

SUSTAINABLE HOUSING APARTMENT FOR TATA WORKERS

A THESIS

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Architecture degree

By

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DEPARTMENT OF ARCHITECTURE
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SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY) Accredited

With Grade “A++” by NAAC

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MAY 2024



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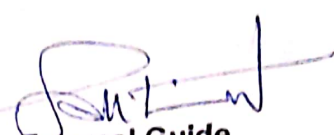
DEPARTMENT OF ARCHITECTURE

BONAFIDE CERTIFICATE

This is to certify that Thesis Report is the bonafide work of **SATHIYAKEERTHI M (39210078)** who carried out the Thesis entitled "**Sustainable housing apartment for tata workers**" under our supervision from December 2023 to May 2024.

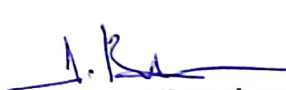

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Submitted for Viva voce Examination held on 23/5/24


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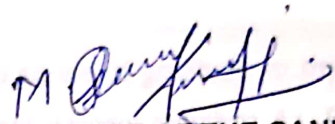

External Examiner

DECLARATION

I, SATHIYAKEERTHI M hereby declare that the Thesis Report entitled "Sustainable housing apartment for tata workers" done by me under the guidance of Ar. Seetha visalakshi (Internal Guide), Ar. Ramesh kumar (Internal Review Member) and Ar. Sakthivel (External Guide) Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Architecture Degree.

DATE: 23/5/24,

PLACE: Chennai


SIGNATURE OF THE CANDIDATE

SATHIYAKEERTHI M

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I am pleased to acknowledge my sincere thanks to Board of Management of **Sathyabama Institute of Science and Technology** for their kind encouragement in doing this Thesis and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr.Devyani Gangopadhay**, Dean and Head of the Department, School of Building and Environment, Our Design Chair **Ar. Sarath C Kanth**, Thesis Coordinator **Ar. Gopiraj** for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Thesis Internal guide **Ar. Seetha visalakshi**, Internal Review member **Ar. Ramesh kumar** and External Guide **Ar. Sakthivel** their guidance, suggestions and constant encouragement which paved the way for the successful completion of my thesis work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the **Department of Architecture**, all my family members and also juniors Dinesh and Anushree helpful in many ways for completion of the Thesis.

SATHIYAKEERTHI M

THESIS SYNOPSIS

Hosur, a burgeoning industrial town in Tamil Nadu, India, has become a critical hub for various manufacturing companies, including Tata. As the industrial sector expands, so does the need for housing solutions that cater to the workers who drive this growth. The traditional housing options often fail to address the critical issues of affordability, environmental sustainability, and social well-being. This thesis proposes the design of a sustainable housing apartment complex for Tata workers in Hosur, integrating innovative architectural practices that respond to local climatic, economic, and social contexts.

The Need for Sustainable Housing

Urbanization and industrialization in Hosur have led to significant environmental stress, including increased energy consumption, waste generation, and resource depletion. The housing sector is a substantial contributor to these challenges. Sustainable housing offers a way to mitigate these impacts by incorporating eco-friendly materials, energy-efficient systems, and water conservation techniques. Furthermore, sustainable housing can enhance the quality of life for residents by providing healthier living environments and reducing long-term costs.

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Scope The Project Will Cover Site Analysis, Design Principles, Sustainability Practices, And Community Integration Strategies for A Housing Complex for Tata Workers in Shoolagiri.

1.2 PROBLEM STATEMENT

- Lack of adequate and affordable housing options for Tata workers in Shoolagiri, Hosur.
- Potential impact on worker productivity, satisfaction, and retention.

1.3 Objectives:

- Design a housing complex that caters to the specific needs and lifestyle of Tata workers.
- Create a sustainable and cost-effective housing solution.
- To design affordable, functional, and aesthetically pleasing housing for Tata workers.
- To create a community-focused environment that promotes well-being and social interaction.

1.4 Scope

The project will cover site analysis, design principles, sustainability practices, and community integration strategies for a housing complex for Tata workers in Shoolagiri.

1.5 Research Methodology:

- Literature review on worker housing, industrial housing typologies, and sustainable design principles.
- Case studies of successful worker housing projects in India and abroad.
- Site analysis of the chosen location in Shoolagiri, Hosur.
- User surveys and interviews with Tata workers to understand their needs and preferences.

1.6 Design Proposal:

The design proposal will consider factors such as:

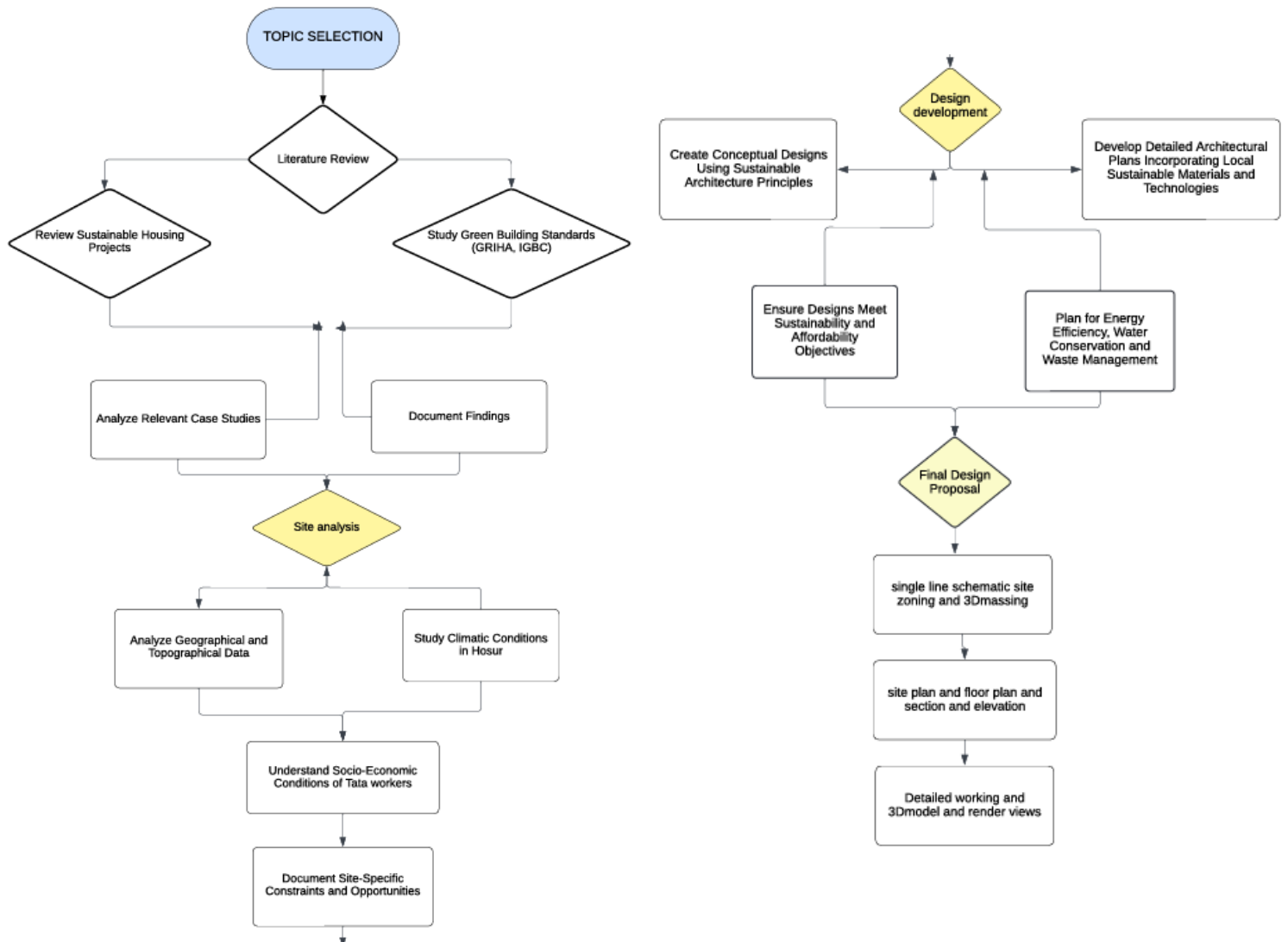
- Unit size and mix: To cater to families and single workers.
- Affordability: To ensure rental or purchase options are accessible to Tata workers.
- Amenities: Provide essential amenities like community spaces, recreation facilities, and childcare (if applicable).
- Sustainability: Integrate elements like rainwater harvesting, energy-efficient design, and waste management.
- Safety and security: Ensure a safe and secure environment for residents.

1.7 Expected Outcome:

This thesis project aims to develop a housing design that improves the living conditions of Tata workers in Shoolagiri, Hosur. The project will contribute to:

- Enhanced worker satisfaction and productivity.
- Reduced employee turnover.
- Creation of a vibrant and sustainable community.

1.8 METHADODOLOGY



CHAPTER 2: SITE ANALYSIS

Geographic location: Shoolagiri, a part of the Hosur taluk in Tamil Nadu.

