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DESIGNING OF A PANCHAYAT UNION OFFICE BUILDING USING SOFTWARE

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Abstract : The structural design is an art and science of designing the structural members with economical, serviceable and durable structure. This project generally based on theoretical design and analysis of structural frame buildings. The entire process of structural designing of this office building is done by using IS code method. Analysis of entire structure having completed by manual design and verified by STAAD-pro software. All the drafting and designing was done by Auto CAD, also serve as a base of transfer of structure for analysis and design in STAAD-pro

IndexTerms **– STAAD.pro, office building, economical, codes, Auto cad.**

I.INTRODUCTION

Designing and analyzing of G+ 2 office building using analyzing software STAAD Pro. Structural analysis is the backbone of civil engineering. During recent years, there has been a growing emphasis on using computer aided software's and tools to analyze the structures. These developments are most welcome, as they relieve the engineer of the often- lengthy calculations and procedures required to be followed while large or complicated structures are analyzed using classical methods. But not all the time such detailed analysis is necessary to be performed. Now-a-days, high rise buildings and multistory buildings are common in metropolitan cities. These multistoried buildings have large number of Joints which are free to move and it is very difficult and time consuming when it analyzed manually. Hence the computer method for analysis is used using the modern analyzing software STAAD.Pro. The purpose of this project is to get a valuable opportunity to designs, thus facilitating the development of various aspect connected with the project work. This project work fulfills planning and designing of a Panchayat Union Office building. We hope our Panchayat Union Office will provide all the facilities to the people.

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1.1 OBJECTIVE OF THE PROJECT.

Planning the public building such as Panchayat Union Office Building. Carrying out a complete analysis and design of the main structure of Panchayat Union Office Building including foundation.. To establishing manual and software design (STAAD PRO).Compare the result with software.

1.2 RULES AND REGULATION REGARDING PUBLIC BUILDING AS PER NBC

The National Building code of India is a single document in which, like a network, the information contained in various Indian Standards is woven into a pattern of continuity and cogency with the interdependent requirements of sections carefully analyzed and fitted into make the whole document a cogent continuous volume. A continuous thread of 'preplanning is woven which, in itself, contributes considerably to the economies in construction particularly in building and plumbing services.

1.3 PROCESSES INVOLVED

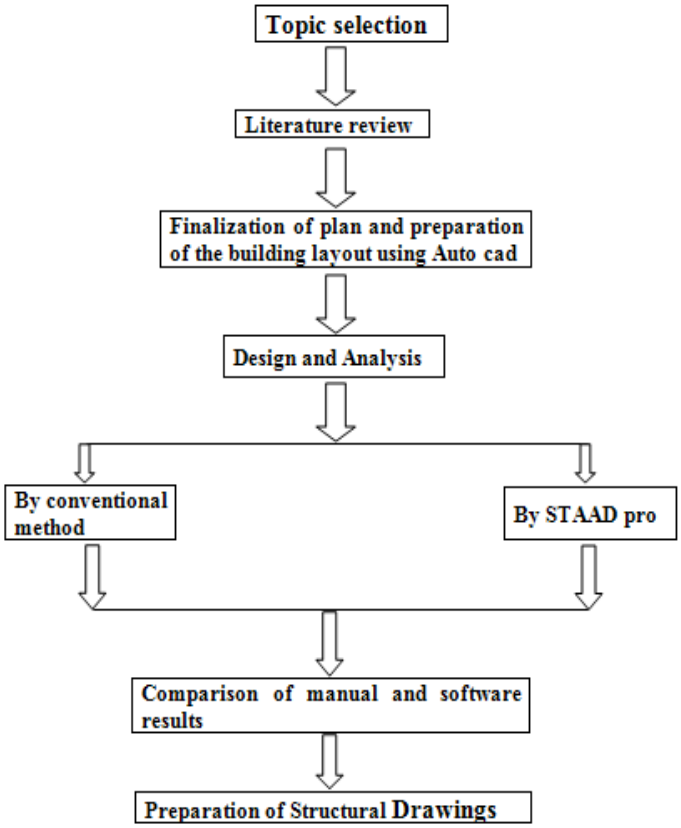
To visit the site and analyze the general site conditions and its orientation. To prepare the plans using AutoCAD. Analyzing the frame, using standard analysis software STAAD Pro for load conditions as per IS 456-2000. Identifying the critical frame. Comparing the critical beam and column with the manual calculations designed using IS 456-2000. Designing the slab, footing, staircase as per IS 456-2000 and SP-16 design aids.

