



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJIRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH


IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 9, September 2023

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.423

 9940 572 462

 6381 907 438

 [ijirset@gmail.com](mailto:ijirset@gmail.com)

 [www.ijirset.com](http://www.ijirset.com)

# Analysis and Design of Flat Slabs Using Different Codes and Staad Pro

**Shoaib Naimoddin Shaikh, Prof. Kariappa M.S.**

Master of Technology in Structural Engineering, Department of Civil Engineering, M. S. Bidve Engineering College,

Latur, India

Department of Civil Engineering, M. S. Bidve Engineering College, Latur, India

**ABSTRACT:** Flat slabs system of construction is one in which the beams used in the conventional methods of constructions are done away with. The slab directly rests on the column and load from the slab is directly transferred to the columns and then to the foundation. To support heavy loads the thickness of slab near the support with the column is increased and these are called drops, or columns are generally provided with enlarged heads called column heads or capitals.

## I. INTRODUCTION

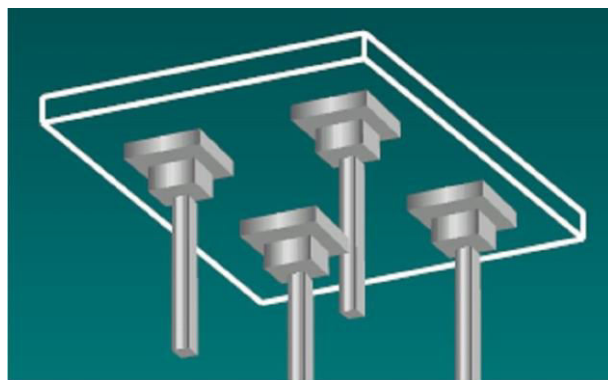
Basic definition of flat slab: In general, normal frame construction utilizes columns, slabs & Beams. However, it may be possible to undertake construction without providing beams, in Such a case the frame system would consist of slab and column without beams. These types of Slabs are called flat slab, since their behavior resembles the bending of flat plates.

Components of flat slabs:

Drops: To resist the punching shear which is predominant at the contact of slab and columnSupport, the drop dimension should not be less than one -third of panel length in that Direction.

Column heads:

Certain amount of negative moment is transferred from the slab to the column at he supports. To resist this negative moment the area at the support needs to be increased. this is facilitated by providing column capital/heads



Flat slab with drop panel & column head



**II. RELATED WORK**

The concept of image inpainting was first introduced by Bertamio et al. [1]. The method was inspired by the real inpainting process of artists. The image smoothness information interpolated by the image Laplacian is propagated along the isophotes directions, which are estimated by the gradient of image rotated by 90 degrees. Exemplar Based method proposed by Criminisi et al. [2] used a best exemplar patch to propagate target patch including missing pixels. This technique uses an approach which combine structure propagation with texture synthesis and hence produced very good results. In [3], the authors decompose the image into sum of two functions and then reconstruct each function separately with structure and texture filling-in algorithms. Morphological technique is used to extract text from the images presented in [4]. In [5], the inpainting technique is combined with the techniques of finding text in images and a simple algorithm that links them. The technique is insensitive to noise, skew and text orientation. The authors in [6] have applied the CCL (connected component labelling) to detect the text and fast marching algorithm is used for inpainting.

The work in this paper is divided in two stages. 1) Text- Detection 2) Inpainting. Text detection is done by applying morphological open-close and close-open filters and combines the images. Thereafter, gradient is applied to detect the edges followed by thresholding and morphological dilation, erosion operation. Then, connected component labelling is performed to label each object separately. Finally, the set of selection criteria is applied to filter out non text regions. After text detection, text inpainting is accomplished by using exemplar based Inpainting algorithm.

**III. METHODOLOGY**

A flat slab is a highly indeterminate structures and its exact analysis is difficult. An approximate analysis can be made by considering an interior panel of slab. For this IS 456-2000 permits use of any of the following methods:- (a)The Direct Design Method: - DDM is very simplest and approximate method for analysis of flat slab. In this method total moment (M0) is calculated and then it distributed to total Negative Moment and Total Positive Moment. All the negative & positive moments are distributed in the column strips & middle strips respectively. (b)Equivalent Frame Method: - In this method moments at each joint is calculated by Moment Distribution Method using the Fixed End Moment on each span.Using those moments calculate negative moments at both left & right support i.e. (Mu-) & the maximum positive moments in the middle of span i.e. (Mu+)

**IV. EXPERIMENTAL RESULTS**

CODE	IS-456	ACI-318	Euro code
Shape of test specimen for concrete strength (mm)	Cube 150x150x150	Cylinder 152.4x304.8	Cylinder 152.4x304.8
Grade of concrete(N/mm <sup>2</sup> )	20	20	20
Grade of steel (N/mm <sup>2</sup> )	415	413	500
Negative moment(KN-m)	186	210	195
Positive moments(KN-m)	88	111	133



Area of reinforcement(mm <sup>2</sup> )	4206	2827	2413
Thickness of slab for Serviceability criteria(mm)	165	145	310
Punching shear	Safe	Safe	Safe

**V. CONCLUSION**

- By comparing with different codes, we concluded that ACI 318 & euro codes are most effective in designing of flat slabs.
- As per Indian code we are using cube strength but in international standards cylindrical are used which gives higher strength than cube.
- Drops are important criteria in increasing the shear strength of the slab.
- Enhance resistance to punching failure at the junction of concrete slab & column.
- By incorporating heads in slab, we are increasing rigidity of slab.
- In the interior span, the total design moments (Mo) are same for IS, ACI.
- The negative moment's section shall be designed to resist the larger of the two interior negative design moments for the span framing into common supports.
- According to Indian standard (IS 456) for RCC code has recommended characteristic strength of concrete as 20, 25, and 30 and above 30 for high strength concrete. For design purpose strength of concrete is taken as 2/3 of actual strength this is to compensate the difference between cube strength and actual strength of concrete in structure. After that we apply factor of safety of 1.5. So, in practice Indian standard actually uses 46% of total concrete characteristic strength. While in International practice is to take 85% of total strength achieved by test and then apply factor of safety which is same as Indian standard so in actual, they use 57% of total strength.
- Pre-fabricated sections to be integrated into the design for ease of construction.

**REFERENCES**

1. Indian standards 456,875.
2. ASI-318
3. 3 Euro code
4. Dr.pradeep kumar ramancharala
5. Reinforced concrete design –S.unnikrishna pillai, Devdas menon
6. R.C.C design S.Ramamrutham



**INNO SPACE**  
SJIF Scientific Journal Impact Factor  
**Impact Factor: 8.423**



**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

9940 572 462 6381 907 438 [ijirset@gmail.com](mailto:ijirset@gmail.com)



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details