AC 2010-369: GLOBAL CONSTRUCTION: INDIA

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GLOBAL CONSTRUCTION: INDIA

Abstract:

In India, the majority of the residential buildings are constructed on a contract basis. Here, an owner who wishes to build signs an agreement with a contractor, taking specific requirements under consideration. Generally, a permit, house plan, structural design, and a contractor are required for construction. The legal permit states that, the owner is the legal heir of the property, and the plan of the buildings is approved by the local municipality.

Construction is continuously facing new demands and pressures. The impact of globalization, the advance of technology and cultural changes are just a few of the issues that are affecting the industry. Hence, construction around the world, both in developed and developing countries, is facing challenges created by these and numerous other issues. The identification of the issues is more critical for developing countries as they could assist in defining research and development efforts to address them more effectively.

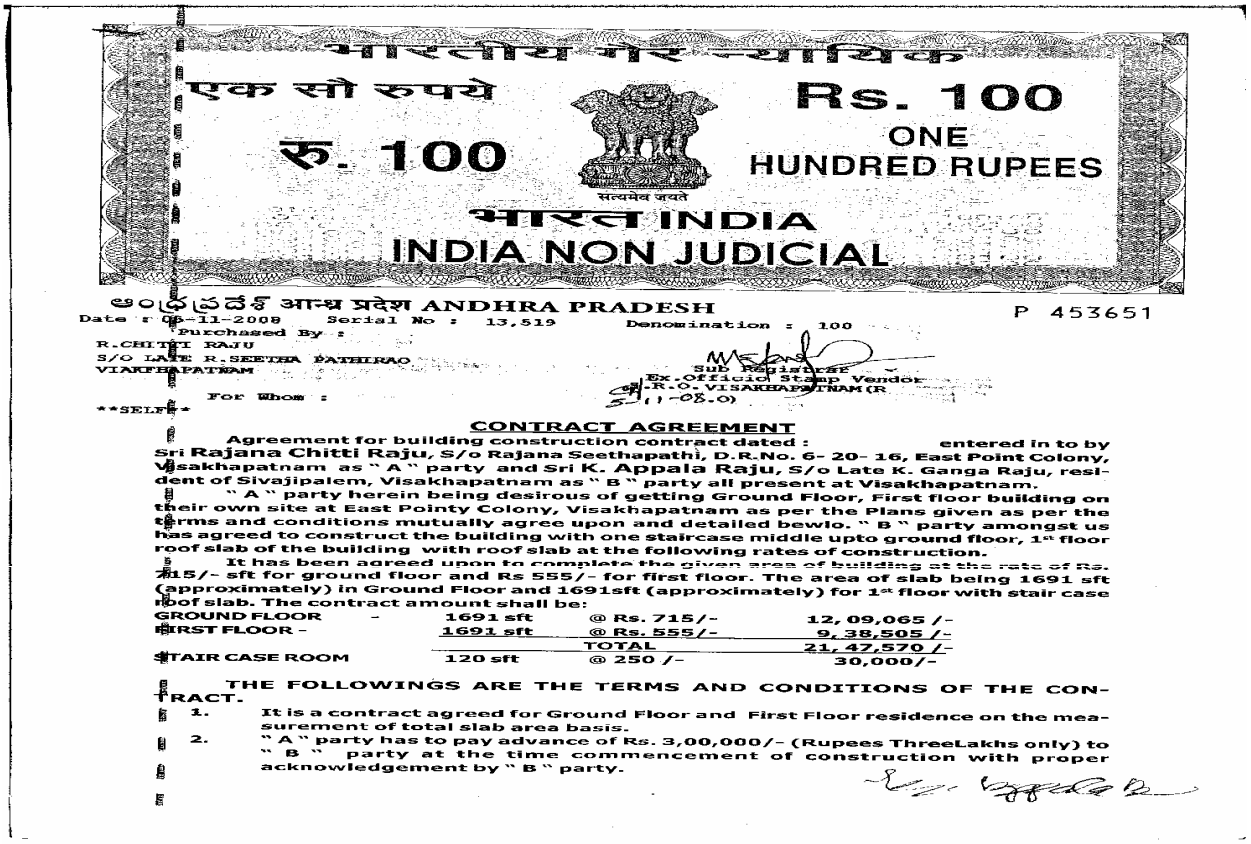
In order to introduce the concept of global construction to university students, a seminar was developed to investigate the subject as well as that of green and sustainable construction. Numerous papers were written and presented at meetings of organizations such as the Texas Section of ASCE and the Gulf-Southwest Section of ASEE. Students were also requested, at times, to present at their finding in the Building Construction course. This has been found to be a good method to increase, in students, the level of knowledge associated with the global aspects of construction and civil engineering. Specifically, the items associated with Labor Intensive Construction which are discussed in a following section should be of interest.