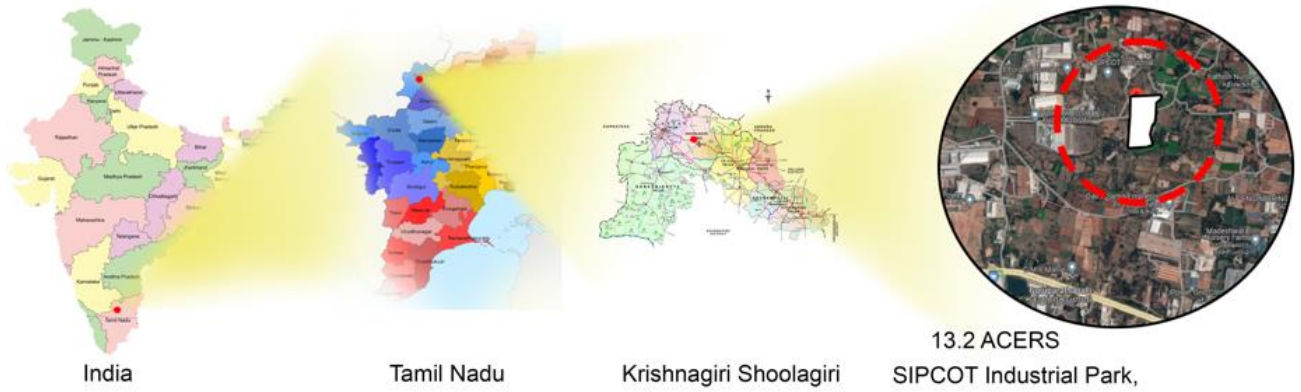


Figure 1 location map

Location	Nallaganakothapalli
Types Of Town	Panchayat Vil;age
District	Krishnagiri
Area	13.2 Acers
Elevation/Altitude	804 Meters Above Sea Level
Typology Of Project	Housing
Main Road	Bangalore - Krishnagiri
Arterial Road	Beriga - Shoolagiri Road
Land Use	Residential Commercia, Educational, Institutional
Climate	Temperature - 10°C - 25°C
Natural Bodies/Terrains	Kelavarapelli River (20km West) Contours 1ft Slop @1-meter Intervals
Near To State Border Line	15 Miles (Proximity To Tamilnadu-karnataka Border Line)
Thrust Area	Sustainable Urban Housing

