

“Estimation & Quality Control of Residential G+3 Building”

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Abstract:- we can estimate the cost of the building before we construct . In any construction project, the probable cost of construction which is known before hand is known as the estimated cost. And hence it is quite essential for the arrangement of financial resources for the completion of any construction project.

In this project, the main aim was to find out the detailed estimate of quantities of all the structural aspect of G+3 building. The Sunway Opus Grand Neville is a result of a joint venture between Sunway City of Malaysia and Opus of Hyderabad, India.

It also awims in finding out the probable cost, or the estimated cost of the project based on the computation of these quantities.

The structural aspects considered for the estimation of quantities are earthwork in excavation and backfilling, concrete work in foundation and in R.C.C structures such as beams, columns, slabs, staircases etc., steel reinforcement in beams, columns and other R.C.C structures and brickwork in superstructure.

The computation of quantities was carried out based on the drawings of various structural elements, such as the each floor plan, footings and columns layout, beams layout, staircases layout, footing specifications and column specifications, which have also been provided in this document.

These details provide an idea for requirement of quantities for a particular project and also the likely expenditure which would be needed to be arranged .This documentation also provides the abstract of the estimated cost for the structural aspects.

Keywords:- NBC, ETABS, Multi-storied Building, Isolated Footing, Open Newel Quarter Turn Staircase, Estimation.

I. INTRODUCTION

Sunway Opus Grand Neville is a result of a joint venture between Sunway City of Malaysia and Opus of Hyderabad, India. Sunway City is one of Malaysia’s best-known and well-diversified conglomerates, with interests in property development, leisure, entertainment, hospitality, conventions, and healthcare. Opus is a leading consortium of builders property developers in Hyderabad, India. With a collective experience of over 100 years, Opus is a name that stands for solid expertise. The Grand Neville-Phase 2 is a

one-of- a-kind project. A refreshingly new residential township spread across 9.4 acres of lush landscape and the first to introduce a concept into every construction. Giving you absolute choice to live in either single, duplex or three-storey villas- all of which are „corner“ villas, with sizeable space outside your front door.

Estimation is defined as we can estimate the cost before we construct quantities of finished items of work and its expenses (cost) likely to be incurred for its construction. The main object of estimate is to know the required quantity of material, labour and cost before actual execution. It helps an engineer to plan the construction work, for quick and proper construction with required quality

It is a accurate estimation in which, each item of work (Earth work, cement concrete etc.,) is worked out separately. The dimensions such as length, width, depth/height are accurately taken from the concerned drawings (plans, sections, elevations) of the proposed project. All the similar items of works are grouped at one place to sum the total contents.

As an intern with GIPPL at the Sunway Opus Grand-Neville project, I was trained in the duties of a site engineer encompassing site supervision and quality control of which the major time was spent on site supervision. Part of my assignment was to take out quantities of shuttering, concreting and reinforcement in order to prepare the bills. I was majorly stationed at, but not limited to, E-Block, which was at the foundation-stage initially as I joined and thus a logical place to start.

II. SCOPE

Cover the activity of quarry dust filling, earth filling in the trenches of foundations, plint, under floors in all towers, we can estimate the total cost of the building, labours, materials. in further days we cant estimate the cost of materials weather it may be increased or decreased, it depends on the quality

