

## PUSHING THE “ENVELOPE”

### Thermal Comfort in a naturally ventilated building in Hot-Humid climate in India

Session 01 – Building India with GRIHA

The GRIHA Summit

12-13<sup>th</sup> March 2015

India Habitat Centre

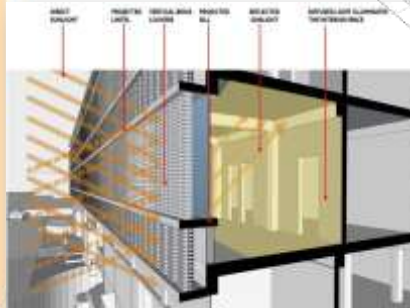
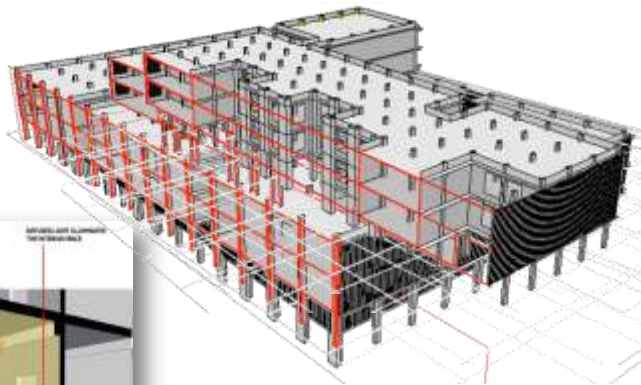
Lodhi Road

New Delhi



#### Passive Design

- Orientation
- Envelope
- Shading
- Zoning
- Natural Ventilation



### Passive Design

- Orientation
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### Comfort calculation system

- SP41 and other Adaptive comfort studies
- Threshold comfort for Indian climates  
30°C 80%RH | 32°C 60%RH | 34°C 40%RH |

- Radhagandhi, D. S., O. S. R. Pillai, P. Praveen, G. Sub. (2014) Adaptive model of the comfort conditions for Offices in hot and humid climates of India.
- Bukhari, A. B. (2010) Building envelope design up by
- Pradhana, M. (2010) Behavior of Adaptive Comfort and the use of environmental controls in summer for thermal comfort and the ASHRAE thermal energy
- and buildings, 42: p.p. 1019-1029.
- C. G. S. S. Studies from CEPT - available at [http://www.cept.ac.in/~cept/](#)
- so they if there observe that the use of additional
- the person trans pushed the people towards the upper
- Ventilation studies on building introduction (MAC2014.pdf) (Clause 4.3.1)
- John G. Humphreys and Peter J. Nicol studies and a
- tropical conditions of 25°C under ceiling fans.
- On a practical study of building envelope comfort and
- when the air velocity was above the ASHRAE limit of
- winter comfort and indoor energy efficiency, 0.8 m/s<sup>2</sup>
- Richard Aynsley - "conceptualizing standard
- Thermal comfort being achieved with personally
- effective temperature, which decreased with
- controlled air movement, up to 3.0 deg C and 0.23
- increase in wind velocity, i.e. @ 25°C with 0.94
- 0.0% RH and acceptable perceived air quality being
- 0.15 m/s, SFET is 5.8 and @ 35°C with 0.0% SFET
- maintained up to 30 deg C and 60% RH, without
- = 29.3 - (See the slides 4 and 7 in KB TCA
- discomfort from auxiliary air movement or eye
- discomfort.
- Prasad, Y., Zhang H., Zhang Y., Pasut W, Arens E, Meng Q.
- \* Higher than those acceptable in practice.