2.1 ROAD CONNECTIVITY

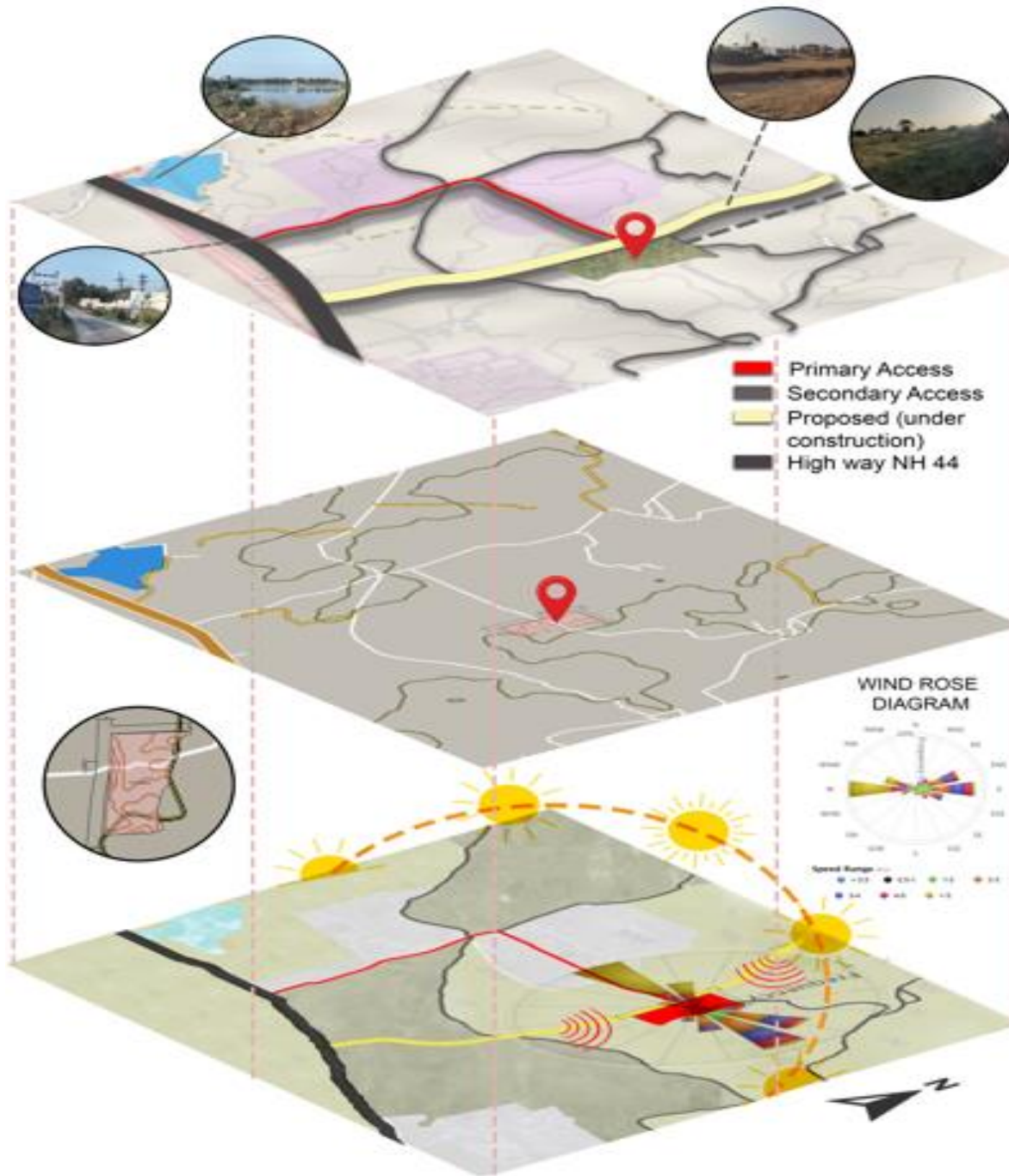


Figure 2 connectivity Map

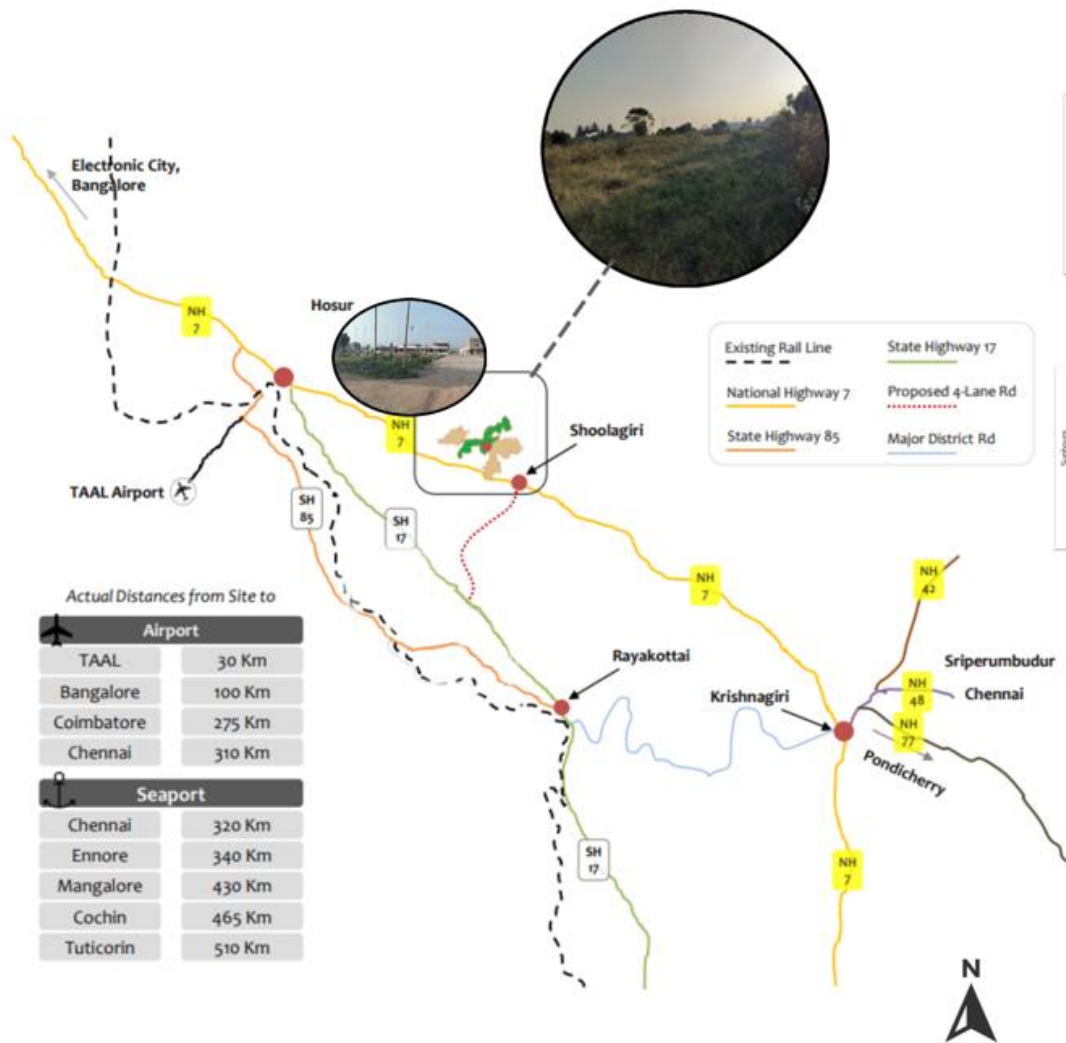


Figure-2 access map

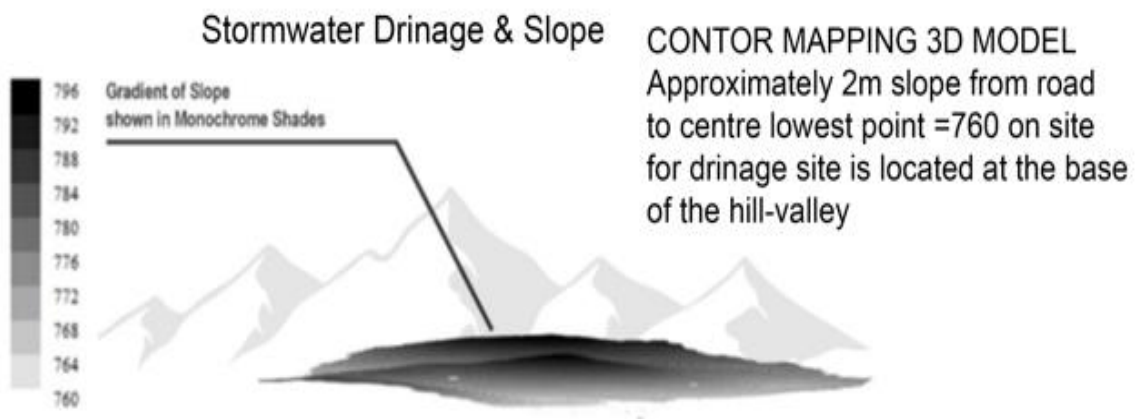
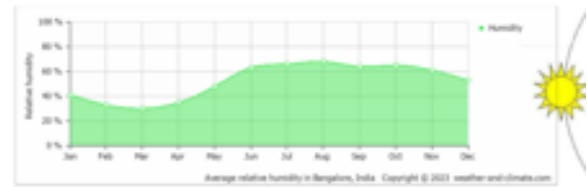
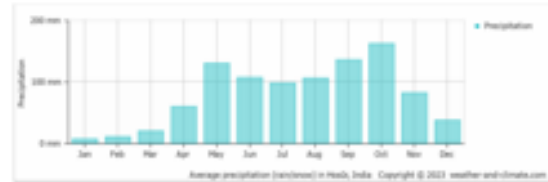
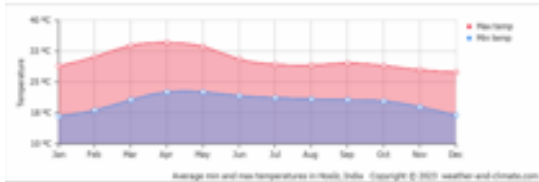


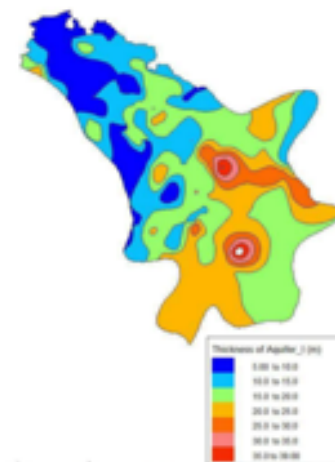
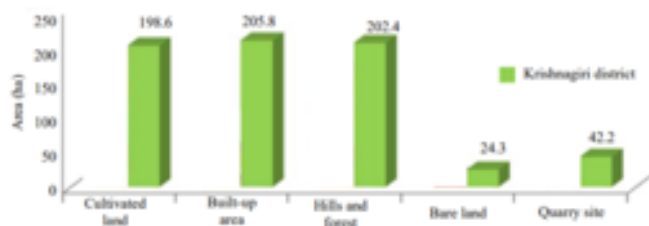
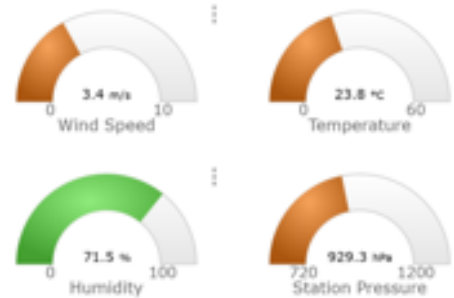
Figure 3 Contour 3d model

2.2 CLIMATIC ANALYSIS

CLIMATIC ANALYSIS



PARAMETER	MIN	MAX	AVG
Wind Speed	N/A	11	3.4
Temperature °C	12.5	35.4	23.8
Dew Point °C	-1	23.9	17.6
Humidity %	11.5	99.6	71.5
Pressure Hpa	922.2	937.6	929.3



2.3 DEMOGRAPHICAL ANALYSIS

POPULATION

Census Parameter	1.Census Data
Total Population	1.9530
Total No of Houses	1.2101
Female Population %	1.49.8 % (4742)
Total Literacy rate %	1.67.2 % (6403)
Female Literacy rate	1.30.7 % (2923)
Working Population %	1.37.8 %
Child(0 -6) Population by 2011	1.1218
Girl Child(0 -6) Population % by 2011	1.50.4 % (614)

Type of User - by Residency (Onsite - Offsite Interaction)

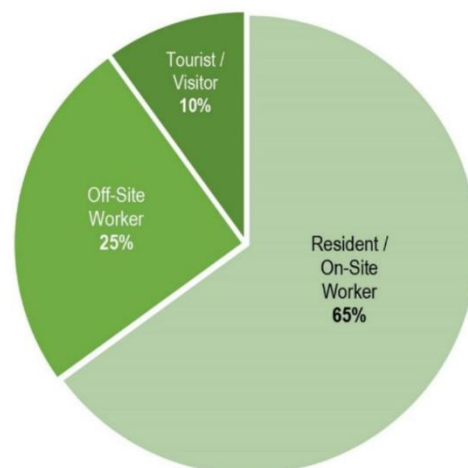


Figure 4 Types of users

CATEGORY OF USERS BY PROFESSION

ENVIRONMENT & BIODIVERSITY

Drinking Water Facilities	1.5 Canned Water (Bisleri from Hosur) 2.Kauvery Water in Sump Tank 3.Bore-350 to 700m (Commonly used)
Flooding, Sewage & Drainage Problems	N/A - Flooding due to rain aids in water procurement
Public Toilet Facilities	None (Needed at least every ½ km) N/A – water goes to waste from household
Reusing Water at Households	N/A - water goes waste from household
Electricity Problems	N/A - no electricity problems
Depth of Ground Water Level at Site	670m GWL @ Site
Procurement of Water for Agriculture?	Bore added, water store in open pond / tank nearby