1.4 SUMMARY

In this chapter specifications of Panchayat Union Office Building are discussed. The above specifications are derived from NBC. Softares used are Autocad, Staadpro. A specification often refers to a set of documented requirements to be satisfied by a material, design, product, or service. A specification is often a type of technical standard. There are different types of technical or engineering specifications, and the term is used differently in different technical contexts.

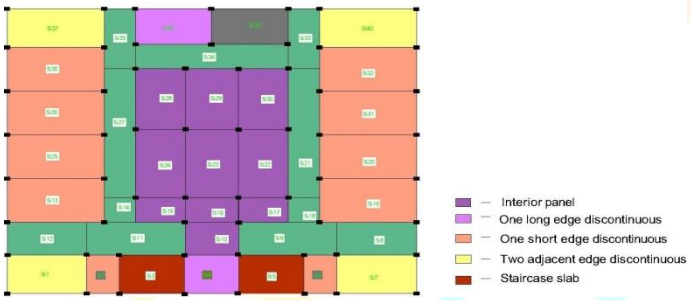
II.RESEARCH METHODOLOGY

Design methodology is the broader study of method in design principles, practices and procedures of designing. Conventional procedures of design, such as drawing, can be regarded as design methods, but since the 1950s new procedures have been developed that are more usually grouped together under the name of "design method"

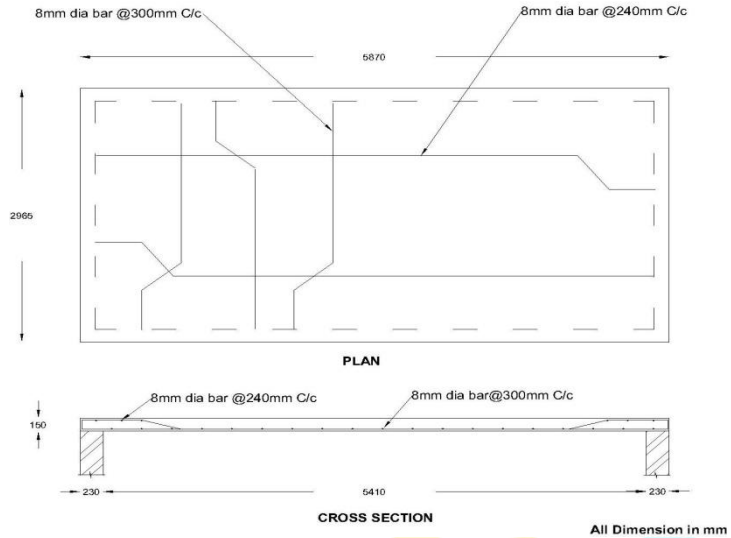


III.EXPERIMENTAL ANALYSIS

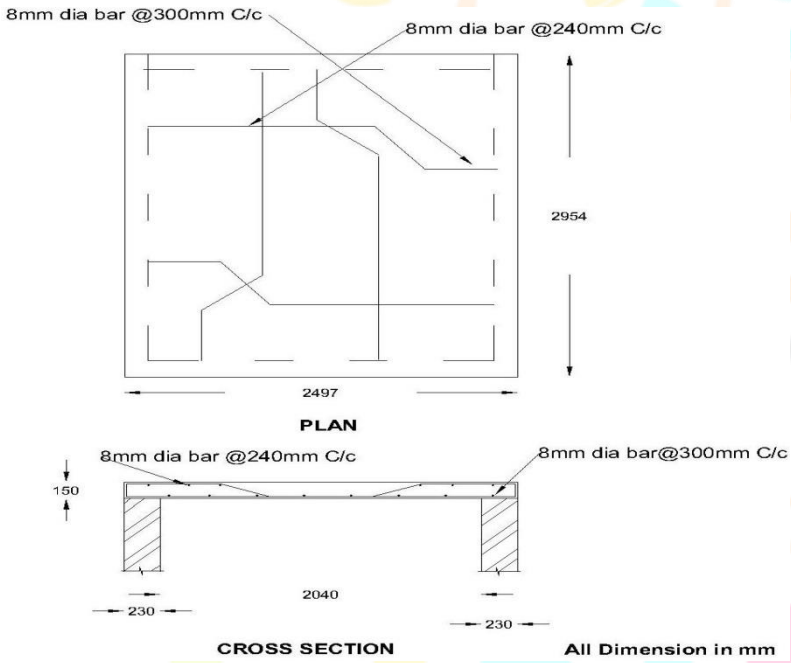
3.1 Type of the slabs are mentioned here