III. METHODOLOGY

- Collection of data

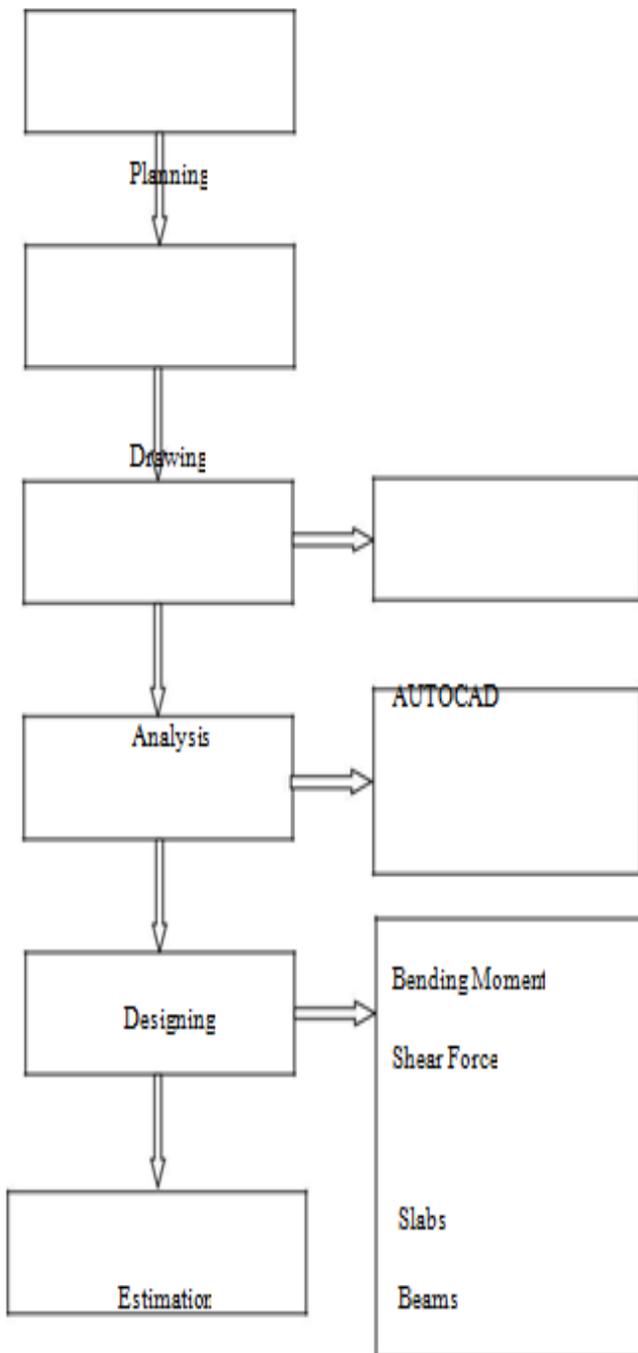


Fig 1:- Collection of data

- Shape of Building :Rectangular
- Number of staircase: one
- Number of Lift: One
- Type of Walls : Brick Wall

IV. BUILDING DATA FOR ANALYSIS SALIENT FEATURES

• Dimensions Of Beams	B ₁ 230x300 mm B ₂ 230x380 mm
• Dimensions of Column	C ₁ 230x380 mm C ₂ 230x460 mm C ₃ 230x600 mm
• Thickness of Slab	4.5" (140mm)
• Thickness of External Wall	9" (230mm)
• Thickness of Internal Wall	5" (120mm) (as per IS:875 part2)
• Live Load	2 1.5kN/m
• Floor Finish	
• All rooms and Kitchen	2kN/m ²
• Toilet and Bathroom Corridor, Staircase and Balcony	2kN/m ² 3N/m ²

- Utility of Building : Residential Building
- Area of the site: 70 X 60 (ft)
- Building Height: 47 ft
- Number of Storey: (BASEMENT+G+3)
- Type of construction: R.C.C Framed Structure

V. ANALYSIS AND DESIGN OF BASEMENT + G+3 GBUILDING USING ETABS

Step - 1: Step by Step procedure for ETABS Analysis

The procedure carried out for Modeling and analyzing the structure involves the following flow chart.

Step - 2: Creation of Grid points & Generation of structure

After getting opened with ETABS we select a new model and a window appears where we had entered the grid dimensions and story dimensions of our building. Here itself we had generated our 3D structure by specifying the building details in the following window.

Step - 3: Defining of property

Here we had first defined the material property by selecting define menu, material properties. We add new material for our structural components (beams, columns, slabs) by giving the specified details in defining. After that we define section size by selecting frame sections as shown below & added the required section for beams, columns etc.

Step - 4: Assigning of Property

After defining the property we draw the structural components using command menu Draw line for beam for beams and create columns in region for columns by which property assigning is completed for beams and columns.

Step - 5: Assigning of Supports

By keeping the selection at the base of the structure and selecting all the columns we assigned supports by going to assign menu, joint/frame, Restraints (supports), fixed.

Step - 6: Defining of loads

The loads in ETABS are defined as using static load cases command in define menu

Step - 7: Assigning of Dead loads

After defining all the loads dead loads are assigned for external walls, internal walls

Step - 8: Assigning of Live loads

Live loads are assigned for the entire structure including floor finishing.

