Planning Designing Estimation of Condominium Building

S.Sankar[*1], C.Elakkiaarasi[#2], G.Sakthivel[#3], S.Sangeetha[#4], E.Saravanan[#5]
[#]*1- Assistant professor,* [#]*2,*[#]*3,*[#]*4,*[#]*5,- BE-Final year students*
Civil Engineering Department in SKP Engineering College
Tiruvannamalai, TamilNadu, India

Abstract-*The project of design and estimation on condominium building an approach to particularly apply the basic knowledge gained during the course of various structural elements. Tamil Nadu is the eleventh largest city in India. The total Area of Tamil Nadu is 13058km^2.As it is rapidly developing the construction on the city is very costly. The residential building gives the aesthetic look to the city and also increase the economical status of the state. now the most dynamic city is Bangalore. It has emerged as the most dynamic city in Jones Lang Laselle's fourth annual city momentum index of cities around the world ,followed by Ho Chi Minh city of Vietnam and Silicon Valley in the U.S. The index tracks the speed of change of a city's economy and commercial real estate market. The construction of building is the main factor to increase economical status. But before the construction of building, analyze the design and estimation is very important process.*

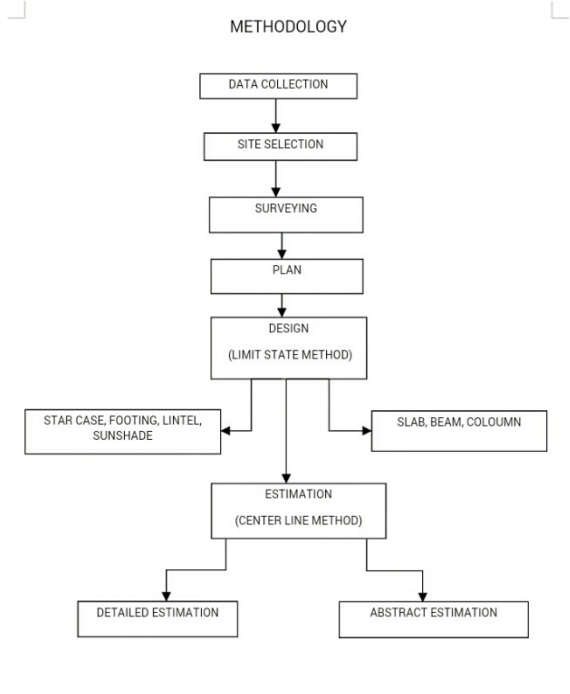
Key words- *Design, Estimation, Dynamic city, Economical status.*

I. INTRODUCTION

The house is the first unit of the society and it is the primary unit of human habitation. Having a peaceful surroundings is the main point of view of the most of the peoples in today's life style. Condominium is a type of residential building.

According to AICE Condominium means "shared property". First of all these types of buildings were constructed in North Indian. The increasing complexity of homes the use of innovative materials ,and technologies, and increased population in high hazards areas of the United States have introduced many challenges to the building industry.

II. METHODOLOGY



2.1 DATA COLLECTION:

The data were collected from the various literatures and get guidance from many engineers. This is main process to start the project.

2.2 SITE SELECTION:

The site selection is the process of selecting a site with respect to the availability of water, sewage disposal and transport facilities. The main aim of the site selection is to collect the data to have the

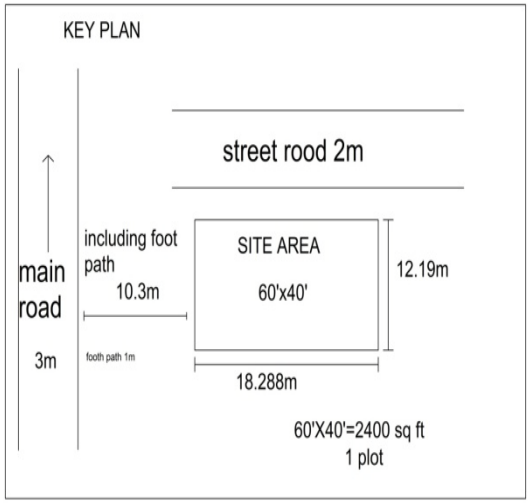
peaceful environment and other basic facilities available to the living area.

