A
Major Project Report
On

“DESIGN OF
STUDENT ACTIVITY CENTER
FOR
RTU CAMPUS KOTA”

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ABSTRACT

Student Activity Center is one of supporting facility to embody the student and non-academic activity. To shape learners to be a part of the society, which expected will not only have academic and professional capabilities, but also can applying and developing science, technology, and arts.

The college, University Departments, RTU, Kota, is 38 years old. Since the college is being expanding at a great rate, vast genre of activities are being held in the college lately apart from the academics. The college is having a strength of 2400+ students. And keeping in mind the overall personality development of the students, there's an urgent needof a Student Activity center in the college.

This project deals with the design of a Student Activity center for the college. The report comprises of the various sections namely planning, structural design and costing and estimation of the building.

The planning of the building was carried out using the AUTOCAD software and the Structural Analysis and Design was carried out using Bentley Staad.Pro as well as STAAD RCDC softwares. The costing and estimation was carried out with the help of MicrosoftExcel.

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1. INTRODUCTION

1.1 GENERAL

Any construction project to begin with starts with the Layout of the building or structure followed by Design and Analysis of the structure which is succeeded by cost estimation and planning for the said project. This project involves the layout, design, analysis and cost estimation of a G+4 student activity center (assembly building) located in Rajasthan Technical University campus, Kota. For completing the project very popular civil engineering software's such as AutoCAD, STAAD Pro V8i, STAAD RCDC and Microsoft Excel for Cost Estimation have been used.

Together with academic knowledge, involvement of students in extracurricular activities is necessary for the development of a balanced personality of the students. To encourage the students to actively participate in various activities appropriate facilities are needed to be provided and thus there is a need to build a proper planned student activity center. The main aim of SAC is to complement the academic experience of students with extra-curricular programs that promote social and personal development. Providing a separate space to student groups is a must for them to carry out planning of various programs. This adds an additional set of valuable learning experiences for students & faculty.

1.2 REQUIREMENT OF THE SAC BUILDING

A Student activities center has been chosen as the topic for our project.

1. The first is the acute need for such a facility on the campus. The students and the faculty have expressed their need for such a facility for a long time. At the present moment, no such comprehensive facility exists on campus to house the student needs of recreation and socializing; only make-shift spaces serve these needs right now, with the result that the present activities are scattered all over the campus grounds.

2. Secondly, a student activities center would enhance the aim of the University by providing an atmosphere for a common life and cultivated social program for the many and varied ethnic population of the students, faculty and Alumni of the University. The facility will serve as an informal educational medium for supplementing the academic and non-academic factors of education by centralizing and intregating the University Community effort and activities. It would definitely contribute to the students awareness of self-government and social and civic responsibility.

3. Thirdly, the University will strive to gather the teachers and students into a closer relationship and make the University a better place to help this inter-relation to formulate intelligent and practical programs for action in realizing the track of creating a better society.

Student activities make a positive impact on the environment of any Institution as these are dedicated to helping students in developing their personality, perception, learning and attitude. There are many ways for students to get involved on campus so, we have planned and designed Student Activity Centre (SAC) which serve as a connection point for the students in finding the niche that is right for them.

1.3 OBJECTIVES OF THE PROJECT

The objectives of the project are mentioned below:

1. Draft the Layout of the proposed building using AutoCAD

2. Analyse and Design the building on STAAD Pro V8i

3. Calculate the approximate cost of the building

1.4 STATEMENT OF PROJECT

Salient features:

Utility of building : Assembly/recreational building.

No of stories : G+4

Shape of the building : Rectangle

No of staircases : 2

No. of rooms

Conference halls: 2

Presentation rooms: 3

Activity rooms : 30

Office rooms: 5

Pantry and storage rooms: 15

No of lifts : 2

Type of construction : R.C.C framed structure

Types of walls : brick wall , shear wall for lift.

Geometric details:

Floor to floor height : 3900 mm

Area of each Floor :

Height of plinth : 900 mm

Depth of foundation: 1800mm

Materials:

Concrete grade : M30

All steel grades: Fe500 grade

Bearing capacity of soil: 600 KN/M2

1.5 SOFTWARES USED

1. AutoCAD is a commercial software application for 2D and 3D computer aided design and drafting for various fields in engineering like civil, mechanical, electrical, automation, architecture etc. It was first launched in 1982 by Autodesk, Inc.

AutoCAD Architecture allows designers to draw 3D objects such as walls, doors and windows, with more intelligent data associated with them rather than simple objects. The data can be programmed to represent products sold in the building industry, or it can be extracted into a file for pricing material estimation etc.

In this project AutoCAD has been used extensively for drafting. Also the various detailing for the different components of structure has also been completed using AutoCAD.

2. STAAD Pro (V8i) and STAAD RCDC: We used this software for analysis of different types of truss with multiple load combinations and selected the most economical truss in designing. “STAAD Pro” is a structural analysis and design computer program original y developed and marketed by research engineers international in 1997. In late 2005, research engineer’s international

was brought by Bentley Systems. The commercial version, STAAD Pro is most widely used structural analysis and design software used all over the world. It supports several steel concrete and timber design codes.

3. Microsoft Excel: Excel is a typical spreadsheet which is nowadays widely used in cost estimation and alsosometimes for planning purposes. Excel has various inbuilt calculation tools which can beused for complex calculation. Apart from that one can also input one’s own formula forspecial calculations. The user interface is very friendly and easy to use. There are aroundRows: 1,048,576 Columns: 16,384, which makes it easier for the user to enter a large amountof data into a single spreadsheet. The key objective of cost estimation is to arrive at an accurate cost and schedules so as toavoid schedule slips and cost overruns. Cost estimation goes beyond preparing approx. Costsand helps in preparing schedules, manage human resource, support assessment and decisionmaking. The wide range of topics in cost estimation represents the crossing of various fieldssuch as project management, business management and engineering. Cost estimationrecognises and pays attention to the relationship between cost and physical dimension ofwhat is being built. Microsoft excel was also used for the design of the staircase after manual calculations.

2. PLANNING

Any building project starts with the preparation of the layout of the structure. The layout of the structure was drafted using the autocad software.

2.1 SITE PLAN

The choice of site for a student activity centre is governed by several factors which may be mutually conflicting, but a compromise has to be struck between the various considerations involved. Student activity centre building is located just to the left of the T- point, behind the dispensary .

A) The site location of Student activity centre is such that it is placed away from the academic blocks so that the studies and cultural activities do not intervene together.

B) Also the cafeteria, stationary shops and dispensary is located nearby and easily accessible.

C) The outdoor sports activities such as football ground, volleyball ground and tennis ground are located nearby.

D) The building is facing towards the west direction .

2.2 GENERAL REQUIREMENTS

	Requirements as per code (minimum)	Considered requirements
Set-Back distance	**7 m**	
Plinth height	**450mm**	**900mm**
Floor Height	**3.6m**	**3.9m**
Staircase	**Width – 1.5m**	**1.83m**
Tread	**300mm (max)**	**275mm**
Riser	**150mm (max)**	**150mm**
Doors	**0.95m (width)**	**1.2m (width)**

Table 2.1 : General Requirements as per National Building Code .

2.3 PLAN OF DIFFERENT FLOORS

The building consists of five floors including ground floor whose details are as folows:

<u>Ground Floor Plan</u>

Each floor consists of an office for the faculty in charge of the student activity centre and for the student in charges of different activities.

It consists of rooms as follows :

- Flying Mustang Club (Aeromodelling Club) works to cultivate and develop aerodynamic skills among students by building various aircrafts. It aims at providing fine details involved in the construction and testing of aero models to students so that they can develop air-mindedness and motivate themselves to participate in national level tech-fests. Various competitions like Water-Rocket Competition, Craft Control etc. are held regularly in this club.
- Marketing club: The club deals with marketing and management systems. The main area of focus of the club is to increase awareness of students towards marketing and advertisement. It helps in working for the college events promotion and sponsorship.
- Conference Hall : The conference hall is for the round table meeting of the faculties and the guests.
- Presentation Hall : The clubs can use this presentation room to present the activity onto the screen to the interested students.
- NCC Room: The National Cadet Corps is the youth wing of the Indian Armed Forces, so this room is for the NCC students to carry out there classes and store there material .
- NSS Room :The National Service Scheme is an Indian government-sponsored flagship for public service program conducted by the Ministry of Youth Affairs and Sports of the Government of India.Purpose of this room is to indulge more and more students in social service and to deliver the social qualities to them.
- Fest Preparation room : This room is for the preparation for the fests such as Thar, Anukriti ,Uttaradh and many more college fests.
- Also one pantry room is provided on each floor for the purpose of refreshments.

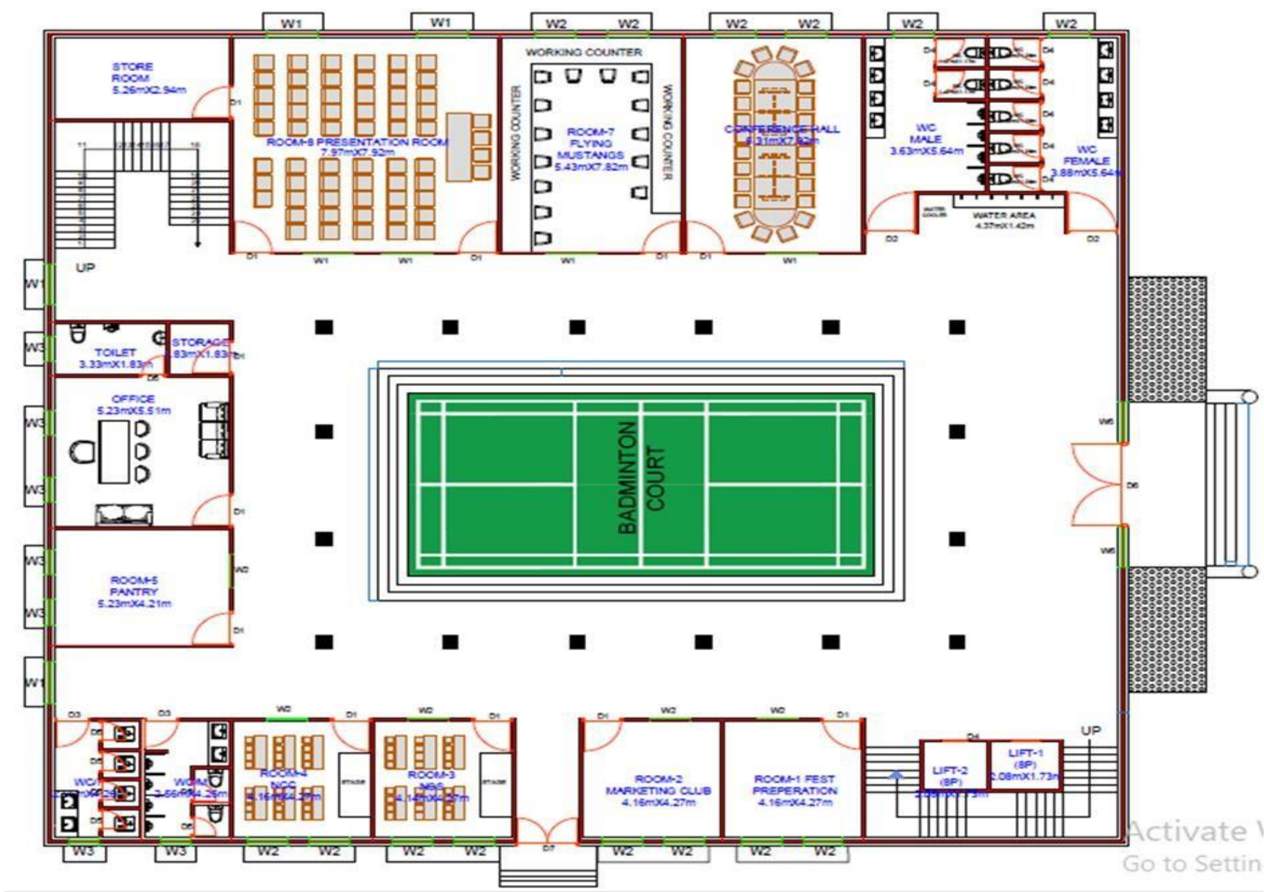


Fig.2.1: Ground floor plan

a) First Floor

1. Master Builders :The objective of club is to learn the advanced technology and their implementation in practical life, to discover new construction projects, learn more about modern infrastructural development. Various workshops on technical and structural softwares like AutoCAD, Staad.Pro, Revit Architecture, etc. are actively organized.
2. Robotics Club :The Robotics Club is the oldest technical club of the college. This Club is an association of students where the all discuss and share their expertise on robotics to create the best of robots with added features. Competitions like robowar, roborace etc are regularly organized to boost the interest of students in the emerging field. This club gives them a technology driven environment.
3. Techknights :Tech Knights (Programming Designing & Gaming Club) works to cultivate and develop programming, development and gaming skills among the students by organizing live Programming & Development sessions and LAN Gaming sessions. It aims at providing

a head start to all programmers. Night Out Coding Challenges (NOCCs) and various workshops are conducted on a regular basis.

4. Technocryptics :Techno Cryptics, aims to bring out the hidden technical talent in students as well as to make them familiar with updated technical and non-technical knowledge. It organizes technical and logical based quizzes which nurtures the inquisitive nature of the students.
5. Wordsworth :True to their motto “Enroll, Enhance and Enlighten” Words-Worth provides a platform for self improvement, linguistic creativity and personality development by practicing communication and leadership skills in friendly and supportive environment. The club organizes meetings on a regular basis to promote literary activities.
6. SAE club room :Society of Automotive Engineers (SAE) RTU is a group of students enthusiastic about design, manufacture and operation of motorcycles, automobiles and trucks and their respective engineering sub-systems. The club is run by the students under the guidance of the teachers. The students of this club made an eco-cart and participated in SAE eco-cart series.
7. Presentation Room

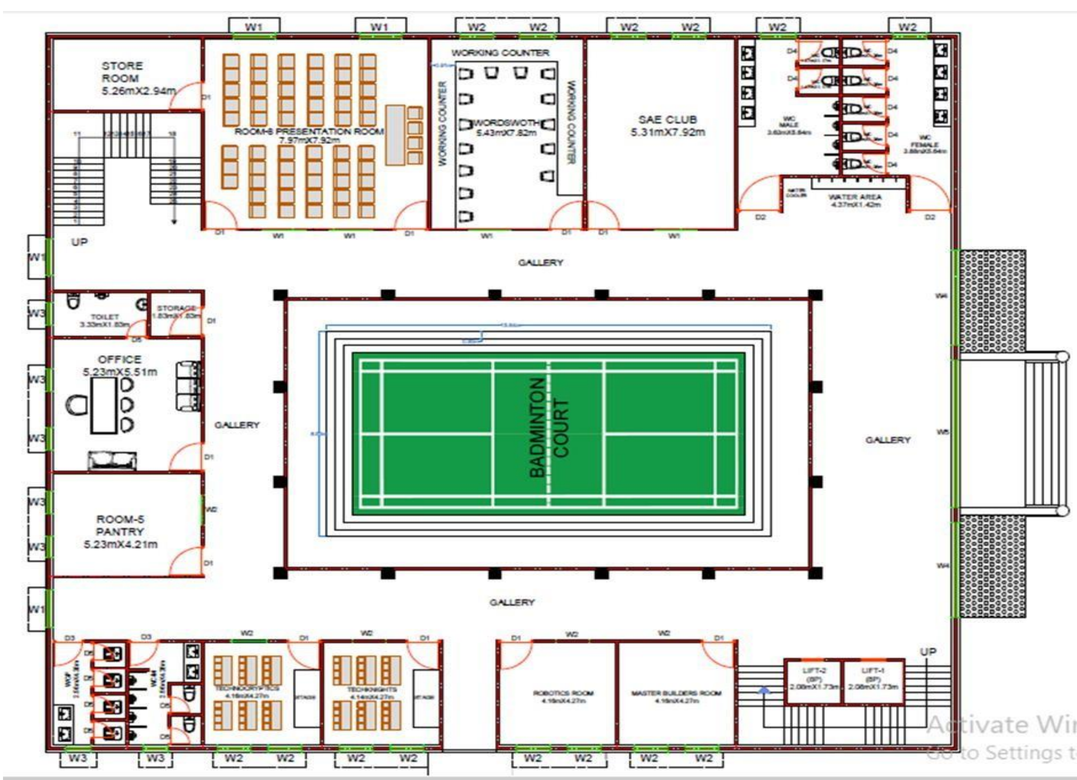


Fig.2.2: First floor plan

b) Second Floor :

1. Art and craft room : The creative club brings out the creative side of the student through the art and craft.
2. Interview Room : In this room interview of the students selected by the companies will be held .
3. Group Discussion Room : The group discussion will be held in this room helping the students to prepare them for the placements.
4. Reading Room : The student can visit this room if they want a peaceful place to read something:
5. Book Store : This floor also includes a book store .
6. Presentation Hall
7. Conference Hall

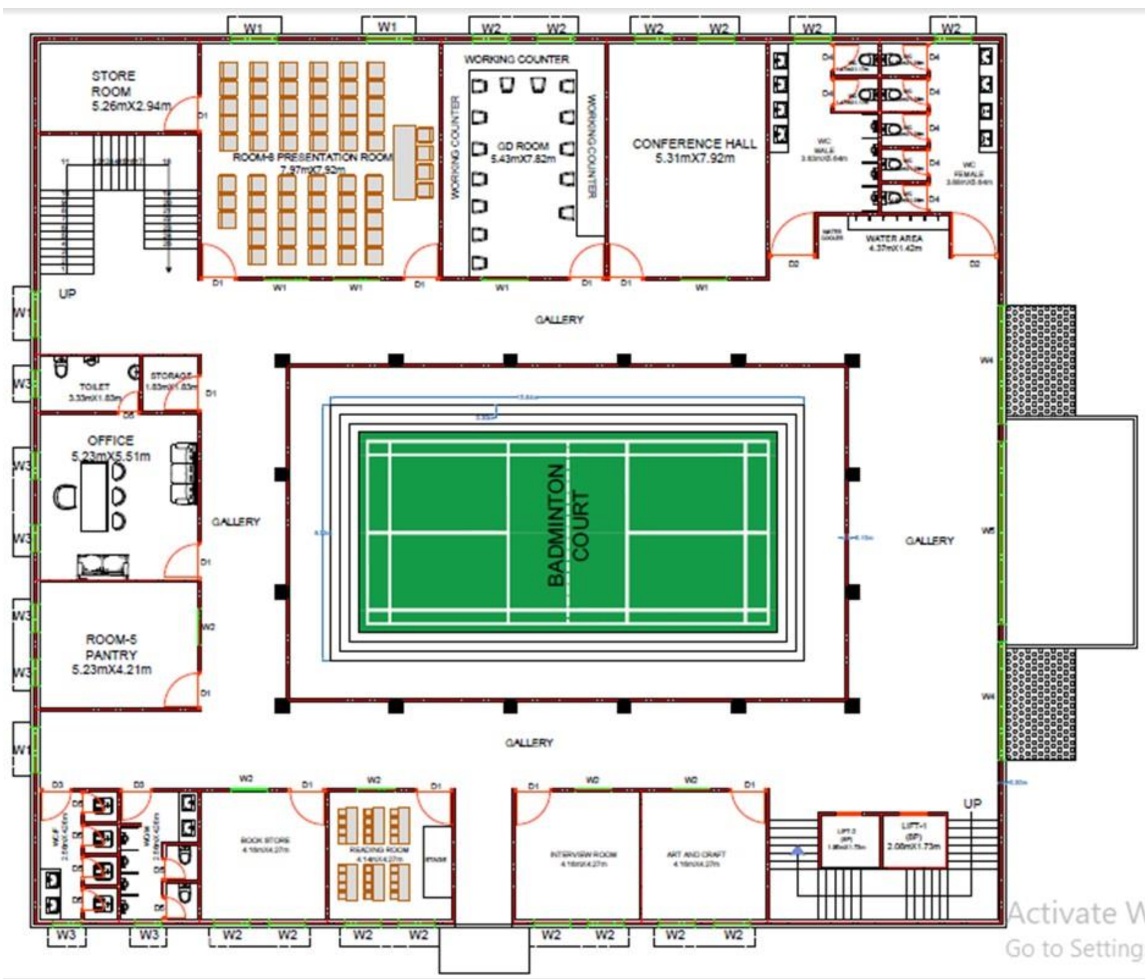


Fig.2.3: Second floor plan

c) Third Floor

1. Vivekanand study circle :Vivekananda study circle RTU Kota is working for enhancement of moral and ethical values among engineering students. The study circle also provides free tuitions to needy students of nearby economically backward colony and motivates parents to send their wards to school.
2. Drama club :Objective of the club – To enhance the characters within ourselves
3. Editorial board
4. Eateries
5. 2 rooms for future extension
6. Quiz room

Fig.2.4: Third floor plan

d) Fourth floor

1. Dance club :Objective of the club – To teach dance to the newcoming students and prepare them for dance competition.

2. Music Club :Objective of the club – The club aims to nurture the talent in every member and enhance their own individual love of music. We provide a conductive environment for mutual learning. Learn vocals & various instruments as well as how to perform on stage.
3. Indoor games :

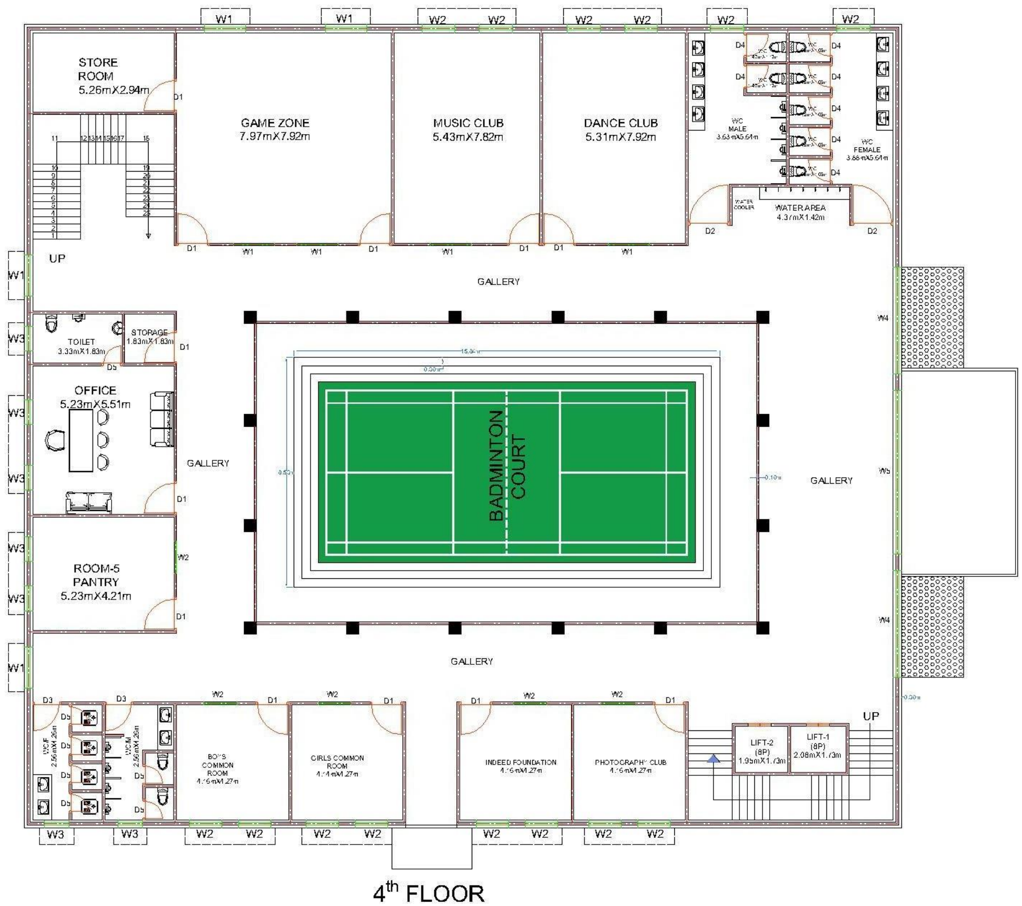


Fig.2.5: Fourth floor plan

2.4 SECTIONAL ELEVATION

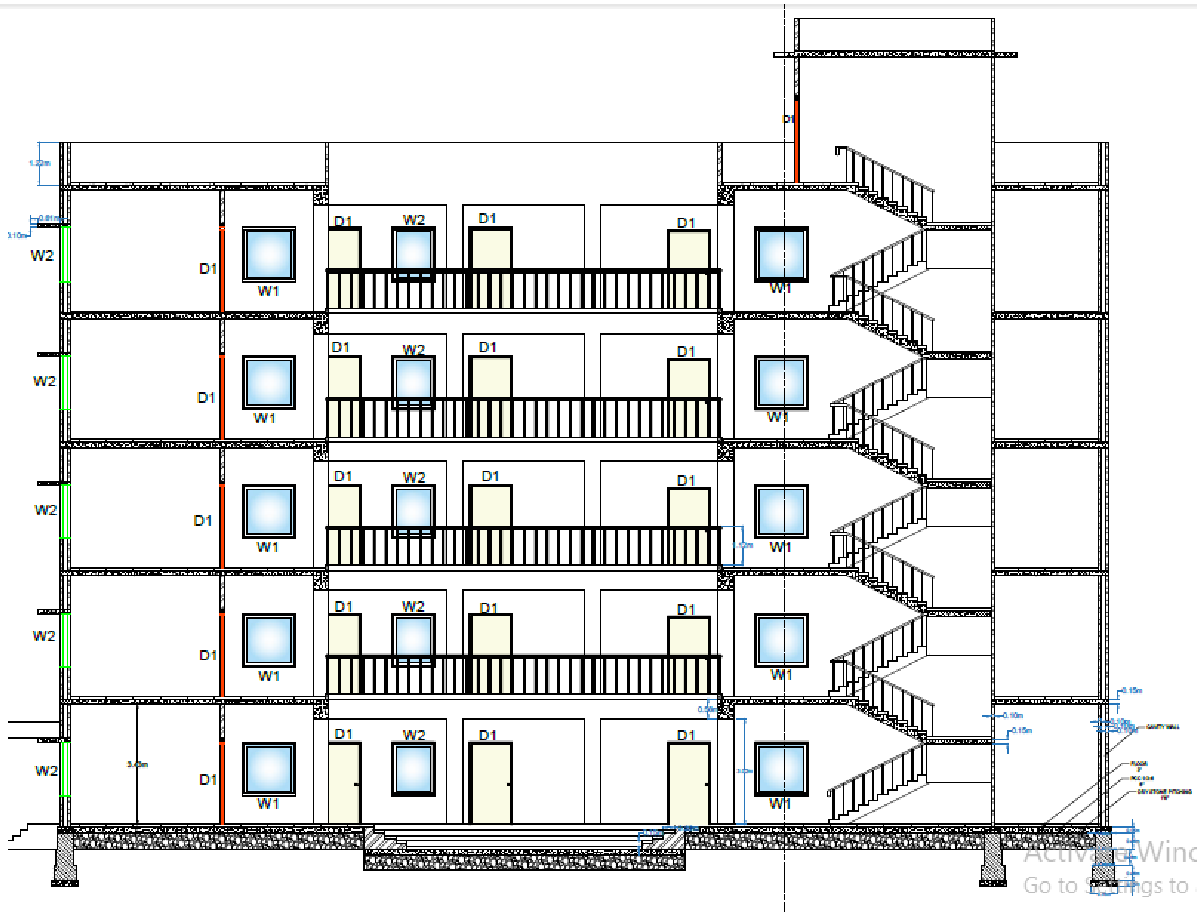


Fig.2.6: Sectional elevation

3. STRUCTURAL ANALYSIS AND DESIGN

3.1 SAC BUILDING MODEL GENERATION

Student activity centre building model was generated using software STAAD.Pro V8i SS6. General design and analysis of beams and columns was done with the help of the above mentioned software.

Staad-Pro Over View:

STAAD.Pro is a general purpose program for performing the analysis and design of a wide variety of types of structures. The basic three activities which are to be carried out to achieve that goal –

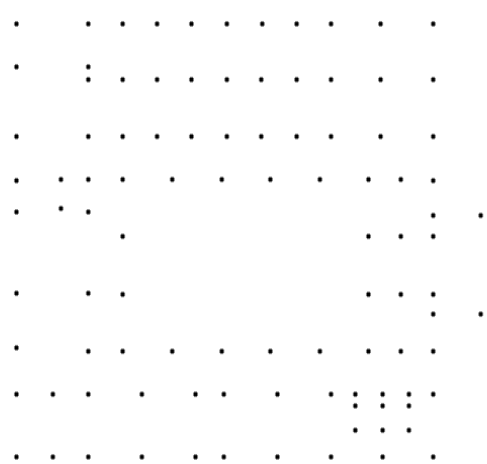
a) Model generation

b) The calculations to obtain the analytical results

c) Result verification – are all facilitated by tools contained in the program's graphical environmentapplication for design and detaining.

Step 1: Creation of nodes.

Based on the column positioning of plan we entered the grid line using Snap Node/Beam command. Open Staad.Pro → New Project → {Enter Name of project} → Add Beam → Create → {Enter data as per plan}

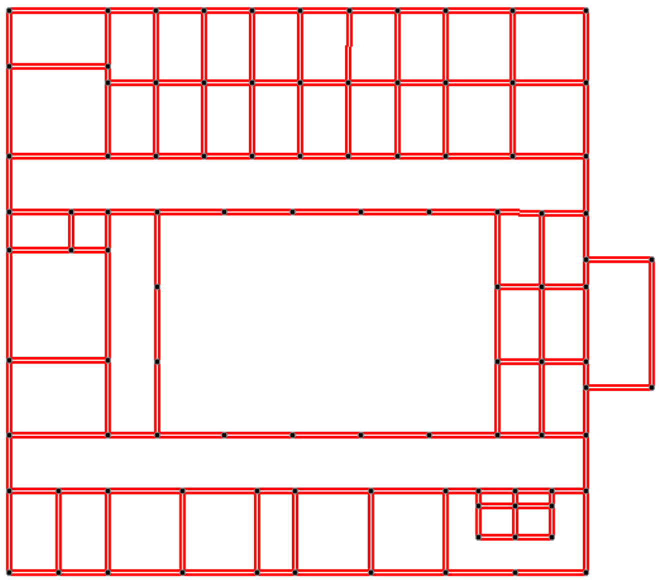


Node	X m	Y m	Z m
1	0.000	0.000	0.000
2	2.768	0.000	0.000
3	5.537	0.000	0.000
4	9.728	0.000	0.000
5	13.894	0.000	0.000
6	16.027	0.000	0.000
7	20.244	0.000	0.000
8	24.409	0.000	0.000
9	28.346	0.000	0.000
10	32.309	0.000	0.000
11	26.289	0.000	-1.777
12	28.346	0.000	-1.777
13	30.404	0.000	-1.777
14	26.289	0.000	-3.404
15	28.346	0.000	-3.404
16	30.404	0.000	-3.404
17	0.000	0.000	-4.191

Fig.3.1: Joint coordinates

Step 2: Representation of beams

By using Snap Node/Beam button in Snap Node/Beam window we had drawn the beams and between the corresponding node points.



Beam	Node A	Node B
1	1	79
2	2	80
3	3	81
4	4	82
5	5	83
6	6	84
7	7	85
8	8	86
9	9	87
10	10	88
11	11	89
12	12	90
13	13	91
14	14	92
15	15	93
16	16	94
17	17	95

Fig.3.2: Creating beams by connecting nodes

Step 3: Creating 3D skeleton view with the help of translational repeat.

