# PLANNING, DESIGNING, ESTIMATION & SCHEDULING OF AIKTC HOSTEL BUILDING

Submitted in partial fulfilment of the requirements

for the degree of

**Bachelor of Engineering**

By

SHAIKH SAQUIB ISRAR AHMED (14DCES73)

BAQI TABISH UMAR JAVED (13CES60)

SHAIKH AB.AHAD IZAZ (15DCES82)

SAYED FAHAD FARID (13CES45)

Under the guidance of

**Prof. Prathamesh P. Gawade**

**Department of Civil Engineering**

School of Engineering and Technology

**Anjuman-I-Islam's Kalsekar Technical Campus**

New Panvel, Navi Mumbai-410206

**Academic year 2017 -- 2018**

A Project Report on

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# CERTIFICATE

This is to certify that the project entitled **"PLANNING.DESIGNING.ESTIMATING AND SCHEDULING OF AIKTC HOSTEL BUILDING"**is a bonafide work of **SHAIKH SAQUIB, SAYED FAHAD, BAQI TABISH, SHAIKH ABDUL AHAD** submitted to the University of Mumbai in partial fulfilment of the requirement for the award of the degree of "Undergraduate" in "Civil Engineering"

**Prof. Prathamesh P. Gawade**
(Supervisor)

**Dr. R. B. Magar**
(Head of Department)

**Dr. Abdul RazakHonnutagi**
(Director, AIKTC)

# APPROVAL SHEET

This dissertation report entitled **"PLANNING.DESIGNING.ESTIMATING AND SCHEDULING OF AIKTC HOSTEL BUILDING"** by **MR. SHAIKH SAQUIB (14DCES73), MR. SAYED FAHAD (13CES45), MR. BAQI TABISH (13CES60), MR. SHAIKH ABDUL AHAD (15DCES82)** is approved for the degree of "Civil Engineering"

Examiners

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Supervisors:

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Date:

Place: Panvel

# DECLARATION

We declare that this written submission represents my ideas in our own words and where others ideas or words have been included we have adequately cited and referenced the original sources. We also declare that, we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Place: Panvel

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We would also like to express our sincere gratitude to Prof. Shivaji Saravade for guiding us in the designing part of our dissertation work. We would like to thank my colleagues and friends for their valuable and timely assistance and their guidance.

# ABSTRACT

The following project deals with the planning, analysis, designing, quantity and cost estimation and scheduling of a 4-storey Hostel building using advance Civil Engineering softwares like AutoCAD, ETABS, Primavera P17 and Microsoft Excel Spreadsheet. Project starts with planning of the building using AutoCAD. Then analysis of building is carried out using ETABS and Microsoft Excel Spreadsheet. Also detailing of reinforcement is done in ETABS. Then for quantity and cost estimation Microsoft Excel Spreadsheet. Further scheduling and monitoring was done on the software Primavera P17.

# CONTENTS

# LIST OF FIGURES

# LIST OF TABLES

ANJUMAN - I - ISLAM'S KALSEKAR TECHNICAL CAMPUS, NEW PANVEL
ENGINEERING & TECHNOLOGY ★ ARCHITECTURE ★ PHARMACY
AIKTC
NAVI MUMBAI - INDIA

# Chapter 1

# Introduction

## 1.1 GENERAL

AIKTC is a constituent college within the University of Mumbai (MU) due to good reputation, AIKTC experienced a tremendous growth over the period till now resulting in introduction of new facilities hence an increased intake. In view of this, there has been an increased in demand for accommodation on campus. AIKTC lacks accommodation facilities for its students. In an endeavour to maintain the increased number of intake, we introduced non-residential system whereby only few students are accommodated on campus. For instance, College of has a total of 4373 students of which 450 and 50 staff are accommodated on campus.

For planning purpose AutoCAD software is used and by referring bye-laws of hostel, planning is done. AutoCAD is a commercial software application for 2D and 3D computer-aided design (CAD) and drafting available since 1982 as a desktop application and since 2010 as a mobile, web- and cloud-based app marketed as AutoCAD 360.

AutoCAD was derived from a program begun in 1977 and released in 1979 called Interact CAD, also referred to in early Autodesk documents as MicroCAD, which was written prior to

Autodesk's (then Marinchip Software Partners) formation by Autodesk cofounder Mike Riddle.

For analysis purpose ETABS software is recommended. The innovative and revolutionary new ETABS is ultimate integrated software package for the structural analysis and design of buildings. Incorporating 40 years of continuous research and development this latest ETABS offered unmatched 3D object based modelling and visualization tools, blazingly fast linear and non linear analytical power, sophisticated and comprehensive design capabilities for a wide range of materials, and insightful graphic displays, reports and schematic drawings that allow users to quickly and easily decipher and understand analysis and design results. From the start of the design conception through the production of schematic drawings, ETABS integrates every aspect of the engineering design process. Creation of models has never been easier and intuitive drawing command allow for the rapid generation of floor and elevating framing. CAD drawings can be converted directly into ETABS models or used as templates onto which ETABS objects may be overlaid.

Design of steel and concrete frames (with automated optimization), composite beams, composite columns, steel joints, concrete, and masonry shear walls is included, as is the capacity check for steel connections and base plates. Models may be realistically rendered, and all results can be shown directly on the structure. Comprehensive and customizable reports are available for all analysis and design output, and schematic construction drawings of framing plans, schedules, details, and cross sections may be generated for concrete and steel structures. ETABS provides an unequalled suite of tools for structural engineers designing buildings, whether they are working on one-storey industrial structures or the tallest commercial high rises. Immensely capable yet easy-to-use, has been the hallmark of ETABS since its introduction decades ago, and this latest release continues that tradition by providing engineers with the technologically-advanced, yet intuitive, software they require to be their most productive.

Microsoft Excel is a spreadsheet developed by Microsoft for Windows, macOS, Android and iOS. It features calculations, graphing tools, pivot tools, pivot tables, and a macro programming language called Visual Basic for Applications. It has been a very widely applied spreadsheet for these platforms, especially since version 5 in 1993.

Microsoft Excel has the basic features of all spreadsheets, using a grid of cells arranged in numbers rows and letter-named columns to organize data manipulations like arithmetic operations. It has a battery of supplied functions to answer statistical, engineering and financial needs. In addition, it can display data as line graphs, histograms and charts, and with the limited three-dimensional display. It allows sectioning of data to view its dependencies on various factors for different perspectives. In a more elaborate realization, an Excel application can automatically poll external databases and measuring instruments using an update schedule, analyze the results, make a Word report or PowerPoint slide show, and e-mail these presentations on a regular basis to a list of participations.

Primavera Systems, Inc. was a private company providing Project Portfolio Management (PPM) software to help project-intensive organizations identify, prioritize, and select project investments and plan, manage, and control projects and project portfolios of all sizes. On January 1, 2009 Oracle Corporation took legal ownership of Primavera. Primavera Systems, Inc. Was founded on May 1, 1983 by Joel Koppelman and Dick Faris. It traded as a private company based in Pennsylvania (USA), developing software for the Project Portfolio Management market. To help expand its product capabilities, Primavera acquired Eagle Ray Software Systems in 1999, Evolve Technologies (a professional services automation vendor) in 2003, Pro Sight (an IT portfolio management software vendor) in 2006, and, in the same year, Pert master (a project risk management software vendor).

The traditional approach for scheduling and progress monitoring techniques likes Bar Charts, CPM, PERT etc. are still being used by the project managers for planning. These are a serious disadvantage in the decision making purpose, as they fail to provide the necessary spatial aspects and data of the construction project. Thus there is a gradual increase in the pressure on the project managers to shorten the delivery time and decrease the costs involved in the process, without a decrease in the quality of the product. The current day demand of construction industry requires a highly accurate planning, scheduling and management of the process of the project which can enable the overall optimization of the cost, time and resources (Dr Gopal M. N. et. al. 2011). These increases in the pressure on the project managers and the current day demand of construction industry have resulted in an increase in the number of commercially available computerized planning and scheduling tools. With the advances in the field of information technologies, construction industry has started taking advantages of some of the developed tools.

Primavera - Project Management Effective project control reaps many benefits. It allows you to keep a close eye on possible problems before they become critical. It lets the project team and senior management view cost and scheduling timeframes based on the reality of the schedule.

Primavera is an appropriate technology for managing construction projects and can improve the construction planning and design efficiency by integrating and thematic information in a single environment. It provides capabilities to solve problems, involving creation and management of data, integration of information, visualization and cost estimation to which most of the construction management software is lacking. In construction management, Primavera leads to the improvement in collective decision making among planners, designers and contractors. Primavera can provide a wide range of information to construction industry with a mechanism for rapid retrieval and manipulation capabilities.

## 1.1 AIM OF THE WORK

To learn civil engineering software like AutoCAD, ETABS and Primavera and apply the same for Designing, Scheduling and Monitoring of a Hostel Building.

## 1.2 OBJECTIVE OF THE WORK

The main objective is to learn Autodesk software AutoCAD, CSI software ETABS and PM software Primavera (P17), and apply the knowledge gained from these software in designing, estimating the cost and prepare a project schedule for the construction of a Hostel Building.
Pursuant to this, following objectives are proposed for this piece of work:
To improve Poor quality of accommodation

To provide better sanitation system

Convenient studying place

## 1.3 SCOPE OF THE WORK

- Based on the aim and objective mentioned in the preceding section, the scope of the present investigation is outlined as under:

By doing this project we will gain some knowledge about the application of civil engineering software such as AutoCAD, ETABS and Primavera.

We also aim to create the best learning and training environment for students by improving their accommodation which will in turn contribute to enhance the quality of education.

## 1.4 EXPECTED OUTCOME

Know how to draw and read a plan of any structure on AutoCAD software

Know how to design various components of a structure such as beams, columns and slabs on ETABS

Know how to prepare a project schedule using Primavera software

To prepare a report on the basis of the work done.

# Chapter 2

# Literature Review

## 2.1 AutoCAD

Azidah Abu Ziden *et. al.* (2012), studied the effectiveness of AutoCAD software in learning of Engineering Drawing to enhance students understanding. It concludes that AutoCAD increases the performance of high and medium level students group and gave a positive impact to study. Effective use of the software proved to be useful based on the data obtained.

Asmaa G. Salih *et. al.*(2014), presents the significant revolution with computers usage in civil engineering business and construction process has been presented. AutoCAD software is an extremely powerful tool and can be adapted to specific needs in order to serve the intended purpose of any project. Civil engineering professionals use this software for variety of infrastructure projects like: land development, transportation, water projects and road design.

Amol A. Metkari *et. al.* (2015), proposed Ladies Hostel building for Rajarambapu Institute of Technology College, Rajarambapu. In that case study, building project, included real life example of BIM and AutoCAD uses and benefits. Also in the case study, a prototype building project, examined the 2D, 3D, 4D and 5D model by using AutoCAD and BIM tools.

Prakash Chandar *et. al.* (2015), research on Integrating Building Information Modelling (BIM) and Construction Project Scheduling to Result in 4D Planning for Construction Project, the conventional 2D drawings are prepared in AutoCAD 2010. The 2D drawing are converted into 3D model in Revit Architecture 2014 and the Time Scheduling is done in Microsoft Office Project 2007.

Raiyan Mansoori *et. al.* (2016), studies the planning and design of Residential building (G+16) by using AutoCAD and Revit Softwares and takind fourth dimension as time. In this paper study is restricted to civil engineering construction planning and scheduling by creating 4D model. Furthermore other dimensions such as cost, resources, materials etc can be used as the nth dimensions.

## 2.2 ETABS

Abhay Guleria *et. al.* (2014) presents the analysis of the multi-storied building using ETABS, which reflected that the storey overturning moment varies inversely with storey height. Moreover, L-shape, I-shape type buildings give almost same type of response to overturning moment. Storey drift displacement increased with storey height up to $6^{th}$ storey reaching to maximum value and then started decreasing. From dynamic analysis, mode shapes are generated and it can be concluded that asymmetrical plans undergo more deformation than symmetrical plans. Asymmetrical plans should be adopted considering the gap.

Arpit A. Bhusar *et. al.* (2014), shows Building information models let structural engineers design, visualize, simulate, analyze, document and build projects more effectively, accurately and competitively. Among the most important benefits of BIM for structural engineer and productivity, coordination, consistency of data, and an improved visualization and simulation of problems and situations. Structural engineers can easily spend more time coordinating a project than performing the structural analysis. With the use of BIM, the time spent in coordination is reduced, allowing structural engineers to focus all their efforts in solving problems, instead of having to constantly checking for errors or coordinating changes made.

Sonia Longjam *et. al*. (2014) publishes the paper that represents the plans, model, analyze and design of a vertical irregular shopping mall structure of G+10 storey and investigate its performance under various lateral loading conditions. The main goal is to access current Indian Standard design practise and provide design guidelines using ETABS.

S. Vijay Bhaskar Reddy *et. al.* (2015), published a paper which describes the salient features of ETABS and its various applications in civil engineering, using ETABS software the analysis of two multi-storeyed buildings is carried out with different heights (15m and 10m). Thus it can help the consulting engineers, construction experts, research scientists and students in analysis of concrete structures. The essential features of ETABS is explained and the capability of the important concepts of effective memory management, plot options and user interface are described.

B. Anjaneyulu *et. al.* (2016), studies the analysis and design of Flat Slab by using ETABS Software, concludes that flat plate/slab can be designed and built either by conventional reinforced concrete or post tensioning. However, due to issues mentioned above with post-tensioning construction in India and its higher cost, conventional reinforced concrete design should be preferred choice for spans up to 10 meters.

## 2.3 Primavera

Dezeng *et. al*. (2005) developed Network Builder Assistance (NBA) which help schedulers to build a preliminary schedule based on predefined module that comprised standardize activities and pay items, it can also be used to address schedule integration issues among multiple contractors & clients multiple management levels. They also developed an automated schedule review system called Network Review Assistance (NRA) which can identify potential schedule errors using rule based reasoning & suggest possible corrections using cased based reasoning. The integration of PM software's like MSP and PV6 becomes difficult due to the requirement of coding within different programming environment. Further the updating of network and the scheduling computations on the modified data is a time-consuming process

Kolagotla *et. al.* (2009) carried out study on GIS application in Project management.
The study shows that different project members may develop inconsistent interpretations of the schedule when reviewing only the CPM schedule. This causes confusion on many occasions and usually makes effective communication among project participations difficult. He has underlined the significance of GIS system that allows project planners and managers to view in detail the spatial characteristics of the project.

Jeoffrey B. Reyes *et. al.* (2010) has prepared a simple and easy guide for preparing a programme or schedule using software development kit (SDK). He has, with the help of a very simple small project, demonstrated how the data in spread sheet can be imported to primavera P6. It also provides a sample of bill of quantity (BOQ) and manpower tabulation for resources reference.

Tom and Paul *et. al.* (2013) have emphasized on the effectiveness of primavera for project monitoring and control. Initially they have studied all the activities, their sequence of occurrence, duration, resources required and cost involved. The Organizational Break Down Structure (OBS) of the company executing the work and 6 the Work Break Down Structure (WBS) of the project are analysed to know the extent of the project later an earned value analysis has been carried out to get an idea about the resources involved and financial aspect of the completed work.

Bansal *et. al.* (2014) evaluated that Pre-construction planning begins after a project is awarded to certain point in time before a construction project starts. It is a macro-level planning for design review, finalization of the execution sequence, constructability analysis, site planning for major organization, logistics planning, and required major equipment. It minimizes risks, material wastage and overheads, and maximizes productivity during the construction stage. The major issues such as site access, locations of various facilities, and storage area required are resolved with respect to the project constraints.

Park *et al*. (2014) developed a system to estimate the construction cost, land acquisition cost, and operation & maintenance cost for the road construction project during a feasibility study using GIS. Their study also showcase that Pre project planning is an owner driven planning process for gathering sufficient information about the potential risk as well as probability of success. It is equally important as compared to the actual construction planning & scheduling of a project.

Subramani and Chinnadurai *et. al.* (2015) have carried out a study on construction management and scheduling of residential buildings using primavera. It focuses on the comparison of different construction scheduling techniques available and emphasizes on effectiveness of primavera as project management software. They have underlined the significance of project management by calling it a road map which if properly followed leads to timely completion, customer satisfaction and most importantly project completion within the budget. They have also mentioned the step by step procedure of how primavera can be used for preparing the schedule of a project.

Polekar and Salgude *et. al.* (2015) have focused on planning, scheduling and tracking a residential project with help of primavera software. They have demonstrated how the results generated, can be of help to the organization for enhancing its project planning skills for similar projects in future.

# Chapter 3

# Materials and Methodology

## 3.1 General

The project A Hostel Building is software based in which processes such as planning, analysis, designing, estimation, scheduling and monitoring will be done by the use of software such as AutoCAD, ETABS, Microsoft Office Excel and Primavera P6.

This project consists of five main parts which are as follows

1. Planning
2. Analysis
3. Designing and Detailing
4. Quantity Survey and Cost Estimation
5. Scheduling and Monitoring

## 3.2 Planning

Planning of a hostel building has been done by the previous final year batch as per building Bye-Laws and IS Code requirement, keeping in mind the accommodation requirement for 450 students for this purpose, AutoCAD software was used. There were some mistakes in the drawing so with the help of the AutoCAD software necessary ramifications were done as shown in the below Figure 3.1

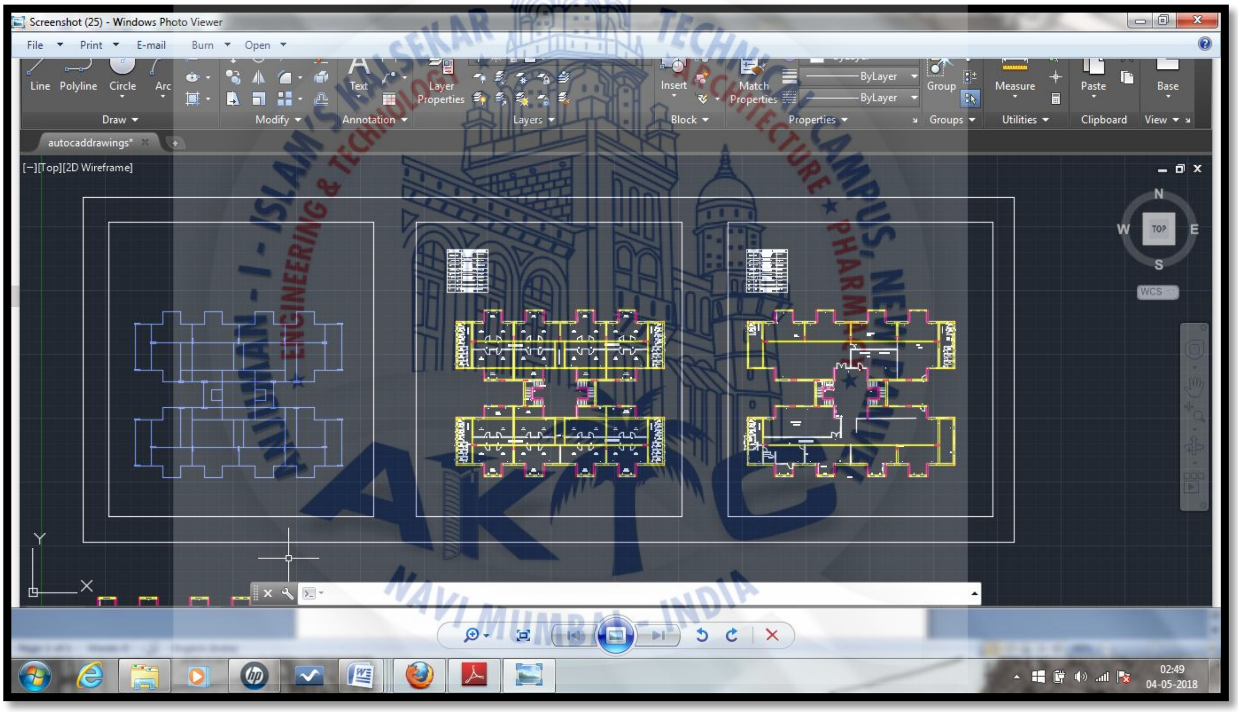



**Figure 3.1** Image of AutoCAD Drawings

### 3.2.1 Ground Floor Plan ( Refer Figure 3.2)

- Ground floor consist of all fundamental amenities like Canteen, Indoor games, Gym, Library and Digital Library.
- Warden Office and Reception is also provided at Ground Floor itself in order to maintain discipline and better coordination for assistance to students
- Server and Maintenance room is provided for systematic monitoring of electricity and computer servers.
- Library and Digital Library is provided away from other distracting units like Canteen and Indoor games in order to maintain silence and better environment for studying.

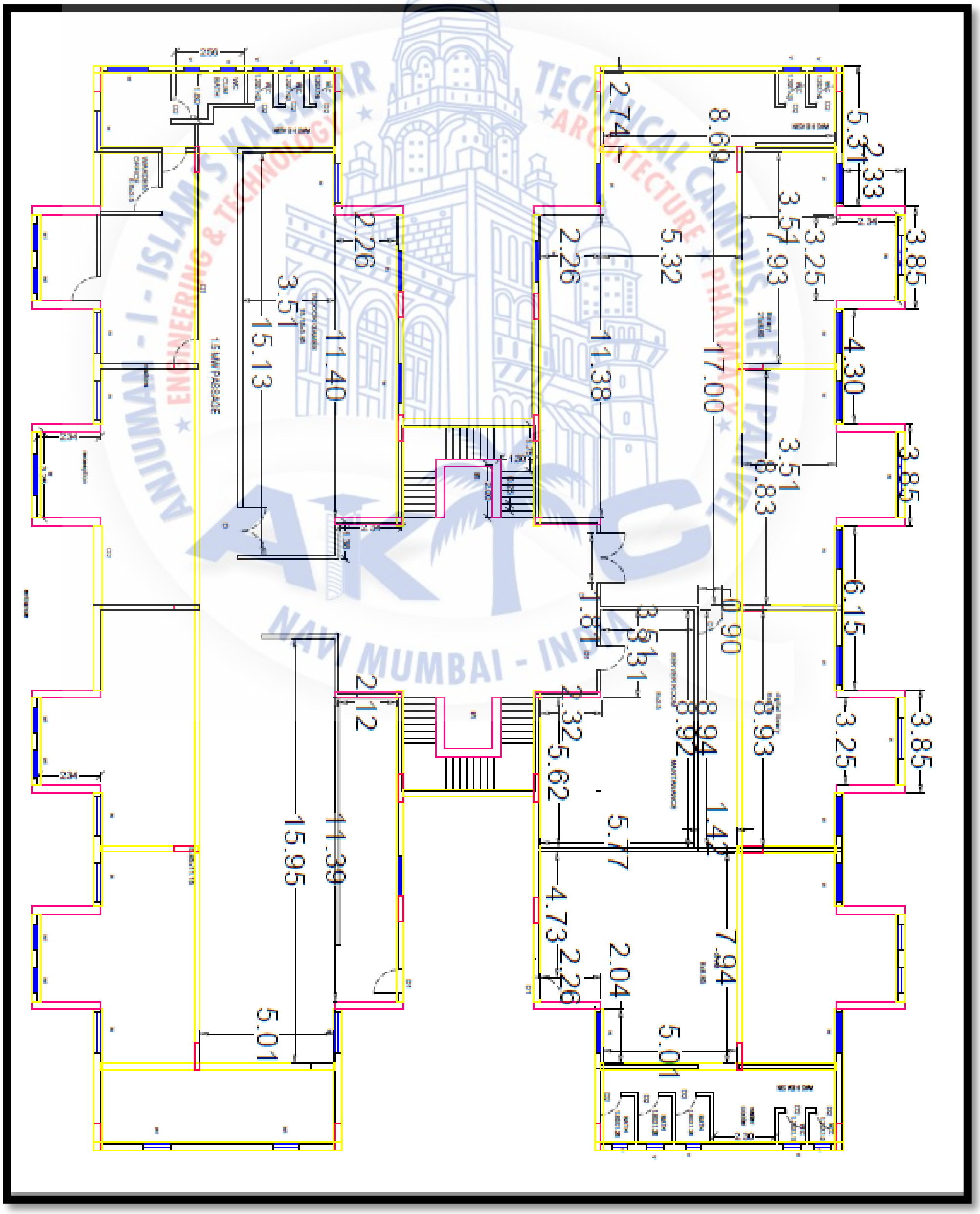


**Figure 3.2** Ground Floor Plan

### 3.2.2 First Floor Plan (Refer Figure 3.3)

- First Floor is the Master Floor for 2nd, 3rd & 4th floor, planned specifically 2-seaters and a common study room. Each room will be accommodating 7 for students
- For every 4 rooms, 4 WC and 3 Bathrooms are provided at the corner of each floor.
- Passage way of 1.5m width is provided for easy movement.
- Open Well Staircase is provided throughout the building with Elevators on opposite sides.
- Each Floor consist of 16 Rooms, and each room consist of 4 beds of students.