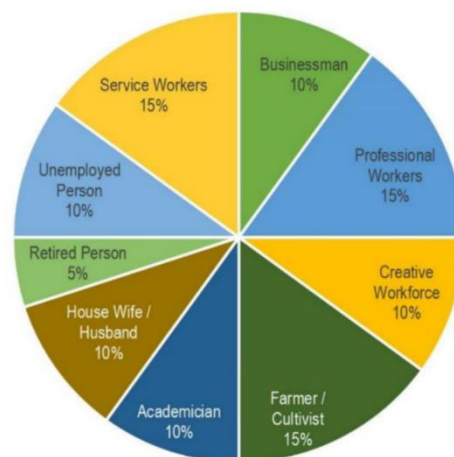


Figure 5 Types of professions

2.4 ECOLOGICAL ANALYSIS

Building Orientation

With Study & Analysis: Recommendations for Building in Krishnagiri

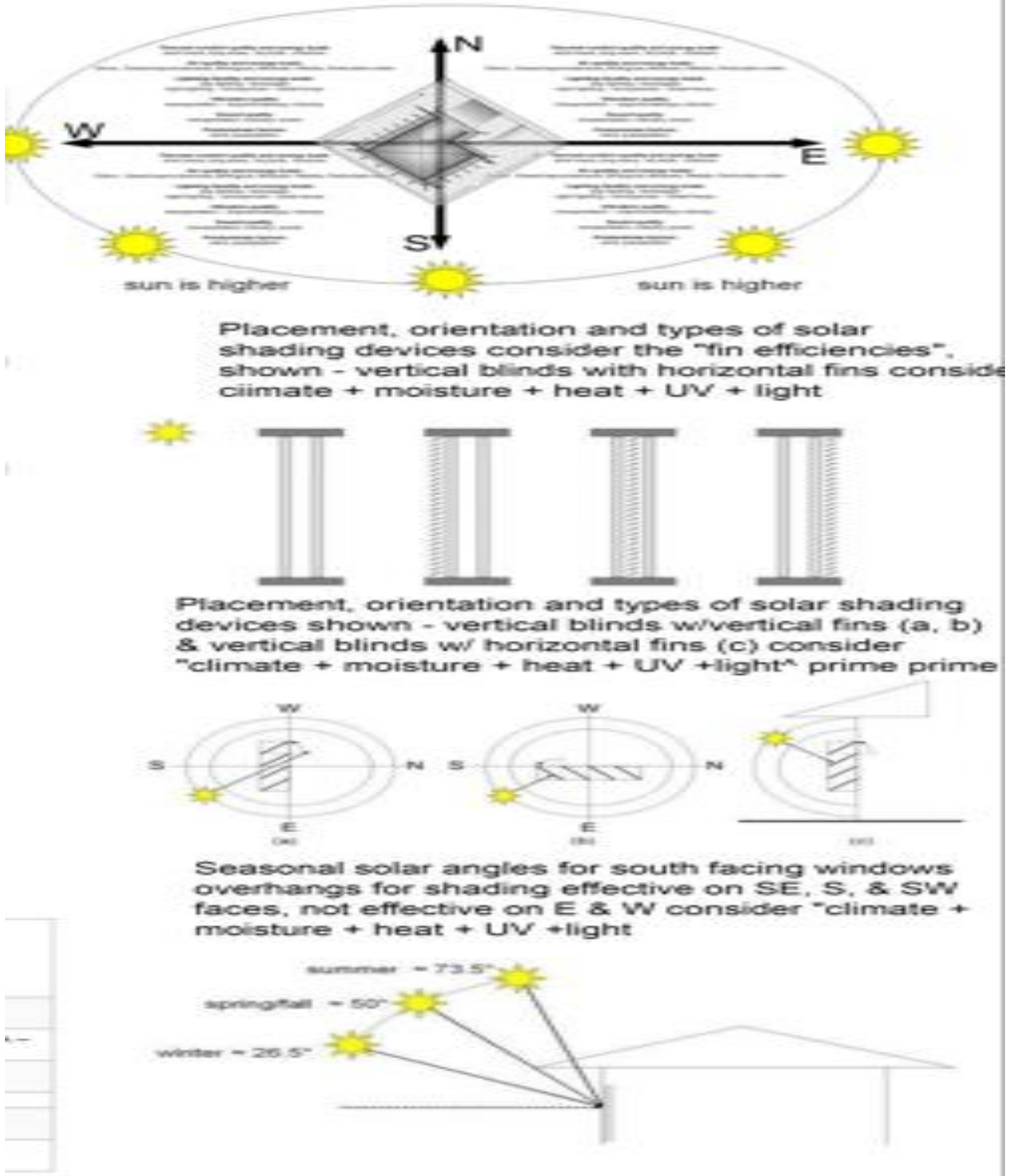
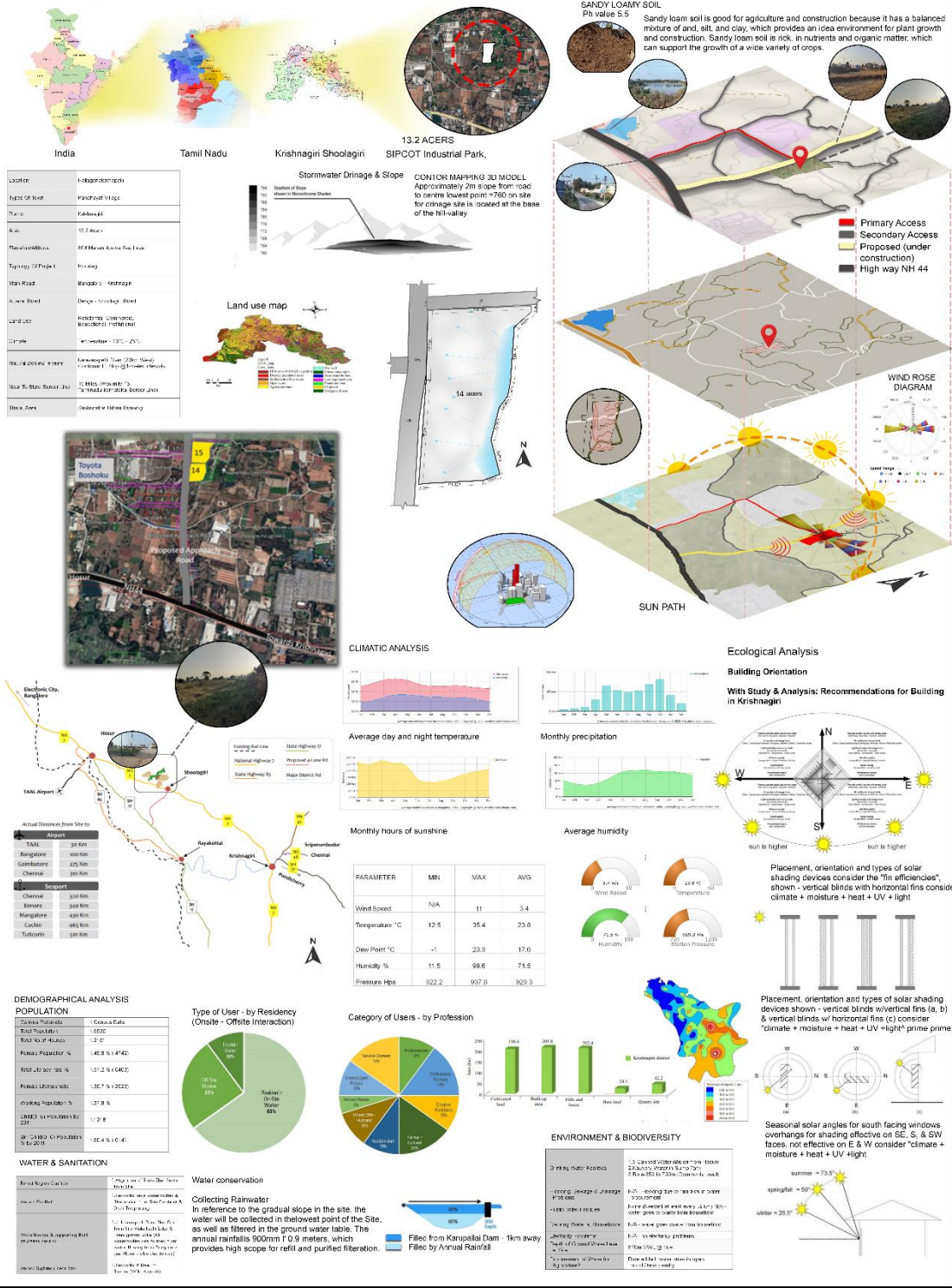
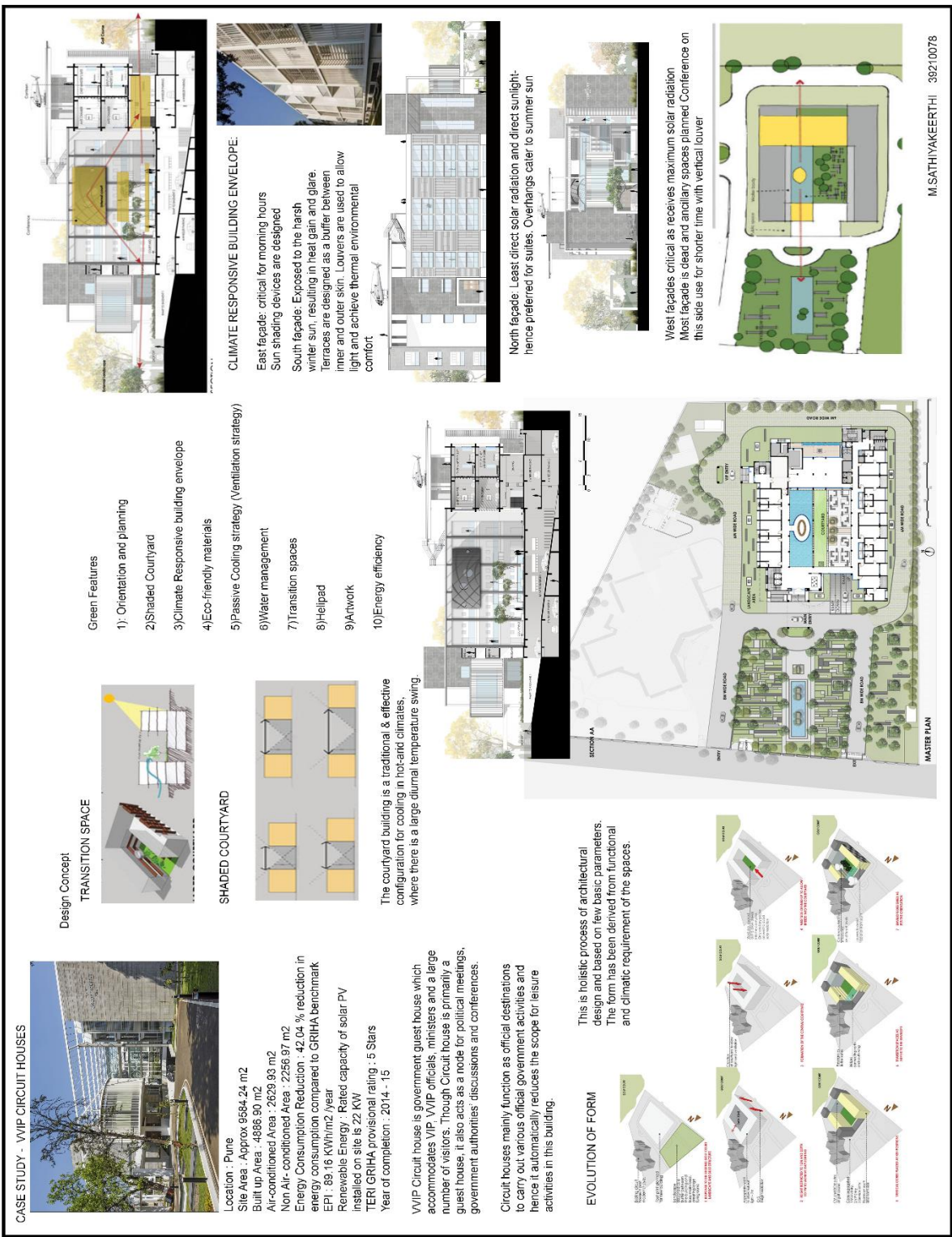


