

**TO IDENTIFY THE IMPLEMENTATION OF PASSIVE DESIGN STRATEGIES  
EMPLOYED IN CHETTINAD ARCHITECTURE CAN BE INCORPORATED TO  
MODERN BUILDINGS.**

**A DISSERTATION**

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

By

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**SATHYABAMA  
INSTITUTE OF SCIENCE AND TECHNOLOGY (DEEMED TO BE UNIVERSITY)  
Accredited with Grade "A++" by NAAC | 12B Status by UGC | Approved by  
AICTE**

**JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119**

**NOV - 2023**



# SATHYABAMA

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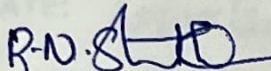
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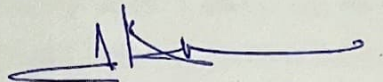
## DEPARTMENT OF ARCHITECTURE

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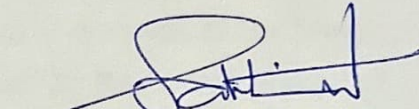
This is to certify that Thesis Report is the bonafide work of **M. Shyam Ganesh (39210085)** who carried out the Thesis entitled "**Rethinking government school**" under our supervision from December 2023 to May 2024.

  
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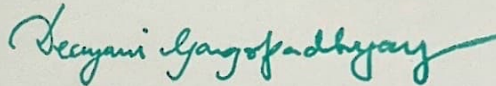
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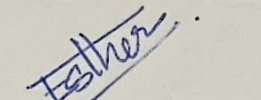
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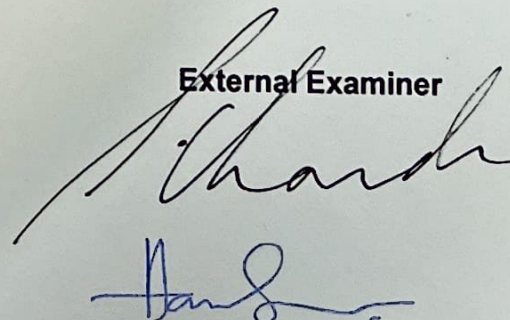


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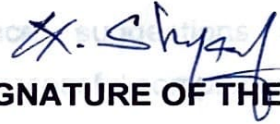
  
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## DECLARATION

I, **M SHYAM GANESH** hereby declare that the Thesis Report entitled "Rethinking of government school" done by me under the guidance of **Ar.shruthi** (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: 20/05/24.

PLACE: Chennai

  
SIGNATURE OF THE CANDIDATE

## **ACKNOWLEDGEMENT**

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 project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. Devyani Gangopadhyay**, Dean and Head of the Department, School of Building and Environment, Dept. of Architecture 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 Project Guide **Ar. Kavitha** for her valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the Department of Architecture who were helpful in many ways for the completion of the project.

**M.SHYAM GANESH**

## THESIS SYNOPSIS

This research delves into the social, cultural, and environmental context of Tamil Nadu, understanding the unique needs and aspirations of students and educators. By rethinking the design principles of government schools, this thesis aims to create spaces that are not only functional but also inspire creativity, collaboration, and a love for learning.

In an era where educational paradigms are shifting towards inclusivity, eco-friendly, and adaptability, it becomes imperative to reimagine the architectural framework of government schools. This thesis aims to explore innovative design solutions that can enhance the educational environment, promote holistic learning, and accommodate the diverse cultural and geographical context of Tamil Nadu.

By integrating modern architectural principles with traditional values, this research seeks to create school environments that are not only functional and efficient but also inspiring and nurturing. The goal is to develop prototypes for school buildings that can serve as models for future developments, ensuring that every student has access to an environment conducive to learning and growth.

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# 1. Chapter- Introduction

This research delves into the social, cultural, and environmental context of Tamil Nadu, understanding the unique needs and aspirations of students and educators. By rethinking the design principles of government schools, this thesis aims to create spaces that are not only functional but also inspire creativity, collaboration, and a love for learning.

In an era where educational paradigms are shifting towards inclusivity, eco-friendly, and adaptability, it becomes imperative to reimagine the architectural framework of government schools. This thesis aims to explore innovative design solutions that can enhance the educational environment, promote holistic learning, and accommodate the diverse cultural and geographical context of Tamil Nadu.