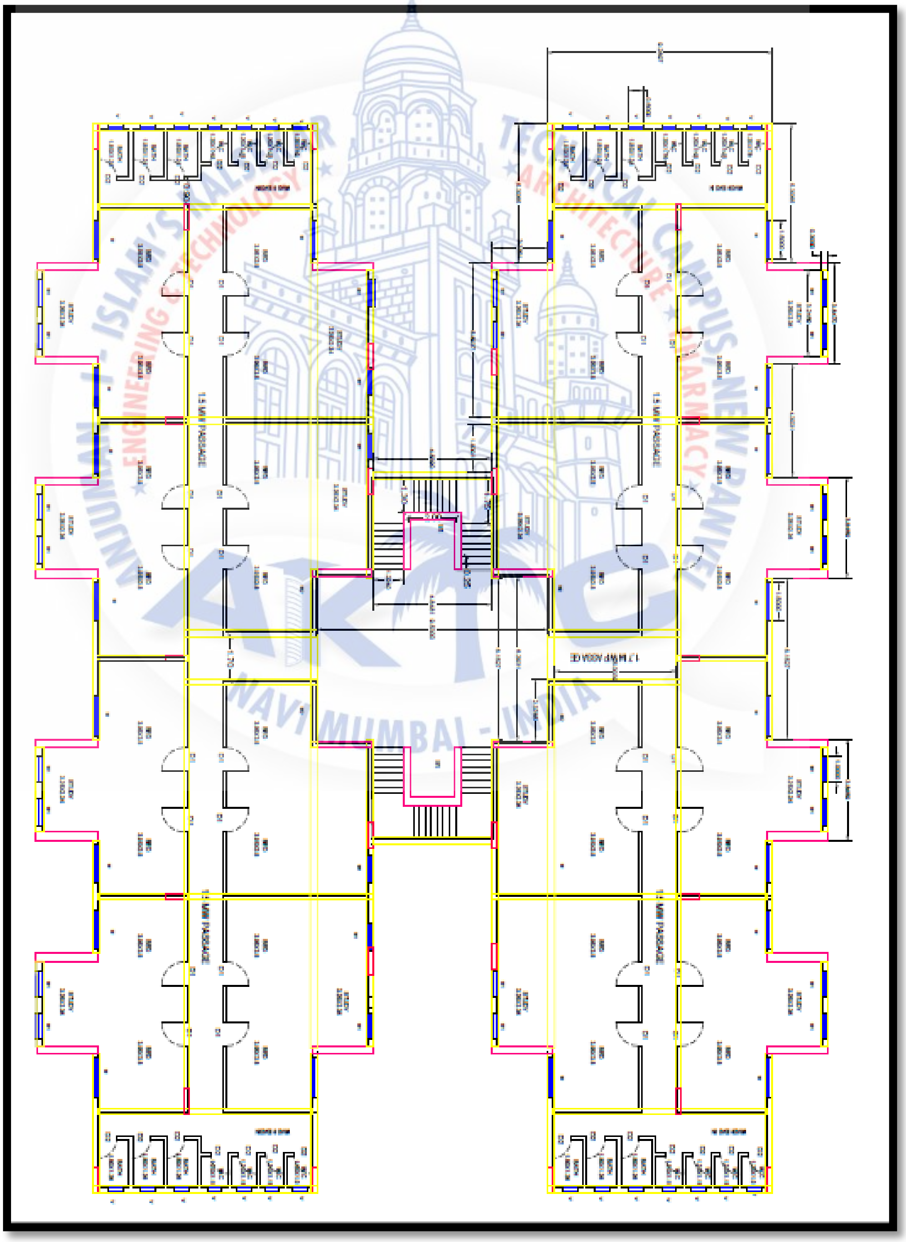


**Figure 3.3 First Floor Plan**

### 3.2.3 Obtaining Centre-Line Plan (Refer Figure 3.4)

- After planning all the floors and its various units, we extracted the Centre-Line plan for importing the plans in ETABS for analysis purpose.

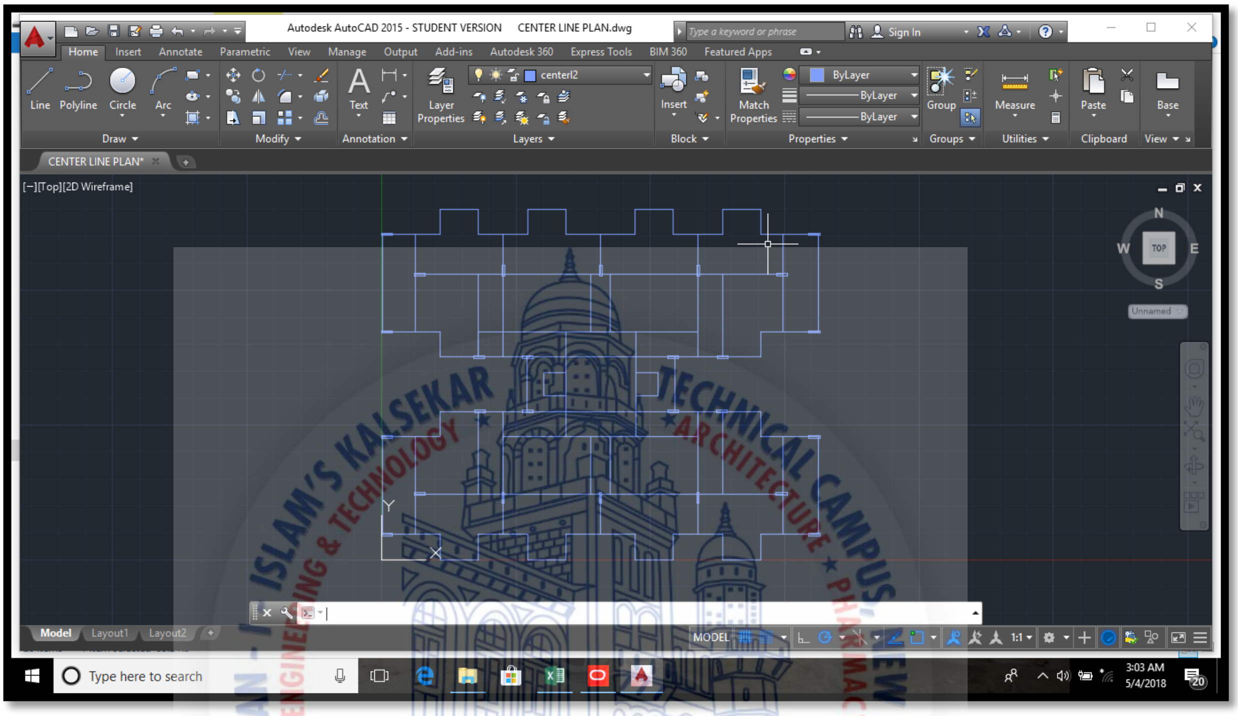



**Figure 3.4** Centre-Line Plan

IR@AIKTC aiktcdspace.org

## 3.3 Analysis

After completion of planning the project will move ahead by analyzing and designing process with the help of ETABS software. ETABS offers a single user interface to perform: Analysis, Design, Detailing, and Reporting. This software will analyze and design an educational complex with much ease. ETABS gives analysis and design for beams and columns only refer Figure 3.5

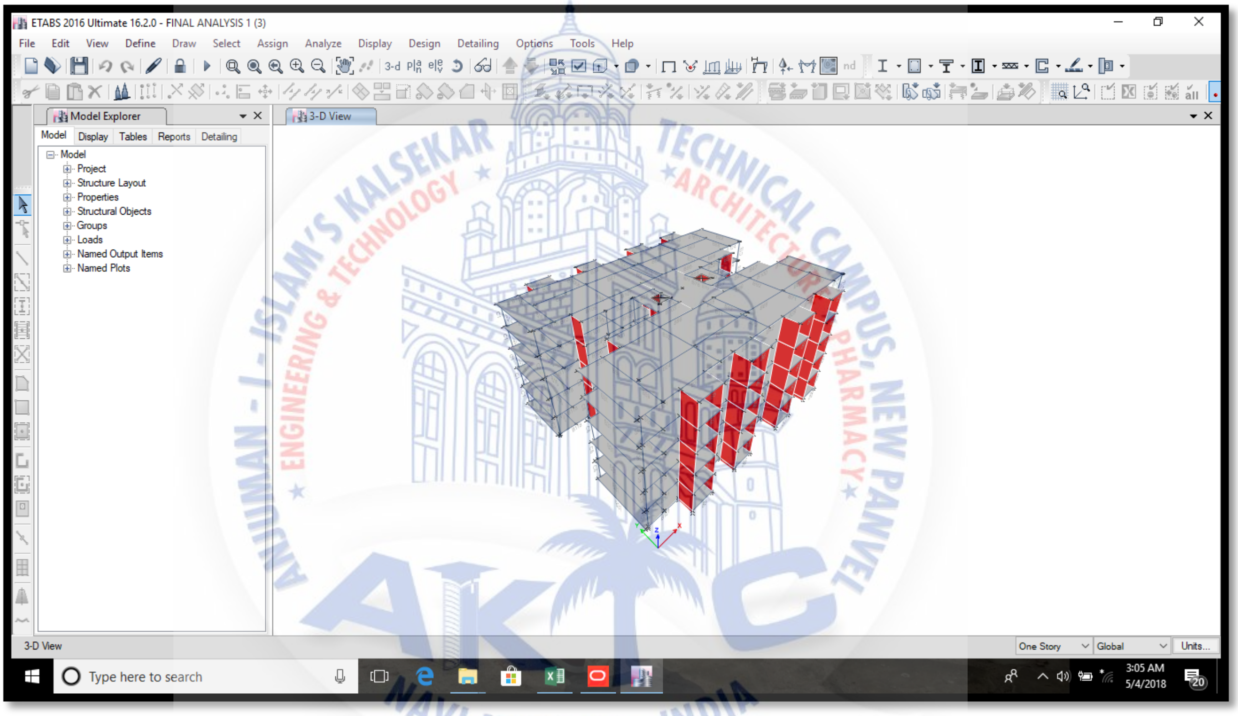



**Figure 3.5** 3-D Rendered View

There is a step-by-step procedure followed by us for analyzing and designing the structure. The steps are explained in detail in proper sequence below:

1. Saving AutoCAD file as .DXF file. .
2. Opening .DXF file in ETABS and provide Unit in meters.
3. Define Material like M30, M35 etc. Grades of Concretes and Fe 415, Fe500, etc. Grades of Steel As per IS code provided in options.
4. Define Section Properties.

5. Frame section: In this section, Beams and Columns can be defined. Beams are as follows:

   Beam B1: (300X800) mm

   Beam B2: (230X600) mm

   Beam B3: (230X600) mm

   Columns are as follows:

   Columns C1: (300X1000) mm

   Slab section: From this section, thickness of slab in defined.

   Wall section: From this section, thickness of shear wall is defined with suitable concrete grade.

6. Placement of beams and columns: Beams and columns are placed as indicated in Centre line plan. After placement of beams and columns, the view typical floors are as follows: (Refer Figure 3.6 and 3.7)

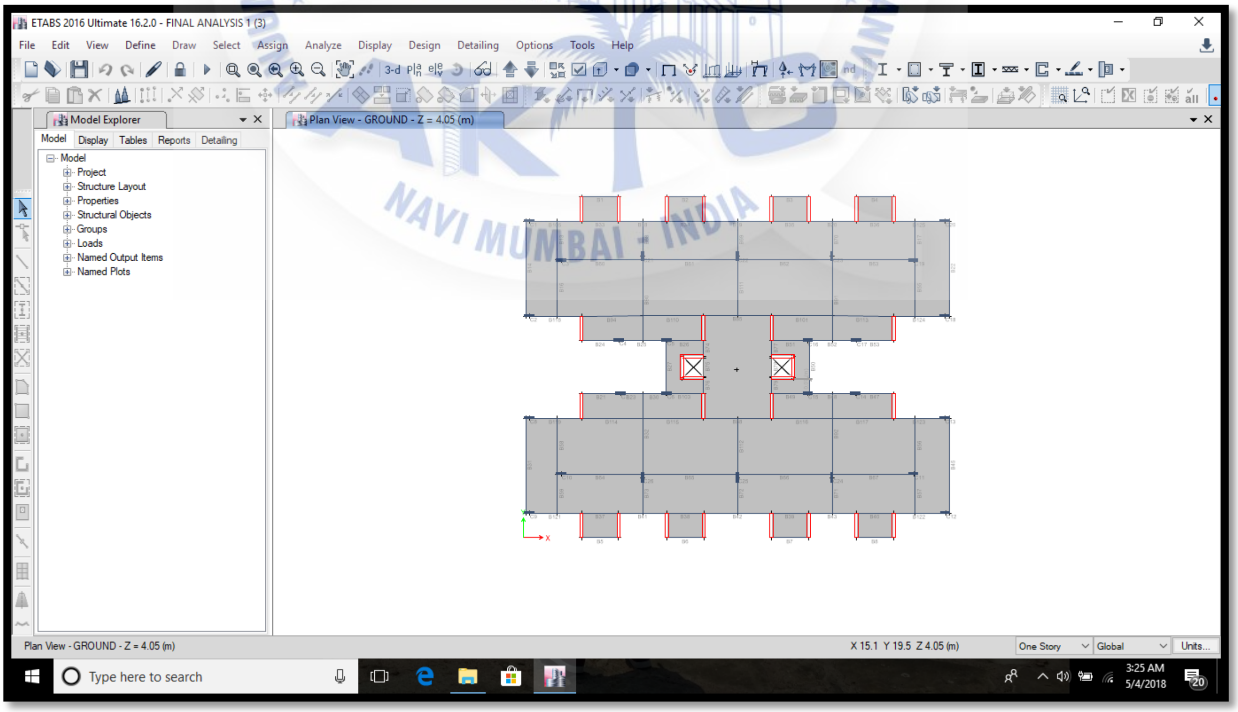



**Figure 3.6** Ground Floor Plan View

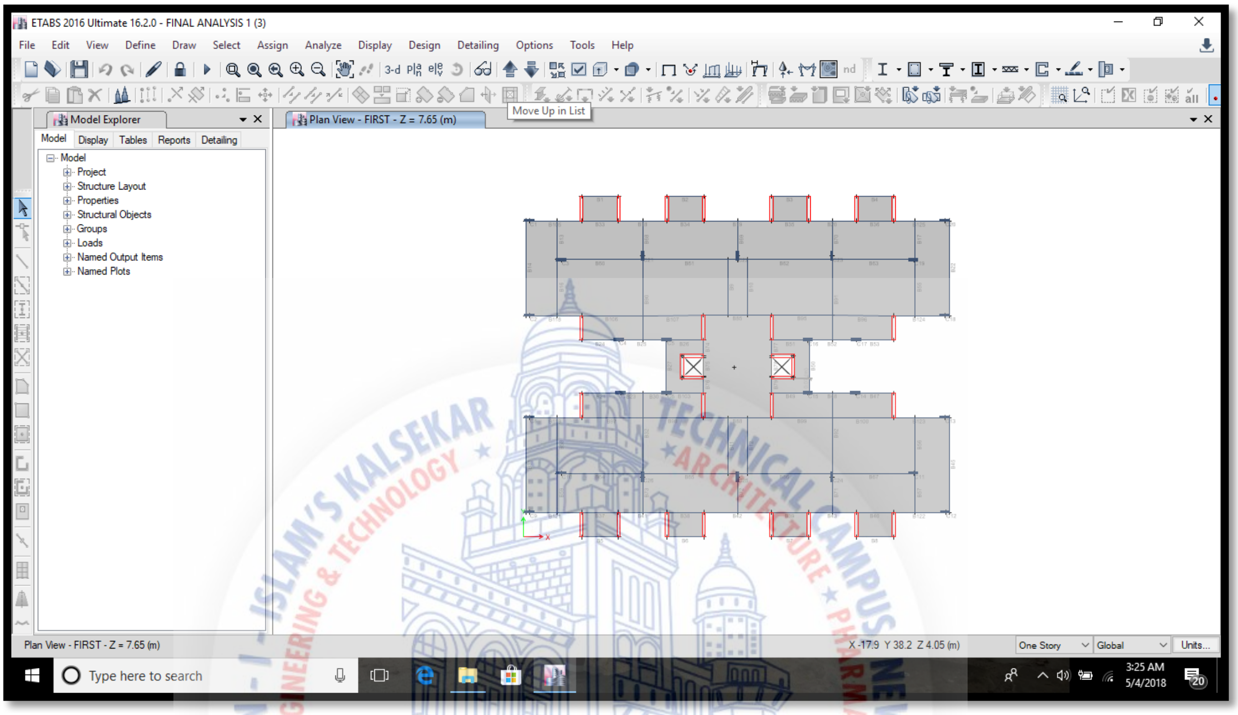



**Figure 3.7** First Floor Plan View

## 3.3.1 Analysis of the Defined Structure

1. Load Define: Different type of load such as Live, Dead, Masonry etc. are defined.
2. Assign of loads: loads are assigned on beams, columns and slabs.
3. Load Cases: Different type of load cases are to be defined.

4. Load Combinations: Different combination of loads are embedded in ETABS as per IS code.
5. Defining Functions: Functions for Seismic load for X & Y direction are defined under Response Spectrum.
6. Checking the model for assigned beams, columns and slabs. (Refer Figure 3.8)
7. After checking the model, analysis is run and the model is found to be safe. (Refer Figure 3.9)
8. After analyzing the structure, we did the design check of frame section and obtained the required area of steel for each structural member. Also we get to know that none of the beam or column is Over-Stressed. (Refer Figure 3.10)

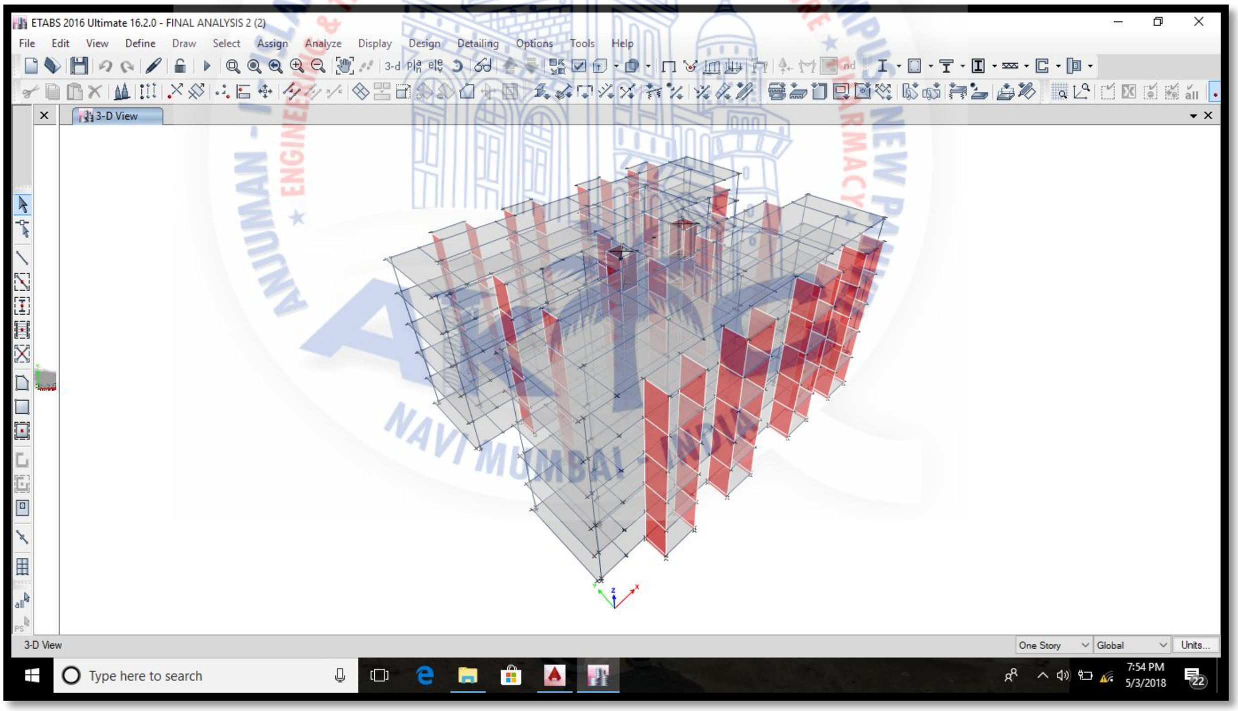



**Figure 3.8** Design Check

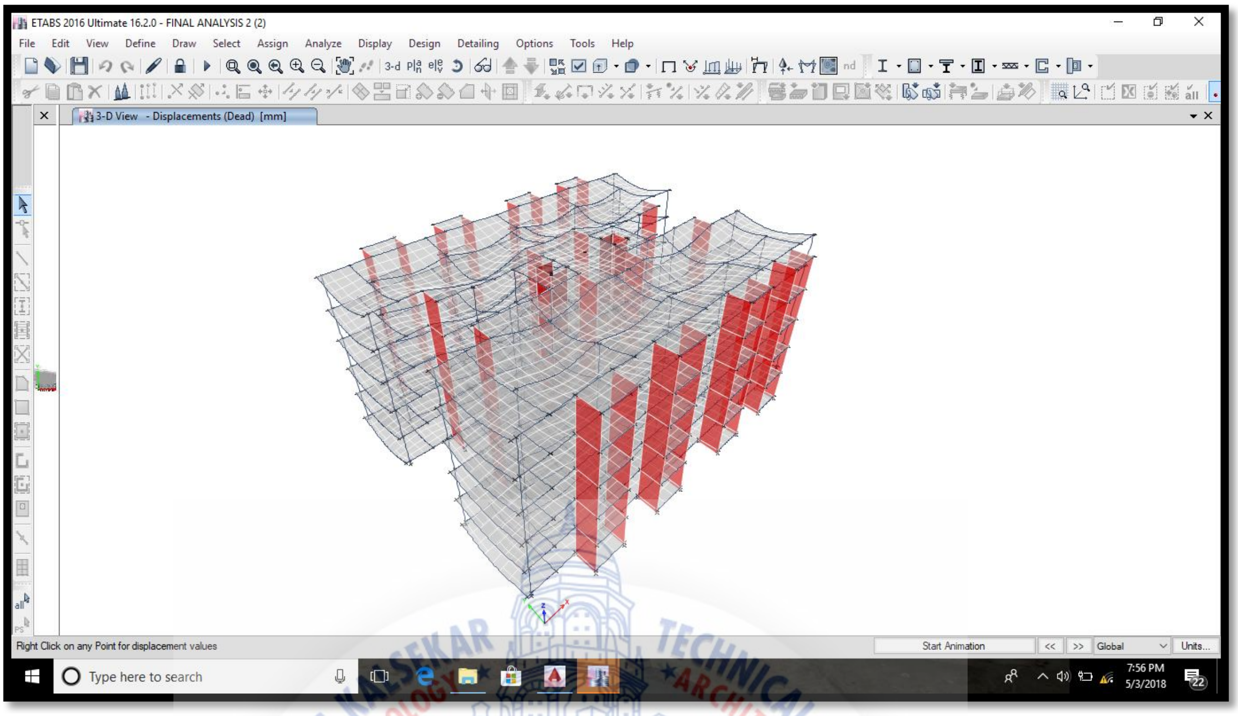



**Figure 3.9** Deformed Shape After Loading

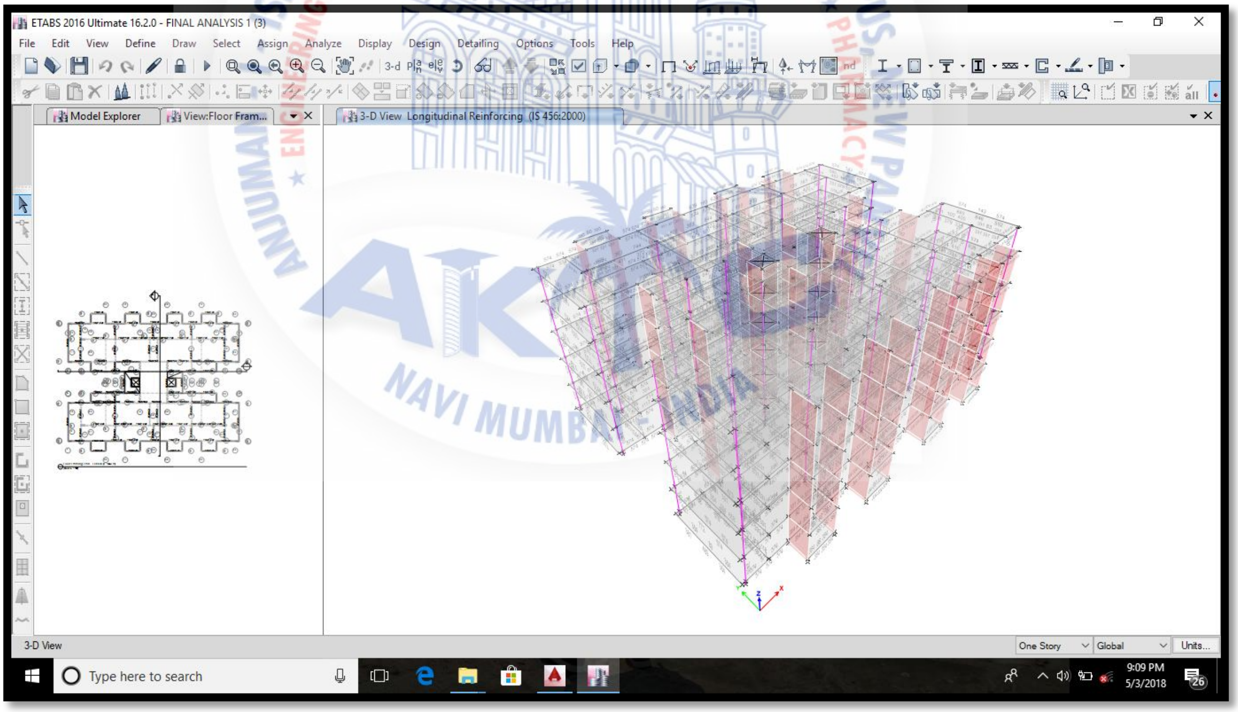



**Figure 3.10** Safe Structure

## 3.4 Designing and Detailing

After analyzing the structure, detailing of the structural members is done. Under this head, we can provide the number of main bars, number of distribution bars and spacing between the stirrups (tie bars) as per the area of steel obtained from the analysis of structure. Different structural members on different floors may or may not have same design and detailing schedule.

