The Indian Perspective | The Global Context

morphogenesis.

Delhi | Bengaluru | Mumbai

Confederation of Indian Industry

Indian Green Building Council

GREEN HOMES AND AFFORDABLE HOUSING CONFERENCE

Blend of Sustainability and Luxury

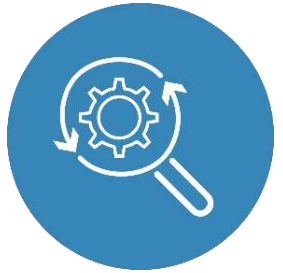
Hyderabad , 28th September 2019

DESIGN PHILOSOPHY

Our buildings consume **upto 50- 75% lesser energy** than certified green building benchmarks through Passive Design and Microclimate Creation proven through **Post Occupancy Evaluation**

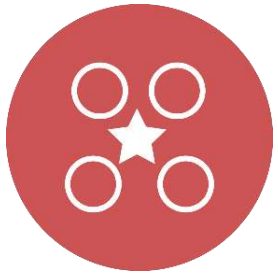
SUSTAINABLE

OPTIMISED



Resource Optimization is achieved through **Integrated Project Delivery**. We break barriers of established **cost** benchmarks and **reduce consumption** through design innovation

All our projects are **unique.** Our design responds to **client, climate & context,** yet is mindful that the project is **globally pertinent.**



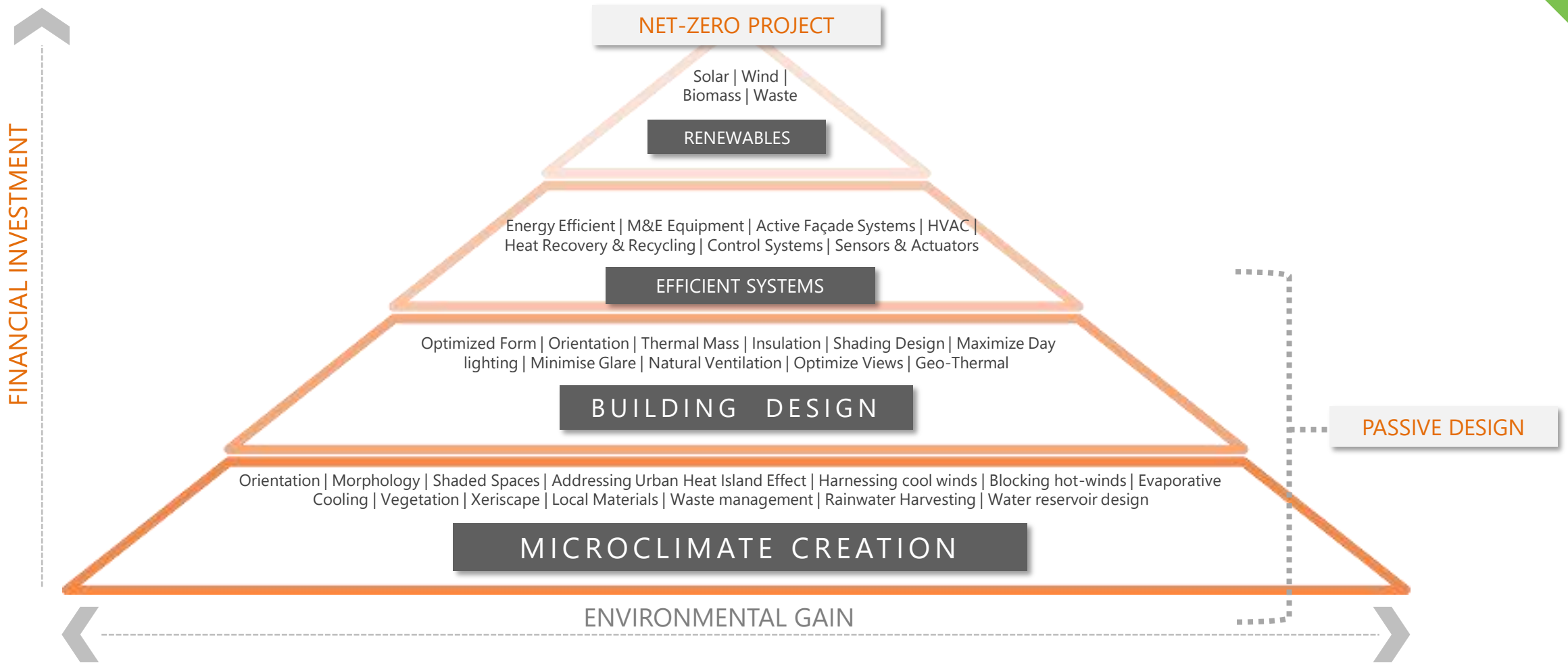
UNIQUE

LIVABLE

Building **Smart** environments by placing the **user at the centre of the design process**

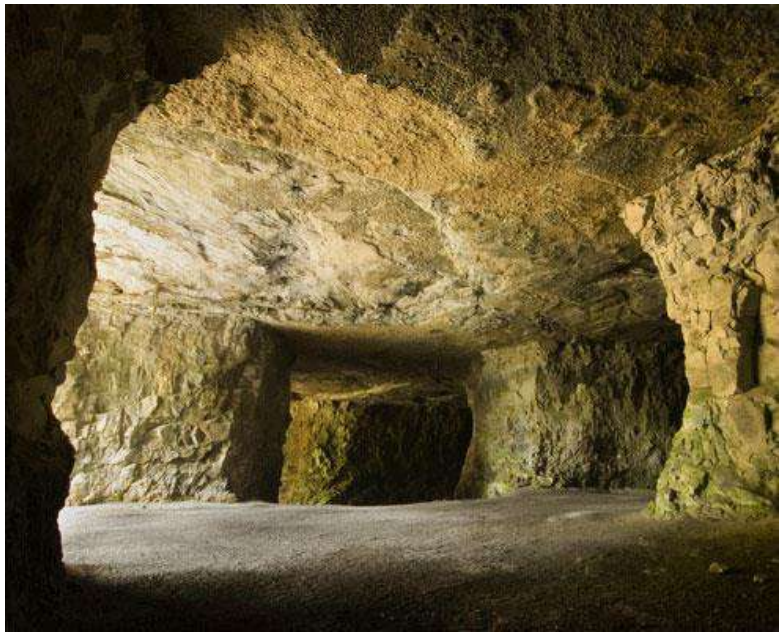
SUSTAINABILITY

Combining the wisdom of the past and cutting edge technology to create exemplars of sustainable design



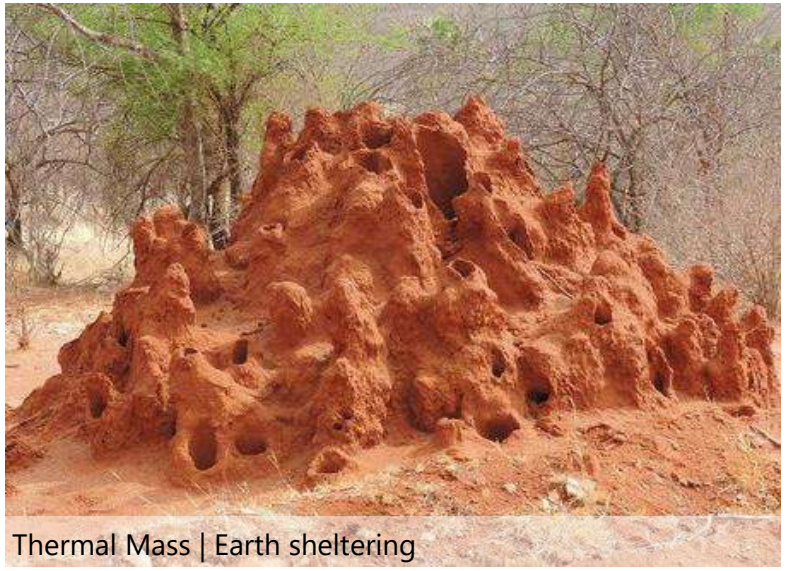
SUSTAINIBILITY

Passive Design in Nature



Evaporative Cooling

Minimal Solar Exposure



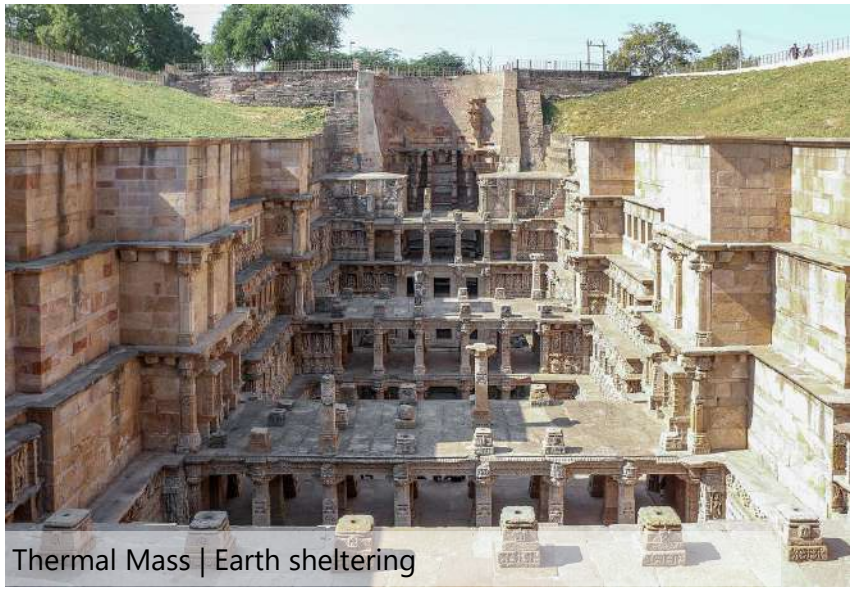
Thermal Mass | Earth sheltering

Insulation

Solar Inclusion

SUSTAINIBILITY

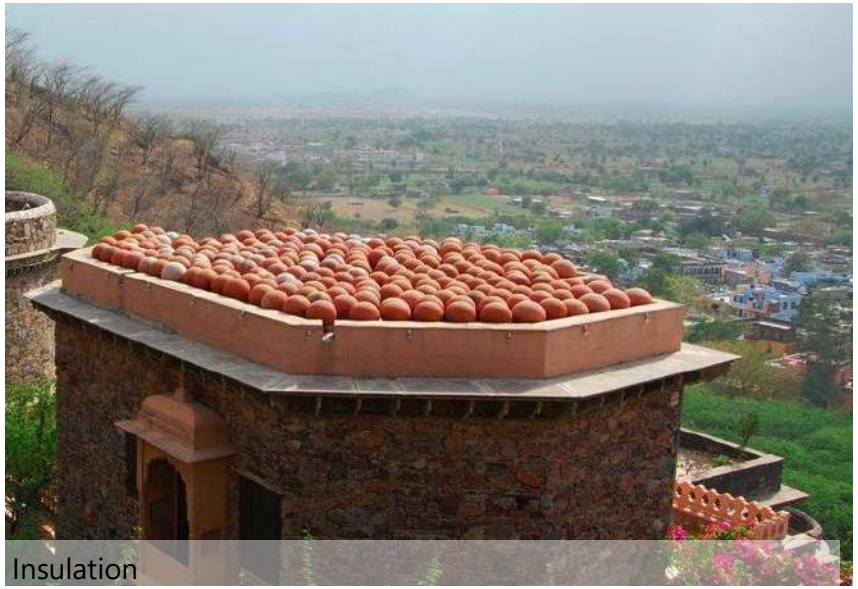
Passive Design in History and the Vernacular



Thermal Mass | Earth sheltering

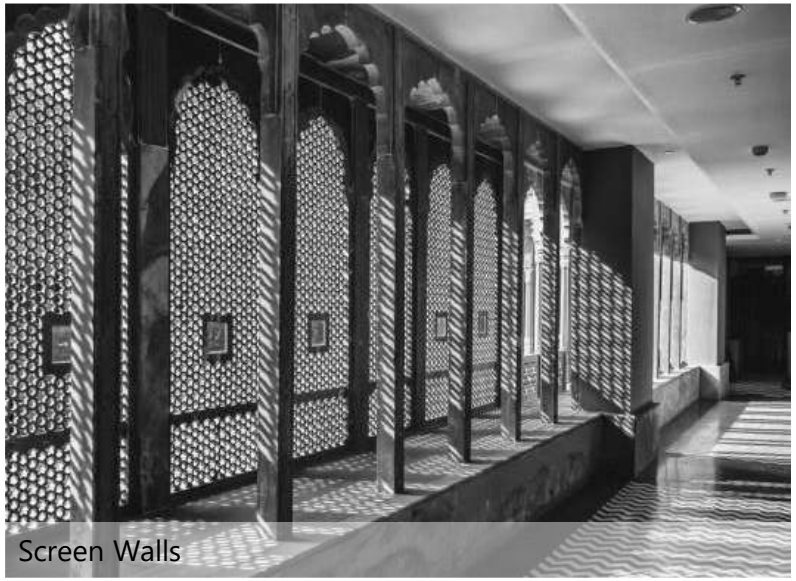
Minimal Solar Exposure

Inward planning



Insulation

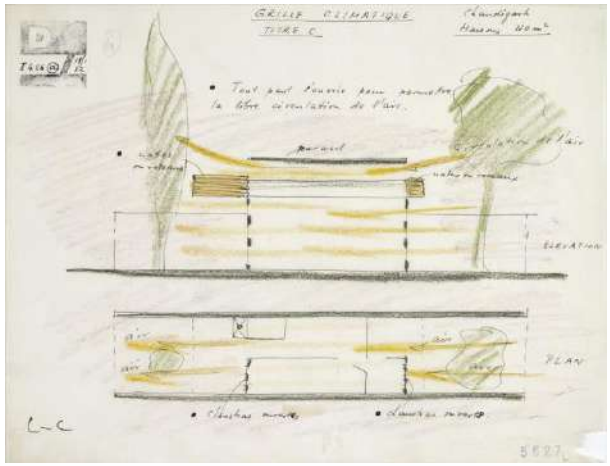
Evaporative Cooling

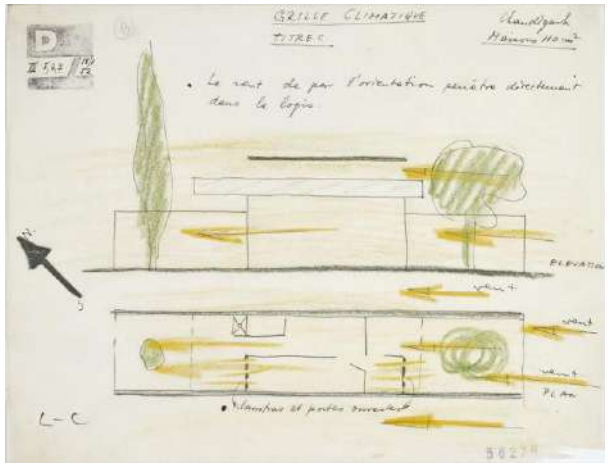


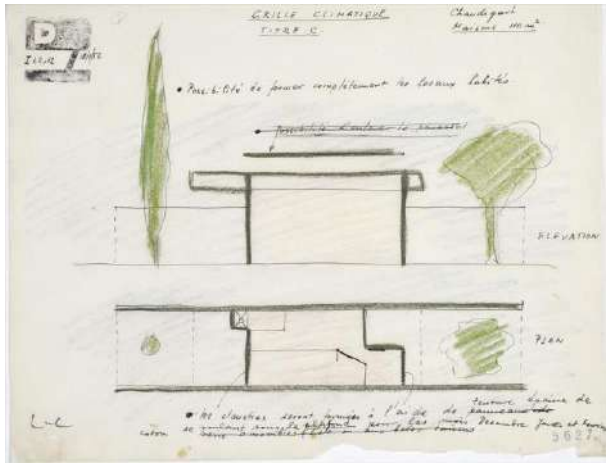
Screen Walls

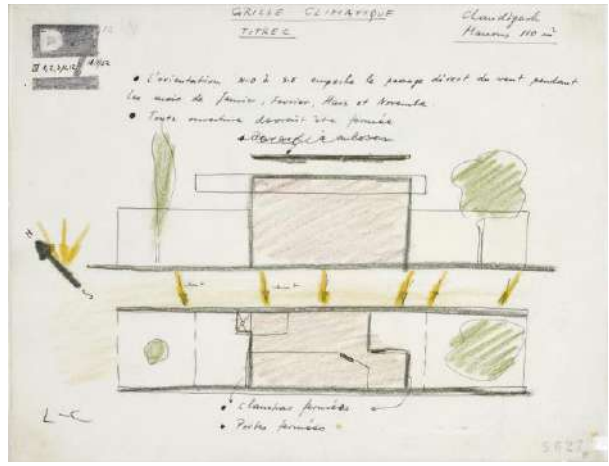
SUSTAINIBILITY

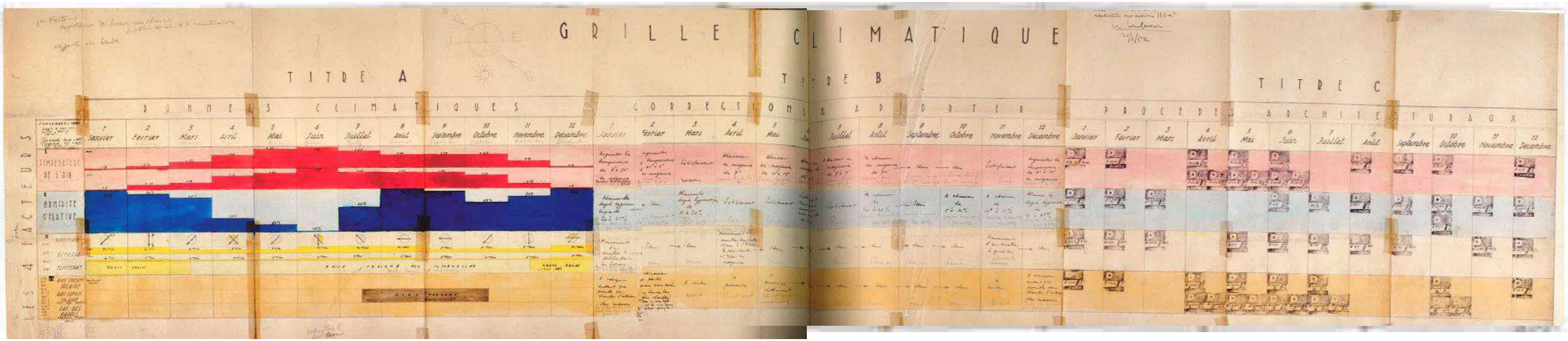
Passive Design : Bringing matrices to design: The Grid Climatique by Corbusier





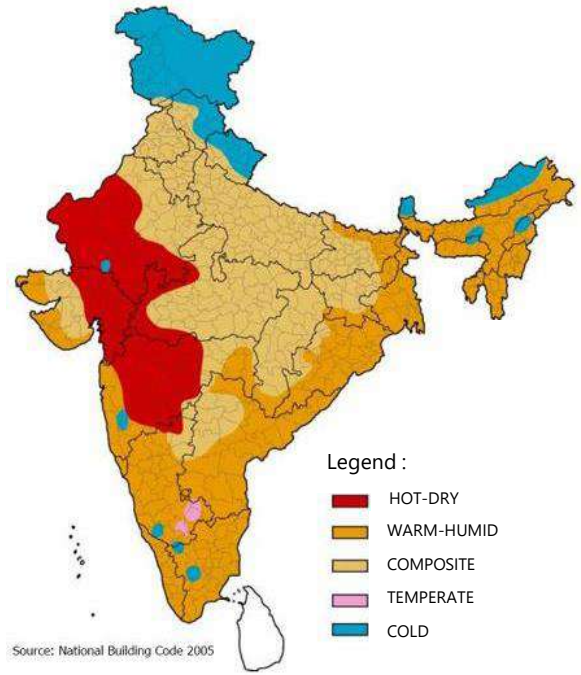




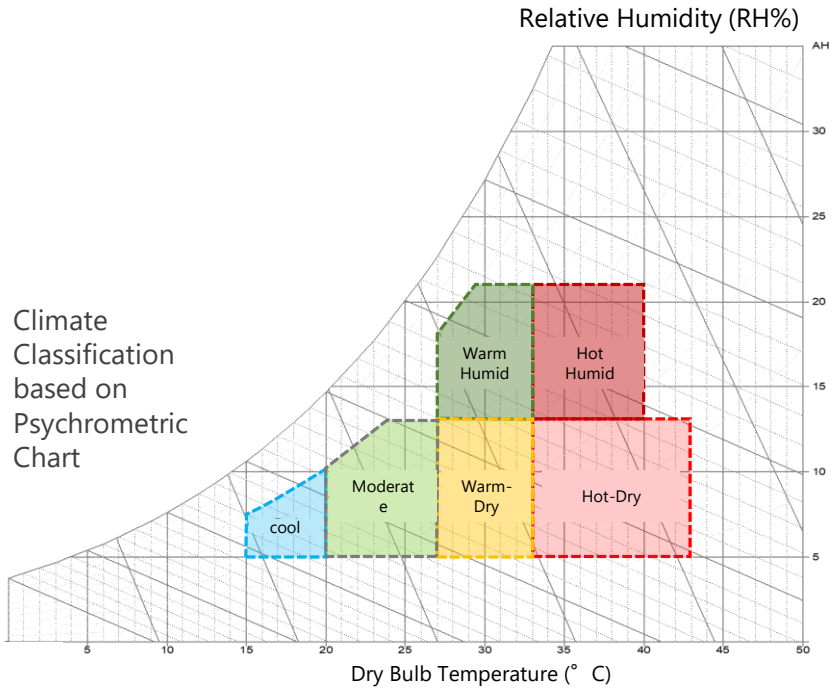


SUSTAINIBILITY

Passive Strategies achieve Thermal Comfort > 75% Time



Climate Classification based on Psychrometric Chart



APPLICABLE PASSIVE STRATEGIES

APPLICABLE STRATEGIES	HOT-DRY	WARM-HUMID	COMPOSITE	TEMPERATE	COLD
SOLAR CONTROL	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
THERMAL MASS + NIGHT PURGING	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
AIR MOVEMENT	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
EVAPORATIVE COOLING	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
PASSIVE HEATING	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D