To create 3D View of structure transitional repeat command was used in Y direction. Geometry → Transitional repeat → {Enter data as per requirement}

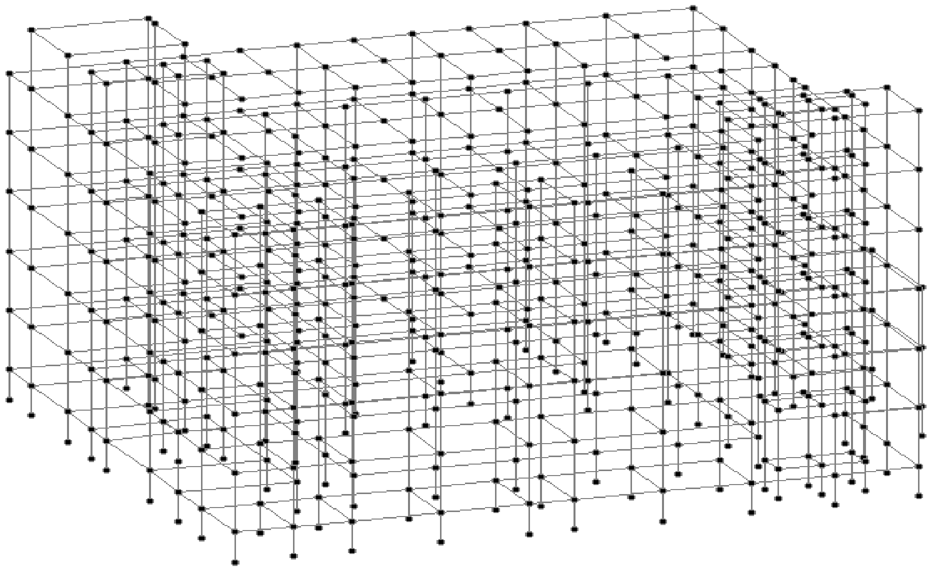


Fig.3.3: Structure of SAC model

Step 4 : Assigning supports

After the creation of structure, the supports at the base of structure are specified as fixed.

Commands → Support specification → Fixed → Add

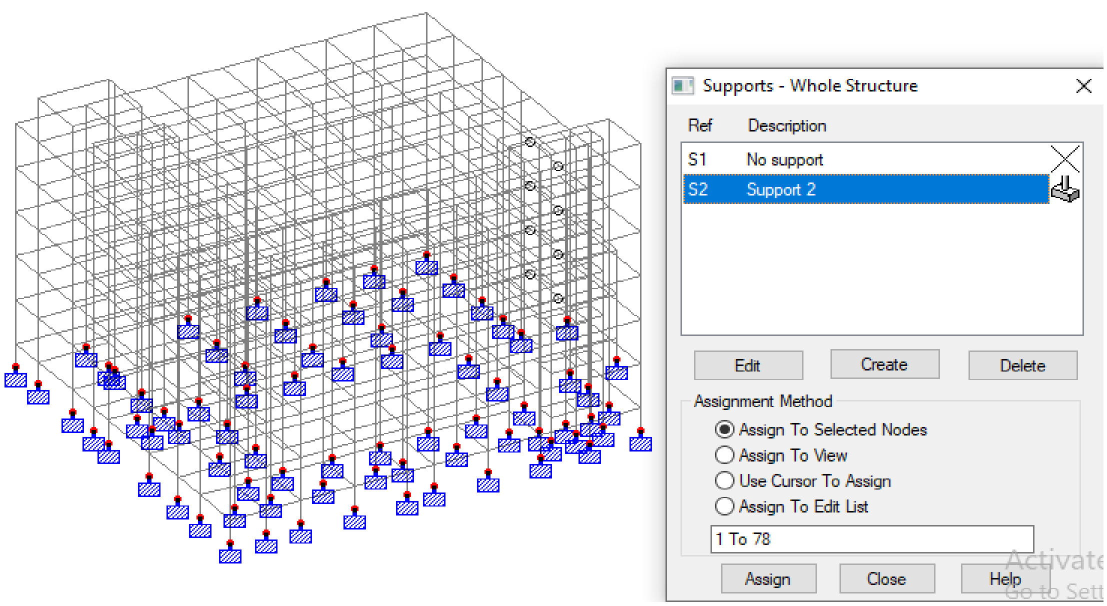


Fig.3.4:Supports assigned

Step 5 : Creating element incidences shell for shear wall

This is done with the help of 4noded plate cursor.

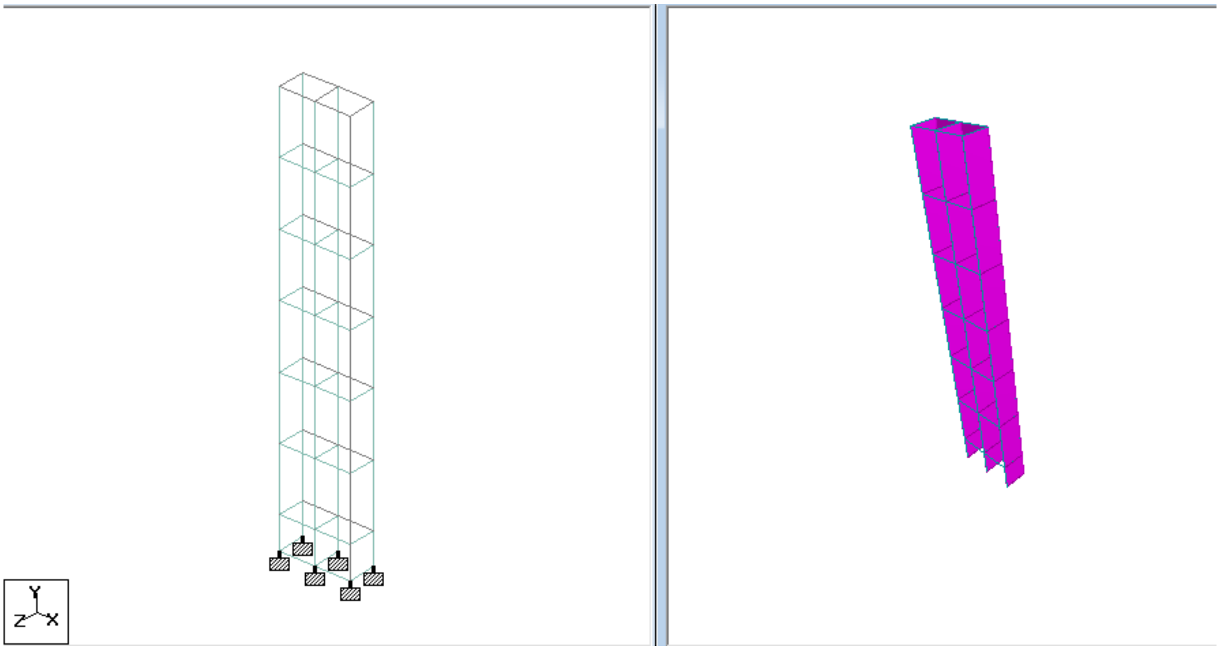


Fig.3.5: Outline of shear walls using 4 noded plate cursor

Step6: Surface incidences

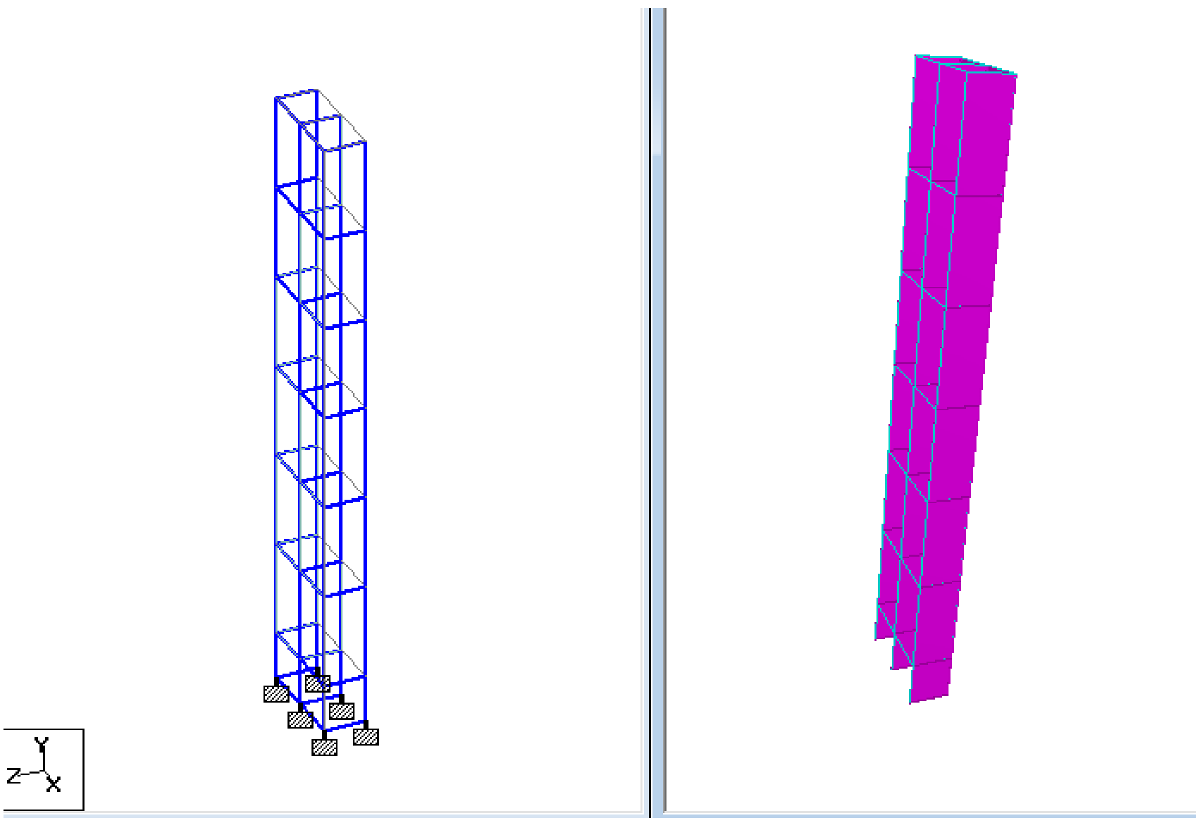


Fig.3.6 Inserting surface between the elements

Step 7 : Assigning properties to members

The materials were specified and cross section of beams and columns members was assigned as shown figure. Commands → Members Property → Prismatic → {Enter data as per requirement}

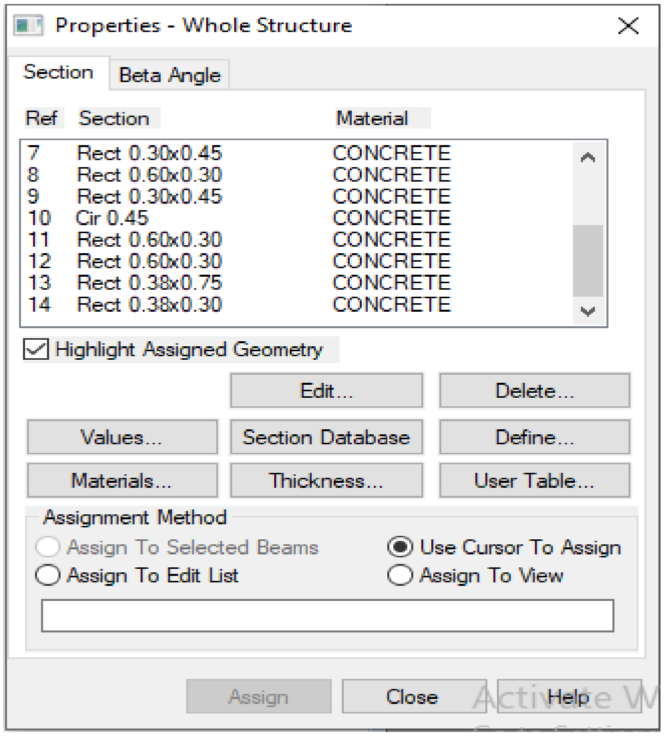


Fig.3.7 Property window

Step 8 : Assigning properties to surface

Once the properties are assigned to beams and columns then the surface properties are assigned as shown below. The thickness of the surface was adopted as 300mm.

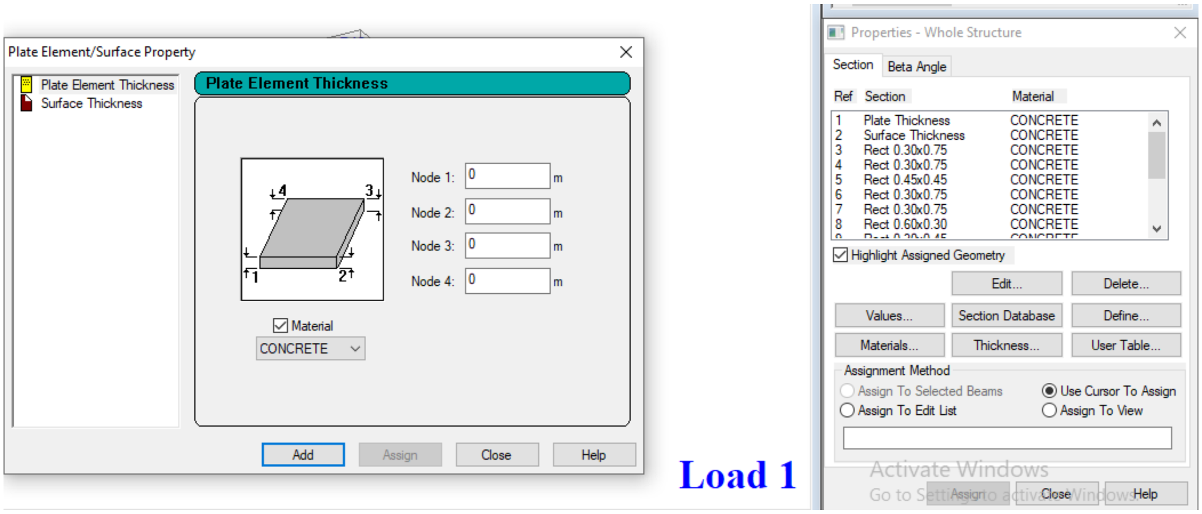


Fig.3.8 Surface property

Step 9: Loads and definitions

<u>(i) Assigning of dead loads</u>

Dead loads are calculated as per IS 875 PART 1 for external walls, internal walls, parapet wall including self-weight of structure. Commands → Loading → Primary Load

(a) Self Weight of Structure

The self-weight of the structure can be generated by STAAD.Pro itself with the self-weight command in the load case column. Density of RCC Material is 25 kN/cum.

(b) Weight of Masonry Wall

- For outer wall 300mm thick

Masonry Flyash Brick wall Thickness is 300mm, height & the density of Flyash brick wall is 20 kN/cum then it can be calculated as: Thickness x Height x Density

DL = height X thickness X length X unit weight of brick = 3.2 X 0.3 X 1.0 X 20 = 19.20 kN

- For inner wall 230mm thick

Masonry Flyash Brick wall Thickness is 230mm, height & the density of Flyash brick wall is 20 kN/cum then it can be calculated as: Thickness x Height x Density

DL = height X thickness X length X unit weight of brick= 3.2 x 0.15 x 1.0 x 20 = 9.6 kN

(c) Self Wt. of Slab

If we know thickness of slabs then it can be calculated as: Thickness x RCC Density

It will be applied as Floor load.0.15 x 25 = 3.75kN/m

(d) Floor Finish Load

0.075 x 20= 1.5 kN/m

(e) False ceiling load

It is taken as 0.5 kN/m2

(ii) Assigning of live load

The Imposed Loads for Residential Buildings are considered as per IS:875-2002 (Part-2) asfollows:

Assemble area	5.00 kN/sqm
Roof	1.50 kN/sqm

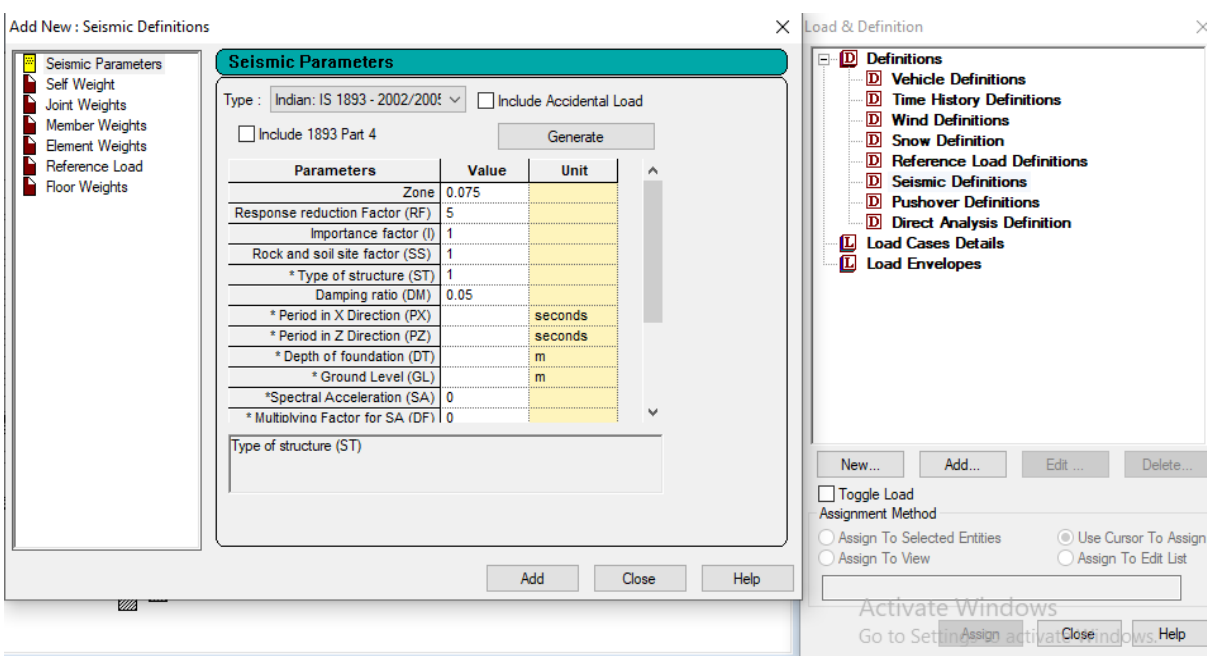


Fig.3.9 Seismic parameters

Step 10 :Load Combinations

After assigning all the loads, the load combinations are given with suitable factor of safety asper IS 875 part 5. Commands → Loading → Load Combination

The structure shall be designed for the following load combinations:

LOAD NO.	TYPE OF LOAD	NOTATION
LOAD 1	Earthquake load in positive X direction	EQ +X
LOAD 2	Earthquake load in negative X direction	EQ -X
LOAD 3	Earthquake load in positive Z direction	EQ +Z
LOAD 4	Earthquake load in negative Z direction	EQ -Z
LOAD 5	Dead load	DL
LOAD 6	Live load	LL

Table 3.1 : Type of Loads

S.NO.	DL	LL	EQ +X	EQ -X	EQ +Z	EQ -Z
1	1.5	1.5				
2	1.2	1.2				
3	1.2	1.2	1.2			
4	1.2	1.2		1.2		
5	1.2	1.2			1.2	
6	1.2	1.2				1.2
7	1.2	1.2	-1.2			
8	1.2	1.2		-1.2		
9	1.2	1.2			-1.2	
10	1.2	1.2				-1.2
11	1.5					
12	1.5		1.5			
13	1.5			1.5		
14	1.5				1.5	
15	1.5					1.5
16	1.5		-1.5			
17	1.5			-1.5		
18	1.5				-1.5	
19	1.5					-1.5
20	0.9		1.5			
21	0.9			1.5		
22	0.9				1.5	
23	0.9					1.5
24	0.9		-1.5			
25	0.9			-1.5		
26	0.9				-1.5	
27	0.9					-1.5
28	1	1				

Table 3.2 : Load Combinations

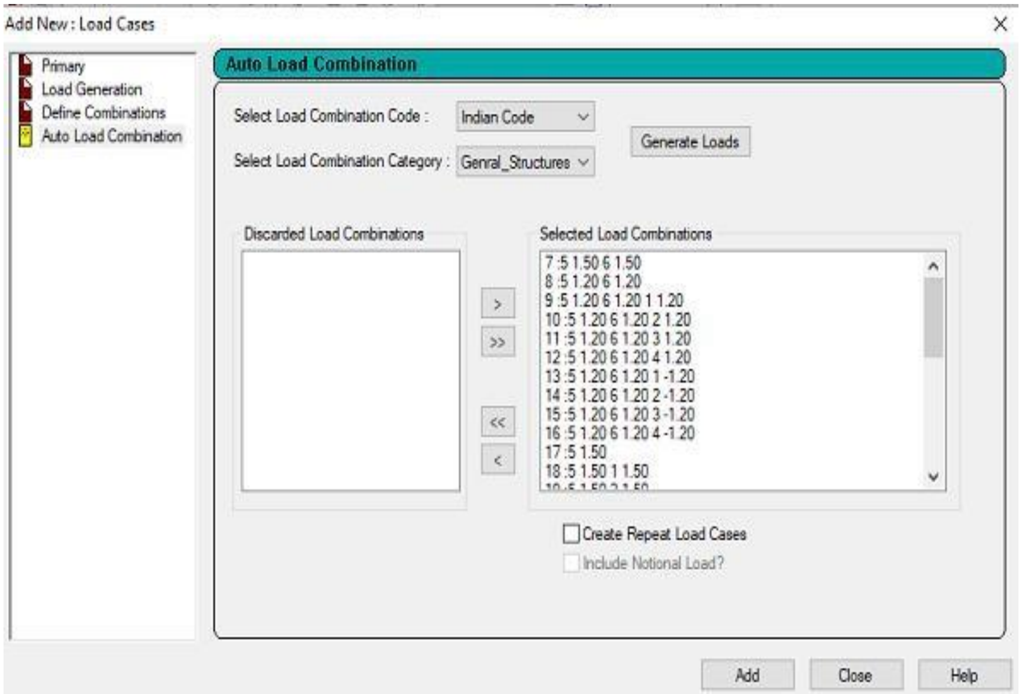


Fig. 3.10 Generating auto load combinations

Step 11 : Analysis of whole structure

After the completion of all the above steps we have performed the analysis and checked for errors. Analyze → Run Analysis

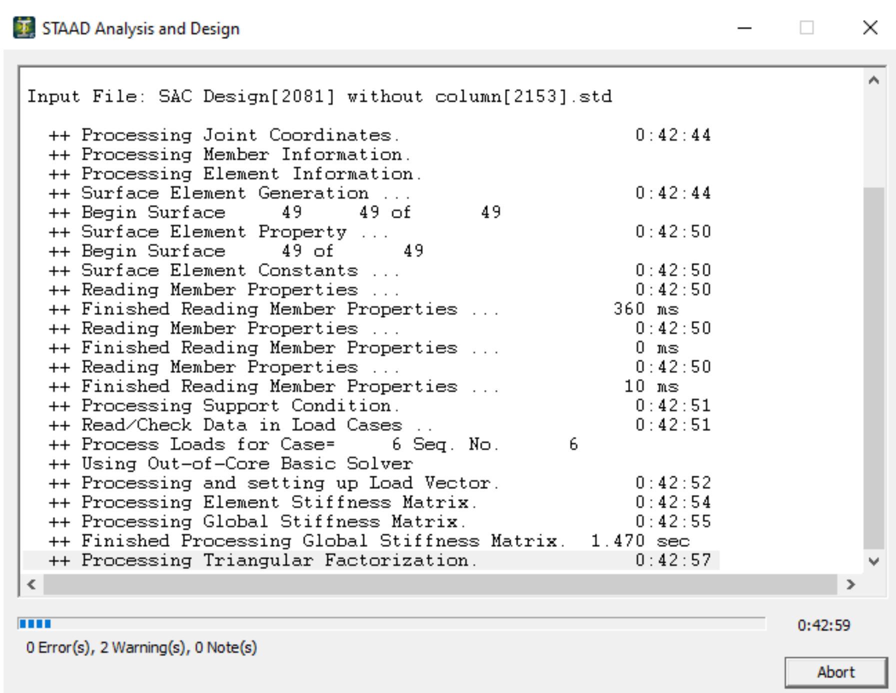


Fig.3.11 Analysis of whole structure

Step 11 : concrete design

Finally, concrete design is performed as per IS 456: 2000 by defining suitable design commands for different structural components. After the assigning of commands again we performed analysis for any errors.

1. Commands → Design → Concrete Design

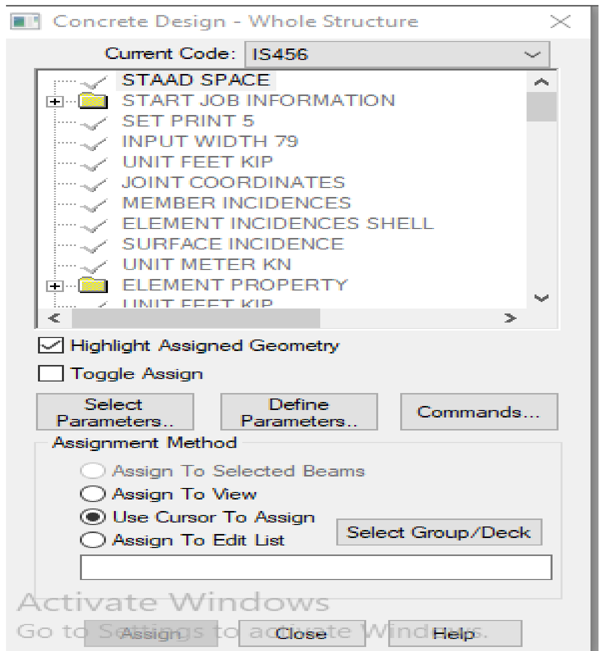


Fig.3.12 Concrete design window

As the concrete design window opens after clicking on design tab parameter selection for concrete design is done .thereafter the selected parameters are defined by clicking on the define parameters tab. Finally, design commands for concrete design are given through the design commands window.

2. During the analysis (and design, if specified), an output file is generated.

3. Select an option for what action occurs when the dialog is closed: Open the output file, go to the post-processing mode.

4. Click the Done button.

5. Output File > STAAD Output to review the output file is this option was not selected in the STAAD Analysis and Design dialog.

From here we can see the concrete design given by Staad by right clicking the individual

Member And selecting the Concrete Design Tab.

3.2 GENERAL DESIGN IN STAAD.Pro

Detailing of beam and column as per IS-456 and SP34

By following basic detailing rule of beam and column design which has been given in IS-456 and SP-34

3.2.1 COLUMN DESIGN

Longitudinal Reinforcement

a) The cross-sectional area of longitudinal reinforcement, shall be not less than 0.8 percent nor

more than 6 percent (usually not exceed 4 percent) of the gross cross- sectional area of the

column.

b) The minimum number of longitudinal bars provided in a column shall be 4 in rectangular

columns and 6 in circular columns. The bars shall not be less than 12 mm in diameter.

c) A reinforced concrete column having helical reinforcement shall have at least six bars of

longitudinal reinforcement within the helical reinforcement. Spacing of longitudinal bars measured along the periphery of the column shall not exceed 300 mm.

The bar generally used in column and beam detailings are:

BAR DIAMETER(mm)	AREA (mm^2)
8	50.24
10	78.5
12	113.04
16	200.96
20	314
25	490.625
32	803.84

Pitch and Diameter of Lateral Ties

1) Pitch-The pitch of transverse reinforcement shall be not more than the least of the following
distances:

i) The least lateral dimension of the compression members;

ii) Sixteen times the smallest diameter of the longitudinal reinforcement bar to be tied; and

iii) 300 mm.

2) Diameter- The diameter of the polygonal links or lateral ties shall be not less than one fourth
of the diameter of the largest longitudinal bar, and in no case less than 16 mm.

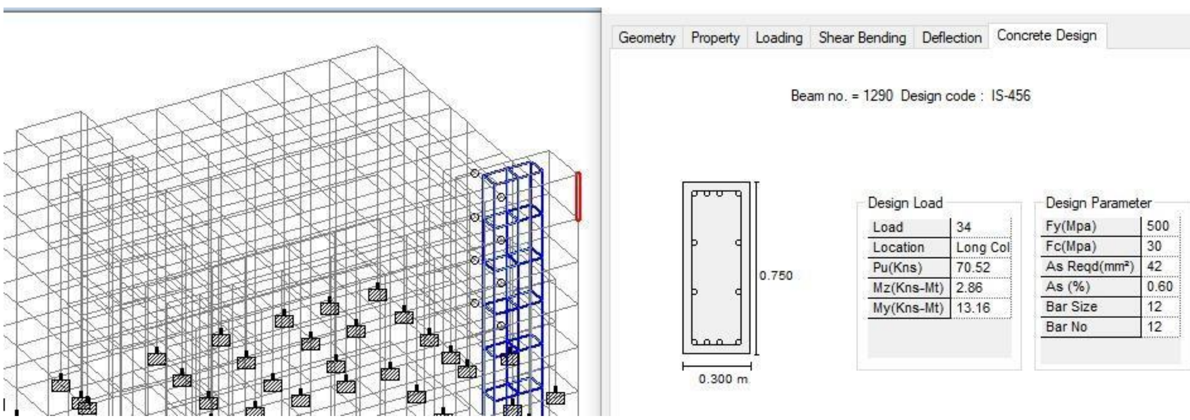


Fig.3.13 Sample of concrete design output of a column

Fig.3.14 Reinforcement detail drawing of columns (1)

Fig.3.15 Reinforcement detail drawing of columns (2)

3.2.2 BEAM DESIGN

a) Minimum reinforcement-The minimum area of tension reinforcement shall be notless than-that

As /bd = 0.85/ fy

As = minimum area of tension reinforcement,

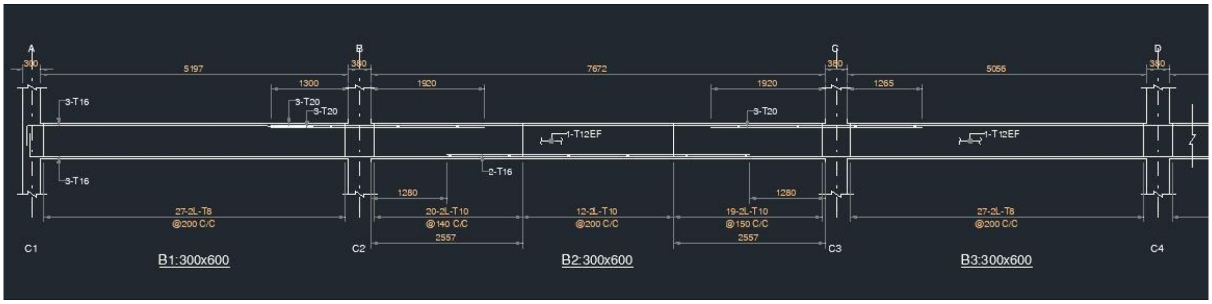
b=breadth of beam

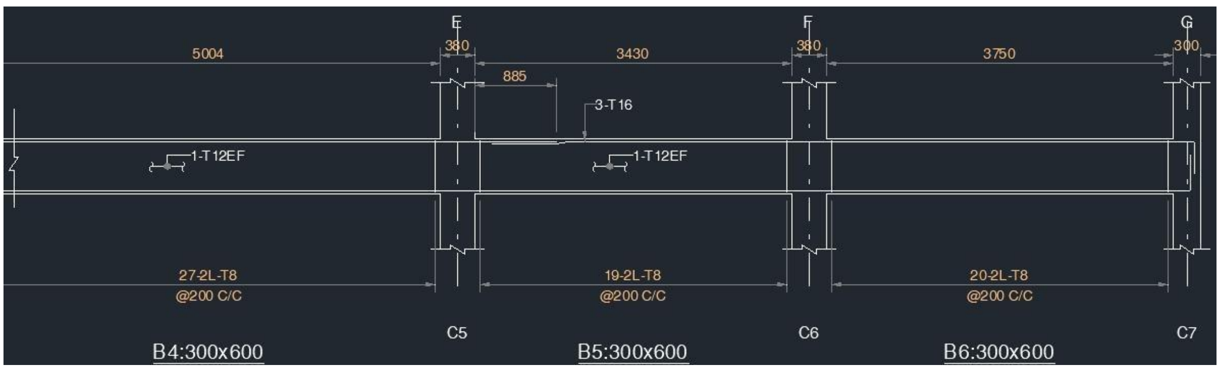
d= depth of beam

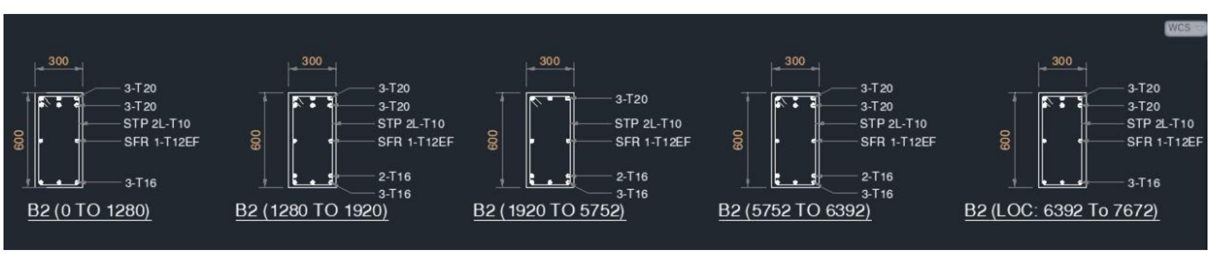
fy = characteristic strength of reinforcement in N/mmz.

b) Maximum reinforcement- the maximum area of tension & compression reinforcementshall not exceed 0.04 bD.

c) Maximum spacing of shear reinforcement measured along the axis of the member shallnot exceed 0.75d for vertical stirrups and d for inclined stirrups at 45 degree where d is theeffective depth of the section under consideration. In no case shall the spacing exceed 300 mm.