Introduction:

Generally, after the plan is completed a contract agreement is signed by the contractor and the owner as shown, in part, in Figure 1 and the appendix. In this agreement the specifications regarding the building materials to be used, cost, and the mode of payment is given. The structural design is accomplished by a structural designer who determines the sizes of beams, columns, rebars and spacing. This data should be utilized by the contractor.

The most important phase is the construction of the building. Here, the owner or his representative should check the quality of the materials used by the contractor, the skill of the workers, and the curing of concrete. If the workers are skilled and the quality of work is good, the duration of construction work should generally be acceptable. Inspection of the building at different stages is done by the senior engineers. If any corrections are required they should be made quickly, so not to affect the progress of the construction work. Payment for any changes in the work other than the specified in the construction agreement is the responsibility of the owner [2].

After the completion of the building, the payments are cleared, nevertheless, the contractor will generally be responsible for any problems six months after completion.



भारतीय गैर-न्यायिक

एक सौ रुपये

Rs. 100

ONE HUNDRED RUPEES

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भारत INDIA

INDIA NON JUDICIAL

ఆంధ్రప్రదేశ్ आन्ध्र प्रदेश ANDHRA PRADESH

P 453651

Date : 05-11-2009 Serial No : 13,519 Denomination : 100

Purchased By :

R.CHITTI RAJU

S/O LATE R.SEETHA PATHIRAO

VIAKHAPATNAM

For Whom :

SELF

Sub Registrar

Ex-Officio Stamp Vendor

R.O. VISAKHAPATNAM (R

5.11-08.0)

CONTRACT AGREEMENT

Agreement for building construction contract dated : entered in to by Sri **Rajana Chitti Raju**, S/o Rajana Seethapathi, D.R.No. 6-20-16, East Point Colony, Visakhapatnam as " A " party and Sri **K. Appala Raju**, S/o Late K. Ganga Raju, resident of Sivajipalem, Visakhapatnam as " B " party all present at Visakhapatnam.

" A " party herein being desirous of getting Ground Floor, First floor building on their own site at East Pointy Colony, Visakhapatnam as per the Plans given as per the terms and conditions mutually agree upon and detailed bewlo. " B " party amongst us has agreed to construct the building with one staircase middle upto ground floor, 1st floor roof slab of the building with roof slab at the following rates of construction.

It has been agreed upon to complete the given area of building at the rate of Rs. 715/- sft for ground floor and Rs 555/- for first floor. The area of slab being 1691 sft (approximately) in Ground Floor and 1691sft (approximately) for 1st floor with stair case roof slab. The contract amount shall be:

GROUND FLOOR -	1691 sft	@ Rs. 715/-	12,09,065 /-
FIRST FLOOR -	1691 sft	@ Rs. 555/-	9,38,505 /-
		TOTAL	21,47,570 /-
STAIR CASE ROOM	120 sft	@ 250 /-	30,000/-

THE FOLLOWINGS ARE THE TERMS AND CONDITIONS OF THE CONTRACT.

1. It is a contract agreed for Ground Floor and First Floor residence on the measurement of total slab area basis.
2. " A " party has to pay advance of Rs. 3,00,000/- (Rupees ThreeLakhs only) to " B " party at the time commencement of construction with proper acknowledgement by " B " party.

Figure 1: Contract Agreement

Construction work in India consists of many phases as described in the following sections.