Figure 6 Ecological Analysis According To The Particular Location

산악 탐구회



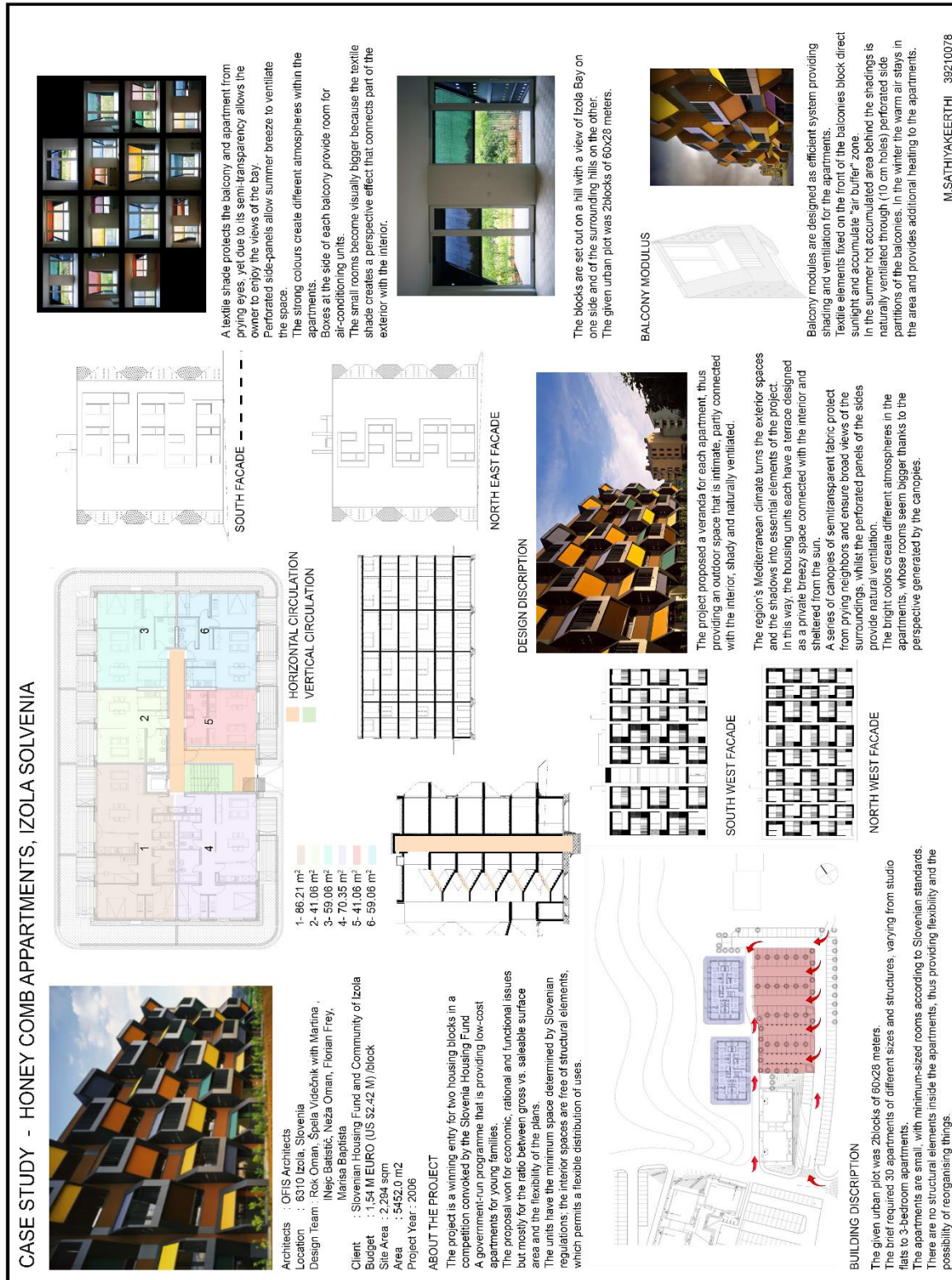
3.2 VVIP CIRCUIT HOUSE



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plate 3 VVIP circuit house -pune

3.3 HONEY COMB APARTMENTS



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plate 4 Honey comb apartments ,Izola Slovenia

3.4 SOCIAL COMPLEX IN ALCABIDECHE PORTUGAL SOCIAL HOSUING

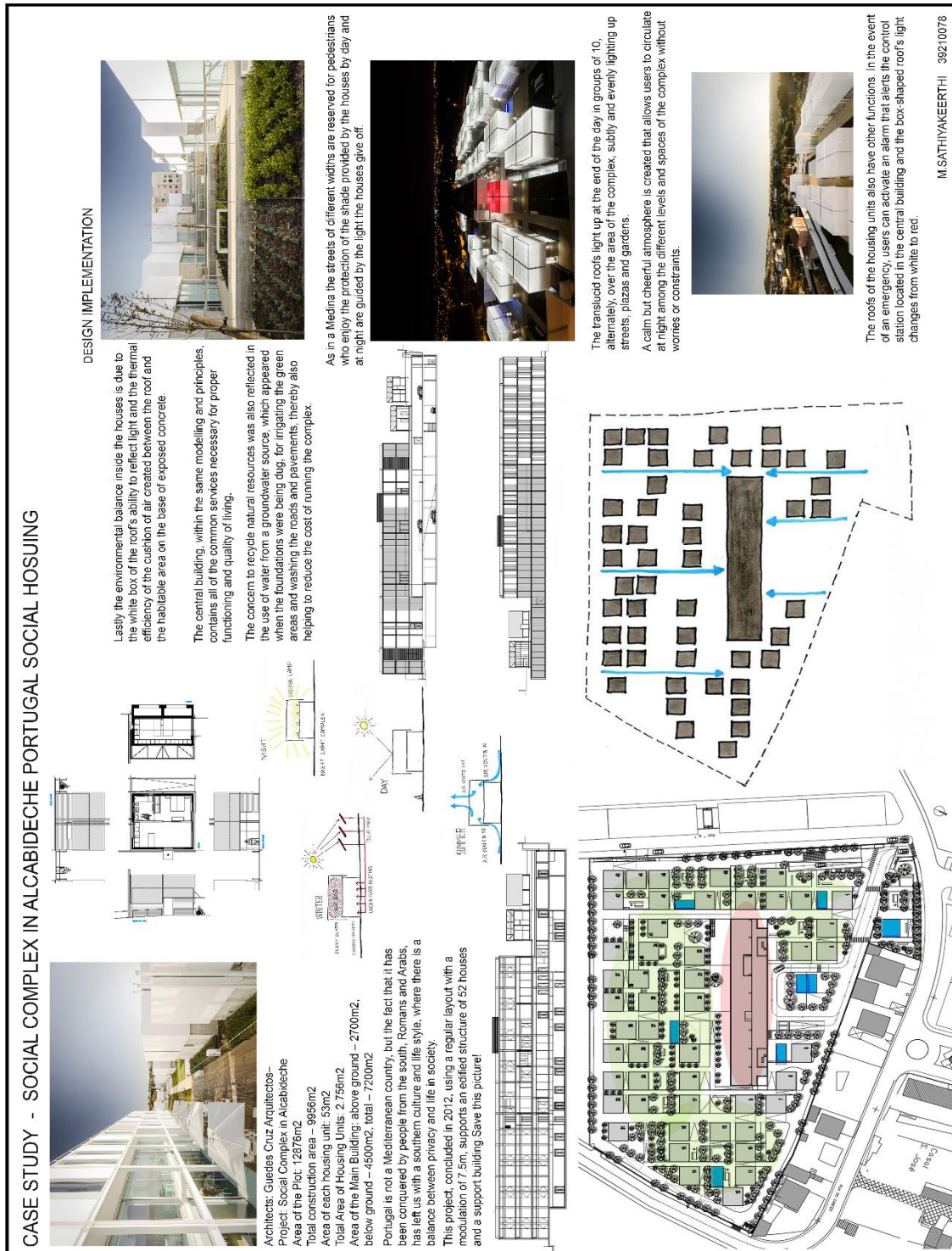


plate 5 Social Complex in Alcabideche Portugal Social Housing

3.5 COMPARATIVE ANALYSIS

SATHYASAMA INSTITUTE OF SCIENCE AND TECHNOLOGY						
Department of architecture						
Thesis 2019-2024						
S no	Parameters	Live case study		Live case study		Inference
		HONEY COMB APARTMENTS, IZOLA SOLVE-NIA	SOCIAL COMPLEX IN ALCABIDECHÉ PORTUGAL SOCIAL HOUSING	URBAN OASIS - GATED COMMUNITY LIVING AHMADABAD	VVIP CIRCUIT HOUSES - PUNE	
1	Location					NA
2	Architect	OFIS Architects	Guadex Cruz Arquitectos	Snehal Suthar, Bhadril Suthar	Sunil Patil And Associates	NA
3	site context	Urban area	Urban area	The urban area is bit far from the site the site surrounding in green land	core of cantonment area of Pune. The site has existing buildings	NA
4	Site area	5452 sqm	9956m2	209422 ft²	10640 m²	NA
5	Purpose	low-cost apartments for young families.	senior housing project	integrate social housing into the urban fabric	Accommodation - Guest suites, Public areas -Conference and meeting hall facilities, Dining, Reception, VIP and visitor's waiting areas etc.	common housing type has been gathered
6	Built up	2,294 sqm	12876m2	76440.23 ft²	4886.90 m2	NA
7	concept					the concept should stick to the environment
8	Massing					the facade should be implemented according to climatic condition
9	Site zoning					the buildings should be placed with site context
10	Entry	2 entrances main entrance	1 main entrance and 2 service entrance	1 Pedestrian entry , 1 vehicular entry	1 Main entrance and 1 Vip entrance	2 entries are preferred with 1 service entry
11	Vision	it was for the most part due to its handling of the economic, rational and functional issues, its ratio between gross vs. saleable surface area and the flexibility of its plans.	high quality in terms of construction and landscape, which aims to help to fill a gap in the elderly support system.	To connect with the earth, sky, water, and nature. It is designed with organic, natural elements that appeals to our senses and tendency to find comfort and inspiration to the natural settings. Architecture space fully integrated living plants and greenery composed with organic materials. Fresh air and warm sunlight.	climate responsive architecture with passive strategies for thermal and visual comfort along with innovative active strategies to achieve energy efficient green building.	The design approach also indicates a commitment to climate-responsive architecture, incorporating both passive and active strategies to enhance thermal and visual comfort while striving for energy-efficient green buildings.
12	Circulation					The circulation should be easily accessible and the people should easily identify the spaces
13	Ideology	it was for the most part due to its handling of the economic, rational and functional issues, its ratio between gross vs. saleable surface area and the flexibility of its plans.	high quality in terms of construction and landscape, which aims to help to fill a gap in the elderly support system.	The imminent need to build homes to reduce carbon footprint. To design an energy-efficient building. The approach was to have living spaces organized and planned to facilitate multi-family needs and restricting public and private spaces. The incredible journey to a residential studio and a studio.	The contemporary architecture of this building has been derived from vernacular ethos. The shaded courtyard, which is the focal point of the building and passage around it leading to suites, is a highly contemporary version of the 'old chowk' of traditional Wadas of Pune with interiors and landscape seamlessly merging with architecture.	high quality, and sustainability. It caters to the elderly, focuses on energy efficiency, and accommodates multi-family living. The design seamlessly blends contemporary and traditional elements, creating a harmonious and sustainable residential space in nature.
14	Parking					providing designated spaces for vehicles near living areas, incorporating efficient layouts and possibly integrating green design elements.
15	Landscaping	minimum landscaping used in the site with trees and seating areas				harmonize with nature, incorporating greenery, organic elements, and open spaces, aesthetics, creating a visually appealing and serene environment, well-being of residents, p
16	Material	Traditional construction material earthy materials brick, rcc	frosted Pileglass roof reinforced concrete metal truss structure	concrete, Stonecrete, aluminum powder-coated louvers, glass	AAC blocks, plaster of paris, Recycled ceramic tiles, reinforced concrete and masonry mortar is up to 35%	rcc and brick makes more raw finish on the exteriors
17	Awards	winning entry for two housing blocks in a competition convoked by the Slovenia	NA	Igbc (Indian Green Building Council) Gujarat 5 First Platinum Rating 2015	The project has received GRHA Five star rating.	prioritize eco-friendly options that reduce environmental impact, and reduced ecological footprint.