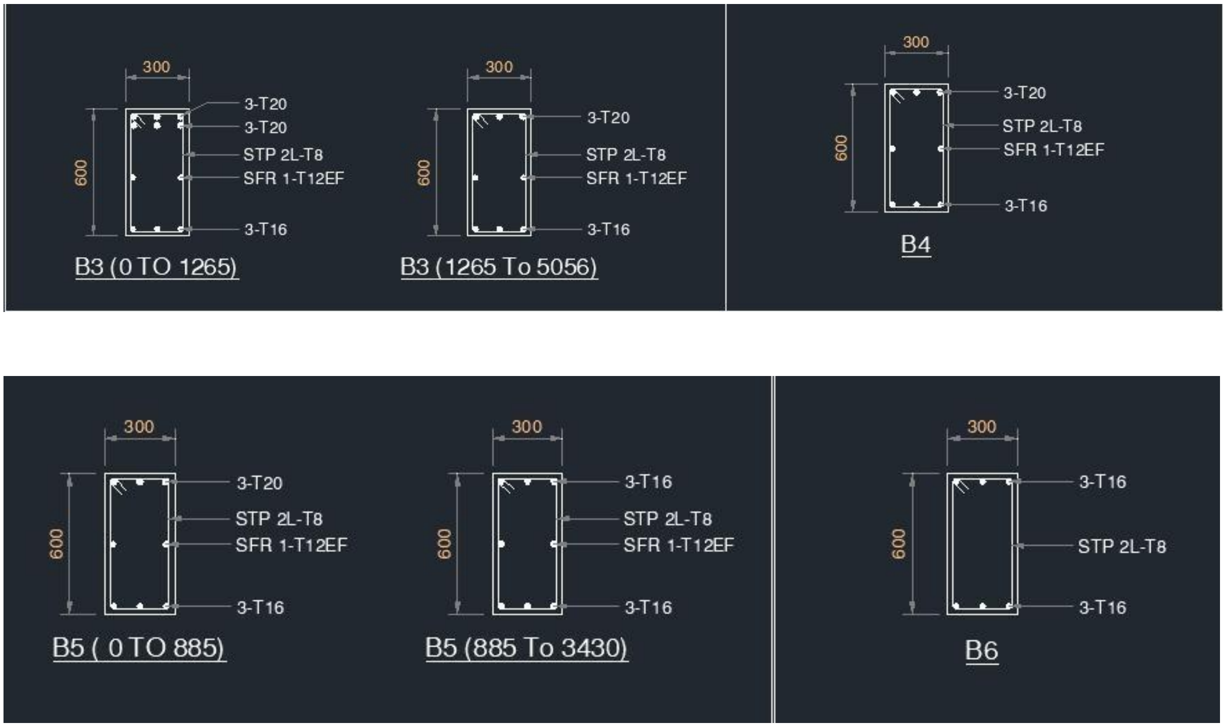


Fig.3.16 BEAM DESIGN

3.3 GENERAL DESIGN IN STAAD RCDC

Analysis and design of slab and footing was done using the software STAAD RCDC.

The procedure carried out is as follows:

1.2.1 Slab Design

Step 1 : Data input for slab design

The long span, short span , span type, panel type and loads definitions are given as the input in a table format in STAAD RCDC as shown below.

Design Input

Design Data

No	Slab Mark	Lx (m)	Ly (m)	Span Type	Panel Type	Imposed Load (kN/sqm)	Live Load (kN/sqm)	Thickne (mm)
1	S1	2.97	5.54	Two Way	Three Edges Discontinuous (Short)	2	5	150
2	S2	2.60	3.81	Two Way	One Short Edge Discontinuous	2	5	150
3	S3	2.68	3.81	Two Way	One Short Edge Discontinuous	2	5	150
4	S4	2.68	3.81	Two Way	One Short Edge Discontinuous	2	5	150
5	S5	2.72	3.81	Two Way	One Short Edge Discontinuous	2	5	150
6	S6	2.69	3.81	Two Way	One Short Edge Discontinuous	2	5	150
7	S7	3.81	3.81	Two Way	One Short Edge Discontinuous	2	5	150
8	S8	3.81	4.09	Two Way	Two Adjacent Edges Discontinuous	2	5	150
9	S9	2.68	3.81	Two Way	Four Edges Discontinuous	2	5	150
10	S10	2.60	3.81	Two Way	One Short Edge Discontinuous	2	5	150
11	S11	4.65	5.51	Two Way	Four Edges Discontinuous	0	0	0
12	S12	2.59	3.82	Two Way	One Long Edge Discontinuous	2	5	150
13	S13	2.72	3.81	Two Way	Interior Panel	2	5	150
14	S14	2.69	3.81	Two Way	Interior Panel	2	5	150
15	S15	2.72	3.81	Two Way	Interior Panel	2	5	150
16	S16	2.69	3.81	Two Way	Interior Panel	2	5	150
17	S17	3.81	3.81	Two Way	Interior Panel	2	5	150
18	S18	3.81	4.09	Two Way	One Short Edge Discontinuous	2	5	150
19	S19	2.58	3.81	Two Way	Interior Panel	2	5	150
20	S20	2.46	3.82	Two Way	Interior Panel	2	5	150
21	S21	2.92	32.31	One Way	Span Next to End Span	2	5	150
22	S22	1.83	3.45	Two Way	Two Short Edges Discontinuous	2	5	150
23	S23	1.91	1.97	Two Way	Interior Panel	0	0	0
24	S24	2.50	3.75	Two Way	One Long Edge Discontinuous	2	5	150
25	S25	2.54	3.72	Two Way	One Long Edge Discontinuous	2	5	150
26	S26	5.42	5.60	Two Way	Four Edges Discontinuous	2	5	200
27	S27	2.63	11.49	One Way	Span Next to End Span	2	5	150
28	S28	11.58	19.05	Two Way	Interior Panel	0	0	0

Fig.3.17 Data input for slab design

Step 2 : Design setting for slab

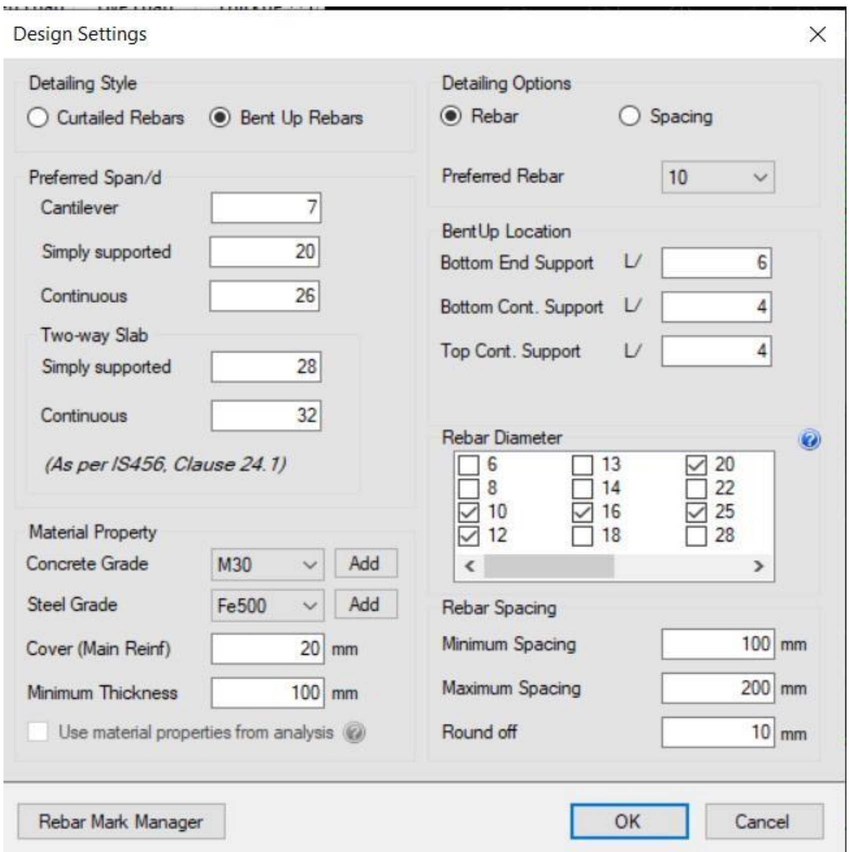
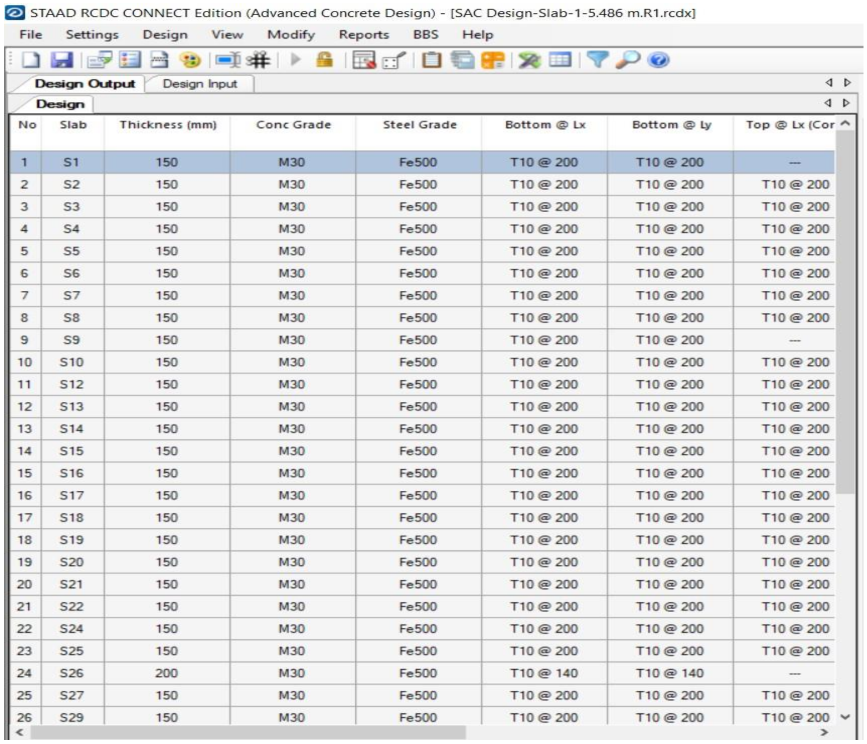


Fig.3.18 Design setting for slab



No	Slab	Thickness (mm)	Conc Grade	Steel Grade	Bottom @ Lx	Bottom @ Ly	Top @ Lx (Cor
1	S1	150	M30	Fe500	T10 @ 200	T10 @ 200	---
2	S2	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
3	S3	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
4	S4	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
5	S5	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
6	S6	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
7	S7	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
8	S8	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
9	S9	150	M30	Fe500	T10 @ 200	T10 @ 200	---
10	S10	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
11	S12	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
12	S13	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
13	S14	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
14	S15	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
15	S16	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
16	S17	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
17	S18	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
18	S19	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
19	S20	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
20	S21	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
21	S22	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
22	S24	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
23	S25	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
24	S26	200	M30	Fe500	T10 @ 140	T10 @ 140	---
25	S27	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200
26	S29	150	M30	Fe500	T10 @ 200	T10 @ 200	T10 @ 200

Fig.3.19 Design output of slab design

FOOTING DESIGN

Step 1. Data input for footing

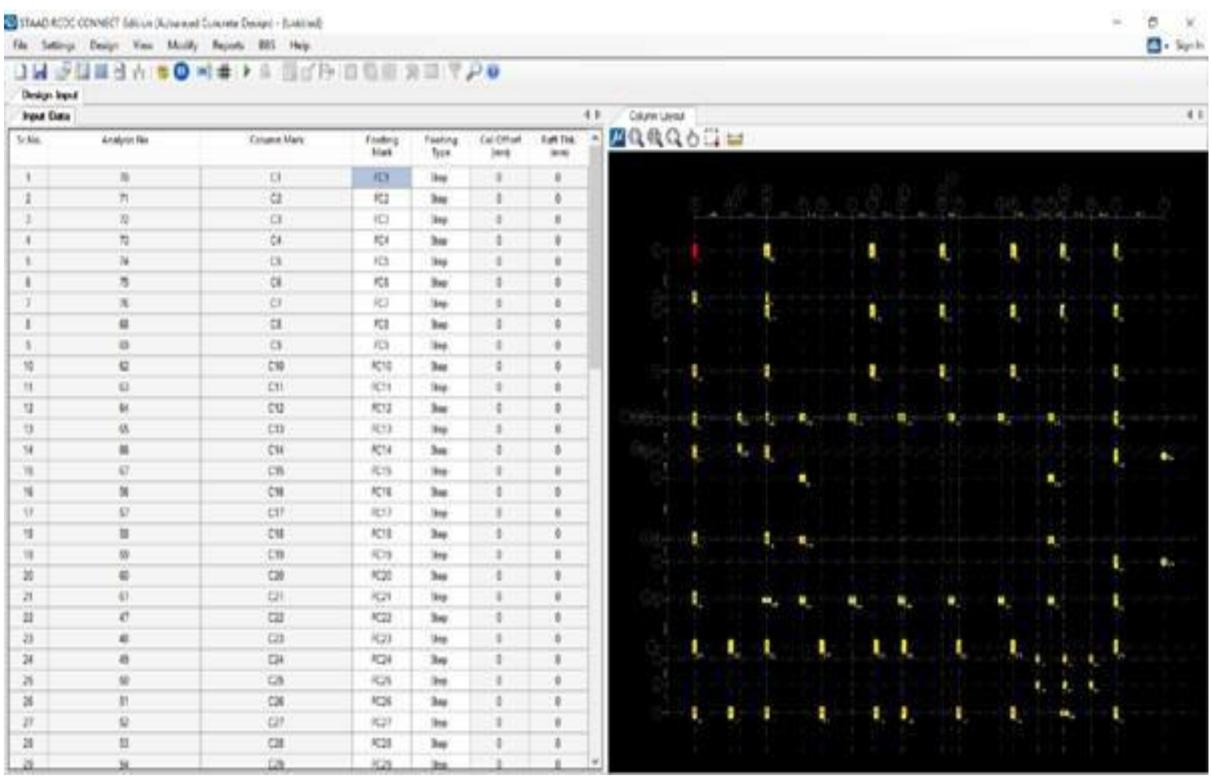


Fig.3.20 Data input for footing

Step 2. General settings for footing

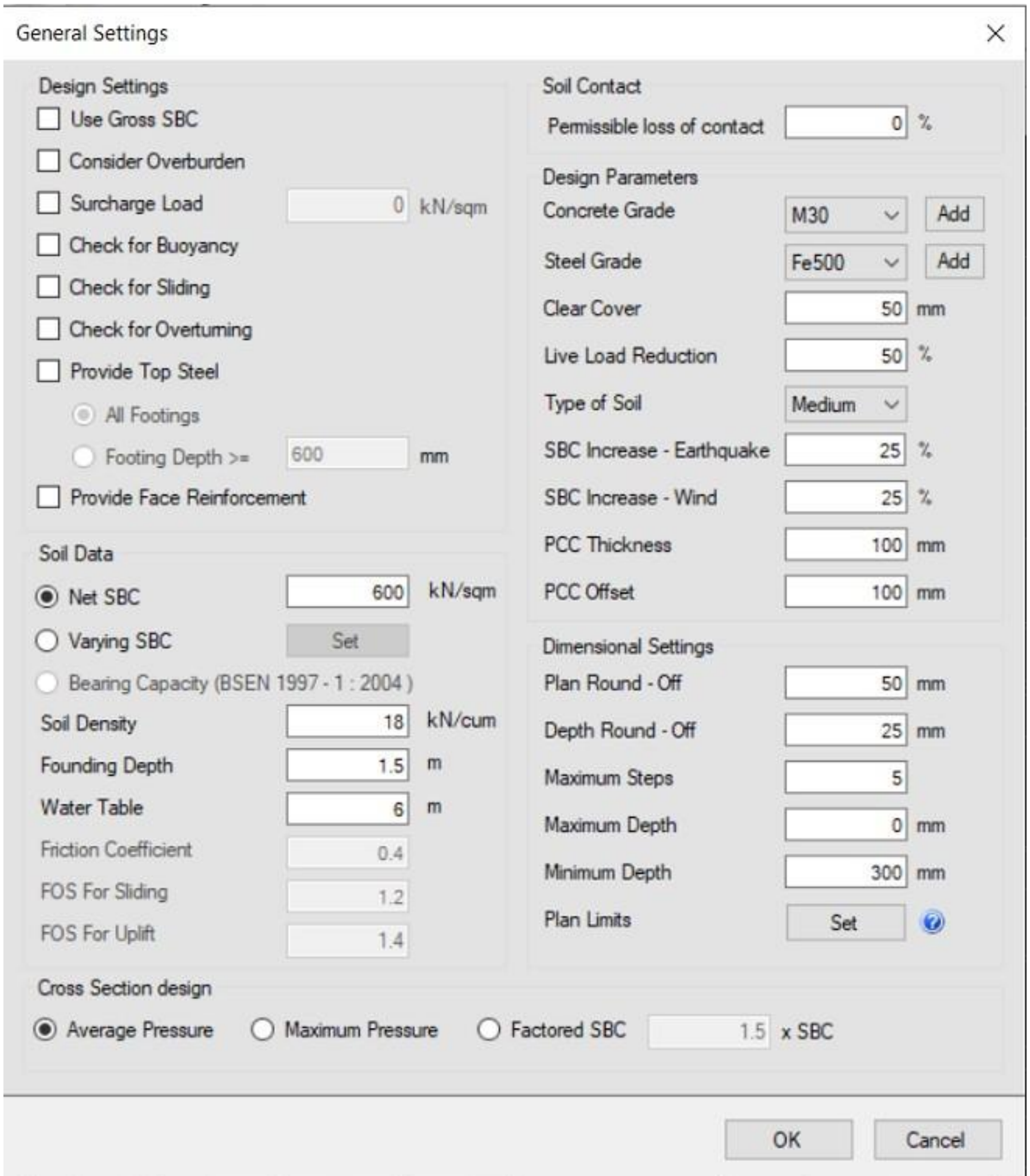


Fig.3.21 General settings for footing

Step 3. Reinforcement settings for footing

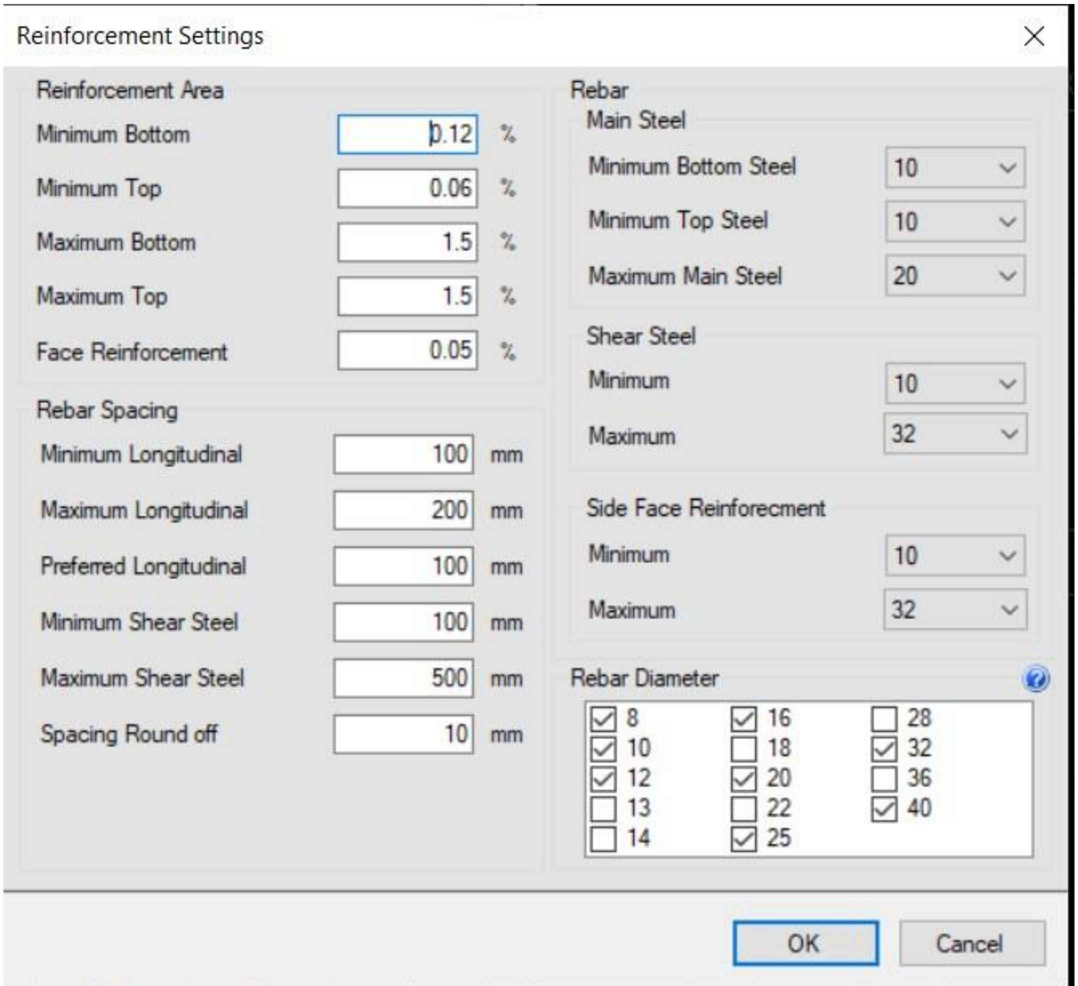


Fig.3.22 Reinforcement settings for footing

Step 4. Load case details of footing

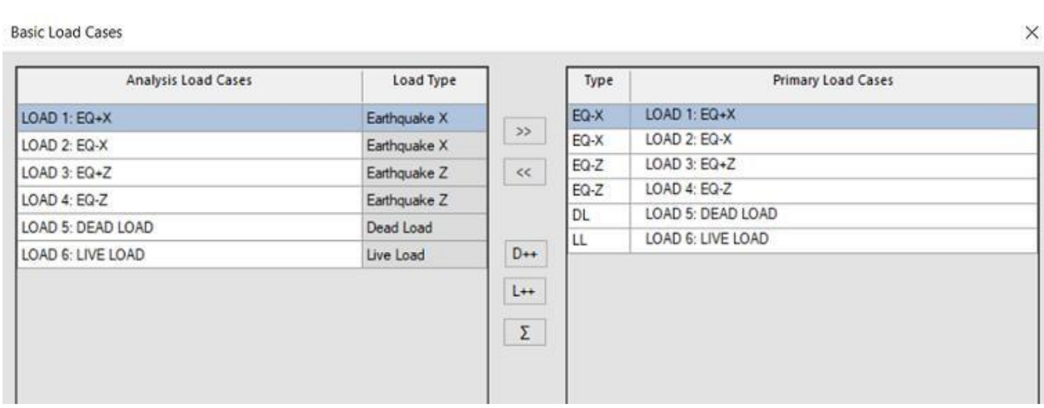
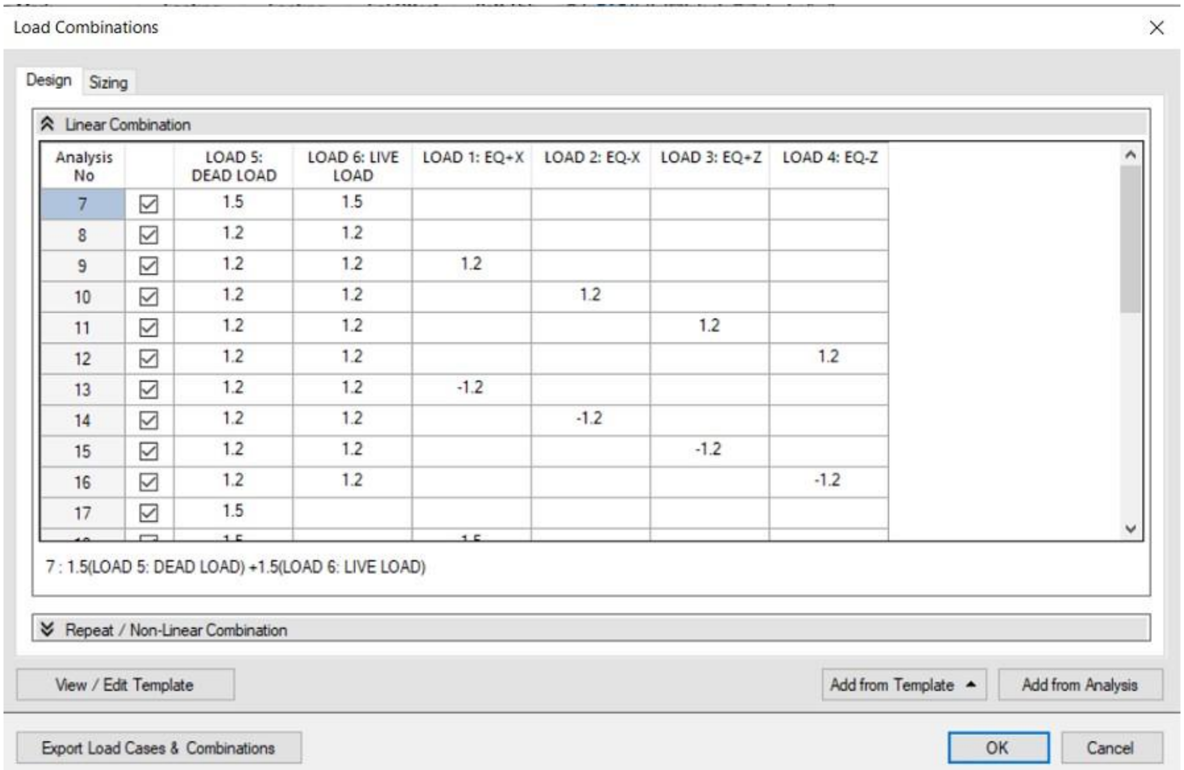


Fig.3.23 Load case details of footing

Step 5. Load combinations

Load combinations are generated automatically by the STAAD RCDC and are given as follows.


Load Combinations

Design | Sizing

Linear Combination

Analysis No		LOAD 5: DEAD LOAD	LOAD 6: LIVE LOAD	LOAD 1: EQ+X	LOAD 2: EQ-X	LOAD 3: EQ+Z	LOAD 4: EQ-Z
7	☑	1.5	1.5				
8	☑	1.2	1.2				
9	☑	1.2	1.2	1.2			
10	☑	1.2	1.2		1.2		
11	☑	1.2	1.2			1.2	
12	☑	1.2	1.2				1.2
13	☑	1.2	1.2	-1.2			
14	☑	1.2	1.2		-1.2		
15	☑	1.2	1.2			-1.2	
16	☑	1.2	1.2				-1.2
17	☑	1.5					

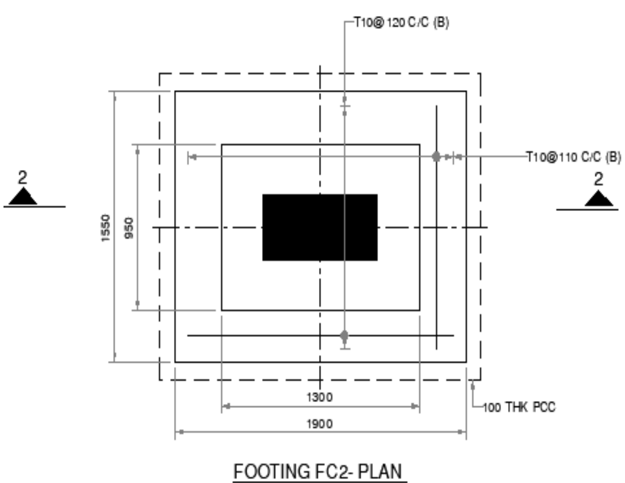
7 : 1.5(LOAD 5: DEAD LOAD) +1.5(LOAD 6: LIVE LOAD)

Repeat / Non-Linear Combination

View / Edit Template | Add from Template | Add from Analysis

Export Load Cases & Combinations | OK | Cancel

Fig.3.24 Load combinations



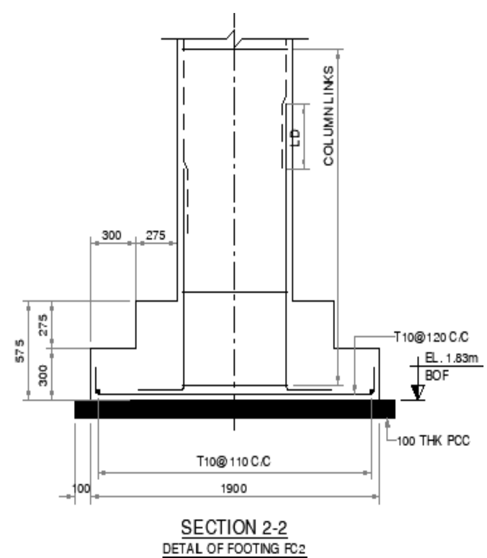


Fig.3.25 Footing plan

Fig.3.26 Detal of footing

3.4 SHEAR WALL DESIGN

The walls, in a building, which resist lateral loads originating from wind or earthquakes are known as shear walls. A large portion of the lateral load on a building, if not the whole amount, as well as the horizontal shear force resulting from the load, are often assigned to such structural elements made of RCC. These shear walls, may be added solely to resist horizontal force, or concrete walls enclosing stairways, elevated shafts, and utility cores may serve as shear walls. Shear walls not only have a very large in-plane stiffness and therefore resist lateral load and control deflection very efficiently, but may also help to ensure development of all available plastic hinge locations throughout the structure prior to failure. The other way to resist such loads may be to have the rigid frame augmented by the combination of masonry walls.

The use of shear walls or their equivalent becomes imperative in certain high-rise buildings, if inter-storey deflections caused by lateral loadings are to be controlled. Well-designed shear walls not only provide adequate safety but also give a great measure of protection against costly non-structural damage during moderate seismic disturbances.

The term shear wall is actually a misnomer as far as high-rise buildings are concerned, since a slender shear wall when subjected to lateral force has predominantly moment deflections and only very insignificant shear distortions. High-rise structures have become taller and more slender, and with this trend the analysis of shear walls may emerge as a critical design element. More often than not, shear walls are pierced by numerous openings. Such shear walls are called coupled shear walls. The walls on both sides of the openings are interconnected by short, often deep, beams forming part of the wall, or floor slab, or both of these.

Figure 3.27(a) shows a building with the lateral force represented by arrowsacting on the edge of each floor or roof. The horizontal surfaces act as deep beams to transmit loads to vertical-resisting elements—the shear walls A and B

[Fig. 3.27(b)]. These walls, in turn, act as cantilever beams fixed at their base and transfer loads to the foundation. For the building plan shown in Fig. 3.27(a),additional shear walls

C and D are provided to resist the lateral loads that may act in the orthogonal direction [Fig. 3.27(c)].

The shear walls are subjected to the following loads:

(a) A variable shear which reaches a maximum at the base.

(b) A bending moment which tends to cause vertical tension near the loaded edge and compression at the far edge.