Planning:

The planning phase of construction is the most important, Here professionals determine how large the house should be, total estimate, the cost, place to build and the position of the rooms (the plan) etc, as shown in Figure 2. The plan of the house is designed by an architect according, in part, to the specifications of the local municipal corporation. Changes in the plan should be accomplished before submission to the corporation [2].

Estimation of the costs should be accomplished after the plan is completed, since it plays a key role in determining the budget of the facility. If the funds available are less than that required, the size of the building must be changed to complete the construction of the facility. The location is decided by the owner, who should have all legal permits to construct before the construction

Figure 2: An example of an elevation and plan

phase. The contract agreement between the contractor and the owner should be written carefully as it contains the specifications of the materials to be used, and the rate and mode of payment. The contractor will generally use locally available material for construction unless the material specified in the agreement is not locally available.

Design:

The structural design of the building is accomplished by a structural engineer. According to the plan of the house and the bearing capacity of the soils the engineer designs the necessary depth of foundations, the columns, beams and slab, and the gauge of reinforcing steel to be used in them. The plan should be available as it plays an important role in safety of the facility also the specifications of steel and concrete must be met.

Construction work:

This is the main phase, as it deals with the construction work of the facility. The owner should select a contractor with skilled laborers, masons, plumbers, electricians, and painters etc, based on previous work.

Guidelines [8]:

- The whole area of the building should be constructed at one time to avoid settlement in any portion of the building. If the construction is done in small portions, there may be a chance of the settlement in the foundation.
- After the execution of earth work for the foundation, pest control is done in the area.
- Reinforcement cages must be vertical and centered in RCC work.
- The concrete used should be specified by the structural engineer and it should be well mixed.
- After the concrete is placed it should be compacted with a needle vibrator or the flat vibrator to release the trapped air.
- The wood used in the construction should be well seasoned and not have cracks and knots.
- In RCC the frame work and curing of concrete is very important. If the concrete is not cured well the strength will be affected.

Foundations:

The foundations or footings illustrated in Figure 3 play an important role in the construction of a building, in addition to providing a level platform for forms or masonry, footings spread out the weight of the house so the soil can carry the load. While constructing the foundations special care should be taken. If some part of foundation is above ground level, it is also covered with earth fill. [6]

Constructing Footings:

- The site should be cleared if roots of the trees exist, they should be removed up to 2 feet below the ground level.
- Layout of the building should be done with fixing centre lines on brick pillars etc. and mark all the walls, columns on the ground with their proper length and width as per designs or drawings.
- Plinth level should be fixed keeping in view the H.F.L (High Flood Level) and surrounding buildings and nearby roads.
- Excavation for the foundation should be done according to the design and exact width and depth required. If extra depth is required due to poor soil, it should be filled in with coarse sand or concrete.
- Water due to infiltration should be pumped out immediately.

Depth of foundation depends on following factors:

1. Availability of adequate bearing capacity of soils.

2. Depth of shrinkage and swelling in case of clayey soils, due to seasonal changes which may cause appreciable movements.

