GREEN BUILDING MAKES BUSINESS SENSE

SUSTAINABLE BUILDING IS COMMERCIALLY PROFITABLE IN SHORT TERM AS WELL

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How Dare You !

- The 16 year old Swedish Girl Greta Thunburg is threatening our generation including the POTUS !
- HOW DARE YOU, HOW CAN YOU RUIN MY FUTURE IN THE NAME OF PROFITABILITY
- My Take on this would be Profits and Sustainability are not mutually exclusive.
  - Both can go hand in hand if we are a little bit thoughtful.
  - We are capable enough to see to it that we hand you over a prosperous life and sustainable Environment.
  - Green Building Concepts precisely work in this direction.

ENERGY EFFICIENT HOMES

- At Aakriti Shantiniketan we have been able to create one of the most energy efficient multi story buildings in the country. The basic concepts required behind them were as follows.
  - Well ventilated apartments
  - Balcony used as shading mechanism keeping in view inter seasonal Solar movements
  - DGU Performance glasses
  - Judicious use of AAC Blocks
  - Heat reflective Paints and materials

Arithmetic behind the Energy Efficient Concepts

- Well ventilated apartments: **Only thoughtful design required, no extra cost.**
- Balconies used as shading mechanism for walls keeping in view inter seasonal Solar movements: It gives large private outdoor space to the user in the concrete jungle. **Since Balcony is cheaper to make and Free of FAR, it gives me extra Profit as well.**
- DGU Performance glasses: **Only item in the building that increases the cost. However, by virtue of this single element we command a huge premium that is, multiple times the investment.**

Arithmetic behind the Energy Efficient Concepts

- Judicious use of AAC/Flyash Blocks and Bricks: **Cheaper and than traditional Bricks**
- Heat reflective Paints and materials: **Insignificant cost addition, but huge USP, contributing to the premium.**
- Energy Efficient Electro Mechanical devices and equipment: **In a residential non AC building the cost of these items is insignificant, and as such do not have much bearing on the overall costing however, gives a marketing point to the salesman and contributes towards sales velocity and premium.**

Reduce, Recycle and Reuse: Items adding straightaway to the bottomline

- By proper management of steel yard, and sorting different sizes of steel we were able to generate almost zero scrap. Normally it is about 3-5 %. This saving alone covers all the incremental expenditure mentioned in the energy efficient sections.
- Similar savings were done by use of Fly-ash in the Concrete and the bricks made inhouse, as Fly-ash is available free of cost, (Only transportation cost has to be incurred) and makes concrete strong, long lasting and water proof, all at the same time.
- On site plants for Windows and proper planning of pumping mechanism also leads to huge savings by way of reducing wastage, transportation, renting and inventory cost.

Reduce, Recycle and Reuse: Items adding straightaway to the bottomline

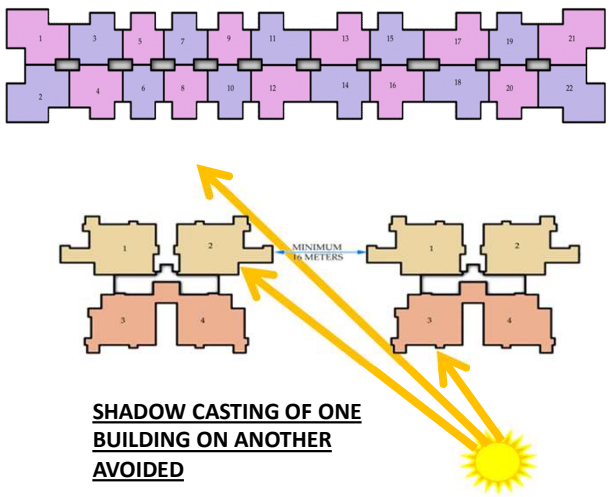
- All the construction Malba/waste was used directly on the site for making substrate for the internal roads in the setback area. No PCC had to be done, and the paver blocks were put straightaway after leveling the Malba. **This provided us savings on count of both the disposal cost as well as the PCC Cost.**
- **Almost infinitely recyclable material Aluminum was used for the Formwork/shuttering. By way of repetition, the shuttering cost was reduced drastically, in addition to better finish, and reducing the chipping job. Combined savings are straightaway profit.**

Reduce, Recycle and Reuse: Items adding straightaway to the bottomline

- Minimum level difference to obviate the requirements of Ramp so that the physically challenged people may move freely, and also saves on my construction cost.
- Sizing of Doors, windows, tile layout plans etc to reduce wastage results in substantial savings.
- Wastage generated from one process is used in another process as a raw material.