Some of the reinforced sections are shown below. It consist of longitudinal sections of column, beams and shear walls:

- Figure 3.11 shows longitudinal reinforcement details of Typical Beam in elevation view for single slab.
- Figure 3.12 shows longitudinal reinforcement details of Typical Beams beneath the two adjacent slabs.
- Figure 3.13 shows longitudinal reinforcement details of Typical Beams beneath the three adjacent slabs.
- Figure 3.14 shows reinforcement details for columns.
- Figure 3.15 shows spacing of main bars in Shear walls.
- Figure 3.16 shows the Meshing in Shear Walls.

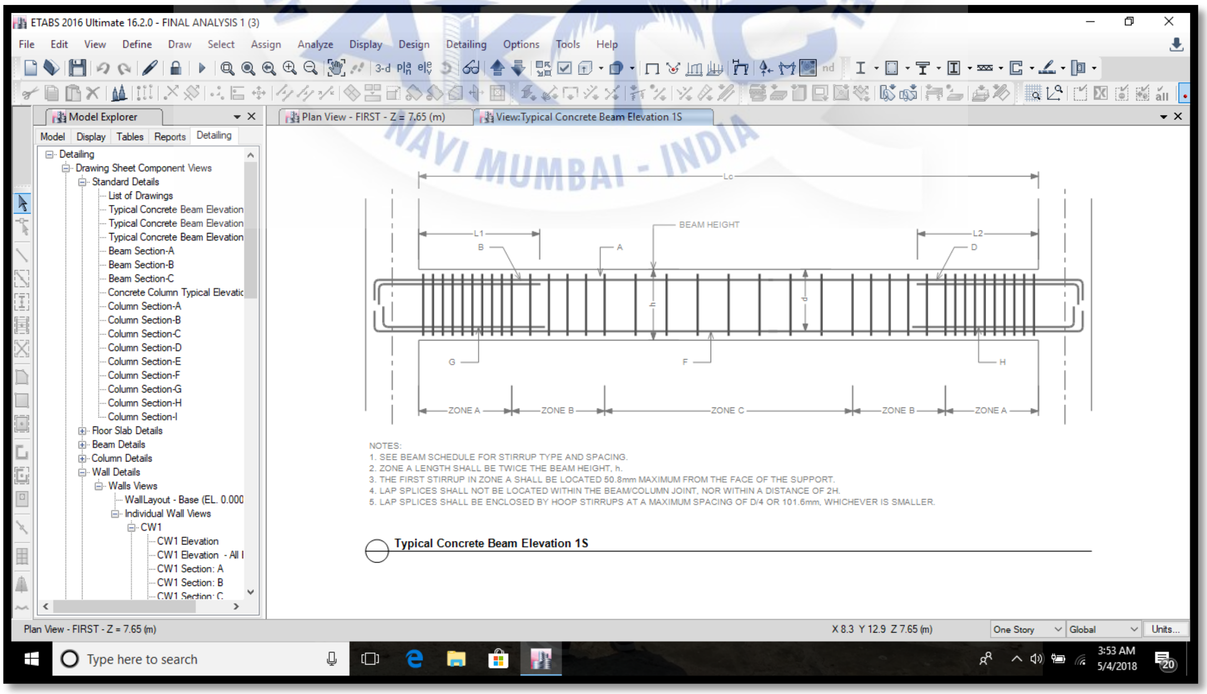



**Figure 3.11** Reinforcement in Typical Beam for single slab

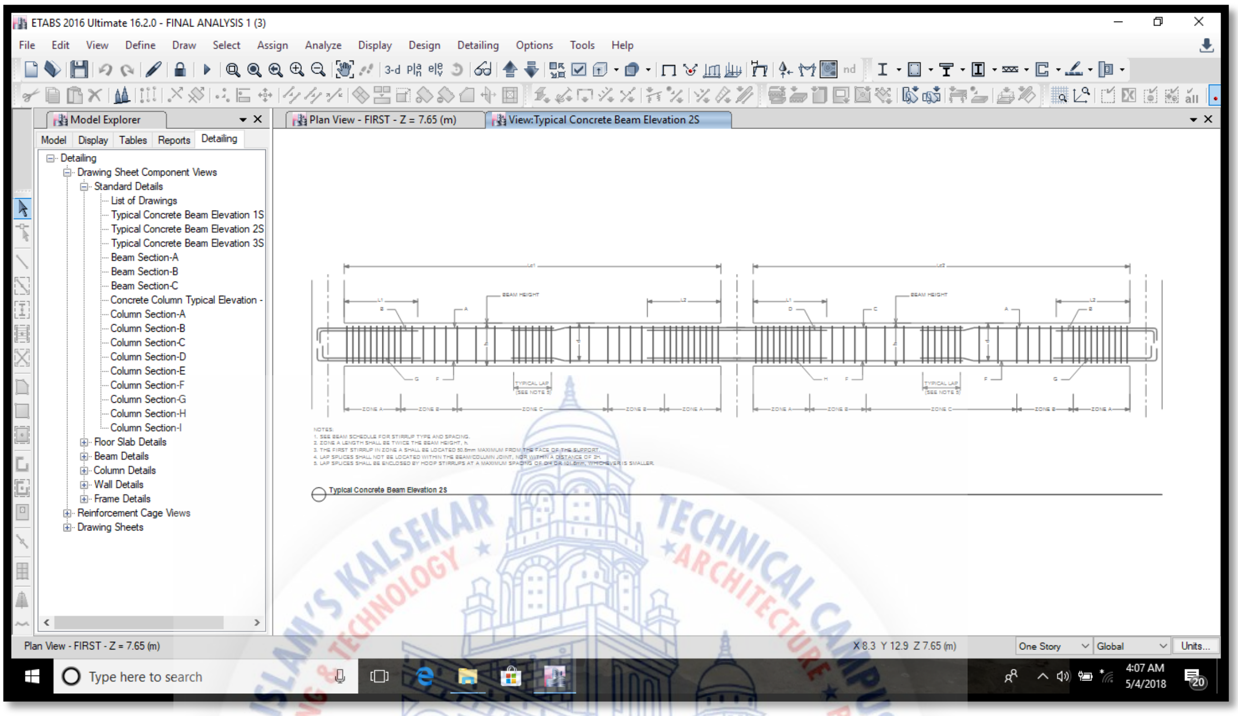


**Figure 3.12** Reinforcement in Typical Beam beneath two adjacent slabs

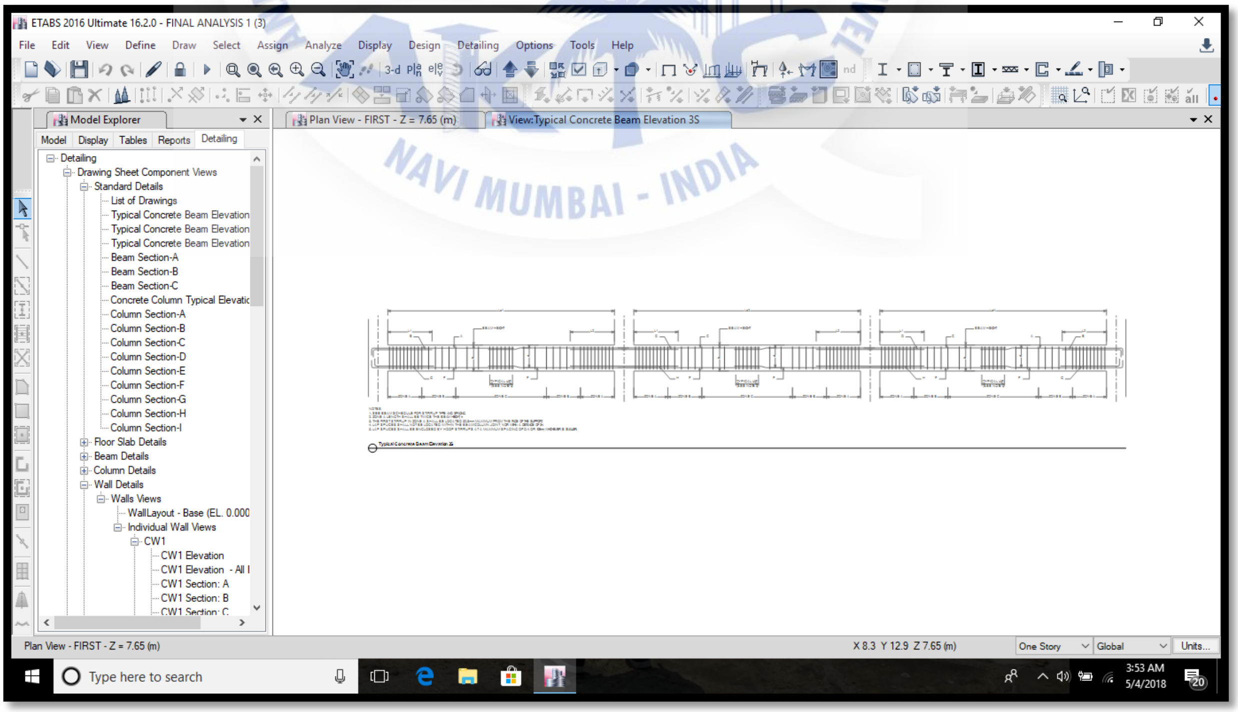


**Figure 3.13** Reinforcement in Typical Beam beneath three adjacent slabs

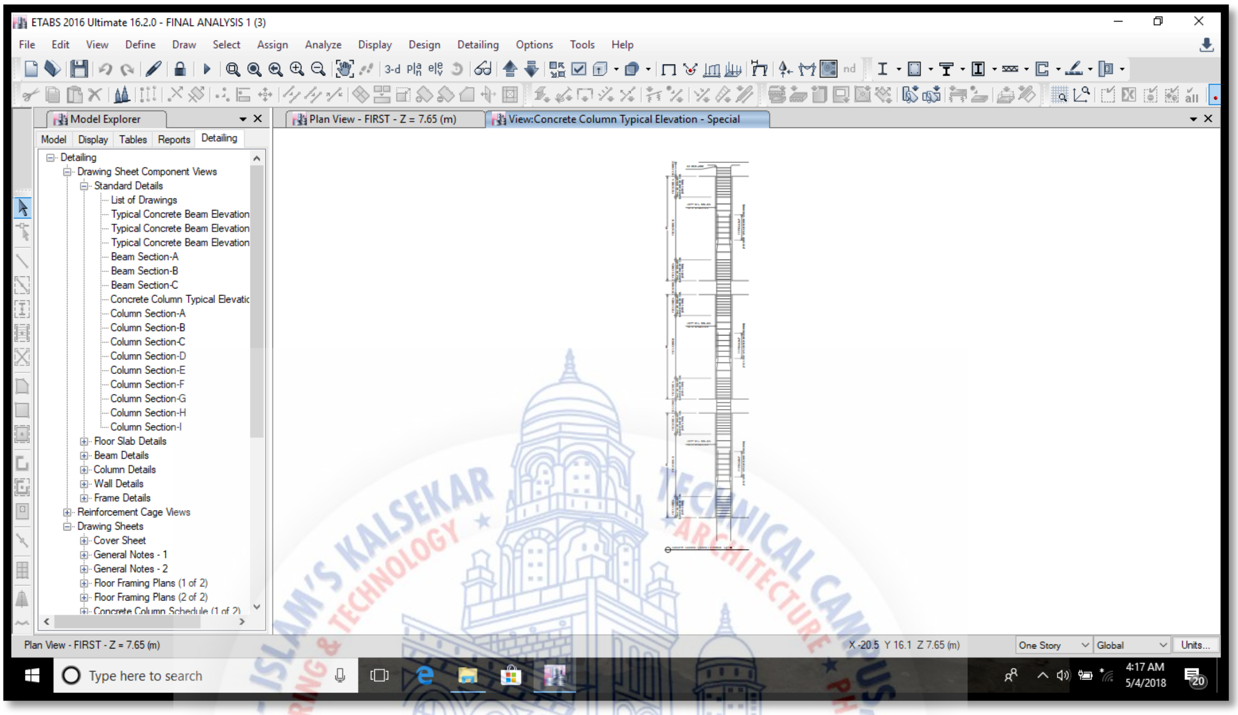



**Figure 3.14** Reinforcement details for Columns

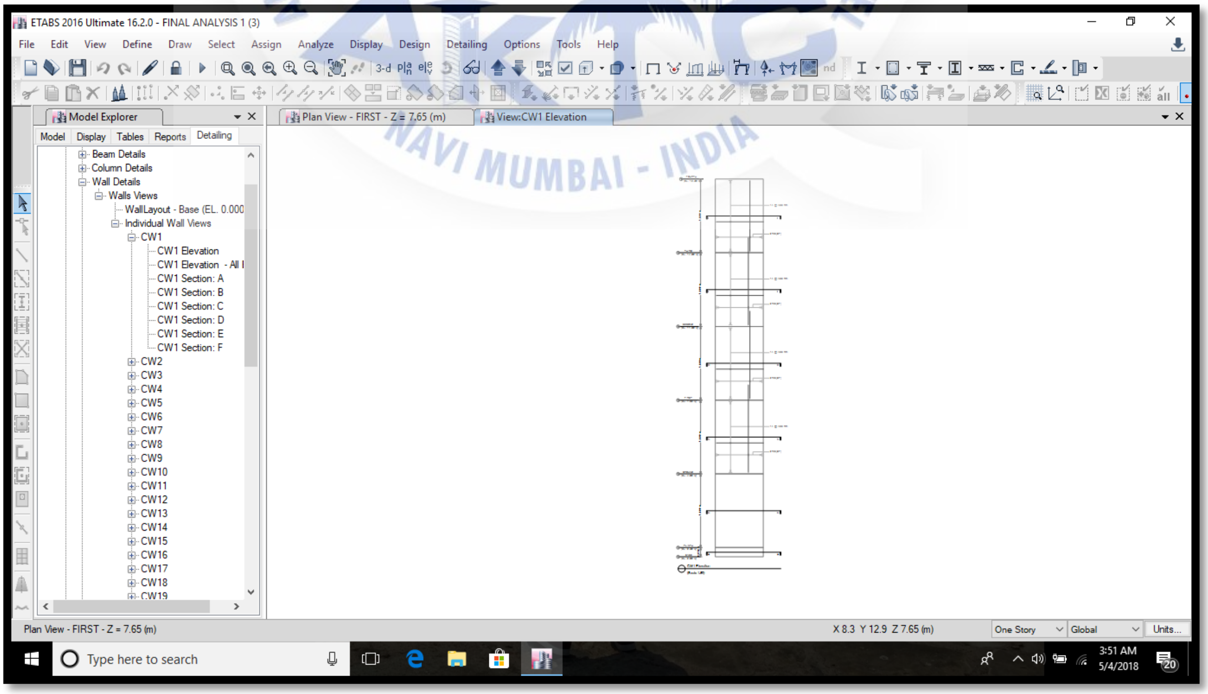



**Figure 3.15** Spacing for main bars in Shear Walls

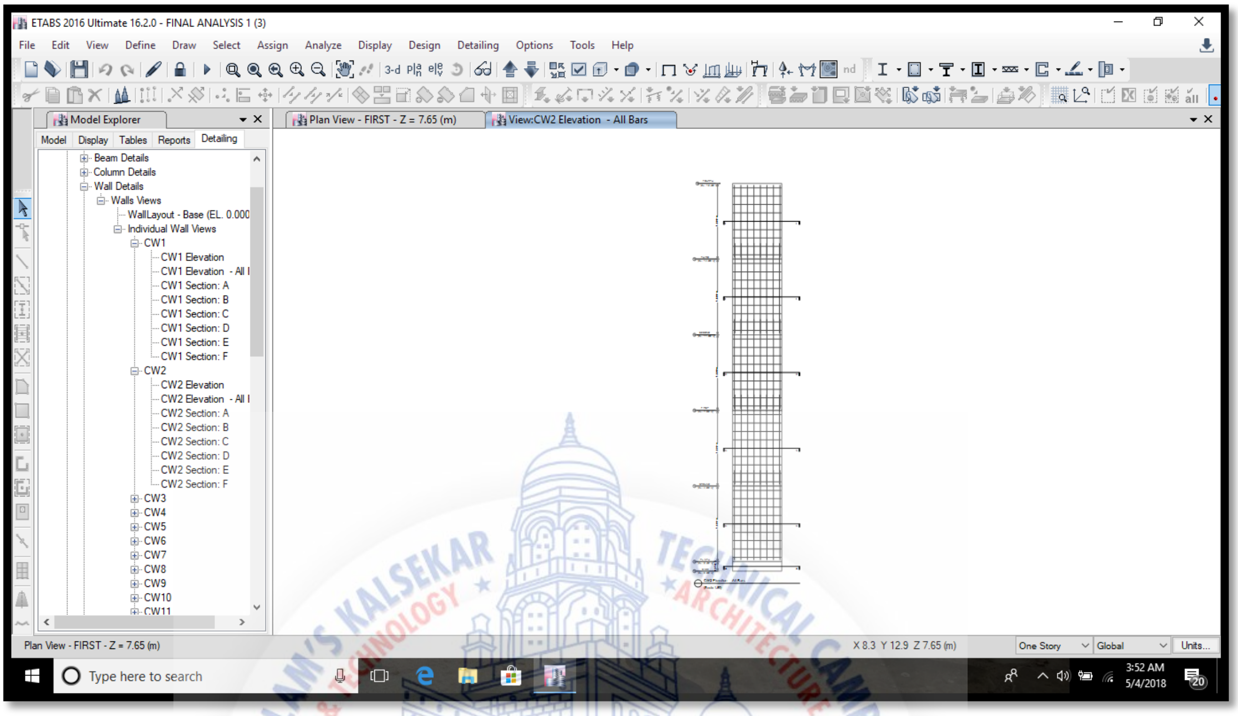
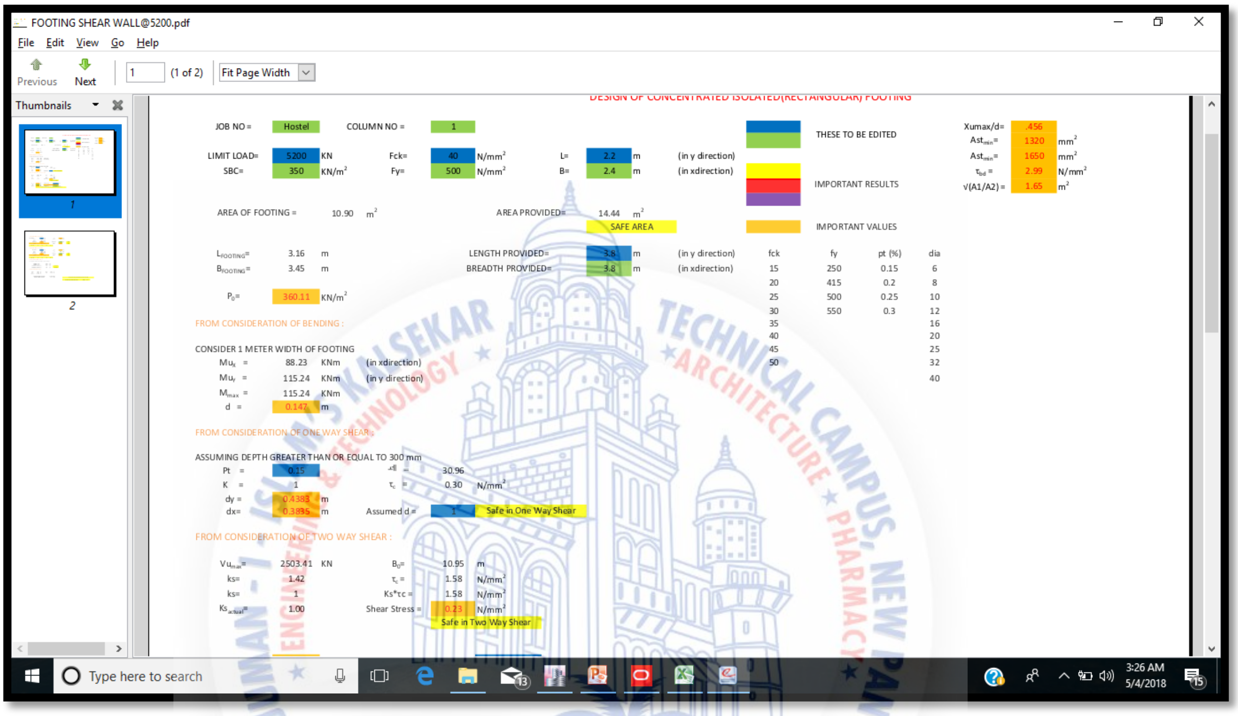



**Figure 3.16** Meshing in Shear Wall

## 3.5 Designing of Footing on Microsoft Excel Spreadsheets

Since ETABS gives analysis and designing for beams and columns only, the analysis of footing was done on Microsoft Excel Spreadsheets. Refer Table 3.1 and Table 3.2

**Table 3.1 Design of Footing 1**




## 3.6 Quantity Survey and Estimation

Estimation of quantities of materials is done on Microsoft Office Excel. The reinforcement of the beams, columns, and shear walls were calculated on ETABS whereas slab reinforcement was calculated manually and now the estimation of cost and quantity of all materials (reinforcement, concrete, finishing materials etc) were done on Microsoft Excel Spreadsheets.

### 3.6.1 Measurement Sheet

The estimation of all the required materials (reinforcement, concrete, finishing materials etc) were done on Microsoft Excel and were calculated manually, below Table 3.3 shows a sample calculation for Measurement sheet

**Table 3.2 Measurement Sheet**

| Sr No. | DESCRIPTION | NO. | LENGTH | BREADTH | HEIGHT | QTY | UNIT | REMARK |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| 1 | EARTHWORK IN EXCAVATION | | | | | | | |
| | F1 | 16 | 4.5 | 3.75 | 1 | 270 | cumecs | |
| | F2 | 3 | 4.5 | 4.2 | 1.05 | 59.535 | cumecs | |
| | F3 | 7 | 5.25 | 4.8 | 1.2 | 211.68 | cumecs | |
| | SW1 | 16 | 3 | 6 | 1.1 | 316.8 | cumecs | |
| | SW2 | 8 | 4.5 | 6 | 1 | 216 | cumecs | |
| | SW3 COMBINED | | | | | 0 | cumecs | |
| | | | | | | | cumecs | |
| 2 | PCC IN FOOTING | | | | | | cumecs | |
| | F1 | 16 | 3 | 2.5 | 0.1 | 12 | cumecs | |
| | F2 | 3 | 3 | 2.8 | 0.1 | 2.52 | cumecs | |
| | F3 | 7 | 3.5 | 3.2 | 0.1 | 7.84 | cumecs | |
| | SW1 | 16 | 2 | 4 | 0.1 | 12.8 | cumecs | |
| | SW2 | 8 | 3 | 4 | 0.1 | 9.6 | cumecs | |
| | SW3 COMBINED | | | | | 0 | cumecs | |
| | | | | | | | cumecs | |
| 3 | CONCRETE IN FOOTING | | | | | | cumecs | |
| | F1 | 16 | 3 | 2.5 | 0.9 | 108 | cumecs | |
| | F2 | 3 | 3 | 2.8 | 0.95 | 23.94 | cumecs | |
| | F3 | 7 | 3.5 | 3.2 | 1.1 | 86.24 | cumecs | |

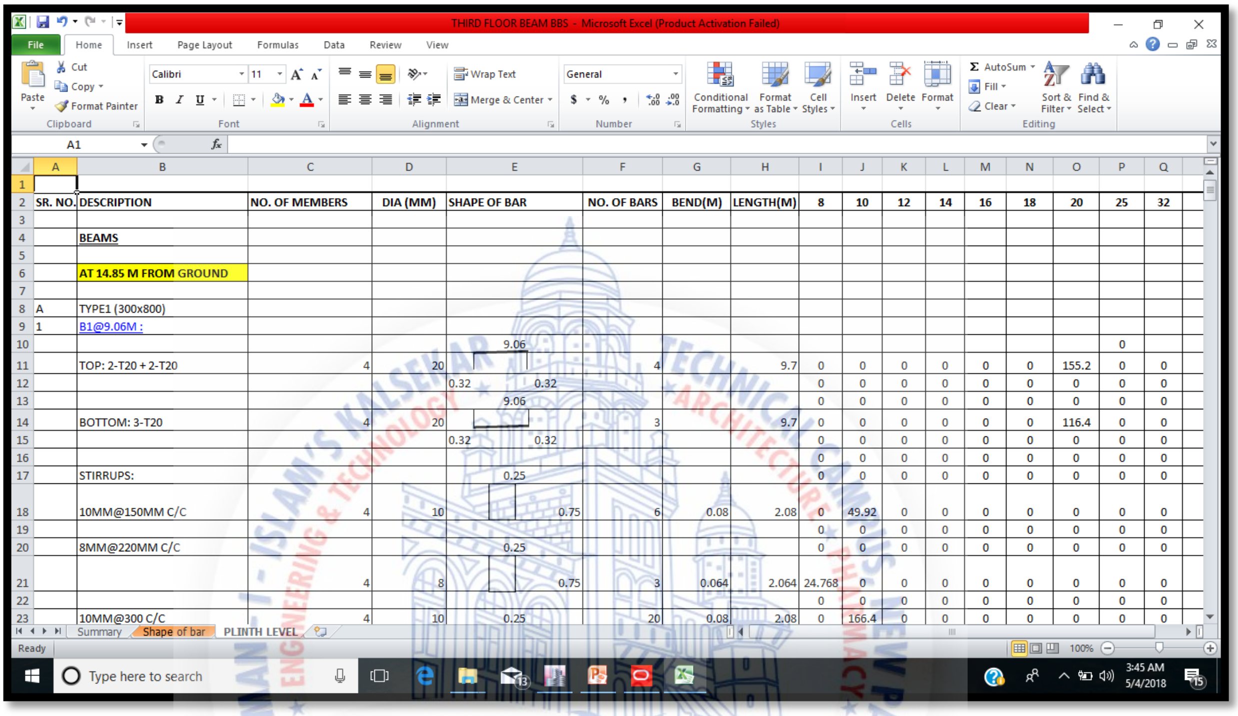
### 3.6.2 Bar Bending Schedule

Bar Bending Schedule is a list of reinforcement bars for a given reinforced concrete work item, and is presented in a tabular form for easy visual reference. Table of bar bending schedule summarizes all the needed particulars of bars – diameter, shape of bending, length of each bent and straight portions, angles of bending, total length of each bar, and number of each type of bar. Below are the spreadsheets showing calculations done for the Bar Bending Schedule.