### Passive Design

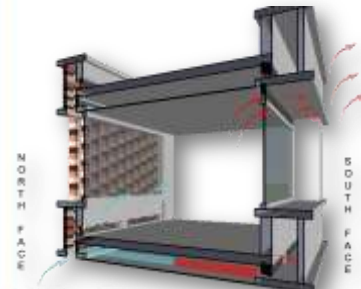
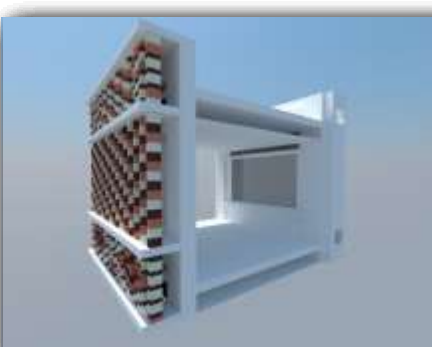
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- Envelope
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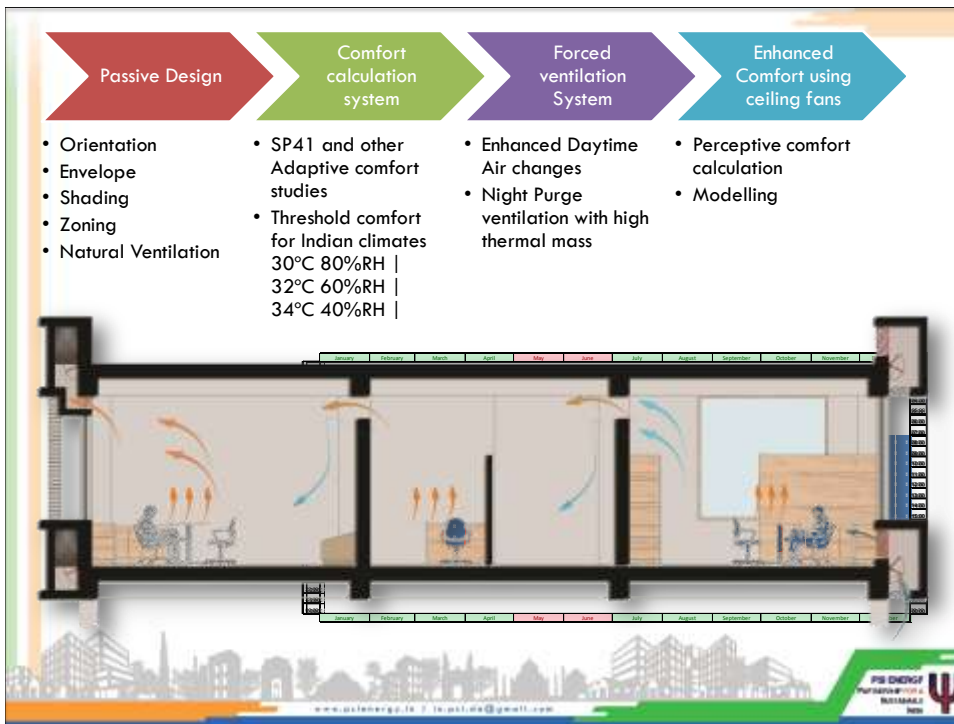
### Comfort calculation system

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### Forced ventilation System

- Enhanced Daytime Air changes
- Night Purge ventilation with high thermal mass



## The Team

**Architects**

- Lotus Design [www.lotuslink.in](http://www.lotuslink.in)
  - Amrishi Arora
  - Sid Talwar
  - Ankita Shukla

**Landscape Architects**

- Royston, Hanamoto, Alley & Abey (RHAA) New Delhi
  - Aditya Advani
  - Riyaz Mohammad

**Structural Consultants**

- NNC Consultants
  - Maqsood Nazir

**MEP Consultants**

- Sterling India Consulting Engineers
  - Mr. G.C. Modgil
  - Khushboo Modgil

**GRIHA Consultants**

- PSI Energy
  - Nishesh Jain
  - Ranapratap Poddar
  - Gaurav Shorey

OFFICE OF THE DIRECTOR OF  
GRIHA, BHUBANESWAR.

Letter No.2M12AGSP.02011 362 Date: 31/12/2014

To:

M/s Lotus Design Services  
F-281, Lotus Link  
First Floor, CNP Park Singh House  
New Delhi-110035

Subj: - Reviewing the Plan of [REDACTED]

Re:

A meeting was held on 28<sup>th</sup> Dec. 2013 in the 2<sup>nd</sup> Floor Conference Hall, Odisha Secretariat, Bhubaneswar under the Chairmanship of [REDACTED] Odisha for finalisation of building plan of [REDACTED]. As per the decisions taken in the meeting, the concept, design and layout was approved subject to following suggestions for incorporation in the final building plan of [REDACTED].

1. Full permission F.A.R.(1.75) should be utilized against the proposed F.A.R.(1.105). The existing design has a provision for approx 1,013 sq sq ft. of built up area which has to be enhanced to 1,522 sq sq ft (maximum).
2. An additional floor is to be provided in the planning and design of the building.
3. The Architect in co-ordination with IDCO will look into maintenance aspect of the proposed design.
4. The Architect will work closely with IDCO to see that the work being made the building is maintained at 25 degree Celsius. They will resolve the issue and further exhibit examples of the proposed system in five buildings elsewhere.

You are therefore requested to look into the above concerns raised and suitably modify the plan before its final submission to the Govt.

Yours faithfully,  
[REDACTED]  
Director of [REDACTED] Odisha



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**THANK YOU FOR YOUR LISTENING**

