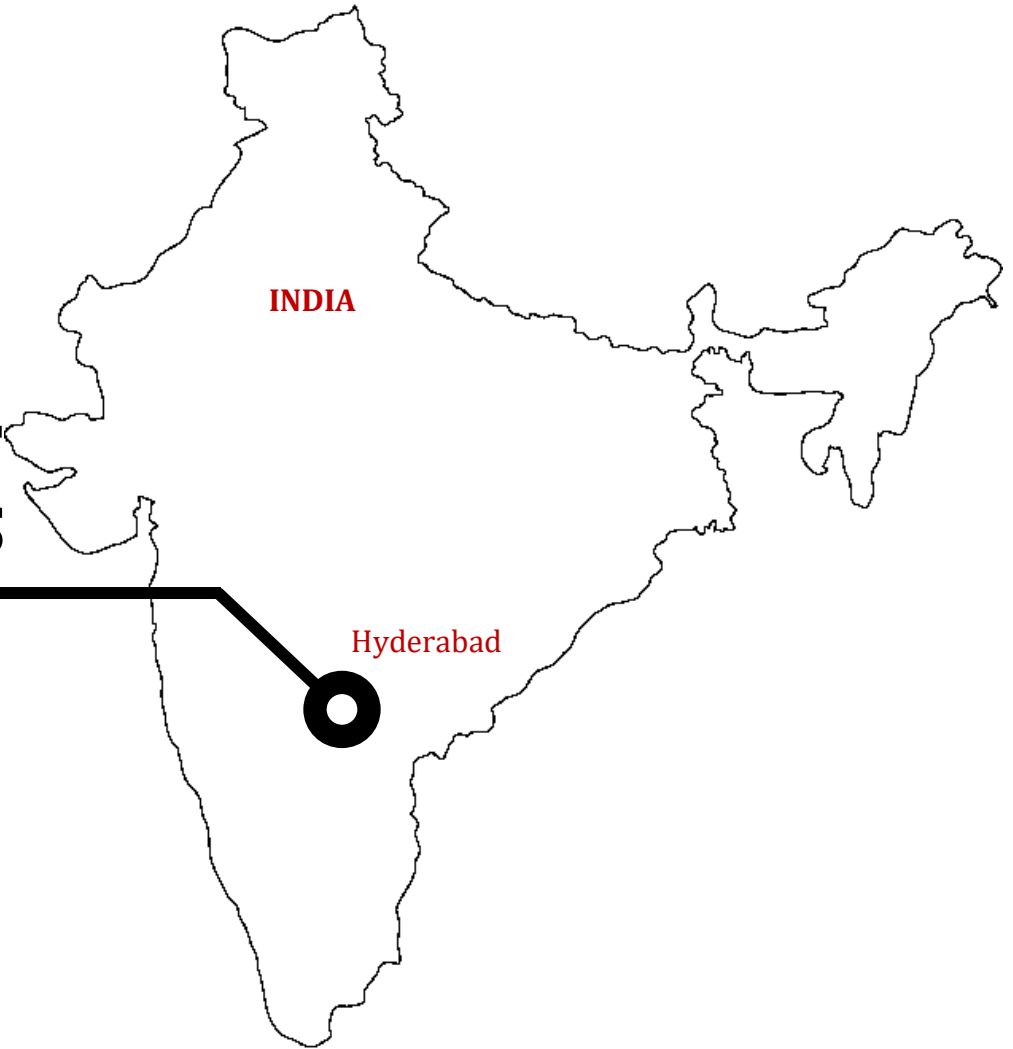


TECHNICAL REPORT 1

HANZA CREST APARTMENTS



Hyderabad

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Advisor: Dr. Robert Leicht

September 16th, 2016

Executive Summary

The Hanza crest apartments is 56,000 square foot residential building located in Hyderabad, India. The building consists of total 8 floors including a cellar and sub-cellar. There are 5 floors which have two 3-bedroom apartments per floor. The top floor is a club house for recreational purpose. The technical report summarizes about Client information, project delivery system, Estimate, site plan, schedule, building systems and staff.