3. Depth of frost penetration in case of fine sand and silt.

4. Possibility of excavation of adjacent facilities.

5. Depth of ground water table.

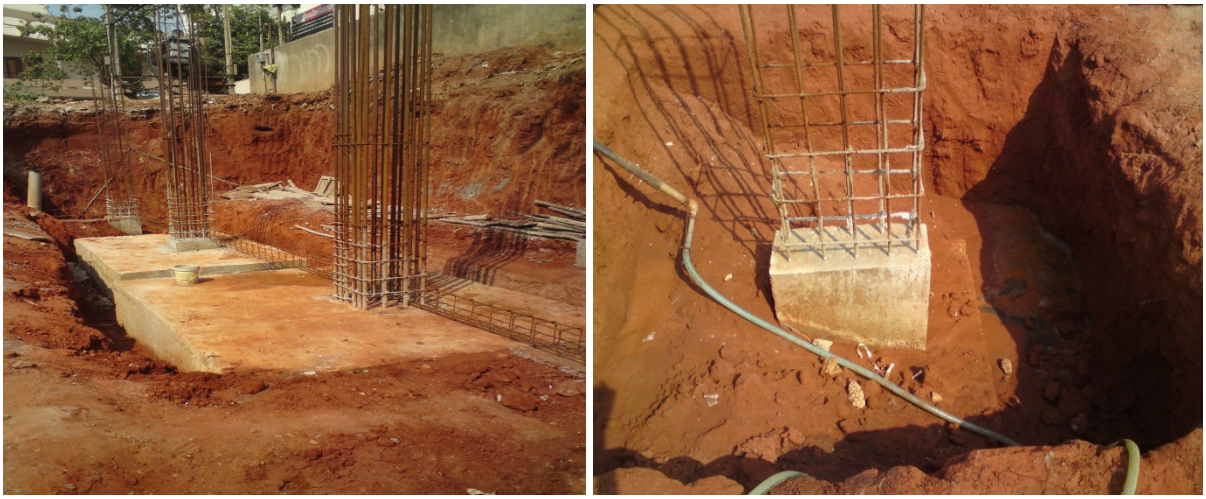

Figure 3: Footings

Plinth beam:

A girder at the ground level called a plinth beam resting on the foundation system is often constructed. The columns are spaced on a girder according to the specific design. This girder is called a plinth beam. The main purpose of the plinth beam is to transfer the load from the columns to the footings. For these beams the base is first constructed with coarse aggregate

placed at a level with top of the footings. The reinforcement is installed and the beams are formed by placing wooden planks on sides as shown in the Figure 4[7].

Figure 4: Construction of Girder/ Plinth beams

Pillars or columns:

A column in structural engineering is a vertical structural element that transmits, through compression, the weight of the structure above to other structural elements below. According to the design, the columns rest on the plinth beams above the footings. These columns take the load from the beams above and transmit it to lower columns or the footings [3].

Guidelines:

- Pillars should be plumb, level and lineup.
- The reinforcement used should be placed as required.
- A vibrator should be used while concreting the column to get a compact mass of concrete.
- Curing as shown in the Figure 5 is done till the pillars gain strength, and then the slab may be constructed above them. Note the covered column.

Figure 5: Columns are cured for at least 28 days

Shoring or shuttering for the slabs:

Shuttering or false work is the term used for temporary timber, plywood, metal or other material used to provide support to the wet concrete mix on the slab till it reaches strength for self support as shown in the Figure 6. Notice the use of a forest of bamboo for the false work and large number of labors involved in construction.

Form work should be strong enough to support the weight of wet concrete mix and the pressure due to placing and compacting concrete on the top of the slab. It should be rigid to prevent any deflection in the surface after laying concrete and also to prevent loss of water and concrete. Shuttering should be easy to erect at site and easy to remove when concrete has reached to strength.

Defects in Shuttering/Formwork:

- The supports of the form work are not are not cross braced.
- The ground supports of wooden posts are poor and therefore settle,
- There is insufficient thickness of shuttering plates/planks unable to bear vertical and lateral pressure imposed by wet concrete especially in columns,
- Shuttering plates are not cleaned and oiled or oiled with dirty oil.

Laying of cement concrete for slab:

After the shuttering/ form work is completed, rebar are tied on the form work according

to the structural design. Proper cover is maintained between the formwork and rebar of

Figure 6: Shuttering or false work

the slab and in beams. Generally the concrete is placed on the slab manually by labor or by ready mix concrete [5]. Figure 7 illustrates the labor intensive operation whereby the wet cement mix is carried by pans on a workers head. In addition the concrete is mixed at the site.

Precautions in RCC Work:

- Steel bars are clear, free from dust, loose rust and any oily materials.
- The bars used at site are manufactured from a good quality brand and have a full length.
- Use full length steel bars in beams, slabs etc, If not possible, proper overlap should be utilized and overlap should be staggered.
- Ribbed and twisted steel bars are used as they have more tensile stress, strength and economy.
- Proper support under rebars supported by beams and slabs must be provided. Steel bars must not be disturbed while lying concrete.
- Proper cover under the steel bars is given

Figure 7: Manual labor working on slab

Checklist/Points for Laying Cement Concrete

- Form work/shuttering should be checked for line, level and strength. Steel bars and their placing should be checked.
- Proper cover of steel bars must be checked.
- Proper planks or plates provided for walking over reinforcement must not be disturbed during working.
- Raw materials should be proper and sufficient in quantity. Electrical conduits, fan box etc. should be laid before lying wet concrete.
- Gap in shuttering plates must be sealed properly by jute bags /mortar /rubber etc. Shuttering plates should be properly oiled.