plate 6 Comparative analysis

CHAPTER 4: DATA COLLECTION

4.1 STANDARDS

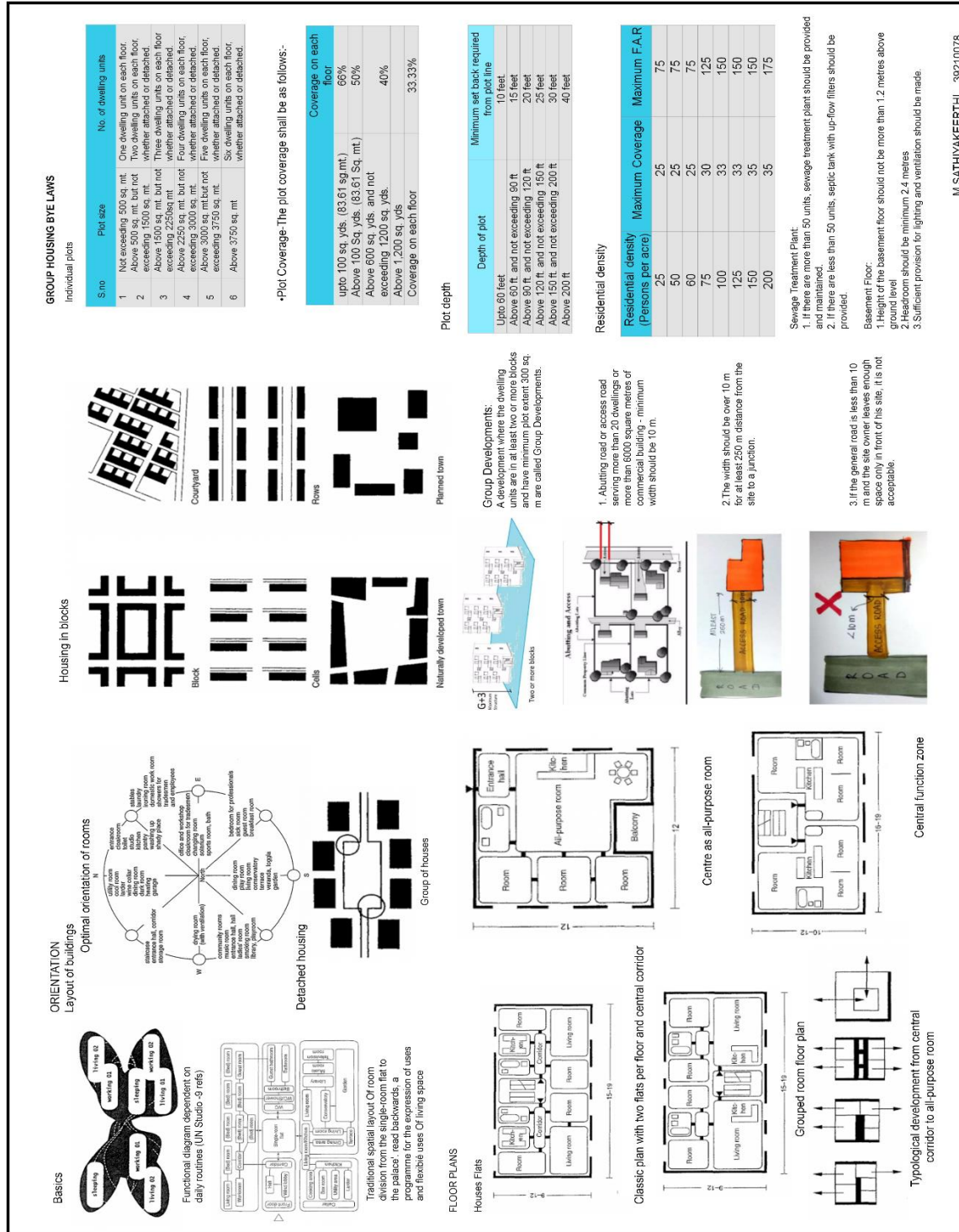


plate 7 Standards

CHAPTER 5: ARCHITECTURAL DESIGN

5.1 AREA STATEMENT

S.No	Description	Area in Sq.m
1	Total site area	54,506.00
2	Road width	36m
3	Fsi for the particular location	3.25
4	Total built up area	1,77,144.50
5	osr	5,449.00
6	PLOT AREA	49,506.00

Floor wise Breakup									
S.No	Block Name	No of Typical Blocks	Carpet Area of Single Dwelling unit	No of Dwelling unit	Total Area of Cluster Unit	Total area on FSI (floor wise)	No of floors	Total area on FSI (Block wise)	NO OF DWELLING UNITS
1	1	2	60	4	317	240	10	3170	80
	1	2	52	6	449	312	10	4490	120
	1	2	62	4	313	248	10	3130	80
	1	4	50	4	246	200	10	2460	160
2	2.1.1	2	94	7	895	658	6	5370	84
	2.1.2	2	94	5	895	470	1	895	10
	2.1.3	2	94	4	677	376	1	677	8
	2.1.4	2	94	4	506	376	2	1012	16
	2	2	96	4	506	384	10	5060	80
	2	2	96	4	506	384	8	4048	64
						0			
3	3.1	3	148	3	645	444	6	3870	54
	3.1.2	3	148	2	645	296	1	645	6
	3.1.3	3	148	1	457	148	1	457	3
	3.1.4	3	148	1	250	148	2	500	6
	3	2	145	2	407	290	10	4070	40
4	Club House	1			2000		2	4000	0
5	services	2			2000			2000	0
	TOTAL BUILDUP AREA								811

FSI = $\frac{\text{TOTAL BUILT UP AREA}}{\text{TOTAL PLOT AREA}} = \frac{92100}{49056} = 1.97$	45% ground coverage
--	---------------------