Client Information

Construction companies in India are almost always real estate agencies as well. They buy a particular piece of land, build on it and then sell/lease the building out. Most Indian metropolitan cities are zoned by the government. The zones can be mixed use, pure residential or pure commercial. The zone Hanza crest apartments are being built falls under the second. Ambience construction firm has constructed only schools and medical centers until last year. The firm is now certain about the residential construction market. These apartments are designed for high-income earning demographic and to intensify the reputation of the firm, mainly in high-end residential sector. It is considered to be one of the prestigious residential projects for ambience construction firm due to the location and for designing spacious luxury apartments, targeting on the quality. The cost is going above than the average budget for residential apartments. The prime factors for the high budget is due to the addition of the club house and limited only two apartments each floor which are 3500 SQFT each. The safety measures taken for Hanza crest apartments is to possess a solar fence to the compound wall of the building and two security guards. Safety during the construction is not one of the top priorities for ambience construction firm. Daily reports are submitted and meetings are held twice a week with all the staff members to make sure the schedule is not deviated. One of the examples, due to the restriction of allowing transportation trucks for 5 days during a strike, there wasn't sufficient sand to do the soil levelling and this led to a delay. In order to cover the delay, the firm hired more labor and equipment to finish the soil levelling and plinth beams placement.

Project Deliver system

The Ambience Construction firm utilized two contracts for this project. The first one is EPC (engineering procurement and contract) this allowed the firm to execute their engineering design, procure the materials and equipment and construct the building. This type of contract is very similar to design-build which is followed in USA. Ambience construction firm is also the owner's representative. The firm has sub-contract with finger6 architects who designed the building and S.D consultants for structural and MEP systems only for design phase. The architect and consultants were selected by the firm based on the cost and quality of the design. The engineers from the Ambience construction firm follow the designs given by these consultants for construction. The second contract is item rate for cash flow purpose. The firm is given an advance of 10-15% of the total estimated cost after submitting the estimate to the owner. The bills are submitted to the owner once in every 15 days or 1 month based on the materials used and amount of work completed. The owner is given a maximum of 1 month time period to pay the bills, if not there are penalties and contract might get cancelled.

Staff Organization:

The staff organization for the Hanza Crest Apartments is typical like any other construction project. The project team is headed by the project director. His responsibilities include overlooking the entire project. Along with the project manager, he is responsible for the delivery of the project resources and resolving issues that come up during the project construction. The project manager comes second in command, and reports only to the project director. He is responsible for the outcome of the project. He ensures that the project is delivered on time, does not exceed the budget and quality is as promised. There are two site engineers. They are the ones that the foremen and the subcontractors report to. They are in the field and overlook the actual construction being done. The site engineer also in charge of the amount and type of material transported and used. They report to the project manager. The foremen are skilled labor who are trained to perform a specific set of activity at site. They are typically associated with different phases of construction. The chargemen, who report to the foremen, are unskilled labor. The site superintendent is responsible for the safety of the on field staff. He ensures that all safety precautions are taken while performing any construction activity, be it the foremen or the project manager. He is also responsible for teaching safe construction practices to the on field staff. The

accountant is responsible for the money flow each day and report the same to the project manager. The accountant is also responsible for the daily wage payment to the foremen and chargemen. The site engineer, accountant and superintendent have their respective assistants to make sure their work is done smoothly. The administrative department takes care of the construction staff. The administrative staff ensures responsibility for time keeping, transportation, document controlling or handling appointments.

Existing Conditions of Site Plan:

As mentioned earlier, the site is located at an extreme elevated and hilly area. The site had trees and immense rocks for a residential location. The excavation could be started only after complete demolition and establishing a flat site. Since there is a height restriction of only 60 feet at the location, the site was required to be excavated 8770 Yds³, 22 feet deep from the initial level. The site consists of two separate plots initially and were separated through fencing. The owner bought both the lands from two different parties and were given to ambience construction together to construct Hanza Crest apartments. There is an empty land of 600 Sq.Yds, opposite to the site which is allowed to use for storing materials and equipment.

Project Summary Schedule:

The total duration of construction for Hanza crest apartments is 32 months. The project initial meeting was held in November 2014. To acquire all the required building permits and review the documents it took 2 months. For demolition of rocks, 13 months was required to clear the site. The excavation was started after demolition and took 5 months. The foundation phase is followed by superstructure which is scheduled for 4 months, is the most important activity and needs to be ensured of no delay in superstructure phase since that will create an impact on the remaining activities. The building enclosure is scheduled for 30 days. The internal finishes is scheduled only after the building for 80 days. The project is scheduled to be handed over by June 2018.