(c) A vertical compression due to ordinary gravity loading from the structure.

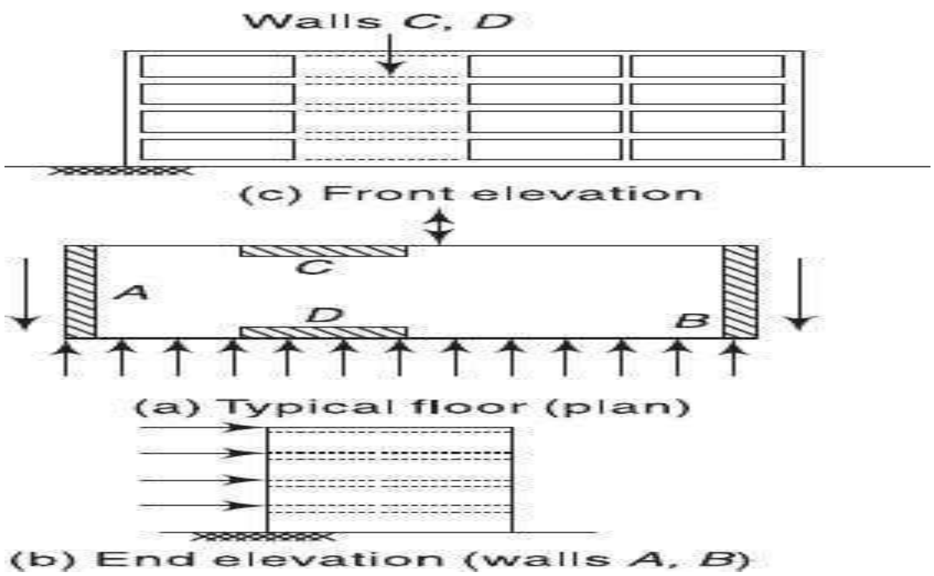


Fig 3.27 (a,b,c)

Behaviour of Shear Walls

The behaviour of shear walls, with particular reference to their typical mode of failure is, as in the case of beams, influenced by their proportions as well as their support conditions. Low shear walls also known as squat walls , characterized by relatively small height-to-length ratios, may be expected to fail in shear just like deep beams. Shear walls occurring in high-rise buildings, on the other hand, generally behave as vertical cantilever beams (Fig. 8.28) with their strength controlled by flexure rather than by shear. Such walls are subjected to bending moments and shears originating from lateral loads, and to axial compression caused by gravity. These may, therefore, be designed in the same manner as regular flexural elements.

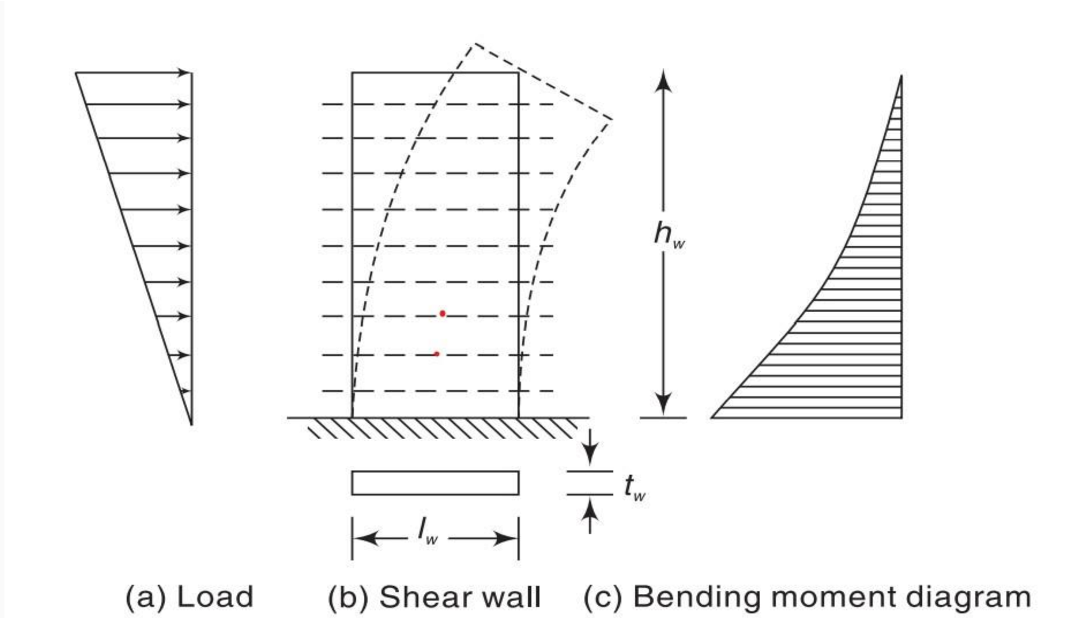


Fig 3.28 Behaviour of shear walls

When acting as a vertical cantilever beam, the behaviour of a shear wall which is properly reinforced for shear (i.e., diagonal tension) will be governed by the yielding of the tension reinforcement located near the vertical edge of the wall and, to some degree, by the vertical reinforcement distributed along the central portion of wall. It is thus evident that shear is critical for walls with relatively low height-to-length ratios and tall shear walls are controlled mainly by flexuralrequirements particularly if only uniformly distributed reinforcement is used.

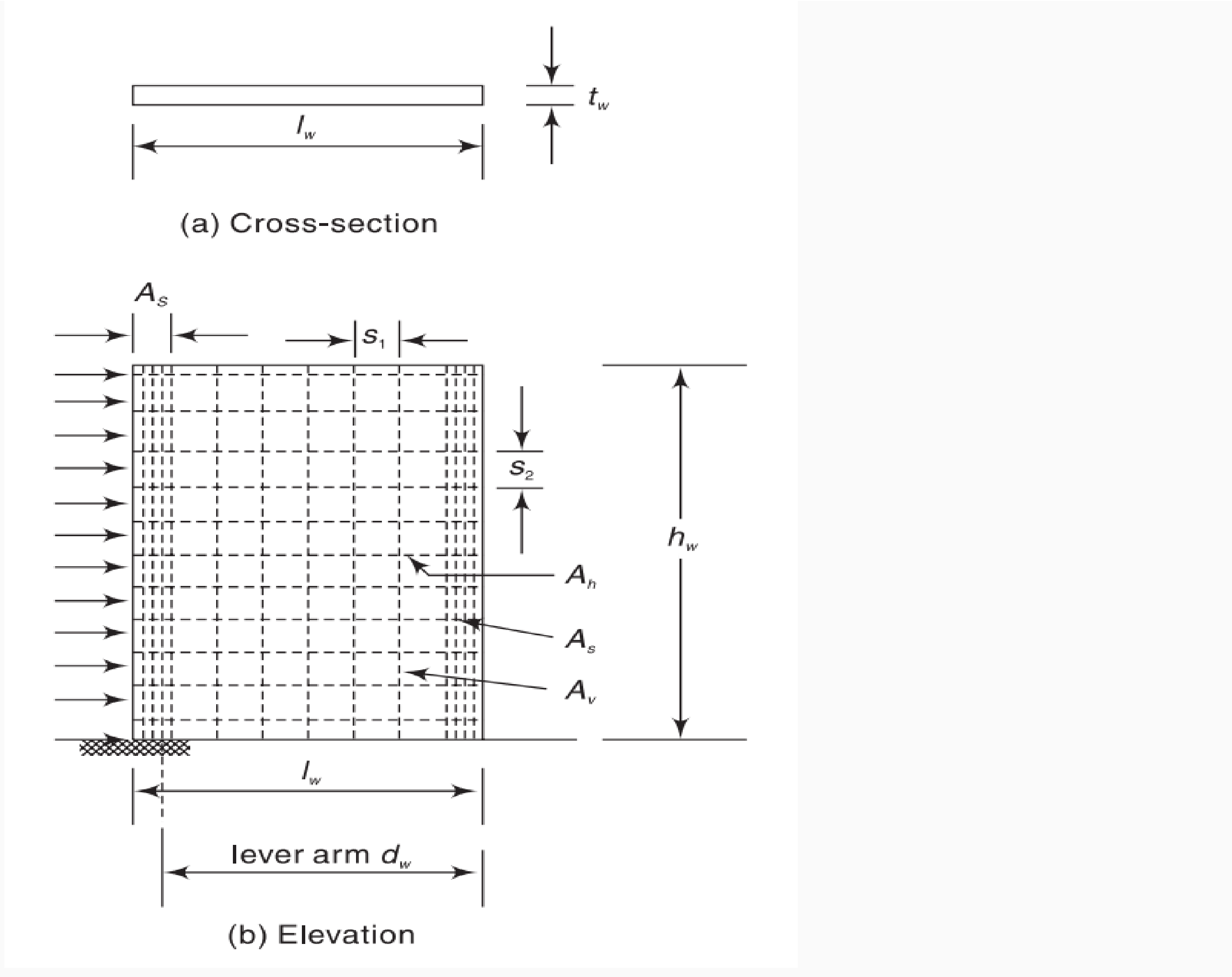


Fig 3.29 Shear wall Cross-section & Elevation

Figure 8.29 shows a typical shear wall of height hw, length l_w, and thickness t_w. It is assumed to be fixed at its base and loaded horizontally along its left edge. Vertical flexural reinforcement of area A_s is provided at the left edge, with its centroid at a distance d_w from the extreme compression face. To allow for reversal of load, identical reinforcement is provided along the right edge. Horizontal reinforcement of area A_h at spacing S_2 as well as vertical reinforcement of area

Av at spacing S_1 is provided as shear reinforcement. Distribution of a minimum reinforcement vertically and horizontally helps to control the width of inclined cracks. Such distributed steel normally is placed in two layers, parallel to both faces of the wall. Since the ductility of a flexural member such as a tall shear wall can be significantly affected by the maximum usable strain in the compression zone concrete, confinement of concrete at the ends of the shear wall section would improve the performance of such shear walls. Such confinement can take the form of enlarged boundary elements with adequate confining reinforcement. In the flanged wall sections, the adjacent parts of the wall will provide lateral supportto each other. Confinement may also be obtained from the presence of other walls running at right angles to the shear wall at its ends. In both cases, the additional compression flanges contribute to the increase in ductility.

Design of Shear Walls

Shear wall construction is an economical method of bracing buildings to limit damage. For good performance of well designed shear walls, the shear wall structures should be designed for greater strength against lateral loads than ductile reinforced concrete frames with similar characteristics; shear walls are inherently less ductile and perhaps the dominant mode of failure is shear. With low design stress limits in shear walls, deflection due to shear forces is small. However, exceptions to the excellent performance of shear walls occur when the height to-length ratio becomes great enough to make overturning a problem and when there are excessive openings in shear walls. Also, if the soil beneath its footing is relatively soft, the entire shear wall may rotate, causing localized damage around the wall. Following are the design steps of cantilever shear walls.

3.4.1 General Requirements

(a) The thickness of the shear wall should not be less than 150 mm to avoid unusually thin sections. Very thin sections are susceptible to lateral instability in zones where inelastic cyclic loading may have to be sustained.

(b) The effective flange width for the flanged wall section from the face of web (wall) should be taken as least of z half the distance to an adjacent shear wall web, and z one-tenth of total wall height.

(c) The minimum reinforcement in the longitudinal and transverse directions in the plan of the wall should be taken as 0.0025 times the gross area in each direction and distributed uniformly across the cross-section of wall. This helps in controlling the width of inclined cracks that are caused due to shear.

(d) If the factored shear stress in the wall exceeds 0.25 fck or if the wall thickness exceeds 200 mm, the reinforcement should be provided in two curtains, each having bars running in both the longitudinal and transverse directions in the plane of the wall. The use of reinforcement in two curtains reduces fragmentation and premature deterioration of the concrete under cyclic loading

(e) The maximum spacing of reinforcement in either direction should be lesser than $l_w/5$, $3t_w$, and 450 mm, where l_w is the horizontal length and t_w is the thickness of the wall web.

(f) The diameter of the bars should not exceed one-tenth of the thickness of that part. This puts a check on the use of very large diameter bars in thin wall sections.

3.4.2 Shear Strength

The provisions for shear strength are almost the same as those of RC beams. The increase in shear strength may also be considered. However, for this, only 80 per cent of the factored axial force is considered as effective. This reduction of 20 per cent is made to account for possible effect of vertical acceleration.

(a) The nominal shear stress is

$$\tau_v = \frac{V_u}{t_w d_w}$$

where V_u is the factored shear force,

t_w is the thickness of web, and

d_w is the effective depth of the wall section (may be taken as 0.8lw).

(b) The design shear strength of concrete (τ_c) should be as per IS 456: 2000.

(c) The nominal shear stress, τ_v, should not be greater than τ_c, max. The value of $\tau_{c,max}$ can be found from IS 456: 2000. If $\tau_v < \tau_c$, minimum shear reinforcement of 0.25 per cent should be provided in the horizontal direction. If $\tau_v > \tau_c$, the area of horizontal shear reinforcement Ah at a vertical spacing S_v can be determined from the expression

$$V_{us} = \frac{0.87 f_y A_h d_w}{S_v}$$

where V_{us} is the shear force to be resisted by the horizontal reinforcement and is given by

$Vus = Vu – \tau_c\, t_w\, d_w$ (8.16)

(e) Uniformly distributed vertical reinforcement not less than the horizontal reinforcement should be provided. This is particularly important for squat walls. When the height-to-width ratio is about 1.0, both the vertical and horizontal reinforcement are equally effective in resisting the shear force.

3.4.3 Flexural Strength

The moment of resistance of short shear walls is calculated as for columns subjected to combined bending and axial load. The procedure for the calculation of moment of resistance, M_{uv} of tall rectangular shear walls is as described. For walls without boundary elements, the vertical reinforcement is concentrated at the ends of the walls. A minimum of four bars, 12mm ϕ, arranged in two layers, are provided at each end.

3.4.4 Boundary Elements

These are the portions along the wall edges and may have the same or greater thickness than the wall web. These are provided throughout the height with special confining reinforcement. Wall sections having stiff and well confined boundary elements develop substantial flexural strength, are less susceptible to lateral buckling and have better shear strength and ductility in comparison to plane rectangular walls not having stiff and well-confined boundary elements.

(a) During a severe earthquake, the ends of a wall are subjected to high Compressive and tensile stresses. Hence, the concrete needs to be well confined so as to sustain the load reversals without a large deterioration in strength. Thus, the boundary elements are provided along the vertical boundaries of walls, when the extreme fibre compressive stress in the wall due to factored Gravity load plus factor earthquake force exceeds 0.2fck. The boundary element may be discontinued where the calculated compressive stress becomes less than 0.15fck.

(b) The boundary element is assumed to be effective in resisting the design moment due to earthquake-induced forces, along with the web of the wall. The boundary element should have an adequate axial load carrying capacity (assuming short-column action) so as to carry an axial compression equal to the sum of the factored gravity load plus compressive load due to seismic load. The latter may be calculated as

$$P_c = \frac{M_u - M_{uv}}{C_w},$$

where Mu is the factored design moment on the entire wall section, Muv is the moment of resistance provided by the distributed reinforcement across the wall section, and Cw is the c/c distance between the boundary elements along the two vertical edges of the wall.

(c) Moderate axial compression results in higher moment capacity of the wall. Hence, the beneficial effect of axial compression by gravity loads should not be fully relied upon in a design, due to the possible reduction in its magnitude by vertical acceleration. When gravity loads add to the strength of the wall, a load factor of 0.8 may be taken.

(d) The percentage of vertical reinforcement in boundary elements should range between 0.8 and 6 per cent (the practical upper limit is four per cent).

(e) During a severe earthquake, boundary elements may be subjected to stress reversals. Hence, they have to be confined adequately to sustain the cyclic loading without a large degradation in strength. Therefore, these should be provided throughout their height.

(f) Boundary elements need not be provided if the entire wall section is provided with special confining reinforcement,

Design of Shear wall of the lift using the STAAD software

The steps to be taken to create the surface and assign the properties are already covered above as the properties are assigned at the beginning.

STEP 1: CREATING SHEAR WALL PANEL

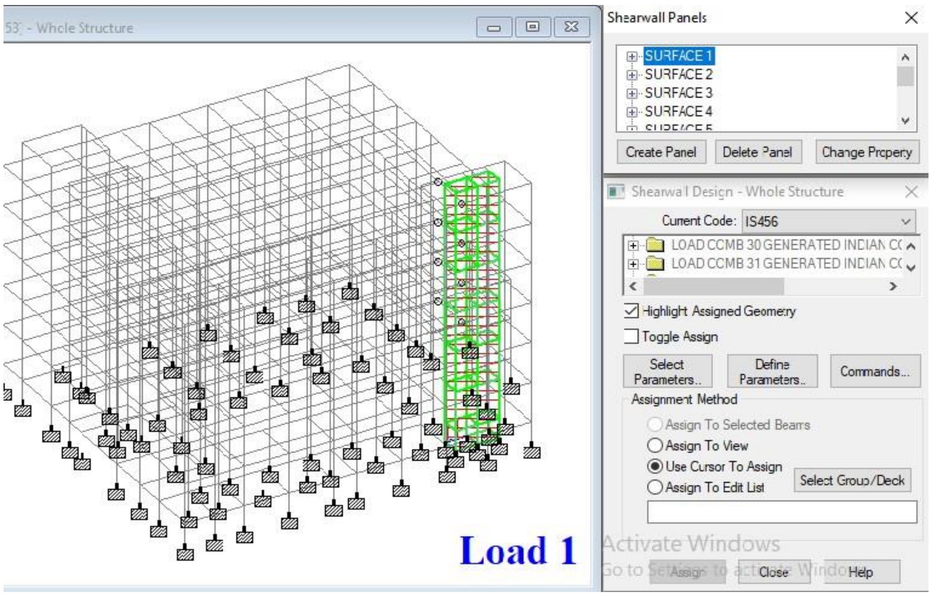


Fig.3.30 CREATING SHEAR WALL PANEL

Step 2:Parameter selection

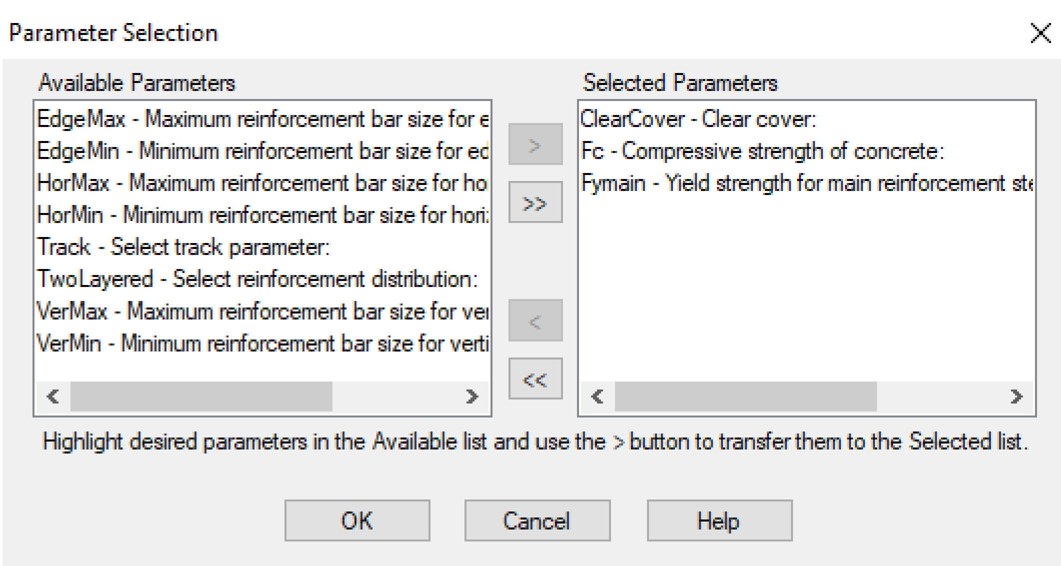


Fig.3.31 Parameter selection

Step 3: Design parameters for shear wall

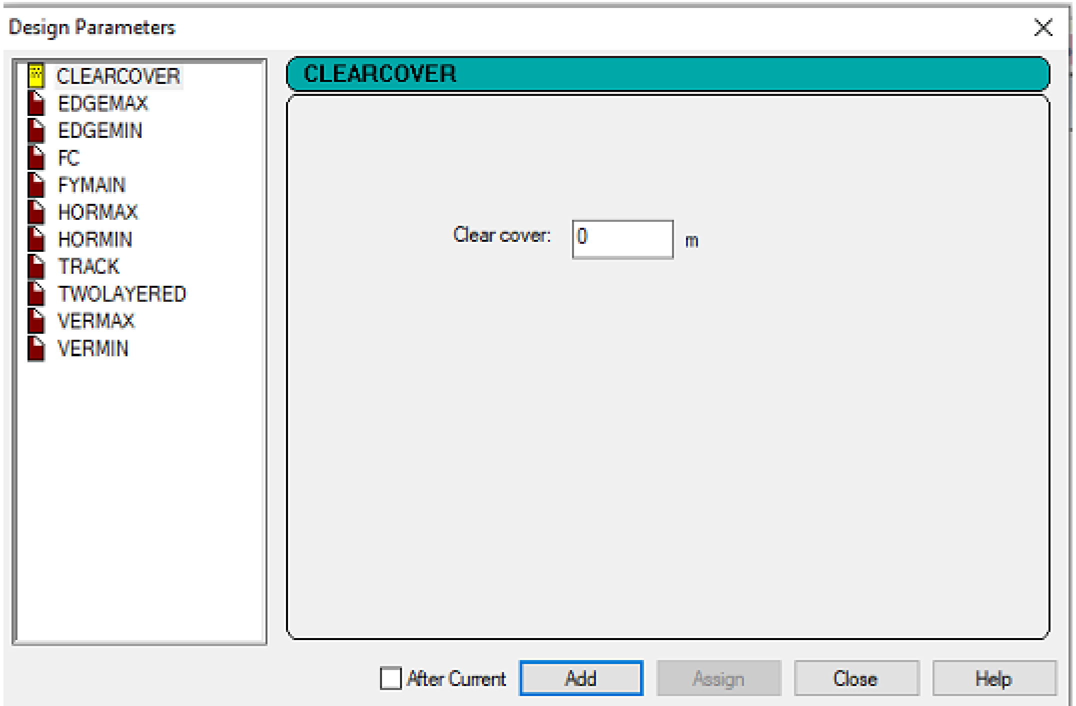


Fig.3.32 Design parameters for shear wall

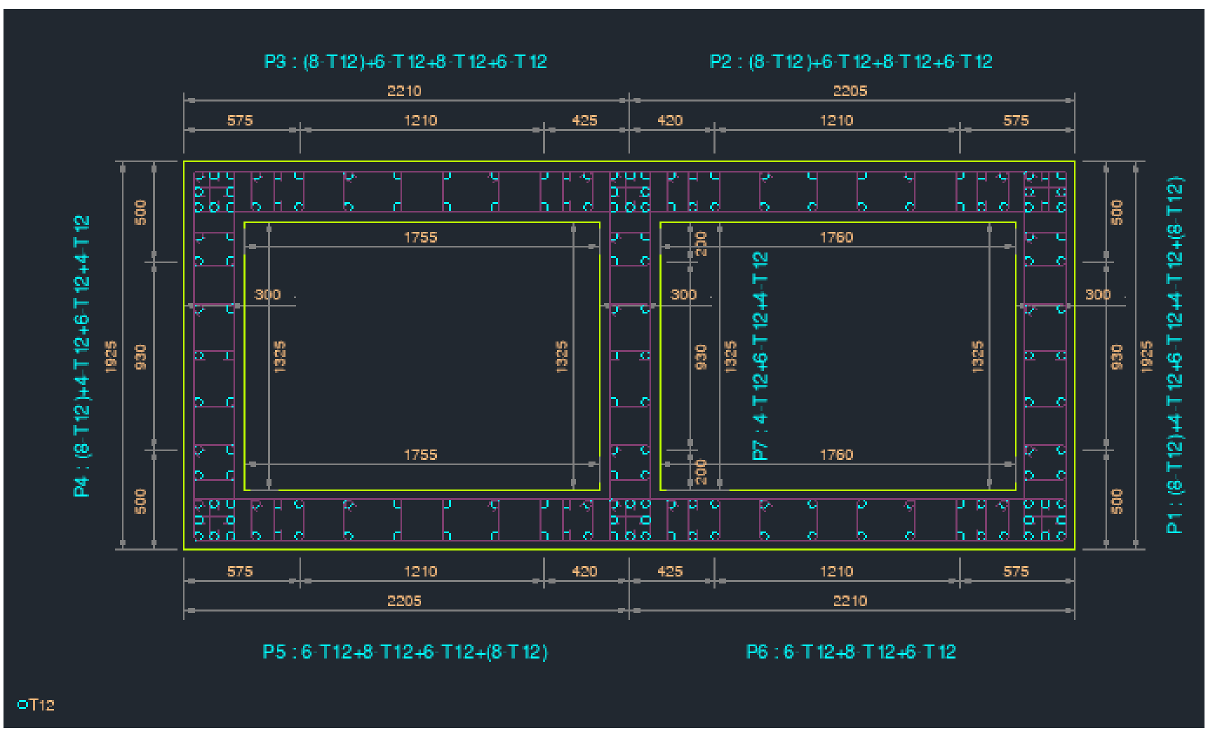
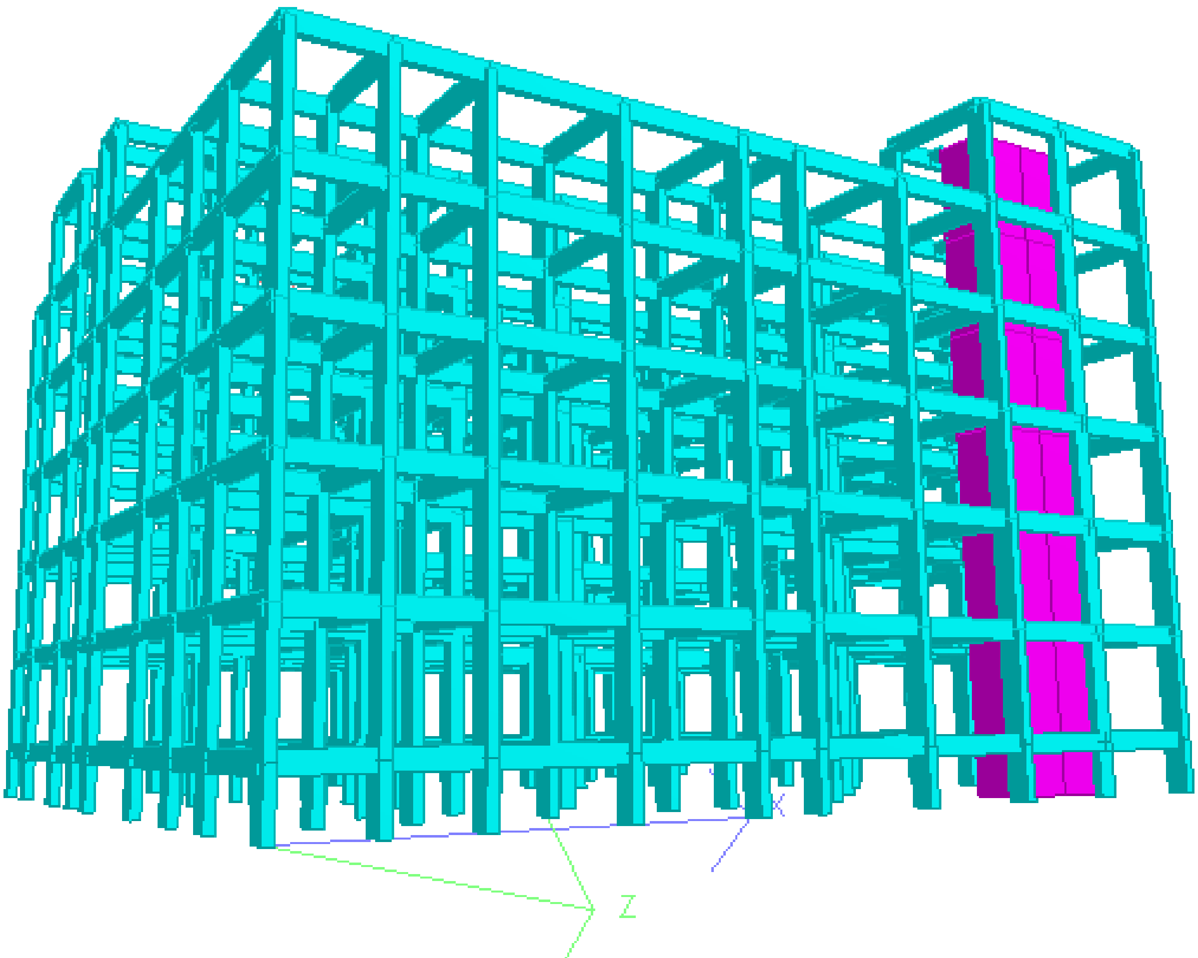


Fig.3.33 Reinforcement details of shear wall

Fig.3.34 3d rendered view



4. <u>STAIRCASE DESIGN</u>

4.1 DESIGN OF WAIST SLAB FOR STAIRCASE

<u>CALCULATION FOR FLIGHT 1 OF STAIRCASE 1</u>

Step 1: Selection of preliminary depth of slab

The depth of the slab shall be assumed from the span to effective depth

ratios as given in section 3.6.2.2 of Lesson 6 IS456

For both edge discontinue L/d = 35*0.8 = 28

Clear Span = 1650 mm = L

d = 1650/28 = 59mm,let us assume d = 126mm

Taking clear cover of 20mm and main reinforcement bars of 8mm.

Total depth(assumed) = 150mm

Step 2 : Effective span calculation

Since both the edges are discontinuous

L_{eff} = Min of (C/C of support or clear span +depth)

Effective span obtained = L_{eff} = 1800mm

Step 3: Load calculations

a) Dead load calculation for stair slab
   Area of one step = 0.5 x Rise x Tread = 0.5 x 0.15 x 0.275 = 0.0206 m^2
   Area of inclined slab = thickness of slab x inclined length = 0.0470 m^2
   Total Area = 0.0206 + 0.0470 = 0.0676 m^2
   dead load (slab+ step) = Total area x Density = 0.0676 x 25 = 1.690 kN/m
   Floor finish load = (rise + tread) x floor finishing thickness x Density = 0.638 kN/m
   Factored Total dead load = 1.5 x total dead load = 10.176 kN/m

b) Live load calculation

Live load is taken as 5 kN/m^2

Factored live load = 1.5 x 5 x 1 = 7.5 kN/m

Total factored Load =W_u = LL+DL = 17.676 kN/m

Step 4 : Determination of bending moment and check for depth of slab

Bending moment = $M_u = \frac{W_u \, X \, L^2}{8}$ = 7.159 kN-m

Design constant = R_u = 0.36 x f_{ck} x X_{umax}/d(1-0.416 x X_{umax}/d) = 3.991

X_{umax}/d = 0.456

Minimum depth required from bending moment consideration = $\sqrt{\frac{M_u}{R_u \, X \, b}}$ = 42.35 mm

$d_{required}$<$d_{adopted}$ Hence O.K.

Step 5 :Calculation of reinforcement details

LONGITUDINAL REINFORCEMENT

Area of Steel required = A_{st}

A_{st}= $0.5 \; X \; \frac{f_{ck}}{f_y} \left[1 - \sqrt{1 - \frac{4.6 \, X \, M_u}{f_{ck} \, b d^2}}\right] bd$ = 133 mm^2

Providing bars of diameter 8 mm ,a_{st} = $\frac{\pi \, X \, 64}{4}$ = 50.26 mm^2

Spacing = $\frac{a_{st}}{Ast} \; X \; \mathbf{1000}$= 378 mm

Maximum allowable spacing = Min of (300 or 3d) = 300mm

Provided Spacing = 200mm

Provided Area of steel for 200 mm spacing = 251.3 mm^2

Perecentage reinforcement = Pt = (Ast/bd) x 100 = 0.199%

DISTRIBUTION REINFORCEMENT

0.12% of the gross area = (0.12 X 1000 X 150)/100 = 180 mm^2

Providing bars of diameter 8 mm ,$a_{st} = \frac{\pi X 64}{4}$ = 50.26 mm^2

Spacing $= \frac{a_{st}}{Ast} X \mathbf{1000}$ = 279mm

Provided spacing = 200mm .