### 3.6.2.1 **Bar Bending Schedule For Beams**

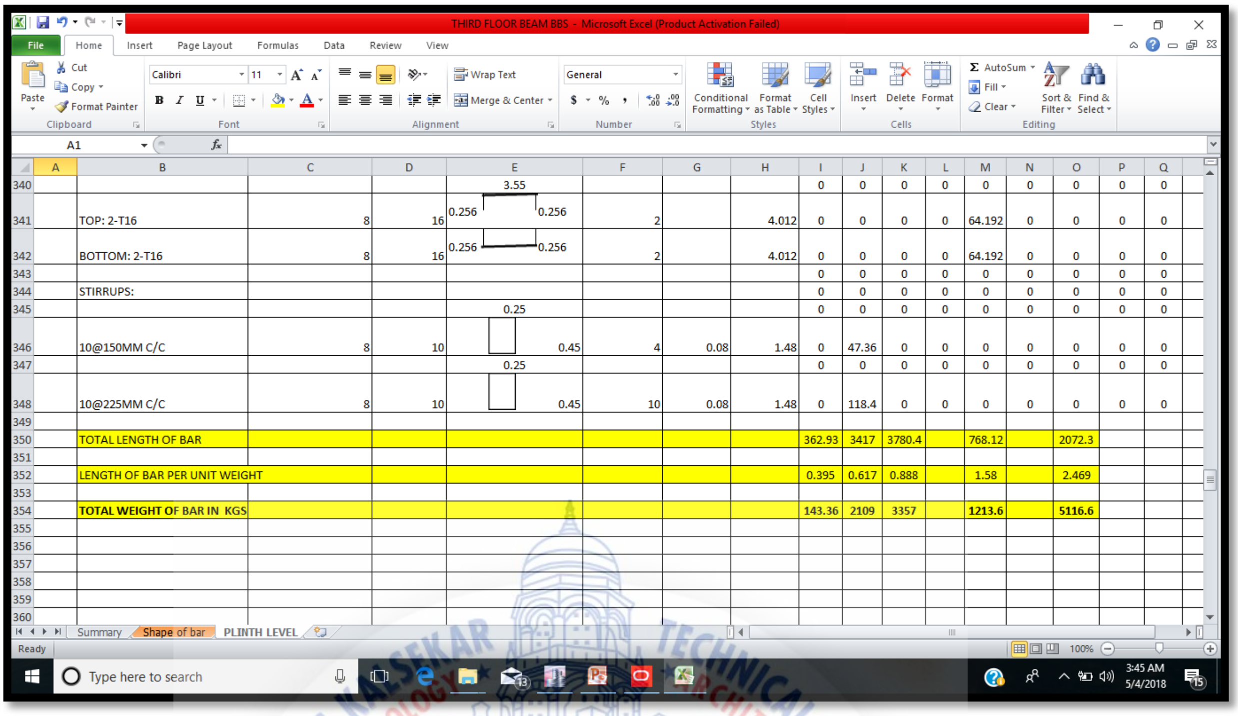
Table 3.4 and Table 3.5 shows Bar Bending Schedule for beams.

**Table 3.3 BBS Sheet 1 for Beam**



| SR. NO. | DESCRIPTION | NO. OF MEMBERS | DIA (MM) | SHAPE OF BAR | NO. OF BARS | BEND(M) | LENGTH(M) | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | |
| | BEAMS | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | AT 14.85 M FROM GROUND | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| A | TYPE1 (300x800) | | | | | | | | | | | | | | | |
| 1 | B1@9.06M : | | | | | | | | | | | | | | | |
| | | | | 9.06 | | | | | | | | | | | 0 | |
| | TOP: 2-T20 + 2-T20 | 4 | 20 | | 4 | | 9.7 | 0 | 0 | 0 | 0 | 0 | 0 | 155.2 | 0 | 0 |
| | | | | 0.32 0.32 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | 9.06 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | BOTTOM: 3-T20 | 4 | 20 | | 3 | | 9.7 | 0 | 0 | 0 | 0 | 0 | 0 | 116.4 | 0 | 0 |
| | | | | 0.32 0.32 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | STIRRUPS: | | | 0.25 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 10MM@150MM C/C | 4 | 10 | 0.75 | 6 | 0.08 | 2.08 | 0 | 49.92 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 8MM@220MM C/C | | | 0.25 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 4 | 8 | 0.75 | 3 | 0.064 | 2.064 | 24.768 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 10MM@300 C/C | 4 | 10 | 0.25 | 20 | 0.08 | 2.08 | 0 | 166.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 3.4 BBS Sheet 2 for Beam**



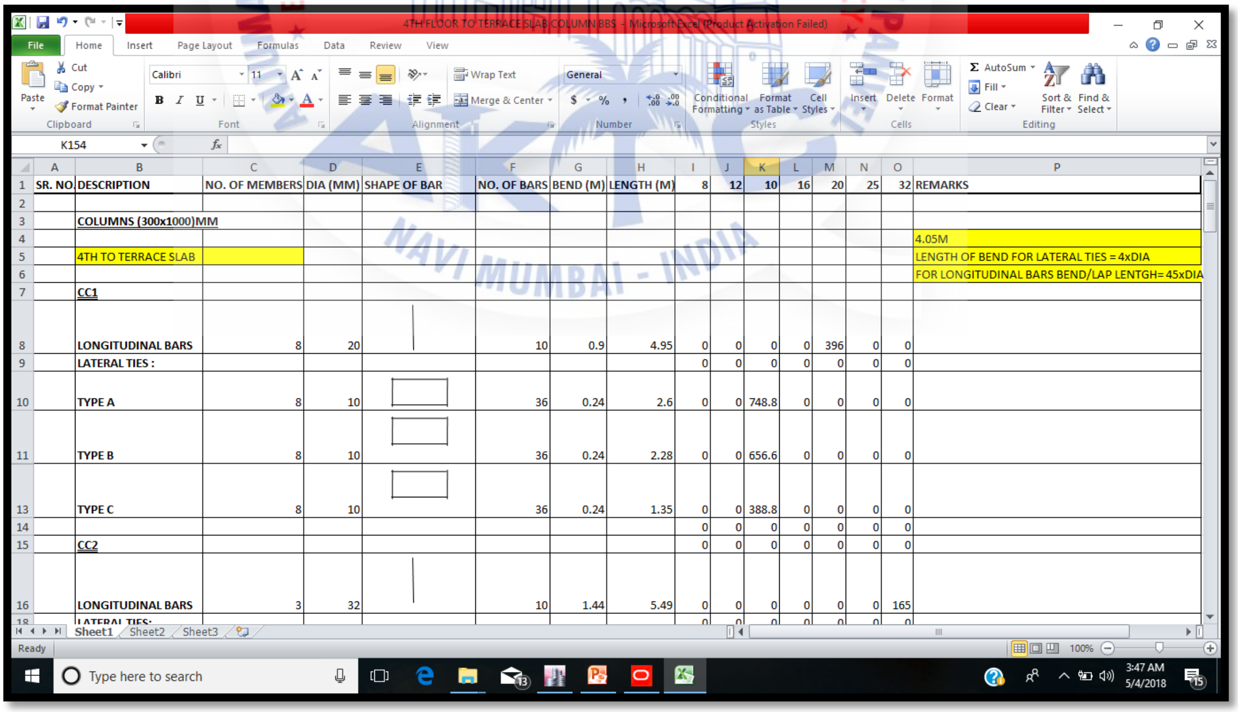
THIRD FLOOR BEAM BBS - Microsoft Excel (Product Activation Failed)

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 340 | | | | | 3.55 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 341 | | TOP: 2-T16 | 8 | 16 | 0.256 0.256 | 2 | | 4.012 | 0 | 0 | 0 | 0 | 64.192 | 0 | 0 | 0 | 0 |
| 342 | | BOTTOM: 2-T16 | 8 | 16 | 0.256 0.256 | 2 | | 4.012 | 0 | 0 | 0 | 0 | 64.192 | 0 | 0 | 0 | 0 |
| 343 | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 344 | | STIRRUPS: | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 345 | | | | | 0.25 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 346 | | 10@150MM C/C | 8 | 10 | 0.45 | 4 | 0.08 | 1.48 | 0 | 47.36 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 347 | | | | | 0.25 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 348 | | 10@225MM C/C | 8 | 10 | 0.45 | 10 | 0.08 | 1.48 | 0 | 118.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 349 | | | | | | | | | | | | | | | | | |
| 350 | | TOTAL LENGTH OF BAR | | | | | | | 362.93 | 3417 | 3780.4 | | 768.12 | | 2072.3 | | |
| 351 | | | | | | | | | | | | | | | | | |
| 352 | | LENGTH OF BAR PER UNIT WEIGHT | | | | | | | 0.395 | 0.617 | 0.888 | | 1.58 | | 2.469 | | |
| 353 | | | | | | | | | | | | | | | | | |
| 354 | | **TOTAL WEIGHT OF BAR IN KGS** | | | | | | | 143.36 | 2109 | 3357 | | 1213.6 | | 5116.6 | | |

## 3.6.2.2 Bar Bending Schedule For Columns

Table 3.6 and Table 3.7 shows Bar Bending Schedule For Columns.

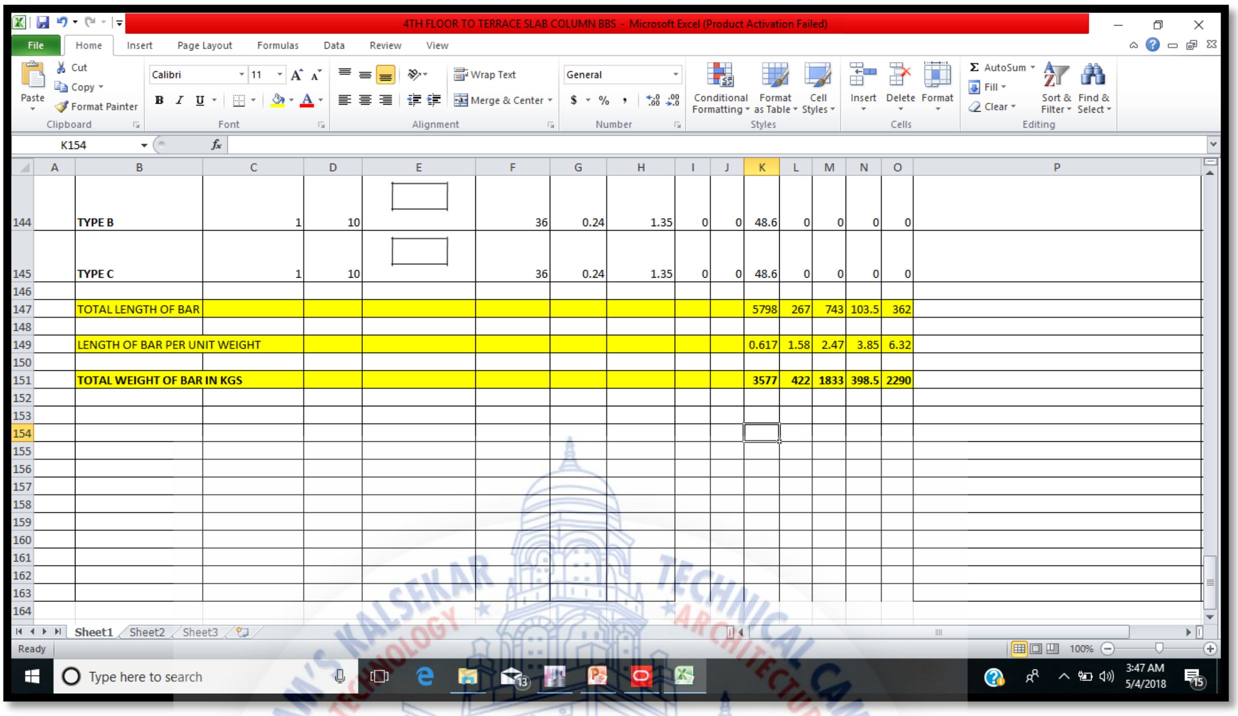
**Table 3.5 BBS Sheet 1 for Column**



4TH FLOOR TO TERRACE SLAB COLUMN BBS - Microsoft Excel (Product Activation Failed)

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | SR. NO. | DESCRIPTION | NO. OF MEMBERS | DIA (MM) | SHAPE OF BAR | NO. OF BARS | BEND (M) | LENGTH (M) | 8 | 12 | 10 | 16 | 20 | 25 | 32 | REMARKS |
| 2 | | | | | | | | | | | | | | | | |
| 3 | | COLUMNS (300x1000)MM | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | 4.05M |
| 5 | | 4TH TO TERRACE SLAB | | | | | | | | | | | | | | LENGTH OF BEND FOR LATERAL TIES = 4xDIA |
| 6 | | | | | | | | | | | | | | | | FOR LONGITUDINAL BARS BEND/LAP LENTGH= 45xDIA |
| 7 | | CC1 | | | | | | | | | | | | | | |
| 8 | | LONGITUDINAL BARS | 8 | 20 | | 10 | 0.9 | 4.95 | 0 | 0 | 0 | 0 | 396 | 0 | 0 | |
| 9 | | LATERAL TIES : | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 10 | | TYPE A | 8 | 10 | | 36 | 0.24 | 2.6 | 0 | 0 | 748.8 | 0 | 0 | 0 | 0 | |
| 11 | | TYPE B | 8 | 10 | | 36 | 0.24 | 2.28 | 0 | 0 | 656.6 | 0 | 0 | 0 | 0 | |
| 13 | | TYPE C | 8 | 10 | | 36 | 0.24 | 1.35 | 0 | 0 | 388.8 | 0 | 0 | 0 | 0 | |
| 14 | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 15 | | CC2 | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 16 | | LONGITUDINAL BARS | 3 | 32 | | 10 | 1.44 | 5.49 | 0 | 0 | 0 | 0 | 0 | 0 | 165 | |
| 18 | | LATERAL TIES: | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

## Table 3.6 BBS Sheet 2 for Column

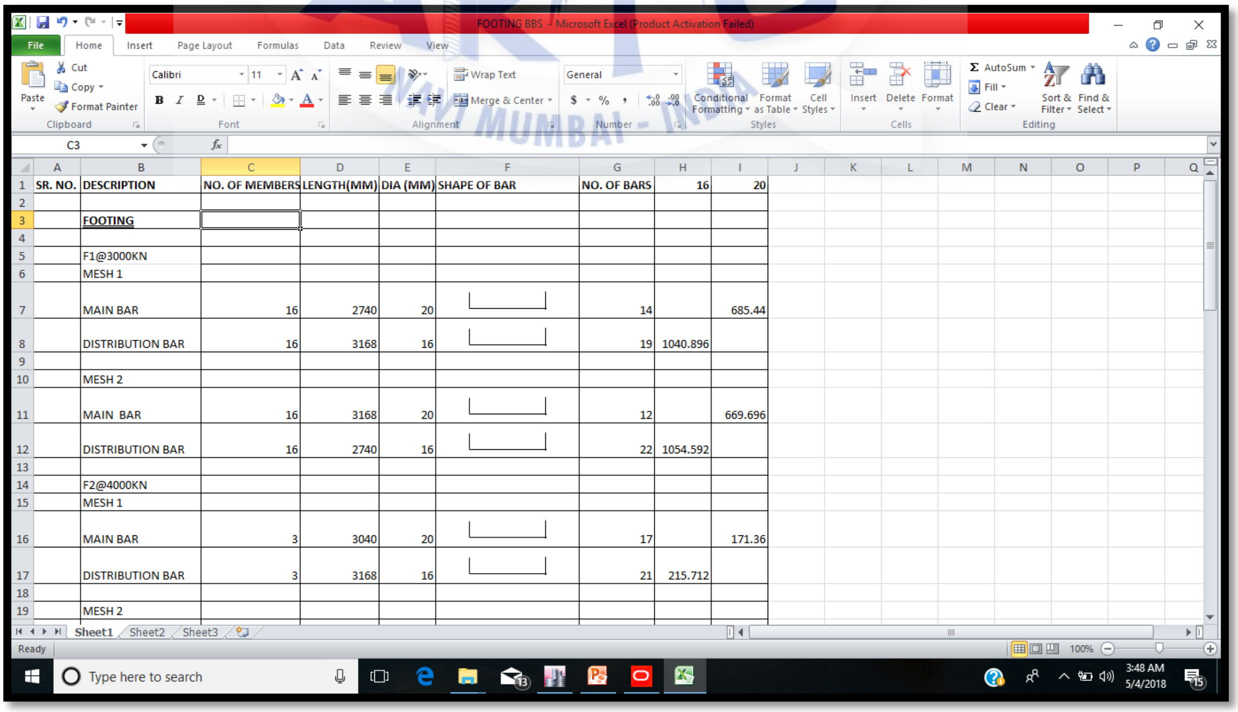


| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 144 | | TYPE B | 1 | 10 | | 36 | 0.24 | 1.35 | 0 | 0 | 48.6 | 0 | 0 | 0 | 0 |
| 145 | | TYPE C | 1 | 10 | | 36 | 0.24 | 1.35 | 0 | 0 | 48.6 | 0 | 0 | 0 | 0 |
| 146 | | | | | | | | | | | | | | | |
| 147 | | TOTAL LENGTH OF BAR | | | | | | | | | 5798 | 267 | 743 | 103.5 | 362 |
| 148 | | | | | | | | | | | | | | | |
| 149 | | LENGTH OF BAR PER UNIT WEIGHT | | | | | | | | | 0.617 | 1.58 | 2.47 | 3.85 | 6.32 |
| 150 | | | | | | | | | | | | | | | |
| 151 | | TOTAL WEIGHT OF BAR IN KGS | | | | | | | | | 3577 | 422 | 1833 | 398.5 | 2290 |

### 3.6.2.3 **Bar Bending Schedule For Footing**

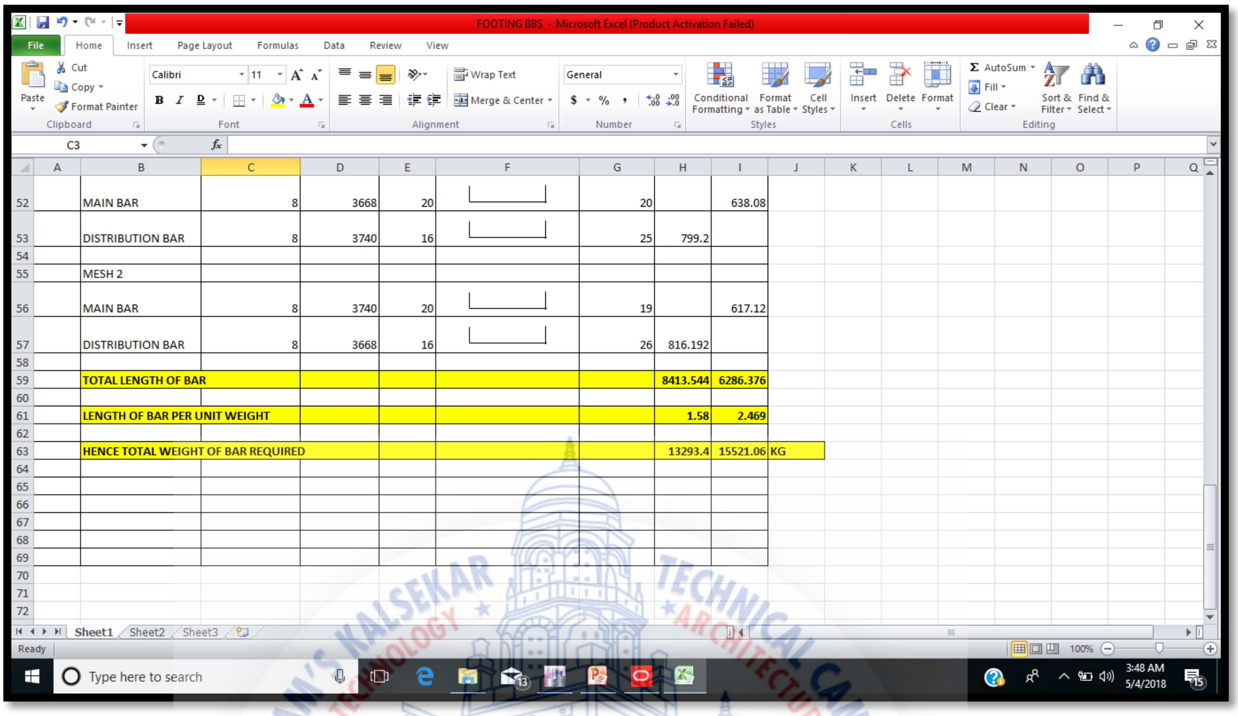
Table 3.8 and 3.9 shows Bar Bending Schedule For Footings

## Table 3.7 BBS Sheet 1 for Footing



| | SR. NO. | DESCRIPTION | NO. OF MEMBERS | LENGTH(MM) | DIA (MM) | SHAPE OF BAR | NO. OF BARS | 16 | 20 |
|---|---|---|---|---|---|---|---|---|---|
| 2 | | | | | | | | | |
| 3 | | FOOTING | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | F1@3000KN | | | | | | | |
| 6 | | MESH 1 | | | | | | | |
| 7 | | MAIN BAR | 16 | 2740 | 20 | | 14 | | 685.44 |
| 8 | | DISTRIBUTION BAR | 16 | 3168 | 16 | | 19 | 1040.896 | |
| 9 | | | | | | | | | |
| 10 | | MESH 2 | | | | | | | |
| 11 | | MAIN BAR | 16 | 3168 | 20 | | 12 | | 669.696 |
| 12 | | DISTRIBUTION BAR | 16 | 2740 | 16 | | 22 | 1054.592 | |
| 13 | | | | | | | | | |
| 14 | | F2@4000KN | | | | | | | |
| 15 | | MESH 1 | | | | | | | |
| 16 | | MAIN BAR | 3 | 3040 | 20 | | 17 | | 171.36 |
| 17 | | DISTRIBUTION BAR | 3 | 3168 | 16 | | 21 | 215.712 | |
| 18 | | | | | | | | | |
| 19 | | MESH 2 | | | | | | | |

**Table 3.8 BBS Sheet 2 for Footing**

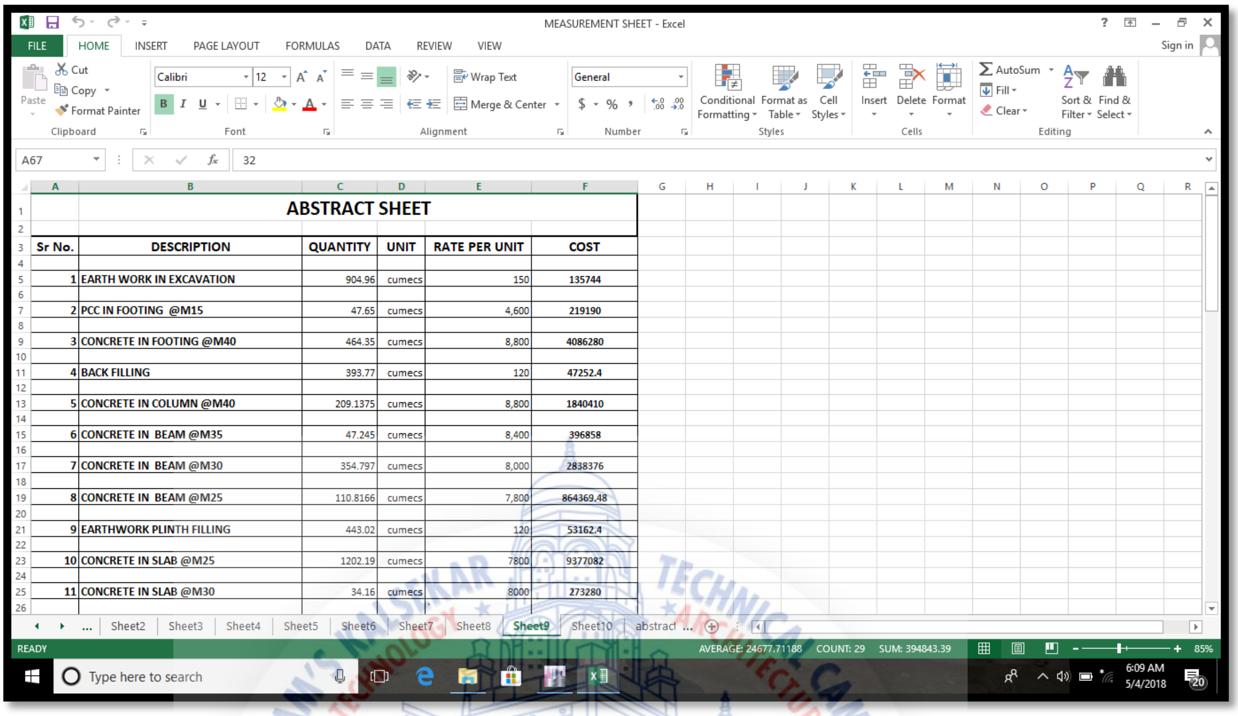


| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| 52 | | MAIN BAR | 8 | 3668 | 20 | | 20 | | 638.08 | |
| 53 | | DISTRIBUTION BAR | 8 | 3740 | 16 | | 25 | 799.2 | | |
| 54 | | | | | | | | | | |
| 55 | | MESH 2 | | | | | | | | |
| 56 | | MAIN BAR | 8 | 3740 | 20 | | 19 | | 617.12 | |
| 57 | | DISTRIBUTION BAR | 8 | 3668 | 16 | | 26 | 816.192 | | |
| 58 | | | | | | | | | | |
| 59 | | TOTAL LENGTH OF BAR | | | | | | 8413.544 | 6286.376 | |
| 60 | | | | | | | | | | |
| 61 | | LENGTH OF BAR PER UNIT WEIGHT | | | | | | 1.58 | 2.469 | |
| 62 | | | | | | | | | | |
| 63 | | HENCE TOTAL WEIGHT OF BAR REQUIRED | | | | | | 13293.4 | 15521.06 | KG |

## 3.6.3 Abstract sheets

The cost under item of work calculated from the quantities already computed at workable rate, and the total cost is worked out in a prescribed form known as Abstract Sheet. Table 3.10 shows calculation of cost.