By integrating modern architectural principles with traditional values, this research seeks to create school environments that are not only functional and efficient but also inspiring and nurturing. The goal is to develop prototypes for school buildings that can serve as models for future developments, ensuring that every student has access to an environment conducive to learning and growth.

This thesis will delve into various aspects such as spatial planning, eco friendly construction practices, incorporation of digital technologies, and community involvement in the design process. Through a comprehensive analysis of existing schools and the exploration of successful educational spaces globally, this study will propose a new architectural paradigm that aligns with the aspirations of Tamil Nadu's educational policy and its vision for the future.

Ultimately, rethinking government schools is not merely about constructing new buildings; it is about building a better future for the next generation.

## **1.1. AIM**

The primary aim of this architectural thesis is to develop innovative and contextually appropriate design solutions for government schools in Tamil Nadu that enhance the quality of education and promote holistic development. This involves rethinking existing school infrastructure to create learning environments that are eco-friendly, adaptable, and conducive to the diverse needs of students and educators in the region.

## **1.2. OBJECTIVE**

Overview of the current state of government schools in tamil nadu.

- Identify the issues faced by the students and teachers.
- Study passive design strategies and the partial inclusive design strategies.
- To analyze the ways to achieve passive design strategies in a school building and creating a beneficial learning environment.

## **1.3. NEED OF THE PROJECT**

Current infrastructure in many government schools in Tamil Nadu is inadequate, with poor ventilation, lighting, and thermal comfort. Research shows that better physical environments can significantly improve student concentration, performance, and overall academic success

Though initial construction costs might be higher, passive design leads to lower operational costs over the building's lifespan. Savings on energy bills can be redirected towards educational resources and programs.