Step 6: Check for shear

Design shear force = $V_u = (W_u \times L)/2$ = 15.9 kN

Nominal shear stress $= \tau_V = V_u/bd$ = 0.126 N/mm^2

$\tau_{cmax} =$ 3.5 N/mm^2

$\tau_v < \tau_{cmax}$ O.K.

τ_c=0.33 N/mm^2

however for solid slab design shear strength = $\tau_{c`} = k \times \tau_c =$ 0.429 N/mm^2

So for overall depth = 150mm, k = 1.3

$\tau_{c`} > \tau_v$ O.K.

Step 7 : Check for deflection

$$(\frac{l}{d})_{actual} < (\frac{l}{d})_{allowable}$$

$$(\frac{l}{d})_{allowable} = (\frac{l}{d})_{basic} k_1 k_2 k_3 k_4$$

k_1- Modification factor for tension steel = 1.7, (for P_t = 0.199%)

k_2 – Modification factor for compression steel

k_3 – Modification factor for T-sections

k_4-Only if span exceeds 10 m (10/span)

$$\left(\frac{l}{d}\right)_{allowable} = 28\ X\ 1.7 = 47.6$$

$$\left(\frac{l}{d}\right)_{actual} = \frac{1800}{126} = 14.28$$

$$\left(\frac{l}{d}\right)_{actual} < \left(\frac{l}{d}\right)_{allowable}$$ Hence O.K.

STAIRCASE 1

Design of staircase performed in excel

STAIRCASE1 FLIGHT 2

Design Constants & Slab Parameters

Grade of Steel						500	N/mm2	
Grade of Concrete						30	N/mm2	
Density of Concrete						25	kN/m3	
Riser						150	mm	
Tread						275	mm	
Span (Flight)						1.375	m	
Bottom Landing						1.650	m	
Top Landing						0.605	m	
Stair Width						1.650	m	
Width of Support						0.300	m	
Floor to Floor Height						0.900	m	
Support condition				**One Egde Continuous**		1		
Size of Bar Main Bar adopterd						8	mm	
Spacing of Main bars required			623		Provided	200	mm	SAF
Size of Bar Distribution Bar						8	mm	
Spacing of Distribution bars required			141372		Provided	200	mm	SAF
Clear Cover						20	mm	
Depth	Required	OK	**60.7**	mm	Provided	150	mm	ROCE
Floor Finishing Thickness						75	mm	
Live Load						5.0	kN/m2	
For Discontinue Edge L/d =			28	**For continue Edge L/d =**		32	mm	

	xumax/d =	0.456
	Ru =0.36*fck*xumax/d(1-0.416*xumax/d)	3.991
Effective Span	For end span L = min of C/C of support or clear span +depth	

				1.525	mm
Number of Risers				6	Nos.
Number of Trades				5	Nos.
Total Length (flight+ Landing)				3.630	m
Effective Span				3.930	m
Incliend length of one step				313	mm
Area of Step				0.0206	m2
Area of Inclind Slab				0.0470	m2
Total Area				0.0676	m2
Dead load of Step				1.690	kN/m
Floor finishing load				0.638	kN/m
Total Dead Load				6.784	kN/m
Live Load				5.0	kN/m2
Factored Live Load				7.500	kN/m
Factored Total Dead Load				10.176	kN/m
Bending Moment	Near Support			4.374	kN-m
	At the Centre			3.820	kN-m
Design Moment				4.374	kN-m
Factored Design Moment				4.374	kN-m
Depth				33.1	mm
Overall depth provided				150	mm
Actual effective depth available				126	mm
Area of Steel required				80.7	mm2
Spacing of bars required				623	mm
Maximum Allowable spacing	300	OR	378	623	mm
Provided spacing				300	mm
Area of Steel provided				251.3	mm2
				SAFE	
Percentage of steel required				0.199	%
Modication factor				1.387	
L/d ratio				30	
Depth required for servicibility criteria				37	mm
Distribution Steel required				180	mm2
Dia of bar provided				180	mm
Spacing required				141372	mm

Check for deflection

Service Stress			290	N/mm^2
Actual Span/Eff. Depth			12.10	
Allowable Span /deff.	Mod. Factor	1.387	41.60	

OK

5. ESTIMATION AND COSTING

5.1 DEFINITION OF ESTIMATING AND COSTING

Estimating is the technique of calculating or Computing the various quantities and the expected Expenditure to be incurred on a particular work or project.

In case the funds available are less than the estimated cost the work is done in part or by reducing it or specifications are altered, the following requirement are necessary for preparing an estimate. a) Drawings like plan, elevation and sections of important points.

b) Detailed specifications about workmenship & properties of materials etc.

c) Standard schedule of rates of the current year.

5.2 NEED FOR ESTIMATION AND COSTING

1. Estimate give an idea of the cost of the work and hence its feasibility can be determined i.e whether the project could be taken up with in the funds available or not.
2. Estimate gives an idea of time required for the completion of the work.
3. Estimate is required to invite the tenders and Quotations and to arrange contract.
4. Estimate is also required to control the expenditure during the execution of work.
5. Estimate decides whether the proposed plan matches the funds available or not.

5.3 PROCEDURE OF ESTIMATING OR METHOD OF ESTIMATING.

Estimating involves the following operations

1. Preparing detailed Estimate.
2. Calculating the rate of each unit of work
3. Preparing abstract of estimate

5.4 DATA REQUIRED TO PREPARE AN ESTIMATE

1. Drawings i.e. plans, elevations, sections etc.
2. Specifications.
3. Rates.

5.4.1 DRAWINGS

If the drawings are not clear and without complete dimensions the preparation of estimation become very difficult. So, It is very essential before preparing an estimate.

5.4.2. SPECIFICATIONS

a) General Specifications: This gives the nature, quality, class and work and materials in general terms to be used in various parts of wok. It helps no form a general idea of buildi ng.

b) Detailed Specifications: These gives the detailed description of the various items of work laying down the Quantities and qualities of materials, their proportions, the method of preparation workmanship and execution of work.

5.4.3. RATES:

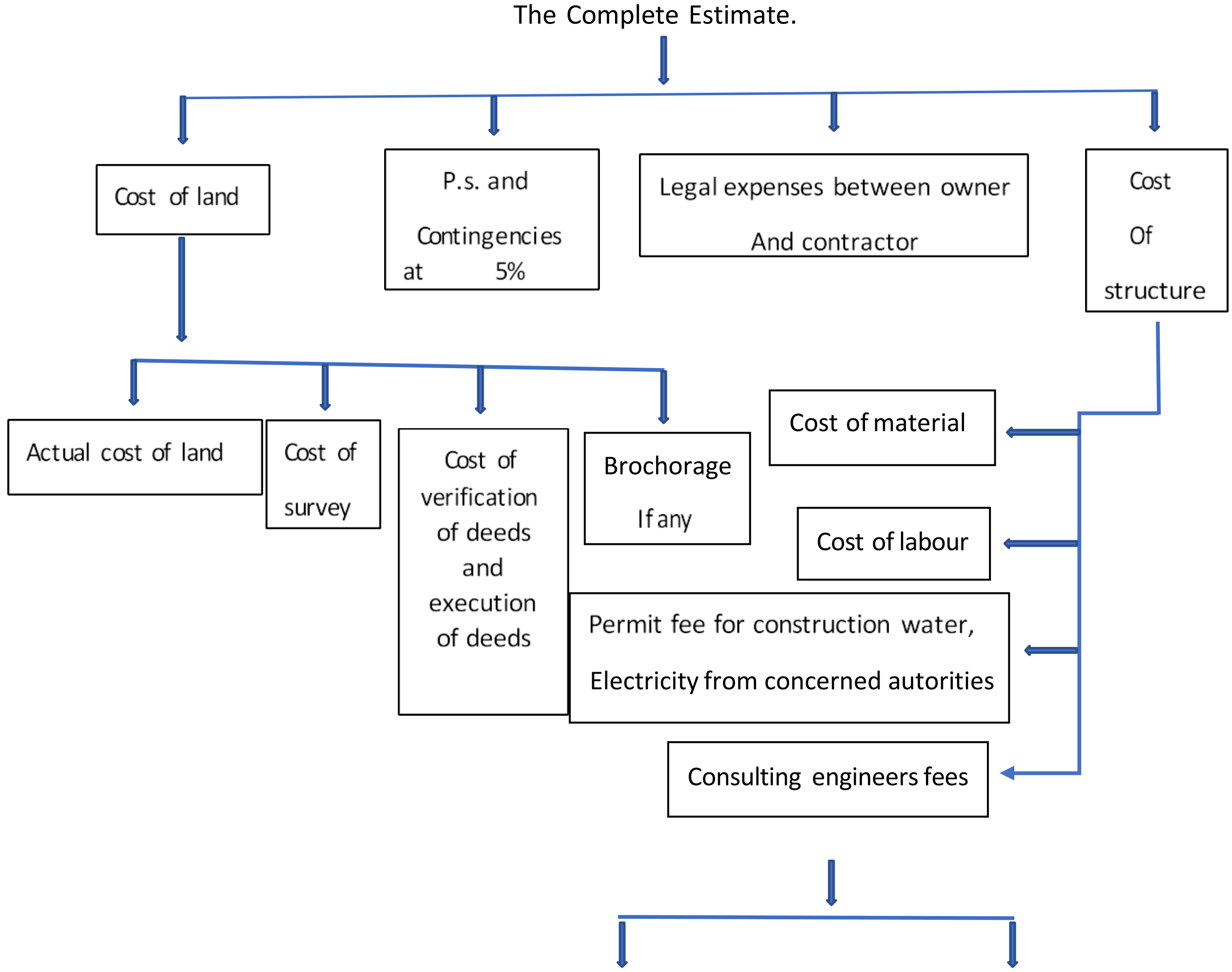
For preparing the estimate the unit rates of each item of work are required.

1. For arriving at the unit rates of each item.
2. The rates of various materials to be used in the construction.
3. The cost of transport materials.
4. The wages of labour, skilled or unskilled of masons, carpenters, Mazdoor, etc.,

5.5 COMPLETE ESTIMATE:

Most of people think that the estimate of a structure includes cost of land, cost of materials and labour, But many other direct and indirect costs included and is shown below

The Complete Estimate.



Cost of preparation of plan,Estimate and design

Cost of supervision

5.6 LUMPSUM:

While preparing an estimate, it is not possible to workout in detail in case of petty items. Items other than civil engineering such items are called lumpsum items or simply L.S. Items.

The following are some of L.S. Items in the estimate.

1. Water supply and sanitary arrangements.
2. Electrical installations like meter, motor, etc.,
3. Architectural features.
4. Contingencies and unforeseen items.

Ingeneral, certain percentage on the cost of estimation is alloted for the above L.S. Items.

Even if subestimates prepared or at the end of execution of work, the actual cost should not exceed the L.S. amounts provided in the main estimate.

5.7 WORK CHARGED ESTABLISHMENT:

During the construction of a project considerable number of skilled supervisors, work assistance, watch men etc., are employed on temporary basis. The salaries of these persons are drawn from the L.S. amount alloted towards the work charged establishment. that is, establishment which is charged directly to work. an L.S. amount of 1½ to 2% of the estimated cost is provided towards the work charged establishment.

5.8 UNITS OF MEASUREMENTS:

The units of measurements are mainly categorised for their nature, shape and size and for making payments to the contractor and also. The principle of units of measurements normally consists the following:

a) Single units work like doors, windows, trusses etc., are expressed in numbers.

b) Works consists linear measurements involve length like cornice, fencing, hand rail, bands of specified width etc., are expressed in running metres (RM).

c) Works consists areal surface measurements involve area like plastering, white washing, partitions of specified thickness etc., are expressed in square meters (m2) d) Works consists cubical contents which involve volume like earth work, cement concrete

Sr.No.	Particulars of item	Unit of measurement	Unit of payment
1 2	Earth work: 1. Earth work in Excavation 2. Earthwork in filling in foundation trenches 3. Earth work in filling in plinth Concrete: 1. Lime concrete in foundation 2. Cement concrete in Lintels 3. R.C.C.in slab 4. C.C. or R.C.C. Chujja, Sunshade 5. L.C. in roof terracing (thickness specified)	 cum cum cum cum cum cum cum sqm	 Per%cum Per%cum Per%cum percum percum percum percum persqm
   3 4	6. Cement concrete bed 7. R.C. Sunshade (Specified Width & Hight Damp Proof Course (D.P.C) (Thickness should be mentioned) Brick work: 1. Brickwork in foundation 2. Brick work in plinth 3. Brick work in super structure 4. Thin partition walls 5. Brick work in arches 6. Reinforced brick work (R.B. Work)	cum cum sqm cum cum cum sqm cum cum	per cum 1rm persqm percum percum percum percum percum percum

5	Stone Work: Stone masonry Wood work: 1. Door sand windows frames or chowkhats, rafters beams 2. Shutters of doors and windows (thickness specified) 3. Doors and windows fittings (like hinges, tower bolts, sliding bolts, handles) Steel work	cum cum sqm Number Quintal	percum percum persqm per number per quintal
	1. Steel reinforcement bars etc in R.C.C. and R.B.work. quintal 2. Bending, binding of steel Reinforcement 3. Rivets, bolts, & nuts, Anchor bolts, Lewis bolts, Holding down bolts. 4. Iron hold fasts 5. Iron railing (height and types specified) 6. Iron grills Roofing 1. R.C.C. and R.B. Slab roof (excluding steel) 2. L.C. roof over and inclusive of tiles or brick or stone slab etc (thickness specified) 3. Centering and shuttering form work 4. A.C. Sheet roofing Plastering, points & finishing 1. Plastering-Cement or Lime Mortar (thickness and proportion specified) 2. Pointing	Quintal Quintal Quintal Quintal sqm cum sqm sqm sqm sqm sqm sqm sqm	per quintal per quintal per quintal per quintal per sqm per cum per sqm per sqm per sqm per sqm per sqm per sqm per sqm per sqm

	3. White washing, colour washing, cement wash (number of coats specified) 4. Distempering (number of coats specified) 5. Painting, varnishing (number of coats specified) Flooring 1. 25mm cement concrete over 75mm lime concrete floor (including L.C.) 2. 25mm or 40mm C.C. floor 3. Doors and window sills (C.C. or cement mortar plain) Rain water pipe /Plain pipe Steel wooden trusses Glass panels (supply)	sqm sqm sqm sqm 1RM 1No sqm No	per sqm per sqm per sqm per RM per 1No per sqm per no.
	Fixing of glass panels or cleaning		

5.8.2 RULES FOR MEASUREMENT :

The rules for measurement of each item are invaribly described in IS1200. However some of the general rules are listed below.

1. Measurement shall be made for finished item of work and description of each item shall include materials, transport, labour, fabrication tools and plant and all types of overheads for finishing the work in required shape, size and specification.
2. In booking, the order shall be in sequence of length, breadth and height or thickness.
3. All works shall be measured subject to the following tolerances.

i) Linear measurement shall be measured to the nearest 0.01m. ii)

Areas shall be measured to the nearest 0.01 sq.m iii) Cubic contents

shall be worked-out to the nearest 0.01 cum

4. Same type of work under different conditions and nature shall be measured separately under separate items.
5. The bill of quantities shall fully describe the materials, proportions, workmanships and accurately represent the work to be executed.

6. In case of masonary (stone or brick) or structural concrete, the categories shall be measured separately and the heights shall be described:

a) from foundation to plinth level

b) from plinth level to First floor level

c) from Fist floor to Second floor level and so on.

5.8.3 METHODS OF TAKING OUT QUANTITIES:

The quantities like earth work, foundation concrete, brickwork in plinth and super structure etc., can be workout by any of following two methods:

a) Long wall - short wall method

b) Centre line method.

c) Partly centre line and short wall method.

a) Long wall-short wall method:

In this method, the wall along the length of room is considered to be long wall while the wall perpendicular to long wall is said to be short wall. To get the length of long wall or short wall, calculate first the center line lengths of individual walls. Then the length of long wall, (out to out) may be calculated after adding half breadth at each end to its center line length. Thus the length of short wall measured into in and may be found by deducting half breadth from its center line l ength at each end. The length of long wall usually decreases from earth work to brick work in super structure while the short wall increases. These lengths are multiplied by breadth and depth to get quantities.

b) Centre line method:

This method is suitable for walls of similar cross sections. Here the total center line length is multiplied by breadth and depth of respective item to get the total quantity at a time. When cross walls or partitions or verandah walls join with main all, the center line length gets reduced by half of breadth for each junction. such junction or joints are studied carefully while calculating total center line length. The estimates prepared by this method are most accurate and quick.

c) Partly center line and partly cross wall method:

method is adopted when external (i.e., all round the building) wall is of one thickness This and the internal walls having different thicknesses. In such cases, center line method is applied to external walls and long wall-short wall method is used to internal walls. This method suits for different thicknesses walls and different level of foundations. Because of this reason, all Engineering departments are practicing this method.

5.9 DETAILED ESTIMATE:

The preparation of detailed estimate consists of working out quantities of various items of work and then determine the cost of each item. This is prepared in two stages.

i) Details of measurements and calculation of quantities:

The complete work is divided into various items of work such as earth work concreting, brick work, R.C.C. Plastering etc., The details of measurements are taken from drawings and entered in respective columns of prescribed proforma. the quantities are calculated by multiplying the values that are in numbers column to Depth column as shown below:

Details of measurements form:-

S. No.	Description Of Item	No	Length (m)	Breadth (B)	Depth / Height (m)	Quantity	Explanatory Notes

ii) Abstract of Estimated Cost :

The cost of each item of work is worked out from the quantities that already computed in the details measurement form at workable rate. But the total cost is worked out in the prescribed form is known as abstract of estimated form. 4%of e stimated Cost is allowed for Petty Supervision, contingencies and Unforeseen items.

ABSTRACT OF ESTIMATE FORM

Item Nos	Description	Quantity	Unit	Rate	Per(Unit)	AMOUNT

The detailed estimate should accompained with

i) Report

ii) Specification

iii) Drawings (plans, elevation, sections)

iv) Design charts and calculations

iv) Standard schedule of rates.

5.9.1.1 Factors to be consisdered While Preparing Detailed Estimate:

i) Quantity and transportation of materials:

For bigger project, the requirement of materials is more. such bulk volume of mateials will be purchased and transported definitely at cheaper rate. ii) Location of site:

The site of work is selected, such that it should reduce damage or in transit during loading, unloading, stocking of materials.

iii) Local labour charges:

The skill, suitability and wages of local laboures are considered while preparing the detailed estimate.

5.9.2 DATA:

The process of working out the cost or rate per unit of each item is called as Data. In preparation of Data, the rates of materials and labour are obtained from current standard scheduled of rates and while the quantities of materials and labour required for one unit of item are taken from Standard Data Book (S.D.B).

5.9.2.1 Fixing of Rate per Unit of an Item:

The rate per unit of an item includes the following:

1) Quantity of materials & cost: The requirement of materials are taken strictly in a ccordance with standard data book (S.D.B). The cost of these includes first cost, freight, insurance and transportation charges.
2) Cost of labour: The exact number of labours required for unit of work and the multiplied by the wages/ day to get of labour for unit item work.
3) Cost of equipment (T&P): Some works need special type of equipment, tools and plant. In such case, an amount of 1 to 2% of estimated cost is provided.
4) Overhead charges: To meet expenses of office rent, depreciation of equipment salaries of staff postage, lighting an amount of 4% of estimate cost is allocated.

5.9.3 METHODS OF PREPARATION OF APPROXIMATE ESTIMATE:

Preliminary or approximate estimate is required for studies of various aspects of work of project and for its administrative approval. It can decide, in case of commercial projects, whether the net income earned justifies the amount invested or not. The approximate estimate is prepared from the practical knowledge and cost of similar works. The estimate is accompanied by a report duely explaining necessity and utility of the project and with a site or layout plan. A percentage 5 to 10% is allowed for contingencies. The following are the methods used for preparation of approximate estimates.

a) Plinth area method

b) Cubical contents methods

c) Unit base method.

a) Plinth area method: The cost of construction is determined by multiplying plinth area with plinth area rate. The area is obtained by multiplying length and breadth (outer dimensions of building). In fixing the plinth area rate, carefull observation and necessary enquiries are made in respect of quality and quantity aspect of materials and labour, type of foundation, hight of building, roof, wood work, fixtures, number of storeys etc.,

As per IS 3861-1966, the following areas include while calculating the plinth area of building.

Types Of estimates

a) Area of walls at floor level.

b) Internal shafts of sanitary installations not exceeding 2.0m2, lifts, air conditionsing ducts etc.,

c) Area of barsati at terrace level:

Barsati means any covered space open on one side constructed on one side constructed on terraced roof which is used as shelter during rainy season.

d) Porches of non cantilever type.

Areas which are not to include

a) Area of lofts.

b) Unenclosed balconies.

c) Architectural bands, cornices etc.,

d) Domes, towers projecting above terrace level.

e) Box louvers and vertical sunbreakers.

b) Cubical Contents Method: This method is generally used for multistoreyed buildings. It is more accurate that the other two methods viz., plinth area method and unit base method. The cost of a structure is calculated approximately as the total cubical contents (Volume of buildings) multiplied by Local Cubic Rate. The volume of building is obtained by Length x breadth x depth or height. The length and breadth are measured out to out of walls excluding the plinth off set.

The cost of string course, cornice, carbelling etc., is neglected.

The cost of building= volume of buildings x rate/ unit volume.

c) Unit Base Method: According to this method the cost of structure is determined by multiplying the total number of units with unit rate of each item. In case schools and co lleges, the unit considered to be as 'one student' and in case of hospital, the unit is 'one bed'. the unit rate is calculated by dividing the actual expenditure incured or cost of similar building in the nearby locality by the number of units

5.10 ANALYSIS OF RATES**:-**

Definition : In order to determine the rate of a particular item, the factors affecting the rate of that item are studied carefully and then finally a rate is decided for that item. This process of determining the rates of an item is termed as analysis of rates or rate analysis.

The rates of particular item of work depends on the following.

1. Specifications of works and material about their quality, proportion and constructional operation method.
2. Quantity of materials and their costs.
3. Cost of labours and their wages.
4. Location of site of work and the distances from source and conveyance charges.
5. Overhead and establishment charges

6. Profit

Cost of materials at source and at site of construction:-

The costs of materials are taken as delivered at site inclusive of the transport local taxes and other charges.

Purpose of Analysis of rates:

1. To work out the actual cost of per unit of the items.
2. To work out the economical use of materials and processes in completing the particulars item.
3. To work out the cost of extra items which are not provided in the contract bond, but are to be done as per the directions of the department.
4. To revise the schedule of rates due to increase in the cos t of material and labour or due to change in technique.

Cost of labour -types of labour, standard schedule of rates

The labour can be classified in to

1) Skilled 1st class

2) Skilled IInd Class

3) un skilled

The labour charges can be obtained from the standard schedule of rates 30% of the skilled labour provided in the data may be taken as Ist class, remaining 70% as II class. The rates of materials for Government works are fixed by ANALYSIS OF RATES Chapter 5 57 Estimation and Costing the superintendent Engineer for his circle every year and approved by the Board of Chief Engineers. These rates are incorporated in the standard schedule of rates.

Lead statement: The distance between the source of availability of material and construction site is known as "Lead " and is expected in Km. The cost of convenayce of material depends on lead.

This statement will give the total cost of materials per unit item. It includes first cost, convenayce loading, unloading stacking, charges etc.

The rate shown in the lead statement are for mettalled road and include loading and staking charges . The environment lead on the metalled roads are arrived by multiplying by a factor

a) for metal tracks - lead x 1.0

b) For cartze tracks - Lead x 1.1

c) For Sandy tracks - lead x 1.4

Note: For 1m3 wet concrete = 1.52m3 dry concrete approximately

SP.Wt of concrete= 1440 kg/m3 (or) 1.44 t/m3

1 bag of cement = 50 Kg

Estimation for Stair case :-

Total cutting length for bar No.1:-

=a + b + c+ d + Development length - 45 degree Bend - 90 degree bend

For 90 degree bend = 2d

For 45 degree dend = d Cover for beam

=30mm

Cover for waist slab= 25mm

Development length = (Breadth-cc)+(Depth-cc) = (300-30)+(600-30) =840mm

Cutting length = 706 + 260.14 + 3504 + 597+ 840 =5767mm =5.767m

No of bars calculations:-

No. of bars = [(width of flight-clear cover)/spacing] + 1

= [(1200-(2*30))/100] +1 = 13 Nos No of crank

bars = 7nos = Bars shape No 1

No of Nominal bars = 6 N0s = bars shape No 2

Total length of Bar shape No 1= 7 * 5.676 = 40.37m

Calculation of bar shape No 2:-

Cutting length = e + f + g + Development length + LS Extra length – 45 degree bend – 90 degree bend

= 903 + 3504 + 597 + 390 + 220 - (2*10)-(1*2*10)

= 5.57m

Total length of bar shape No 2:-

=6*5.57 = 33.44m

Calculation of bar shape No 3:-

Cutting length = h + I + Development length- 45 degree bend

= 450 + 993.0 + 220- 10

= 1.65m

Nos of bars :- = [((1200)-(30*2))/200] + 1

= 7 Nos

Total length of shape Nos 3:-

= 1.65*7 = 11.16m

Calculation of binder bar in waist slab:-

Cutting length of binder bar = 1200-2*30 = 1140mm

Nos of binder bars in waist slab = (length of waist slab/ spacing) + 1

= (3504/150) + 1 =24 N0s

Total length of binder bar = 1.15* 24 = 27.60m

Calculation of Binder bars in landing no 1:-

Bottom binder bars:-

Cutting length = 2500-(2*30) = 2440mm =2.44m

Nos of bottom Binder bars in landing = (width of landing /spacing) + 1

= (903/150) + 1 = 7 Nos

Total length of bottom binder bars = 2.45 * 7 = 17.15 m

Top binder bars:-

Cutting length of top binder bars = 2500-(2*30) = 2440mm = 2.44m

Nos of top binder bars in landing Nos 1:- = (width of B/U bar in landing (L/7)/Spacing) + 1

= (643/150) + 1 = 5 Nos

Total length = 2.45*5 = 12.25m

Calculation of binder bars in landing no 2: - Binder for extra

bottom bars in landing Nos. 2 :-

Cutting length = 2500- 2*30 = 2440mm = 2.44m

Nos of binder (extra) bars in landing no. 2 :- (847/150) + 1 = 7 Nos

Total length = 2.45 * 7 = 17.15m

Binder for extra top bars in waist slab :-

Cutting length = width of waist – (2*30) = 1200-(2*30) = 1140mm = 1.14m

No. of extra bottom binder bars in waist slab : -

= (length of extra bar in waist slab / spacing) + 1

= (450/200) + 1 =4 Nos.

Total length of extra bottom binder bars in landing :-

= 1.15* 4 = 4.60m

Footing estimation and costing

DETAILED BAR BENDING SCHEDULE FOR FOOTING												
									Total CUTTING Lenth			
SR. NO	GROUP	DESCRIPTION	DIRECTION	BAR SHAPE	SPAN OF Member	Straigth length	Extra Length for L	NO of footings	No of bars	6	8	10
		Wt. Kg/m								0.2	0.4	0.617
1		COLUMN FOOTING										
		FC1,FC7,FC56 ,	X		1.50	1.20	0.13	3	11			43.89
A	G-1		Y		1.05	1.10	0.13	3	8			29.52
B	G-2	FC2,FC3,FC11 , FC18,	X		1.90	1.25	0.13	4	18.27			100.87
			Y		1.55	1.20	0.13	4	13.92			74.04
C	G-3	FC38	X		1.55	1.15	0.13	1	15.09			19.32
			Y		1.55	1.15	0.13	1	15.09			19.32
D	G-4	FC4,FC8,FC10 ,FC12, FC19,FC20,FC 30,FC35, FC39,FC40,FC 45,FC61, FC76,FC78	X		1.70	1.60	0.13	14	14.08			340.94
			Y		1.35	1.55	0.13	14	11.38			267.77
E	G-5	FC5,FC6,FC13 ,FC14, FC16,FC31,FC	X		1.65	1.30	0.13	12	13.69			234.96
			Y		1.30	1.20	0.13	12	11.00			175.56
	G-6	FC9,FC22,	X		1.15	1.10	0.13	2	7.76			19.10
			Y		0.95	0.80	0.13	2	6.00			11.16
	G-7	FC24,FC47,	X		1.15	1.10	0.13	2	6.75			16.61
			Y		1.15	1.10	0.13	2	**6.75**			16.61
	G-8	FC25,FC29,FC	X		1.3	1.2	0.13	4	10.00			53.20
			Y		1.3	1.2	0.13	4	10.00			53.20
								TOTAL LENGTH(m)				**1155.22**
								TOTAL WIEGTH(Kg)				**85528.4**

Table 1

DETAILED BAR BENDING SCHEDULE FOR FOOTING												
.									Total CUTTING Lenth			
SR. NO	GROUP	DESCRIPTION	DIRECTION	BAR SHAPE	SPAN OF Member	Straigth length	Extra Length for L	NO of footin	No of bars	6	8	10
		Wt. Kg/m								0.2	0.4	0.617
		FC27,FC28,FC	X		1.50	1.20	0.13	3	16			63.84
A	G-9	42,	Y		1.50	1.20	0.13	3	14.64			58.40
B	G-10	FC32,	X		1.10	1.00	0.13	1	6.5			7.35
			Y		0.85	0.70	0.13	1	5.25			4.36
C	G-11	FC23,FC44,FC	X		1.05	1.00	0.13	7	6.25			49.44
		63,FC64,FC66	Y		0.85	0.70	0.13	7	5.25			30.50
		FC15,FC58,FC	X	=	1.55	1.30	0.13	6	8.75			75.08
D	G-12	59,FC71,	Y		1.10	1.00	0.13	6	7			47.46
		FC37,FC41,FC	X		1.25	1.10	0.13	3	5			18.45
E	G-13	51	Y		1.25	1.10	0.13	3	5			18.45
F	G-14	FC70,FC72,	X		1.45	1.30	0.13	2	4			11.44
G	G-15		Y		1.00	0.80	0.13	2	5			9.30
						TOTAL WEIGHT(Kg)				394.06		
							NET TOTAL WEIGHT(Kg)				85922.46	

Table 2

Columns estimation and costing

DETAILED BAR BENDING SCHEDULE FOR COLUMN								Total CUTTING Lenth						25
S N														
	Wt. Kg/m ⇨	member	for Overlap	for L bend	Embedded in footing	mns	bars	0.2	0.4	0.6	0.89	1.58	2.5	3.86
2	UP to 1.829m height													
A														
1	C1,C7,C8,C10,C12, C13,C14,C15,C16, C17,C18,C19,C20,C21 C30,C31,C33,C34, C39,C40,C45,C53, C54,C55,C56,C57, C58,C59,C60,C61, C62,C69,C70	1.829	0.6	0.3	0.53	33						737	235	215
	stirrups	0.768				33	19	479						
	C2,C3,C4,C5,C6 ,C11, C35,C43,	1.829	0.6	0.3	0.53	8						332		
2	Stirrups	0.768				8	19		116					
	C9,C22,C23,C32,C63 C64,C65,C66,C67	1.829	0.6	0.3	0.53	10						196		
3		0.768				10	19		145					
	C24,C25,C26,C27, C28,C29,C38,C42, C47,C48,C49,C50,C51, C52, C68,	1.829	0.6	0.3	0.53	14						548		
4	Stirrups	0.768				14	19		203					
		1.829	0.6	0.3	0.53							45.6		
	Stirrups	0.768				2	19		29					
6	C37,C41,	1.829	0.6	0.3	0.53	2					46			
	Stirrups	0.768					19		29					
						TOTAL WEIGHT	2	105	126		41	2935	580	830
						SUM (Kg)			4616.98			Kg		