Step - 9: Assigning of load combinations

Load combinations is based on IS 875 1987 PART 5 using load combinations command in define menu

Step - 10: Analysis

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

After the completion of analysis we had performed concrete design on the structure as per IS 456:2000.

A. Plan of the Building

Fig 2:- Plan of the building

B. Quality Control

Following the compaction, in-situ density test (core-cutter test), moisture content, the MDD test & OMC test are carried out at the site laboratory as per testing frequency plan. Density-moisture relationship as per IS 2720 (Part8) shall be carried out at the site laboratory as per testing frequency plan. Each 100sqm. area compacted in layers shall be tested {as per IS2720 (Part29) and records for the same shall be maintained} for each layer in plinth

filling before starting placing soil for the next layer.

The structure of the building is constructed by casting of foundation, columns, beams and slabs with concrete and reinforced with steel reinforcing bars. In RC construction, the following materials are used:

- Steel reinforcing bars.
- Cement.
- Aggregate
- Brick

To ensure construction of building which will be safe and durable, the construction materials should be of good quality.

- *Steel Reinforcing Bars*

It should be of good quality and manufactured as per BSTI standard. From strength consideration, there are three grades of steel reinforcing bars available in our market e.g. 40 grade, 60 grade and 75 grade.

Quality of steel reinforcing bars should be tested regularly from a standard testing laboratory.

- *Cement*

Routine tests to check the quality of cement should be done regularly from a standard testing laboratory having testing facilities as per BSTI standard.

- *Aggregate*

The aggregate gives volume, stability, resistance to wear or erosion, and other desired physical properties to the finished product.

Fine aggregate usually consists of sand, crushed stone, or crushed slag screenings; coarse aggregate consists of gravel (pebbles), fragments of broken stone, slag, and other coarse substances.

Fine aggregate is used in making thin concrete slabs or other structural members and where a smooth surface is desired; coarse aggregate is used for more massive members.

Burnt clay brick.

It used for construction purpose this bricks are generally moulds in which clay is filled and dried and then baked or fired in the kiln burnt bricks are usually not visually appealing, they need on application of plaster they can withstand extreme heat and therefore use in construction projects involving thermal, chemical, and mechanical stress

- *Plastering & Scope*

Covers the activity of 20mm thick external cement plastering on masonry or concrete surface for the project.

- *Cube Test*

Cube test is the best way to ensure that the concrete cast on site will reach a particular compressive strength. It is also a good way of testing that the concrete

is strong enough to support its own weight, plus the weight of anything it must support.

Cubes of concrete are tested after 3,7 and 28 days. Here on site, cubes are tested after 7 and 28days.

The strength of concrete after 7 days is about two-thirds of the strength it will reach on the 28th day. So if you want to make 20MPa concrete, when you do a cube test after 7 days, you can expect the cube to have reached 13.33MPa.

Given Table is a record of 7-day and 28-day cube test results of a few structural elements on site.

- *Statistical Q/C*
Standard deviation reports are prepared every month after testing of adequate specimens in the monthly time-period.
- *Rolling Margin for steel*
- Other Routine Inspections By Quality Dept. Common Checks For Reinforcement.



Fig 3.

- *Correct Spacing Of Slab Reinforcement*



Fig 4.

- The main object of estimate is to know the required quantity of material, labour and cost before actual execution.

VI. ESTIMATION DETAILS

Land acquisition, including assembly, holding and improvement. Planning and feasibility studies. Architectural and engineering design.

Construction, including materials, equipment and labour. Field supervision of construction. Construction financing.

Insurance and taxes during construction. Owner's general office overhead.

Equipment and furnishings not included in construction. Inspection and testing

Description	Total amount
Basement	105191
Super structure	105253
Masonry	296450
Plastering	293097
Door frames, shutters & lockset	132797
Aluminium windows & sliding doors	374598
Roof structure & finishes	345943
Floor wall & finishes	606292
Railing	724000
Water proofing works	659778
Sanitary fitting internal water supply & santri piping	136093
Total construction cost	3,779,492.

VII. CONCLUSION

Our calculation it is based on precise measurements which gave us approximate and accurate values. The structural estimate had been prepared in detail such that the values can be used in the actual project being carried out.

Also, the abstract of the estimated cost was prepared such that the current rate per unit of each item of work were considered. Hence the estimated costs of the structural requirements of the project are accurate too.

The main object of estimate is to know the required quantity of material, labour and cost before actual execution.

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