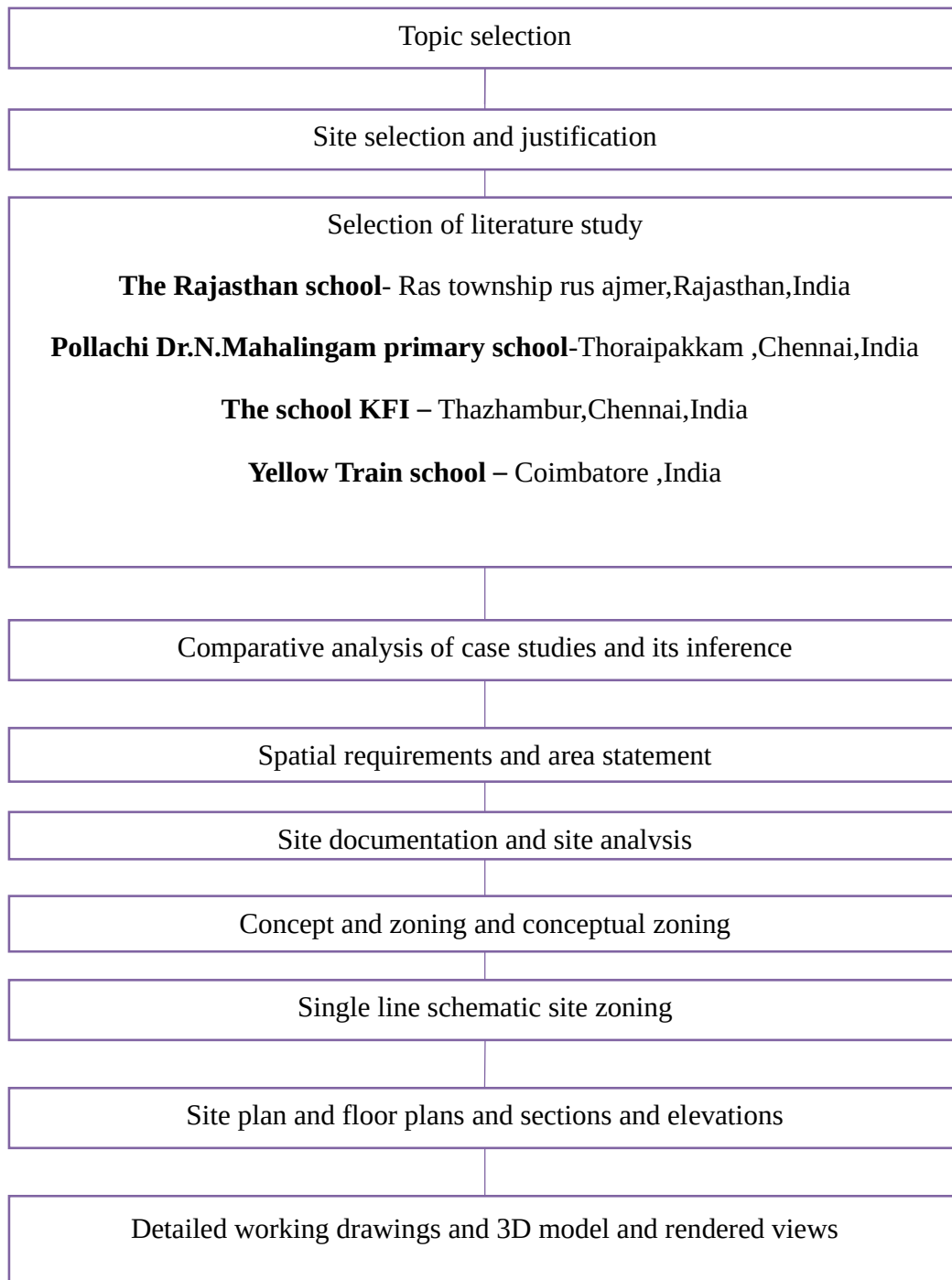
## **1.4. OUTLINE OF PROJECT**

- Brief Overview of the challenges faced by rural schools in providing adequate learning environments.
- The need for integrating passive design strategies to address comfortable and eco friendly.
- The potential impact improved school design on educational outcomes and community well being.

## **1.5. CONTEXT AND PROBLEM STATEMENT**

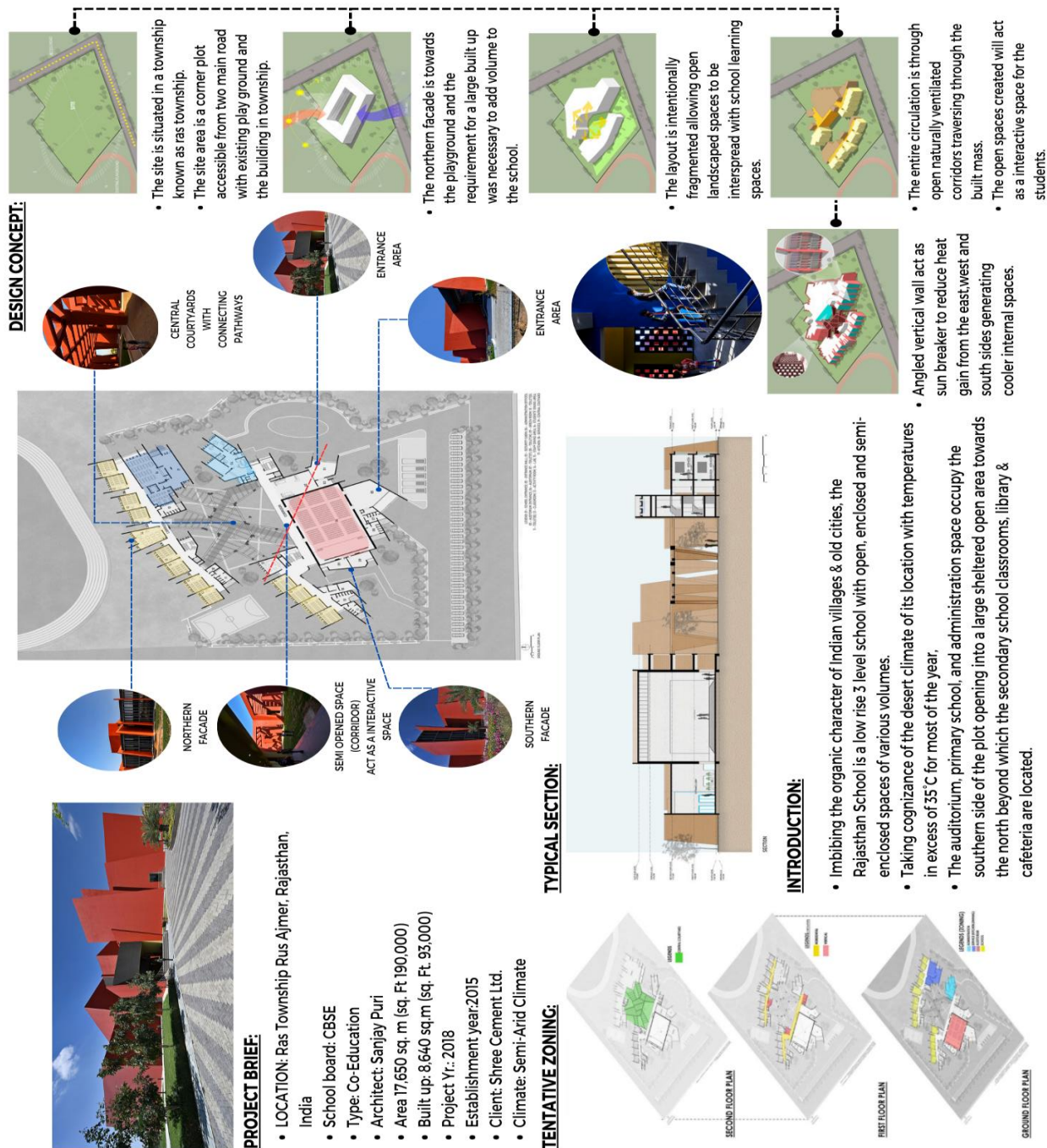
- Primary schools in rural areas face variety of difficulties such as little funding , poor infrastructure and restricted access to modern amenities.
- These problems need for creative solutions that minimize their negative effects on the environment while giving students and employees
- comfort
- safety
- etc...