SUSTAINABILITY

BUILDING | ENVELOPE DESIGN

Efficiency Parameters		Design Considerations
Orientation :		
Optimum Orientation for Minimal Solar Exposure		North-South

Robust Envelope Design: Optimal Thermal Properties and Element Proportions

Efficiency Parameters	ECBC Baseline Metrics	Design Considerations
U-value of Walls (W/sq.m.K)	0.4	.3
U-value of Roofs (W/sq.m.K)	0.33	.26
U-value of Glass (W/sq.m.K)	3	2.2
Max. Window : Wall Ratio (WWR)	40%	≤ 25%
Solar Control: Effective Shading Design		
Effective SHGC for Glass (Shading)	0.25	0.35

Resultant Envelope Load*	**≥ 4.5 W/sq.ft.**	**≤ 1.75 W/sq.ft.**

**Envelope Load : Design cooling load for HVAC systems*

SUSTAINABILITY

Our buildings consume upto 75% lesser energy than certified green building benchmarks through passive design and microclimate creation proven through post occupancy evaluation

TRUMP TOWERS, GURGAON

58 kWh/sq.m/yr

MAHINDRA VIVANTE, MUMBAI

45 kWh/sq.m/yr

GRAN CARMEN, BENGALURU

30 kWh/sq.m/yr

AMBUJA NEOTIA, SILIGURI

25 kWh/sq.m/yr

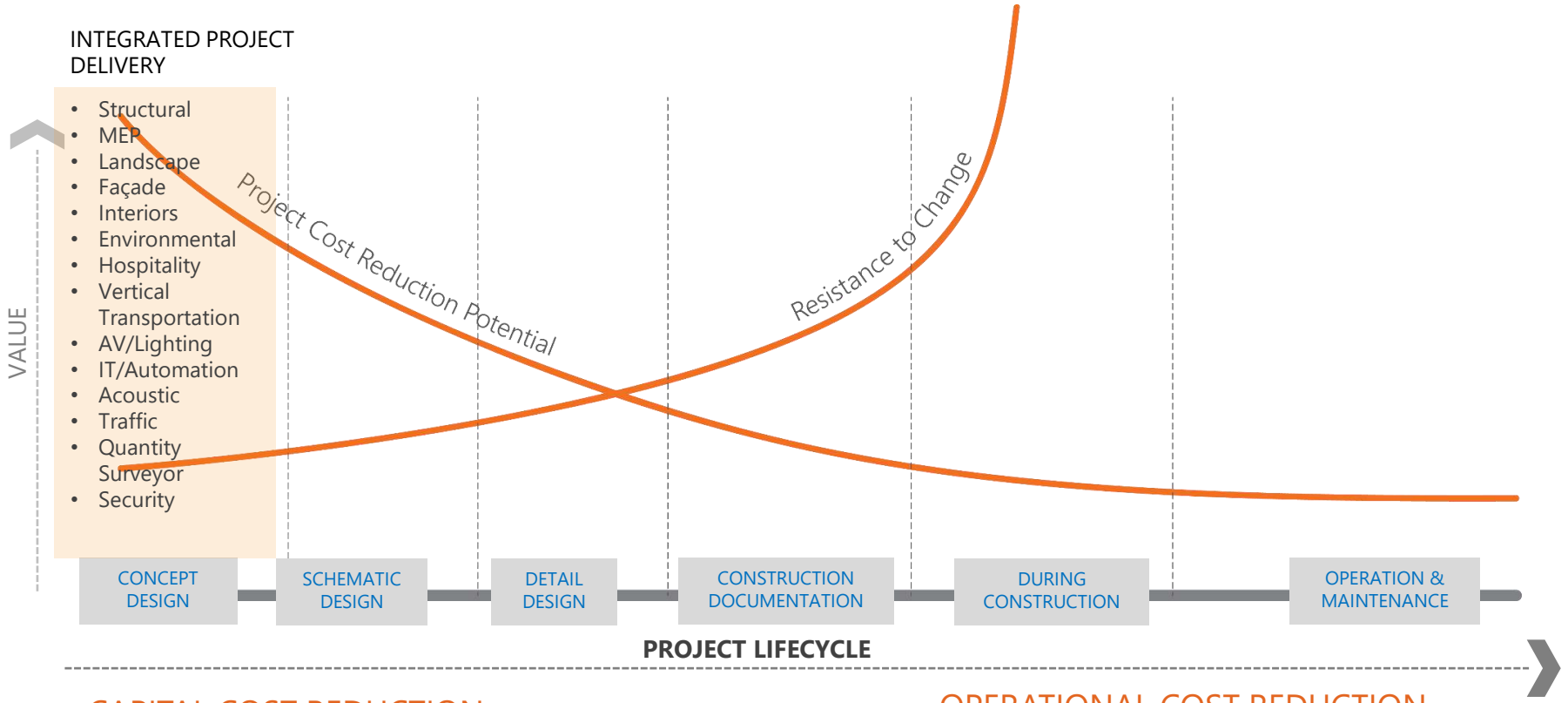
ADANI ELYSIUM, AHMEDABAD

25 kWh/sq.m/yr

> Morphogenesis has established itself as not only a leading architecture practice in India, but as an influential **research-based firm**, and a **world leader** in **sustainable design**.
>
> - Professor John Frazer*
>
> *Professor John Frazer is acknowledged as a world leader in the domains of intelligent and interactive design, sustainable design, participatory design and computer-generated design.

OPTIMISATION

Integrated project delivery with spatial, structural, façade and M&E efficiency bring in reduction in capital and operational cost



CAPITAL COST REDUCTION

SPACE PLANNING: Efficient Parking & Structure Optimisation

M&E OPTIMISATION : Passive design reducing lighting & HVAC loads

FAÇADE OPTIMISATION : Façade Optimised for Daylight, Glare and Shading

OPERATIONAL COST REDUCTION

FACILITIES MAINTENANCE Reduction expected due to lesser installation of M&E equipment

M&E OPERATIONAL COST : 90% Daylit spaces & reduced envelope load reduce Lighting & HVAC Loads & hence operational costs

> Morphogenesis lays out few simple strategies that make **perfect sense** in **Social ,Economic and Aesthetic terms**.
> Their buildings are **pragmatic**, often **frugal always imaginative...**
>
> - Michael Webb *

*Michael Webb is a Los Angeles Based writer who has authored more than 20 books on Architecture & Design

OPTIMIZATION

RESIDENTIAL METRICS FOR AFFORDABLE HOUSING	
Target Construction Cost	< Rs.1750 / sft
Daylight	> 90 %
Glare (Blinds Free)	< 10%
Shading	> 90%
Envelope Heat Load	< 1.75W/sft
WWR	< 15%
Façade Surface/ Built Up Area	< 100%
Carpet/Total Superstructure	> 75%
Carpet /Total construction area	> 50%
Structural Height (Zone based)	< 45M
Floor-plate Symmetry (Zone based)	Increased structural stability
Vertical Transportation	< 60 Sec Wait Time
Common Shafts Stacks	Maximized
Basement Parking Efficiency	< 36 sq.m
Basement Ventilation	Natural Ventilation(1 Basement)
Inter building distance	Optimized as per parking bay widths
WFR	< 20%

Weight of a Building **: 1,500 Kg/sqm**

Spatial Standard	: 12.5 sqm / person	Spatial Efficiency	: 10 sqm / person
Weight of Building	: 18,750 kg / person	Weight of Building	: 15,000 kg / person

Efficient and Optimized Design can save up to 3,750 kg of material per person

Source: Allianz/WWF

UNIQUE

All our projects are unique. Our design responds to client, climate & context, yet is mindful that the project is globally pertinent.

MAHINDRA | **GURUGRAM**

SIGNATURE HORIZON | **HYDERABAD**

TRUMP TOWER | **KOLKATA**

AANAND VILAS | **NOIDA**

TRUMP TOWERS | **GURGAON**

GRAN CARMEN | **BENGALURU**

WOODSIDE | **KASAULI**

MAHINDRA | **MUMBAI**

> Morphogenesis has consistently developed an architectural language which is **contextual**, **climatically sensitive** and high in **social content**.Their works are very much rooted into the **culture, climatic, social and economic conditions of India.....**
>
> Jury Citation , 2014 Singapore Institute of Architects GETZ Award for Emergent Architecture In Asia

UNIQUE

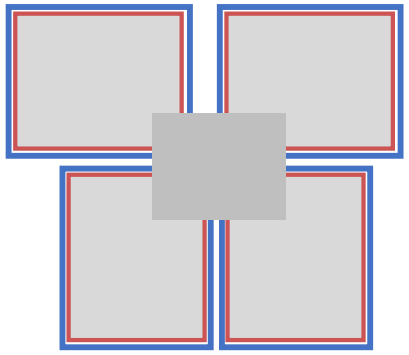
IDENTITY IS BASED ON COMBINATION OF CLIMATE AND CODAL REQUIREMENTS

TRUMP TOWERS, KOLKATA


MAHINDRA LUMINARE, GURUGRAM

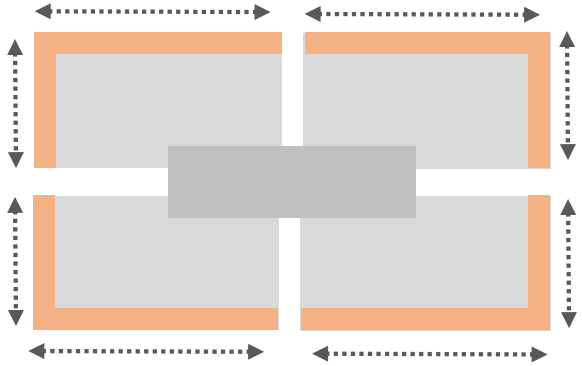

MAHINDRA WINDCHIMES, BENGALURU


ADANI ELYSIUM, AHMEDABAD

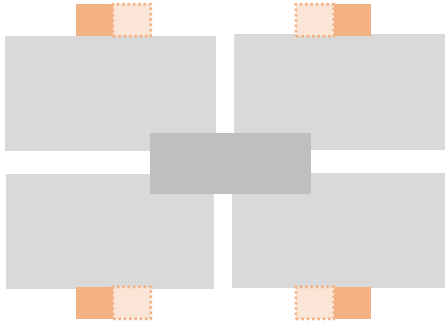


Added carpet area on façade perimeter

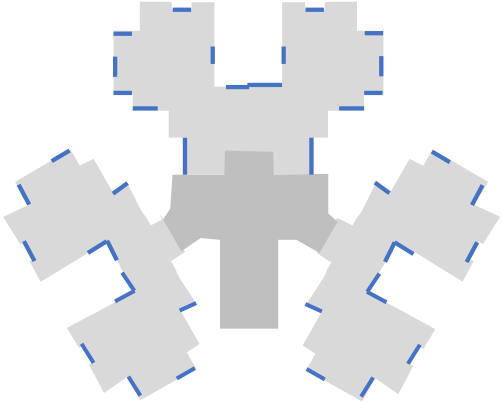
ADDED CARPET AREA OFFSET THE INCREMENTAL COST OF HIGH PERFORMANCE FACADE



WRAPAROUND 6FT BALCONIES THAT ARE FREE OF FAR, MAXIMIZING THE FEELING OF SPACE IN THE APARTMENT



LARGE DECKS MAXIMIZES THE INSIDE OUTSIDE EXPERIENCE RESPONDING TO TEMPERATE CLIMATE



OPTIMUM WINDOW WALL RATIO WITH RECESSED WINDOWS TO REDUCE THERMAL INGRESS

LIVABILITY

Building **smart** environments by placing the **user at the centre of the design process**

> Morphogenesis has mastered **the Architecture of Smart Environments** and created worthy buildings made to optimise resources
>
> - Dr Simos Yannas

Dr Simos Yannas is the Director for the Sustainable Environmental Design Programme & PhD Programme at The Architectural Association, London

UTTORAYON TOWNSHIP | **SILIGURI**

MARBLE ARCH | **CHANDIGARH**

AANANDVILAS | **FARIDABAD**

WOODSIDE | **KASAULI**

GRAN CARMEN | **BENGALURU**

THE RESIDENCY | **SILIGURI**

LIVABILITY

USER-CENTRIC APPROACH | PLACING THE USER AT THE CENTRE OF THE DESIGN

	Community Level Elements	Block Level Elements	Building/ Unit Level Elements
Transport and Movement	**SMART Bus Stops** with real time information SMART internal travel mods- Bike hires, segways **SMART Car Share** club Integrated transport management system.	SMART visitor car parking with real time info with **green roof tops** **SMART Car share with charging stations** Cycle storage and hire pods **SMART Car Parking** installations with real time capacity information	Smart elevators/lifts with digital information/detection **Electric car charging points/areas** Smart bike storage areas Real time information panel on **green transport network**
Community Infrastructure	Disaster Resilience Event screens Open air theatres (**Amphitheaters**) Viewing decks	**Solar powered or green roof** facilities **Online healthcare** service platforms Smart auto walkways **Intelligent food kiosks/pods**	**Pop-up free gym** Security
Public Realm	**Public art** (sculptures, interactive panels) **Solar powered pedestrian and cycle paths** **Smart street lights** (energy efficient or solar powered) **Interactive street furniture** (smart refuse bins) Drinking fountains Route markers Street furniture-benches, seating pods	**Smart Building Management Systems**	
Sustainable Urban Drainage And Water	Infiltration basins Infiltration trenches **Permeable pavements** **Swales** **Reservoirs and ponds** **Filtration strips** (Block level)	Pervious pavements **Green roofs** **Bio-retention** Sustainable car park drainage through bio-mats	**Run-offs from green roofs** Façade runoff **Greywater runoff** Bio-retention basin **Low-flow fixtures** Rainwater harvesting **Smart water system** with advanced leak control and water consumption display

LIVABILITY

USER-CENTRIC APPROACH | PLACING THE USER AT THE CENTRE OF THE DESIGN

	Community Level Elements	Block Level Elements	Building/ Unit Level Elements
Security & Safety	**Digital access control** **Digital information panel/kiosk** **Digital way-finders** (solar powered) Public telephone booths/ **Wifi zones**	**Smart card access** (building level) **Interactive public space** with pervasive wifi Smart CCTV monitors **Smart turnstiles** (building level) **Sensory bollards**	**Internet of Things** (IoT) **Biometric access** **Emergency control monitors/buttons**
Energy Solutions	**Waste heat recovery** for district cooling Passive cooling through **micro climate** Combined heat and power (CHP) Combined cooling and heating plant (CCHP)	**Climate-responsive design** Combined heat and power for individual block(CHP) Solar powered backup generators (N+1)	**Smart energy monitors** (air quality, temperature, electricity, cooling, heating) Mini combined heat and power for individual units **Integrated rooftop solar PVs** **Green roofs**
Waste Management & Recycling	**Smart Waste treatment** and recycling station **Sewage and sludge treatment plants**	**Systematic underground waste collection system** (Envac) Smart refuse bins	**Refuse shoots** **Segregated Recycle bins**
Landscape & Ecology	**Rain Gardens** Bioswales **Community allotments** **Community orchards** Parks with curriculum based education programs (**theme parks**)	**Edible gardens** **Fruit trees planting** Shrub gardens Island gardens	**Herb garden** **Sky gardens** **Sky lobbies**
Connectivity & Technology	**Wifi enabled zones/areas** Advanced traffic light signal control systems	**Internet pods**/standalone/hub **Power stations** (for charging electrical devices)	**Remote home control access** **Cloud computing** Smart Grid
Public Areas	**Native species based landscaped streets** **Information and education based parks** Pop up gyms	Knowledge tree/shelter/pod/seating with wifi connection **Pop up yoga areas**	
Imageability	**LEED** ratings **GRIHA** (Green Rating for Integrated Habitat Assessment) **IGBC** Green Township ratings		**Integrated smart façade systems** **Smart windows control** Sustainable/recycled exterior building finishes

CASE STUDIES

UTTORAYON TOWNSHIP, SILIGURI

IILM, GREATER NOIDA

MARBLE ARCH, CHANDIGARH

ANANTA HOUSE, NEW DELHI

UTTORAYON TOWNSHIP

SILIGURI, WEST BENGAL

4,30,000 sq ft | 5.4 acres

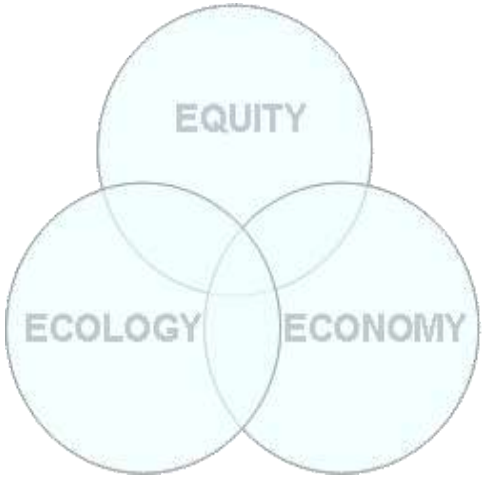
morphogenesis

UTTORAYON TOWNSHIP, SILIGURI

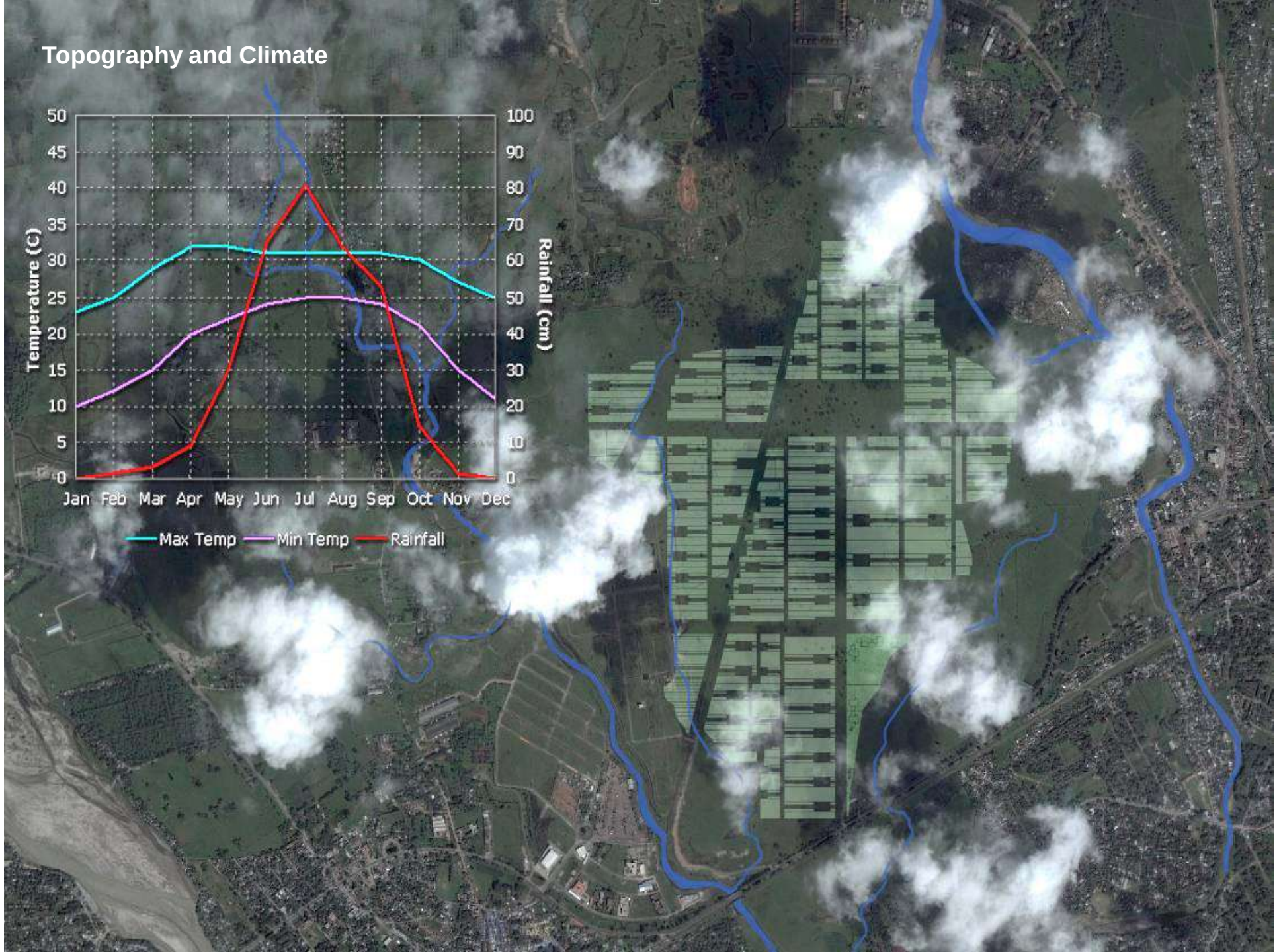
PROJECT BRIEF

Total site area: **600 acre**
Proposed residential population: **30,000**
Master-planning Cost **: $3000 / Acre**
Housing Construction Cost : **$20 / SqFt**
Commercial Construction Cost : **$30 / SqFt**
Rainfall: 3000mm

Broad Objective:
Township to be self-sustainable in terms of its Social **equity, economy, and ecology**



Topography and Climate

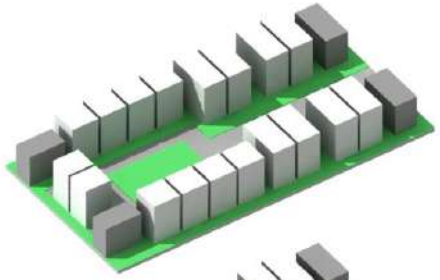



Township Level
Zonal Level
Cluster Level
Unit Level
Communal spaces at the heart of each cluster encourages citizen interaction and social equity
Bicycle and footpaths connect all corners of the township so that the use of private cars is reduced
A clever and cost effective open drainage network prevents flooding while recharging the ground water table
north south
Buildings are orientated North South to optimize the regulation of solar radiation in both summer and winter
Spacing between buildings enhance natural ventilation and lower humidity levels during the long wet season.