**Table 3.9** Abstract Sheet 1



ABSTRACT SHEET

| Sr No. | DESCRIPTION | QUANTITY | UNIT | RATE PER UNIT | COST |
|---|---|---|---|---|---|
| 1 | EARTH WORK IN EXCAVATION | 904.96 | cumecs | 150 | 135744 |
| 2 | PCC IN FOOTING @M15 | 47.65 | cumecs | 4,600 | 219190 |
| 3 | CONCRETE IN FOOTING @M40 | 464.35 | cumecs | 8,800 | 4086280 |
| 4 | BACK FILLING | 393.77 | cumecs | 120 | 47252.4 |
| 5 | CONCRETE IN COLUMN @M40 | 209.1375 | cumecs | 8,800 | 1840410 |
| 6 | CONCRETE IN BEAM @M35 | 47.245 | cumecs | 8,400 | 396858 |
| 7 | CONCRETE IN BEAM @M30 | 354.797 | cumecs | 8,000 | 2838376 |
| 8 | CONCRETE IN BEAM @M25 | 110.8166 | cumecs | 7,800 | 864369.48 |
| 9 | EARTHWORK PLINTH FILLING | 443.02 | cumecs | 120 | 53162.4 |
| 10 | CONCRETE IN SLAB @M25 | 1202.19 | cumecs | 7800 | 9377082 |
| 11 | CONCRETE IN SLAB @M30 | 34.16 | cumecs | 8000 | 273280 |

## 3.7 Monitoring and Scheduling

With the use of Primavera software the scheduling and modelling of the project was done. Firstly all the activities required was noted then the days needed for the completion of these activities was noted and at last the number of days for its completion was calculated on Primavera. Refer Figure 3.17, 3.18, 3.19, 3.20 and 3.21

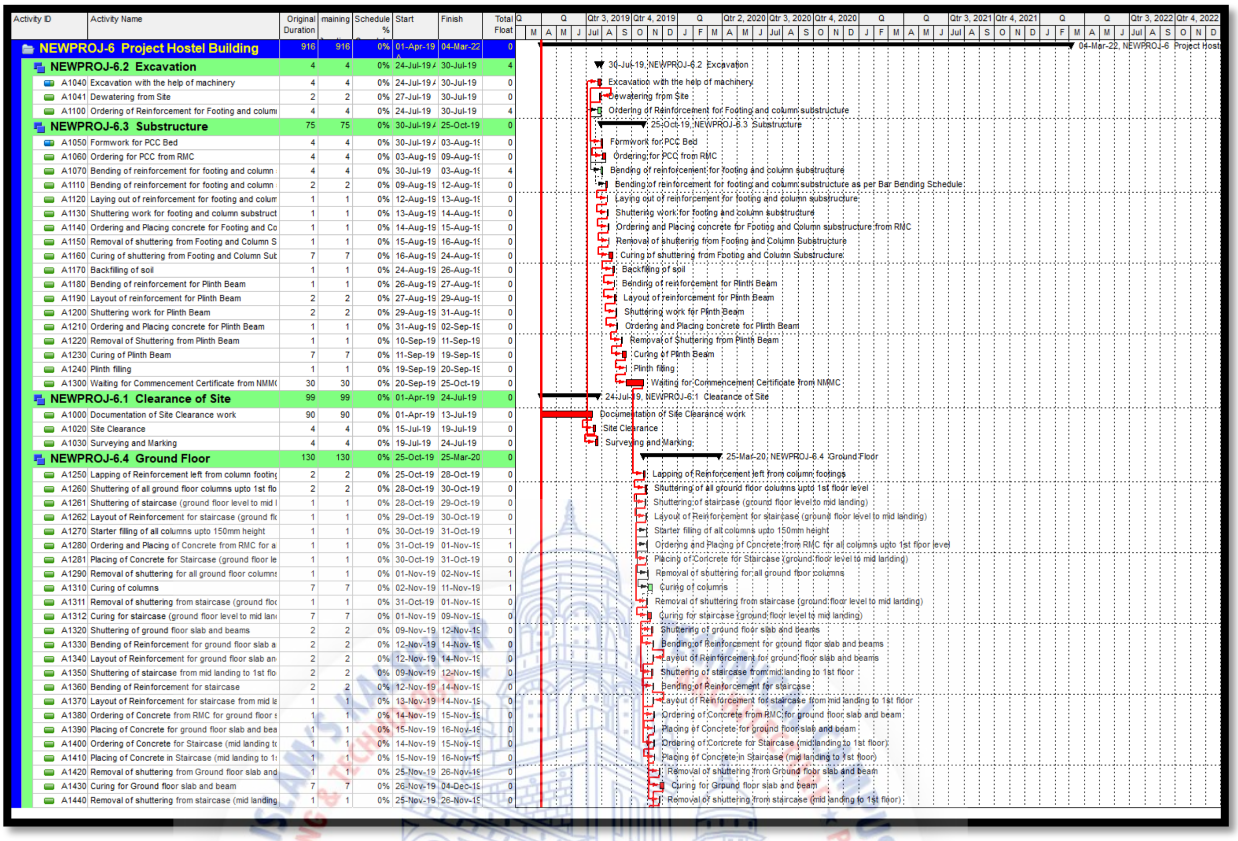


**Figure 3.17** Activities of Project

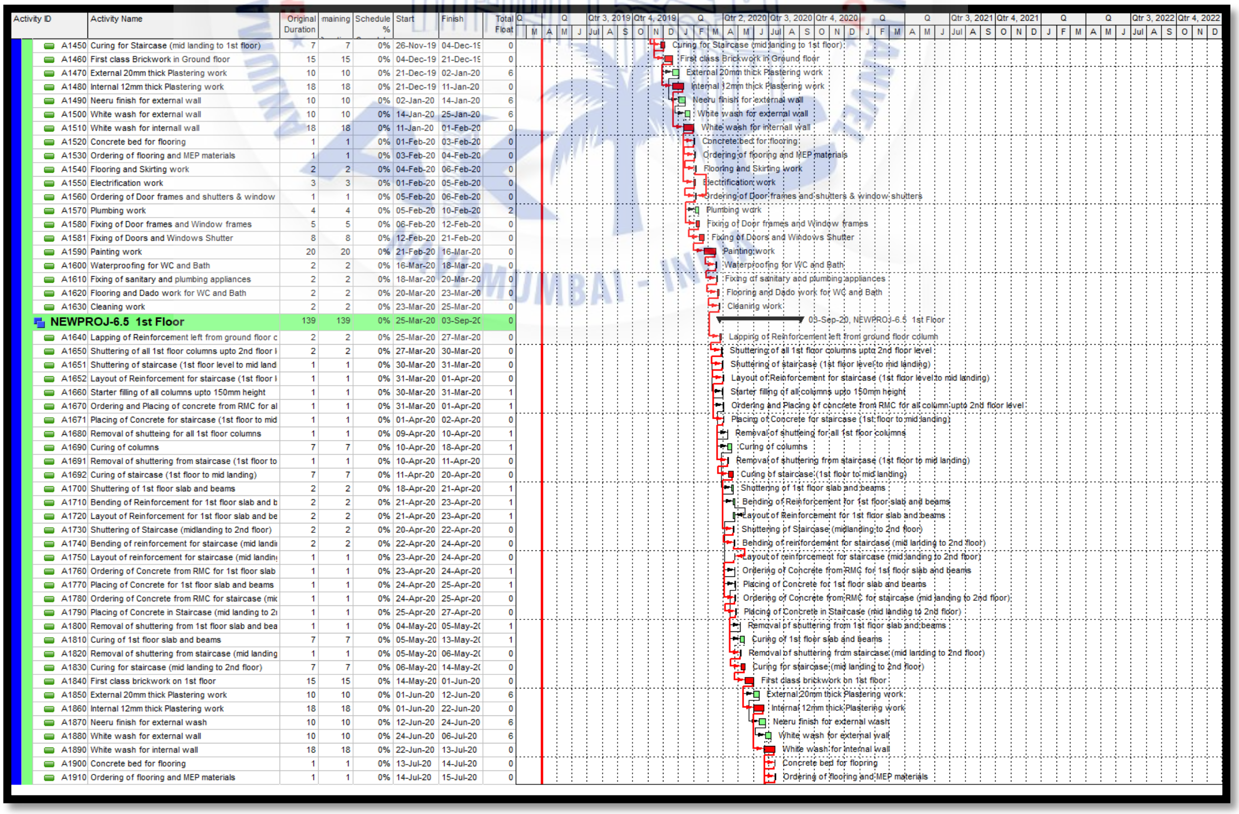
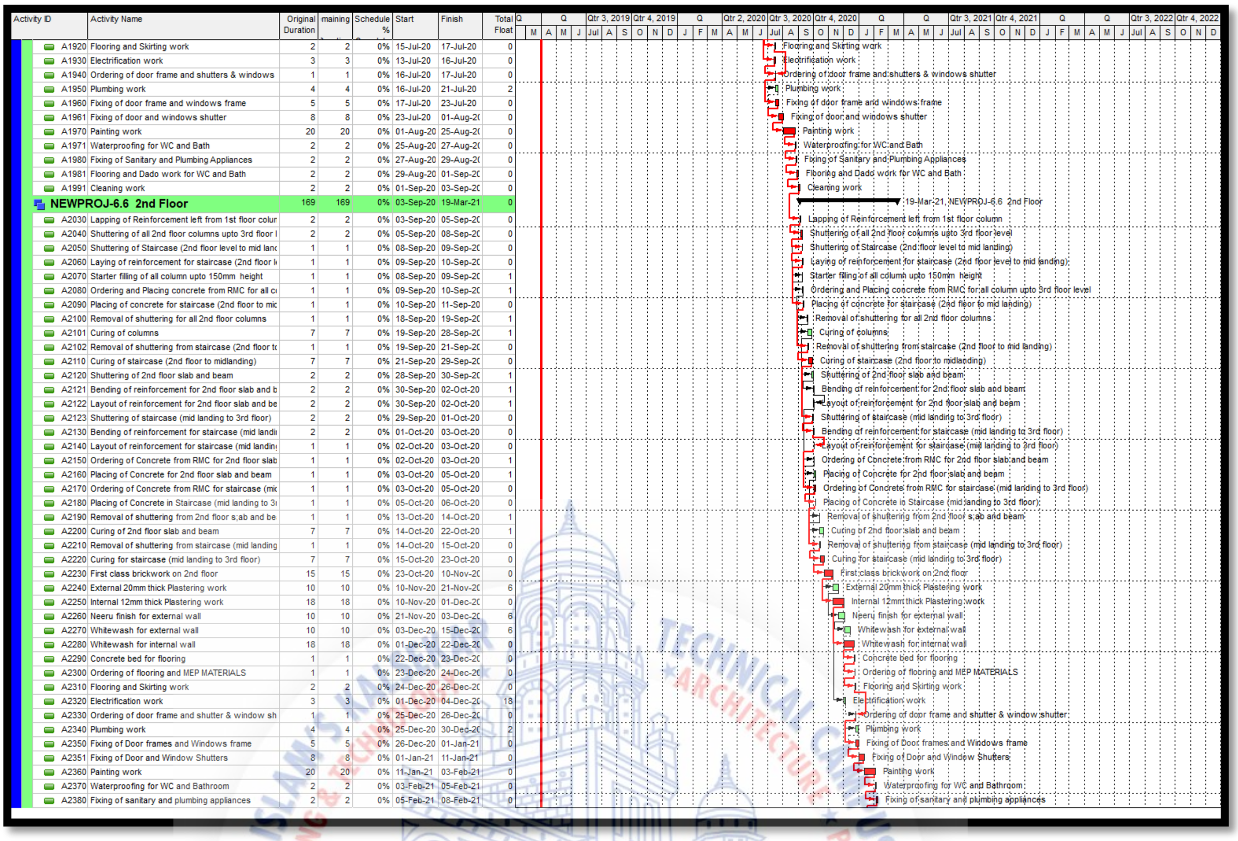
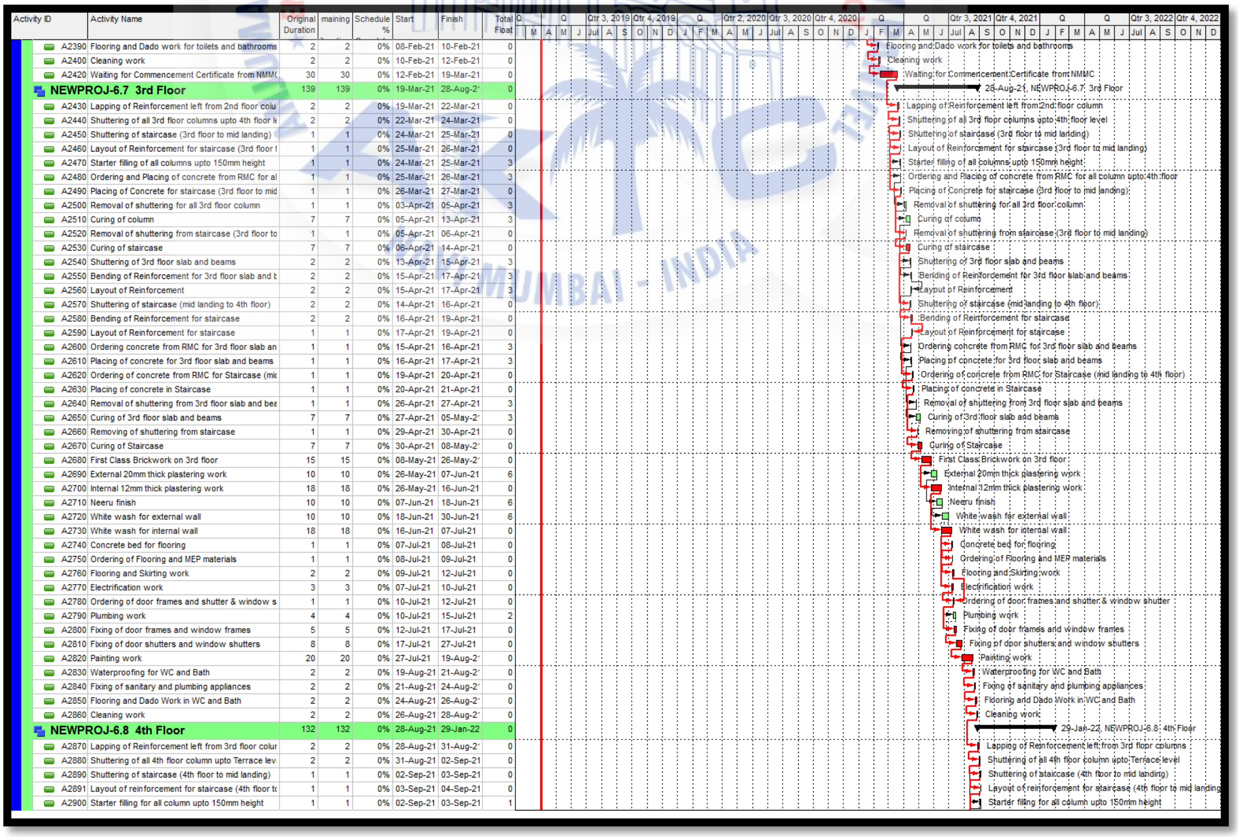


**Figure 3.18** Activities of Project



| Activity ID | Activity Name | Original Duration | maining | Schedule % | Start | Finish | Total Float |
|---|---|---|---|---|---|---|---|
| A1920 | Flooring and Skirting work | 2 | 2 | 0% | 15-Jul-20 | 17-Jul-20 | 0 |
| A1930 | Electrification work | 3 | 3 | 0% | 13-Jul-20 | 16-Jul-20 | 0 |
| A1940 | Ordering of door frame and shutters & windows | 1 | 1 | 0% | 16-Jul-20 | 17-Jul-20 | 0 |
| A1950 | Plumbing work | 4 | 4 | 0% | 16-Jul-20 | 21-Jul-20 | 2 |
| A1960 | Fixing of door frame and windows frame | 5 | 5 | 0% | 17-Jul-20 | 23-Jul-20 | 0 |
| A1961 | Fixing of door and windows shutter | 8 | 8 | 0% | 23-Jul-20 | 01-Aug-2( | 0 |
| A1970 | Painting work | 20 | 20 | 0% | 01-Aug-20 | 25-Aug-2( | 0 |
| A1971 | Waterproofing for WC and Bath | 2 | 2 | 0% | 25-Aug-20 | 27-Aug-2( | 0 |
| A1980 | Fixing of Sanitary and Plumbing Appliances | 2 | 2 | 0% | 27-Aug-20 | 29-Aug-2( | 0 |
| A1981 | Flooring and Dado work for WC and Bath | 2 | 2 | 0% | 29-Aug-20 | 01-Sep-2( | 0 |
| A1991 | Cleaning work | 2 | 2 | 0% | 01-Sep-20 | 03-Sep-2( | 0 |
| **NEWPROJ-6.6 2nd Floor** | | 169 | 169 | 0% | 03-Sep-20 | 19-Mar-21 | 0 |
| A2030 | Lapping of Reinforcement left from 1st floor colur | 2 | 2 | 0% | 03-Sep-20 | 05-Sep-2( | 0 |
| A2040 | Shuttering of all 2nd floor columns upto 3rd floor l | 2 | 2 | 0% | 05-Sep-20 | 08-Sep-2( | 0 |
| A2050 | Shuttering of Staircase (2nd floor level to mid lanc | 1 | 1 | 0% | 08-Sep-20 | 09-Sep-2( | 0 |
| A2060 | Laying of reinforcement for staircase (2nd floor l | 1 | 1 | 0% | 09-Sep-20 | 10-Sep-2( | 0 |
| A2070 | Starter filling of all column upto 150mm height | 1 | 1 | 0% | 08-Sep-20 | 09-Sep-2( | 1 |
| A2080 | Ordering and Placing concrete from RMC for all c | 1 | 1 | 0% | 09-Sep-20 | 10-Sep-2( | 1 |
| A2090 | Placing of concrete for staircase (2nd floor to mic | 1 | 1 | 0% | 10-Sep-20 | 11-Sep-20 | 0 |
| A2100 | Removal of shuttering for all 2nd floor columns | 1 | 1 | 0% | 18-Sep-20 | 19-Sep-2( | 1 |
| A2101 | Curing of columns | 7 | 7 | 0% | 19-Sep-20 | 28-Sep-2( | 1 |
| A2102 | Removal of shuttering from staircase (2nd floor tc | 1 | 1 | 0% | 19-Sep-20 | 21-Sep-2( | 0 |
| A2110 | Curing of staircase (2nd floor to midlanding) | 7 | 7 | 0% | 21-Sep-20 | 29-Sep-2( | 0 |
| A2120 | Shuttering of 2nd floor slab and beam | 2 | 2 | 0% | 28-Sep-20 | 30-Sep-2( | 1 |
| A2121 | Bending of reinforcement for 2nd floor slab and b | 2 | 2 | 0% | 30-Sep-20 | 02-Oct-20 | 1 |
| A2122 | Layout of reinforcement for 2nd floor slab and be | 2 | 2 | 0% | 30-Sep-20 | 02-Oct-20 | 1 |
| A2123 | Shuttering of staircase (mid landing to 3rd floor) | 2 | 2 | 0% | 29-Sep-20 | 01-Oct-20 | 0 |
| A2130 | Bending of reinforcement for staircase (mid landi | 2 | 2 | 0% | 01-Oct-20 | 03-Oct-20 | 0 |
| A2140 | Layout of reinforcement for staircase (mid landin | 1 | 1 | 0% | 02-Oct-20 | 03-Oct-20 | 0 |
| A2150 | Ordering of Concrete from RMC for 2nd floor slab | 1 | 1 | 0% | 02-Oct-20 | 03-Oct-20 | 1 |
| A2160 | Placing of Concrete for 2nd floor slab and beam | 1 | 1 | 0% | 03-Oct-20 | 05-Oct-20 | 1 |
| A2170 | Ordering of Concrete from RMC for staircase (mic | 1 | 1 | 0% | 03-Oct-20 | 05-Oct-20 | 0 |
| A2180 | Placing of Concrete in Staircase (mid landing to 3 | 1 | 1 | 0% | 05-Oct-20 | 06-Oct-20 | 0 |
| A2190 | Removal of shuttering from 2nd floor s;ab and be | 1 | 1 | 0% | 13-Oct-20 | 14-Oct-20 | 1 |
| A2200 | Curing of 2nd floor slab and beam | 7 | 7 | 0% | 14-Oct-20 | 22-Oct-20 | 1 |
| A2210 | Removal of shuttering from staircase (mid landing | 1 | 1 | 0% | 14-Oct-20 | 15-Oct-20 | 0 |
| A2220 | Curing for staircase (mid landing to 3rd floor) | 7 | 7 | 0% | 15-Oct-20 | 23-Oct-20 | 0 |
| A2230 | First class brickwork on 2nd floor | 15 | 15 | 0% | 23-Oct-20 | 10-Nov-2( | 0 |
| A2240 | External 20mm thick Plastering work | 10 | 10 | 0% | 10-Nov-20 | 21-Nov-2( | 6 |
| A2250 | Internal 12mm thick Plastering work | 18 | 18 | 0% | 10-Nov-20 | 01-Dec-2( | 0 |
| A2260 | Neeru finish for external wall | 10 | 10 | 0% | 21-Nov-20 | 03-Dec-2( | 6 |
| A2270 | Whitewash for external wall | 10 | 10 | 0% | 03-Dec-20 | 15-Dec-2( | 6 |
| A2280 | Whitewash for internal wall | 18 | 18 | 0% | 01-Dec-20 | 22-Dec-2( | 0 |
| A2290 | Concrete bed for flooring | 1 | 1 | 0% | 22-Dec-20 | 23-Dec-2( | 0 |
| A2300 | Ordering of flooring and MEP MATERIALS | 1 | 1 | 0% | 23-Dec-20 | 24-Dec-2( | 0 |
| A2310 | Flooring and Skirting work | 2 | 2 | 0% | 24-Dec-20 | 26-Dec-2( | 0 |
| A2320 | Electrification work | 3 | 3 | 0% | 01-Dec-20 | 04-Dec-2( | 18 |
| A2330 | Ordering of door frame and shutter & window sh | 1 | 1 | 0% | 25-Dec-20 | 26-Dec-2( | 0 |
| A2340 | Plumbing work | 4 | 4 | 0% | 25-Dec-20 | 30-Dec-2( | 2 |
| A2350 | Fixing of Door frames and Windows frame | 5 | 5 | 0% | 26-Dec-20 | 01-Jan-21 | 0 |
| A2351 | Fixing of Door and Window Shutters | 8 | 8 | 0% | 01-Jan-21 | 11-Jan-21 | 0 |
| A2360 | Painting work | 20 | 20 | 0% | 11-Jan-21 | 03-Feb-21 | 0 |
| A2370 | Waterproofing for WC and Bathroom | 2 | 2 | 0% | 03-Feb-21 | 05-Feb-21 | 0 |
| A2380 | Fixing of sanitary and plumbing appliances | 2 | 2 | 0% | 05-Feb-21 | 08-Feb-21 | 0 |