## 1.6. METHODOLOGY



## 2. Chapter – case study

### 2.1. THE RAJASTHAN SCHOOL



## DESIGN STRATEGIES:

### ACCESSIBILITY:

- The site can be approached through two entries: Both the entry are from front facade facing Ras-babra highway.
- No entry has been provided along the secondary road due to township security, as it is a heavy traffic zone.
- Pedestrian pathway is provided inside the township which provide ease for students to come to school without vehicles.
- The school is located in the township for the students, who are in the township and nearby places.

### CIRCULATION:



- The entire circulation is through open naturally ventilated corridors traversing & skirting the focal semi- sheltered landscaped court in the center.
- Angled vertical walls act as sun breakers to reduce heat gain from the east, west & south sides generating cooler internal spaces.
- classrooms is north oriented to derive indirect sunlight
- The complete electrical power requirement is generated by the residual energy of a cement plant nearby.
- The entire water is recycled & reused. The building by its design is thus extremely energy efficient.

### CENTRAL COURTYARD:

- The semi-sheltered courtyard has multiple angular pathways.
- Connecting the two parts of the school with landscaped play spaces that foster engagement.
- Traversed by a series of linear trapezoidal frames and sun-breakers.
- This focal area has a constantly changing shadow pattern depending on the sun direction throughout the day.



### CORRIDOR:



- The entire school is created in such a way that daylight could reach at every corner by providing
- jaaali pattern,
- open spaces
- And glass material for the daylight to enter.
- The organic layout creates a different character to each part of the school orienting each space with different views & different perceptions.

### JAAALI:



- The entire school is created in such a way that daylight could reach at every corner by providing jaaali pattern, open spaces and glass material for the daylight to enter.
- The organic layout creates a different character to each part of the school orienting each space with different views & different perceptions.

### VERTICAL WALL:



- The northern side wall are twisted by edges and inclined to protect the classroom from harsh light from west and it also provide a good front facade.
- The school is divided into two parts which in centrally connected by central courtyard towards the north all the classroom are placed for natural light and ventilation