2.3 SURVEYING:

To obtain the area of the site is calculated by using of surveying equipments. This process is used to find the main facilities available to near the site.

2.4 KEY PLAN:

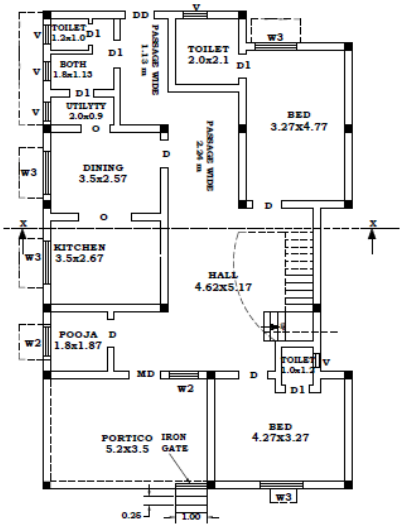
Key plan is simply indicate the site area and also indicate available main sources to near the site.



2.5 PLAN OF CONDOMINIUM BUILDING:

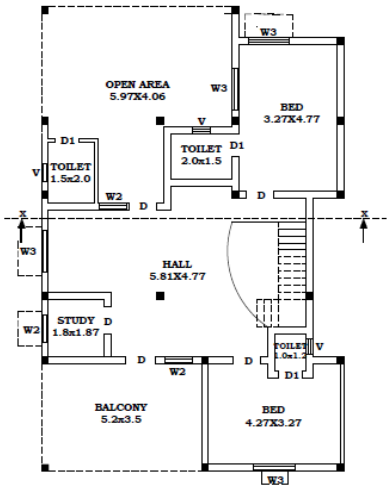
The modern planning of building is considered the main factors of Aspect, Roominess, Elegance, Flexibility, Grouping, Privacy. In example of Aspect means, a kitchen should have an eastern side aspect so that the morning sun would refresh, purify the air and remains cool in later part of the day.

GROUND FLOOR PLAN:



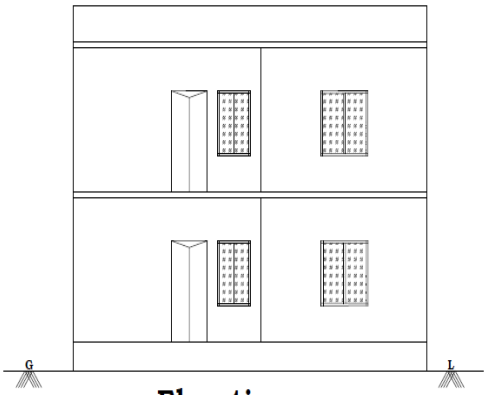
Ground floor plan

FIRST FLOOR PLAN:



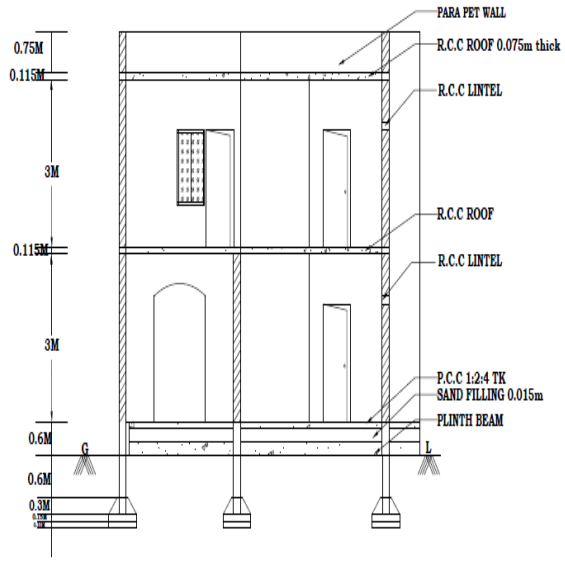
First floor plan

ELEVATION:



Elevation

SECTION:



Section

2.6 DESIGN:

Kevin Lynch eight stage site planning cycle and John Simonds six-phase design process is used to design the building. These are Commission, Research, Analysis, Synthesis, Construction, Operation. The limit state method design is followed to design the condominium building.