Estimate:

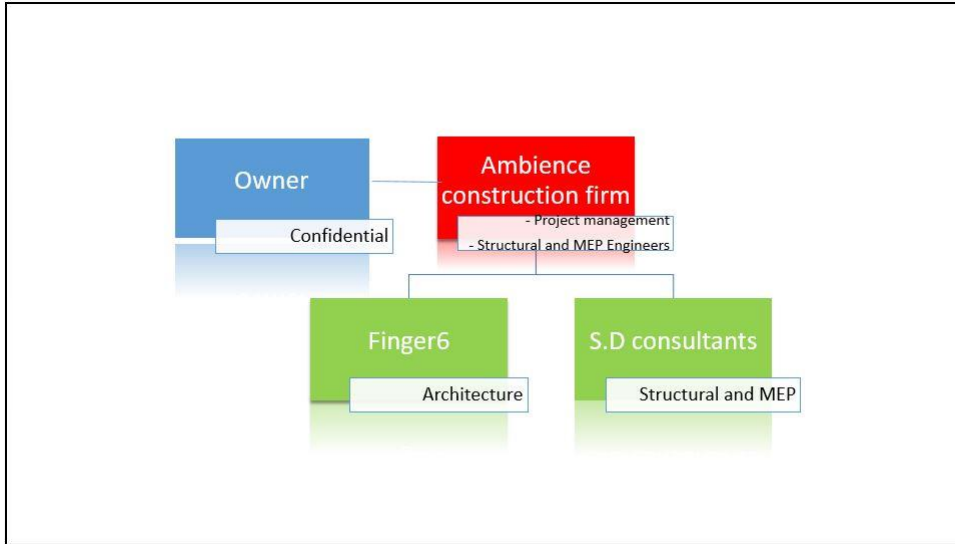
The total cost of this project based on material, labor and equipment prices in India is \$1,042,759. Ambience construction was restricted from providing the detailed estimate due to government concerns. The square foot cost as per prices in India is \$19/SF. The estimated cost based on R.S means (2016) pricing, the cost/SF is \$123.80. The total cost is \$6,844,320. The total cost of construction in USA is 6.5 times more than the total cost in India. The difference in cost is mainly due to the availability of labor for a very less price. The land price is very low compared to USA due to the low cost of living in India. Based on climate and population, Hyderabad is compared to Los Angeles in terms of land price, labor price and concrete price which has a tremendous difference.

Building System Summary:

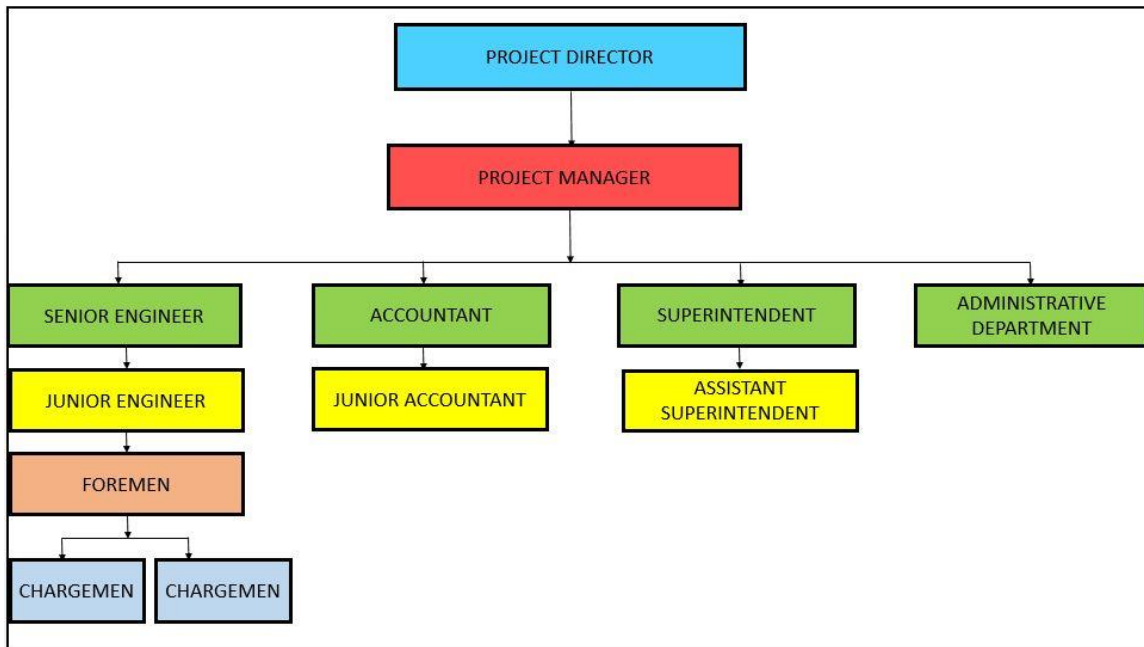
The site being located at a hilly area, acquired huge rocks which were existing on the site. The entire site required huge excavation of approximately 8770.6 yd³. Ambience construction decided to use cast-in-place RCC structure. Steel shuttering is the type of formwork used for columns and slabs. Previously in India, plywood was used for formwork but the practice has been stopped, since it consumes more effort and time to make a formwork, size it and place them accordingly. Steel shuttering or formwork is more convenient as the steel plates are already sized according to the requirements of the building and are bolted together for formwork purpose. Though the building is not LEED certified. To follow certain Indian standard codes, fly ash bricks, paint with lead free, waterproofing for cement which is lead free are some of the strategies to stay environment friendly. Biometric plumbing system is applied to Hanza crest apartments. The water acquired from bathrooms is sent to sewage treatment plant to purify it and used for gardening and bathrooms in staff rooms. This system is productive for the building and helps to reduce the water scarcity in India. The electrical system is similar in most of the residential buildings in Hyderabad. Each bedroom is facilitated with electrical points fan, Air conditioner, and two lights. The signal alarm system is installed inside falls ceiling for firefighting including at the corridors. Most of the buildings in India do not acquire mechanical system. Based on the occupant's requirement, wall units are fixed.