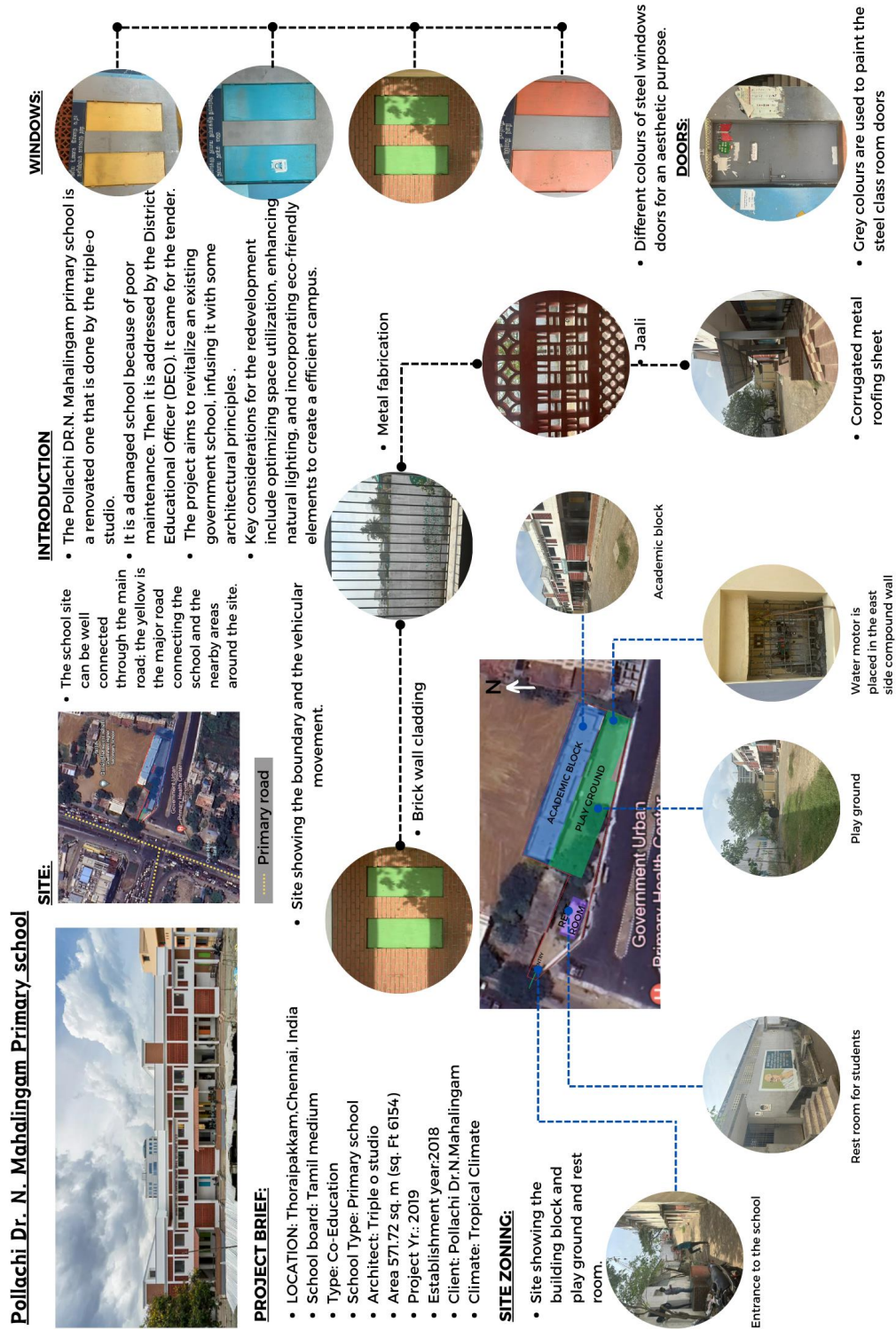
### SALIENT FEATURES:

- CCTV Cameras provided everywhere including site entrances, security cameras, academic block, recreational spaces etc.
- Built Security Cabins provided at all two entrances gates.
- Fire Extinguishers provided on the periphery and nearby built structures for fire protection.
- Over head water tank provided.
- Barrier free like ramps provided at the backside of every workshop leading to the public canteen.

### CAMPUS ACTIVITIES AND FUNCTION:

| INSTITUTIONAL COMPLEX                                                                                                                                                                                                                                   | ADDITIONAL ACTIVITIES                                                                                                                                             | PUBLIC SPACES:                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• Auditorium hall</li><li>• Art and craft room</li><li>• Central courtyard</li><li>• Lecture Hall</li><li>• Library</li><li>• Laboratories</li><li>• Workshop</li><li>• Faculty Rooms</li><li>• Canteen</li></ul> | <ul style="list-style-type: none"><li>• Football ground</li><li>• Upcoming swimming pool</li><li>• Cricket ground</li><li>• Running track for students.</li></ul> | <ul style="list-style-type: none"><li>• These are the areas like the amphitheatre, seminar halls ground, sports courts, courtyards, exhibition areas and informal spaces that facilitate interaction between students and outsiders.</li><li>• Various activities like cultural events, seminars, exhibits etc. happen here</li></ul> |