Brick work:

Brick work is an important part of construction in India. Different qualities of bricks are used with various ratios of cement mortar according to the requirements. All the brick walls are constructed according to the plan and the space for the doors and windows are left as shown in Figure 8. Notice the bamboo used for scaffolding. The walls are cured for at least a week and then the grooves are made for plumbing pipes and electrical wire.

Figure 8: Brick Work

Common defects in brick work and cement mortar

- Bricks are not soaked in water properly.
- The joints in brick works are thicker, unfilled properly. Raking of mortar is not done when the mortar is green.
- Bricks bats are used in masonry work. Mortar is not mixed properly on platform.
- There is improper mixing of cement mortar.
- There is excessive water content in mortar.
- Brick work is not in plumb, level and straight line. Mortar is not according to the structural requirements.
- There are gaps between door/window frame and masonry**.** The holes of scaffolding are not filled in with mortar properly.
- Vertical joints in brick work are hollow.
- There are uneven joints in brick works.

Other Works:

The shoring is removed under the slab only after the adequate strength is achieved. The columns are then raised and the process may continue till last floor is built.

In the mean time the work on the first floor can be begin; the walls, wood work, plastering, and the flooring can be installed. The first activity after removing the shoring is generally to plaster the ceiling. The marble floor tiles can be placed before plastering of walls, since they can be polished at the end. After plastering over the electrical wires and plumbing, painting, and finishing work is accomplished [5].

- **Sanitary System, Plumbing and electrical fittings**: After brick walls are plastered the plumbing, sanitary and electrical fittings are fixed to the walls.

- **Flooring:** Now a day's many different types of flooring are available. Generally flooring like marble, kadappa, granite, and tiles are used.

- **Finishing:** After fixing all the plumbing, electrical and flooring suitable colors of paints are selected according to owners wish and painted. Emulsion paints are used on interior walls and snowcem is used for exteriors.

Before the contractor hands over the building to the owner all the electrical, plumbing work should be inspected. If any problem develops the contractor should repair them for at least six months after occupancy

Labor Intensive Construction

The level of construction productivity varies for different countries depending, in part, on the degree of development and industrialization[10]. This knowledge is important to construction and civil engineering students especially if they plan to work in the global construction industry after finishing their studies. Specifically, this article presents graphic data concerning labor intensive construction in a developing country such as India. The findings in other studies suggest that the overall comparative labor requirement for smaller firms in India may be five – ten times that experienced in developing countries. In contrast, larger firms, which tend to be less labor intensive, experience considerably lower labor requirements. This indicates that there may be, overall, approximately 3 times more workers on a construction site in a typical developing country compared to that of a developed region.

In summary, the graphical data presented involving labor requirements should be of universal interest to any contractor considering projects in developing countries. As shown, developing countries normally exhibit low labor productivity. Utilizing various labor requirement factors will facilitate the efficient management, estimating, scheduling, monitoring, and updating of resources required for construction operations. The application of this data should assist international contractors in achieving their goal of successfully completing quality construction projects in developing countries.

Conclusions and Summary:

The construction industry is the second largest industry of India after agriculture. It makes a significant contribution to the national economy and provides employment to a large number of

people. The use of various new technologies and deployment of project management strategies has made it possible in urban areas to undertake projects of mega scale. In its path of advancement, the industry has to overcome a number of challenges. As an example the majority of construction is still highly labor intensive. In this regard the industry is still faced with some major challenges, including housing, disaster resistant construction, construction safety and water management.

The performance under demanding situations in the past will stand in good stead and give confidence to the Indian construction industry to bring about an overall development of the infrastructure of the nation. The gains of large investments in the mega-projects eventually will feedback to the construction industry itself in the form of better economy and improved working conditions.

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Acknowledgement

The authors wish to recognize Ms. Linda Dousay for her assistance with the production activities involved in preparing this paper.