2.6.1 DESIGN OF SLAB:

Slab will distribute the load to the beam. The load distribution of the slab is depend upon the type of slab chosen.

S.NO	SIZE OF ROOM	TYPE OF SLAB	EFFECTIVE DEPTH , d	A_{st} in mm^2
1	4.5 × 3.5m	Two way slab	150mm	226.64
2	3.5 × 6.15m	Two way slab	120mm	188.23
3	3.0 × 4.5m	Two way slab	160mm	143.76

This table shows the type of slab, the slab type is calculated from l_y/l_x ratio. The area reinforcement calculations are calculated from using of formulae.

2.6.1 DESIGN OF BEAM:

The beam will distribute the load to the column .if the beam will get failed in that floor only will be collapsed.

S.NO	SIZE OF ROOM	TYPE OF BEAM	EFFECTIVE DEPTH , d	A_{st} in mm^2
1	4.5 × 3.5m	Doubly reinforced beam	170mm	240.0
2	3.5 × 6.15m	Doubly reinforced beam	250mm	261.3
3	3.0 × 4.5m	Doubly reinforced beam	195mm	418.2

This table shows the type of beam , the beam type is calculated from the load distribution of slab.

2.6.3 DESIGN OF COLUMN:

The column can distribute the load to the foundation. Incase of the column member will get fail, the whole building will get collapsed.

S.NO	SIZE OF ROOM	TYPE OF COLUMN	LOAD (P_u)	A_{sc}
1	4.5 × 3.5m	Square column	26.78KN	$720mm^2$
2	4.5× 6.15m	Square column	56.25KN	$360mm^2$
3	4.5× 4.5m	Square column	65.48KN	$540mm^2$

This table shows the column detailing. The loads are taken from beam and the square column is easily distribute the load to the foundation.

2.6.4 REINFORCEMENT DETAIL OF SLAB:

S.NO	SLABS	REINFORCEMENT DETAILS
1	S_1	10 mm dia @ 200mm c/c
2	S_2	16 mm dia @ 250mm c/c
3	S_3	10 mm dia @ 300mm c/c

The reinforcement details are perfectly calculated from the using of formulae.

2.6.5 REINFORCEMENT DETAIL OF BEAM:

S.NO	BEAM	REINFORCEMENT DETAILS
1	B_1	25mm dia @ 250mm c/c
2	B_2	16 mm dia @ 180mm c/c
3	B_3	16 mm dia @ 290mm c/c

The reinforcement details are perfectly calculated from the using of formulae

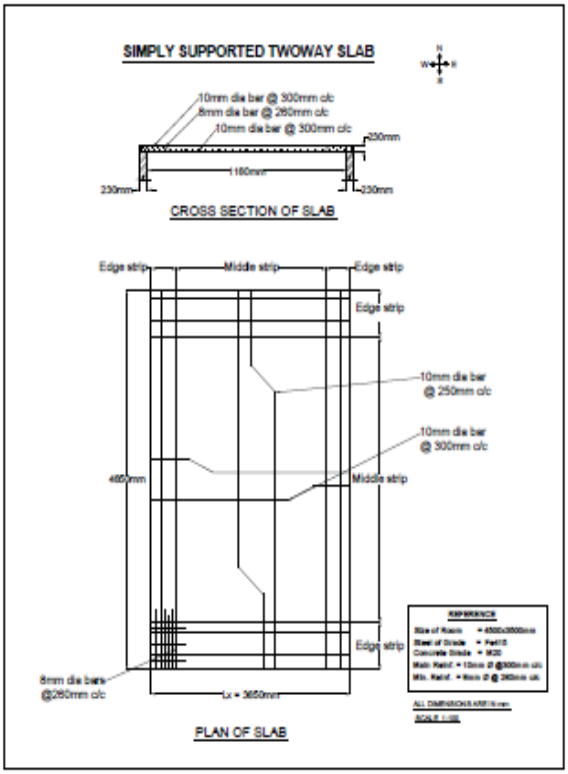
2.6.6 REINFORCEMENT DETAIL OF COLUMN:

S.NO	COLUMN	REINFORCEMENT DETAILS
1	C_1	16 mm dia @ 300mm c/c
2	C_2	20 mm dia @ 180mm c/c
3	C_3	8 mm dia @ 290mm c/c

The reinforcement details are perfectly calculated from the using of formulae.

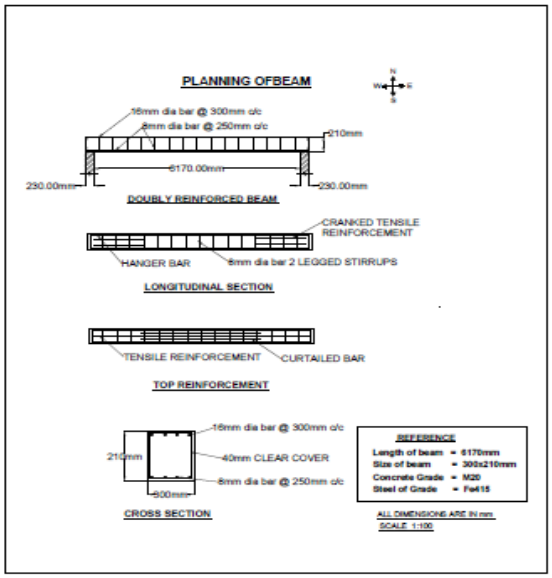
2.6.7 REINFORCEMENT DIAGRAMS:

DETAILING OF SLAB:



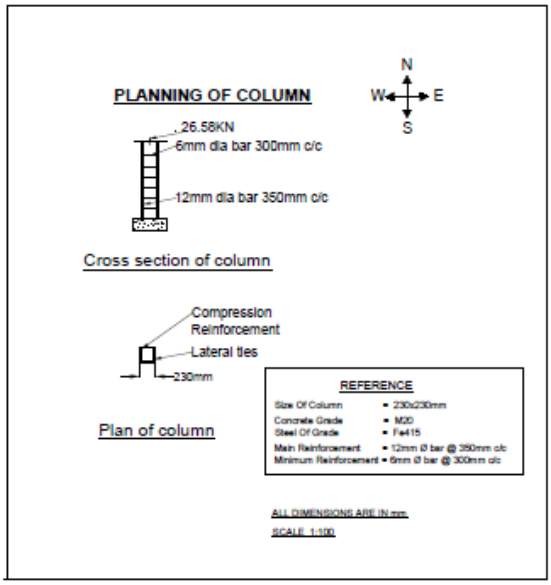
The diagram shows the type of slab, size of slab and the reinforcement detailing of slab.

DETAILING OF BEAM:



The diagram shows the type of beam, size of beam, load distribution in slab, and the reinforcement detailing of beam.

DETAILING OF COLUMN:



The diagram shows the column size, value of load and reinforcement detailing of column

ESTIMATION:

Estimation is a complexity process but this is used to calculate the cost of building construction. It is a way to find the expense of construction of a building before the construction of building.

The estimation process has two types. These are centre line method and individual wall method .we are choosing centre line method because this type of estimation process done in quickly.

DETAILED ESTIMATION OF GROUND FLOOR:

This tables are shown the types of work will done in the construction and the quantity of materials and also used to calculate the cost of the ground floor.