DETAILED BAR BEN IN SC EDULE FOR COL

Total

Table 1

DETAILED BAR BENDING SCHEDULE FOR COLUMN														
.								Total CUTTING Lenth						
SR. NO	DESCRIPTION	Length of member	Extra length for Overlap	Extra length for L bend	Extra Length Embedded in footing	NO of Columns	No of bars	6	8	10	12	16	20	25
	Wt. Kg/m⇨							0.2	0.4	0.6	0.89	1.58	2.5	3.86
2	FOR GROUND FLOOR COLUMNS													
A														
1	C1,C7,C8,C10,C12, C13,C14,C15,C16, C17,C18,C19,C20,C21 C30,C31,C33,C34, C39,C40,C45,C53, C54,C55,C56,C57, C58,C59,C60,C61, C62,C69,C70	3.657	0.6	0.3	0.53	33						1150	366	336
	stirrups	0.768				33	36	912						
2	C2,C3,C4,C5,C6,C11, C35,C43,	3.657	0.6	0.3	0.53	8						519		
	Stirrups	0.768				8	36		221					
3	C9,C22,C23,C32,C63 C64,C65,C66,C67,C68,	3.657	0.6	0.3	0.53	10						305		
	Stirrups	0.768				10	36		276					
4	C24,C25,C26,C27, C28,C29,C38,C42,C47,C48,C49,C50,C51, C52,	3.657	0.6	0.3	0.53	14						855		
	Stirrups	0.768				14	36		387					
5	C36,C44,	3.657	0.6	0.3	0.53	2						71.2		
	Stirrups	0.768				2	36		55					
6	C37,C41,	3.657	0.6	0.3	0.53	2					71			
	Stirrups	0.768				2	36		55					
		SUM	7439.18	Kg	TOTAL Weight (kg)			201	393		63	4581	905	1296

Table 2

DETAILED BAR BENDING SCHEDULE FOR COLUMN														
.						Total CUTTING Lenth								
SR. NO	DESCRIPTION	Length of member	Extra length for Overlap	Extra length for L bend	Extra Length Embedded in footing	NO of Columns	No of bars	6	8	10	12	16	20	25
	Wt. Kg/m⇨							0.2	0.4	0.6	0.89	1.58	2.5	3.86
2	FOR SECOND FLOOR COLUMNS													
A														
1	C1,C7,C8,C10,C12, C13,C14,C15,C16, C17,C18,C19,C20,C21 C30,C31,C33,C34, C39,C40,C45,C53, C54,C55,C56,C57, C58,C59,C60,C61, C62,C69,C70	3.687	0.6	0.3	0.53	33						1566	61	102
	stirrups	0.768				33	36	912						
2	C2,C3,C4,C5,C6,C11, C35,C43,	3.657	0.6	0.3	0.53	8						488		
	Stirrups	0.768				8	36		221					
3	C9,C22,C23,C32,C63 C64,C65,C66,C67,C68,	3.657	0.6	0.3	0.53	10						305		
	Stirrups	0.768				10	36		276					
4	C24,C25,C26,C27, C28,C29,C38,C42,C47,C48,C49,C50,C51, C52,	3.657	0.6	0.3	0.53	14						855		
	Stirrups	0.768				14	36		387					
5	C36,C44,	3.657	0.6	0.3	0.53	2						71.2		
	Stirrups	0.768				2	36		55					
6	C37,C41,	3.657	0.6	0.3	0.53	2					71			
	Stirrups	0.768				2	36		55					
7	C46	3.657	0.6	0.3	0.53	1						30.5		
	Stirrups	0.768				1	36		28					
		SUM	6300.77	Kg	TOTAL Weight			201	251		63	5239	152	395

Table 3

DETAILED BAR BENDING SCHEDULE FOR COLUMN														
.								Total CUTTING Lenth						
SR. NO	DESCRIPTION	Length of member	Extra length for Overlap	Extra length for L bend	Extra Length Embedded in footing	NO of Columns	No of bars	6	8	10	12	16	20	25
	Wt. Kg/m⇨							0.2	0.4	0.6	0.89	1.58	2.5	3.86
2	FOR THIRD FLOOR COLUMNS													
A														
1	C1,C7,C8,C10,C12, C13,C14,C15,C16, C17,C18,C19,C20,C21 C30,C31,C33,C34, C39,C40,C45,C53, C54,C55,C56,C57, C58,C59,C60,C61, C62,C69,C70	3.657	0.6	0.3	0.53	33						1577	112	50.9
	stirrups	0.768				33	36	912						
2	C2,C3,C4,C5,C6,C11, C35,C43,	3.657	0.6	0.3	0.53	8						488		
	Stirrups	0.768				8	36		221					
3	C9,C22,C23,C32,C63 C64,C65,C66,C67,C68,	3.657	0.6	0.3	0.53	10						305		
	Stirrups	0.768				10	36		276					
4	C24,C25,C26,C27, C28,C29,C38,C42,C47,C48,C49,C50,C51, C52,	3.657	0.6	0.3	0.53	14						855		
	Stirrups	0.768				14	36		387					
5	C36,C44,	3.657	0.6	0.3	0.53	2						122		
	Stirrups	0.768				2	36		55					
6	C37,C41,	3.657	0.6	0.3	0.53	2					71			
	Stirrups	0.768				2	36		55					
		SUM	6418.63	Kg	TOTAL Weight(kg)			201	393		63	5289	276	196

Table 5

DETAILED BAR BENDING SCHEDULE FOR COLUMN														
.							Total CUTTING Lenth							
SR. NO	DESCRIPTION	Length of member	Extra length for Overlap	Extra length for L bend	Extra Length Embedded in footing	NO of Columns	No of bars	6	8	10	12	16	20	25
	Wt. Kg/m⇨							0.2	0.4	0.6	0.89	1.58	2.5	3.86
2	FOR THIRD FLOOR COLUMNS													
A														
1	C1,C7,C8,C10,C12, C13,C14,C15,C16, C17,C18,C19,C20,C21 C30,C31,C33,C34, C39,C40,C45,C53, C54,C55,C56,C57, C58,C59,C60,C61, C62,C69,C70	3.657	0.6	0.3	0.53	33						1577	112	50.9
	stirrups	0.768				33	36	912						
2	C2,C3,C4,C5,C6,C11, C35,C43,	3.657	0.6	0.3	0.53	8						488	41	
	Stirrups	0.768				8	36		221					
3	C9,C22,C23,C32,C63 C64,C65,C66,C67,C68,	3.657	0.6	0.3	0.53	10						305		
	Stirrups	0.768				10	36		276					
4	C24,C25,C26,C27, C28,C29,C38,C42,C47,C48,C49,C50,C51, C52,	3.657	0.6	0.3	0.53	14						855		
	Stirrups	0.768				14	36		387					
6	C37,C41,	3.657	0.6	0.3	0.53	2					71			
	Stirrups	0.768				2	36		55					
7	C46	3.657	0.6	0.3	0.53	1						30.5		
	Stirrups	0.768				1	36		28					
		SUM	6363.55	Kg	TOTAL Weight (Kg)			201	382		63	5144	377	196

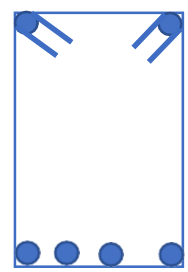
Table 6

DETAILED BAR BENDING SCHEDULE FOR COLUMN

SR. NO	DESCRIPTION	Length of member	Extra length for Overlap	Extra length for L bend	Extra Length Embedded in footing	NO of Columns	No of bars	6	8	10	12	16	20
								Total CUTTING Lenth					
	Wt. Kg/m⇨							0.2	0.4	0.6	0.89	1.58	2.5
2	FOR TOP FLOOR TO TERRIES FLOOR												
A													
1	C8,C10,C16,C17,C61 C62,C76,C78	3.657	0.6	0.3		8						**365**	
	stirrups	0.768				8	36	**221**					
2	C2,C3,C4,C5,C6,C11, C35,C43,	3.657	0.6	0.3	0	8						**437**	**36**
	Stirrups	0.768				8	36		**221**				
3	C9,C63,C64,C65,C66 C67,C68	3.657	0.6	0.3	0	7						**191**	
	Stirrups	0.768				7	36		**194**				
4	NO	3.657	0.6	0.3	0	0						**0**	
	Stirrups	0.768				0	0		**0**				
5	NO	0	0	0	0	0						**0**	
	Stirrups	0				0	0		**0**				
						TOTAL WEIGHT(Kg)		**49**	**164**			**1570**	**90**
						Sum			**1872.13428**			**Kg**	
				NET WEIGHT (Kg)			**33020.71**			**Kg**	**33**	**MT**	

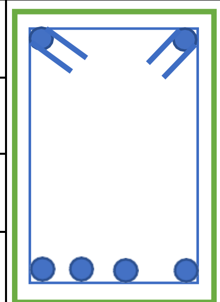
Table 7

Beams estimation and costing :

DETAILED BAR BENDING SCHEDULE FOR BEAMS				
Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	650	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	600	mm	
5	Span of beam(L)	5.512	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	16	mm	
8	Number of Main straight bar	6	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	2	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	200	mm	
	Length of Bars and Number of stirrups			

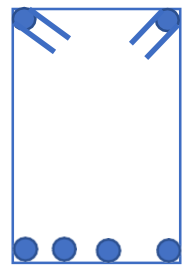
Sr. No.	Description	Value	Unit	Cross- Section of beam			
1	Total length of Beam (TL)	6112.00	mm				
2	Length of main straight bar	6.06	m				
3	Length of bentup bar	6.85	m				
4	Length of anchor bar	6.35	m				
5	Length of stirrups	1.89	m				
6	Number of stirrups	45.00	Numbers				
Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	6	16	6.062	36.372	1.58	57.48
2	Main bentup Bars	2	16	6.854	13.708	1.58	21.66
3	Anchor Bars	2	16	6.35	12.7	1.58	20.07
4	Stirrups	45	8	1.892	85.14	0.4	33.64
				TOTAL WEIGHT(Kg)			132.84
	Bars	No of Bars		Weight per bar			
	B7,B13,B22,B25	4		94.53	378.12	kg	

Table 1

Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	650	mm	
3	Cover(d’)	25	mm	
4	Effective depth (d)	600	mm	
5	Span of beam(L)	5.512	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	16	mm	
8	Number of Main straight bar	5	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	3	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	200	mm	
	Length of Bars and Number of stirrups			
Sr. No.	Description	Value	Unit	Cross- Section of beam

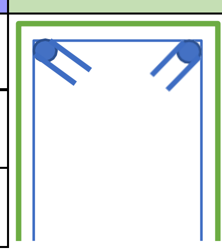
1	Total length of Beam (TL)	6112.00	mm				
2	Length of main straight bar	6.06	m				
3	Length of bentup bar	6.85	m				
4	Length of anchor bar	6.35	m				
5	Length of stirrups	1.89	m				
6	Number of stirrups	45.00	Numbers				
Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	79eigh t (Kg/ m)	Total weigth (Kg)
1	Main Straight Bars	5	16	6.062	30.31	1.58	47.90
2	Main bentup Bars	3	16	6.854	20.562	1.58	32.49
3	Anchor Bars	2	16	6.35	12.7	1.58	20.07
4	Stirrups	45	8	1.892	85.14	0.4	33.64
				TOTAL WEIGHT(Kg)			134.10
	Bars	No of Bars		Weight per bar			
	B1	1		114.94	114.94	kg	

Table 2

Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	650	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	600	mm	
5	Span of beam(L)	8.267	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	16	mm	
8	Number of Main straight bar	6	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	3	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	200	mm	
	Length of Bars and Number of stirrups			
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Total length of Beam (TL)	8867.00	mm	
2	Length of main straight bar	8.82	m	

3	Length of bentup bar	9.61	m					
4	Length of anchor bar	9.11	m					
5	Length of stirrups	1.89	m					
6	Number of stirrups	45.00	Numbers					
Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)	
1	Main Straight Bars	6	16	8.817	52.902	1.58	83.60	
2	Main bentup Bars	3	16	9.609	28.827	1.58	45.55	
3	Anchor Bars	2	16	9.105	18.21	1.58	28.78	
4	Stirrups	45	8	1.892	85.14	0.4	33.64	
				TOTAL WEIGHT(Kg)			191.56	
	Bars	No of Bars		Weight per bar				
B	B2,B8,B14	3		114.94	344.82	kg		

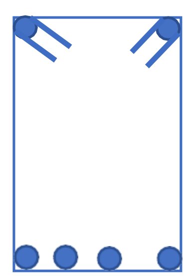
Table 3

Designed beam given data				.			
Sr. No.	Description	Value	Unit	Cross- Section of beam			
1	Width of beam(b)	300	mm				
2	Depth of beam(D)	650	mm				
3	Cover(d')	25	mm				

4	Effective depth (d)	600	mm	
5	Span of beam(L)	5.409	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	16	mm	
8	Number of Main straight bar	6	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	3	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	200	mm	
	Length of Bars and Number of stirrups			
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Total length of Beam (TL)	6009.00	mm	
2	Length of main straight bar	5.96	m	
3	Length of bentup bar	6.75	m	
4	Length of anchor bar	6.25	m	
5	Length of stirrups	1.89	m	
6	Number of stirrups	45.00	Numbers	

Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	6	16	5.959	35.754	1.58	56.50
2	Main bentup Bars	3	16	6.751	20.253	1.58	32.00
3	Anchor Bars	2	16	6.247	12.494	1.58	19.74
4	Stirrups	45	8	1.892	85.14	0.4	33.64
				TOTAL WEIGHT(Kg)			141.88
	Bars	No of Bars		Weight per bar			
C	B3,B9,B15,B4,B10,B16	6		141.88	851.3	kg	

Table 4

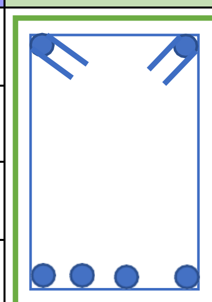
Designed beam given data				.			
Sr. No.	Description	Value	Unit	Cross- Section of beam			
1	Width of beam(b)	300	mm				
2	Depth of beam(D)	650	mm				
3	Cover(d')	25	mm				
4	Effective depth (d)	600	mm				
5	Span of beam(L)	3.925	m				
6	Width of support(bs)	300	mm				
7	Diameter of main straight	16	mm				

	bar			
8	Number of Main straight bar	6	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	3	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	200	mm	
	Length of Bars and Number of stirrups			
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Total length of Beam (TL)	4525.00	mm	
2	Length of main straight bar	4.48	m	
3	Length of bentup bar	5.27	m	
4	Length of anchor bar	4.76	m	
5	Length of stirrups	1.89	m	
6	Number of stirrups	45.00	Numbers	

Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	6	16	4.475	26.85	1.58	42.43

2	Main bentup Bars	3	16	5.267	15.801	1.58	24.97
3	Anchor Bars	2	16	4.763	9.526	1.58	15.05
4	Stirrups	45	8	1.892	85.14	0.4	33.64
				TOTAL WEIGHT(Kg)			116.09
	Bars	No of Bars		Weight per bar			
D	B5,B6,B11,B12,B20,B24,	34		116.09	3947	kg	
	B61,B69,B72,B78,B80, B84,B86,B92,B99,B114						
	B67,B71,B77,B79,B83, B85,B88,B91,B98,B113						
	B79,B74,B75,B96,B103, B104,B110						

Table 5

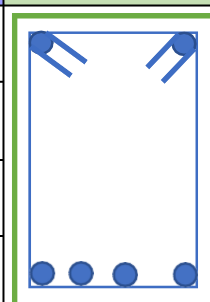
Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	650	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	600	mm	
5	Span of beam(L)	7.6	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	16	mm	

8	Number of Main straight bar	6	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	4	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	200	mm	
	Length of Bars and Number of stirrups			
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Total length of Beam (TL)	8200.00	mm	
2	Length of main straight bar	8.15	m	
3	Length of bentup bar	8.94	m	
4	Length of anchor bar	8.44	m	
5	Length of stirrups	1.89	m	
6	Number of stirrups	45.00	Numbers	

Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	6	16	8.15	48.9	1.58	77.27
2	Main bentup Bars	4	16	8.942	35.768	1.58	56.52

3	Anchor Bars	2	16	8.438	16.876	1.58	26.67
4	Stirrups	45	8	1.892	85.14	0.4	33.64
				TOTAL WEIGHT(Kg)			194.10
	Bars	No of Bars		Weight per bar			
D	B17	1		194.10	194.1	kg	

Table 6

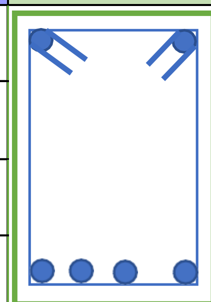
Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	650	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	600	mm	
5	Span of beam(L)	1.853	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	16	mm	
8	Number of Main straight bar	5	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	2	Numbers	
11	Diameter of Anchor bars	16	mm	

12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	180	mm	
	Length of Bars and Number of stirrups			
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Total length of Beam (TL)	2453.00	mm	
2	Length of main straight bar	2.40	m	
3	Length of bentup bar	3.20	m	
4	Length of anchor bar	2.69	m	
5	Length of stirrups	1.89	m	
6	Number of stirrups	45.00	Numbers	

Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	5	16	2.403	12.015	1.58	18.99
2	Main bentup Bars	2	16	3.195	6.39	1.58	10.10
3	Anchor Bars	2	16	2.691	5.382	1.58	8.50
4	Stirrups	45	8	1.892	85.14	0.4	33.64
				TOTAL WEIGHT(Kg)			71.22
	Bars	No of Bars		Weight per bar			

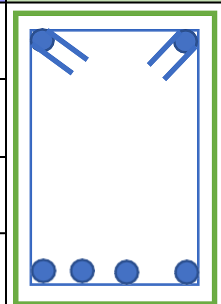
D	B19,B117	2	71.22	142.45	kg	

Table 7

Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	650	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	600	mm	
5	Span of beam(L)	5.004	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	16	mm	
8	Number of Main straight bar	8	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	2	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	180	mm	

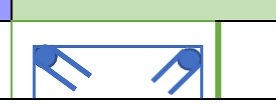
	Length of Bars and Number of stirrups						
Sr. No.	Description	Value	Unit	Cross- Section of beam			
1	Total length of Beam (TL)	5604.00	mm				
2	Length of main straight bar	5.55	m				
3	Length of bentup bar	6.35	m				
4	Length of anchor bar	5.84	m				
5	Length of stirrups	1.89	m				
6	Number of stirrups	15.00	Numbers				
Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	8	16	5.554	44.432	1.58	70.21
2	Main bentup Bars	2	16	6.346	12.692	1.58	20.06
3	Anchor Bars	2	16	5.842	11.684	1.58	18.46
4	Stirrups	15	8	1.892	28.38	0.4	11.21
				TOTAL WEIGHT(Kg)			119.95
	Bars	No of Bars		Weight per bar			
D	B21,B24,B32	3		119.95	359.84	kg	

Table 8

Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	650	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	600	mm	
5	Span of beam(L)	2.768	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	16	mm	
8	Number of Main straight bar	8	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	2	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	180	mm	
	Length of Bars and Number of stirrups			
Sr. No.	Description	Value	Unit	Cross- Section of beam

1	Total length of Beam (TL)	3368.00	mm				
2	Length of main straight bar	3.32	m				
3	Length of bentup bar	4.11	m				
4	Length of anchor bar	3.61	m				
5	Length of stirrups	1.89	m				
6	Number of stirrups	15.00	Numbers				
Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	8	16	3.318	26.544	1.58	41.95
2	Main bentup Bars	2	16	4.11	8.22	1.58	12.99
3	Anchor Bars	2	16	3.606	7.212	1.58	11.40
4	Stirrups	15	8	1.892	28.38	0.4	11.21
				TOTAL WEIGHT(Kg)			77.54
	Bars	No of Bars		Weight per bar			
D	B26,B118,B33,B34,B37,B45, B46,B47	8		77.54	620.35	kg	

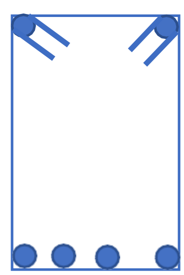
Table 9

Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	

2	Depth of beam(D)	650	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	600	mm	
5	Span of beam(L)	2.768	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	16	mm	
8	Number of Main straight bar	8	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	2	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	180	mm	
	Length of Bars and Number of stirrups			
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Total length of Beam (TL)	3368.00	mm	
2	Length of main straight bar	3.32	m	
3	Length of bentup bar	4.11	m	
4	Length of anchor bar	3.61	m	
5	Length of stirrups	1.89	m	
6	Number of stirrups	15.00	Numbers	

Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	8	16	3.318	26.544	1.58	41.95
2	Main bentup Bars	2	16	4.11	8.22	1.58	12.99
3	Anchor Bars	2	16	3.606	7.212	1.58	11.40
4	Stirrups	15	8	1.892	28.38	0.4	11.21
				TOTAL WEIGHT(Kg)			77.54
	Bars	No of Bars		Weight per bar			
D	B26,B118,B33,B34,B37,B45, B46,B47	8		77.54	620.35	kg	

Table 10

Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	650	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	600	mm	
5	Span of beam(L)	5.1	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight	20	mm	

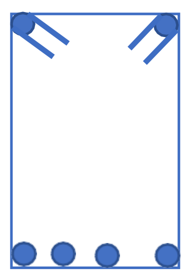
	bar		
8	Number of Main straight bar	6	Numbers
9	Diameter of bentup bar	16	mm
10	Number of Bentup bar	3	Numbers
11	Diameter of Anchor bars	16	mm
12	Number of Anchor bars	2	Numbers
13	Diameter of stirrups	8	mm
14	Spacing of stirrups	180	mm
	Length of Bars and Number of stirrups		

Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Total length of Beam (TL)	5700.00	mm	
2	Length of main straight bar	5.65	m	
3	Length of bentup bar	6.44	m	
4	Length of anchor bar	5.94	m	
5	Length of stirrups	1.89	m	
6	Number of stirrups	15.00	Numbers	

Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	6	20	5.65	33.9	2.47	83.70

2	Main bentup Bars	3	16	6.442	19.326	1.58	30.54
3	Anchor Bars	2	16	5.938	11.876	1.58	18.77
4	Stirrups	15	8	1.892	28.38	0.4	11.21
				TOTAL WEIGHT(Kg)			144.22
	Bars	No of Bars		Weight per bar			
N	B35,B36,B38,B39,B47, B48,B50,B51,B52,B53,	10		144.22	1442.2	kg	

Table 11

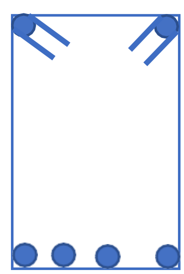
Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	600	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	550	mm	
5	Span of beam(L)	9	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	20	mm	
8	Number of Main straight bar	4	Numbers	
9	Diameter of bentup bar	16	mm	

10	Number of Bentup bar	2	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	180	mm	
	Length of Bars and Number of stirrups			
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Total length of Beam (TL)	9600.00	mm	
2	Length of main straight bar	9.55	m	
3	Length of bentup bar	10.30	m	
4	Length of anchor bar	9.84	m	
5	Length of stirrups	1.79	m	
6	Number of stirrups	46.00	Numbers	

Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	4	20	9.55	38.2	2.47	94.32
2	Main bentup Bars	2	16	10.3	20.6	1.58	32.55

3	Anchor Bars	2	16	9.838	19.676	1.58	31.09
4	Stirrups	46	8	1.792	82.432	0.4	32.57
				TOTAL WEIGHT(Kg)			190.53
	Bars	No of Bars		Weight per bar			
N	B40	1		190.53	190.53	kg	

Table 12

Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	750	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	700	mm	
5	Span of beam(L)	2.35	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	20	mm	
8	Number of Main straight bar	4	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	3	Numbers	

11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	180	mm	
	Length of Bars and Number of stirrups			

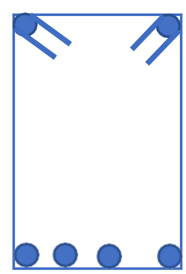
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Total length of Beam (TL)	2950.00	mm	
2	Length of main straight bar	2.90	m	
3	Length of bentup bar	3.78	m	
4	Length of anchor bar	3.19	m	
5	Length of stirrups	2.09	m	
6	Number of stirrups	15.00	Numbers	

Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	4	20	2.9	11.6	2.47	28.64
2	Main bentup Bars	3	16	3.776	11.328	1.58	17.90
3	Anchor Bars	2	16	3.188	6.376	1.58	10.08
4	Stirrups	15	8	2.092	31.38	0.4	12.40
				TOTAL WEIGHT(Kg)			69.02

	Bars	No of Bars	Weight per bar			
N	B44,B43,B58,B63,B66,B109,B11 1	7	69.02	483.11	kg	

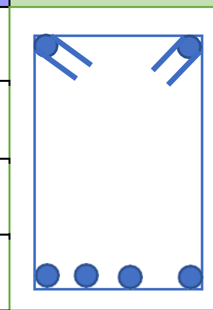
Table 13

Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	380	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	330	mm	
5	Span of beam(L)	1.67	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	20	mm	
8	Number of Main straight bar	4	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	3	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	



13	Diameter of stirrups	8	mm				
14	Spacing of stirrups	180	mm				
	Length of Bars and Number of stirrups						
Sr. No.	Description	Value	Unit	Cross- Section of beam			
1	Total length of Beam (TL)	2270.00	mm				
2	Length of main straight bar	2.22	m				
3	Length of bentup bar	2.79	m				
4	Length of anchor bar	2.51	m				
5	Length of stirrups	1.35	m				
6	Number of stirrups	10.00	Numbers				
Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	4	20	2.22	8.88	2.47	21.93
2	Main bentup Bars	3	16	2.7852	8.3556	1.58	13.20
3	Anchor Bars	2	16	2.508	5.016	1.58	7.93
4	Stirrups	10	8	1.352	13.52	0.4	5.34
				TOTAL WEIGHT(Kg)			48.40
	Bars	No of Bars		Weight per bar			
N	B93,B100,B105	3		48.40	145.19	kg	

Table 14

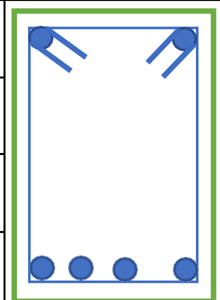
Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	600	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	550	mm	
5	Span of beam(L)	4.5	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	20	mm	
8	Number of Main straight bar	4	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	3	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	180	mm	
	Length of Bars and Number of stirrups			

Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Total length of Beam (TL)	5100.00	mm	
2	Length of main straight bar	5.05	m	
3	Length of bentup bar	5.80	m	
4	Length of anchor bar	5.34	m	
5	Length of stirrups	1.79	m	
6	Number of stirrups	26.00	Numbers	

Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	4	20	5.05	20.2	2.47	49.88
2	Main bentup Bars	3	16	5.8	17.4	1.58	27.50
3	Anchor Bars	2	16	5.338	10.676	1.58	16.87
4	Stirrups	26	8	1.792	46.592	0.4	18.41
				TOTAL WEIGHT(Kg)			112.65
	Bars	No of Bars		Weight per bar			
N	B54,B62,B70,B76,B81, B82,B87,B90,B107	22		112.65	2478.3	kg	
	B55,B56,B64,B73,B95, B102,B108,B116						
	B57,B65						
	B59,B112						

	B60					

Table 15

Designed beam given data				.
Sr. No.	Description	Value	Unit	Cross- Section of beam
1	Width of beam(b)	300	mm	
2	Depth of beam(D)	380	mm	
3	Cover(d')	25	mm	
4	Effective depth (d)	330	mm	
5	Span of beam(L)	6.67	m	
6	Width of support(bs)	300	mm	
7	Diameter of main straight bar	20	mm	
8	Number of Main straight bar	4	Numbers	
9	Diameter of bentup bar	16	mm	
10	Number of Bentup bar	3	Numbers	
11	Diameter of Anchor bars	16	mm	
12	Number of Anchor bars	2	Numbers	
13	Diameter of stirrups	8	mm	
14	Spacing of stirrups	200	mm	
	Length of Bars and Number of stirrups			
Sr. No.	Description	Value	Unit	Cross- Section of beam

1	Total length of Beam (TL)	7270.00	mm				
2	Length of main straight bar	7.22	m				
3	Length of bentup bar	7.79	m				
4	Length of anchor bar	7.51	m				
5	Length of stirrups	1.35	m				
6	Number of stirrups	35.00	Numbers				
Sr. No.	Description of bar	No	Diameter	Length(m)	Total length of bar(m)	Weight (Kg/m)	Total weigth (Kg)
1	Main Straight Bars	4	20	7.22	28.88	2.47	71.31
2	Main bentup Bars	3	16	7.7852	23.356	1.58	36.91
3	Anchor Bars	2	16	7.508	15.016	1.58	23.73
4	Stirrups	35	8	1.352	47.32	0.4	18.69
				TOTAL WEIGHT(Kg)			150.64
	Bars	No of Bars		Weight per bar			
N	B110,B115	2		150.64	301.28	kg	
				TOTAL WEIGHT(Kg)	11994	kg	
	FOR GROUND FLOOR BEAM				11994	kg	
	FOR FIRST FLOOR BEAM				11994	kg	
	FOR SECOND FLOOR BEAM				11994	kg	

	FOR THIRD FLOOR BEAM				11994	kg	
	FOR FOURTH FLOOR				11994	kg	
				NET TOTAL WEIGHT (Kg)	71961	kg	

Table 16

Slab estimation and costing tables

BAR BENDING SCHEDULE (BBS)-SLAB														
Sr. No.	Slab Des-cription	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars			Dia 10mm
	S27	Shorter Length	2728	Short span Steel Alternate 1St Bar	10	29.4	1	29.4	3270.0	96.29	200	2770	300.0	59.44
		Longer Length	11429											
		Shorter Bar spacing	200											
		Longer side Bar Spacing c/c	200											
		Depth	150											
	Next Slab Distance	Left side	5537	Short span Steel Alternate 2nd Bar	10	29.4	5	147.2	4227	622.43	1257	2770	200	384.22
		Right side	450											
				Long span steel	10	14.39	5	71.95	11829	851.10	200	11429	200	525.37
				Long Bentup steel lift side	10	3.73	5	18.64	11829	220.49	200	11429	200	136.107
				Long Bentup steel Right side	10	3.73	5	18.64	11829	220.49	200	11429	200	136.107
										Total Weight(Kg)				1241.2

								no. of bars			Shape of bars	
	S24,S25,S28, S29,S30,S32, S33,S34,S39, S40	Shorter Length	2660	Short span Steel Alternate 1St Bar	10	10.7	10	106.5	3923.0	417.90	200 1021.0 2702	257.96
		Longer Length	3911									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	2613	Short span Steel Alternate 2nd Bar	10	10.7	10	106.5	3575	380.78	673 200 2702	235.05
		Right side	2613									
	S24,S25,S28, S29,S30,S32, S33,S34,S39, S40	Shorter Length	2660	Long span Steel Alternate 1St Bar	10	7.5	10	75.3	5174.0	389.34	200 1021.0 3953	240.34
		Longer Length	3911									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	2613	Long span Steel Alternate 2nd Bar	10	7.5	10	75.3	4826	363.13	673 200 3953	224.15
		Right side	2613									
											TOTAL Weight kg	957.50

BAR BENDING SCHEDULE (BBS)-SLAB

Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars			Dia 10mm
	S41,S42,S43, S44,S45	Shorter Length	4191	Short span Steel Alternate 1St Bar	10	11.4	5	56.8	5753.7	326.59				201.60
		Longer Length	4191								200		1320.7	
		Shorter Bar spacing	200									4233		
		Longer side Bar Spacing c/c	200											
		Depth	150											
	Next Slab Distance	Left side	2769	Short span Steel Alternate 2nd Bar	10	11.4	5	56.8	5137	291.58				179.99
		Right side	3512								704		200	
												4233		
	S41,S42,S43, S44,S45	Shorter Length	4191	Long span Steel Alternate 1St Bar	10	11.4	5	56.8	5454.0	309.58				191.10
		Longer Length	4191								200		1021.0	
		Shorter Bar spacing	200									4233		
		Longer side Bar Spacing c/c	200											
		Depth	150											
	Next Slab Distance	Left side	2613	Long span Steel Alternate 2nd Bar	10	11.4	5	56.8	5106	289.81				178.89
		Right side	2613								673		200	
												4233		
										TOTAL Weight				751.58