## 2.2. POLLACHI DR. N. PRIMARY SCHOOL



## 2.3. THE SCHOOL KFI

### The School KFI

- PROJECT BRIEF:**
- LOCATION: Thazhambur Chennai, India
  - School board: ICSE
  - Type: Co-Education
  - Architect: Green evolution
  - Built up: 56,000 SFT ON 2.75 ACRE SITE
  - Project Yr.: 2018
  - Establishment year: 2017
  - Client: Krishna murti Foundations.
  - Climate: Tropical- Climate



### INTRODUCTION:

- The School is affiliated to Council for Indian School Certificate Examinations at New Delhi and the students appear for the ICSE and ISC in Classes 10 and 12 respectively.
- The School KFI is a day boarding school of 400 students and staff.
- School Timings are from 7:30 am to 2:30 pm.
- For Green Evolution, this was an ideal opportunity to design an earth friendly campus which would inspire students to embrace a sustainable way of life.
- The new campus was awarded the Green School certification with the highest Platinum rating by the Indian Green Building Council in 2018.



### VEGETATION:

- The site has nearly 73 trees, like neem, coconut, mango, etc., so the client and the designer do not want to cut down the trees.
- Their motto is to construct the school without cutting down or disturbing the existing trees, and the client's motto is "If you lose touch with nature, you lose touch with humanity."
- Its existing trees thus shaping the buildings and spaces in its path.
- It brings the beauty of organic forms and sweeping curves that allow a sense of freedom and blend effortlessly with nature.
- And the New campus is nestled among trees existing on site.



### WALL PAINTING:



- The corridor walls are filled with paintings.
- And in the corridors students used to have their lunch.

### SIT -OUT SPACE:



- In the sit-out, only students can sit and play the indoor games, and sometimes it acts as an informal teaching space.
- And for the sit-out space, they used a corrugated metal roofing sheet for the roof.

### STORE ROOM"



- The room is in the first-floor landing area.
- In the store room, they used to store the table, benches, and old files.