Sl.NO	Particulars of items of work	Quantity	Unit	Rate in Rs	Per	Amount in Rs
	EARTHWORK					
1	Site clearance and setting out	1	Job		L.S	300
2						
3	Earthwork in Excavation in Foundation	20.00	cu m	900	% cu m	15000
	Earthwork in Filling in plinth	15.53	cu m	750	% cu m	11647.5
4	**CONCRETE**					
5	Cement concrete 1:3:6 in foundation	0.74	cu m	1100	/ cu m	814
6	R.C.C.work 1:2:4 in cols., Beams,slabs and chujjas fair finished Excluding steel Reinforcement	46.3	m^3	1200	/ m^3	55560
7						
8	2.5cm Damp proof course C.C 1:2:4 with water proofing	35.77	Sq m	110	/ sq m	3934.7
9	Compound					
	2.5cm 1:2:4 nosing in steps neat cement finished	30.80	m	250	/ m	7700
	Weathering course	77.19	cu m	120	cu m	9262.8
	R.C.C work in roof	12.50	cu m	800	cu m	10000

Sl.NO	Particulars of items of work	Quantity	Unit	Rate in Rs	Per	Amount in Rs
	EARTHWORK					
1	Site clearance and setting out	1	Job		L.S	300
2						
3	Earthwork in Excavation in Foundation	20.00	cu m	900	% cu m	15000
	Earthwork in Filling in plinth	15.53	cu m	750	% cu m	11647.5
4	**CONCRETE**					
5	Cement concrete 1:3:6 in foundation	0.74	cu m	1100	/ cu m	814
6	R.C.C.work 1:2:4 in cols., Beams,slabs and chujjas fair finished Excluding steel Reinforcement	46.3	m^3	1200	/ m^3	55560
7						
8	2.5cm Damp proof course C.C 1:2:4 with water proofing	35.77	Sq m	110	/ sq m	3934.7
9	Compound					
	2.5cm 1:2:4 nosing in steps neat cement finished	30.80	m	250	/ m	7700
	Weathering course	77.19	cu m	120	cu m	9262.8
	R.C.C work in roof	12.50	cu m	800	cu m	10000

The excavation process is only done in the ground floor. The total load of the first floor can distribute to the ground floor. The foundation is a main content to stand with the floor load. The column is a important factor to withstand with the floor load.

Sl.NO	Particulars of items of work	Quantity	Unit	Rate in Rs	Per	Amount in Rs
	FLOORING					
17	2.5cm CC 1:2:4 floor over And including 7.5 cm lime concrete	7.74	sq m	250	/ sq m	1935
18	Floor finishing	103.78	sq m	250	/ sq m	25945
	WHITE WASHING and **COLOUR WASHING**					
19	White washing inside 3 Coat inside	420.36	sq m	250	/ sq m	105090
20	Colour washing 2 coats over One coat of white washing	232.51	sq m	300	/ sq m	69753
	MISCELLENEOUS ITEMS					
21	100mm dia A.C rain water pipe	38.60	m	500	m	19300
					TOTAL	**598240.7**

The need of total quantity is perfectly calculated to construct the ground floor. The current rate schedule is got from PWD Office.

ESTIMATION FOR FIRST FLOOR:

This tables are shown the types of work will done in the construction and the quantity of materials and also used to calculate the cost of the first floor.

Sl.NO	Particulars of items of work	Quantity	Unit	Rate in Rs	Per	Amount in Rs
	CONCRETE					
1	Lime concrete in roof terracing 7.5 cm thick complete with surface finishing	165.52	sq m	110	/ sq m	18207.2
2	R.C.C. work 1:2:4 excluding steel and its bending but including centering and shuttering and binding steel	156.42	cu m	1200	/ cu m	187704
3	2.5 cm CC 1:2:4 nosing in steps of staircase neat cement finished	30.80	m	250	/ m	7700
	BRICK WORK					
4	First class brick work in 1:6 cement local sand mortar in super structure in 20 cm thick wall	67.28	cu m	1250	/ cu m	84100
	WOOD WORK					
5	Doors and Windows Salwood work in chowkhats in Doors and windows	2.59	cu m	14000	/ cu m	36260