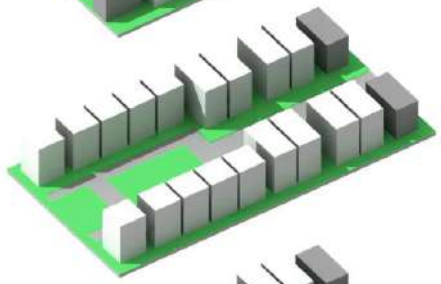
UTTORAYON TOWNSHIP, SILIGURI

FLEXIBILITY OF CLUSTERS

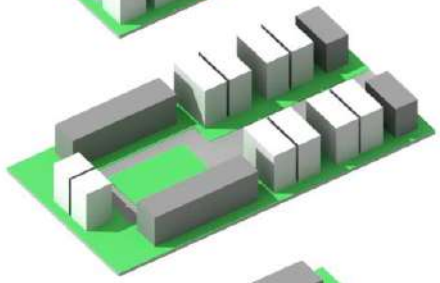
Option 1



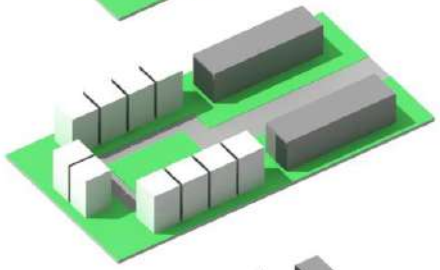
Option 2



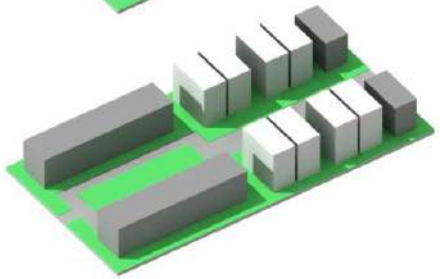
Option 3

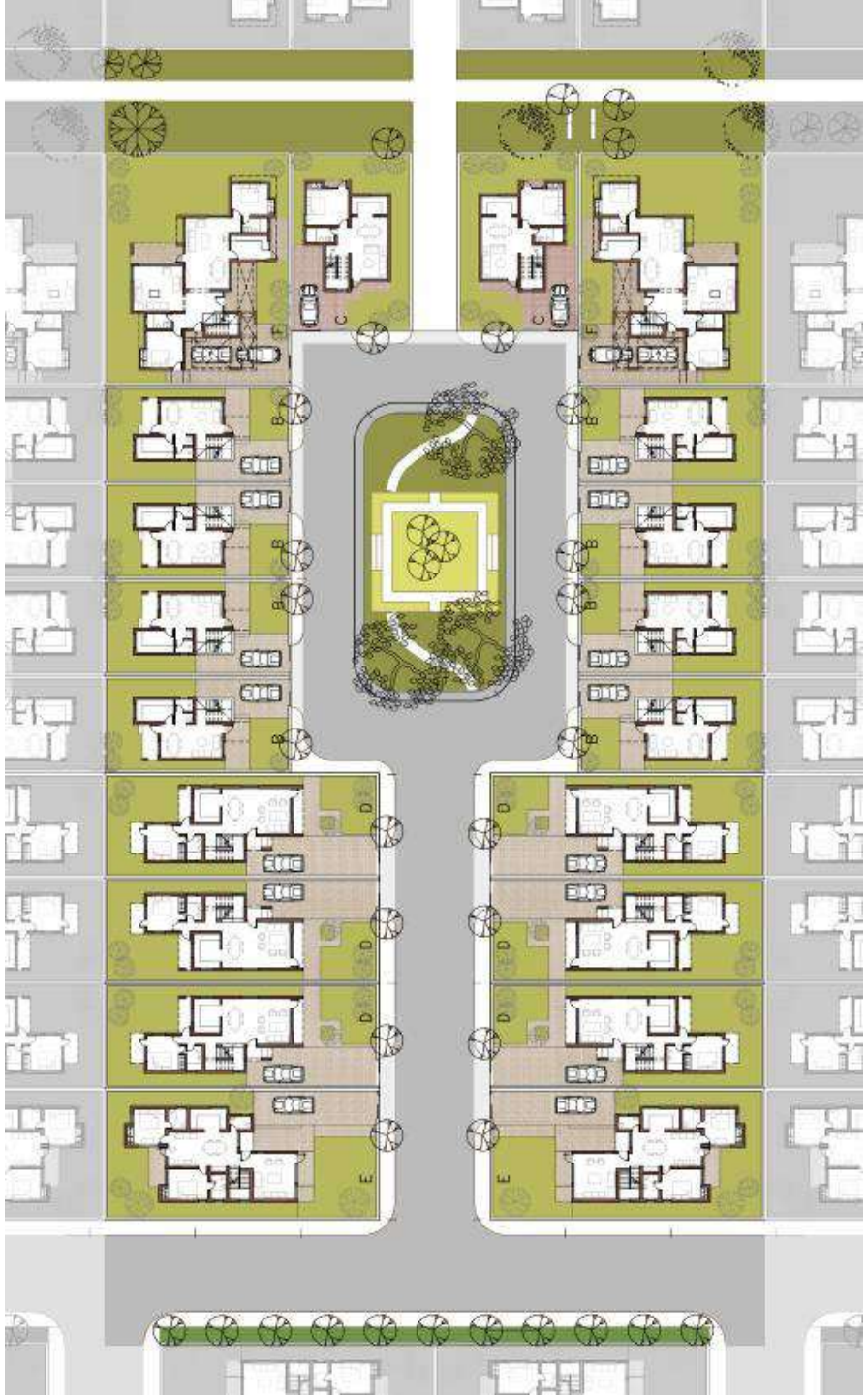


Option 4

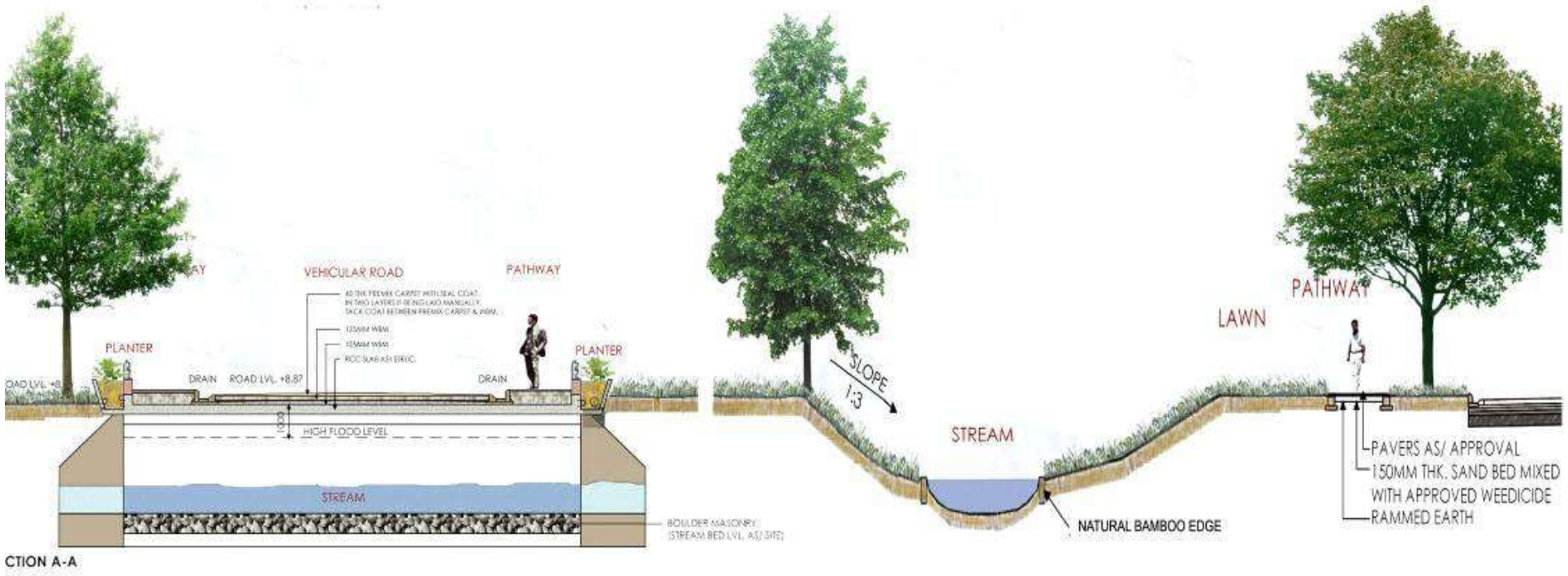


Option 5

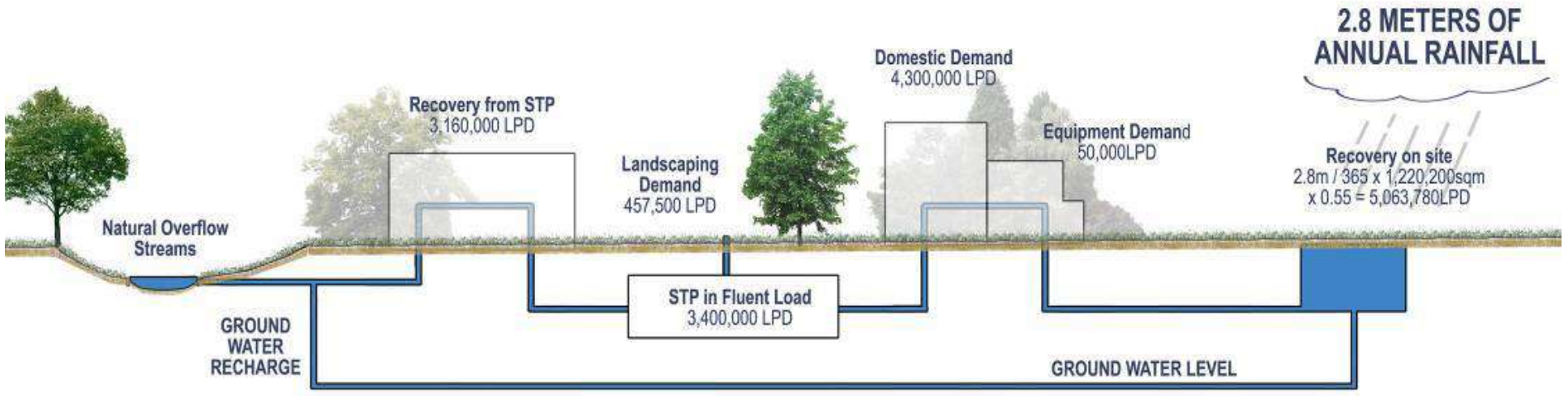




Storm Water and Sewage Treatment – Zero Discharge



2.8 Metres of Annual Rainfall

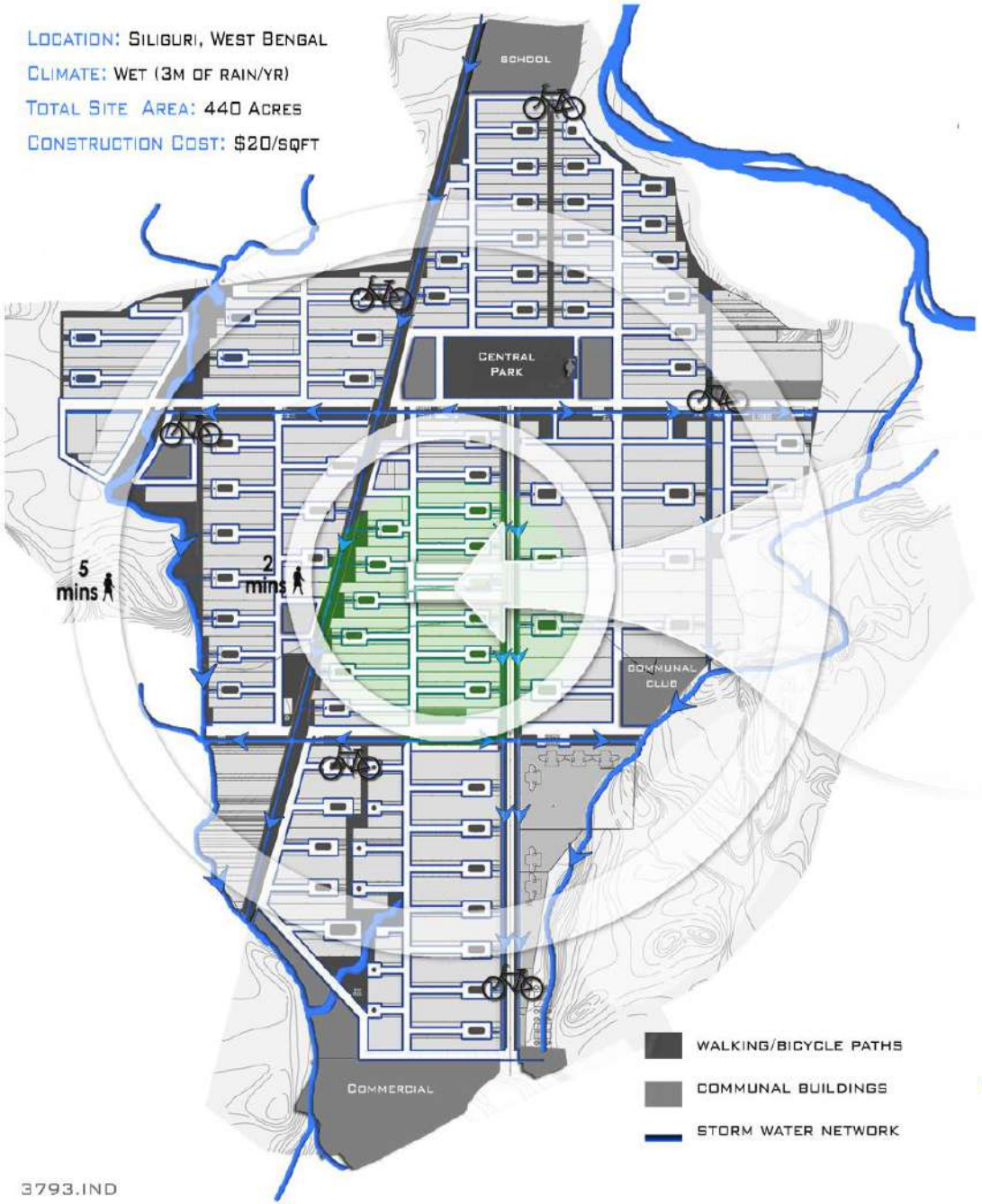


Rainwater harvesting: Water on site is recycled and recharged into the ground

UTTORAYON TOWNSHIP, SILIGURI

A Low Cost Sustainable Model for Townships of Tier 2 Cities in India

Location: Siliguri, West Bengal
Climate: Wet (3m of rain/yr)
Total Site Area: 440 Acres
Construction Cost: $20/sqft



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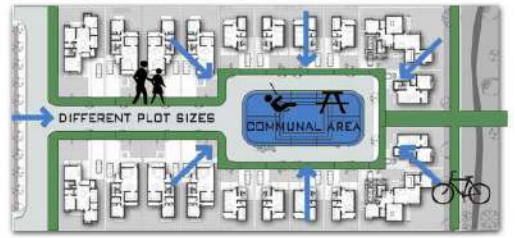
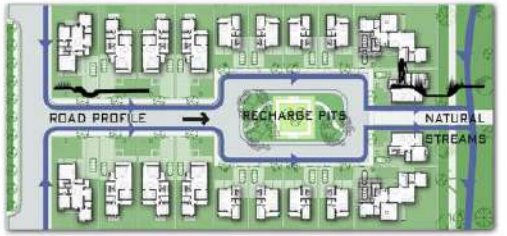
COMMUNITY/WALKABILITY

A NETWORK OF COURTYARDS, WALKWAYS AND BICYCLE PATHS



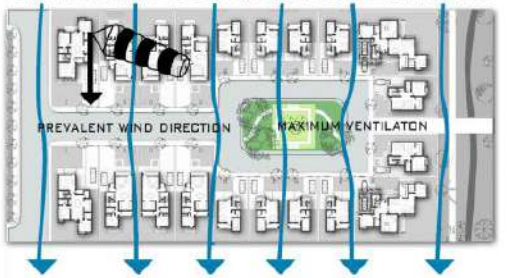
SURFACE DRAINAGE SYSTEM

A NATURAL TOPOGRAPHICAL NETWORK WITH NO SITE RUNOFF



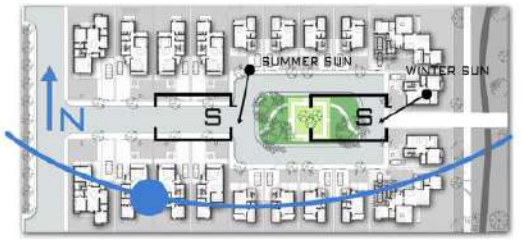
NATURAL VENTILATION

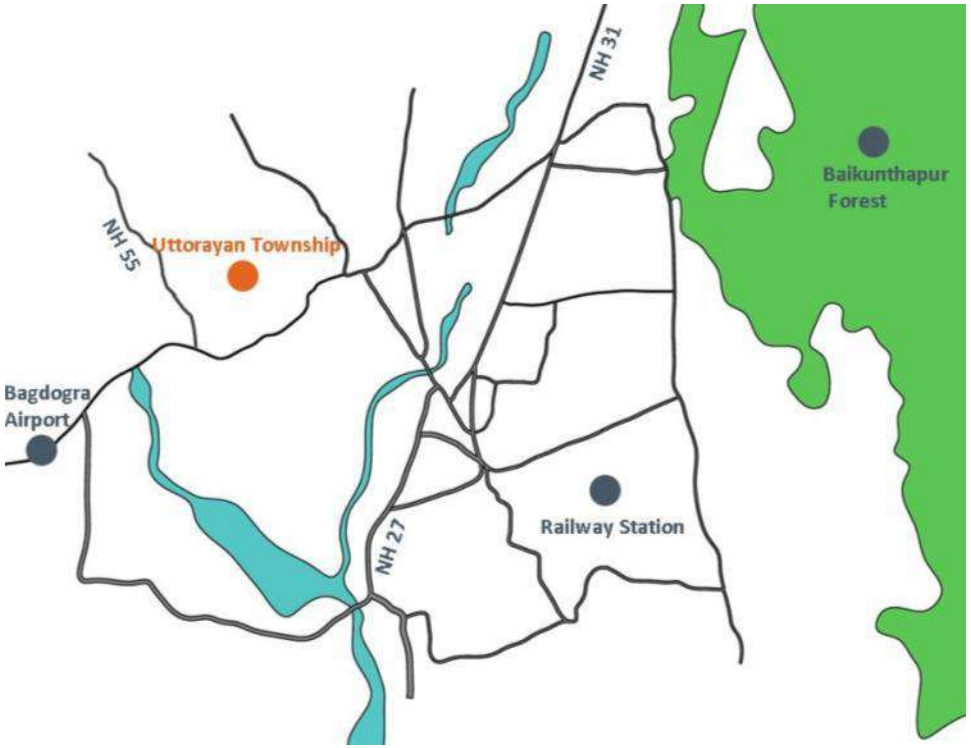
SPATIAL PLANNING TO CONTROL ELEVATED HUMIDITY LEVELS