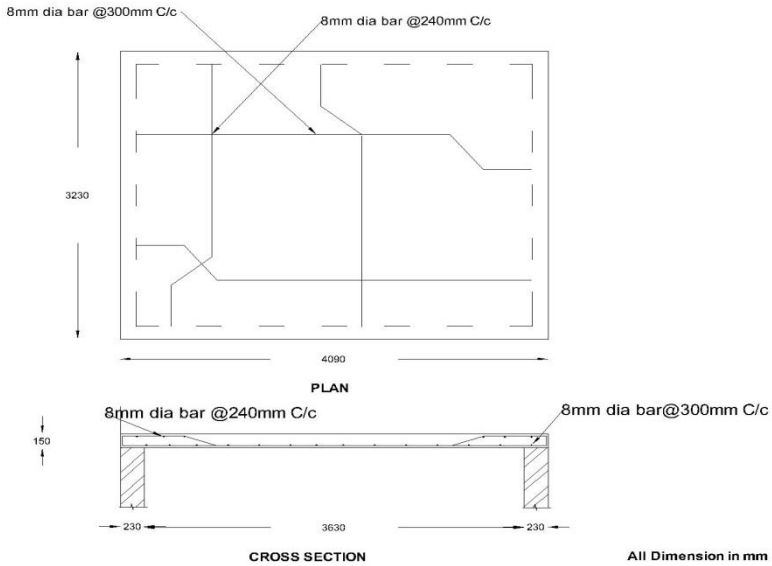
3.1.1 TWO WAY – ADJACENT EDGE DISCONTINUOUS



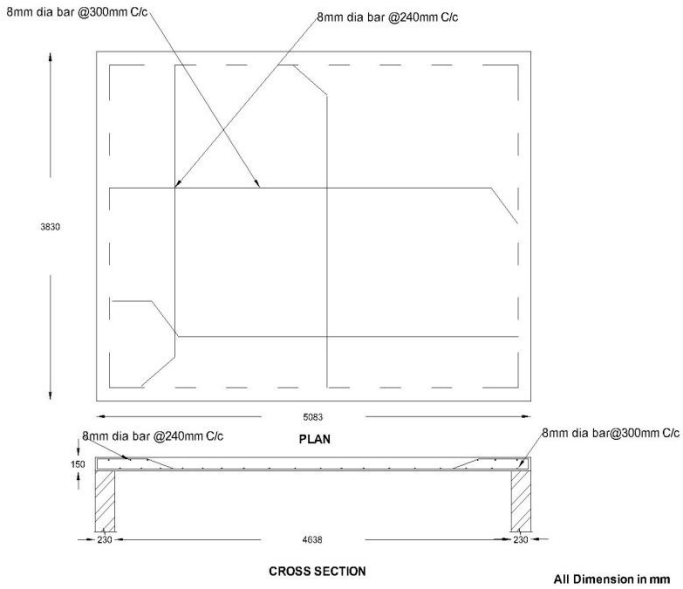
3.1.2 TWO WAY – ONE SHORT EDGE DISCONTINUOUS