Brief data

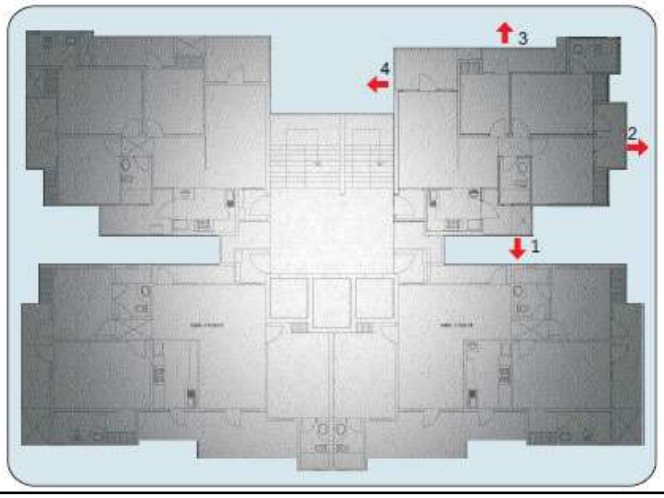
- No. of dwelling units- 428
- Total constructed area- 10 lac sqm approx.
- 3 Parking levels- 2 Basements+1 Podium
- No. of units per floor, per tower- 4
- No. of lifts- 3 per tower



SHADOW CASTING OF ONE BUILDING ON ANOTHER AVOIDED

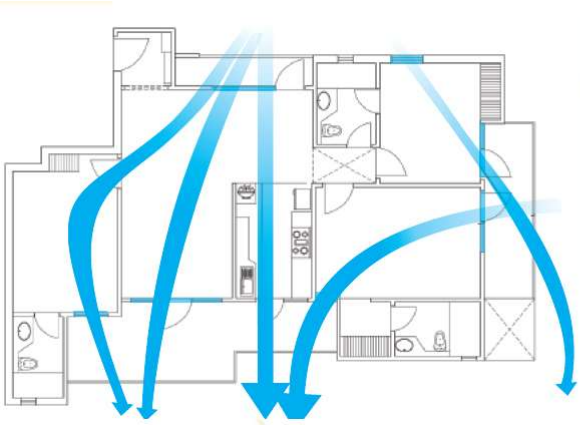
Design features implemented in the project

- All flats exposed to open air on at least 3 sides



Design features implemented in the project

- Two windows on opposite sides in every room for cross ventilation



Indoor Air Pollution
Hard Facts

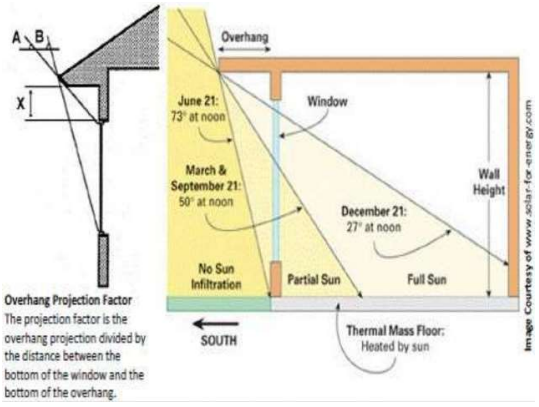
- Many a time indoor air quality is worse than the most polluted outdoor air.
- Fresh air contains 21.0% (v/v) O_2
- Exhaled air contains 17.0% (v/v) O_2 and 83.0 % (v/v) CO_2
- An adult emits 45 gm sweat/hour containing bio aerosols.
- An adult produces 300 BTU of heat/hour.
- Carbon-based gaseous pollutants (VOCs) indoors are 2 to 5 times higher than outdoors.