**Figure 3.19** Activities of Project



| Activity ID | Activity Name | Original Duration | maining | Schedule % | Start | Finish | Total Float |
|---|---|---|---|---|---|---|---|
| A2390 | Flooring and Dado work for toilets and bathrooms | 2 | 2 | 0% | 08-Feb-21 | 10-Feb-21 | 0 |
| A2400 | Cleaning work | 2 | 2 | 0% | 10-Feb-21 | 12-Feb-21 | 0 |
| A2420 | Waiting for Commencement Certificate from NMM( | 30 | 30 | 0% | 12-Feb-21 | 19-Mar-21 | 0 |
| **NEWPROJ-6.7 3rd Floor** | | 139 | 139 | 0% | 19-Mar-21 | 28-Aug-2' | 0 |
| A2430 | Lapping of Reinforcement left from 2nd floor colu | 2 | 2 | 0% | 19-Mar-21 | 22-Mar-21 | 0 |
| A2440 | Shuttering of all 3rd floor columns upto 4th floor le | 2 | 2 | 0% | 22-Mar-21 | 24-Mar-21 | 0 |
| A2450 | Shuttering of staircase (3rd floor to mid landing) | 1 | 1 | 0% | 24-Mar-21 | 25-Mar-21 | 0 |
| A2460 | Layout of Reinforcement for staircase (3rd floor t | 1 | 1 | 0% | 25-Mar-21 | 26-Mar-21 | 0 |
| A2470 | Starter filling of all columns upto 150mm height | 1 | 1 | 0% | 24-Mar-21 | 25-Mar-21 | 3 |
| A2480 | Ordering and Placing of concrete from RMC for al | 1 | 1 | 0% | 25-Mar-21 | 26-Mar-21 | 3 |
| A2490 | Placing of Concrete for staircase (3rd floor to mid | 1 | 1 | 0% | 26-Mar-21 | 27-Mar-21 | 0 |
| A2500 | Removal of shuttering for all 3rd floor column | 1 | 1 | 0% | 03-Apr-21 | 05-Apr-21 | 3 |
| A2510 | Curing of column | 7 | 7 | 0% | 05-Apr-21 | 13-Apr-21 | 3 |
| A2520 | Removal of shuttering from staircase (3rd floor to | 1 | 1 | 0% | 05-Apr-21 | 06-Apr-21 | 0 |
| A2530 | Curing of staircase | 7 | 7 | 0% | 06-Apr-21 | 14-Apr-21 | 0 |
| A2540 | Shuttering of 3rd floor slab and beams | 2 | 2 | 0% | 13-Apr-21 | 15-Apr-21 | 3 |
| A2550 | Bending of Reinforcement for 3rd floor slab and b | 2 | 2 | 0% | 15-Apr-21 | 17-Apr-21 | 3 |
| A2560 | Layout of Reinforcement | 2 | 2 | 0% | 15-Apr-21 | 17-Apr-21 | 3 |
| A2570 | Shuttering of staircase (mid landing to 4th floor) | 2 | 2 | 0% | 14-Apr-21 | 16-Apr-21 | 0 |
| A2580 | Bending of Reinforcement for staircase | 2 | 2 | 0% | 16-Apr-21 | 19-Apr-21 | 0 |
| A2590 | Layout of Reinforcement for staircase | 1 | 1 | 0% | 17-Apr-21 | 19-Apr-21 | 0 |
| A2600 | Ordering concrete from RMC for 3rd floor slab an | 1 | 1 | 0% | 15-Apr-21 | 16-Apr-21 | 3 |
| A2610 | Placing of concrete for 3rd floor slab and beams | 1 | 1 | 0% | 16-Apr-21 | 17-Apr-21 | 3 |
| A2620 | Ordering of concrete from RMC for Staircase (mic | 1 | 1 | 0% | 19-Apr-21 | 20-Apr-21 | 0 |
| A2630 | Placing of concrete in Staircase | 1 | 1 | 0% | 20-Apr-21 | 21-Apr-21 | 0 |
| A2640 | Removal of shuttering from 3rd floor slab and bea | 1 | 1 | 0% | 26-Apr-21 | 27-Apr-21 | 3 |
| A2650 | Curing of 3rd floor slab and beams | 7 | 7 | 0% | 27-Apr-21 | 05-May-2' | 3 |
| A2660 | Removing of shuttering from staircase | 1 | 1 | 0% | 29-Apr-21 | 30-Apr-21 | 0 |
| A2670 | Curing of Staircase | 7 | 7 | 0% | 30-Apr-21 | 08-May-2' | 0 |
| A2680 | First Class Brickwork on 3rd floor | 15 | 15 | 0% | 08-May-21 | 26-May-2' | 0 |
| A2690 | External 20mm thick plastering work | 10 | 10 | 0% | 26-May-21 | 07-Jun-21 | 6 |
| A2700 | Internal 12mm thick plastering work | 18 | 18 | 0% | 26-May-21 | 16-Jun-21 | 0 |
| A2710 | Neeru finish | 10 | 10 | 0% | 07-Jun-21 | 18-Jun-21 | 6 |
| A2720 | White wash for external wall | 10 | 10 | 0% | 18-Jun-21 | 30-Jun-21 | 6 |
| A2730 | White wash for internal wall | 18 | 18 | 0% | 16-Jun-21 | 07-Jul-21 | 0 |
| A2740 | Concrete bed for flooring | 1 | 1 | 0% | 07-Jul-21 | 08-Jul-21 | 0 |
| A2750 | Ordering of Flooring and MEP materials | 1 | 1 | 0% | 08-Jul-21 | 09-Jul-21 | 0 |
| A2760 | Flooring and Skirting work | 2 | 2 | 0% | 09-Jul-21 | 12-Jul-21 | 0 |
| A2770 | Electrification work | 3 | 3 | 0% | 07-Jul-21 | 10-Jul-21 | 0 |
| A2780 | Ordering of door frames and shutter & window s | 1 | 1 | 0% | 10-Jul-21 | 12-Jul-21 | 0 |
| A2790 | Plumbing work | 4 | 4 | 0% | 10-Jul-21 | 15-Jul-21 | 2 |
| A2800 | Fixing of door frames and window frames | 5 | 5 | 0% | 12-Jul-21 | 17-Jul-21 | 0 |
| A2810 | Fixing of door shutters and window shutters | 8 | 8 | 0% | 17-Jul-21 | 27-Jul-21 | 0 |
| A2820 | Painting work | 20 | 20 | 0% | 27-Jul-21 | 19-Aug-2' | 0 |
| A2830 | Waterproofing for WC and Bath | 2 | 2 | 0% | 19-Aug-21 | 21-Aug-2' | 0 |
| A2840 | Fixing of sanitary and plumbing appliances | 2 | 2 | 0% | 21-Aug-21 | 24-Aug-2' | 0 |
| A2850 | Flooring and Dado Work in WC and Bath | 2 | 2 | 0% | 24-Aug-21 | 26-Aug-2' | 0 |
| A2860 | Cleaning work | 2 | 2 | 0% | 26-Aug-21 | 28-Aug-2' | 0 |
| **NEWPROJ-6.8 4th Floor** | | 132 | 132 | 0% | 28-Aug-21 | 29-Jan-22 | 0 |
| A2870 | Lapping of Reinforcement left from 3rd floor colur | 2 | 2 | 0% | 28-Aug-21 | 31-Aug-2' | 0 |
| A2880 | Shuttering of all 4th floor column upto Terrace lev | 2 | 2 | 0% | 31-Aug-21 | 02-Sep-21 | 0 |
| A2890 | Shuttering of staircase (4th floor to mid landing) | 1 | 1 | 0% | 02-Sep-21 | 03-Sep-21 | 0 |
| A2891 | Layout of reinforcement for staircase (4th floor tc | 1 | 1 | 0% | 03-Sep-21 | 04-Sep-21 | 0 |
| A2900 | Starter filling for all column upto 150mm height | 1 | 1 | 0% | 02-Sep-21 | 03-Sep-21 | 1 |

Figure 3.20 **Activities of Project**

| Activity ID | Activity Name | Original Duration | Remaining Duration | Schedule % Complete | Start | Finish | Total Float |
|---|---|---|---|---|---|---|---|
| A2910 | Ordering and Placing concrete from RMC for colu | 1 | 1 | 0% | 03-Sep-21 | 04-Sep-21 | 1 |
| A2920 | Placing concrete for staircase | 1 | 1 | 0% | 04-Sep-21 | 06-Sep-21 | 0 |
| A2930 | Removal of shuttering for all columns | 1 | 1 | 0% | 04-Sep-21 | 06-Sep-21 | 1 |
| A2940 | Curing of columns | 7 | 7 | 0% | 06-Sep-21 | 14-Sep-21 | 1 |
| A2950 | Removal of shuttering from staircase | 1 | 1 | 0% | 06-Sep-21 | 07-Sep-21 | 0 |
| A2960 | Curing of staircase | 7 | 7 | 0% | 07-Sep-21 | 15-Sep-21 | 0 |
| A2970 | Shuttering of 4th floor slab and beams | 2 | 2 | 0% | 14-Sep-21 | 16-Sep-21 | 1 |
| A2980 | Bending of Reinforcement for 4th floor slab and b | 2 | 2 | 0% | 16-Sep-21 | 18-Sep-21 | 1 |
| A2990 | Layout of Reinforcement | 2 | 2 | 0% | 16-Sep-21 | 18-Sep-21 | 1 |
| A3000 | Shuttering of Staircase (mid landing to head room | 2 | 2 | 0% | 15-Sep-21 | 17-Sep-21 | 0 |
| A3010 | Bending of Reinforcement for staircase | 2 | 2 | 0% | 17-Sep-21 | 20-Sep-21 | 0 |
| A3020 | Layout of Reinforcement | 1 | 1 | 0% | 18-Sep-21 | 20-Sep-21 | 0 |
| A3030 | Ordering concrete from RMC for 4th floor slab ar | 1 | 1 | 0% | 18-Sep-21 | 20-Sep-21 | 1 |
| A3040 | Placing concrete for 4th floor slab and beam | 1 | 1 | 0% | 20-Sep-21 | 21-Sep-21 | 1 |
| A3050 | Ordering of concrete from RMC for staircase (mic | 1 | 1 | 0% | 20-Sep-21 | 21-Sep-21 | 0 |
| A3060 | Placing of concrete in Staircase | 1 | 1 | 0% | 21-Sep-21 | 22-Sep-21 | 0 |
| A3070 | Removal of shuttering from 4th floor slab and bea | 1 | 1 | 0% | 29-Sep-21 | 30-Sep-21 | 1 |
| A3080 | Curing of 4th floor slab and beam | 7 | 7 | 0% | 30-Sep-21 | 08-Oct-21 | 1 |
| A3090 | Removal of shuttering from Staircase | 1 | 1 | 0% | 30-Sep-21 | 01-Oct-21 | 0 |
| A3100 | Curing of staircase | 7 | 7 | 0% | 01-Oct-21 | 09-Oct-21 | 0 |
| A3110 | First class brickwork on 4th floor | 15 | 15 | 0% | 09-Oct-21 | 27-Oct-21 | 0 |
| A3120 | External 20mm thick Plastering work | 10 | 10 | 0% | 27-Oct-21 | 08-Nov-21 | 6 |
| A3130 | Internal 12mm thick Plastering work | 18 | 18 | 0% | 27-Oct-21 | 17-Nov-21 | 0 |
| A3140 | Neeru Finish | 10 | 10 | 0% | 08-Nov-21 | 19-Nov-21 | 6 |
| A3150 | White wash for External wall | 10 | 10 | 0% | 19-Nov-21 | 01-Dec-21 | 6 |
| A3160 | White wash for Internal wall | 18 | 18 | 0% | 17-Nov-21 | 08-Dec-21 | 0 |
| A3170 | Concrete Bed for Flooring | 1 | 1 | 0% | 08-Dec-21 | 09-Dec-21 | 0 |
| A3180 | Ordering of Flooring and MEP Materials | 1 | 1 | 0% | 09-Dec-21 | 10-Dec-21 | 0 |
| A3190 | Flooring and Skirting work | 2 | 2 | 0% | 10-Dec-21 | 13-Dec-21 | 0 |
| A3200 | Electrification work | 3 | 3 | 0% | 08-Dec-21 | 11-Dec-21 | 0 |
| A3210 | Ordering of Door frames and shutter & window s | 1 | 1 | 0% | 11-Dec-21 | 13-Dec-21 | 0 |
| A3220 | Plumbing work | 4 | 4 | 0% | 11-Dec-21 | 16-Dec-21 | 2 |
| A3230 | Fixing of door frames and windows frames | 5 | 5 | 0% | 13-Dec-21 | 18-Dec-21 | 0 |
| A3240 | Fixing of door and window shutters | 8 | 8 | 0% | 18-Dec-21 | 28-Dec-21 | 0 |
| A3250 | Painting work | 20 | 20 | 0% | 28-Dec-21 | 20-Jan-22 | 0 |
| A3260 | Waterproofing for WC and Bath | 2 | 2 | 0% | 20-Jan-22 | 22-Jan-22 | 0 |
| A3270 | Fixing of sanitary and plumbing appliances | 2 | 2 | 0% | 22-Jan-22 | 25-Jan-22 | 0 |
| A3280 | Flooring and Dado work in WC and Bath | 2 | 2 | 0% | 25-Jan-22 | 27-Jan-22 | 0 |
| A3290 | Cleaning work | 2 | 2 | 0% | 27-Jan-22 | 29-Jan-22 | 0 |
| **NEWPROJ-6.9 Terrace** | | 29 | 29 | 0% | 29-Jan-22 | 04-Mar-22 | 0 |
| A3300 | First Class Brickwork for Headroom | 2 | 2 | 0% | 29-Jan-22 | 01-Feb-22 | 0 |
| A3310 | First Class Brickwork for Parapet Wall | 8 | 8 | 0% | 29-Jan-22 | 08-Feb-22 | 0 |
| A3320 | External 20mm thick Plastering work | 5 | 5 | 0% | 08-Feb-22 | 14-Feb-22 | 2 |
| A3330 | Internal 12mm thick Plasteing work | 5 | 5 | 0% | 08-Feb-22 | 14-Feb-22 | 0 |
| A3340 | Neeru wash | 5 | 5 | 0% | 14-Feb-22 | 19-Feb-22 | 2 |
| A3350 | White wash for External Wall | 5 | 5 | 0% | 19-Feb-22 | 25-Feb-22 | 2 |
| A3360 | White wash for Internal wall | 5 | 5 | 0% | 14-Feb-22 | 19-Feb-22 | 0 |
| A3370 | Waterproofing work | 3 | 3 | 0% | 19-Feb-22 | 23-Feb-22 | 0 |
| A3380 | Flooring | 4 | 4 | 0% | 23-Feb-22 | 28-Feb-22 | 0 |
| A3390 | External Painting | 2 | 2 | 0% | 28-Feb-22 | 02-Mar-22 | 0 |
| A3400 | Cleaning work | 2 | 2 | 0% | 02-Mar-22 | 04-Mar-22 | 0 |
| A3410 | Project Finished | 0 | 0 | 0% | | 04-Mar-22 | 0 |

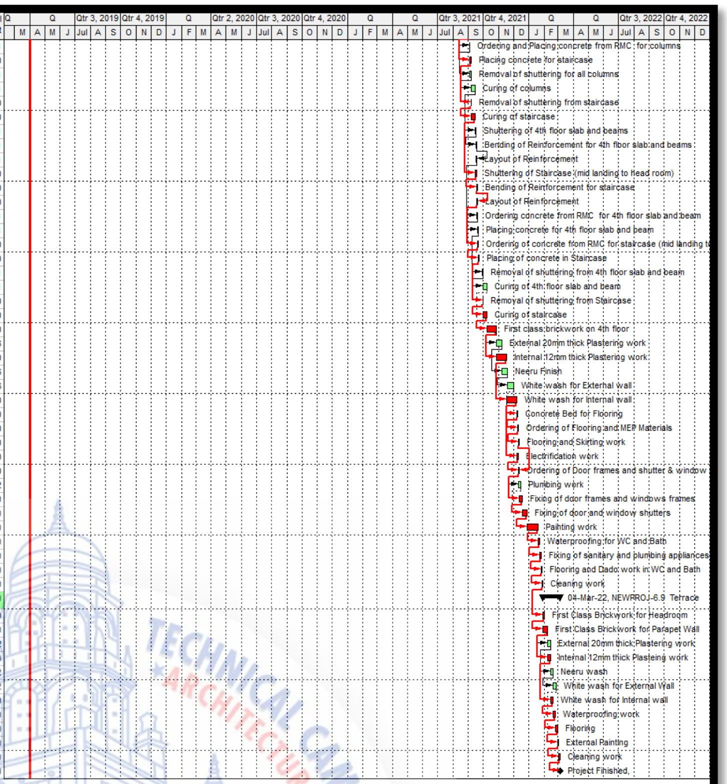


**Figure 3.21** Activities of Project

# Chapter 4

## 4.1 Results and Discussions

### 4.1.1 AutoCAD

After the necessary corrections were made on the plan with the help of AutoCAD this was the new plan the was adopted for our further work that is designing, estimation of quantity and cost and the scheduling and monitoring of the same. Figure 4.1 shows final plan of the Hostel Building.

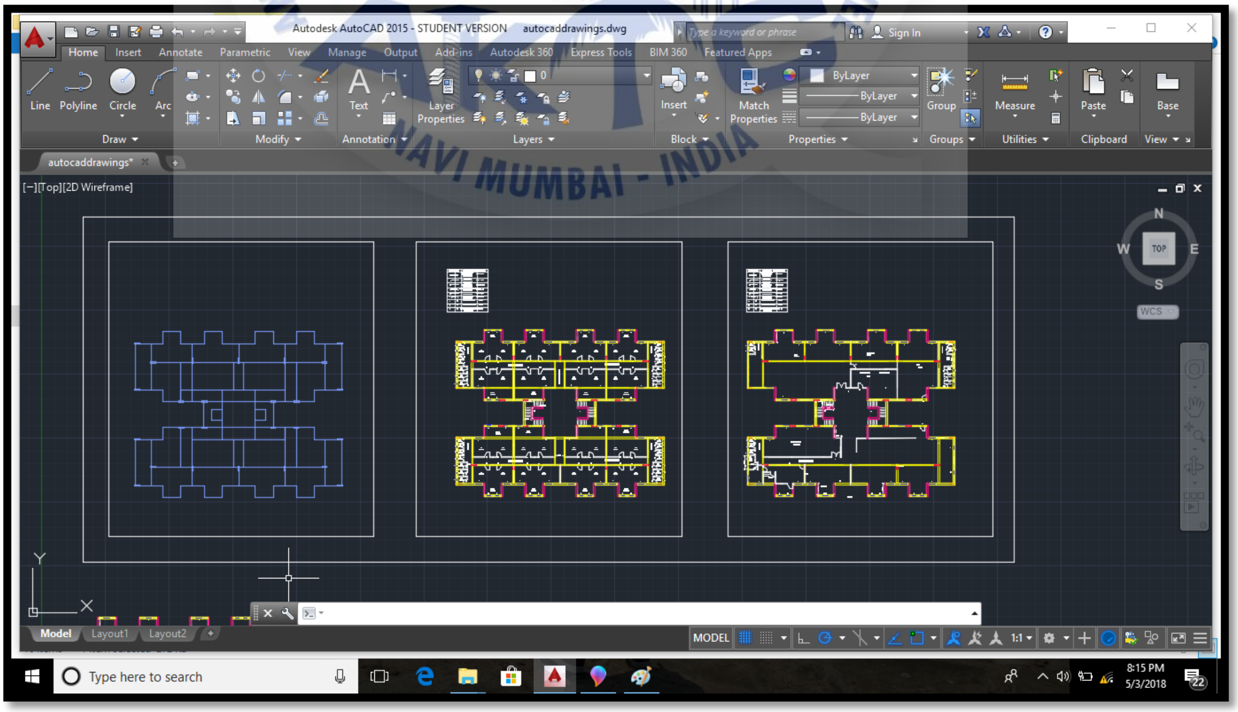


**Figure 4.1** Final Plan

## 4.1.2 ETABS

After the detailed analysis of structure, the following results were obtained which shows the area of steel required in respective structural members (beams, columns, shear walls). Along with the steel area, the bending moment details, shear force details and deflections in each beam is also obtained in a systematic manner. All these details are obtained in an auto-generated ".docx" file which is generated automatically by ETABS software while we work on the structure. Necessary snapshots are provided below.

Following are some of the cross-sections and longitudinal sections from the structure along with the reinforcement details:

- Figure 4.3 shows section of Beam A
- Figures 4.4 shows section of Beam B
- Figure 4.5 shows section of Beam C
- Figure 4.6 shows section of Column A
- Figure 4.7 shows section of Column B
- Figure 4.8 shows section of Column C,D and E