APPENDIX

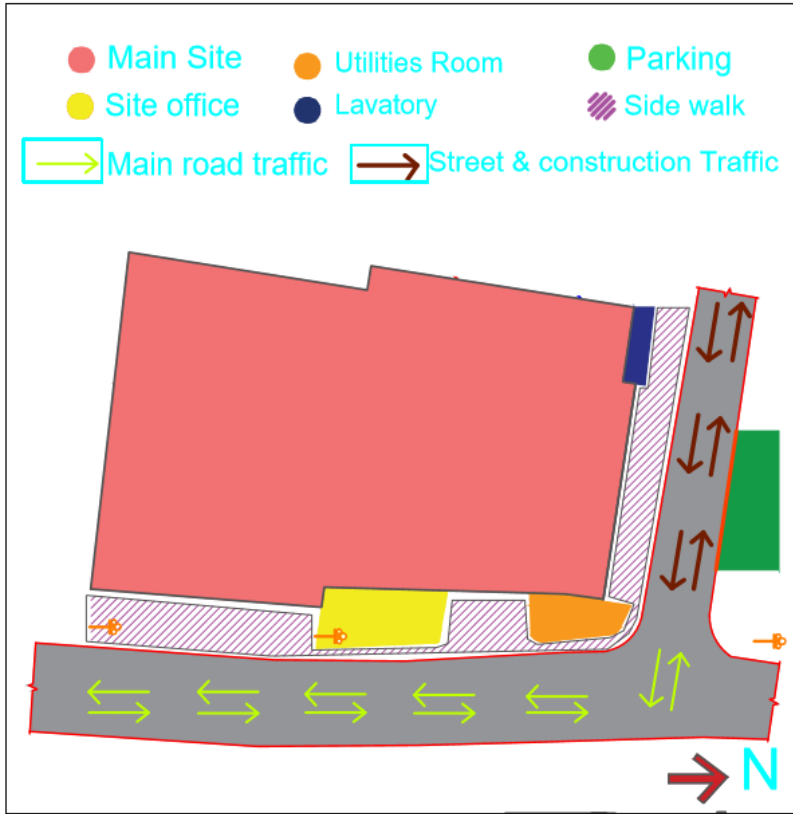
Project Deliver system



Staff Organization

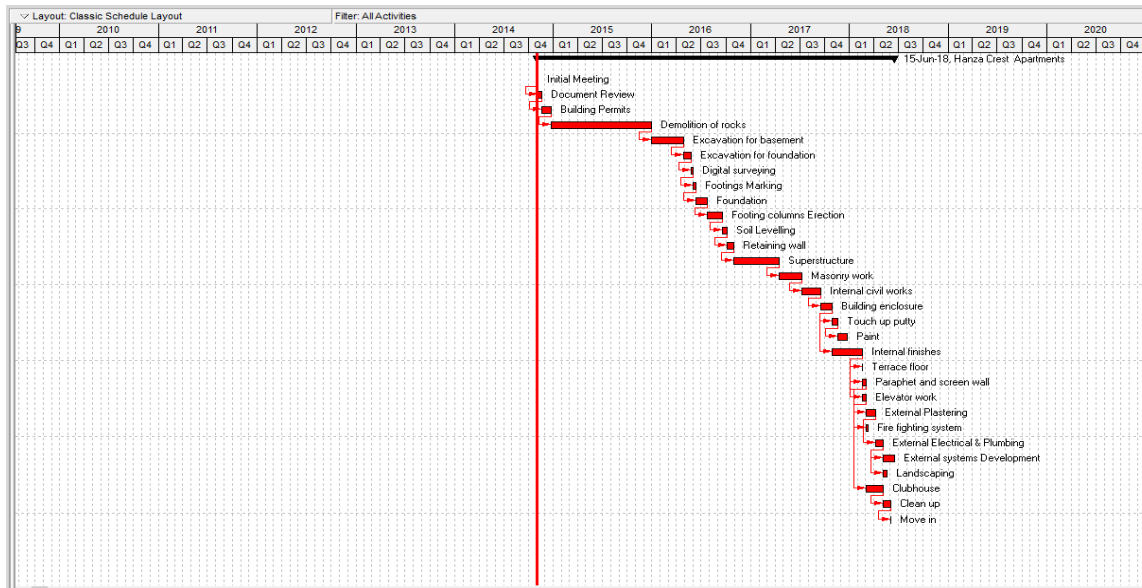


Site Plan



Project Schedule Summary

Activity ID	Activity Name	Original Duration	aining	Start	Finish
Hanza Crest Apartments		945	945	03-Nov-14	15-Jun-18
A1000	Initial Meeting	3	3	03-Nov-14	05-Nov-14
A1010	Document Review	11	11	06-Nov-14	20-Nov-14
A1020	Building Permits	25	25	21-Nov-14	25-Dec-14
A1030	Demolition of rocks	265	265	26-Dec-14	31-Dec-15
A1040	Excavation for basement	85	85	01-Jan-16	28-Apr-16
A1050	Excavation for foundation	20	20	29-Apr-16	26-May-16
A1060	Digital surveying	4	4	27-May-16	01-Jun-16
A1070	Footings Marking	7	7	02-Jun-16	10-Jun-16
A1080	Foundation	30	30	13-Jun-16	22-Jul-16
A1090	Footing columns Erection	40	40	25-Jul-16	16-Sep-16
A1100	Soil Levelling	12	12	19-Sep-16	04-Oct-16
A1110	Retaining wall	18	18	05-Oct-16	28-Oct-16
A1120	Superstructure	120	120	31-Oct-16	14-Apr-17
A1140	Masonry work	60	60	17-Apr-17	07-Jul-17
A1150	Internal civil works	50	50	10-Jul-17	15-Sep-17
A1160	Building enclosure	30	30	18-Sep-17	27-Oct-17
A1170	Touch up putty	15	15	30-Oct-17	17-Nov-17
A1180	Paint	25	25	20-Nov-17	22-Dec-17
A1190	Internal finishes	80	80	30-Oct-17	16-Feb-18
A1200	Terrace floor	0	0	19-Feb-18	19-Feb-18