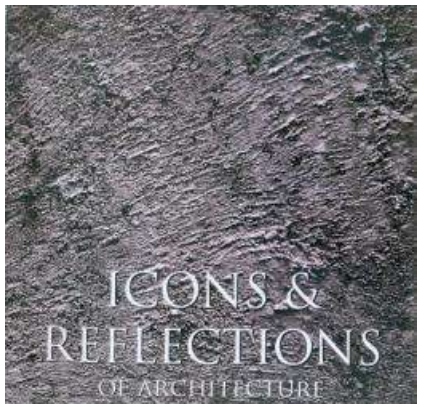


PASSIVE SOLAR DESIGN

OPTIMAL NORTH-SOUTH ORIENTATION TO CONTROL SOLAR GAIN







publications ::

A+D 2012
Dwell Asia (Hong Kong) 2012
Society Interiors - Collaborative Designs (Barcelona) 2010
Icons & Reflections of Architecture by Hettich 2010
Inner Eye 2009

awards ::

Smart Cities India Award, 2018
HUDCO Award Commendation, 'New and Innovative Town Design Solutions/Eco-Cities', 2013
Construction Week India Awards, Commercial Project of the Year 2012
Property Awards for Commercial Property Excellence, Office Architect of the Year 2011
Cityscape Awards, Highly Commended Seal of Distinction Dubai 2010
ArchiDesign Award, Best High-Rise Apartments/Township 2009
Cityscape India Award for Best Master Planning and Urban Design 2007

fact file ::

Area :: 400 Acres
Climate :: Wet
Client :: Ambuja Realty
Year of Completion :: 2006

The Uttorayon Township
Siliguri

IILM: A Co-Living space

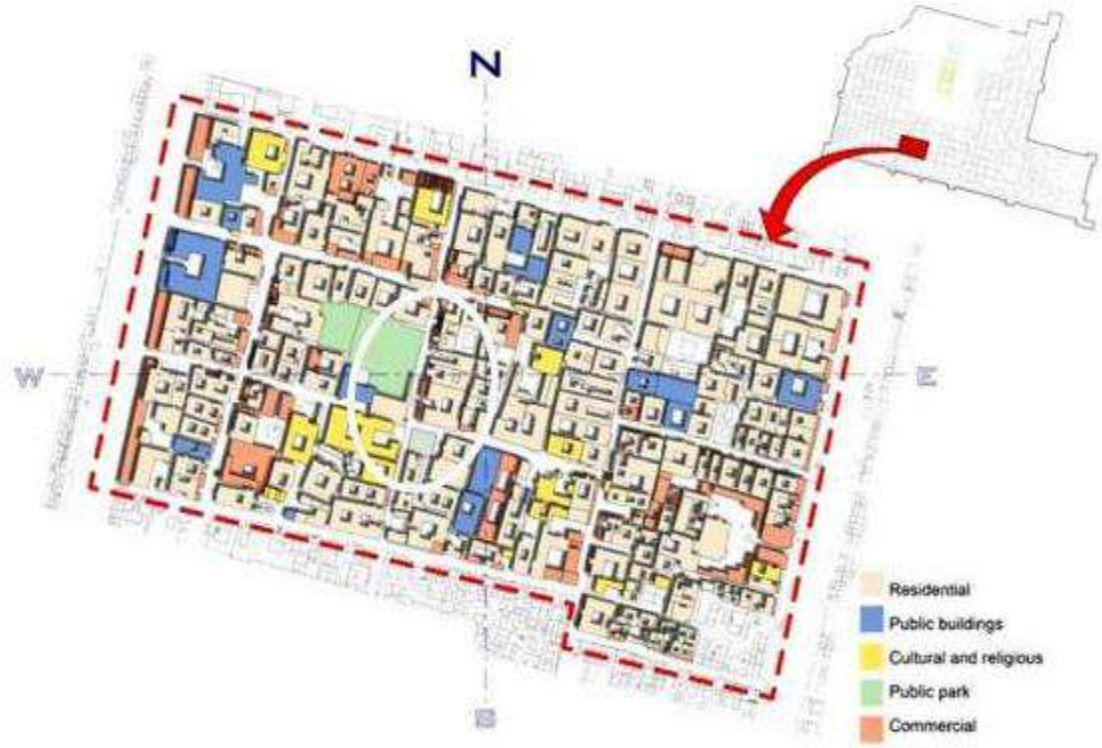
GREATER NOIDA

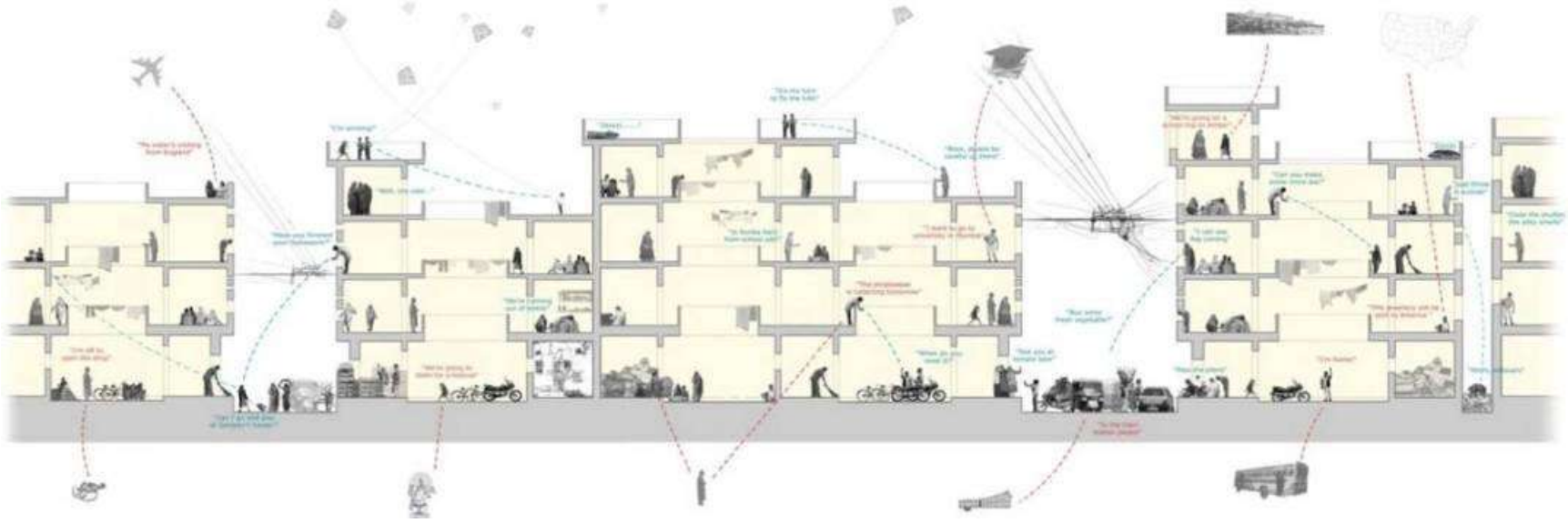
1,75,000 sq ft | 8 acres

LIFE IN THE WALLED CITY

SAFETY

- Solid Fort like perimeter
- Introverted morphology
- “Eyes” on all spaces
- No Dead-ends





CREATING A SAFE ENVIRONMENT IN < $30/SQ.FT.

Safety

"Eyes" on all spaces

Solid Fort like perimeter

Introverted morphology

No Dead-ends

Affordability

Low Cost material <500Km radius

Eliminate over-building

Naturally ventilated circulation spaces

Minimise/Eliminate HVAC

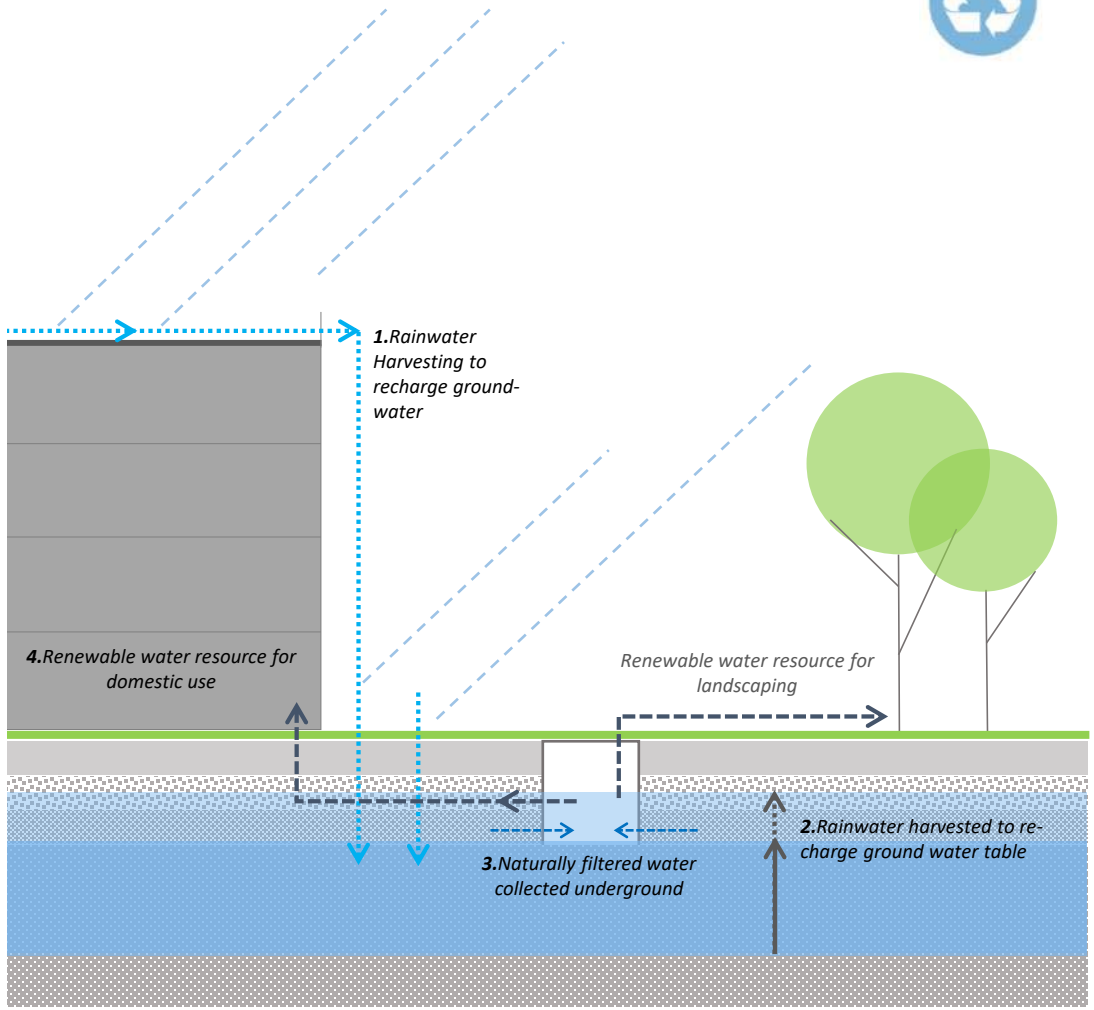
Sustainability

To build passively by making the best use of opportunities presented by the site and the climate

SUSTAINABILITY

CARRYING CAPACITY ON WATER

	Particulars	Water requirement
A	**Rainwater Harvesting potential**	
1	Site Area	32,000 sq.m
2	Annual rainfall	**0.617** M
3	Evaporation Losses	**10%**
4	**Rainwater Harvesting potential** *(A1xA2xA3)*	**17,800** cu.m. /yr
B	**Daily water requirement per person** *(35% Improvement over NBC i.e,135 lpcd)*	**90 lpcd**
1	**Total Annual requirement per person** *(@300 days occupancy)*	**27 cu.m. /yr**
C	**Carrying Capacity**	
1	**Carrying capacity of site for water demand** *[A4 / (B1x300days)]*	**660 people**



Inference:

- Carrying capacity with respect to WATER is **660 people**
- The site has the potential to be **NET ZERO on WATER** with **100% rainwater harvesting**

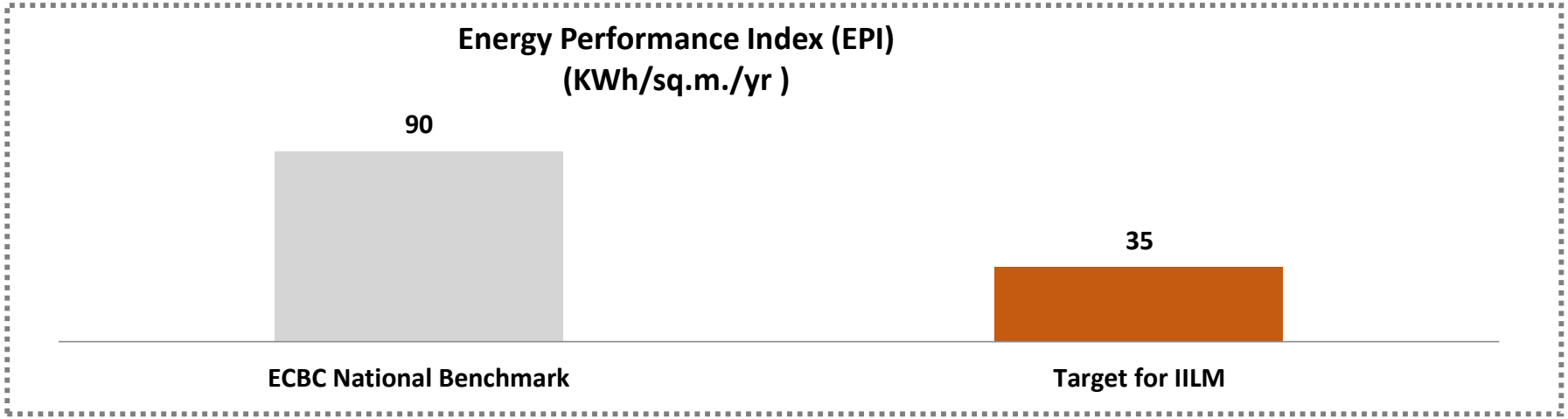
SUSTAINABILITY

CARRYING CAPACITY ON ENERGY DEMAND

	Particulars		
A	**Carrying capacity for people**	**660**	**people**
1	Site Area	32,000	Sq.m
2	Ground Coverage (GC) @35%	11,200	Sq.m
3	Roof Area available for Solar panels = 0.7xGC	7,840	Sq.m
4	Solar PV installation potential of roof *(@1kWp per 15sq.m.)*	550	KWp
5	Total annual energy generation potential of solar PV *(1kWp expected to generate 1500kWh annually)*	8,25,000	KWh
B	**Built-Up area** *@ 30sq.m. per person*	**19,800**	**Sq.m.**
C	**Target EPI for IILM**	**40**	**Wh/sq.m./yr**

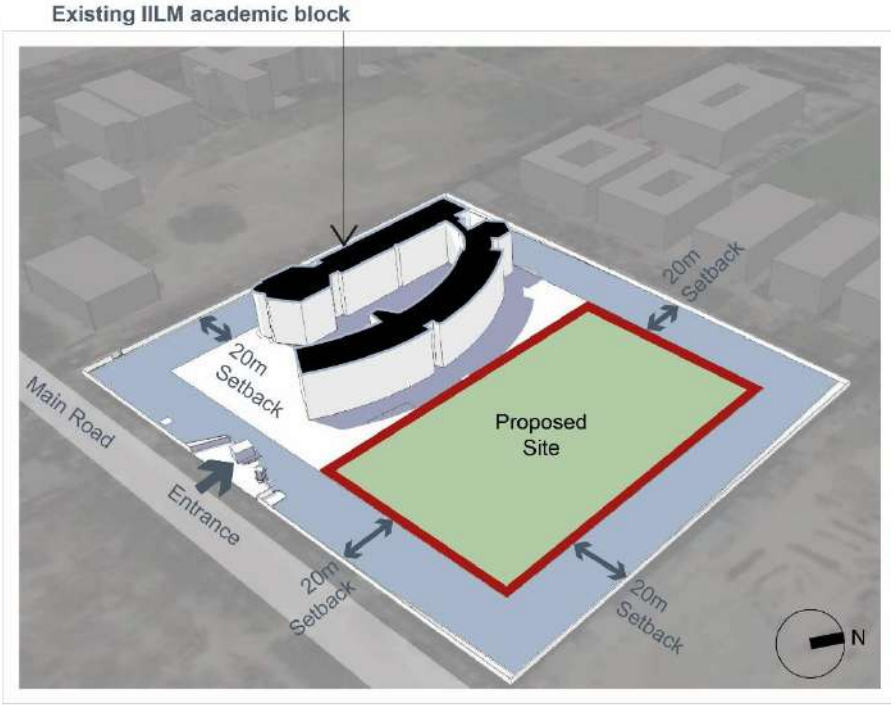
SUSTAINABILITY
ENERGY EFFICIENCY

Design Parameters	ECBC Baseline Recommendations	Target for IILM
U-value of Walls (W/sq.m.K)	0.44	0.44
U-value of Roofs (W/sq.m.K)	0.26	0.26
U-value of Glass (W/sq.m.K)	3.30	3.30
Effective SHGC for Glass (Shading)	0.25	0.25
Max. Window : Wall Ratio (WWR)	60%	15%
% Day-lit living spaces (from available daylight hours)	25%	80%
Energy Performance Index (EPI)	**90 kWh/sq.m./yr.**	**35 kWh/sq.m./yr.**



(Source: Bureau of Energy Efficiency)

CONTEXT
SITE



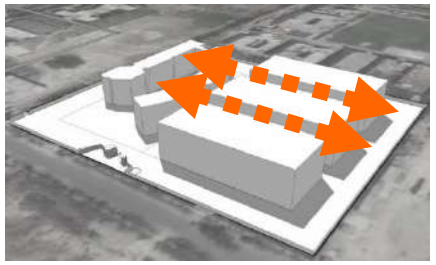
1. Existing Academic Block

2. View of the site from the Academic Block

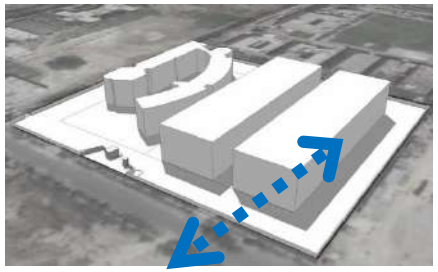
3. View of the site from the entrance

MICROCLIMATE

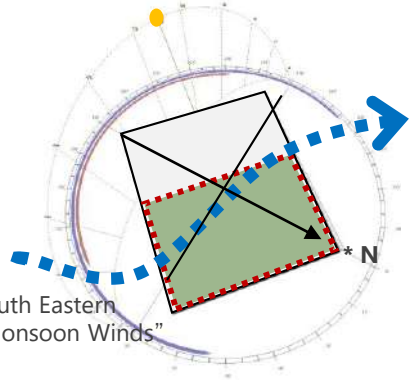
SHADED COURTS | "EYES" ON ALL CIRCULATION AREAS



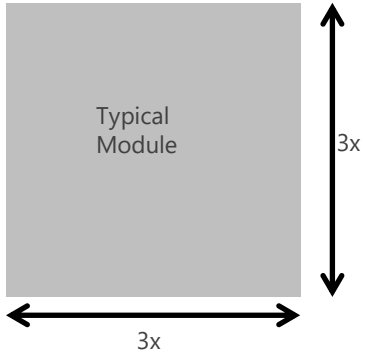
Generating a Horizontal street pattern
Maintaining a visual and physical connection between the existing building and proposed



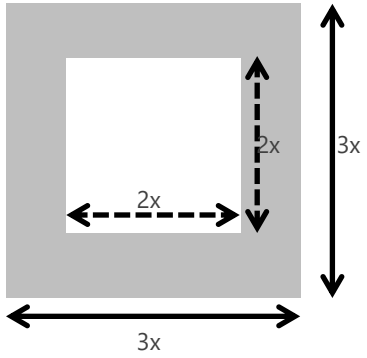
Channeling the Monsoon winds
Massing to allow the south eastern monsoon winds for increasing air movement across the site.