3.1.3 TWO WAY – ONE LONG EDGE DISCONTINUOUS

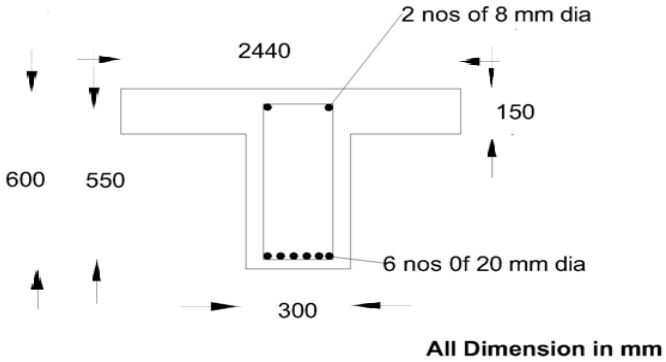


3.1.4 TWO WAY – INTERIOR PANEL

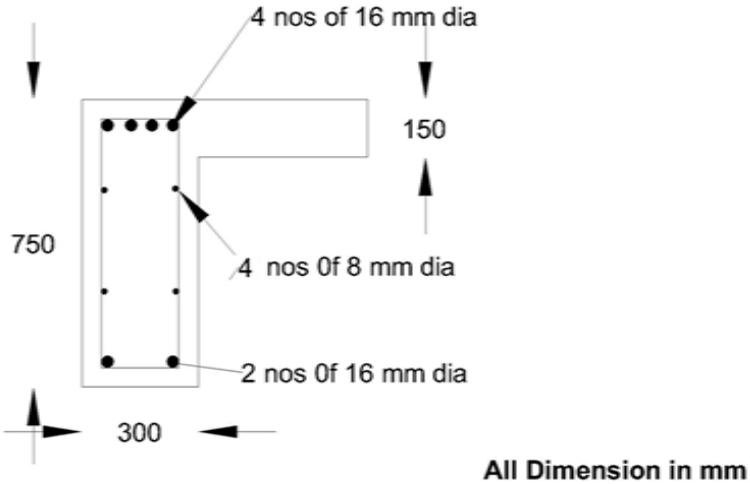


3.2 BEAM

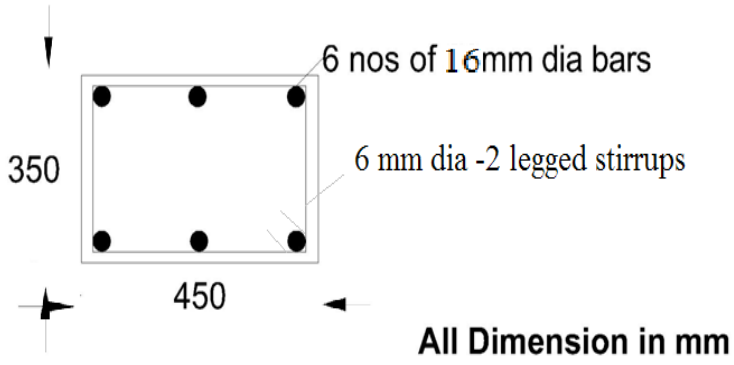
3.2.1 T – BEAM



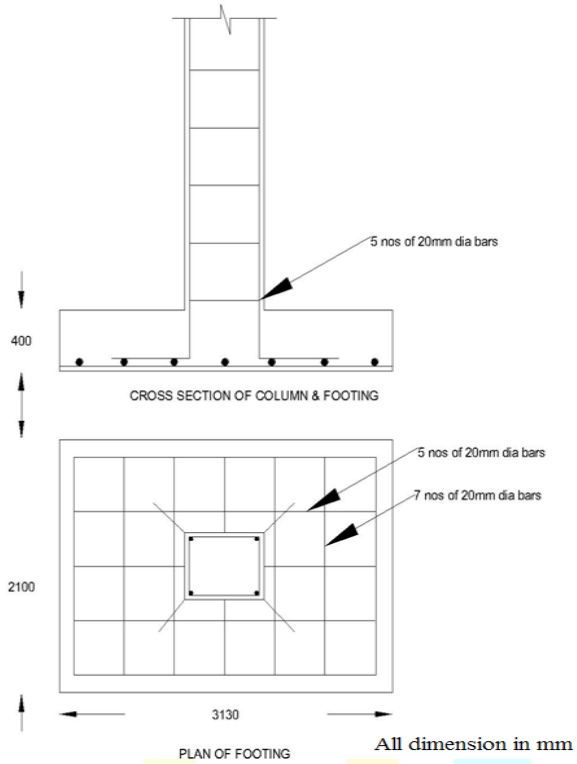
3.2.2 L – BEAM



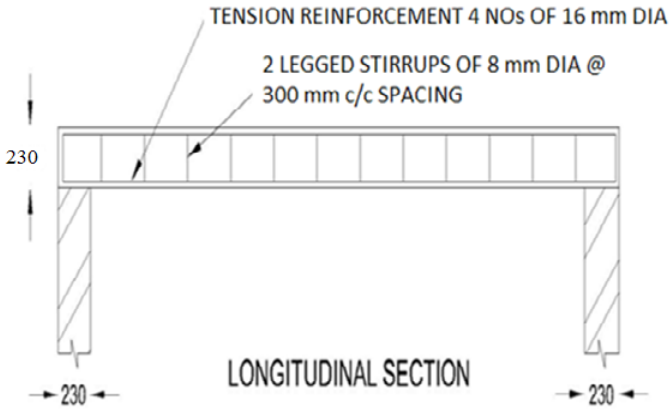
3.3 COLUMN



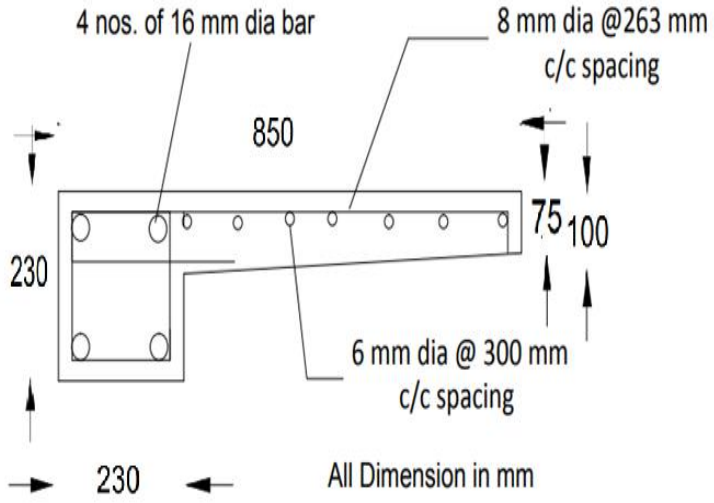
3.4 FOOTING



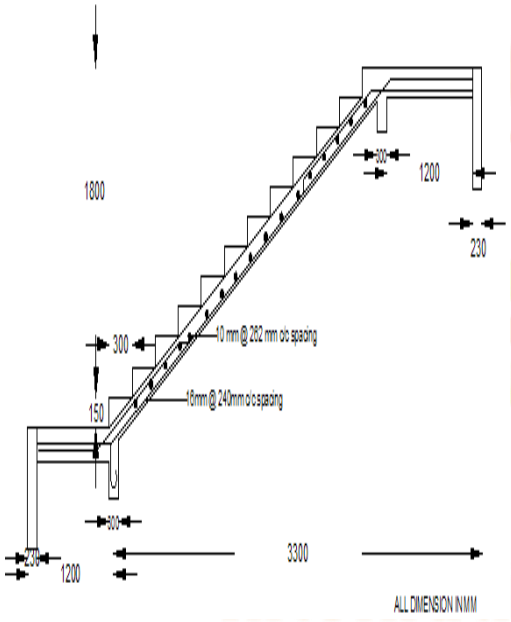
3.4 LINTEL



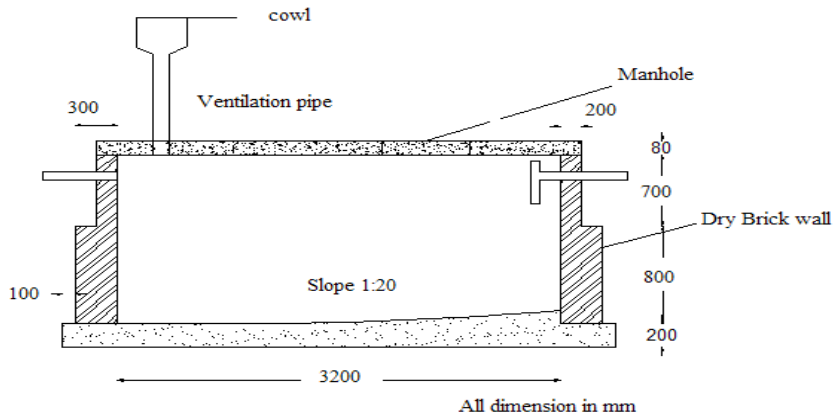
3.5 SUNSHADE



3.6 STAIRCASE (Dog legged)



3.7 SEPTIC TANK



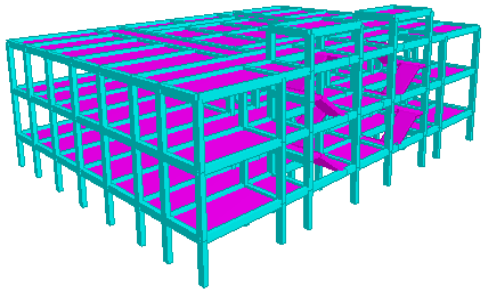
IV. STAAD PRO ANALYSIS

4.1 ANALYSIS

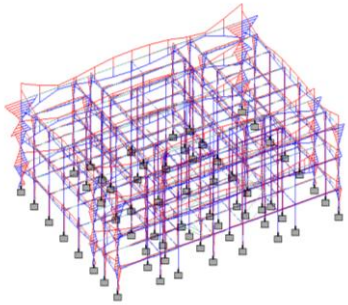
The analysis of the structure that is determination of the internal forces like bending moment, shear force, etc. in the component members, for