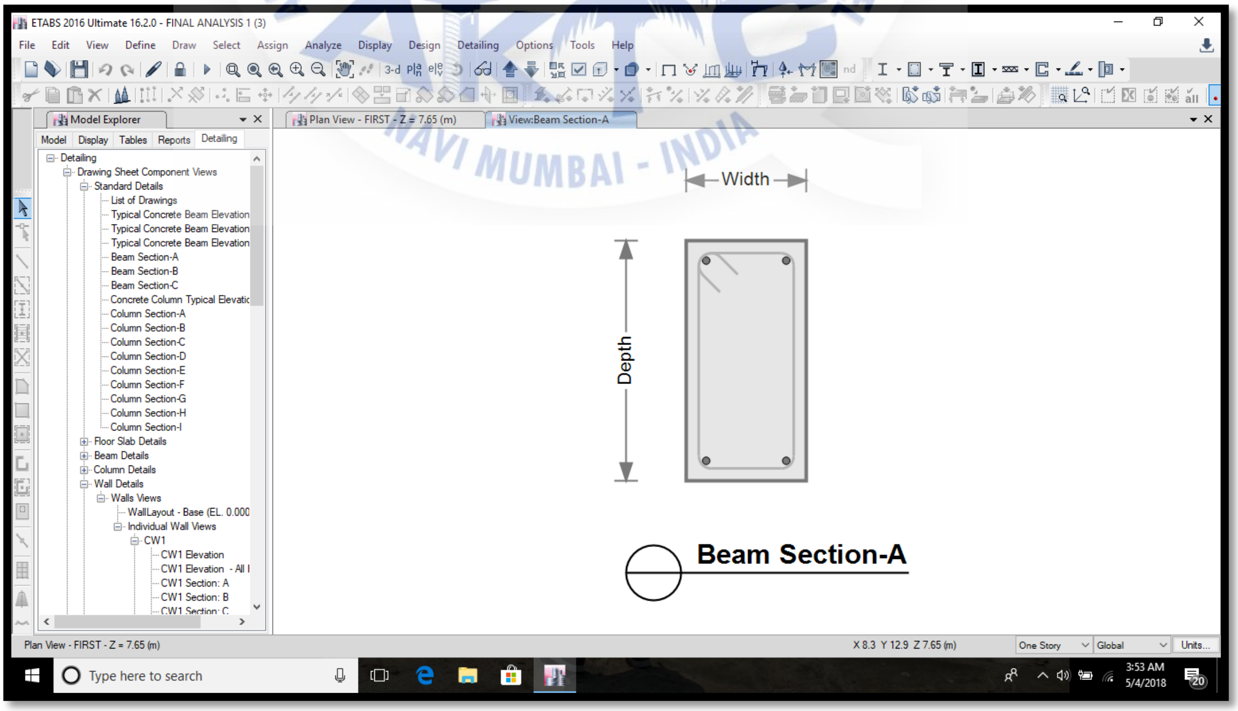



**Figure 4.2 Beam Section A**

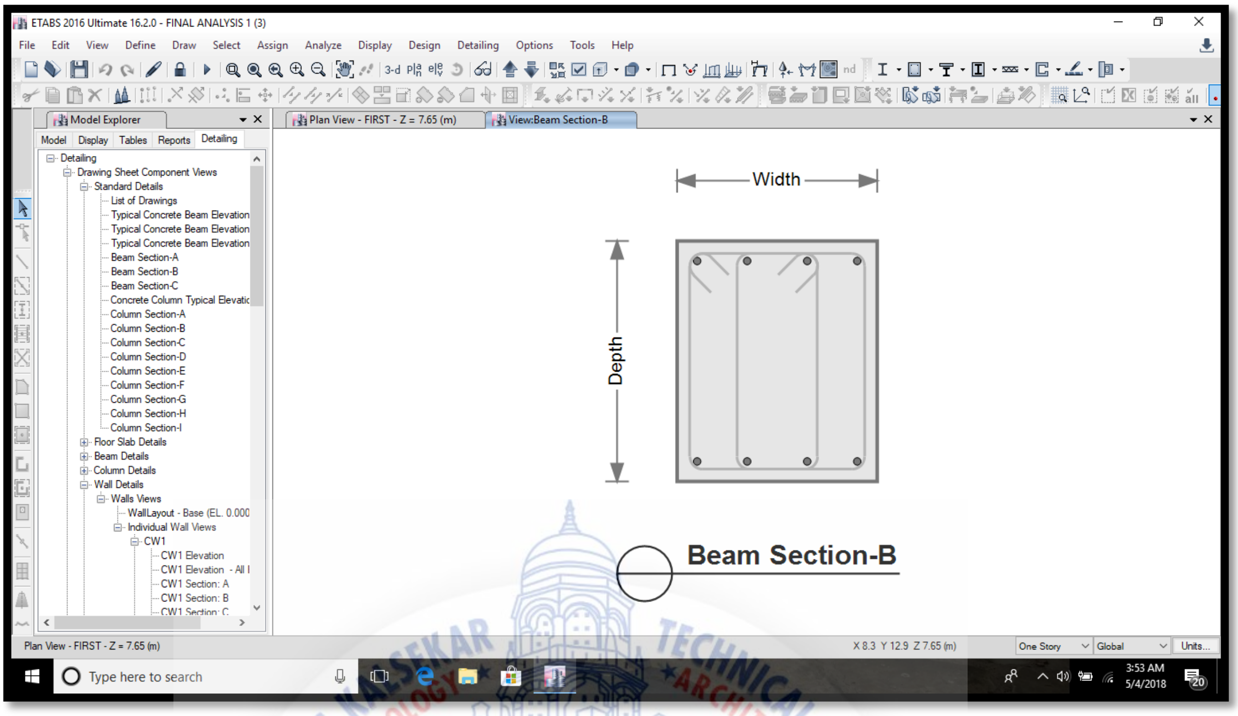



**Figure 4.3 Beam Section B**

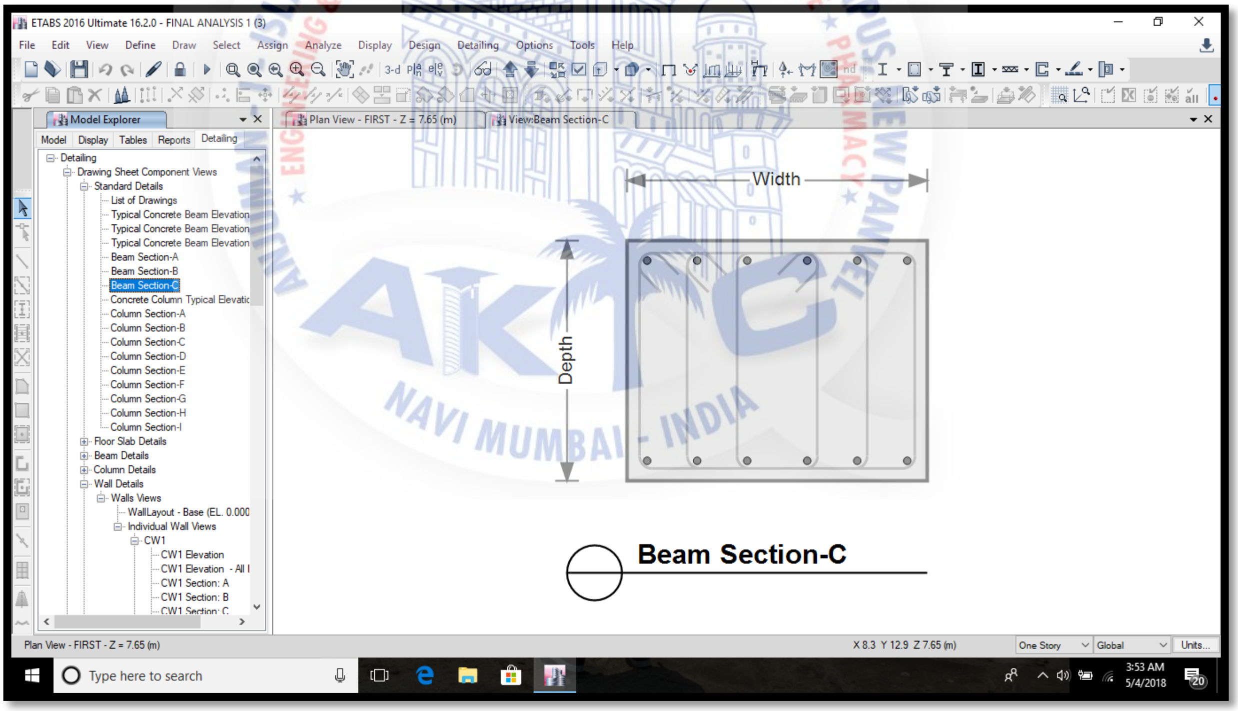



**Figure 4.4 Beam Section C**

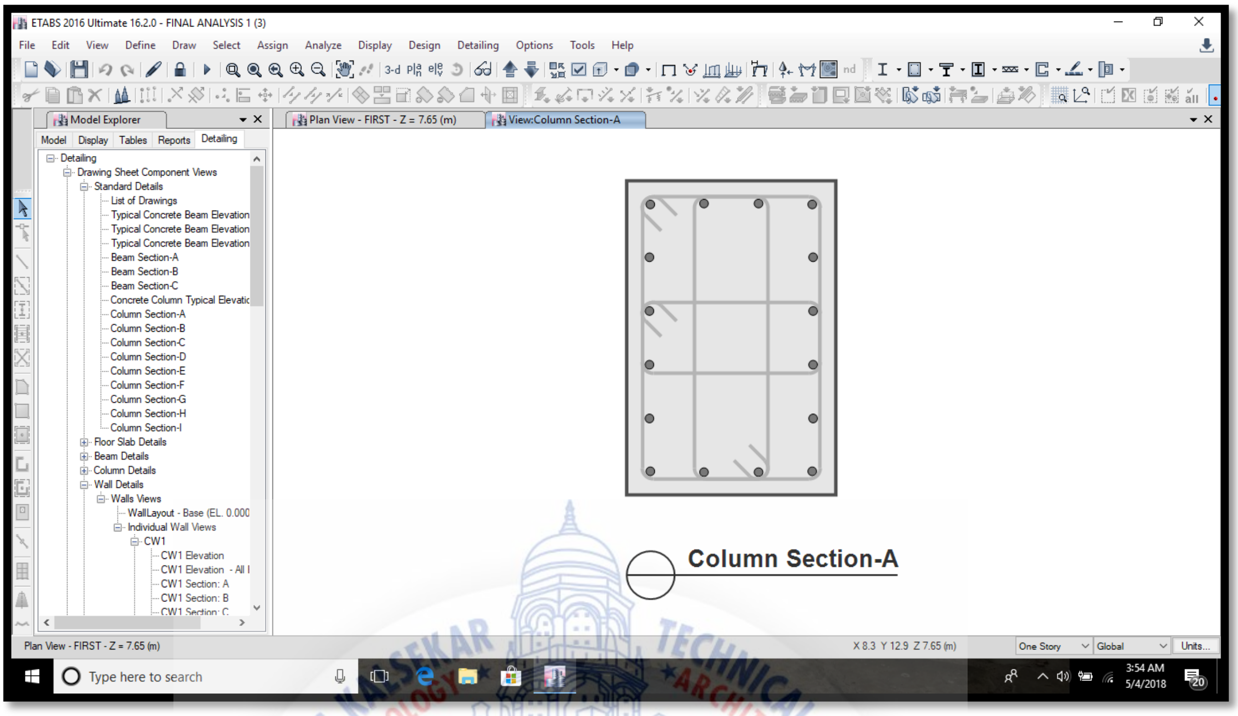



**Figure 4.5 Column Section A**

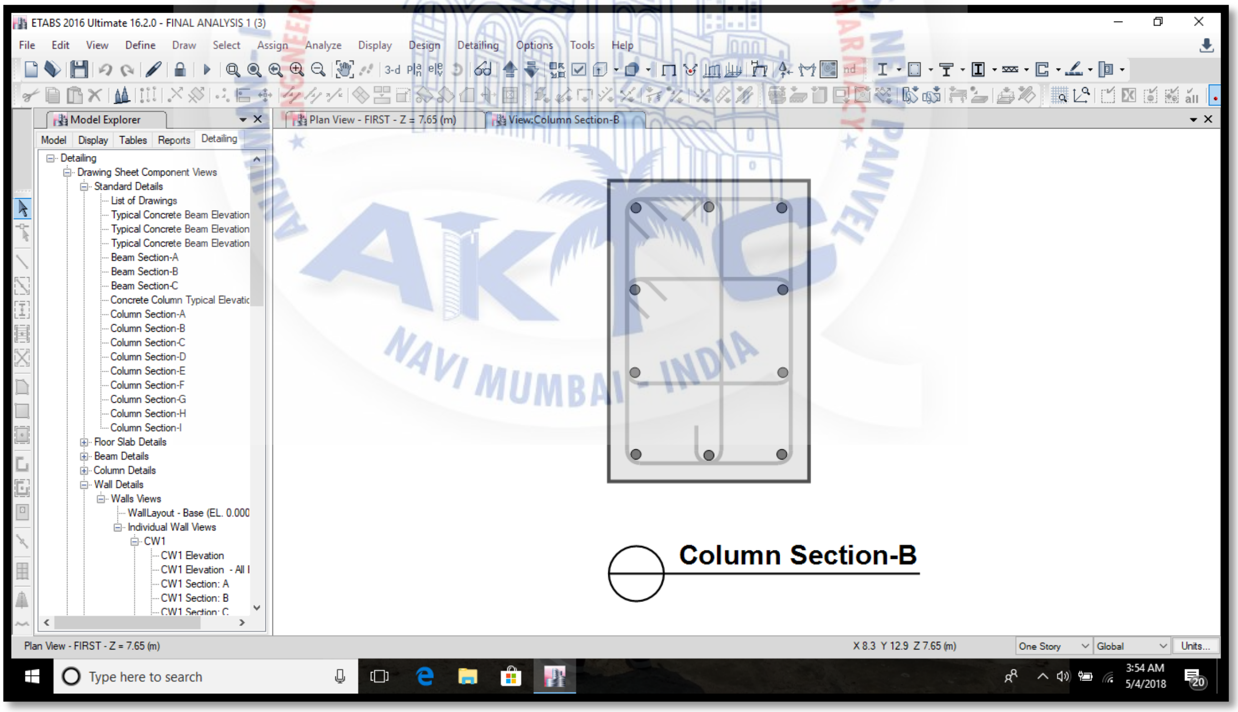



**Figure 4.6 Column Section B**

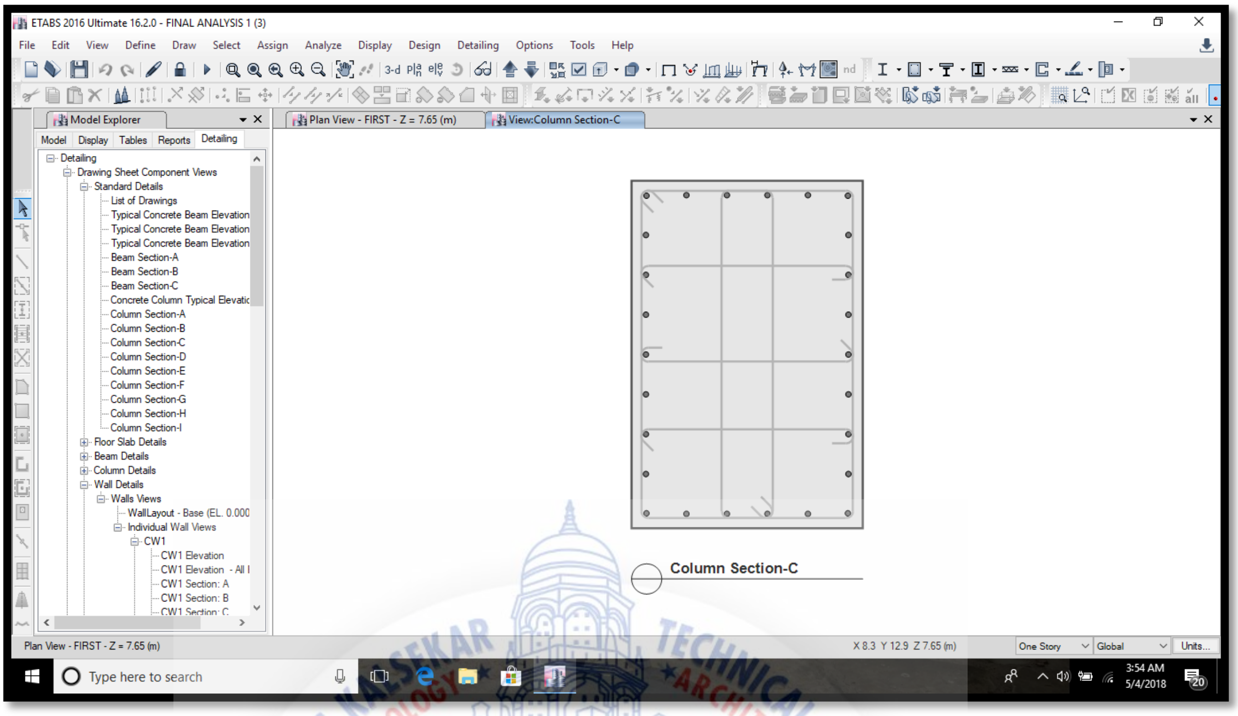



Figure 4.7 Column Section C, D and E

### 4.1.3 Microsoft Excel Spreadsheets

As beams, columns and shear walls are designed in detailed manner in ETABS, the design of footing was done in Microsoft Excel Spreadsheets. The details of designs can be seen in the following Figure 4.8 and Figure 4.9

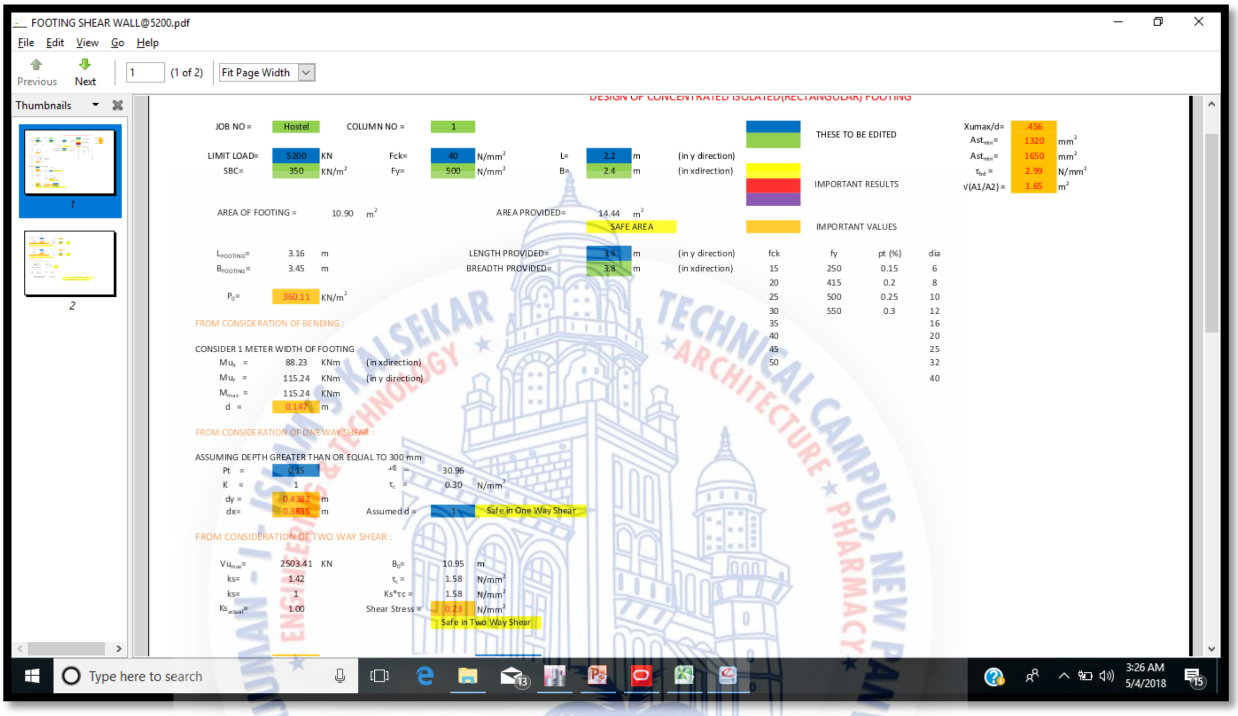


Figure 4.8 Sheet 1

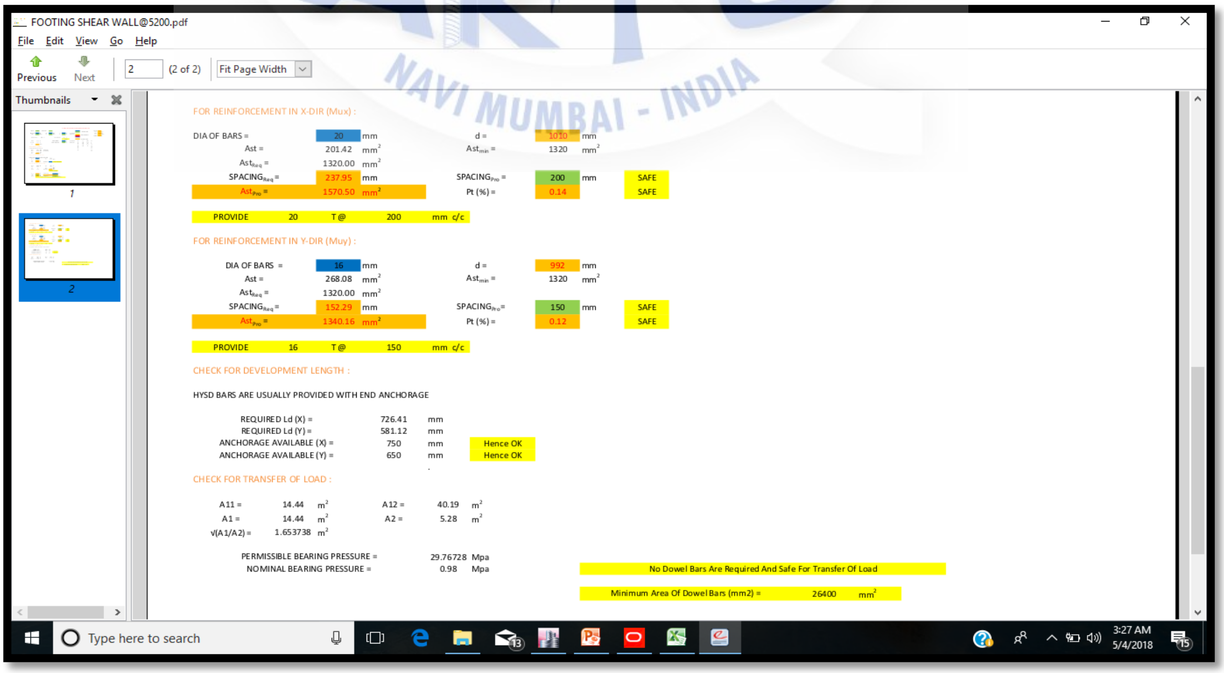
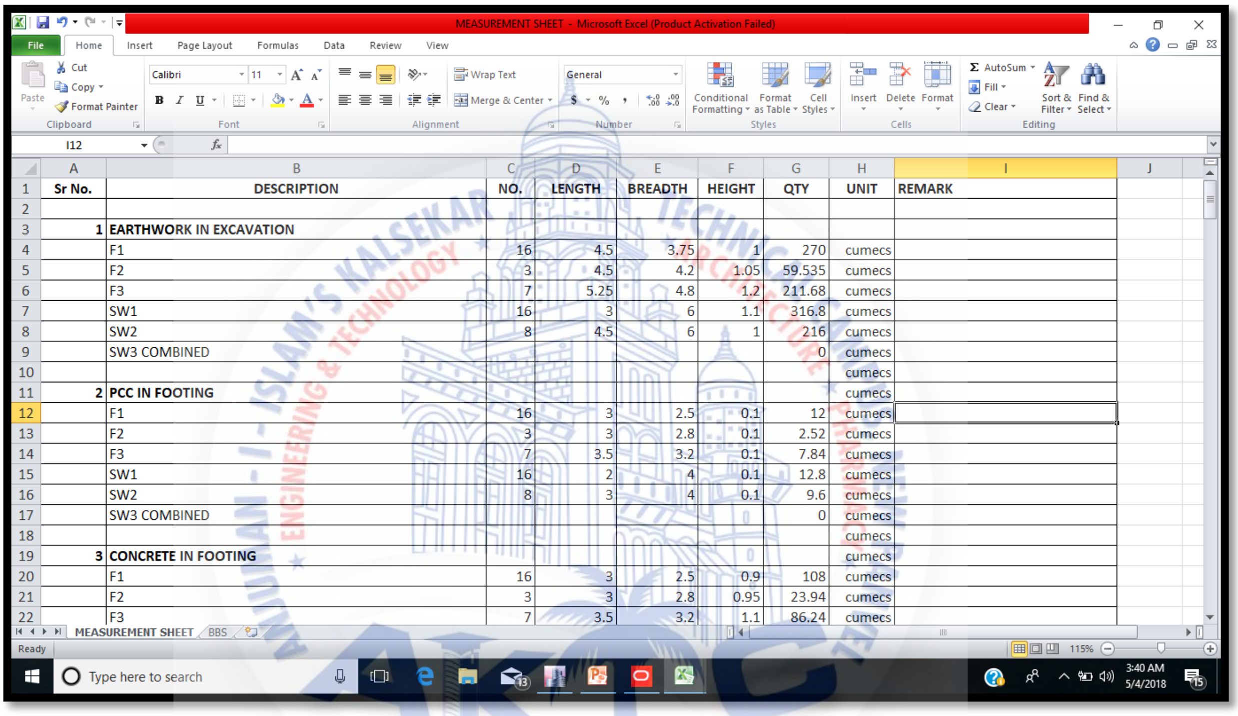


Figure 4.9 Sheet 2

## 4.1.4 Measurement sheets

Measurement sheet for all the required items i.e. reinforcement, concrete, brickwork, cement, finishing materials, etc was prepared on Microsoft Excel Spreadsheets. Figure 4.10 shows an example of the quantities of all the materials required for the completion of the structure.

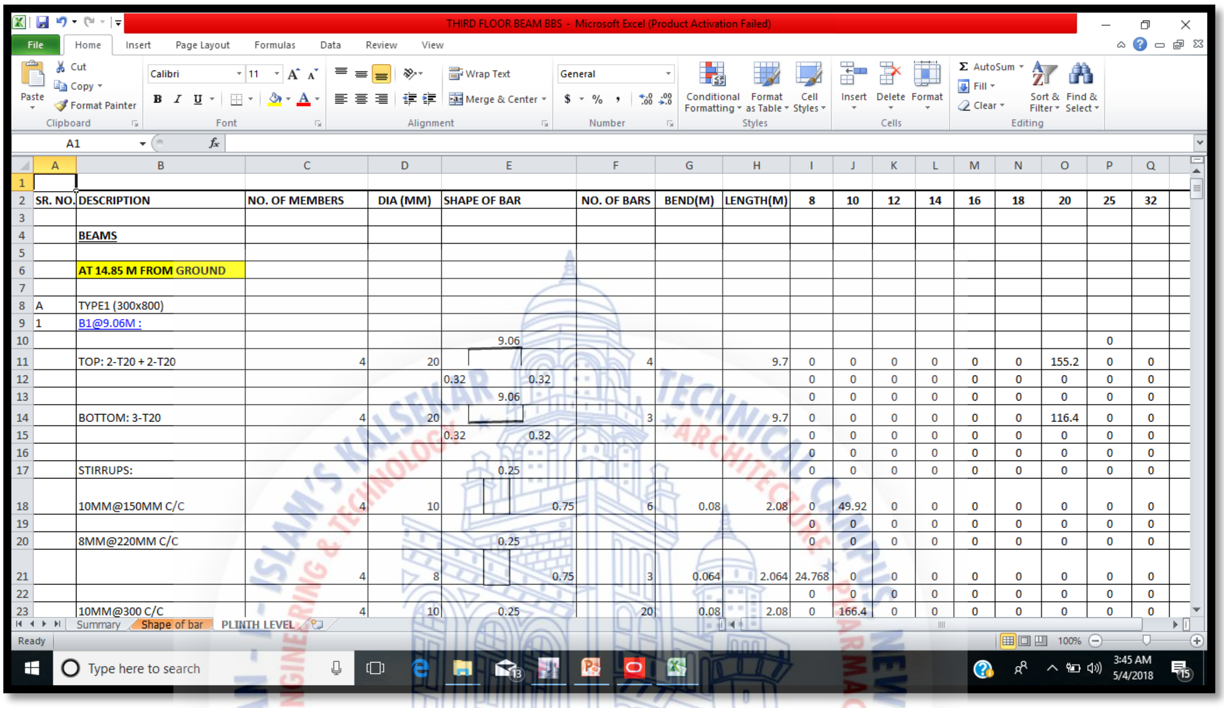


| Sr No. | DESCRIPTION | NO. | LENGTH | BREADTH | HEIGHT | QTY | UNIT | REMARK |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| 1 | EARTHWORK IN EXCAVATION | | | | | | | |
| | F1 | 16 | 4.5 | 3.75 | 1 | 270 | cumecs | |
| | F2 | 3 | 4.5 | 4.2 | 1.05 | 59.535 | cumecs | |
| | F3 | 7 | 5.25 | 4.8 | 1.2 | 211.68 | cumecs | |
| | SW1 | 16 | 3 | 6 | 1.1 | 316.8 | cumecs | |
| | SW2 | 8 | 4.5 | 6 | 1 | 216 | cumecs | |
| | SW3 COMBINED | | | | | 0 | cumecs | |
| | | | | | | | cumecs | |
| 2 | PCC IN FOOTING | | | | | | cumecs | |
| | F1 | 16 | 3 | 2.5 | 0.1 | 12 | cumecs | |
| | F2 | 3 | 3 | 2.8 | 0.1 | 2.52 | cumecs | |
| | F3 | 7 | 3.5 | 3.2 | 0.1 | 7.84 | cumecs | |
| | SW1 | 16 | 2 | 4 | 0.1 | 12.8 | cumecs | |
| | SW2 | 8 | 3 | 4 | 0.1 | 9.6 | cumecs | |
| | SW3 COMBINED | | | | | 0 | cumecs | |
| | | | | | | | cumecs | |
| 3 | CONCRETE IN FOOTING | | | | | | cumecs | |
| | F1 | 16 | 3 | 2.5 | 0.9 | 108 | cumecs | |
| | F2 | 3 | 3 | 2.8 | 0.95 | 23.94 | cumecs | |
| | F3 | 7 | 3.5 | 3.2 | 1.1 | 86.24 | cumecs | |