Sl.NO	Particulars of items of work	Quantity	Unit	Rate in Rs	Per	Amount in Rs
	PLASTERING					
6	12mm Plastering with 1:6 cm cement in inside	326.73	sq m	300	/ sq m	98019
7	12mm Plastering with 1:6 cm cement in outside	318.77	sq m	300	/ sq m	95631
8	6mm plastering with 1:3 Cement medium sand mortar in ceiling	15.57	sq m	300	/ sq m	4671
	FLOORING					
9	2.5cm CC floor	110.25	sq m	250	/ sq m	27562.5
	WHITE WASHING and COLOUR WASHING					
10	White washing 3 coats inside	342.30	sq m	250	/ sq m	85575
11	Colour washing 2 coats over One coat of white washing	318.77	sq m	300	/ sq m	99631
	MISCELLENEOUS ITEMS					
12	100mm dia A.C rain water pipe	19.20	m	500	/ sq m	9600
					TOTAL	75460.90

The need of total quantity is perfectly calculated to construct the first floor. The current rate schedule is got from PWD Office.

CALCULATION OF COST OF BUILDING:

Add 8% for Water Supply and Sanitary Works = 60372.87

Add 8% for Electrification Works = 60372.87

TOTAL = 196206.64

Add 3% for Contengencies = 5886.20

Add 2% for Workcharged Establishment = 3924.13

GRAND TOTAL = 206016.97

GROUND AND FIRST FLOOR GRAND TOTAL = Rs.929674.13

Plinth Area Rate of Ground Floor:

Plinth Area = 14.71 × 9.93

= 146.07 sq m.

Plinth Area Rate Inclusive of Water Supply and Sanitary Work and Electrification Works = Total/ Plinth Area

= Rs. 206016.97/ 146.07

= 1410.39 per sq m.

Plinth Area Rate of Double Storeyed building, for both Ground floor And First floor combined = P.A. Rate of G.F + P.A. Rate of F.F

= Rs. 4988.41 + Rs.1410.39

= Rs. 6398.8 Per sq m.

This calculation is shown the total expense to construct the building and also indicate the plinth area rate.

III CONCLUSION:

The above process are give the practical knowledge about site work and also give the how to do the survey with use of equipment in perfect way. Planning and Design is perfectly done with theoretical knowledge and also estimation process gave the perfect and accurate expense of building construction before starting the construction of building. Also this process are useful to analyze the building perfect way.

IV REFERENCES:

[1]Burden, E. (2004) Illustrated Dictionary of study work. Plan and design Of building. New York: McGraw Hill.
[2]IS 456. (2000). Plain reinforced concrete-code of practice, Bureau of Indian Standards, New Delhi, India.
[3]N.Krishna Raju, "**Advanced reinforced concrete design**", CBS Publishers and distributors,2009.
[4]Manuel Gottlieb,
http://www.nber.org/books/gott64-1, Introduction to "Estimates of Residential Building, United States, 1840-1939"
[5] A Ghafar Ahmad (2004) The Dilapidation Report, Journal of '**'Majalah Arkitek**", vol. 16,pp. 19–21.
[6] A Sufian and Rozanah Abdul Rahman (2008) Quality Housing: Regulation and Administrative Framework in Malaysia, Int. Journal of "**Economic and Management**", pp. 141–156.
[7]. **Varghese.p.c** , "**Advanced Reinforced Concrete Design**",pretince Hall of India pvt.Ltd.,New Delhi,2012.
[8].Punmia B.C., Ashok Kumar jain, Arun jain, "RCC Designs of Reinforced Concrete Structures", laxmi publications Pvt.Ltd., New Delhi,2006.
[9]."Design of Reinforced Concrete Structures", **S.Ramamrutham**
[10]." Dr.H.J.Shah and Dr.Sudhir K Jain, "*Design Example of a six storey building*", (*SSR Journals*).
[11]." Prakrithi Joshi, Bhawana Rana Manger, Prashika Tamang, Dinesh Nabkoty, Tshering Yangden Lachenpai, "*Planning and analysis of (G+2) Residential Building using integrated green design concept"* (IJETT Journals), volume 33 , number 8 (March 2016).