BAR BENDING SCHEDULE (BBS)-SLAB														
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars			Dia 10mm
1	Top Reinforcement			Long Bentup steel lift side	10	1.20	5	6.00	4591	27.55				17.004
											200	4191	200	
				Long Bentup steel Right side	10	1.20	5	6.00	4591	27.55				17.004
											200	4191	200	
2	Top Reinforcement			Long Bentup steel Front side	10	1.20	5	6.00	4591	27.55				17.004
											200	4191	200	
				Long Bentup steel Back side	10	1.20	5	6.00	4591	27.55				17.004
											200	4191	200	
	Shorter Length	4191	Shorter Bar spacing	200	Longer side Bar Spacing c/c	200	Left side	1500	Front side	1500		**Total Weight (Kg)**		**68.015**
	Longer Length	4191					Right side	2000	Back side	2000		**NET TOTAL WEIGHT (Kg)**		**818.30**

BAR BENDING SCHEDULE (BBS)-SLAB												
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars	Dia 10mm
	S9,S10 ,S11	Shorter Length	2676	Short span Steel Alternate 1St Bar	10	8.4	3	25.1	3943.7	99.03	200 1025.7 2718	61.13
		Longer Length	2998									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	2627	Short span Steel Alternate 2nd Bar	10	8.4	3	25.1	3593	90.23	675 200 2718	55.70
		Right side	2627									
	S9,S10 ,S11	Shorter Length	2676	Long span Steel Alternate 1St Bar	10	7.6	3	22.7	4265.7	96.81	200 1025.7 3040	59.76
		Longer Length	2998									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	2627	Long span Steel Alternate 2nd Bar	10	7.6	3	22.7	3915	88.86	675 200 3040	54.85
		Right side	2627									
											TOTAL Weight kg	231.44

BAR BENDING SCHEDULE (BBS)-SLAB													
Sr. No.	Slab Description	Measurement	Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars			Dia 10mm
1	Top Reinforcement		Long Bentup steel lift side	10	1.20	3	3.60	3398	12.23				7.551
										200	2998	200	
			Long Bentup steel Right side	10	1.20	3	3.60	3398	12.23				7.551
										200	2998	200	
2	Top Reinforcement		Long Bentup steel Front side	10	1.20	3	3.60	3076	11.07				6.836
										200	2676	200	
			Long Bentup steel Back side	10	1.20	3	3.60	3076	11.07				6.836
										200	2676	200	
	Shorter Length	2676 Shorter Bar spacing	200	Longer side Bar Spacing c/c	200	Left side	2676	Front side	1500		Total Weight (Kg)		28.773
	Longer Length	2998				Right side	2676	Back side	2000		NET TOTAL WEIGHT (Kg)		260.21

Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars	Dia 10mm
	S22,S23	Shorter Length	2185	Short span Steel Alternate 1St Bar	10	9.5	2	19.0	3778.0	71.84	200 / 1351.0 / 2227	44.34
		Longer Length	3453									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	2627	Short span Steel Alternate 2nd Bar	10	9.5	2	19.0	3102	58.99	675 / 200 / 2227	36.41
		Right side	3603									
	S22,S23	Shorter Length	2185	Long span Steel Alternate 1St Bar	10	6.3	2	12.7	5046.0	63.96	200 / 1351.0 / 3495	39.48
		Longer Length	3453									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	2627	Long span Steel Alternate 2nd Bar	10	6.3	2	12.7	4370	55.39	675 / 200 / 3495	34.19
		Right side	3603									
											TOTAL Weight kg	154.43

BAR BENDING SCHEDULE (BBS)-SLAB														
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars			Dia 10mm
1	Top Reinforcement			Long Bentup steel lift side	10	1.20	2	2.40	3853	9.25				5.708
											200	3453	200	
				Long Bentup steel Right side	10	1.20	2	2.40	3853	9.25				5.708
											200	3453	200	
2	Top Reinforcement			Long Bentup steel Front side	10	1.20	2	2.40	2585	6.20				3.830
											200	2185	200	
				Long Bentup steel Back side	10	1.20	2	2.40	2585	6.20				3.830
											200	2185	200	
	Shorter Length	2185	Shorter Bar spacing	200	Longer side Bar Spacing c/c	200	Left side	2676	Front side	3116		Total Weight (Kg)		19.076
	Longer Length	3453					Right side	2676	Back side	2000		NET TOTAL WEIGHT (Kg)		173.51

BAR BENDING SCHEDULE (BBS)-SLAB													
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars		Dia 10mm
	S26	Shorter Length	5486	Short span Steel Alternate 1St Bar	10	14.6	1	14.6	7079.0	103.28			63.75
		Longer Length	5486								200	1351.0	
		Shorter Bar spacing	200								5528		
		Longer side Bar Spacing c/c	200										
		Depth	150										
	Next Slab Distance	Left side	2627	Short span Steel Alternate 2nd Bar	10	14.6	1	14.6	6403	93.43			57.67
		Right side	3603								675	200	
											5528		
	S26	Shorter Length	5486	Long span Steel Alternate 1St Bar	10	14.6	1	14.6	7079.0	103.28			63.75
		Longer Length	5486								200	1351.0	
		Shorter Bar spacing	200								5528		
		Longer side Bar Spacing c/c	200										
		Depth	150										
	Next Slab Distance	Left side	2627	Long span Steel Alternate 2nd Bar	10	14.6	1	14.6	6403	93.43			57.67
		Right side	3603								675	200	
											5528		
										TOTAL Weight kg			242.85

BAR BENDING SCHEDULE (BBS)-SLAB												
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars	Dia 10mm
	S35,S36	Shorter Length	2050	Short span Steel Alternate 1St Bar	10	6.9	2	13.8	3057.0	42.25	200 765.0 2092	26.08
		Longer Length	2414									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	1845	Short span Steel Alternate 2nd Bar	10	6.9	2	13.8	2811	38.85	519 200 2092	23.98
		Right side	1845									
	S35,S36	Shorter Length	2050	Long span Steel Alternate 1St Bar	10	6.0	2	12.0	3421.0	41.05	200 765.0 2456	25.34
		Longer Length	2414									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	1845	Long span Steel Alternate 2nd Bar	10	6.0	2	12.0	3175	38.10	519 200 2456	23.52
		Right side	1845									
											TOTAL Weight kg	98.92

BAR BENDING SCHEDULE (BBS)-SLAB														
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars			Dia 10mm
1	Top Reinforcement			Long Bentup steel lift side	10	1.20	2	2.40	2814	6.75				4.169
											200	2414	200	
				Long Bentup steel Right side	10	1.20	2	2.40	2814	6.75				4.169
											200	2414	200	
2	Top Reinforcement			Long Bentup steel Front side	10	1.20	2	2.40	2450	5.88				3.630
											200	2050	200	
				Long Bentup steel Back side	10	1.20	2	2.40	2450	5.88				3.630
											200	2050	200	
	Shorter Length	2050	Shorter Bar spacing	200	Longer side Bar Spacing c/c	200	Left side	1845	Front side	1777		Total Weight (Kg)		15.597
	Longer Length	2414					Right side	1845	Back side	1777		NET TOTAL WEIGHT (Kg)		114.52

BAR BENDING SCHEDULE (BBS)-SLAB												
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars	Dia 10mm
	S37,S38	Shorter Length	2050	Short span Steel Alternate 1St Bar	10	6.0	2	12.0	3057.0	36.68	200 765.0 2092	22.64
		Longer Length	2050									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	1845	Short span Steel Alternate 2nd Bar	10	6.0	2	12.0	2811	33.73	519 200 2092	20.82
		Right side	1845									
	S37,S38	Shorter Length	2050	Long span Steel Alternate 1St Bar	10	6.0	2	12.0	3057.0	36.68	200 765.0 2092	22.64
		Longer Length	2050									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	1845	Long span Steel Alternate 2nd Bar	10	6.0	2	12.0	2811	33.73	519 200 2092	20.82
		Right side	1845									
										TOTAL Weight kg		86.93

BAR BENDING SCHEDULE (BBS)-SLAB											
Sr. No.	Slab Description	Measurement	Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars	Dia 10mm
1	Top Reinforcement		Long Bentup steel lift side	10	1.20	2	2.40	2450	5.88		3.630
										200 2050 200	
			Long Bentup steel Right side	10	1.20	2	2.40	2450	5.88		3.630
										200 2050 200	
2	Top Reinforcement		Long Bentup steel Front side	10	1.20	2	2.40	2450	5.88		3.630
										200 2050 200	
			Long Bentup steel Back side	10	1.20	2	2.40	2450	5.88		3.630
										200 2050 200	
	Shorter Length	2050 Shorter Bar spacing	200	Longer side Bar Spacing c/c	200	Left side	1845	Front side	1777	Total Weight (Kg)	14.519
	Longer Length	2050				Right side	1845	Back side	1777	NET TOTAL WEIGHT (Kg)	101.45

BAR BENDING SCHEDULE (BBS)-SLAB												
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars	Dia 10mm
	S31	Shorter Length	3911	Short span Steel Alternate 1St Bar	10	14.7	1	14.7	5192.3	76.44	200 1039.3 3953	47.19
		Longer Length	5539									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	0	Short span Steel Alternate 2nd Bar	10	14.7	1	14.7	4303	63.35	150 200 3953	39.11
		Right side	2668									
	S31	Shorter Length	3911	Long span Steel Alternate 1St Bar	10	10.7	1	10.7	6820.3	72.65	200 1039.3 5581	44.85
		Longer Length	5539									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	0	Long span Steel Alternate 2nd Bar	10	10.7	1	10.7	5931	63.18	150 200 5581	39.00
		Right side	2668									
										TOTAL Weight kg		170.14

BAR BENDING SCHEDULE (BBS)-SLAB												
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars	Dia 10mm
	middle S1 Slab	Shorter Length	2500	Short span Steel Alternate 1St Bar	10	20.9	5	104.4	3558.7	371.44	200 / 816.7 / 2542	229.28
		Longer Length	8000									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	1500	Short span Steel Alternate 2nd Bar	10	20.9	5	104.4	3192	333.17	450 / 200 / 2542	205.66
		Right side	2000									
				Long span steel	10	13.25	5	66.25	8400	556.50	200 / 8000 / 200	343.52
				Long Bentup steel lift side	10	3.50	5	17.50	8400	147.00	200 / 8000 / 200	90.741
				Long Bentup steel Right side	10	3.50	5	17.50	8400	147.00	200 / 8000 / 200	90.741
										Total Weight(Kg)		959.9

BAR BENDING SCHEDULE (BBS)-SLAB												
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars	Dia 10mm
	S1	Shorter Length	2972	Short span Steel Alternate 1St Bar	10	14.7	1	14.7	4278.3	62.97	200 / 1064.3 / 3014	38.87
		Longer Length	5537									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	0	Short span Steel Alternate 2nd Bar	10	14.7	1	14.7	3364	49.51	150 / 200 / 3014	30.56
		Right side	2743									
	S1	Shorter Length	2972	Long span Steel Alternate 1St Bar	10	8.3	1	8.3	6843.3	56.83	200 / 1064.3 / 5579	35.08
		Longer Length	5537									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	0	Long span Steel Alternate 2nd Bar	10	8.3	1	8.3	5929	49.24	150 / 200 / 5579	30.40
		Right side	2743									
											TOTAL Weight kg	134.91

BAR BENDING SCHEDULE (BBS)-SLAB											
Sr. No.	Slab Description	Measurement	Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars	Dia 10mm
1	Top Reinforcement		Long Bentup steel lift side	10	1.20	1	1.20	5937	7.12		4.398
										200 5537 200	
			Long Bentup steel Right side	10	1.20	1	1.20	5937	7.12		4.398
										200 5537 200	
2	Top Reinforcement		Long Bentup steel Front side	10	1.20	1	1.20	3372	4.05		2.498
										200 2972 200	
			Long Bentup steel Back side	10	1.20	1	1.20	3372	4.05		2.498
										200 2972 200	

	Shorter Length	2972	Shorter Bar spacing	200	Longer side Bar Spacing c/c	200	Left side	0	Front side	0	Total Weight (Kg)	13.791
	Longer Length	5537					Right side	2676	Back side	2638	NET TOTAL WEIGHT (Kg)	148.79

BAR BENDING SCHEDULE (BBS)-SLAB												
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars	Dia 10mm
	S12,S13 ,S14,S15,S16,S17,S18,S19,S20,S8 ,S3,S4,S2,S5,S6,S7,S8,S32 ,S33,	Shorter Length	2743	Short span Steel Alternate 1St Bar	10	10.4	19	197.6	4049.3	800.15	200 1064.3 2785	493.92
		Longer Length	3810									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	2743	Short span Steel Alternate 2nd Bar	10	10.4	19	197.6	3684	727.88	699 200 2785	449.31
		Right side	2743									
	S12,S13 ,S14,S15,S16,S17,S18,S19,S20,S8 ,S3,S4,S2,S5,S6,S7,S8,S32 ,S33,	Shorter Length	2743	Long span Steel Alternate 1St Bar	10	7.7	19	146.9	5116.3	751.68	200 1064.3 3852	464.00
		Longer Length	3810									
		Shorter Bar spacing	200									
		Longer side Bar Spacing c/c	200									
		Depth	150									
	Next Slab Distance	Left side	2743	Long span Steel Alternate 2nd Bar	10	7.7	19	146.9	4751	697.95	699 200 3852	430.83
		Right side	2743									
											TOTAL Weight kg	1838.06

BAR BENDING SCHEDULE (BBS)-SLAB														
Sr. No.	**Slab Description**	**Measurement**		**Bar No.**	**Dia. Of Bar**	**No. Of Bar per slab**	**No. of slabs**	**Total no. of bars**	**Cutting Length (mm)**	**Net Length (m)**	**Shape of bars**			**Dia 10mm**
1	Top Reinforcement			Long Bentup steel lift side	10	1.20	19	22.80	4210	95.99				**59.252**
											200	3810	200	
				Long Bentup steel Right side	10	1.20	19	22.80	4210	95.99				**59.252**
											200	3810	200	
2	Top Reinforcement			Long Bentup steel Front side	10	1.20	19	22.80	2960	67.49				**41.659**
											200	2560	200	
				Long Bentup steel Back side	10	1.20	19	22.80	2960	67.49				**41.659**
											200	2560	200	
	Shorter Length	2560	Shorter Bar spacing	200	Longer side Bar Spacing c/c	200	Left side	2743	Front side	1500		**Total Weight (Kg)**		**201.82**
	Longer Length	3810					Right side	2743	Back side	2000		**NET TOTAL WEIGHT (Kg)**		**2039.9**

BAR BENDING SCHEDULE (BBS)-SLAB														
Sr. No.	Slab Description	Measurement		Bar No.	Dia. Of Bar	No. Of Bar per slab	No. of slabs	Total no. of bars	Cutting Length (mm)	Net Length (m)	Shape of bars			Dia 10mm
	S21, S34	Shorter Length	2972	Short span Steel Alternate 1St Bar	10	80.9	2	161.8	3364.0	544.28				335.97
		Longer Length	32009								200		150.0	
		Shorter Bar spacing	200									3014		
		Longer side Bar Spacing c/c	200											
		Depth	150											
	Next Slab Distance	Left side	0	Short span Steel Alternate 2nd Bar	10	80.9	5	404.5	3364	1360.70				839.94
		Right side	0								150		200	
												3014		
				Long span steel	10	15.61	5	78.05	32409	2529.52	200	32009	200	1561.43
				Long Bentup steel lift side	10	3.97	5	19.86	32409	643.64				397.310
											200	32009	200	
				Long Bentup steel Right side	10	3.97	5	19.86	32409	643.64				397.310
											200	32009	200	
										Total Weight(Kg)				3532.0

SLAB SCHEDULE(M30:Fe500)										
Sr. No.	Groups	Slabs	Nos	TYPE	THICKNESS	Bottom Reinforcement		Top Reinforcement		Distribution
					MM	Short Span (Bentup)	Long Span (Bentup)	SS CONT.	LS CONT.	.
1	A	S1,S2,S3 ,S4,S5,S 6,S7,S8, S9,S10, S12,S13, S14,S15, S16,S17, S18,S19, S20,S22, S23,S24, S25,S29, S30,S31, S32,S33, S37,S39, S40, S42,S43, S44,S45	35	2-Way	150	T10@ 200	T10@ 200	T10@ 200 (NAS1,S9)	T10@ 20 0 (NAS9,S22)	T10@ 200
2	B	S21,S27, S34, S35,S36	5	1-Way	150	T10@ 200	T10@ 200	T10@ 200 (NAS1,S9)	T10@ 20 0 (NAS9,S22)	T10@ 200
3	C	S26	1	2-Way	200	T10@ 200	T10@ 200 (NA-S27,S34,S3 5 ,S36)	T10@ 200 (NAS1,S9)	T10@ 20 0 (NAS21,S27, S34,S35, S36)	T10@ 200

Shear wall estimation and costing tables :

BBS FOR SHEAR WALL							
Sr. No.	Level	Description	Diameter	Nos.	L(m)	Wt./m	Qty.
	Base To level 1		1.829				
1		Vertical Bars 1 (Column Bars)	12	48	2.429	0.888889	103.6373333
2		Vertical Bars 2	12	122	2.429	0.888889	263.4115556
3		Master Links	8	204.848	2.71	0.405	224.8309224
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total(KG)	**770.8141735**
Sr. No.	Level	Description	Diameter	Nos.	L(m)	Wt./m	Qty.
	Level 1 To Level 2		3.687				
1		Vertical Bars 1 (Column Bars)	12	48	4.287	0.888889	182.912
2		Vertical Bars 2	12	122	4.287	0.888889	464.9013333
3		Master Links	8	412.944	2.71	0.405	453.2266872
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total (Kg)	**1279.974383**
Sr. No.	Level	Description	Diameter	Nos.	L(m)	Wt./m	Qty.
	Level 2 To Level 3		3.687				
1		Vertical Bars 1 (Column Bars)	12	48	4.287	0.888889	182.912
2		Vertical Bars 2	12	122	4.287	0.888889	464.9013333
3		Master Links	8	412.944	2.71	0.405	453.2266872
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total(kg)	**1279.974383**
Sr. No.	Level	Description	Diameter	Nos.	L(m)	Wt./m	Qty.
	Level 3 To Level 4		3.687				

n and

1		Vertical Bars 1 (Column Bars)	12	48	4.287	0.888889	182.912
2		Vertical Bars 2	12	122	4.287	0.888889	464.9013333
3		Master Links	8	412.944	2.71	0.405	453.2266872
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total(Kg)	**1279.974383**
Sr. No.	**Level**	**Description**	**Diameter**	**Nos.**	**L(m)**	**Wt./m**	**Qty.**
	Level 4 To Level 5		3.687				
1		Vertical Bars 1 (Column Bars)	12	48	4.287	0.888889	182.912
2		Vertical Bars 2	12	122	4.287	0.888889	464.9013333
3		Master Links	8	412.944	2.71	0.405	453.2266872
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total(Kg)	**1279.974383**
Sr. No.	**Level**	**Description**	**Diameter**	**Nos.**	**L(m)**	**Wt./m**	**Qty.**
	Level 5To Level 6		3.687				
1		Vertical Bars 1 (Column Bars)	12	48	4.287	0.888889	182.912
2		Vertical Bars 2	12	122	4.287	0.888889	464.9013333
3		Master Links	8	412.944	2.71	0.405	453.2266872
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total(Kg)	**1279.974383**
					NET TOTAL (Kg)		**8450.66047**

BBS FOR SHEAR WALL							
Sr. No.	Level	Description	Diameter	Nos.	L(m)	Wt./m	Qty.
	Base To level 1		1.829				
1		Vertical Bars 1 (Column Bars)	12	48	2.429	0.888889	103.6373333
2		Vertical Bars 2	12	122	2.429	0.888889	263.4115556
3		Master Links	8	204.848	2.71	0.405	224.8309224
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total(KG)	**770.8141735**
Sr. No.	Level	Description	Diameter	Nos.	L(m)	Wt./m	Qty.
	Level 1 To Level 2		3.687				
1		Vertical Bars 1 (Column Bars)	12	48	4.287	0.888889	182.912
2		Vertical Bars 2	12	122	4.287	0.888889	464.9013333
3		Master Links	8	412.944	2.71	0.405	453.2266872
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total (Kg)	**1279.974383**
Sr. No.	Level	Description	Diameter	Nos.	L(m)	Wt./m	Qty.
	Level 2 To Level 3		3.687				
1		Vertical Bars 1 (Column Bars)	12	48	4.287	0.888889	182.912
2		Vertical Bars 2	12	122	4.287	0.888889	464.9013333
3		Master Links	8	412.944	2.71	0.405	453.2266872
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total(kg)	**1279.974383**
Sr. No.	Level	Description	Diameter	Nos.	L(m)	Wt./m	Qty.
	Level 3 To Level 4		3.687				

Quantity sheet 1										R
Sr. No.	Description	Nos	L	B	H	Qty.	Un	Rate	Amount	Remarks
1	Excavation work of footing									
	Excavation for foundation in earth, soil of all types sand, gravel and soft murum including removing the excavated material upto a distance of 50m beyond the building area stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary back filling, ramming, watering(including shoring and strutting) etc. complete.					250.3	cum	175.0	43801.4	
A	F+B5:J5C1,FC7,FC56,	3	1.5	1.05	2	9.45				
B	FC2,FC3,FC11,FC18,	4	1.9	1.55	2	23.56				
C	FC38	1	1.55	1.55	2	4.805				
D	FC4,FC8,FC10,FC12, FC19,FC20,FC30,FC35, FC39,FC40,FC45,FC61, FC76,FC78	14	1.7	1.35	2	64.26				
E	FC5,FC6,FC13,FC14, FC16,FC31,FC33,FC43, FC53,FC54,FC60,FC75	12	1.65	1.3	2	51.48				
F	FC9,FC22,	2	1.15	0.95	2	4.37				
G	FC24,FC47,	2	1.15	1.15	2	5.29				
H	FC25,FC29,FC28,FC48,	4	1.3	1.3	2	13.52				
I	FC27,FC28,FC42,	3	1.5	1.5	2	13.5				
J	FC32,	1	1.1	0.85	2	1.87				
K	FC23,FC44,FC63,FC64,FC66,FC67 ,FC68,	7	1.05	0.85	2	12.5				
L	FC15,FC58,FC59,FC71, FC73,FC74,	6	1.55	1.1	2	20.46				
M	FC37,FC41,FC51	3	1.125	1.13	2	7.594				
N	FC46,FC55,FC57	3	1.35	1	2	8.1				

O	FC70,FC72,	2	1.45	1	2	5.8				
1:4:8 PCC For foundation						6.72	cum	4000	26880.0	
	F-1, F-2, F-3, F-4, F-5, F-6, F-7,	7	1.6	1.5	0	1.68				
	F-8, F-9, F-10, F-11, F-12, F-13 ,F-14,F-15,F-16	9	1.65	1.6	0	2.376				
	F-17, F-18,F-19, F-20,F-21,F-22, F-23, F-24	8	1.85	1.8	0	2.664				
3	Concrete forcolumn footing									
A1										
1	F-1, F-2, F-3, F-4, F-5, F-6, F-7,	7	1.3	1.2	0	1.638				
A2										
1	F-8, F-9, F-10, F-11, F-12, F-13 ,F-14,F-15,F-16	9	0.389			3.501				75mm offset
	F-17, F-18,F-19, F-20,F-21,F-22, F-23, F-24	8	0.386			3.088				
A3	Lift raft slab	1	2.072	0.5		0.622				
					To	8.849	cum	5000	44243.0	

Quantity sheet 1.1									R
Sr. No.	Description	Nos	L	B	H	Qty.	Un	Remarks
	1:4:8 PCC For foundation Laying plain cement concrete machine mix for foundation of columns, walls, etc. with 40mm coarse aggregate including ramming, consolidating and curing etc. complete.					18.738	cum	
A	FC1,FC7,FC56,	3	1.5	1.05	0.1	0.4725	cum	
B	FC2,FC3,FC11,FC18,	4	1.9	1.55	0.1	1.178	cum	
						0	cum	
C	FC38	1	1.55	1.55	0.1	0.2403	cum	
							cum	
D	FC4,FC8,FC10,FC12, FC19,FC20,FC30,FC35, FC39,FC40,FC45,FC61, FC76,FC78	14	1.7	1.35	0.15	4.8195	cum	
E	FC5,FC6,FC13,FC14, FC16,FC31,FC33,FC43, FC53,FC54,FC60,FC75	12	1.65	1.3	0.1	2.574	cum	75mm offset
F	FC9,FC22,	2	0.389			0.778	cum	
G	FC24,FC47,	2	1.15	0.95	0.1	2.3	cum	
H	FC25,FC29,FC28,FC48,	4	1.3	1.3	0.1	5.2	cum	
I	FC27,FC28,FC42,	3	1.5	1.5	0.15	0.3375	cum	
J	FC32,	1	1.1	0.85	0.15	0.1403	cum	
K	FC23,FC44,FC63,FC64,FC66,FC67 ,FC68,	7	1.05	0.85	0.1	0.0893	cum	
L	FC15,FC58,FC59,FC71, FC73,FC74,	6	1.5	1.15	0.1	0.1725	cum	
M	FC37,FC41,FC51	3	1.25	1.25	0.1	0.1563	cum	

N	FC46,FC55,FC57	3	1.35	1	0.1	0.135	cum	
	FC70,FC72,	2	1.45	1	0.1	0.145	cum	
			TOTAL Qty.(m3)			18.738	cum	

Quantity sheet 1.2								
Sr. No.	Description	.	Nos	L	B	H	Qty.	Un
3	Concrete for column footing							Cum
	FOOTINGS	TYPE						Cum
A	FC1,FC7,FC56,	Pad	3	1.5	1.05	0.35	1.654	Cum
B	FC2,FC3,FC11,FC18,	Step	4	1.9	1.55	0.3	3.534	Cum
				1.3	0.95	0.275	1.359	Cum
C	FC38	Step	1	1.55	1.55	0.325	0.781	Cum
				0.95	0.95	0.2	0.181	Cum
D	FC4,FC8,FC10,FC12, FC19,FC20,FC30,FC35, FC39,FC40,FC45,FC61, FC76,FC78	Pad	12	1.65	1.35	0.45	12.029	Cum

E	FC5,FC6,FC13,FC14, FC16,FC31,FC33,FC43, FC53,FC54,FC60,FC75	Pad	12	1.65	1.3	0.45	11.583	Cum
F	FC9,FC22,	Pad	2	1.15	0.95	0.35	0.765	Cum
G	FC24,FC47,	Pad	2	1.15	1.15	0.35	0.926	Cum
H	FC25,FC29,FC28,FC48	Pad	4	1.3	1.3	0.4	2.704	Cum
I	FC27,FC28,FC42,	Pad	3	1.5	1.5	0.45	3.038	Cum
J	FC32,	Pad	1	1.1	0.85	0.375	0.351	Cum
K	FC23,FC44,FC63,FC64, FC66,FC67 ,FC68,	Pad	7	1.05	0.85	0.3	1.874	Cum
L	FC15,FC58,FC59,FC71 FC73,FC74,	Pad	6	1.55	1.1	0.375	3.836	Cum
M	FC37,FC41,FC51	Pad	3	1.25	1.25	0.375	1.758	Cum
N	FC46,FC55,FC57	Pad	3	1.35	1	0.375	1.519	Cum
O	FC70,FC72,	Pad	2	1.45	1	0.35	1.015	Cum
				TOTAL Qty.(m3)			48.904	Cum

Quantity sheet 3								
Sr.No.4	CONCRETE FOR COLUMN							
A	Level- From Ground slabTop to First Stlit floor slab Top							
	PERTICULERS	Nos	B	L	H	Qty.	Un	Remark
1	C1,C7,C8,C10,C12, C13,C14,C15,C16, C17,C18,C19,C20,C21 C30,C31,C33,C34, C39,C40,C45,C53, C54,C55,C56,C57, C58,C59,C60,C61, C62,C69,C70	33	0.3	0.75	3.658	27.16065	cum	

2	C2,C3,C4,C5,C6,C11, C35,C43,	8	0.23	0.45	3.658	3.028824	cum	
3	C24,C25,C26,C27, C28,C29,C38,C42,C47,C 48,C49,C50,C51, C52,	14	0.45	0.45	3.658	10.37043	cum	
4	C36,C44,	2	Dia .45		3.658	0.290742	cum	
5	C37,C41,	2	0.45	0.6	3.658	1.97532	cum	
6	C46	1	0.23	0.6	3.658	0.504804	cum	
B	FROM LEVEL First floor slab Top TO STILT SECOND FLOOR TOP							
1	C1,C7,C8,C10,C12, C13,C14,C15,C16, C17,C18,C19,C20,C21 C30,C31,C33,C34, C39,C40,C45,C53, C54,C55,C56,C57, C58,C59,C60,C61, C62,C69,C70	33	0.3	0.75	3.658	27.16065	cum	
2	C2,C3,C4,C5,C6,C11,C4 3,	8	0.23	0.45	3.658	3.028824	cum	
3	C24,C25,C26,C27, C28,C29,C38,C42,C47,C 48,C4,C50,C51,C52,	14	0.45	0.45	3.658	10.37043	cum	
4	C36,C44,	2	Dia .45		3.658	1.162652	cum	
5	C37,C41,	2	0.45	0.6	3.658	1.97532	cum	
6	C46	1	0.23	0.6	3.658	0.504804	cum	

Quantity sheet 5								
Sr.No.4	CONCRETE FOR COLUMN							
A	Level- From Four floor slab Top to slab Top							
	PERTICULERS	Nos	B	L	H	Qty.	Un	Remark
1	C8,C10,C16,C17,C61	8	0.3	0.75	3.658	6.5844	cum	

2	C62,C76,C78 C2,C3,C4,C5,C6,C11, C35,C43,	7	0.38	0.75	3.658	7.29771	cum	
3	C9,C63,C64,C65,C66 C67,C68	7	0.23	0.45	3.658	2.650221	cum	
4	NO	0	0.45	0.45	3.658	0	cum	
5	NO	0	0.45	0.6	3.658	0	cum	
6	C77	1	0.23	0.6	3.658	0.504804	cum	
					Total	17.03714	cum	
B	FROM LEVEL Thirdfloor slab Top TO STILT FOURTH FLOOR TOP							
G	HEADROOM SLAB TOP TO WATER TANK TOP							
1	C21, C22, C23, C31	4	0.23	0.3	2.6	0.7176	cum	
					TOTAL	26.8904	cum	
5	LIFT WALL- FromFooting Top to M/c Floor Slab Bottom							
	SW 1	2	1.8	0.15	22.3	12.042		2.6+3+(3*4) +4.7= 22.3
	SW 2	2	2	0.15	22.3	13.38		
	Deduct					0		
	Door	-6	1.2	0.15	2.3	-2.484		
					Total	22.938	cum	

Quantity sheet 3

Sr.No.4	CONCRETE FOR COLUMN							
A	Level- From Ground slabTop to First Stlit floor slab Top							
	PERTICULERS	Nos	B	L	H	Qty.	Un	Remark
1	C1,C7,C8,C10,C12, C13,C14,C15,C16, C17,C18,C19,C20,C21 C30,C31,C33,C34, C39,C40,C45,C53, C54,C55,C56,C57, C58,C59,C60,C61, C62,C69,C70	33	0.3	0.75	3.658	27.16065	cum	
2	C2,C3,C4,C5,C6,C11, C35,C43,	8	0.23	0.45	3.658	3.028824	cum	
3	C24,C25,C26,C27, C28,C29,C38,C42,C47, C48,C49,C50,C51, C52,	14	0.45	0.45	3.658	10.37043	cum	
4	C36,C44,	2	Dia .45		3.658	0.290742	cum	
5	C37,C41,	2	0.45	0.6	3.658	1.97532	cum	
6	C46	1	0.23	0.6	3.658	0.504804	cum	
B	FROM LEVEL First floor slab Top TO STILT SECOND FLOOR TOP							
1	C1,C7,C8,C10,C12, C13,C14,C15,C16, C17,C18,C19,C20,C21 C30,C31,C33,C34, C39,C40,C45,C53, C54,C55,C56,C57, C58,C59,C60,C61, C62,C69,C70	33	0.3	0.75	3.658	27.16065	cum	
2	C2,C3,C4,C5,C6,C11,C43,	8	0.23	0.45	3.658	3.028824	cum	

