but at edge column it increased to 66%. The openings at all interior column by critical size, the maximum bending moment at corner column increased 2%, at interior column it increased 26% and at edge column it increased 11%. For maximum shear stress, at corner column it increased 3%, at edge column it increased 13% and at interior column it increased 84%.

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