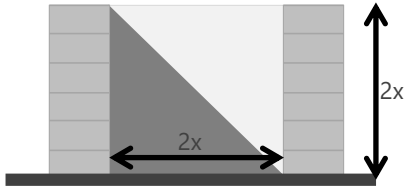
South Eastern
"Monsoon Winds"



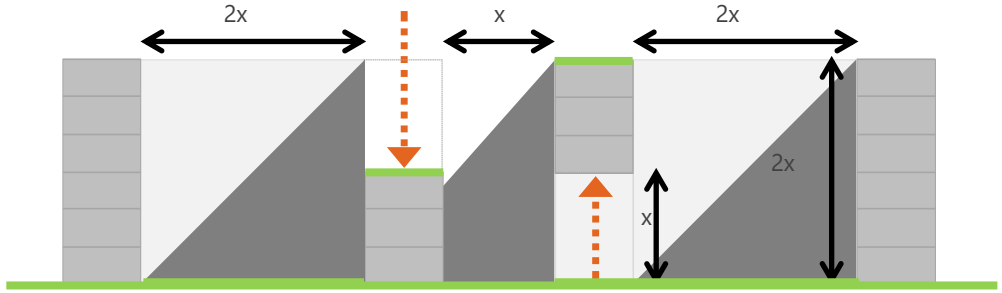
1. Typical Module
Buildable boundaries generated from site and climatic parameters. Distributing the built-up equally, the result was a module measuring
32M x 32M x 19M



2. Introducing Central courtyard
Opening up the block internally to create protected interactive spaces while allowing dual aspect floorplates



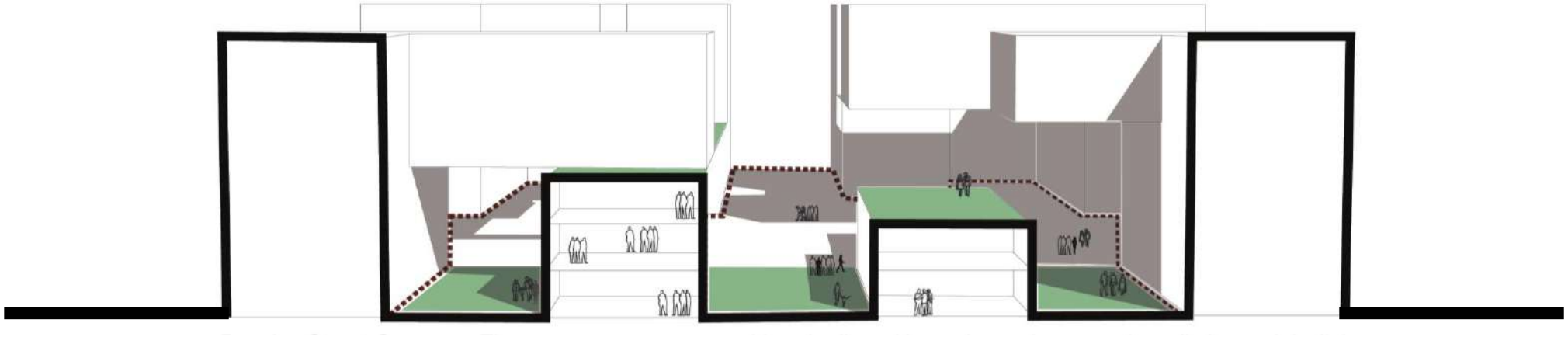
3. Stack Effect
A 1:1 proportion of central open space is optimal in improving air movement as well as creating a well shaded courtyard

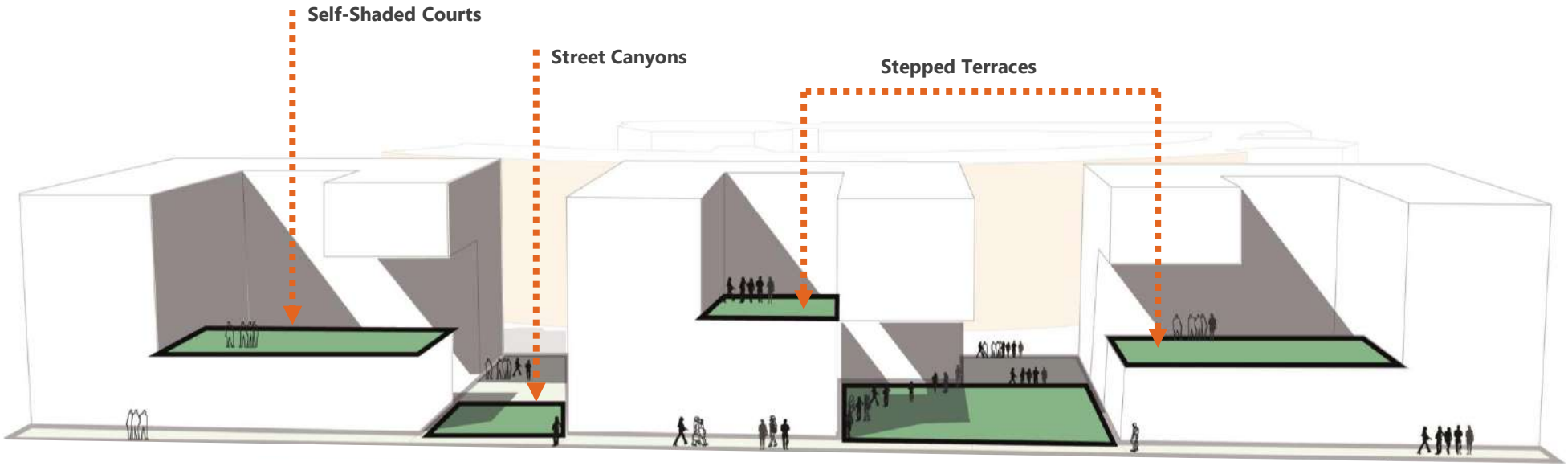


Creating a Network of Interactive Spaces
Maintaining a visual connection between interactive spaces while allowing for semi-private terraces

Generating typical modules by balancing Built vs Open proportions

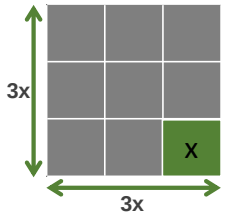
MICROCLIMATE
MORPHOLOGY





Inference:

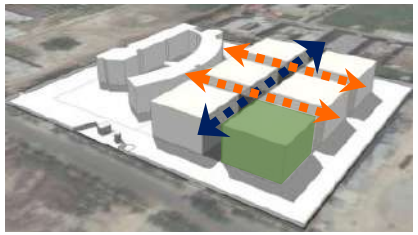
- **Passive street Canyons:** The 12m street canyon provides shading without obstructing natural ventilation and daylight
- **Urban Streetscape:** Created by visually connecting spaces at different levels
- All the above level terrace Garden to open onto the street to generate the Urban Streetscape



Typical Module

Buildable boundaries generated from site and climatic parameters. Distributing the built-up equally, the result was a module 32M x 32M x 19M

Seed



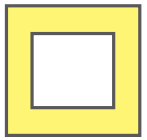
Creating visual and physical planning axes

The building zone divided into 6 equal modules with an integrated pedestrian network

Generate

Objectives :

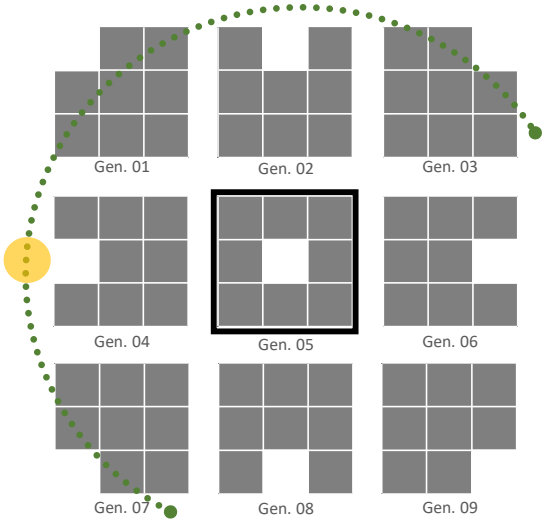
• Daylight • Solar control



Narrow Floorplate
Daylight + Cross Ventilation

Courtyard
Controlled Microclimate

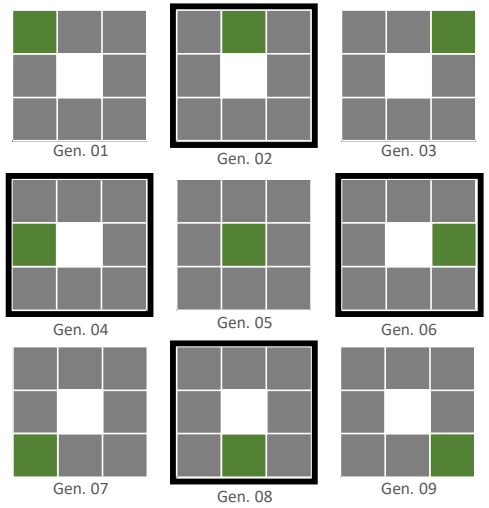
Staggered openings Enhanced air-movement



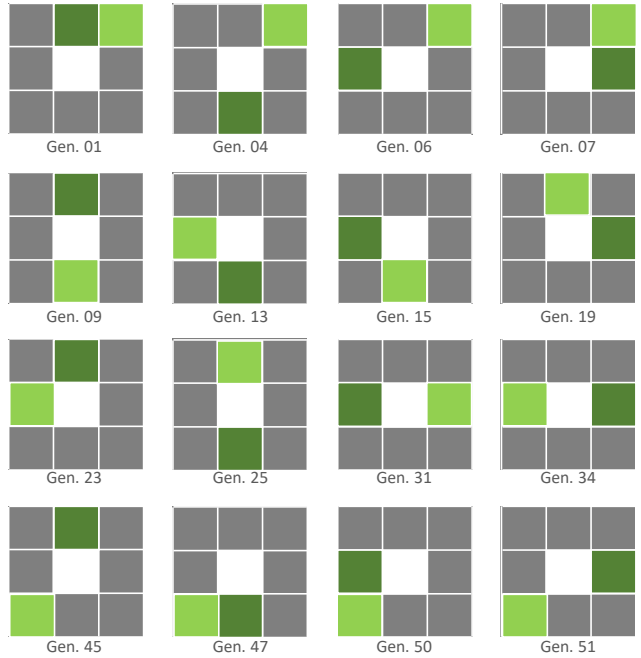
Creating a courtyard surrounded by a narrow floorplate for daylit indoors and comfortable outdoor spaces

Targeting 10°C reduction in perceptible temperature

Evaluate



Identifying the most suitable location for vertical connection



Introducing voids in the built-form to enhance air-movement within the courtyard and hostel units

Objectives :

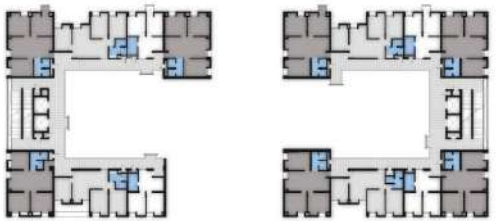
- Security
- Energy **(56kWh/sqm/yr)**
- Daylight
- Solar control
- Natural Ventilation
- Microclimate

FLOOR PLANS

First Floor

Second Floor

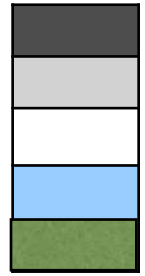
Third Floor



Fourth Floor

Fifth Floor

LEGEND



UNIT- TYPE - A

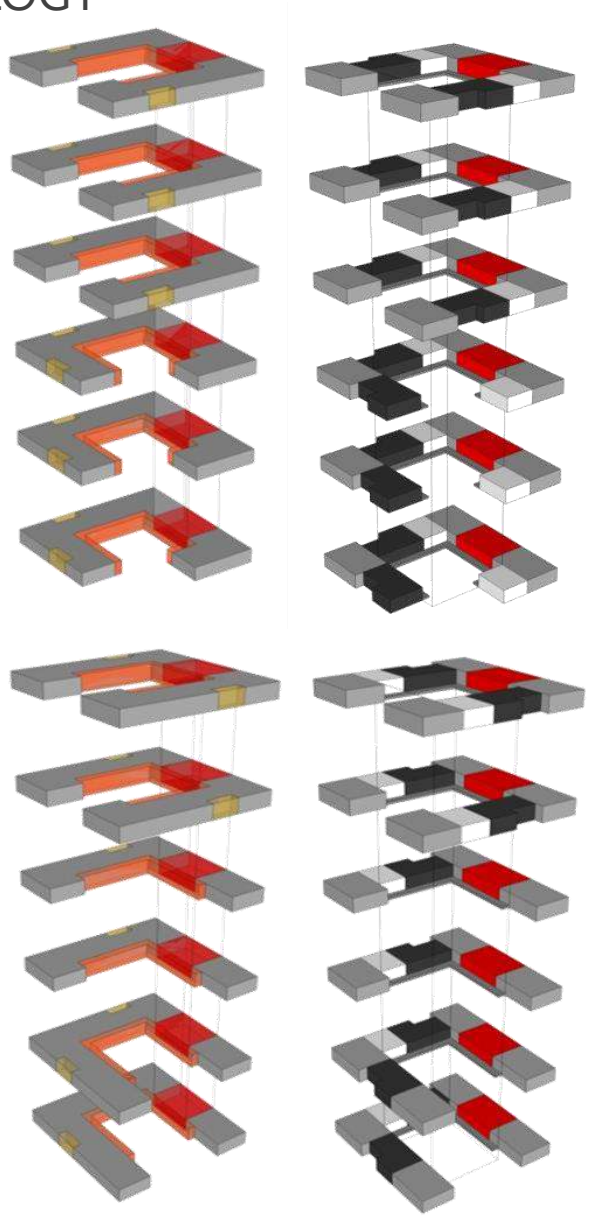
UNIT- TYPE- B

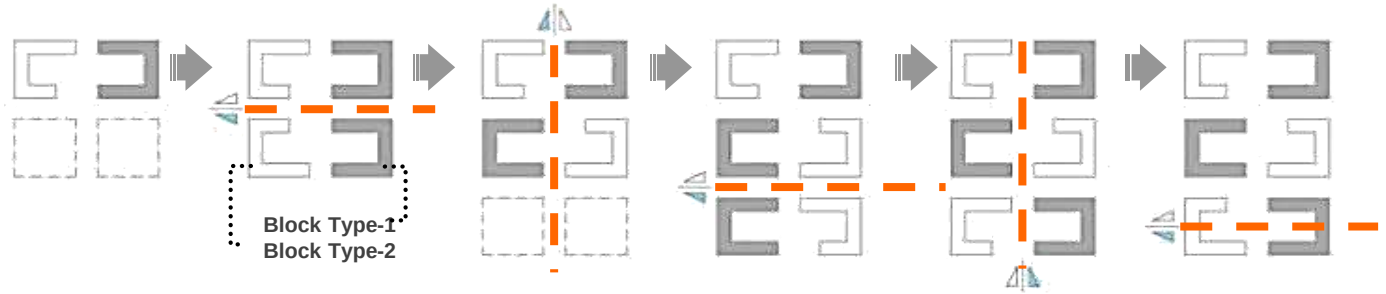
UNIT- TYPE- C

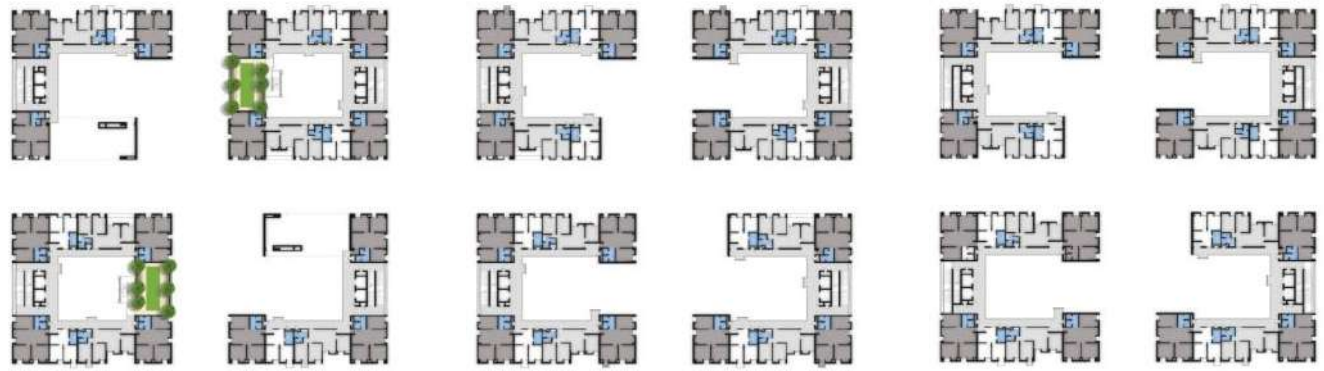
TOILETS

LANDSCAPED COURTYARD

MORPHOLOGY





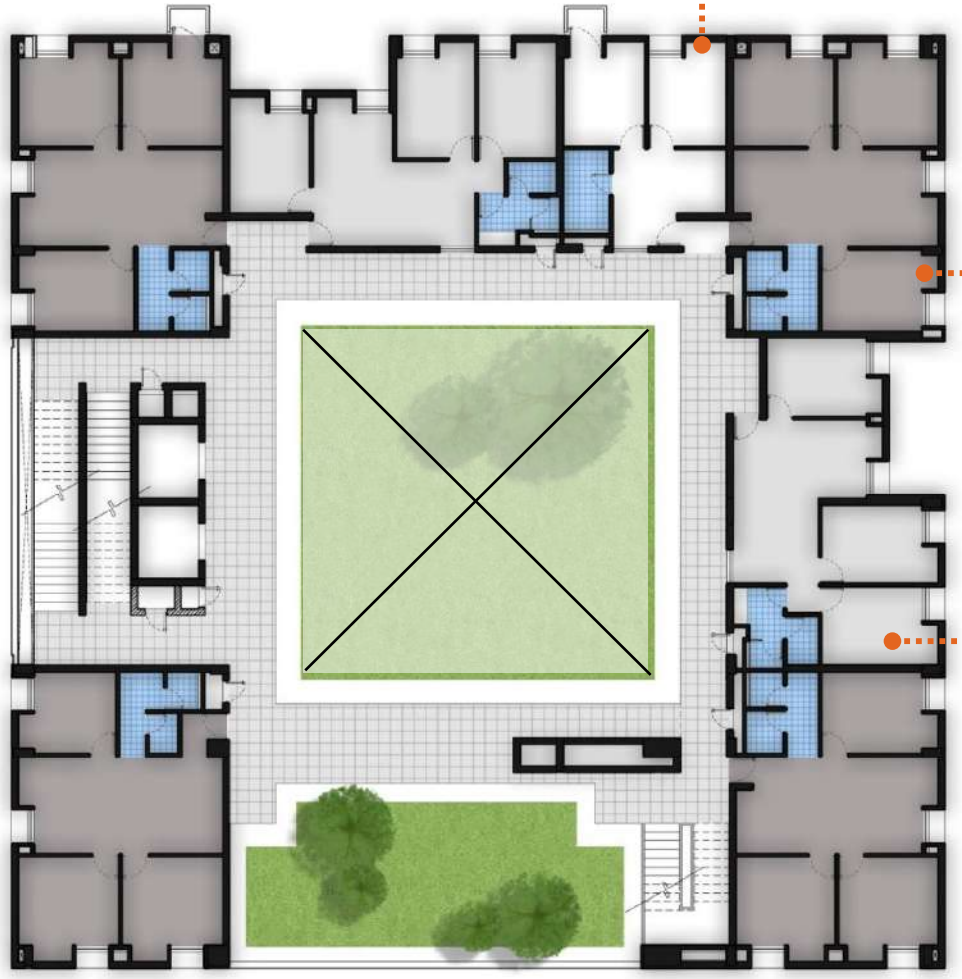


LEGEND

CORE
CORRIDOR
BUILT MASS
PRIVATE OPEN SPACES

FLOORPLATE ANALYSIS

SHARED LIVING



First Floor-Plan for Block-A

Type-C (2-Bedroom)

Type-A (3-Bedroom)

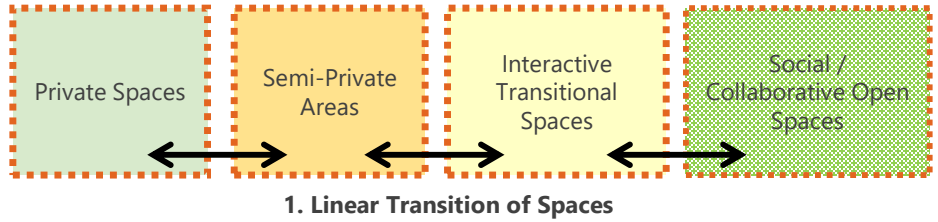
Type-B (3-Bedroom)