which these members have to be designed, under the action of given external loads. This process requires the knowledge of structural mechanics which includes mechanic of rigid bodies (i.e., mechanics of forces), mechanics of deformable bodies (i.e., mechanics of deformations) and the theory of structures (i.e., the science dealing with response of structural system to external loads). A brief review is taken of structural analysis to refresh the basic principles.

4.2 Analysis Report

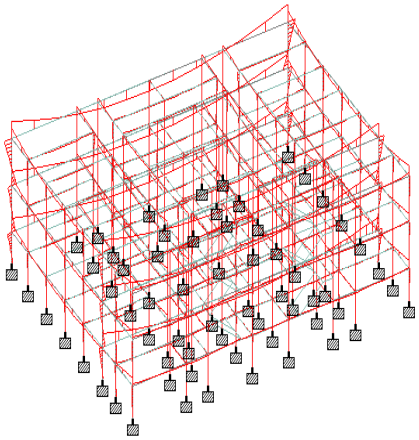
4.2.1 Rendering View



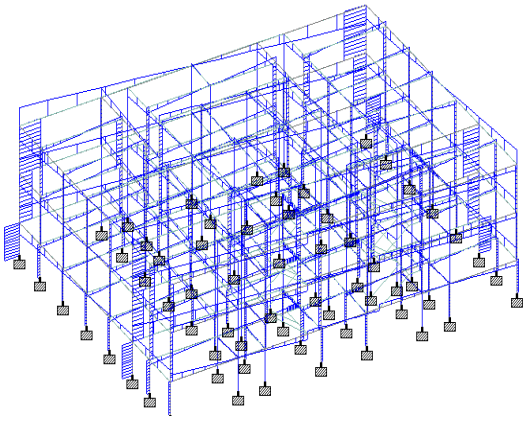
4.2.2 Beam Stress Contour



4.2.3 Bending Moment



4.2.4 Shear Force



4.3 ANALYSIS OF BEAM

BEAM

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B E A M N O. 94 D E S I G N R E S U L T S

M25 Fe500 (Main) Fe500 (Sec.)