3	C24,C25,C26,C27, C28,C29,C38,C42,C47, C48,C4,C50,C51,C52,	14	0.45	0.45	3.658	10.37043	cum	
4	C36,C44,	2	Dia .45		3.658	1.162652	cum	
5	C37,C41,	2	0.45	0.6	3.658	1.97532	cum	
6	C46	1	0.23	0.6	3.658	0.504804	cum	

Quantity sheet 4

Sr.No.4	CONCRETE FOR COLUMN							
A	Level- From Second floor slab Top to Third Stlit floor slab Top							
	PERTICULERS	Nos	B	L	H	Qty.	Un	Remark
1	C1,C7,C8,C10,C12, C13,C14,C15,C16, C17,C18,C19,C20,C21 C30,C31,C33,C34, C39,C40,C45,C53, C54,C55,C56,C57, C58,C59,C60,C61, C62,C69,C70	33	0.3	0.75	3.658	27.16065	cum	
2	C2,C3,C4,C5,C6,C11, C35,C43,	8	0.38	0.75	3.658	8.34024	cum	
3	C9,C22,C23,C32,C63 C64,C65,C66,C67,C68	10	0.23	0.45	3.658	3.78603	cum	
4	C24,C25,C26,C27, C28,C29,C38,C42,C47, C48,C49,C50,C51,C52,	14	0.45	0.45	3.658	0.290742	cum	
5	C37,C41,	2	0.45	0.6	3.658	0.290742	cum	
6	C46	1	0.23	0.6	3.658	0.290742	cum	
B	FROM LEVEL Thirdfloor slab Top TO STILT FOURTH FLOOR TOP							
1	C1,C7,C8,C10,C12, C13,C14,C15,C16, C17,C18,C19,C20,C21 C30,C31,C33,C34, C39,C40,C45,C53, C54,C55,C56,C57, C58,C59,C60,C61,	33	0.3	0.75	3.658	27.16065	cum	

2	C62,C69,C70	7	0.38	0.75	3.658	7.29771	cum	
3	C2,C3,C4,C5,C6,C11, C35,C43, C9,C22,C23,C32,C63 C64,C65,C66,C67,C68	10	0.23	0.45	3.658	3.78603	cum	
4	C24,C25,C26,C27, C28,C29,C38,C42,C47, C48,C49,C50,C51,C52,	2	0.45	0.45	3.658	1.162652	cum	
5	C37,C41,	2	0.45	0.6	3.658	1.97532	cum	
6	C46	1	0.23	0.6	3.658	0.504804	cum	

Quantity sheet 5

Sr.No.4	CONCRETE FOR COLUMN							
A	Level- From Four floor slab Top to slab Top							
	PERTICULERS	Nos	B	L	H	Qty.	Un	Remark
1	C8,C10,C16,C17,C61 C62,C76,C78	8	0.3	0.75	3.658	6.5844	cum	
2	C2,C3,C4,C5,C6,C11, C35,C43,	7	0.38	0.75	3.658	7.29771	cum	
3	C9,C63,C64,C65,C66 C67,C68	7	0.23	0.45	3.658	2.650221	cum	
4	NO	0	0.45	0.45	3.658	0	cum	
5	NO C77	0	0.45	0.6	3.658	0	cum	
6		1	0.23	0.6	3.658	0.504804	cum	
					Total	17.03714	cum	
B	FROM LEVEL Thirdfloor slab Top TO STILT FOURTH FLOOR TOP							
G	HEADROOM SLAB TOP TO WATER TANK TOP							
1	C21, C22, C23, C31	4	0.23	0.3	2.6	0.7176	cum	
					TOTAL	26.8904	cum	

5	LIFT WALL- FromFooting Top to M/c Floor Slab Bottom							
	SW 1	2	1.8	0.15	22.3	12.042		2.6+3+(3* 4) +4.7= 22.3
	SW 2	2	2	0.15	22.3	13.38		
	Deduct					0		
	Door	-6	1.2	0.15	2.3	-2.484		
					Total	22.938	cum	

Quantity sheet 6

Sr.No.4	CONCRETE FOR COLUMN							
A	Level- From Four floor slab Top to slab Top							
	PERTICULERS	Nos	B	L	H	Qty.	Un	Remark
1	C8,C10,C16,C17,C61 C62,C76,C78	8	0.3	0.75	3.658	6.5844	cum	
2	C2,C3,C4,C5,C6,C11, C35,C43,	7	0.38	0.75	3.658	7.29771	cum	
3	C9,C63,C64,C65,C66 C67,C68	7	0.23	0.45	3.658	2.650221	cum	
4	NO	0	0.45	0.45	3.658	0	cum	
5	NO	0	0.45	0.6	3.658	0	cum	
6	C77	1	0.23	0.6	3.658	0.504804	cum	
					Total	17.03714	cum	
B	FROM LEVEL Thirdfloor slab Top TO STILT FOURTH FLOOR TOP							
G	HEADROOM SLAB TOP TO WATER TANK TOP							
1	C21, C22, C23, C31	4	0.23	0.3	2.6	0.7176	cum	
					TOTAL	26.8904	cum	

5	LIFT WALL- FromFooting Top to M/c Floor Slab Bottom							
	SW 1	2	1.8	0.15	22.3	12.042		2.6+3+(3*4) +4.7= 22.3
	SW 2	2	2	0.15	22.3	13.38		
	Deduct					0		
	Door	-6	1.2	0.15	2.3	-2.484		
					Total	22.938	cum	
					Net Total For Columns	285.368	cum	

QUANTITY SHEET 4								
Sr.No.	.							
6	CONCRETE FOR RCC BEAMS							
	Perticulers	Nos	L	B	H	Qty.	Un	Remarks
A	Plinth beams							
1	B1,B7,B13,B22, B25	5	5.512	0.3	0.6	4.96	cum	
2	B2,B8, B14	3	8.267	0.3	0.6	4.46	cum	
3	B3,B9, B15	3	5.409	0.3	0.6	2.92	cum	
4	B4,B10, B16	3	5.384	0.48	0.48	3.72	cum	
5	B5,B11	2	3.925	0.3	0.6	1.41	cum	
6	B6,B12	2	4.09	0.3	0.6	1.47	cum	

7	B17	1	7.6	0.3	0.6	1.37	cum	
8	B19,B117	2	1.853	0.3	0.6	0.67	cum	
9	B20,B24	2	3.807	0.3	0.6	1.37	cum	
10	B21,B23, B32	3	5.004	0.3	0.6	2.70	cum	
11	B26,B118	2	2.603	0.3	0.6	0.94	cum	
12	B27,B28,B29,B30,B31,B120,B121,B122,B123	9	3.81	0.3	0.48	4.94	cum	
13	B33,B34,B37,B45,B46, B47	6	2.768	0.3	0.6	2.99	cum	
14	B35,B36,B38,B39,B47, B48,B50,B51,B52,B53,	10	4.901	0.3	0.6	8.82	cum	
15	B40	1	9	0.3	0.6	1.62	cum	
16	B44,B43	2	2.185	0.3	0.38	0.50	cum	
17	B54,B62,B70,B76,B81, B82,B87,B90,B107	9	4.191	0.3	0.75	8.49	cum	
18	B55,B56,B64,B73,B95, B102,B108,B116	8	3.633	0.3	0.6	5.23	cum	
19	B57,B65	2	5.587	0.3	0.6	2.01	cum	
20	B59,B112	2	3.048	0.45	0.45	1.23	cum	
21	B60	1	4.648	0.3	0.75	1.05	cum	
22	B61,B69,B72,B78,B80, B84,B86,B92,B99,B114	20	3.81	0.3	0.6	13.72	cum	

23	B67,B71,B77,B79,B83, B85,B88,B91,B98,B113	20	3.81	0.3	0.6	13.72	cum	
24	B79,B74,B75,B96,B103, B104,B110	7	3.886	0.3	0.38	3.10	cum	
25	B93,B100,B105	3	1.692	0.3	0.6	0.91	cum	
26	B58,B63,B66,B109,B111	5	2.414	0.3	0.6	2.17	cum	
27	B110,B115	2	6.679	0.3	0.75	3.01	cum	
					TOTAL	99.50	cum	
B	Ground Floor Beab							
1	B1,B7,B13,B22, B25	5	5.512	0.3	0.6	4.96	cum	
2	B2,B8, B14	3	8.267	0.3	0.6	4.46	cum	
3	B3,B9, B15	3	5.409	0.3	0.6	2.92	cum	
4	B4,B10, B16	3	5.384	0.48	0.48	3.72	cum	
5	B5,B11	2	3.925	0.3	0.6	1.41	cum	
6	B6,B12	2	4.09	0.3	0.6	1.47	cum	
7	B17	1	7.6	0.3	0.6	1.37	cum	
8	B19,B117	2	1.853	0.3	0.6	0.67	cum	
9	B20,B24	2	3.807	0.3	0.6	1.37	cum	
10	B21,B23, B32	3	5.004	0.3	0.6	2.70	cum	
11	B26,B118	2	2.603	0.3	0.6	0.94	cum	
12	B27,B28,B29,B30,B31,B120,B121,B122,B123	9	3.81	0.3	0.48	4.94	cum	
13	B33,B34,B37,B45,B46, B47	6	2.768	0.3	0.6	2.99	cum	

14	B35,B36,B38,B39,B47, B48,B50,B51,B52,B53,	10	4.901	0.3	0.6	8.82	cum	
15	B40	1	9	0.3	0.6	1.62	cum	
16	B44,B43	2	2.185	0.3	0.38	0.50	cum	
17	B54,B62,B70,B76,B81, B82,B87,B90,B107	9	4.191	0.3	0.75	8.49	cum	
18	B55,B56,B64,B73,B95, B102,B108,B116	8	3.633	0.3	0.6	5.23	cum	
19	B57,B65	2	5.587	0.3	0.6	2.01	cum	

20	B59,B112	2	3.048	0.45	0.45	1.23	cum	
21	B60	1	4.648	0.3	0.75	1.05	cum	
22	B61,B69,B72,B78,B80, B84,B86,B92,B99,B114	20	3.81	0.3	0.6	13.72	cum	
23	B67,B71,B77,B79,B83, B85,B88,B91,B98,B113							
24	B79,B74,B75,B96,B103, B104,B110	7	3.886	0.3	0.38	3.10	cum	
25	B93,B100,B105	3	1.692	0.3	0.6	0.91	cum	
26	B58,B63,B66,B109,B111	5	2.414	0.3	0.6	2.17	cum	
27	B110,B115	2	6.679	0.3	0.75	3.01	cum	
					TOTAL	85.78	cum	
	FOR FIRST FLOOR					85.78	cum	
	FOR SECOND FLOOR					85.78	cum	

	FOR THIRD FLOOR					85.78	cum	
	FOR FOURTH FLOOR					85.78	cum	
					TOTAL	528.42	cum	
	HEADROOM BEAM AND WATER TANK BEAM							
		HB-1	1	4.77	0.3	0.38	0.54	cum
		HB-2	1	4.77	0.3	0.38	0.54	cum
		HB-3	1	2.14	0.3	0.38	0.24	cum
		HB-4	1	2.14	0.3	0.38	0.24	cum
		WTB1	1	5.6	0.3	0.6	1.01	cum
		WTB2	1	5.6	0.3	0.6	1.01	cum
		WTB3	1	4.2	0.3	0.6	0.76	cum
		WTB4	1	4.2	0.3	0.6	0.76	cum
						Total	5.10	cum
					NET TOTAL		533.52	cum

Quntity Sheet 8								
Sr.No.	.							
	Particulars	Nos	L	B	H	Qty.	Un	Remarks
11	SHEAR WALL							
A	BASE SLAB							
	S-2	1	2	1.5	0.1	0.30	cum	
B	TOP SLAB							
	S-3	1	2	1.5	0.1	0.30	cum	
C	Side Wall parking floor							
	SW-1	1	2.3	0.15	2.7	0.93	cum	
	SW-2,SW-3	2	1.8	0.15	2.7	1.46	cum	
D	side Wall First floor							
	SW-1	1	2.3	0.15	3	1.04	cum	
	SW-2,SW-3	2	1.8	0.15	3	1.62	cum	
E	Side wall Second Floor							
	SW-1	1	2.3	0.15	3	1.04	cum	
	SW-2,SW-3	2	1.8	0.15	3	1.62	cum	
F	Side wall third floor							
	SW-1	1	2.3	0.15	3	1.04	cum	
	SW-2,SW-3	2	1.8	0.15	3	1.62	cum	
G	Side wall fourth floor							
	SW-1	1	2.3	0.15	3	1.04	cum	
	SW-2,SW-3	2	1.8	0.15	3	1.62	cum	
H	Bottom beam							
	LB-1,LB-2	2	2.3	0.23	0.3	0.32	cum	
	LB-3,LB-4	2	1.5	0.23	0.3	0.21	cum	
I	TOP BEAM							
	LB-5, LB-6	2	2.3	0.23	0.3	0.32	cum	
	LB-7, LB-8	2	1.5	0.23	0.3	0.21	cum	
					TOTAL	16.28	cum	

Quantity sheet for slabs									
Sr. No.	GROUP	Perticular	Nos	L	B	H	Qty.	Un	Remarks
CONCRETE FOR RCC SLAB									
1	A	S27	1	2.728	11.492	0.15	4.702526	cum	
2 3 4 5 6 7	B	S24,S25, S28,S29, S30,S32, S33,S34, S39,S40	10	2.66	3.911	0.15	15.60489	cum	
8	C	S41,S42, S43,S44, S45	5	4.191	4.191	0.15	13.17336	cum	
9	D	S9,S10, S11	3	2.57	2.998	0.15	3.467187	cum	
10	E	S22,S23	2	2.185	3.453	0.15	2.263442	cum	
11	F	S26	1	5.486	5.486	0.15	4.514429	cum	
12	G	S35,S36	2	2.05	2.414	0.15	1.48461	cum	
13	H	S37,S38	2	2.05	2.05	0.15	1.26075	cum	
14	I	S31	1	3.111	5.529	0.15	2.580108	cum	
15	J	S1	1	2.972	5.529	0.15	2.464828	cum	
16	K	S12,S13, S14,S15,S 16,S17,S1 8,S19,S20 ,S8,S3,S2, S4,S5,S6,S 7,S8,S32, S33,	19	2.743	3.81	0.15	29.78487	cum	
17	L	S21,S34	2	2.972	32.009	0.15	28.53922	cum	
					TOTAL QUANTITY (m3)		109.8402	cum	
FOR FIRST FLOOR							109.8402	cum	
SECOND FLOOR							109.8402	cum	
THIRD FLOOR							109.8402	cum	
FOURTH FLOOR							109.8402	cum	
				NET TOTAL(m3)			549.2011	cum	

1		Vertical Bars 1 (Column Bars)	12	48	4.287	0.888889	182.912
2		Vertical Bars 2	12	122	4.287	0.888889	464.9013333
3		Master Links	8	412.944	2.71	0.405	453.2266872
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total(Kg)	**1279.974383**
Sr. No.	**Level**	**Description**	**Diameter**	**Nos.**	**L(m)**	**Wt./m**	**Qty.**
	Level 4 To Level 5		3.687				
1		Vertical Bars 1 (Column Bars)	12	48	4.287	0.888889	182.912
2		Vertical Bars 2	12	122	4.287	0.888889	464.9013333
3		Master Links	8	412.944	2.71	0.405	453.2266872
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total(Kg)	**1279.974383**
Sr. No.	**Level**	**Description**	**Diameter**	**Nos.**	**L(m)**	**Wt./m**	**Qty.**
	Level 5To Level 6		3.687				
1		Vertical Bars 1 (Column Bars)	12	48	4.287	0.888889	182.912
2		Vertical Bars 2	12	122	4.287	0.888889	464.9013333
3		Master Links	8	412.944	2.71	0.405	453.2266872
4		Other links	8	892.552	0.495	0.405	178.9343622
						Total(Kg)	**1279.974383**
					NET TOTAL (Kg)		**8450.66047**

BRICKWORK ESTIMATION SHEETS :

Sr. No.	Item Description	No.	Length (m)	Width (m)	Height (m)	Quantity	Unit
1	Brickwork masonary in superstructure						
	For 305 mm thick cavity wall brick masonary C.L. =61.86	1	61.87	0.20	3.5	44.17	cu m
	Deduction						
	column	-31	0.38	0.75	3.5	-30.92	cu m
	window W1	-4	1.52	0.20	1.52	-1.89	cu m
	window W2	-14	1.21	0.20	1.52	-5.25	cu m
	window W3	-7	0.91	0.20	1.52	-1.98	cu m
	window W6	-2	1.52	0.20	1.82	-1.13	cu m
	Door D6	-1	3.04	0.20	2.74	-1.70	cu m
	Door D7	-1	1.89	0.20	2.43	-0.94	cu m
		Total quantity 305 mm thick wall				0.37	cu m
	For 102 mm thick wall brick masonary						
	long wall 1	5	5.37	0.10	3.5	9.59	cu m
	long wall 2	1	26.45	0.10	3.5	9.44	cu m
	long wall 3	1	22.48	0.10	3.5	8.02	cu m
	short wall 1	7	4.26	0.10	3.5	10.65	cu m
	short wall 2	1	3.99	0.10	3.5	1.42	cu m
	short wall 3	1	5.51	0.10	3.5	1.97	cu m
	short wall 4	2	1.82	0.10	3.5	1.30	cu m
	short wall 5	4	7.92	0.10	3.5	11.31	cu m
	short wall 6	2	1.46	0.10	3.5	1.04	cu m

	short wall 7	1	5.66	0.10	3.5	2.02	cu m
	washroom wall 1	2	3.31	0.10	2.43	1.64	cu m
	washroom wall 2	2	1.72	0.10	2.43	0.85	cu m
	washroom wall 3	3	1.21	0.10	2.43	0.90	cu m
	washroom wall 4	2	1.15	0.10	2.43	0.57	cu m
	washroom wall 5	1	0.71	0.10	2.43	0.18	cu m
	washroom wall 6	1	2.39	0.10	2.43	0.59	cu m
	washroom wall 7	4	0.97	0.10	2.43	0.96	cu m
	washroom wall 8	7	1.39	0.10	2.43	2.41	cu m
	Deduction						
	column	-23	0.30	0.75	3.5	-18.11	cu m
	window W1	-4	1.52	0.10	1.524	-0.95	cu m
	window W2	-5	1.22	0.10	1.524	-0.95	cu m
	Door D1	-12	1.22	0.10	2.438	-3.64	cu m
	Door D2	-2	1.52	0.10	2.438	-0.76	cu m
	Door D3	-2	1.07	0.10	2.438	-0.53	cu m
	Door D4	-7	0.91	0.10	1.828	-1.19	cu m
	Door D5	-7	0.76	0.10	1.828	-0.99	cu m
		Total quantity 102 mm thick wall				71.96	cu m

2	Inside plaster						
	Inside rooms (100mm skirting reduction)						
	long wall 1	2	31.60		3.4	214.85	sq m

	long wall 2	4	5.27		3.4	71.67	sq m
	long wall 3	2	24.81		3.4	168.73	sq m
	short wall 1	1	56.40		3.4	191.76	sq m
	short wall 2	1	19.00		3.4	64.60	sq m
	short wall 3	8	4.26		3.4	115.87	sq m
	washroom 1	1	64.06		3.4	217.80	sq m
	washroom 2	1	39.57		3.4	134.54	sq m
	washroom 3	1	9.80		3.4	33.32	sq m
	service room	1	7.28		3.4	24.75	sq m
	open space	1	131.24		3.4	446.22	sq m
	Deduction						
	window W 1	-4	1.52		1.524	-9.29	sq m
	window W 2	-9.5	1.22		1.524	-17.65	sq m
	window W 3	-3.5	0.91		1.524	-4.88	sq m
	window W 6	-1	1.52		1.828	-2.79	sq m
	Door D1	-12	1.22		2.438	-35.66	sq m
	Door D2	-2	1.52		2.438	-7.43	sq m
	Door D3	-1	1.07		2.438	-2.60	sq m
	Door D4	-1	0.91		1.828	-1.67	sq m
	Door D5	-6.5	0.76		1.828	-9.04	sq m
	Door D6	-1	3.05		2.743	-8.36	sq m
	Door D7	-1	1.90		2.438	-4.64	sq m
	Addition						
	D2 soffit	2	1.52	0.10		0.31	sq m

	D2 jamb	4		0.10	2.438	0.99	sq m
	D6 soffit	1	3.05	0.10		0.31	sq m
	D6 jamb	2		0.10	2.743	0.56	sq m
	D7 soofit	1	1.90	0.10		0.19	sq m
	D7 jamb	2		0.10	2.438	0.50	sq m
		Total quantity inside plaster				1582.97	sq m
3	Outside plaster						
	Front side	1	29.87		3.5	104.55	sq m
	Deduction						
	Door D6	-1	3.05		2.743	-8.36	sq m
	window W6	-1	1.52		1.828	-2.79	sq m
	Addition						
	Door D6 soffit	1	3.05	0.31		0.93	sq m
	Door D6 jamb	2		0.31	2.743	1.67	sq m
	Back side	1	29.87		3.5	104.55	sq m
	Deduction						
	window W1	-1	1.52		1.524	-2.32	sq m
	window W3	-2.5	0.91		1.524	-3.48	sq m
	Left side	1	32.61		3.5	114.14	sq m
	Deduction						
	Door D7	1	1.90		2.438	4.64	sq m

	Addition						
	Door D7 soffit	1	1.90	0.31		0.58	sq m
	Door D7 jamb	2		0.31	2.438	1.49	sq m
	window W2	-4	1.22		1.524	-7.43	sq m
	window W3	-1	0.91		1.524	-1.39	sq m
	Right side	1	32.61		3.5	114.14	sq m
	Deduction						
	Window W1	-1	1.52		1.524	-2.32	sq m
	Window W2	-3	1.22		1.524	-5.57	sq m
		Total quantity outside plaster				413.00	sq m
4	Ceiling plaster						
	Inside rooms						
	type 1	1	5.27	2.98		15.70	sq m
	type 2	1	7.98	7.92		63.20	sq m
	type 3	1	5.21	7.86		40.95	sq m
	type 4	1	5.33	7.92		42.21	sq m
	type 5	1	5.27	5.51		29.04	sq m
	type 6	1	5.27	3.99		21.03	sq m
	type 7	1	4.20	4.26		17.89	sq m
	type 8	3	4.15	4.26		53.04	sq m
	washroom 1	2	3.38	5.66		38.26	sq m
	washroom 2	2	2.56	4.26		21.81	sq m
	washroom 3	1	3.08	1.82		5.61	sq m
	service room	1	1.82	1.82		3.31	sq m

	corridor space 1	1	26.64	4.15		110.64	sq m
	corridor spce 2	1	26.64	4.28		114.02	sq m
	corridor space 3	1	4.36	8.53		37.17	sq m
	corridor space 4	1	6.44	8.53		54.99	sq m
	corridor space 5	1	1.91	4.36		8.31	sq m
	stair case area	1	2.44	5.37		13.10	sq m
		Total quantity ceiling plaster				690.28	sq m
		Total plaster quantity				2735.78	sq m
5	In side paint					0.00	
	Inside rooms						
	long wall 1	2	31.60		3.4	214.85	sq m
	long wall 2	4	5.27		3.4	71.67	sq m
	long wall 3	2	24.81		3.4	168.73	sq m
	short wall 1	1	56.40		3.4	191.76	sq m
	short wall 2	1	19.00		3.4	64.60	sq m
	short wall 3	8	4.26		3.4	115.87	sq m
	washroom 1	1	64.06		3.4	217.80	sq m
	washroom 2	1	39.57		3.4	134.54	sq m
	washroom 3	1	9.80		3.4	33.32	sq m
	service room	1	7.28		3.4	24.75	sq m
	open space	1	131.24		3.4	446.22	sq m
	Deduction						
	window W1	-4	1.52		1.524	-9.29	sq m

	window W2	-9.5	1.22		1.524	-17.65	sq m
	window W3	-3.5	0.91		1.524	-4.88	sq m
	window W6	-1	1.52		1.828	-2.79	sq m
	Door D1	-12	1.22		2.438	-35.66	sq m
	Door D2	-2	1.52		2.438	-7.43	sq m
	Door D3	-1	1.07		2.438	-2.60	sq m
	Door D4	-1	0.91		1.828	-1.67	sq m
	Door D5	-6.5	0.76		1.828	-9.04	sq m
	Door D6	-1	3.05		2.743	-8.36	sq m
	Door D7	-1	1.90		2.438	-4.64	sq m
6	Outside paint						
	Front side	1	29.87		3.5	104.55	sq m
	Deduction						
	Door D6	-1	3.05		2.743	-8.36	sq m
	window W6	-1	1.52		1.828	-2.79	sq m
	Addition						
	Door D6 soffit	1	3.05	0.31		0.93	sq m
	Door D6 jamb	2		0.31	2.743	1.67	sq m
	Back side	1	29.87		3.5	104.55	sq m
	Deduction						
	window W1	-1	1.52		1.524	-2.32	sq m
	window W3	-2.5	0.91		1.524	-3.48	sq m
	Left side	1	32.61		3.5	114.14	sq m

	Deduction						
	Door D7	1	1.90		2.438	4.64	sq m
	Addition						
	Door D7 soffit	1	1.90	0.31		0.58	sq m
	Door D7 jamb	2		0.31	2.438	1.49	sq m
	window W2	-4	1.22		1.524	-7.43	sq m
	window W3	-1	0.91		1.524	-1.39	sq m
	Right side	1	32.61		3.5	114.14	sq m
	Deduction						
	Window W1	-1	1.52		1.524	-2.32	sq m
	Window W2	-3	1.22		1.524	-5.57	sq m
7	ceiling paint						
	Inside rooms						
	type 1	1	5.27	2.98		15.70	sq m
	type 2	1	7.98	7.92		63.20	sq m
	type 3	1	5.21	7.86		40.95	sq m
	type 4	1	5.33	7.92		42.21	sq m
	type 5	1	5.27	5.51		29.04	sq m
	type 6	1	5.27	3.99		21.03	sq m
	type 7	1	4.20	4.26		17.89	sq m
	type 8	3	4.15	4.26		53.04	sq m
	washroom 1	2	3.38	5.66		38.26	sq m
	washroom 2	2	2.56	4.26		21.81	sq m

	washroom 3	1	3.08	1.82		5.61	sq m
	service room	1	1.82	1.82		3.31	sq m
	corridor space 1	1	26.64	4.15		110.64	sq m
	corridor spce 2	1	26.64	4.28		114.02	sq m
	corridor space 3	1	4.36	8.53		37.17	sq m
	corridor space 4	1	6.44	8.53		54.99	sq m
	corridor space 5	1	1.91	4.36		8.31	sq m
	stair case area	1	2.44	5.37		13.10	sq m
		Total paint quantity				2683.39	sq m
8	Flooring						
	Inside rooms						
	type 1	1	5.27	2.98		15.70	sq m
	type 2	1	7.98	7.92		63.20	sq m
	type 3	1	5.21	7.86		40.95	sq m
	type 4	1	5.33	7.92		42.21	sq m
	type 5	1	5.27	5.51		29.04	sq m
	type 6	1	5.27	3.99		21.03	sq m
	type 7	1	4.20	4.26		17.89	sq m
	type 8	3	4.15	4.26		53.04	sq m
	washroom 1	2	3.38	5.66		38.26	sq m
	washroom 2	2	2.56	4.26		21.81	sq m
	washroom 3	1	3.08	1.82		5.61	sq m
	service room	1	1.82	1.82		3.31	sq m
	corridor space 1	1	26.64	4.15		110.64	sq m
	corridor spce 2	1	26.64	4.28		114.02	sq m

	corridor space 3	1	4.36	8.53		37.17	sq m
	corridor space 4	1	6.44	8.53		54.99	sq m
	corridor space 5	1	1.91	4.36		8.31	sq m
	stair case area	1	2.44	5.37		13.10	sq m
	skirting addition						
	Inside rooms						
	long wall 1	2	31.60		0.15	9.48	sq m
	long wall 2	4	5.27		0.15	3.16	sq m
	long wall 3	2	24.81		0.15	7.44	sq m
	short wall 1	1	56.40		0.15	8.46	sq m
	short wall 2	1	19.00		0.15	2.85	sq m
	short wall 3	8	4.26		0.15	5.11	sq m
	washroom 1	1	64.06		0.15	9.61	sq m
	washroom 2	1	39.57		0.15	5.94	sq m
	washroom 3	1	9.80		0.15	1.47	sq m
	service room	1	7.28		0.15	1.09	sq m
	open space	1	131.24		0.15	19.69	sq m
			Total flooring quantity			764.58	sq m
	FOR SECOND FLOOR						
	BRICK WORK FOR 305MM WALL					0.37	sq m
	1O2mm WALL					79.96	sq m
	Inside plaster					1582.97	sq m
	out side Plaster					413	sq m
	Ceiling Plaster					690.18	sq m

	Total plaster					2735.78	sq m
	Total paint					2683.39	sq m
	Total flooring					764.58	sq m
	FOR THIRD FLOOR						
	BRICK WORK FOR 305MM WALL					0.37	sq m
	1O2mm WALL					79.96	sq m
	Inside plaster					1582.97	sq m
	out side Plaster					413	sq m
	Ceiling Plaster					690.18	sq m
	Total plaster					2735.78	sq m
	Total paint					2683.39	sq m
	Total flooring					764.58	sq m
	FOR FOURTH FLOOR					0	
	BRICK WORK FOR 305MM WALL					0.37	sq m
	1O2mm WALL					79.96	sq m
	Inside plaster					1582.97	sq m
	out side Plaster					413	sq m
	Ceiling Plaster					690.18	sq m
	Total plaster					2735.78	sq m
	Total paint					2683.39	sq m
	Total flooring					764.58	sq m
	FOR TOP FLOOR					0	
	BRICK WORK FOR 305MM WALL					0.37	sq m
	1O2mm WALL					79.96	sq m
	Inside plaster					1582.97	sq m

	out side Plaster					413	sq m
	Ceiling Plaster					690.18	sq m
	Total plaster					2735.78	sq m
	Total paint					2683.39	sq m
	Total flooring					764.58	sq m

6 CONCLUSION

The rapid development of information technology has brought several innovations to the field of Civil Engineering. In this project advanced concrete design software STAAD RCDC was used for the design of footing and slab which is otherwise not possible in STAAD.Pro V8i SS6. STAAD RCDC also provides the reinforcement detail diagrams as well as schedules which makes the work very simpler and efficient.

In this project, the walls of the lift are designed as shear walls. The creating of the panels or surface for shear wall and assigning of the surface properties was done in STAAD.Pro whereas the design of shear wall and reinforcement drawings was done in STAAD RCDC.

This project is consists of analysis and design of student activity center building with all possible cases of the loadings using STAAD.Pro. Deflection of various members can be checked under the given loading combinations. Further in case of rectification it is simple to change the values at the place where errors occurred and the obtained results are generated in the output. STAAD.Pro software provides us a fast, efficient, easy to use and accurate platform for analyzing and designing structures.

AutoCAD is a computer-aided software drafting program. It is used for a number of applications like creating architectural drawing , structural drawing for building. AutoCAD made the drafting process easy, fast and efficient.

7 REFERENCES

1.) IS 456:2000

2.) IS 13920:1993 is considered very important as the ductile detailing gives the amount of reinforcement required and the alignment of bars. It gives the ductile detailing of shear walls as per clause 9,where

9.1: gives general requirement

9.2: shear strength

9.3: gives flexural strength

9.6: gives opening in shear walls

3.) IS 1893: criteria of earthquake resistant buildings part 3 page 23,clause 4.2 gives the estimation of earthquake loads .

4.) [(1) (PDF) Earthquake-Resistant Design of Structures, Second Edition [Shashikant K. Duggal] | ᑖᖇᑎᗷᒧ ᒫᐃᐟᐸᓈ - Academia.edu] Earthquake-Resistant Design of Structures Second Edition Shashikant K. Duggal

5.) RCC design by B.C. Punmia

6.) Estimation and costing in civil engineering by B.N. Dutta