LEGEND

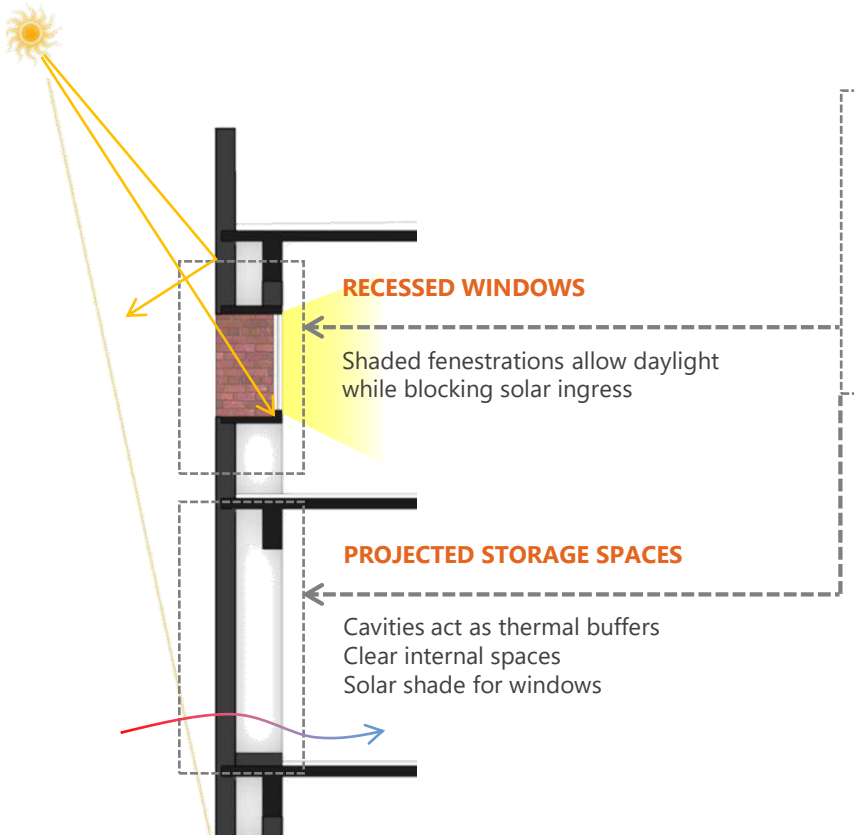
- UNIT- TYPE - A
- UNIT- TYPE- B
- UNIT- TYPE- C
- TOILETS

FLOORPLATE ANALYSIS

PASSIVE DESIGN



1. Linear Transition of Spaces



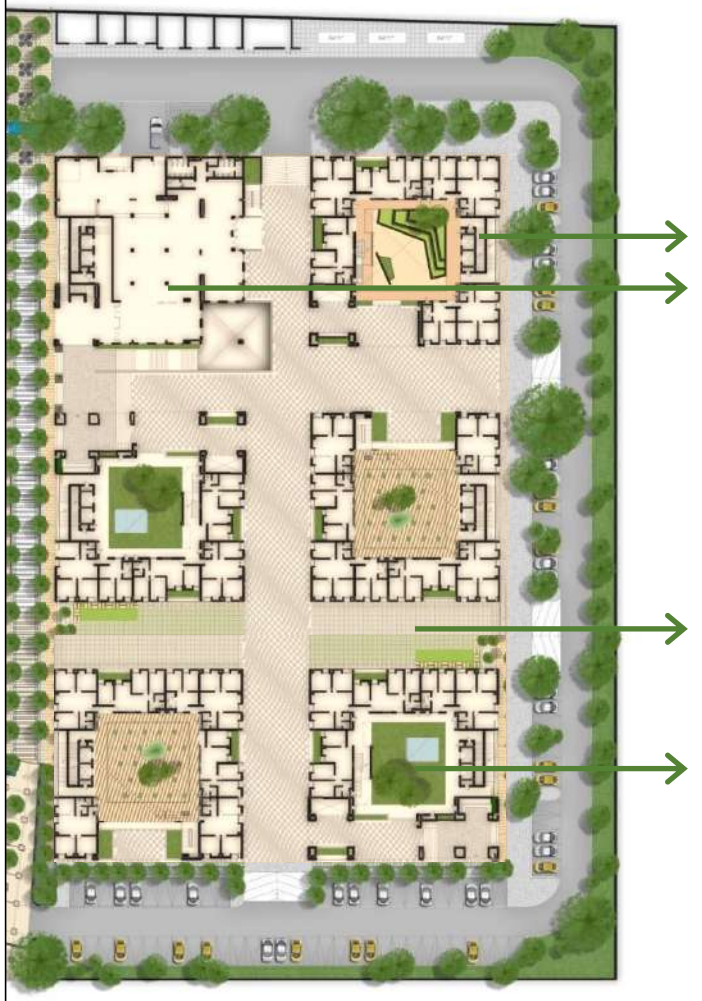
2. Façade Designed as a Thermal Buffer

TYPICAL TYPE-B UNIT

(3-BEDROOM)

DESIGN STRATEGY

INTEGRATING SELF-SUFFICIENT MODULES IN A NETWORK OF INTERACTIVE SPACES

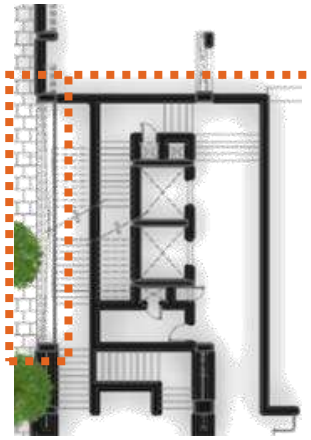


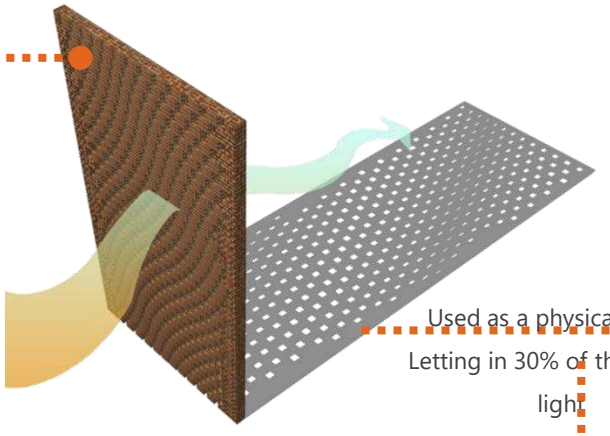
Hostel Block Type-1

Common Facilities on the ground Floor

12m wide pedestrian streets

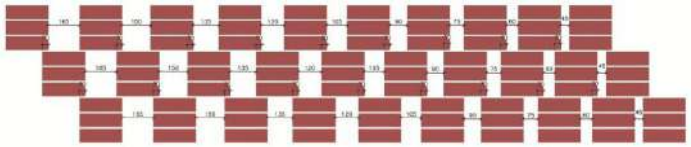
Interactive Courts



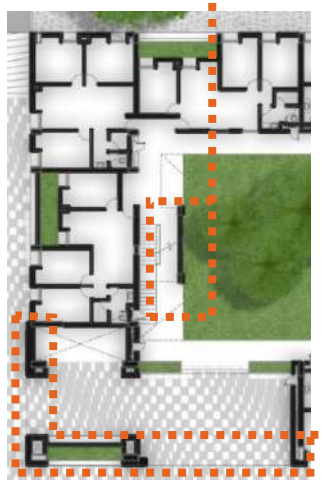


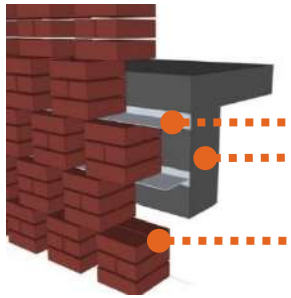
Used as a physical barrier.
Letting in 30% of the outdoor light.

Brick Jaali highlights the entrance, adding thermal mass making the inner environment relatively cooler than the outside.



Typical *Jaali* Module





T Section

Conc. beam

Brick Jaali

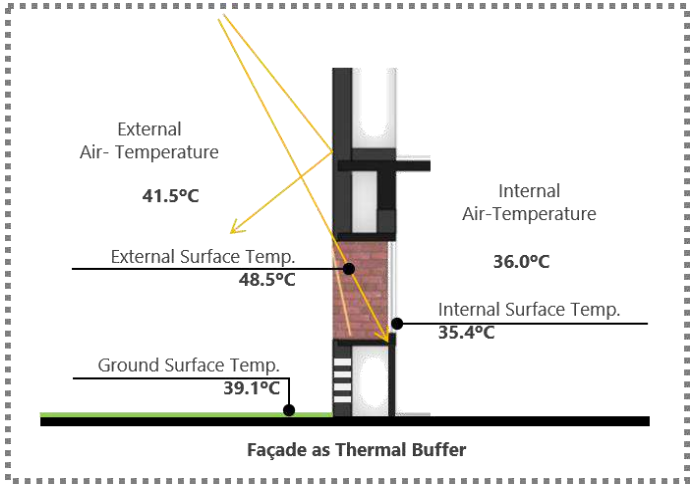
FAÇADE DESIGN

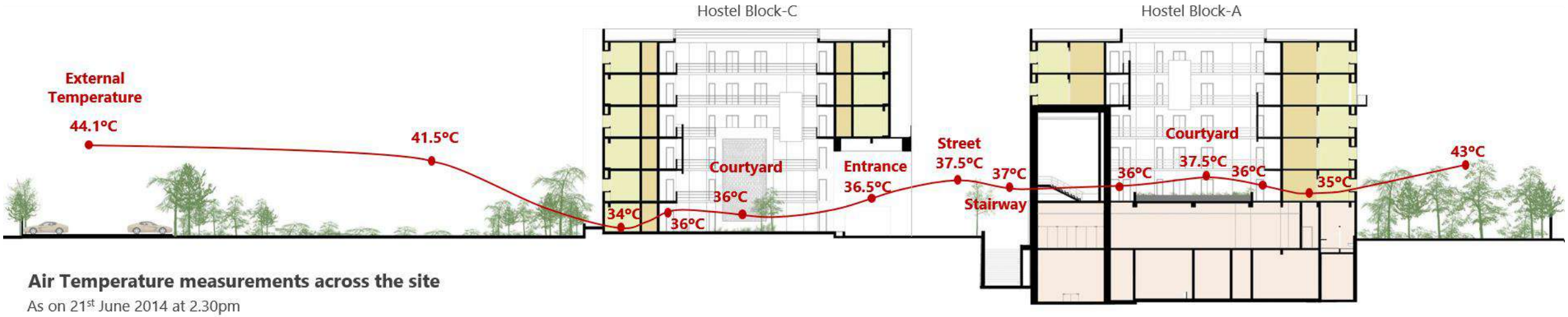
THERMAL EFFICIENCY EPI INDEX

External temperature: **44°C**

Internal temperature: **34°C**

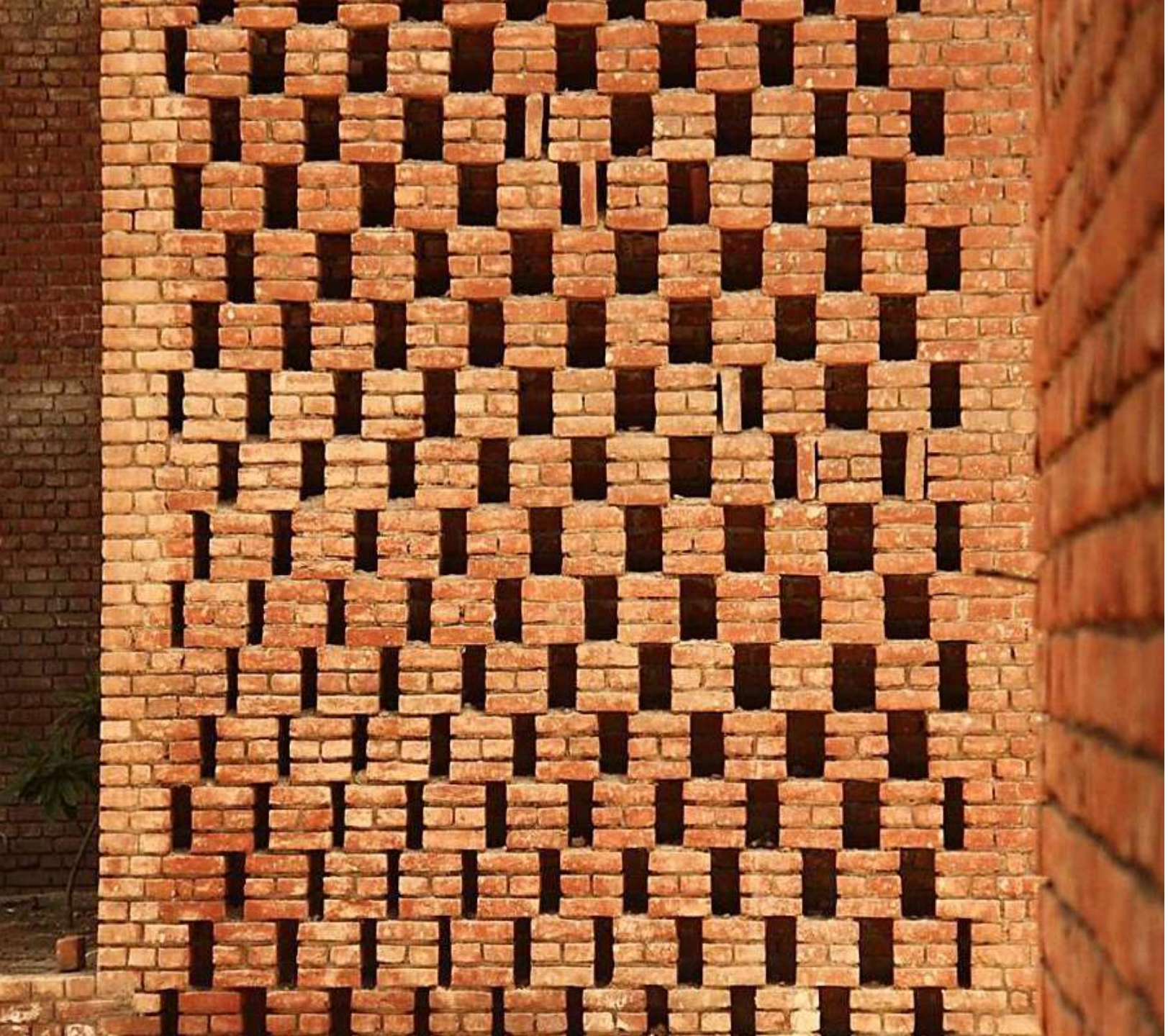
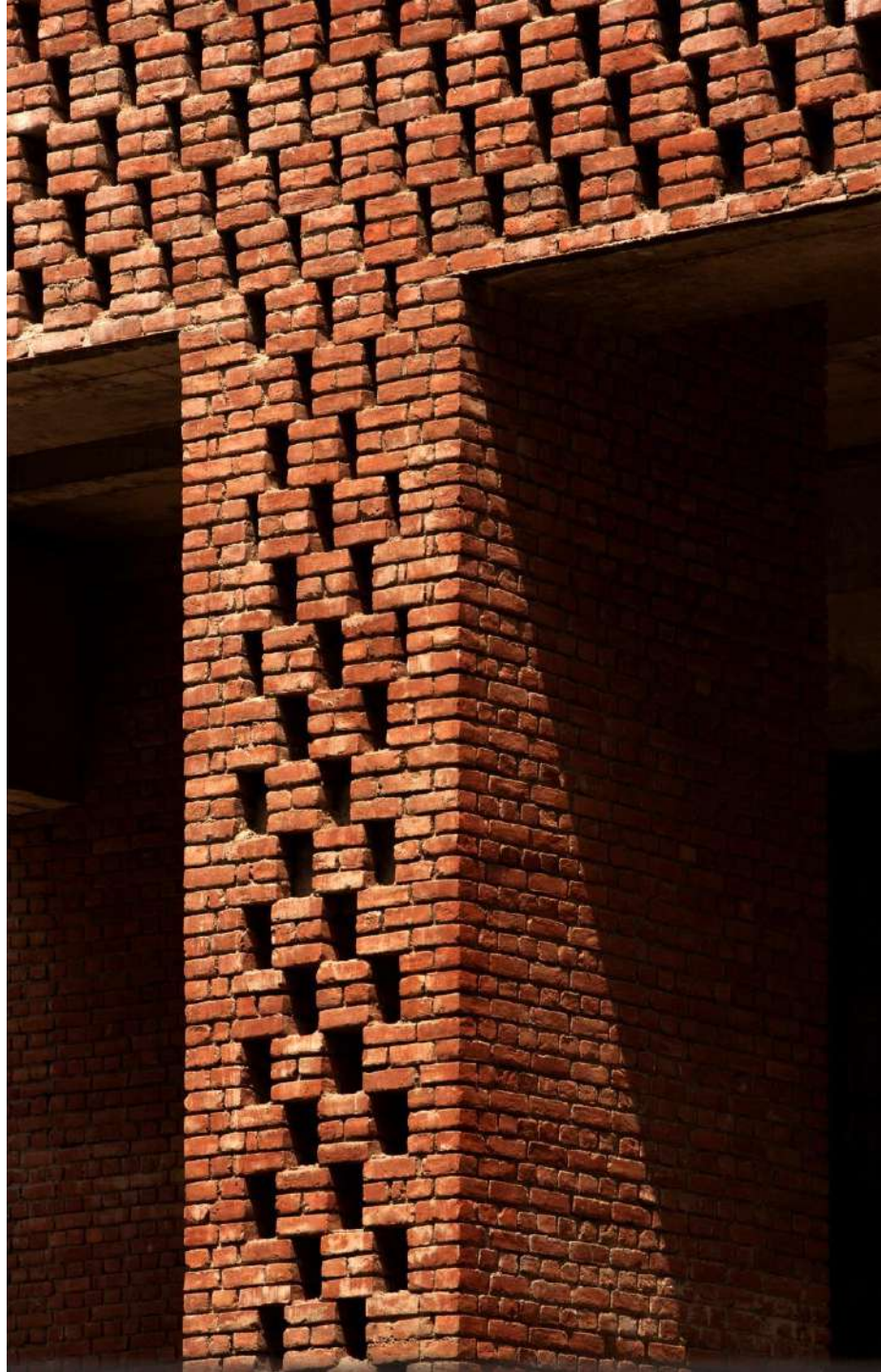
Δ10°C

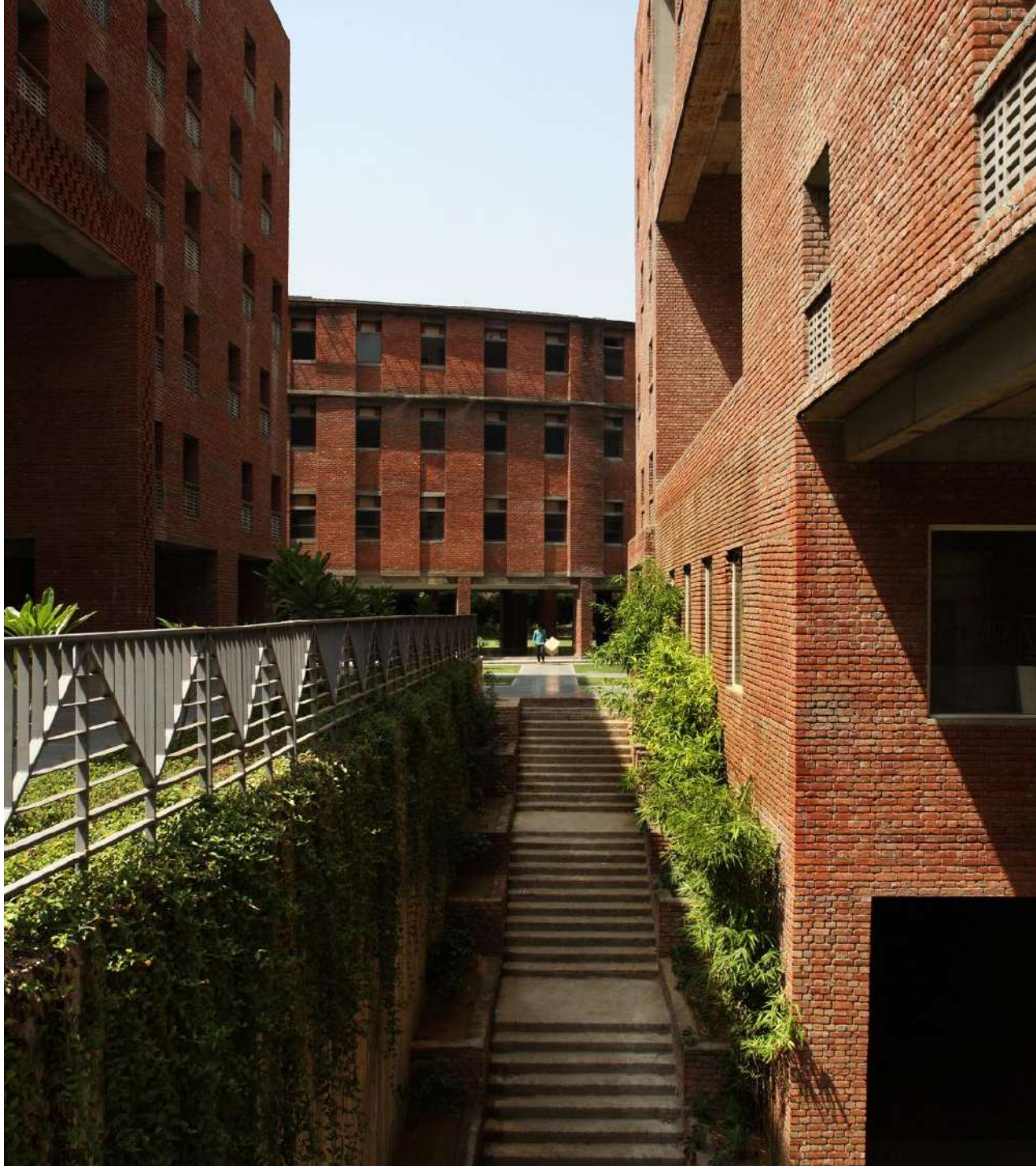




Air Temperature measurements across the site

As on 21st June 2014 at 2.30pm



DESIGN GOALS ACHIEVED

Energy Efficiency

Energy Performance Index:
35 kWh/sq.m./yr

Efficient Envelope Design:
Minimize Solar heat gains

90% day-lit spaces
(during available daylight hours)