Figure 7 Area requirements

5.2 CONCEPT

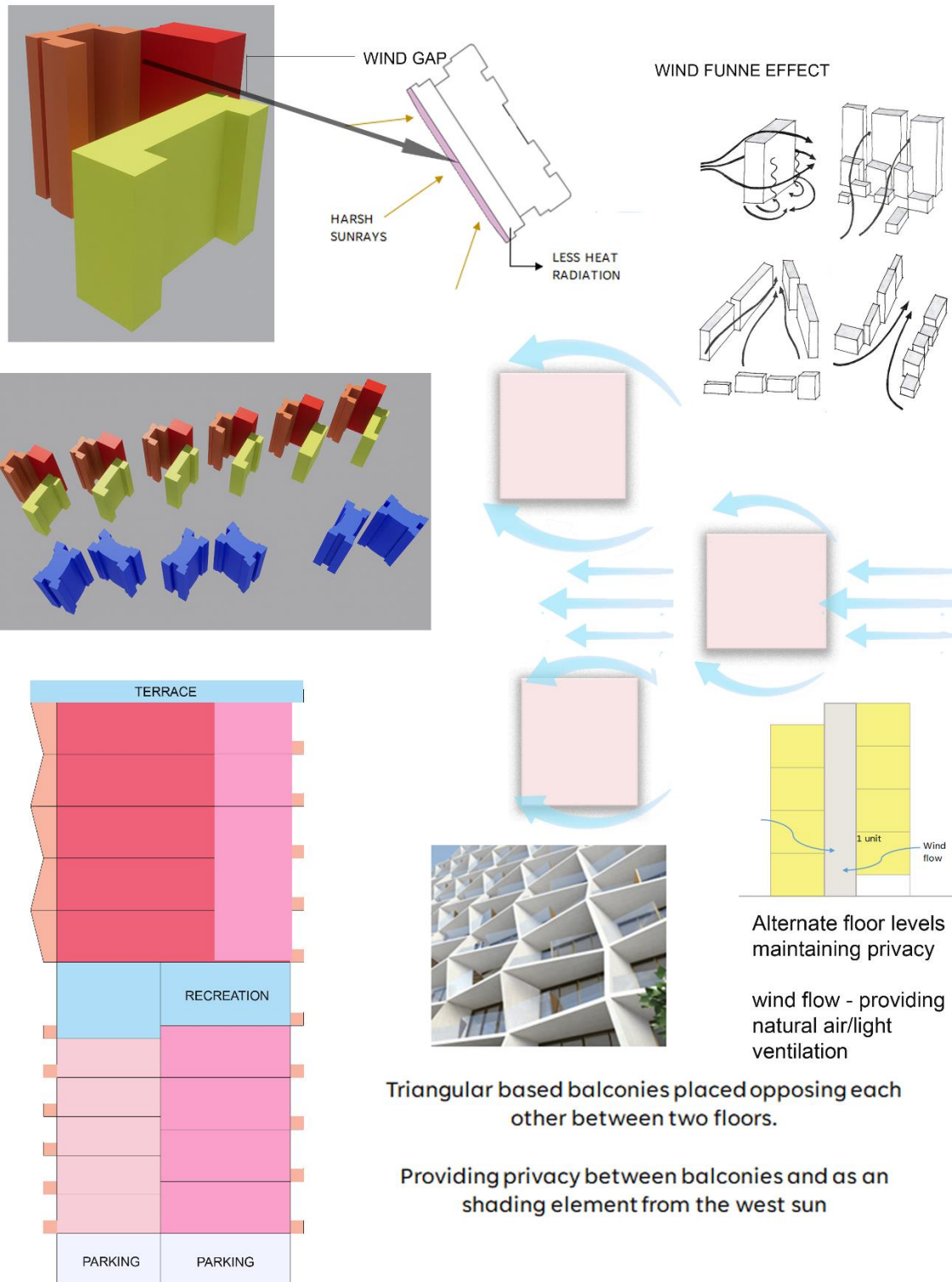


plate 8 concept development

5.3 SITE PLAN

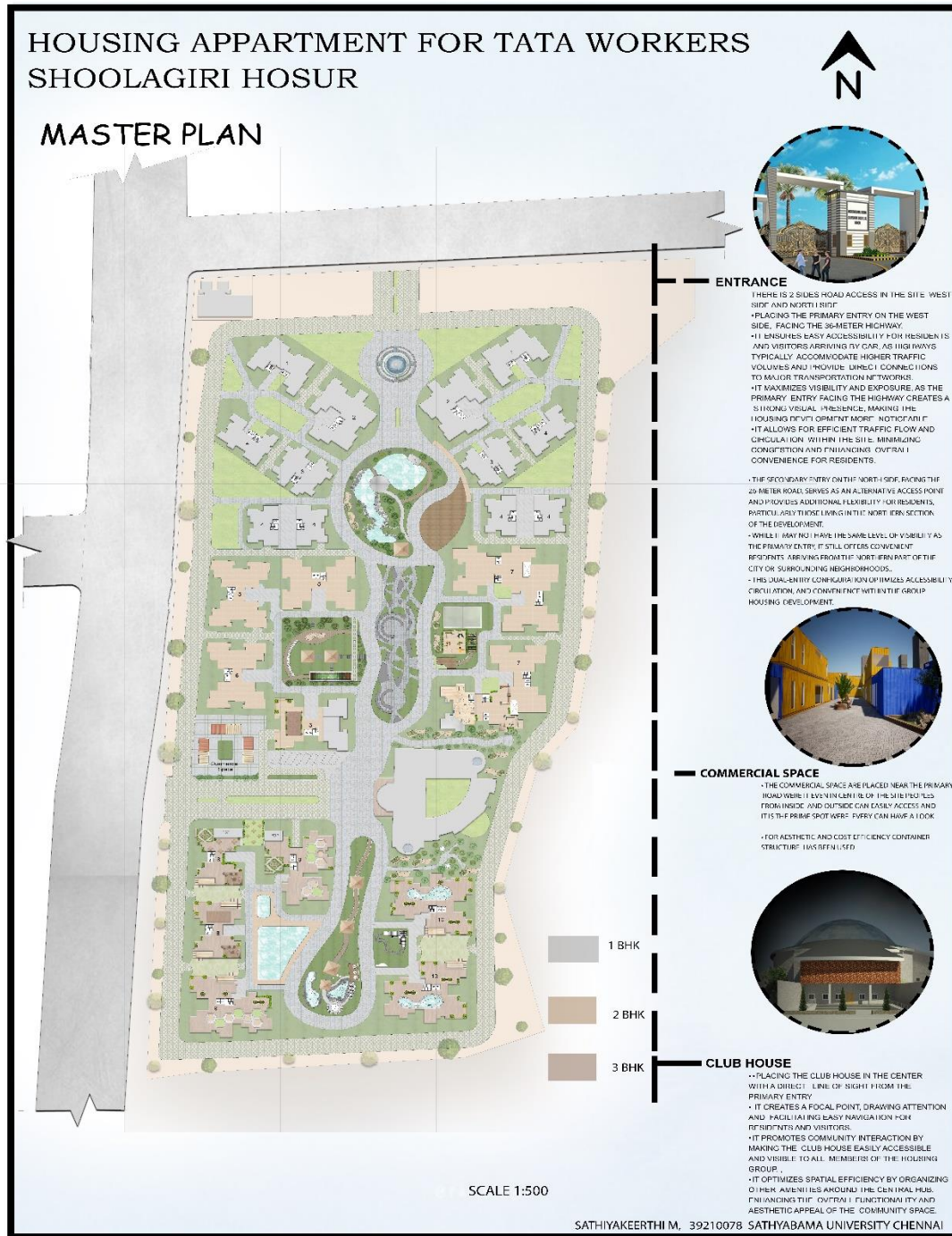


plate 9 Site plan

The image displays four schematic diagrams of anaerobic wastewater treatment systems:

- 1. Settler:** A cross-section of a tank with a floating cover at the top. Sewage enters from the left, passes through a baffle, and then through a layer of sludge at the bottom. An overflow pipe is on the right. Labels include 'Sewage inlet', 'Baffle', 'Sludge', and 'Overflow'.
- 2. Anaerobic Baffled Reactor:** A series of three rectangular tanks connected in series. Each tank has a floating cover and a baffle. Sewage enters the first tank, moves through a baffle to the second, and then to the third. An overflow pipe is on the right. Labels include 'Sewage inlet', 'Baffle', 'Sludge', and 'Overflow'.
- 3. Anaerobic Filter:** A cross-section of a tank with a floating cover. Sewage enters from the left and passes through a layer of sludge at the bottom. An overflow pipe is on the right. Labels include 'Sewage inlet', 'Sludge', and 'Overflow'.
- 4. Planted Gravel Filter:** A cross-section of a tank with a floating cover. Sewage enters from the left and passes through a layer of gravel at the bottom. An overflow pipe is on the right. Labels include 'Sewage inlet', 'Gravel', and 'Overflow'.



Grasscrete

No extra-slip grass cover for structural integrity

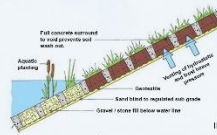
Load Load

Sub base distributors do reinforcement

- ## THE SELF DRAINING SURFACE



THE NATURAL REVETMENT SYSTEM



IN ARCHITECTURAL TERMS, THIS APPROACH EXEMPLIFIES A HOLISTIC DESIGN PHILOSOPHY THAT CONSIDERS THE INTERPLAY BETWEEN THE BUILT ENVIRONMENT AND THE NATURAL LANDSCAPE, ULTIMATELY ENHANCING THE OVERALL QUALITY OF LIFE FOR OCCUPANTS WHILE CONTRIBUTING TO THE SUSTAINABILITY AND RESILIENCE OF THE DEVELOPMENT.

THESE BUFFER SPACES CAN ACT AS TRANSITIONAL ZONES BETWEEN THE INTERIOR AND EXTERIOR, PROVIDING OPPORTUNITIES FOR NATURAL VENTILATION AND DAYLIGHTING WHILE MAINTAINING PRIVACY AND VISUAL CONNECTION WITH THE OUTDOORS. OVERALL, INTEGRATING SUCH DESIGN ELEMENTS