APPENDIX:

Precautions in Brick Work:

- The quality of bricks should be good having required strength and should not show any efflorescence (salt on face).
- The sand should not have fine grains and be free from silt etc.
- The mixing of mortar should be proper with required quantity of water
- The opening of doors and windows should be left simultaneously, not by dismantling.
- The bricks are soaked in water before use otherwise these will absorb water from the mortar and the bonding will be weak

- The frog or depression side of the brick should be upwards.
- Bricks are absolutely aligned horizontally and in a straight line. This can be checked by a stretched string across the face.
- The bricks are vertically aligned which can be checked with a plumb bob.
- The thickness of joints is not more than 1 cm.
- There are no continuous vertical joints
- Bricks, sand and cement used in brick work should be according to their specifications
- All the electrical, sanitary pipe lines are fixed in, by grooving the walls and then the walls are plastered.
- The plastering is done after all the window frames, door frames are fixed to the brick walls.

Planning:

This phase of construction is the most important, because here we have to decide how large the house should be, total estimate, place to build and the position of the rooms (the plan).

In this phase the following:

- A plan made by an architect
- Municipal approve of plan
- Total estimation of the project
- Selection of builder based on his previous projects
- Specifications of material to be used
- Contract agreement between the client and the builder

The following aspects to be consider in planning:

- The plan of the house should be made by an architect, according to the specifications of the local municipal corporation.
- Estimation of costs should be done after the plan is approved by the municipality, as it plays a key role in determining the budget of the facility.
- If the funds available are less than needed, the size of the facility must be changed to complete the construction of the house.

- A contractor is should be selected based on his previous projects and the good will of their company
- If any changes in the specification of the materials to be used, it should be revised before the contract agreement is made.
- Contract agreement must consist of specifications of material to be used and their costs per unit area, and the mode of payment

Example of Specifications:

STRUCTURE : R.C.C. framed structure to withstand wind and seismic loads.

SUPER STRUCTURE: First class Brick masonry with cement mortar (1:6) prop.

PLASTERING : Plastering with cement mortar in sponge finishing.

DOORS : Main door melamine polished teak wood frame with teak Wood shutter aesthetically designed and designer hardware of reputed make.

Internal door frames are of Sal wood with water proof flush door shutters with reputed make fittings.

WINDOWS : Seasoned Sal wood frame with seasoned Kamba wood shutters with tinted bronze glass.

GRILLS : M.S powder coated aesthetically designed grills and fixed to the Sal wood frame.

CUPBOARDS : Cupboards and wardrobes with 12mm thick RCM planks.

KITCHEN : a. Polished Black Granite top with Stainless steel sink with both municipal & bore water connection & provision for fixing of Aqua-guard.

b. Provision for cabinets, exhaust fan & chimney.

c. joint free Glazed ceramic tile dado up to 2'-0" height.

FLOORING : Vitrified tile flooring with 4" skirting for all rooms of standard make. Children bedroom with wooden flooring.

PAINTS : Interior with putty finish and 2 coats of emulsion paints, exterior with Snowcem paint and wood work with enamel paint

ELECTRICAL : Concealed copper wiring of Finolex / Anchor or equivalent make.

a. Power outlets for air conditioners in all bedrooms.

b. Power outlets for geysers in all bathrooms.

	c. Power plug for cooking range chimney, refrigerator, microwave ovens, mixer/ grinders in kitchen.
	d. Plug points for TV and audio systems etc. in hall.
	e. Miniature Circuit Breakers (MCB) for each distribution board of MDS/ Havells make.
	f. Modular Switches of standard make.
	g. A/c for master bedroom.
Toilet	:a. Common toilet with Indian and attached toilets with Western style commodes along with 7' ht glazed tiles dado of size 8" x12", taps of Jaguar make or equivalent.
	b.Hot and cold water mixer with shower in Master bed room toilet.
	c.Commodes white in color. Water supply : Adequate supply of water from bore well of 2nos.
Generator	:Generator backup for lifts, motors, common lighting and 2 points for each apartment.
Intercom	:Intercom facility to all flats connecting the security.
Telecom	:Telephone points in Master Bed rooms and living areas.
Cable TV	:a. Provision for cable connection in Master bedroom and living room.
	b. provision for DTH & Radio space music.
Internet	:One internet provision in each flat.
Lifts	:two no's of high speed automatic passenger lifts with rescue device and V3F for energy efficiency.
Sanitary	:All C.P. fittings are chrome plated of Jaguar or equivalent make. Sanitary ware is of Hind ware or equivalent.
Landscape	:Aesthetically designed landscape court, children play area and swimming pool area.
Extras	:Charges for A.P. Transco, sales tax, service tax, and registration, NETCAB, U.G.D. or any other taxes are extra.