WWR < 15%

100% Solar Shading

Thermal Mass:
optimal U-values

Natural Ventilation

ZERO Energy Capacity Design

Water Management

Reducing Water Demand:
50% reduction from conventional practices

Optimizing water consumption

Efficient water-fixtures

Harvesting 100% Rainwater

ZERO Water Balance

Waste Management

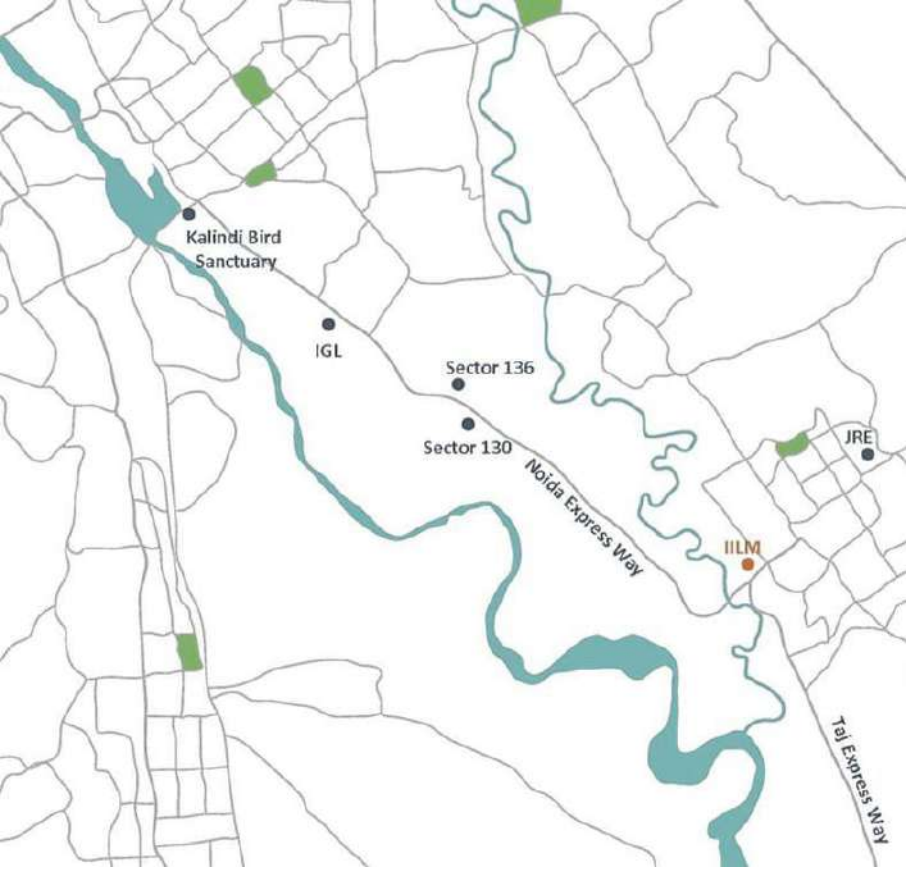
Reducing on-site waste

Segregation of organic and inorganic waste

On-site Recycling of grey-water
(via. STP)

Waste management system for recyclable waste
(Glass, Plastic, Paper)

ZERO discharge to landfill



THE MERIT LIST

DESCROLL design feeds

NDTV

awards ::

The Merit List 2016
NDTV, Design and Architecture Awards, Residential, Winner 2015

publications ::

Futurarc, 2017
A + D, 2016
The Plan, 2016
Architecture Time Space and People, 2016
DecoramaWorld 2016
TFOD 2016
Architecture Update 2015
Descroll 2015
The Journal of the Indian Institute of Architects, 2014
IA&B 2013

Fact File ::

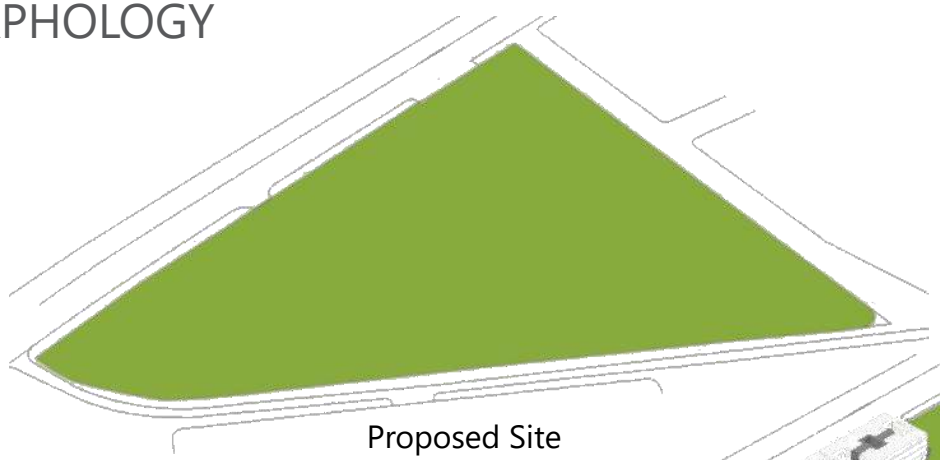
Client :: IILM
Climate :: Composite
Site Area :: 3,44,600 sq ft
Built-Up Area :: 2,25,000 sq.ft
Cost :: INR 2000/ sq.ft.
Year of Completion :: Built 2014

Institute for Integrated Learning in Management
Greater Noida


MARBLE ARCH
CHANDIGARH
4,30,000 sq.ft. | 5.4 acres
morphogenesis

MARBLE ARCH, CHANDIGARH

SITE MORPHOLOGY

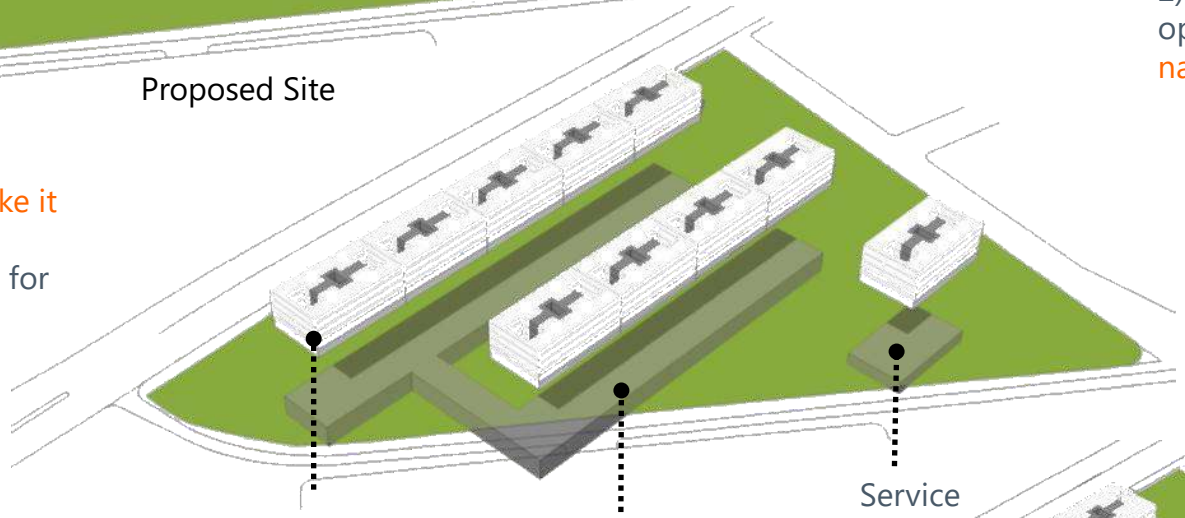


Proposed Site

1) Introduction of housing blocks dividing site into strips of solid and green

2) Arrangement of building blocks in optimum north south orientation allowing natural dayligh and ventilation

4) Entry/exit provided from building towards green to make it an interactive space for community, and towards road for vehicular access



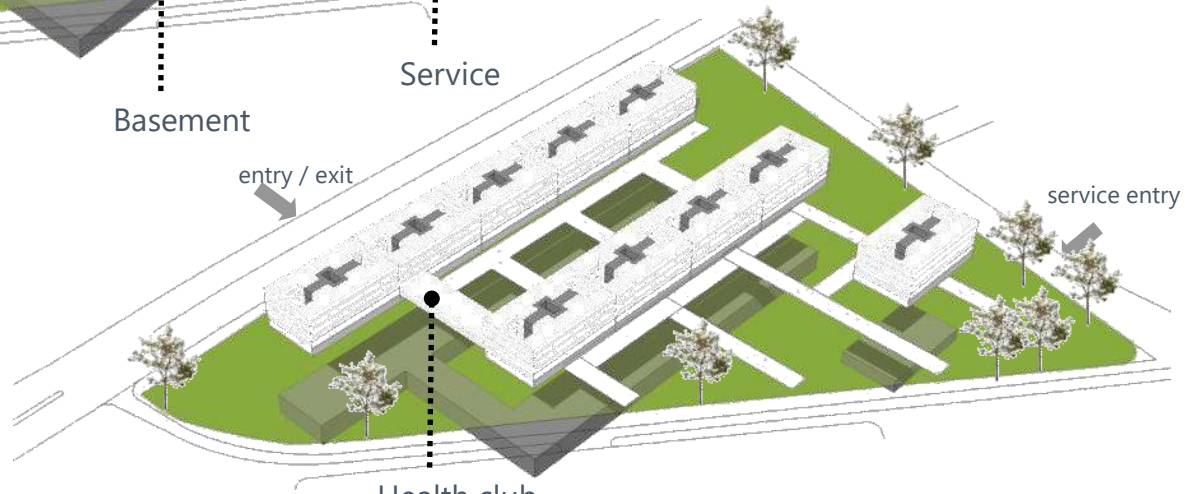
Building blocks

Basement

Service

3) Basement is contained within the building periphery dictating the configuration of the development in the form of linear strips

5) Health club introduced for joing two blocksand optimizing circulation in basement



Health club

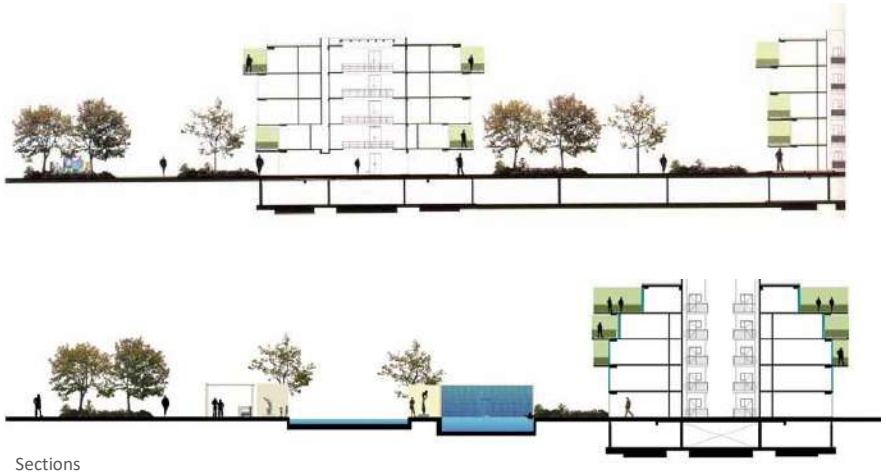
6) Introduction of pedestrian strips in green and restricting vehicular movement along the periphery

7) Pedestrian pathways extending to vehicular road

MARBLE ARCH, CHANDIGARH

DESIGN INNOVATIONS

- Unique scale with respect to contemporary residential developments in Chandigarh
- Play of volumes to provide terraces/open areas at all levels
- Vehicular movement taken to periphery to create a strong communal environment in the central greens.



Sections

Ground Floor Plan

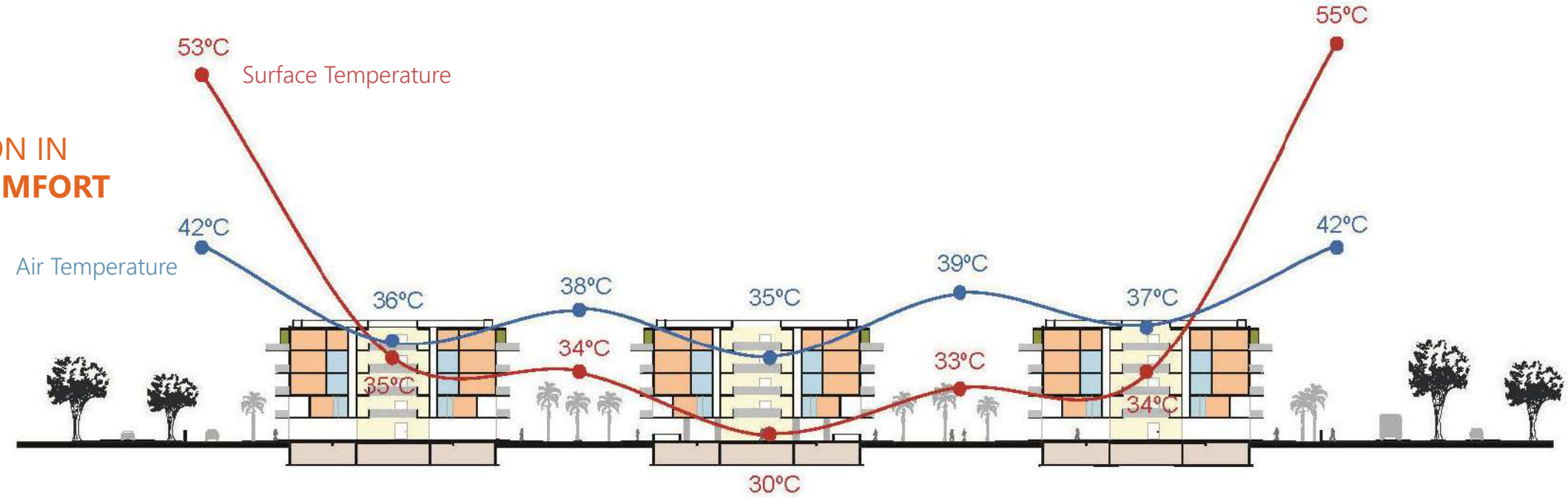
First Floor Plan

Second Floor Plan

Third Floor Plan

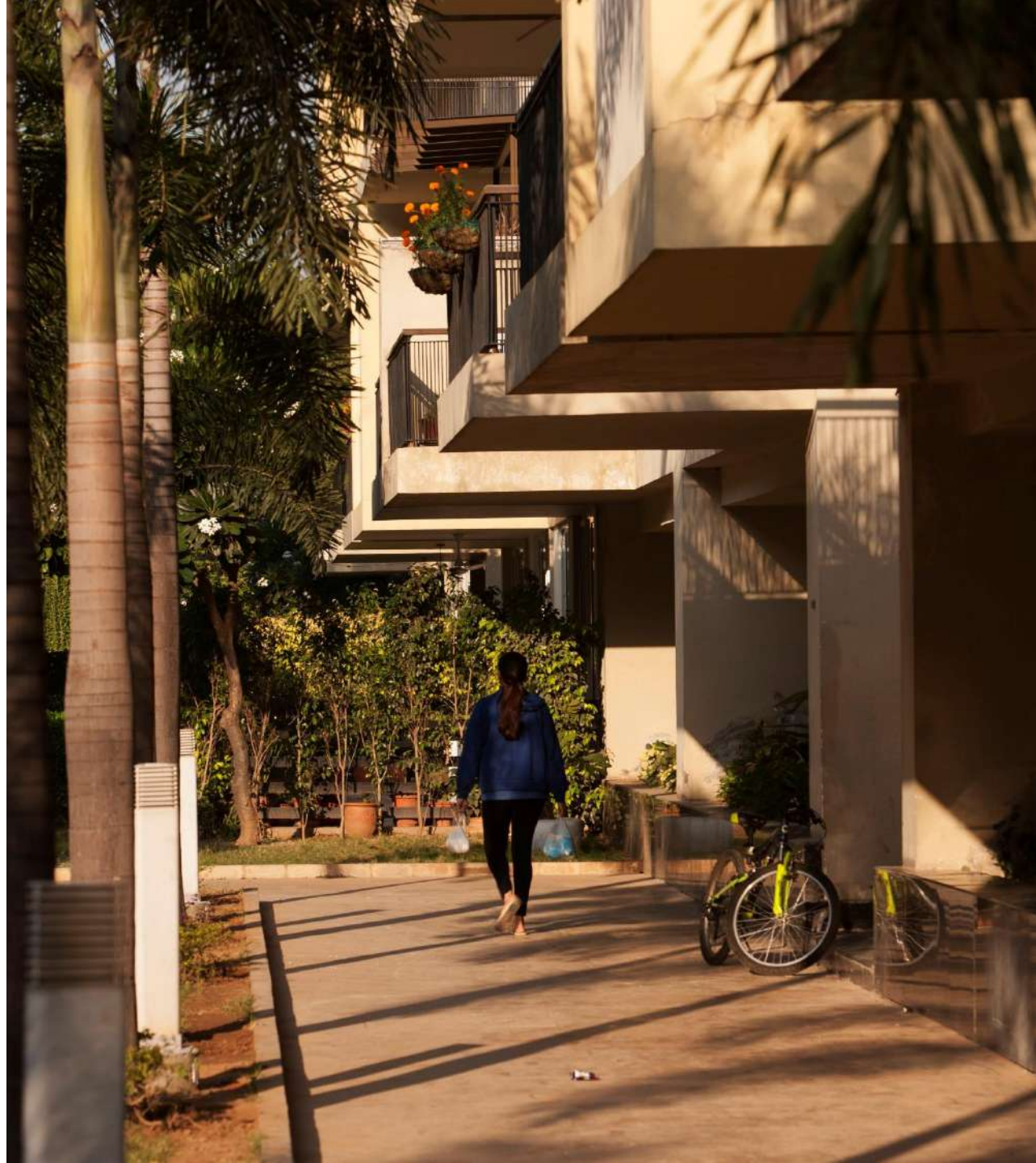
MICROCLIMATE | POST OCCUPANCY ANALYSIS

~10ºC REDUCTION IN
PERCEPTIBLE COMFORT



MARBLE ARCH, CHANDIGARH

Deep balconies were created for all apartments to provide a cool and shaded envelope around the buildings, thereby reducing energy consumption, and allowing for sufficient daylight to penetrate into the apartments on either side.