Design features implemented in the project

- Independent buildings not made like a wall structure

Design features implemented in the project

- Proper balcony size adjusted to annual and daily and seasonal and annual solar movement



Environment Friendly Materials used in the Project

- Aluminum Formwork for not using the Ply wood based formwork
- Chemical Based Curing for conservation of water
- Sound Proof Plumbing in Bathrooms for quiet operation
- Fly-ash Based Bricks, Paver blocks, Plaster, and concrete
- All recommendations of IGBC like low flow fixtures, ROHS compliant materials etc.

Some practical good practices for RRR

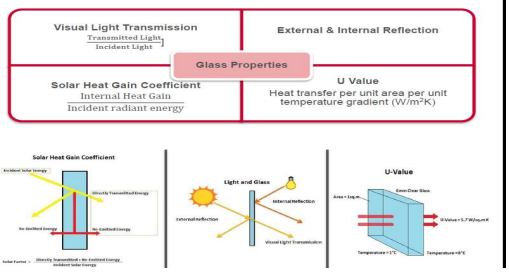
- Monolithic casting of entire floor, reducing concrete wastage .
- Instantaneous making of bricks from the spillover of concrete during casting.
- Column reinforcement cut into longer pieces to reduce steel wastage.
- Proper BBS or Bar Bending Schedule to utilize smaller length of steel properly:- no steel scrap.
- Proper number of sleeves and conduits to be provided in design.

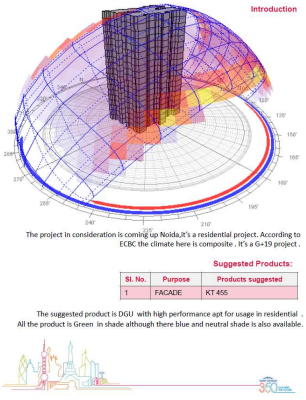
Materials

- Glazing after proper study.

Coated Glass	LIGHT FACTORS			ENERGY FACTORS		
	Visual Light Transmittance	Reflectance (%)		Solar Heat Gain Coefficient (SHGC)	Shading Coefficient (SC)	U-value (W/m^2K)
GLASS THICKNESS 4mm-12-4mm	(%)	Outdoor	Indoor			
SGG Clear Glass	90	8	8	0.87	1	5.8
SGG KT 455	43	15	10	0.31	0.36	1.9

Note: Values in accordance with ISO 9050m1.5 and EN 673





Glazing data

Project Details

No of floors	G+19
Total glazing (sq. m.)	2100
Total Wall Area(sq. m.)	10000
WWR (%)	21%

Payback Calculation

Details	Clear Glass	KT 455
Annual Electricity Consumption(kWh)	758866	259766
HVAC Tonnage(TR)	238	82
AC Capex(INR)	94.96 lakhs	32.43 lakhs
AC Running Cost per year(INR)	53.12 lakhs	18.18 lakhs
Savings in AC Running Cost per year(INR)	<base>	34.94 lakhs
Energy Efficiency(%)	<base>	66%
Cost of Glazing(INR)	9.36 lakhs	34.53 lakhs
Extra Glazing Investment(INR)	<base>	25.17 lakhs
Pay Back	<base>	No extra expenditure

Inference

- KT 455 reduces the HVAC tonnage requirement by 156 .
- It is 66 % more energy efficient compared to clear .
- Saving in electricity running cost is 34.94 lakhs.

Limitations in design imposed by law

- Compulsory basement Problems:-
  - it is the highest ecological footprint.—Dewatering, and mass movement of earth.
  - Huge expense in Retaining wall, Water proofing, Ventillation.
  - Most of the power in the common area used for ventilation of the basements for the life of the building i.e. next 100 years or so.
  - 24 hours lighting required.
  - Frequent flooding and waterlogging.

Limitations in design imposed by law

- Restrictions on FAR and height: Tall building having high FAR saves on green area indirectly as
  - It saves on green area that would have been utilized in horizontal expansion by single dwelling units.
  - It saves on fuel consumption, time wastage on Jams and resulting pollution.
  - More suited for clean mass rapid transportation system.
- Restriction on balcony sizes:-Outdoor experience limited in a concrete jungle.
- Restricted basement/podium height: Reduce ventilation.

Other limitations

- Temporary electrical connections leads to more usage of DG's
- Properly graded fly ash not available leads to lesser amount of it being used in the concrete.

Green Building makes Good Business Sense

THANKS