Example of Contract Agreement:

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ONE HUNDRED RUPEES

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THE FOLLOWINGS ARE THE TERMS AND CONDITIONS OF THE CONTRACT.

1. It is a contract agreed for Ground Floor and First Floor residence on the measurement of total slab area basis.
2. " A " party has to pay advance of Rs. 3,00,000/- (Rupees ThreeLakhs only) to " B " party at the time commencement of construction with proper acknowledgement by " B " party.

TERMS AND CONDITIONS:

1. The concrete mix used for all RCC SLABS AND Beams (1: 3.4) 20 mm HBG Chip.
2. 4" thick chimney brick walls in CM (1: 4) bricks for external, internal walls (Rajahmundry bricks.)
3. Ceiling plastering with CM (1:4)
4. Plywood shuttering shall be used for slabs.
5. Plastering to inside wall 12 mm thick and outer face of wall 20 mm. (1:4)
6. Oil bound distemper for internal faces and cement base paints for external faces only (Asian Paints).
7. Anti – termite treatment wood of "A " party account.
8. Stone available at site shall be used in flooring etc.
9. Toilets shall be provided as per the drawing in ground floor and first floor Only . If any extra toilets required by the " A" party shall be paid extra.
10. Roof shall be plastered with water proof cement for mortar 1:4, 12 mm thick, below a baby chips concrete (1:3: 4) base 20 mm. thick.
11. One number wash basins (white Ceramic (Rasi ware) shall be provided toilet. Additional wash basins shall be charged extra in each flat.
12. Brands of paints and all other material to be used shall be of standard company and color shall be as selected by the " A " party (Nerolac or Berger).
13. Slag cement shall not be used. Only 43/53 grade Opc cement of standard company shall only be used (Ramco or Raasi) etc.,.
14. Dadoing shall be provided for a height of door heights in all toilets with glazed tiles of white colour or any other plain colour (8" x 4" size).
15. Parapet wall on roof shall be provided to a height of 2'-6 ". Slab height shall be 10' clear.
16. Over head one tank with RCC pipes, separate inlet and out let of 6'x4'x 4' brick tank. Internal dimensions with water proof compound.
17. During the construction project if " B " party fails to execute the work as per agreed specifications " A " party shall have the right to terminate the contract unilaterally with immediate effect without assigning any reason.
18. For each and every payment made by " A " party proper receipt shall be submitted by " B " party.
19. " B " party shall have to obtain receipts for each and every material purchased by him in name of " A" party.
20. All 4 nos main doors shall be teak wood only and Vepa shall be used for other doors and windows frames at the const of Rs.350/- ctf. Doors shall be of ready made flush doors and windows shall be made of Sal wood with pin headed 4mm, Glass. Toilet doors shall be PVC.
21. Enamel paints of standard companies shall be applied for wood and iron works (Asian Paints).
22. Cup boards as per specifications and design supplied by Engineer with approval of party shall be provided with R.C.C. Planks only in each room.
23. Ceramic tile/ vitrified flooring shall be done in flooring of ground, first floors at the rate of 15 /- per sft.cost. The rate included in the contract agreement. If "A" party willing to change flooring tile 15/- shall be deducted from total sft of ground and first floor (ie 1691 sft ground floor @ Rs 700/- and 1691 sft first floor @ Rs 540/- only) Steps only P.C.C. finishing.
24. White colored sanitary ware of Rasi or Hindustan shall be provided. If colored Sanitary ware required, Addl. cost shall be borne by " A " party.
25. In one toilet one IWC, one shower, one tap for bath one tap at WC and Hot water provision shall be provided and other toilet with European seat.
26. In kitchen 1 No. tank water tap and 1 No. pump water tap shall be provided in the sink.