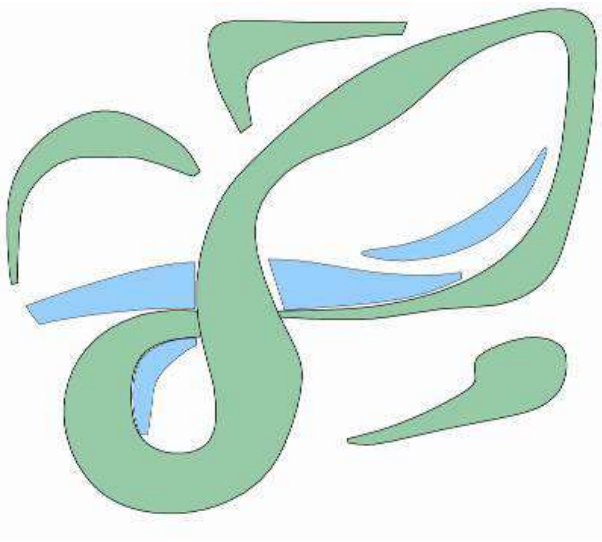


ANANTA HOUSE

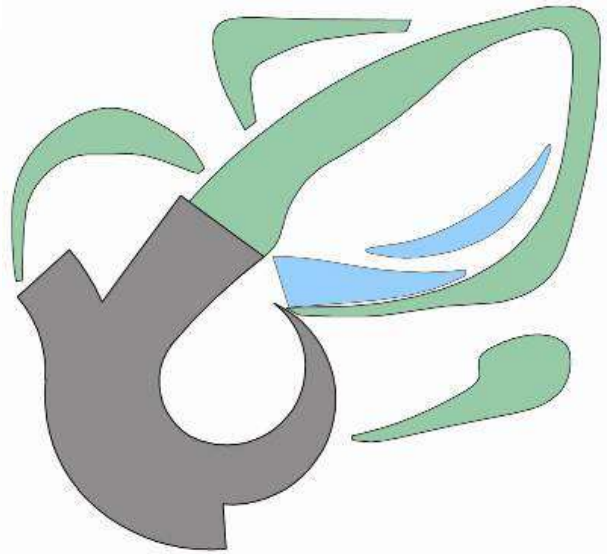
NEW DELHI

15,000 sq.ft. | 3.68 acres

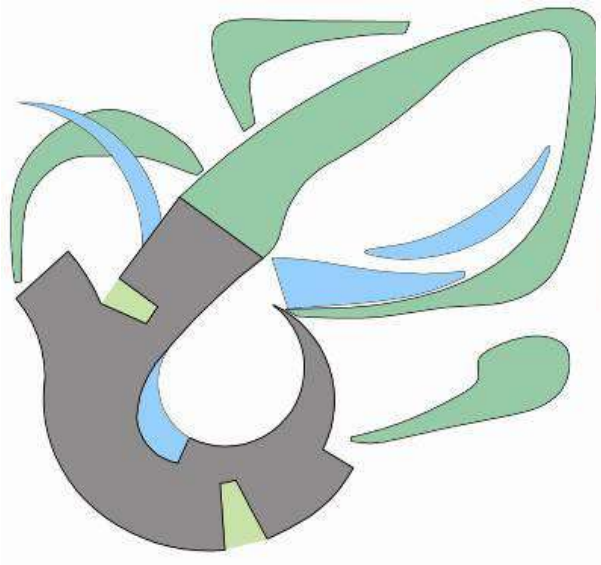
morphogenesis



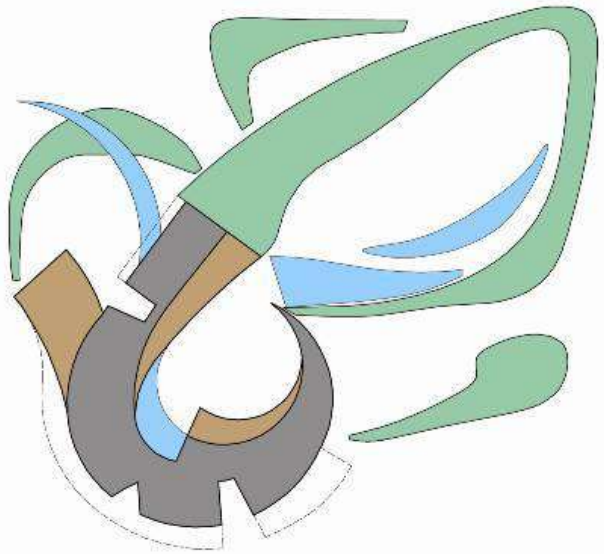
Proposed landscape scheme



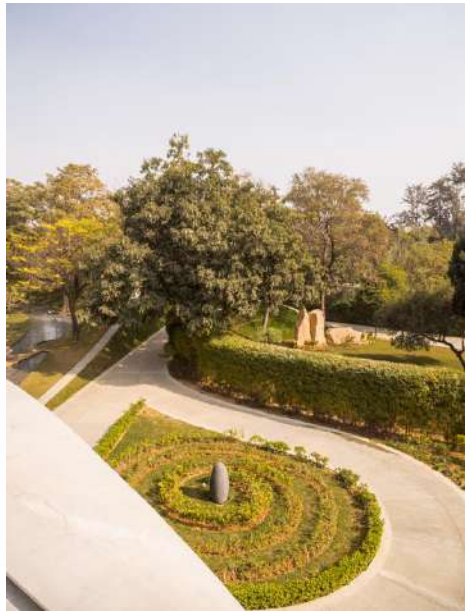
Building form derived out of the proposed landscape idea,
The Ying Yang building - landscape

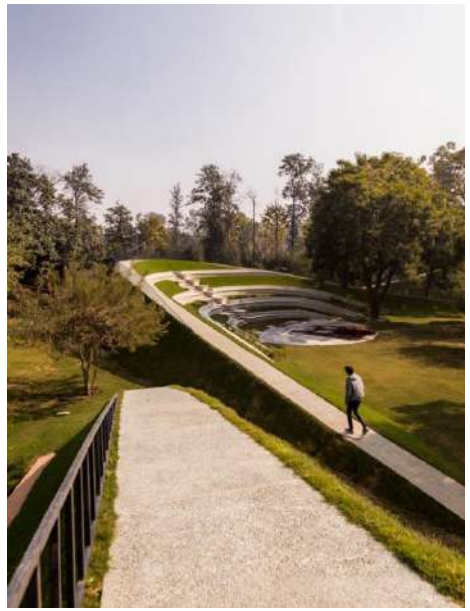


Integrating the water body with the building, Greens penetrating into the building, creating different experience as one moves along the building.



Creating a variety of spaces within the building by providing terrace/ decks and verandahs.





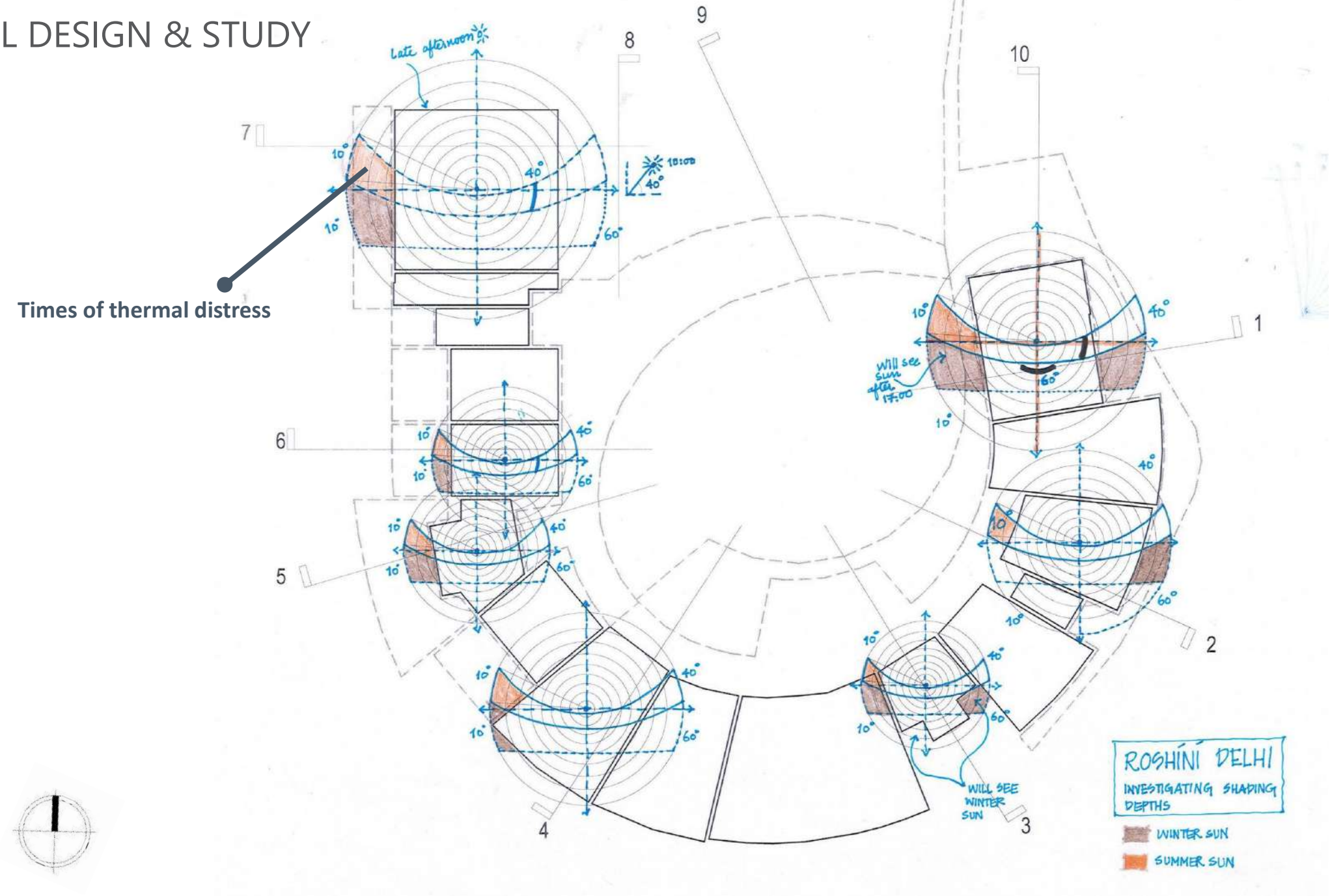
SITE PLAN


SECONDARY ENTRANCE GATE
GUARD ROOM
TENNIS COURT
KITCHEN GARDEN
PERFORMANCE AMPHITHEATRE AND STAGE
GRASS LAWN
WATER 1
SAMRAT YANTRA
GRAVEL PATH
SWIMMING POOL
REFLECTING POOL
WATER 2
MAIN HOUSE
COURTYARD
RUNNING PATH
BOUNDARY BERM
HEDGE
PRIMARY ACCESS ROAD
ANCILLARY BUILDING
SUNSET WALL EMBEDDED SEAT
GUARD ROOM
PRIMARY ENTRANCE GATE
<<< PIPAL DRIVE ROAD >>>
NORTH DRIVE FARM NO. - 9
<<< NORTH DRIVE ROAD >>>

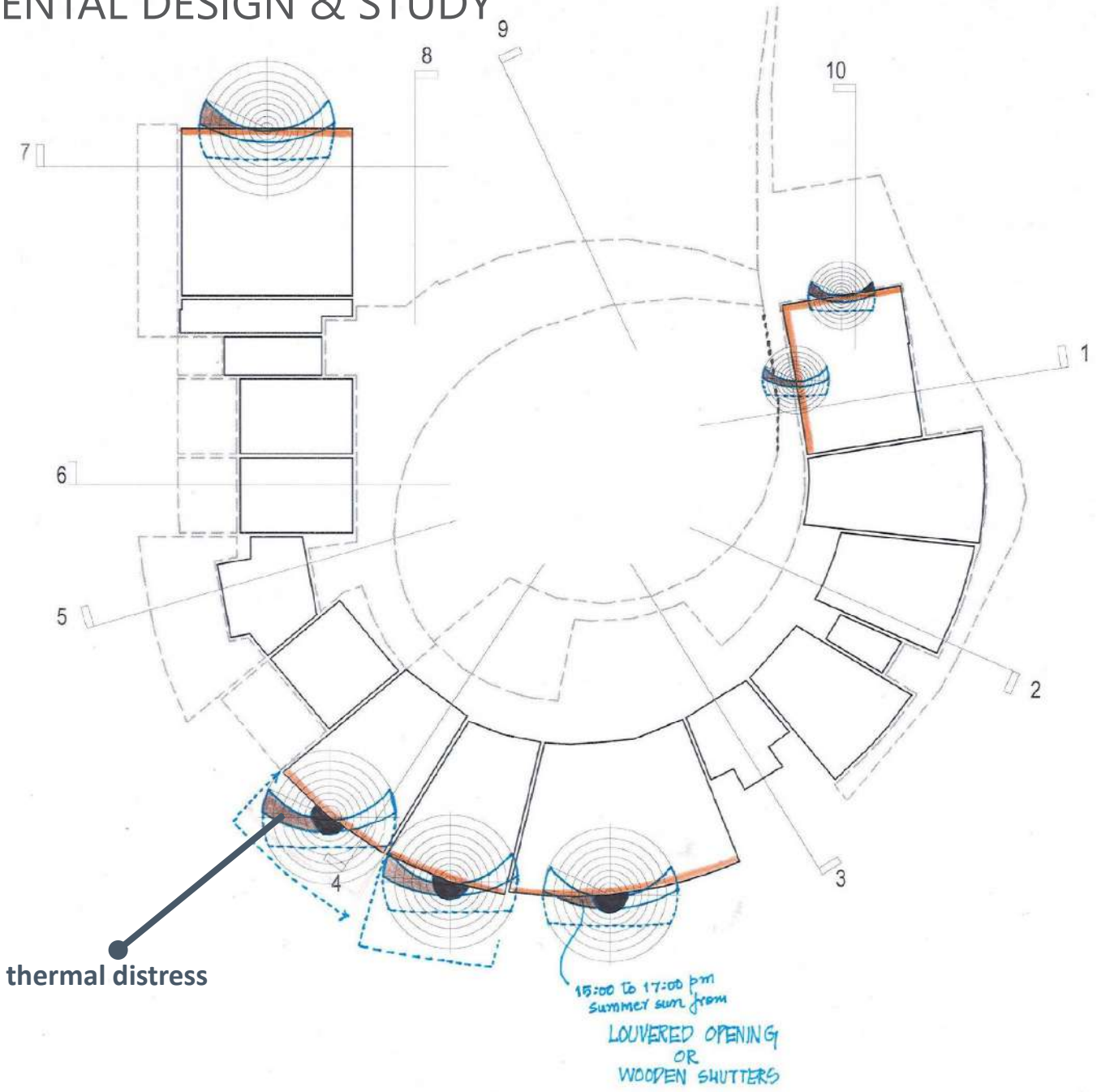
GROUND FLOOR PLAN

ENVIRONMENTAL DESIGN & STUDY

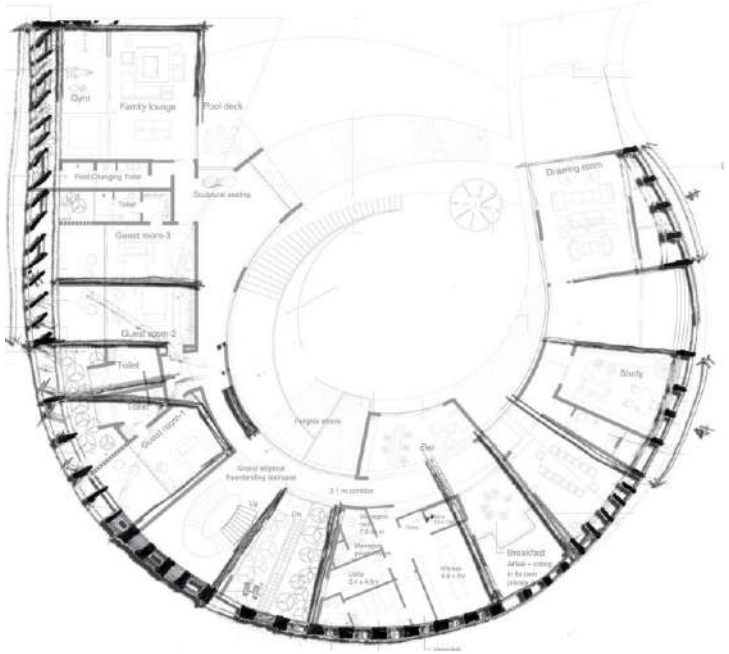
Times of thermal distress



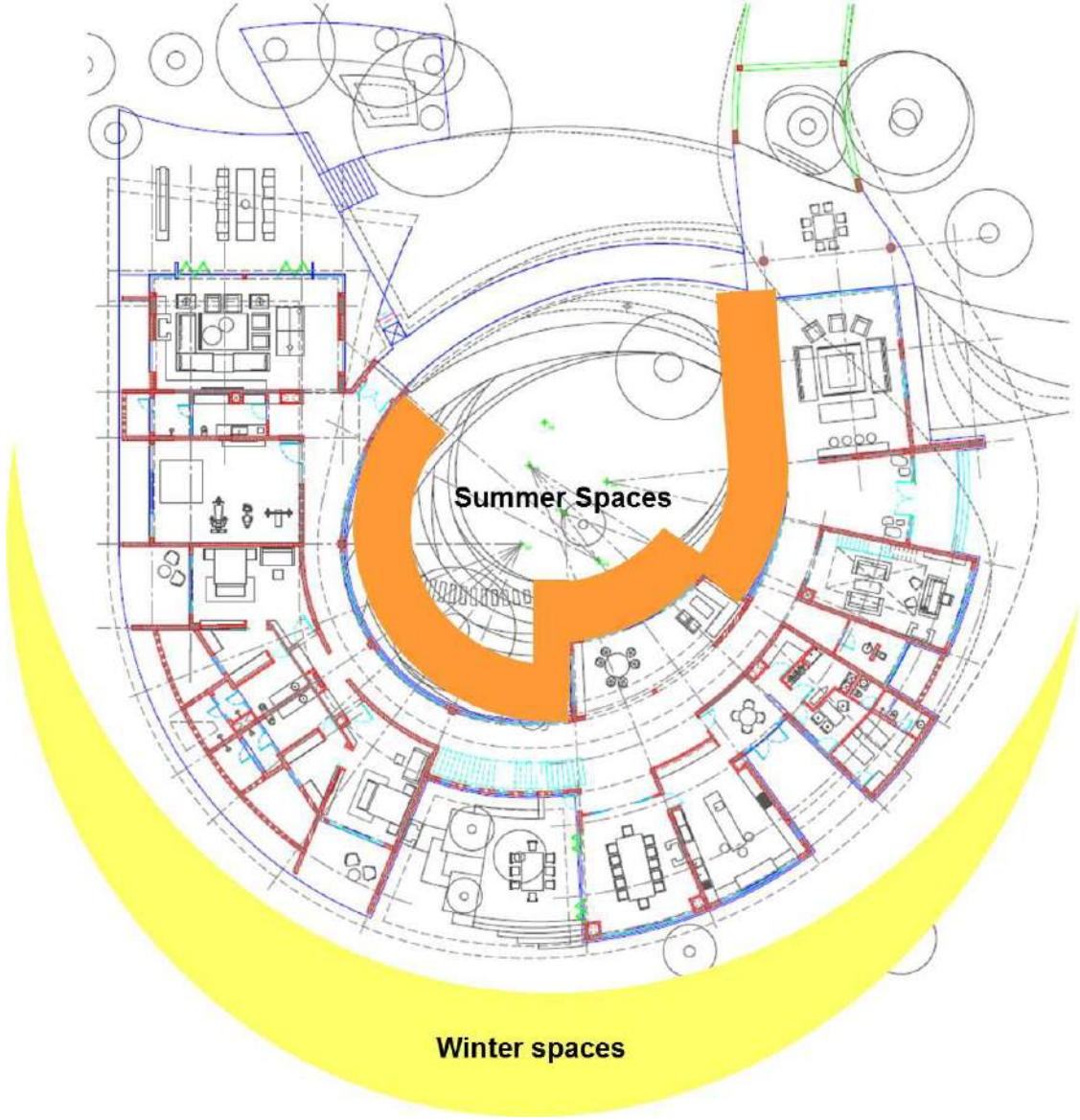
ENVIRONMENTAL DESIGN & STUDY



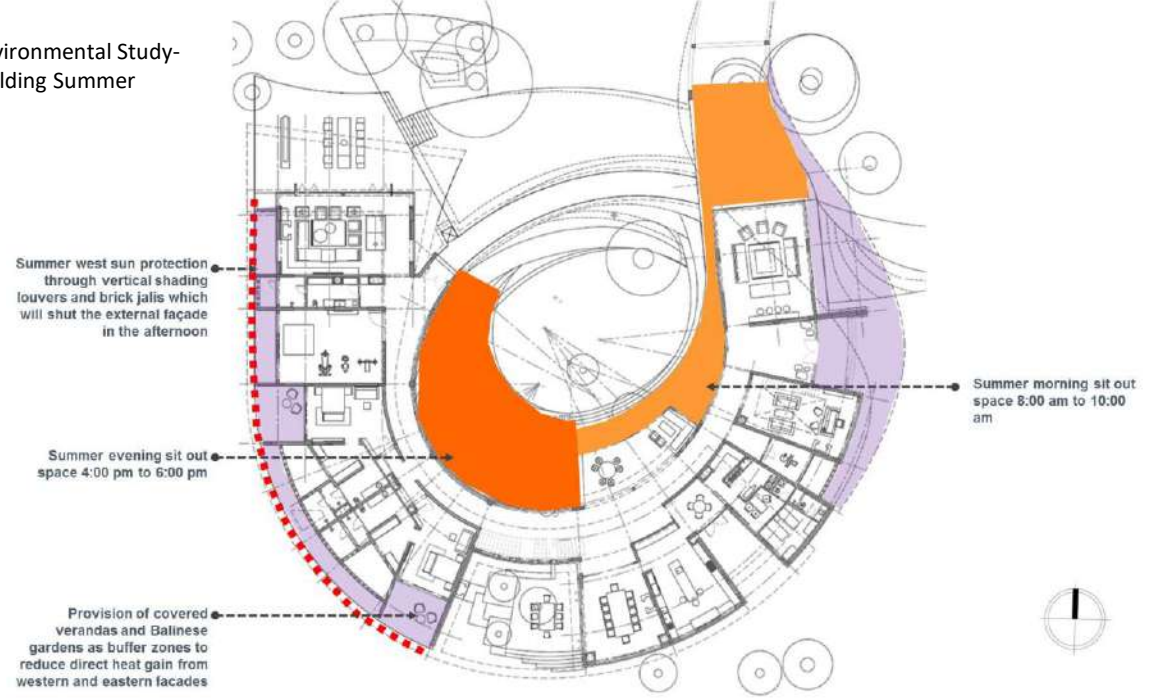
Times of thermal distress



ENVIRONMENTAL DESIGN & STUDY



Environmental Study- Building Summer



Environmental Study- Building Orientation- Winter