**Figure 4.10 Measurement Sheet 1**

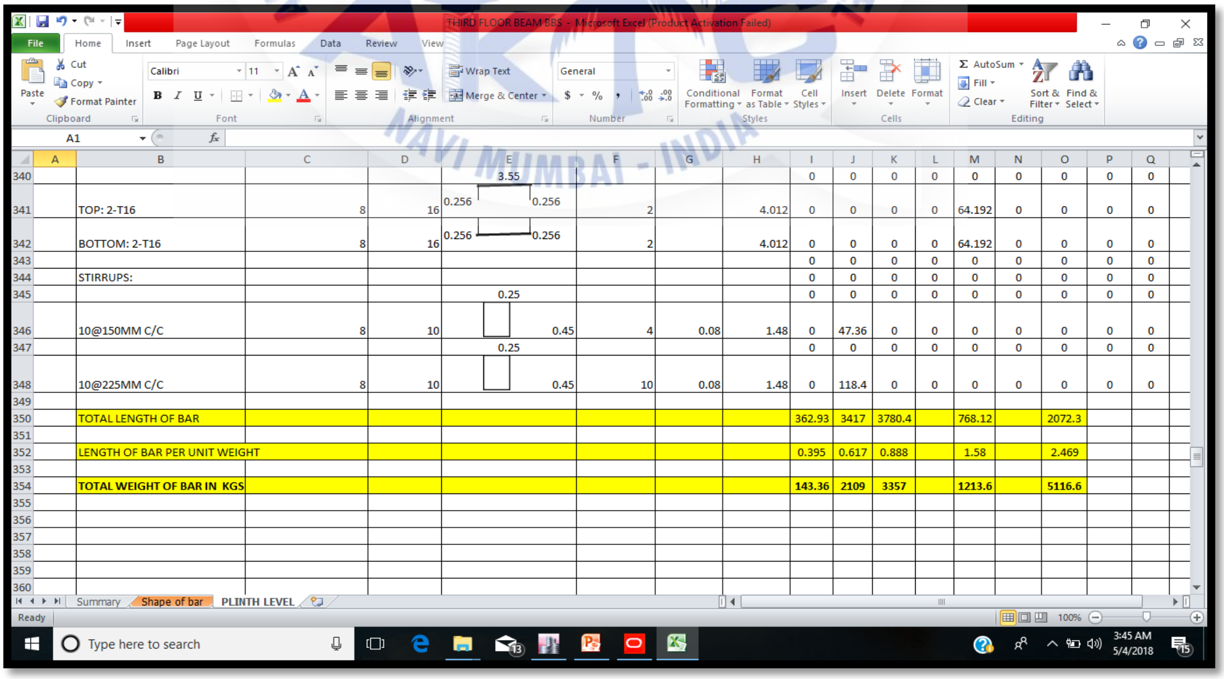
### 4.1.5 Bar Bending Schedule

Bar Bending Schedule for all reinforcement was prepared on Microsoft Excel. Figure 4.11 and 4.12 shows the shape, length, weight and quantity of the steels bars required.



| | SR. NO. | DESCRIPTION | NO. OF MEMBERS | DIA (MM) | SHAPE OF BAR | NO. OF BARS | BEND(M) | LENGTH(M) | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | | BEAMS | | | | | | | | | | | | | | | |
| 6 | | AT 14.85 M FROM GROUND | | | | | | | | | | | | | | | |
| 8 | A | TYPE1 (300x800) | | | | | | | | | | | | | | | |
| 9 | 1 | B1@9.06M : | | | | | | | | | | | | | | | |
| 10 | | | | | 9.06 | | | | | | | | | | | 0 | |
| 11 | | TOP: 2-T20 + 2-T20 | 4 | 20 | | 4 | | 9.7 | 0 | 0 | 0 | 0 | 0 | 0 | 155.2 | 0 | 0 |
| 12 | | | | | 0.32 0.32 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | | | | | 9.06 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | | BOTTOM: 3-T20 | 4 | 20 | | 3 | | 9.7 | 0 | 0 | 0 | 0 | 0 | 0 | 116.4 | 0 | 0 |
| 15 | | | | | 0.32 0.32 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | | STIRRUPS: | | | 0.25 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | | 10MM@150MM C/C | 4 | 10 | 0.75 | 6 | 0.08 | 2.08 | 0 | 49.92 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | | 8MM@220MM C/C | | | 0.25 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | | | 4 | 8 | 0.75 | 3 | 0.064 | 2.064 | 24.768 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | | 10MM@300 C/C | 4 | 10 | 0.25 | 20 | 0.08 | 2.08 | 0 | 166.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Figure 4.11 BBS for Beam Sheet 1

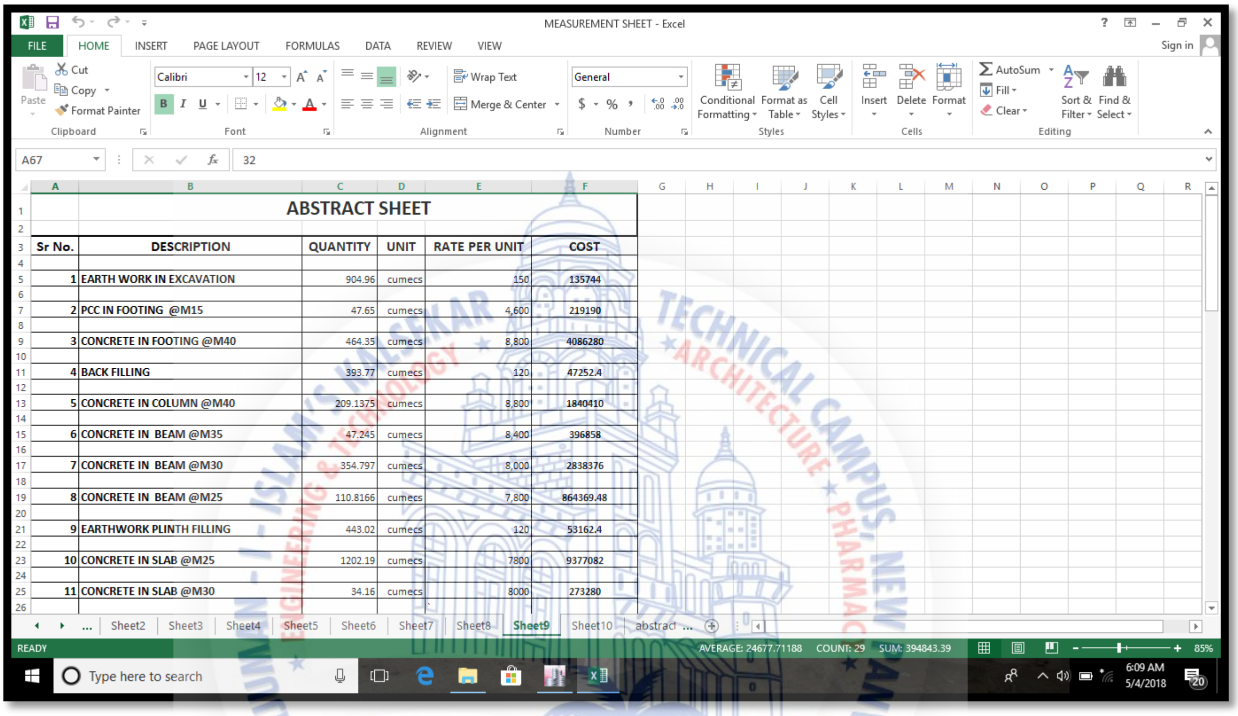


| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 340 | | | | | 3.55 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 341 | | TOP: 2-T16 | 8 | 16 | 0.256 0.256 | 2 | | 4.012 | 0 | 0 | 0 | 0 | 64.192 | 0 | 0 | 0 | 0 |
| 342 | | BOTTOM: 2-T16 | 8 | 16 | 0.256 0.256 | 2 | | 4.012 | 0 | 0 | 0 | 0 | 64.192 | 0 | 0 | 0 | 0 |
| 343 | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 344 | | STIRRUPS: | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 345 | | | | | 0.25 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 346 | | 10@150MM C/C | 8 | 10 | 0.45 | 4 | 0.08 | 1.48 | 0 | 47.36 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 347 | | | | | 0.25 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 348 | | 10@225MM C/C | 8 | 10 | 0.45 | 10 | 0.08 | 1.48 | 0 | 118.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 350 | | TOTAL LENGTH OF BAR | | | | | | | 362.93 | 3417 | 3780.4 | | 768.12 | | 2072.3 | | |
| 352 | | LENGTH OF BAR PER UNIT WEIGHT | | | | | | | 0.395 | 0.617 | 0.888 | | 1.58 | | 2.469 | | |
| 354 | | TOTAL WEIGHT OF BAR IN KGS | | | | | | | 143.36 | 2109 | 3357 | | 1213.6 | | 5116.6 | | |

Figure 4.12 BBS for Beam Sheet 2

### 4.1.6 Abstract Sheet

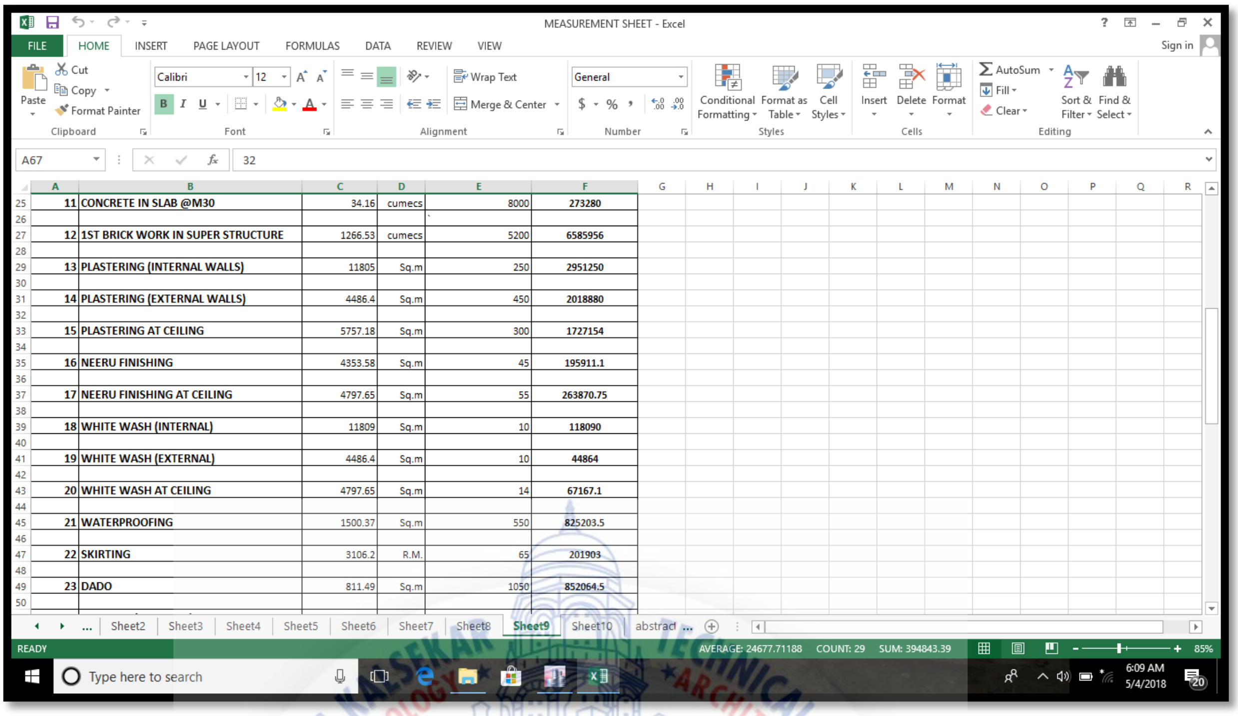
Abstract sheet shows the cost calculation of various items used in the line of construction of this structure and with the help of Microsoft Office Excel this was possible. Below Figure 4.13, Figure 4.14, Figure 4.15 and Figure 4,16shows the cost calculation of all items/materials.



ABSTRACT SHEET

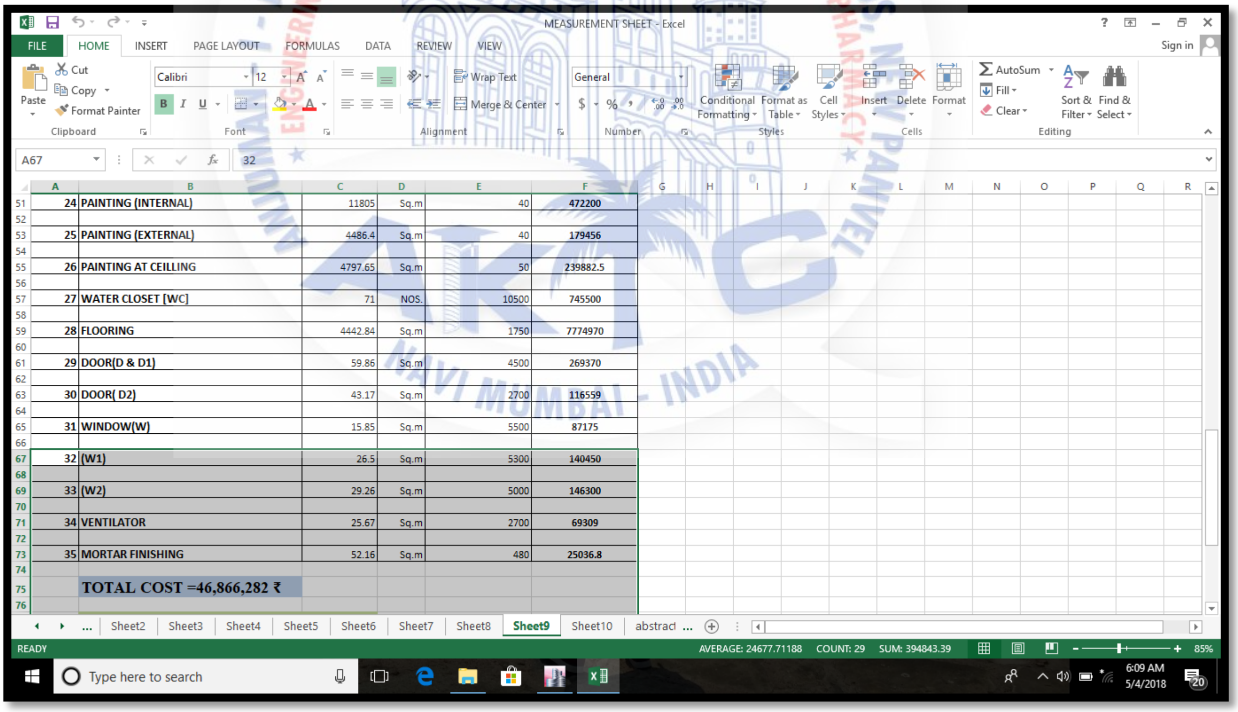
| Sr No. | DESCRIPTION | QUANTITY | UNIT | RATE PER UNIT | COST |
|---|---|---|---|---|---|
| 1 | EARTH WORK IN EXCAVATION | 904.96 | cumecs | 150 | 135744 |
| 2 | PCC IN FOOTING @M15 | 47.65 | cumecs | 4,600 | 219190 |
| 3 | CONCRETE IN FOOTING @M40 | 464.35 | cumecs | 8,800 | 4086280 |
| 4 | BACK FILLING | 393.77 | cumecs | 120 | 47252.4 |
| 5 | CONCRETE IN COLUMN @M40 | 209.1375 | cumecs | 8,800 | 1840410 |
| 6 | CONCRETE IN BEAM @M35 | 47.245 | cumecs | 8,400 | 396858 |
| 7 | CONCRETE IN BEAM @M30 | 354.797 | cumecs | 8,000 | 2838376 |
| 8 | CONCRETE IN BEAM @M25 | 110.8166 | cumecs | 7,800 | 864369.48 |
| 9 | EARTHWORK PLINTH FILLING | 443.02 | cumecs | 120 | 53162.4 |
| 10 | CONCRETE IN SLAB @M25 | 1202.19 | cumecs | 7800 | 9377082 |
| 11 | CONCRETE IN SLAB @M30 | 34.16 | cumecs | 8000 | 273280 |

Figure 4.13 Abstract Sheet 1



| | | | | | |
|---|---|---|---|---|---|
| 11 | CONCRETE IN SLAB @M30 | 34.16 | cumecs | 8000 | 273280 |
| 12 | 1ST BRICK WORK IN SUPER STRUCTURE | 1266.53 | cumecs | 5200 | 6585956 |
| 13 | PLASTERING (INTERNAL WALLS) | 11805 | Sq.m | 250 | 2951250 |
| 14 | PLASTERING (EXTERNAL WALLS) | 4486.4 | Sq.m | 450 | 2018880 |
| 15 | PLASTERING AT CEILING | 5757.18 | Sq.m | 300 | 1727154 |
| 16 | NEERU FINISHING | 4353.58 | Sq.m | 45 | 195911.1 |
| 17 | NEERU FINISHING AT CEILING | 4797.65 | Sq.m | 55 | 263870.75 |
| 18 | WHITE WASH (INTERNAL) | 11809 | Sq.m | 10 | 118090 |
| 19 | WHITE WASH (EXTERNAL) | 4486.4 | Sq.m | 10 | 44864 |
| 20 | WHITE WASH AT CEILING | 4797.65 | Sq.m | 14 | 67167.1 |
| 21 | WATERPROOFING | 1500.37 | Sq.m | 550 | 825203.5 |
| 22 | SKIRTING | 3106.2 | R.M. | 65 | 201903 |
| 23 | DADO | 811.49 | Sq.m | 1050 | 852064.5 |

Figure 4.14 Abstract Sheet 2



| | | | | | |
|---|---|---|---|---|---|
| 24 | PAINTING (INTERNAL) | 11805 | Sq.m | 40 | 472200 |
| 25 | PAINTING (EXTERNAL) | 4486.4 | Sq.m | 40 | 179456 |
| 26 | PAINTING AT CEILLING | 4797.65 | Sq.m | 50 | 239882.5 |
| 27 | WATER CLOSET [WC] | 71 | NOS. | 10500 | 745500 |
| 28 | FLOORING | 4442.84 | Sq.m | 1750 | 7774970 |
| 29 | DOOR(D & D1) | 59.86 | Sq.m | 4500 | 269370 |
| 30 | DOOR( D2) | 43.17 | Sq.m | 2700 | 116559 |
| 31 | WINDOW(W) | 15.85 | Sq.m | 5500 | 87175 |
| 32 | (W1) | 26.5 | Sq.m | 5300 | 140450 |
| 33 | (W2) | 29.26 | Sq.m | 5000 | 146300 |
| 34 | VENTILATOR | 25.67 | Sq.m | 2700 | 69309 |
| 35 | MORTAR FINISHING | 52.16 | Sq.m | 480 | 25036.8 |
| | TOTAL COST =46,866,282 ₹ | | | | |

**Figure 4.15 Abstract Sheet 3**

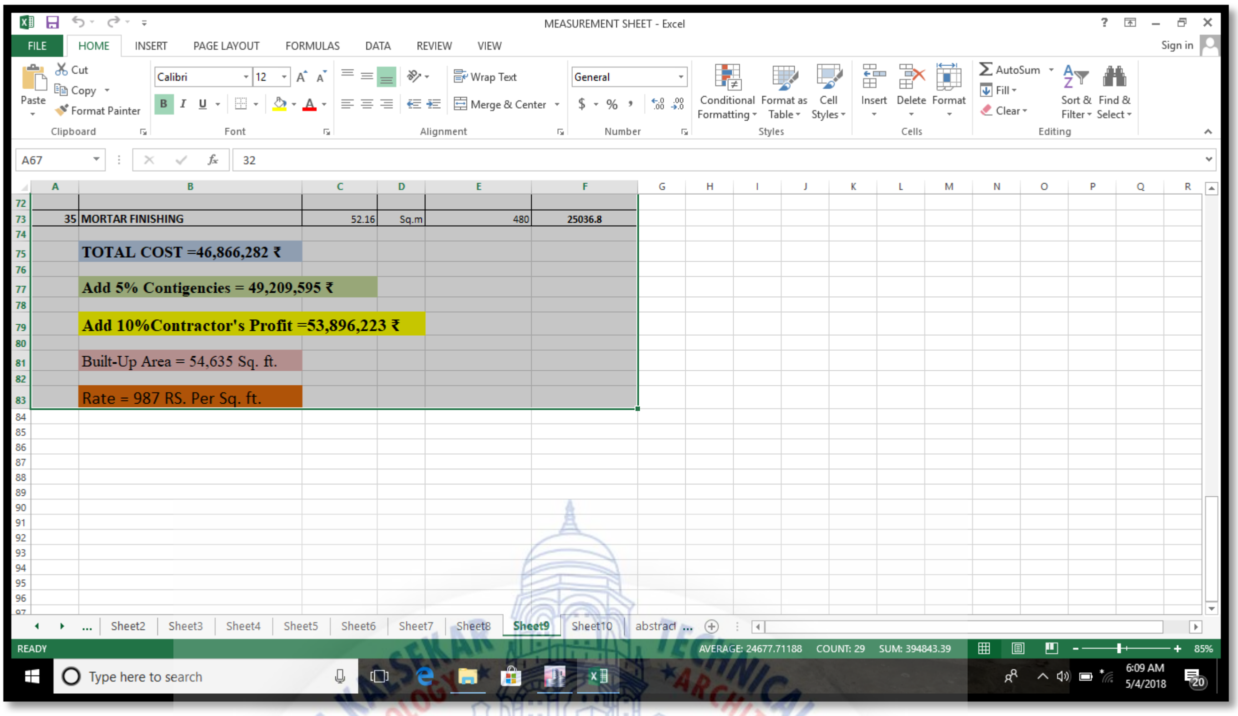



Figure 4.16 Abstract Sheet 4

### 4.1.7 Modelling and Scheduling

The results of the schedule prepared in primavera can be displayed in the form of various kinds of reports that are generated at the end. The types of reports are categorized under different categories so as to be useful to different stakeholders involved in a project. On the basis of these reports, the project progress can be monitored and corrective measures if required can be taken so that the project is completed in the said duration. Figure 4.17 shows scheduling done in Primavera.

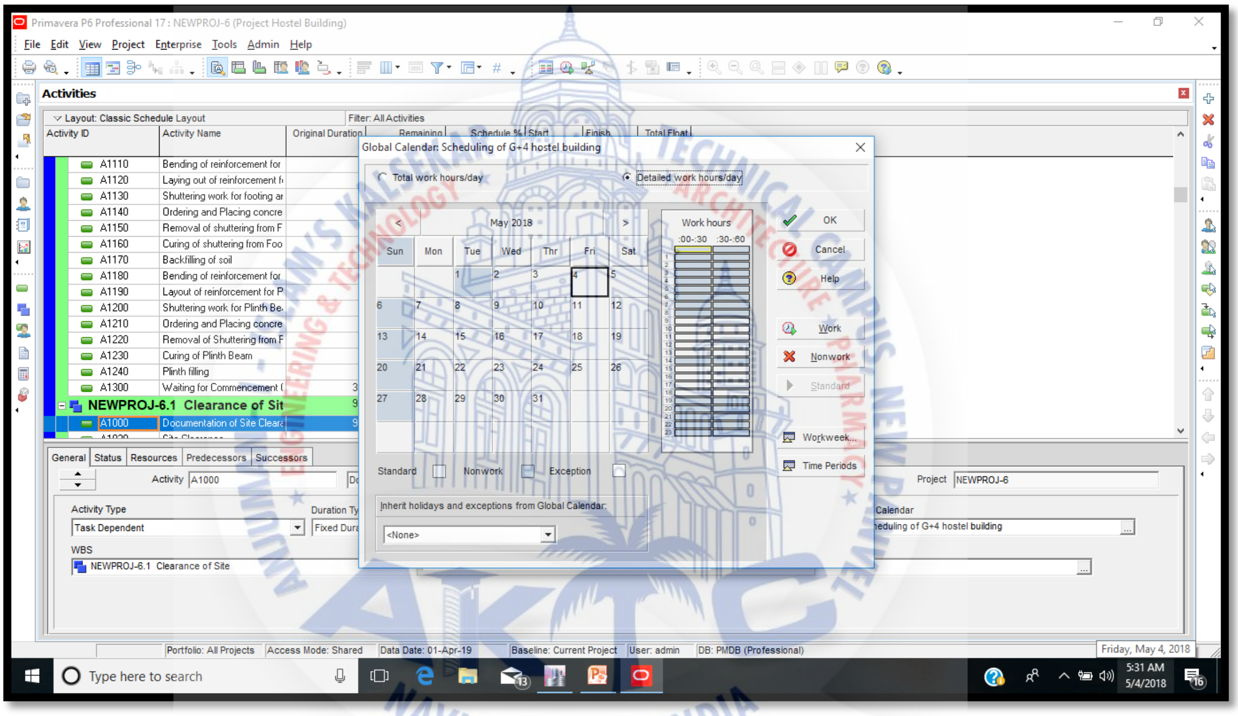



**Figure 4.17 Work Schedule on Primavera**

# Chapter 5

# Conclusions

## 5.1 Conclusions

- After the completion of project, we end up with the conclusion that all the software used by us for completing this project is of great significance and unique of its kind
- AutoCAD is an advanced software which is very user-friendly and efficient for planning any kind of structure.
- Analysis and designing part can be done most efficiently and quickly with the help of ETABS.
- Designing of Footings is done very easily and in detailed manner using Microsoft Excel Spreadsheet.

- For the estimation of quantity of materials and the cost of materials Measurement sheets and Abstract Sheets were made on Microsoft Excel Spreadsheets.

- The estimated total quantity of concrete is 2407.3461 cumecs.

- The total cost of the project is estimated to be about 53,896,223₹
- Primavera serves as an effective tool for generating Gantt chart for the schedule of different types of construction projects.

- In primavera we can link all activities, update the project accordingly, assign resources for the project, determine a critical path, total duration and total float of the project. Primavera can do all these tasks effectively and saves time as compared to conventional methods.

- With the help of Primavera software the estimated time for the completion of a Hostel Building was calculated to be 916 days.

In all we can conclude that we have successfully gained enough basic knowledge about the above mentioned software and it will surely be beneficial for us in the near future.

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# ANNEXURE

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