27. Elevation stone cladding or glass works shall be charged extra cost.
28. Painting enamel 2 coats over Primer for wood.
29. Snocem Distemper 2 coats over of white cement.
30. In puja room dadoing up to door height of glazed tiles of white colour.
31. ELECTRIFICATION:

Bed Rooms	: Fan and light points	-	4
	5 amps plug pints	-	1
Dining & Living	: Light Pints	-	4
	15 amps Plug	-	1
	5 amps plug	-	1
Kitchen	: Light Points -	2	
	15 Amps plug	-	1
Balcony	: Light	-	2
	5 amps plug	-	1
Toilets	: 5 amps plug	-	1
Outside Light point in 6 Floor		-	4

Make: Wire : (Finolex or Millenium) Switches : (Anchor or Millenium) (Wirinng and switch Concections provision providided according to "A " party Intrest only).

32. Standard quality of PVC (Sudhakar) pipe shall be used for plumbing and sanitary. Separate waste water pipes and separate toilet pipes shall be provided and Drainage connection to UGD.
33. Caddapah black (granite polish) cooking platform with suitable sink of 1'-9" wide shall be provided in the kitchen with dadoing upto 2' – 0" height.
34. Windows grills with flat shall be fix to the windows or 9 mm. Square bar. Glazed window shutter shall be provided with 4 m.m., pin headed glass.
35. No electrical fitting shall be provided such as Fans, Lights, Pumps etc.,.
36. Bus bars, power meters and power connection shall be borne by the " A " party. Bore and the pump are to be arranged by the " A" party. Any charges to be paid to the Government if any shall be borne by the " A " party like Sales Taxes and Municipal Taxes etc.,. The owner is responsible for any trouble created by any external party. He should solve the hurdles with his own expenses.
37. Electricity and water shall be supplied by the owner at site. During construction Electrical charges shall be borne by owner.
38. Other than the Building construction any other works shall be of owner account.
39. Front elevation to be developed for a neat and tidy look as per the suggestion.
40. Phone and Internet cable points shall be provided in drawing room and bed rooms.
41. Compound wall shall be made with CC BLOCK. Main gate supply and fixing.
42. Watch man payment shall be "B" party account only.
43. size of footings 4' x 4' x 12" with 10 mm at 6" c/c both ways
44. Columns 9" x 12" with 6 nos 16 dia T with 8 dia ring at 6" c/c. The total numbers of building columns are 12 nos.
45. Beams 9" x 12" with 12 dia – 3 nos top 12 dia – 3 nos both slabs 8 dia T @ 6" c/c both ways.
46. one manpower completely deployed for watering to be done one week to 10 days after every complete of construction of particular structure.
47. In ground floor external flooring should be shall be provide by party "B" all around the building.

SIGNATURE OF THE OWNER. (" A ") CONTRACTOR("B ").

MODE OF PAYMENT

1. Advance	-		Rs. 3,00,000/-	Rs. 3,00,000/-
2. RCC Slab of each floor	-	2/	Rs. 5,00,000/-	Rs. 10,00,000/-
3. Brick work with frame Of each floor.	-	2/	Rs. 75,000/-	Rs. 1, 50,000/-
4. Wood work of each floor	-	2/	Rs. 75,000/-	Rs. 1, 50,000/-
5. Sanitary and plumbing of- First floor		2/	Rs. 75,000/-	Rs. 1, 50,000/-
6. Tiles flooring	-	2/	Rs. 75,000/-	Rs. 1, 50,000/-
7.Electrification	-	2/	Rs. 40,000/-	Rs. 80,000/-

8. Other finishing (flooring and etc) Balance amount will be paid after finishing all the jobs

NOTE:

" B" PARTY HAS TO COMPLETE THE BUILDING WITHIN SIX MONTHS FROM THE DATE OF COMMENCEMENT.

SIGNATURE OF THE OWNER. (" A ") CONTRACTOR("B ").

WITNESSES:

1.

2.