LENGTH: 12430.0 mm SIZE: 300.0 mm X 450.0 mm COVER: 25.0 mm

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	3107.5 mm	6215.0 mm	9322.5 mm	12430.0 mm
TOP REINF.	1182.60 (Sq. mm)	213.69 (Sq. mm)	0.00 (Sq. mm)	0.00 (Sq. mm)	768.27 (Sq. mm)
BOTTOM REINF.	2.35 (Sq. mm)	213.69 (Sq. mm)	631.68 (Sq. mm)	332.77 (Sq. mm)	213.69 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

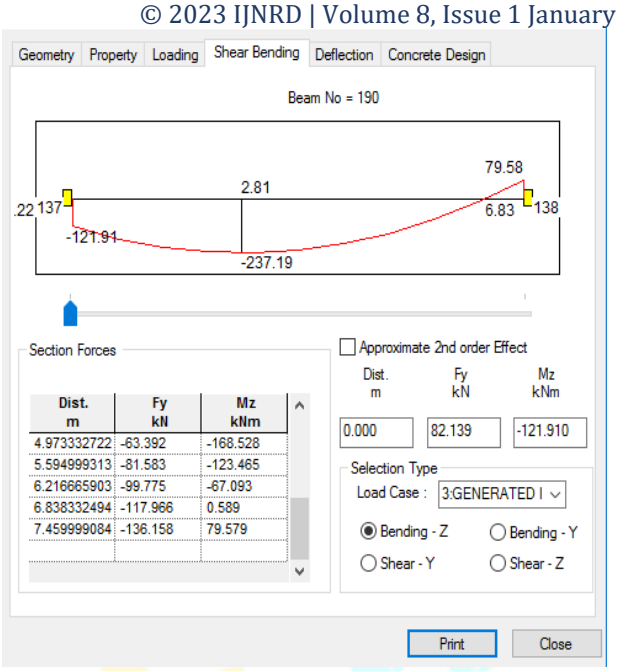
SECTION	0.0 mm	3107.5 mm	6215.0 mm	9322.5 mm	12430.0 mm
TOP REINF.	6-16í 1 layer(s)	3-16í 1 layer(s)	2-16í 1 layer(s)	2-16í 1 layer(s)	4-16í 1 layer(s)
BOTTOM REINF.	3-12í 1 layer(s)	3-12í 1 layer(s)	6-12í 1 layer(s)	3-12í 1 layer(s)	3-12í 1 layer(s)
SHEAR REINF.	2 legged 8í @ 165 mm c/c	2 legged 8í @ 165 mm c/c	2 legged 8í @ 165 mm c/c	2 legged 8í @ 165 mm c/c	2 legged 8í @ 165 mm c/c