5.4 -1 BHK CLUSTER UNIT 1 - 2

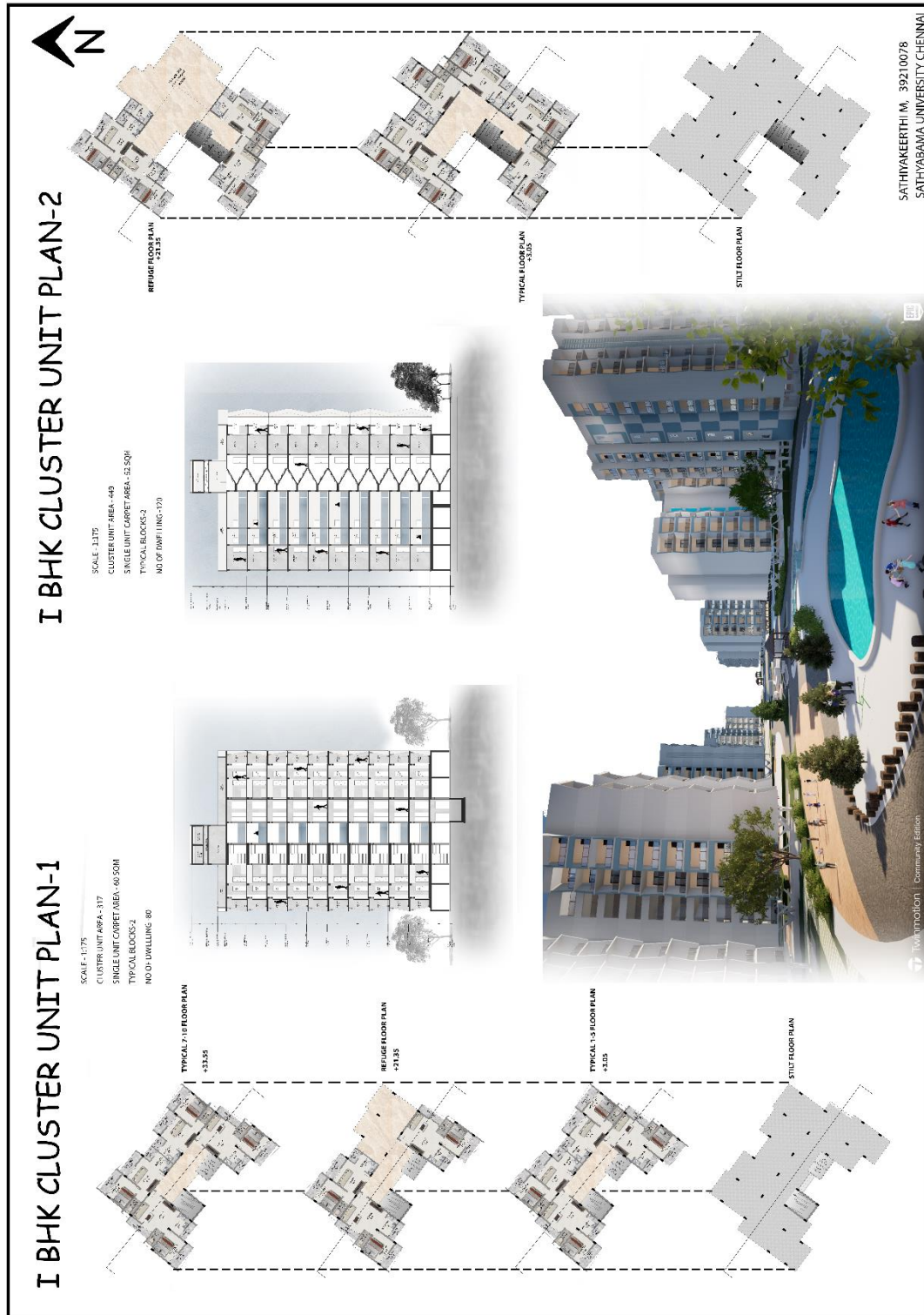


plate 11 1BHK block 1 and 2

5.5 -1 BHK CLUSTER UNIT 3 - 4

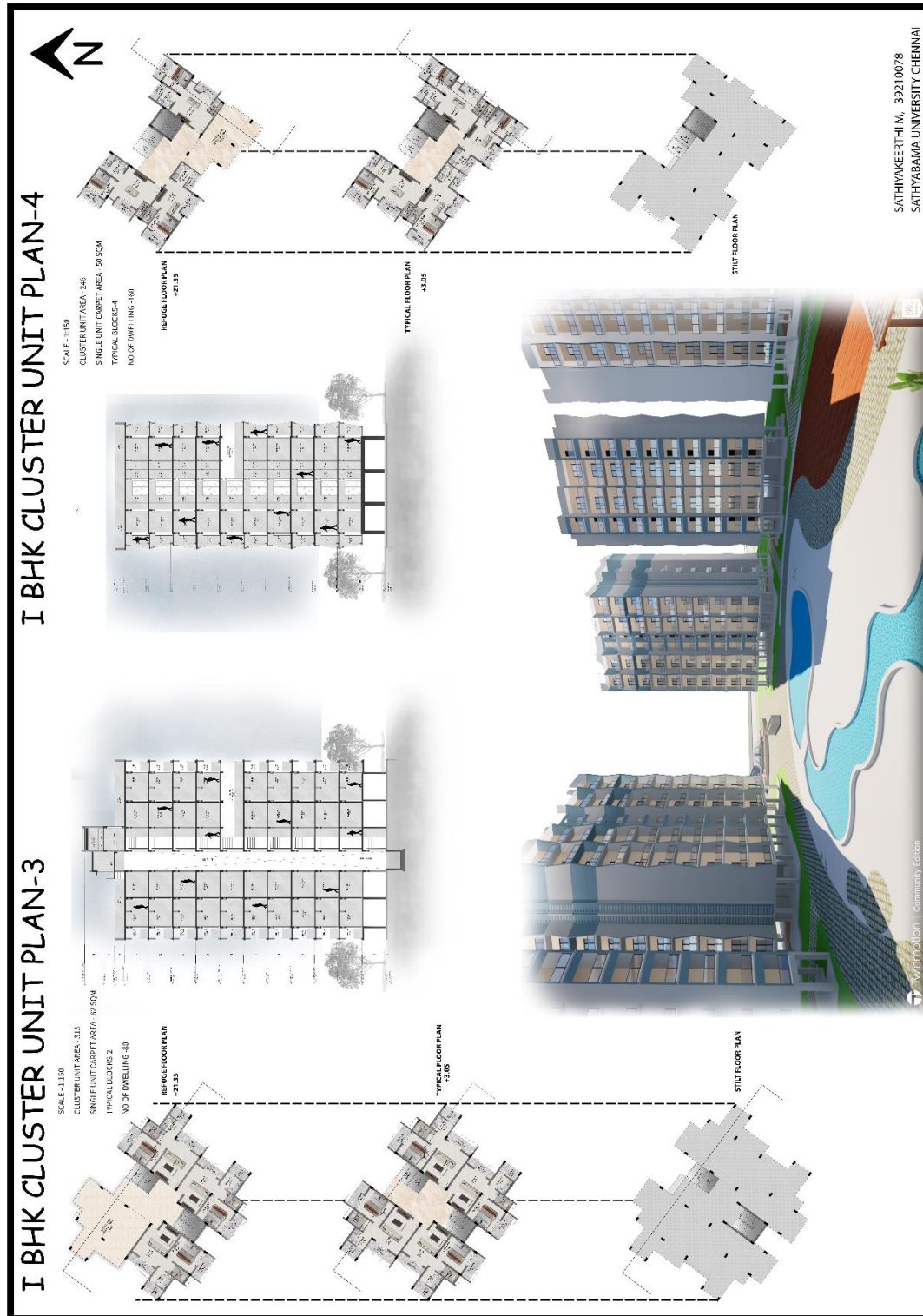


plate 12 1BHK block 3 and 4

5.6 -2 BHK CLUSTER UNIT-1



plate 13 2 BHK Cluster Unit -1

5.7 -2 BHK AND 3 BHK CLUSTER UNIT-1

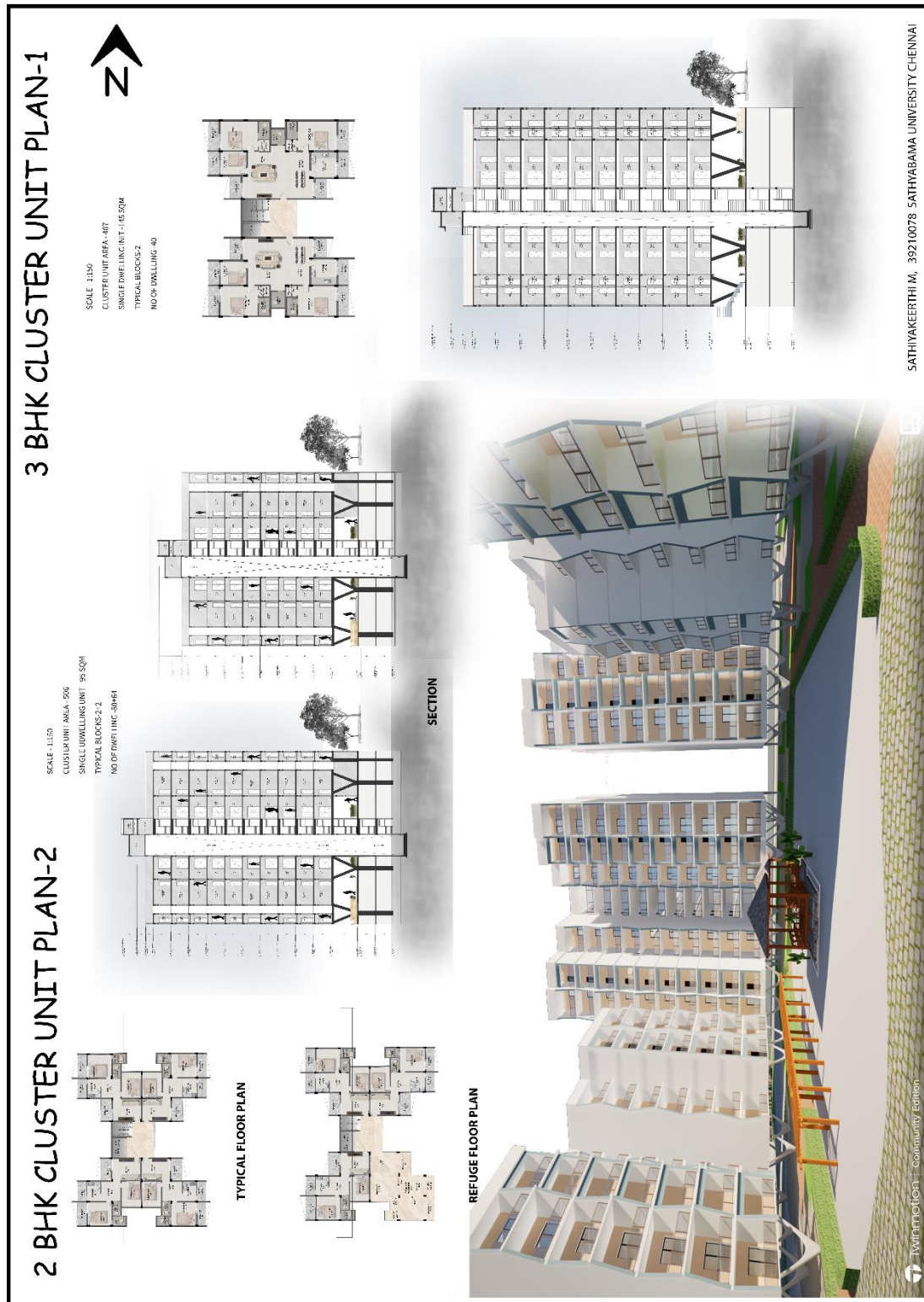


plate 14 2 and 3 bhk cluster unit

5.8 -3 BHK CLUSTER UNIT



plate 15 3bhk cluster unit

CHAPTER 6: REFERENCE

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