A1210	Paraphet and screen wall	10	10	19-Feb-18	02-Mar-18
A1220	Elevator work	10	10	19-Feb-18	02-Mar-18
A1230	External Plastering	25	25	05-Mar-18	06-Apr-18
A1240	Fire fighting system	5	5	05-Mar-18	09-Mar-18
A1250	External Electrical & Plumbing	20	20	09-Apr-18	04-May-18
A1260	External systems Development	30	30	07-May-18	15-Jun-18
A1270	Landscaping	10	10	07-May-18	18-May-18
A1280	Clubhouse	45	45	05-Mar-18	04-May-18
A1290	Clean up	20	20	07-May-18	01-Jun-18
A1300	Move in	0	0	04-Jun-18	04-Jun-18



Estimate

Calculated Square Foot Take-Off		
Building System	Cost/SF	Total
substructure	\$ 2.20	\$ 123,200.00
superstructure	\$ 13.50	\$ 756,000.00
Exterior enclosure	\$ 23.80	\$ 1,332,800.00
Roofing	\$ 1.11	\$ 62,160.00
Interiors	\$ 26.80	\$ 1,500,800.00
Conveying	\$ 7.70	\$ 431,200.00
Plumbing	\$ 14.30	\$ 800,800.00
HVAC	\$ 17.40	\$ 974,400.00
Fire Protection	\$ 3.71	\$ 207,760.00
Electrical	\$ 11.70	\$ 655,200.00
	Total Cost	\$ 6,844,320.00

Comparison		
	United States	India
City	Los Angeles	Hyderabad
Population	10.02million	9.5 million
Climate	68 F	79 F
Land Price	\$3077/ SQYD	\$1029/ SQYD
Labor Price	\$27/Day	\$4/Day
Concrete Price	\$82/Cu.Yd	\$40/Cu.Yd

Building System Summary



Figure1: RCC structure



Figure 2: Typical air conditioners (AC) used in India (Wall Units)



Figure3: External Unit of AC