SHEAR DESIGN RESULTS AT DISTANCE d (EFFECTIVE DEPTH) FROM FACE OF THE SUPPORT

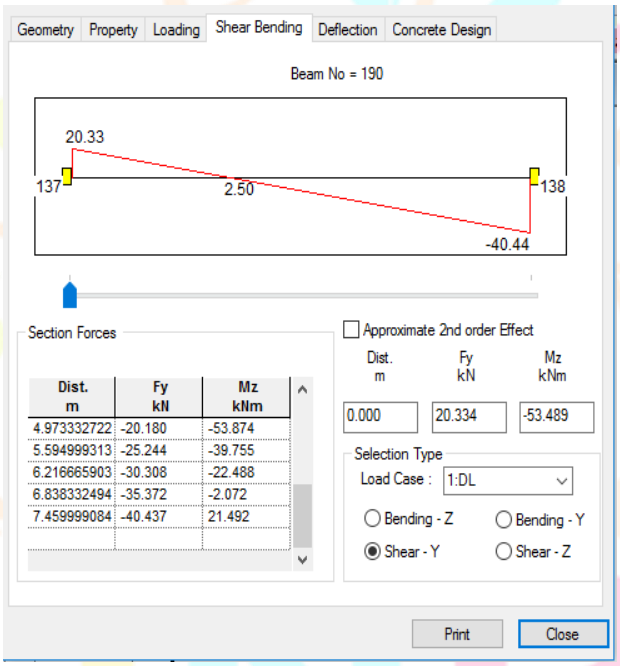
SHEAR DESIGN RESULTS AT 567.0 mm AWAY FROM START SUPPORT

VY = 73.20 MX = -5.25 LD= 3

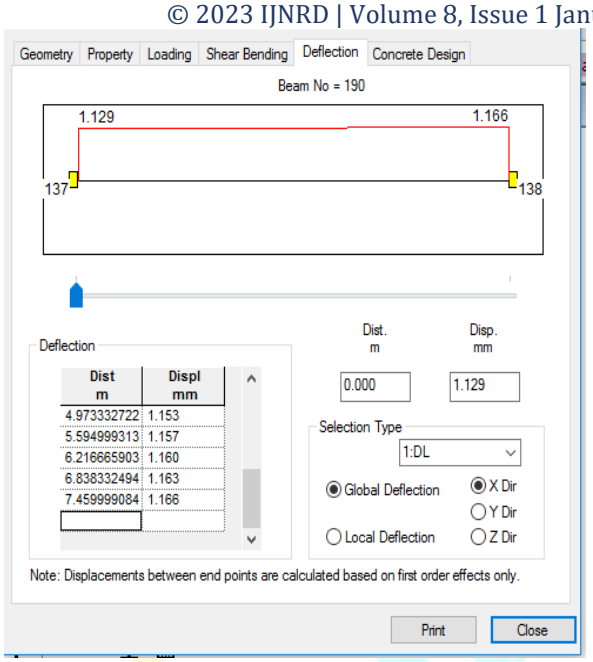
Provide 2 Legged 8í @ 165 mm c/c



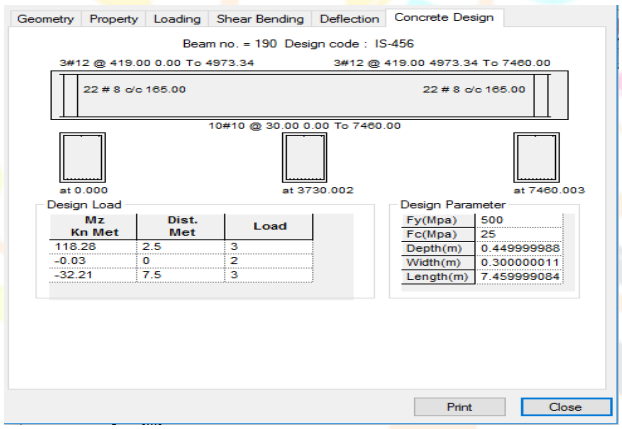
Bending moment



Shear force



Deflection



Concrete design

4.4 ANALYSIS OF COLUMN

COLUMN
C O L U M N N O. 36 D E S I G N R E S U L T S

M25 Fe500 (Main) Fe500 (Sec.)

LENGTH: 3600.0 mm CROSS SECTION: 450.0 mm X 300.0 mm COVER: 40.0 mm
** GUIDING LOAD CASE: 3 BRACED LONG(Z) /SHORT(Y)
REQD. STEEL AREA : 4863.24 Sq.mm.
REQD. CONCRETE AREA: 130136.76 Sq.mm.
MAIN REINFORCEMENT : Provide 16 - 20 dia. (3.72%, 5026.55 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 300 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 3287.75 Muz1 : 183.85 Muy1 : 321.96

INTERACTION RATIO: 1.00 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 3
Puz : 3347.16 Muz : 187.35 Muy : 329.62 IR: 0.98
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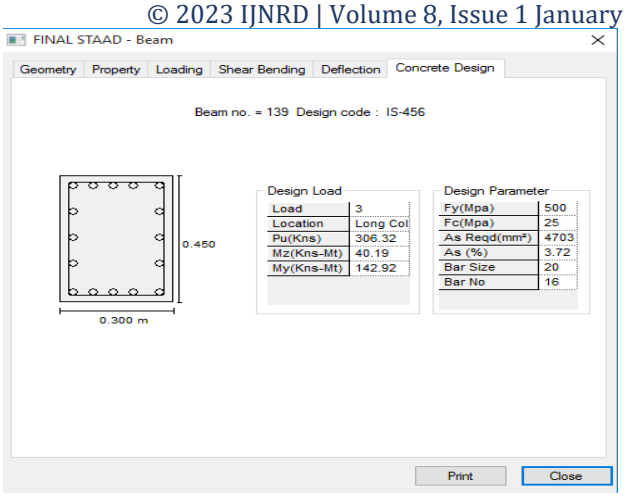

Concrete Design

V. RESULTS AND DISCUSSION

- The design of the structure is done by limit state method. According to which the structure is safe and reliable drawings showing plan are drawn. And also after the completion of the project, we gathered knowledge about "Planning, Analysis and Designing" of **PANCHAYAT UNION OFFICE BUILDING** & other structures

- The building act as a three dimensional space frame. All the drawings presented in this project report were drafted by using AutoCAD 2016 software and designed as per codal provisions.

- The two way slab have been designed manually.
  Eg : One short edge discontinuous S2

  LONGER SPAN - 8MM BAR IS PROVIDE AT 280 MM C/C SPACING

  SHORTER SPAN - 8 MM BAR IS PROVIDED AT 280 MM C/C SPACING

- Beams are designed as L & T beams.
  Eg : T beam
  Bottom reinforcement of Rib – 6 nos of 20 mm dia
  Hanger bar reinforcement – 2 nos of 8 mm dia

- Beams are been analyzed by using STAAD PRO Software.

- Columns are designed as a short column based on condition.
  Eg: Column
  Longitudinal Reinforcement - 6 nos of 20 mm dia
  Transverse Reinforcement - 2 legged 8 mm dia stirrups

- The soil here is alluvial and for that reason foundation is designed as shallow.
  Eg : Footing Mat
  7 nos of 20 2mm dia bar and 5 nos of 20 mm dia

- Septic tank has been designed for average per capita demand.
  Eg : Dimension is found to be 3.2 m x 1.06 m x 1.5 m

VI.CONCLUSION

The design of the structure is done by limit state method. According to which the structure is safe and reliable drawings showing plan are drawn. And also after the completion of the project, we gathered knowledge about "Planning, Analysis and Designing" of **PANCHAYAT UNION OFFICE BUILDING .**

I. ACKNOWLEDGMENT

We wish to express our immense gratitude with pleasure to those individuals who have either directly or indirectly contributed to my needs at time for the Development and success of the work. Thanks to our civil department HOD and other staff members who helped us in this project.

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