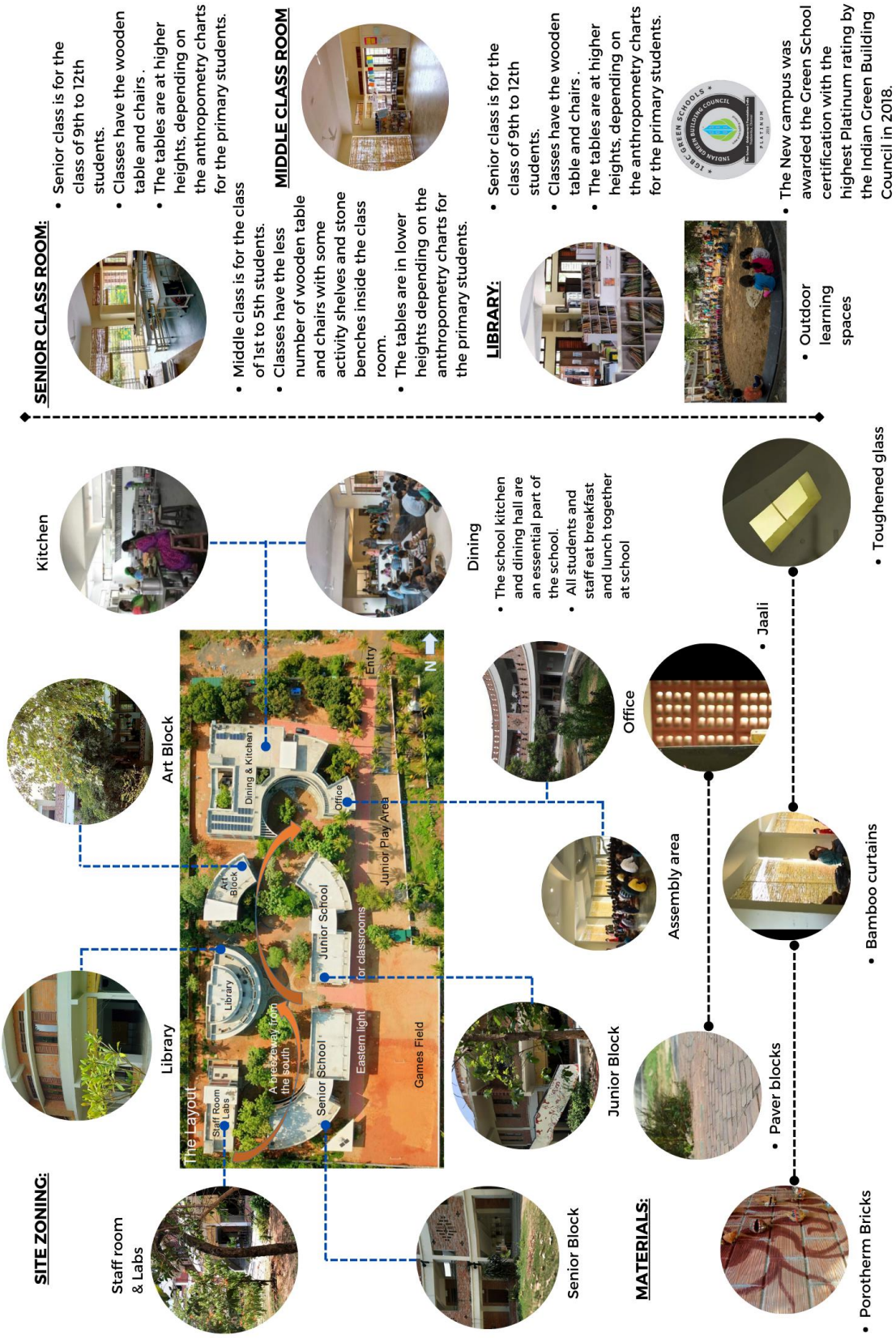
### STAFF-REST ROOM



- The rest rooms are under the staircase, which is used by the staff only.



- Variation in ceiling heights to provide sense of space.
- And to bring to natural lighting and ventilation to the corridors.



## 2.4. YELLOW TRAIN SCHOOL

### Yellow train school, Coimbatore



#### PROJECT BRIEF:

- Location: Coimbatore, Tamil nadu
- School board: ICSE
- Type: Waldorf Education
- Architect: Biome-envt solutions
- Area :1334sq.m
- Project Year:2013
- Climate: Hot and Dry

#### INTRODUCTION:

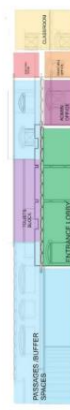
- This school is an international school offering ICSE and A Levels located in coimbatore yellow train is consistently ranked in top 10 schools
- The building has been acknowledge and conferred with the design and architecture award in 2015.
- The mud buildings with murals with the play of light and wind lawns and lily ponds and the tree lined avenues have a distinct architectural style.

#### CIRCULATION:

- To tackle the west and south sun the spaces in that region were given into spaces that are used.
- For comparative lesser time such as corridors and ramps.
- The Jaali on west facade helps in keeping the heat gain low in the building.

#### SOUTH ELEVATION :

- Classrooms and other recreational spaces are kept towards Northside to utilize max use of natural light and reduce the cost of electricity .



- On south face mostly buffer spaces are placed to protect the main spaces such as classroom and recreational spaces from heat up.

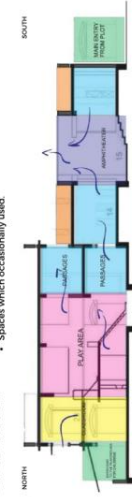
#### TRANSITION SPACES:

- In the North western part the circulation spaces continue into transition spaces.



- Towards south face there are more Buffer spaces
- Spaces which occasionally used.

#### SECTION A-A:



#### ACADEMIC CLASS BLOCKS AND OUTDOOR PLAY AREA:

- The classroom and outdoor play spaces are placed in the northern-east part of the site.
- To cut off the harsh sun and create a shade outdoor play space the classroom being naturally lit are places such the north light comes in.



#### INDOOR PLAY SPACE:

- These are placed in shade of the West Jaali facade keeping the wind coming into the building to cold and the area shaded and open to sky.

#### SERVICE BLOCK (KITCHEN & TOILET):

- These blocks are placed in the central Space of the Structure and ventilated via ducts

#### ACADEMIC STAFF BLOCKS:

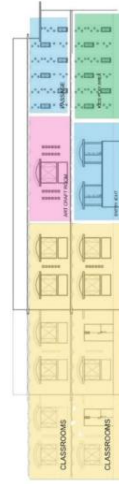
- Entry to the building is from the north-east adjoining the principal room, staff room and meeting room.
- The staff block are kept in the East part of the site.
- According to the time of usage of these spaces.

#### TRAIN:

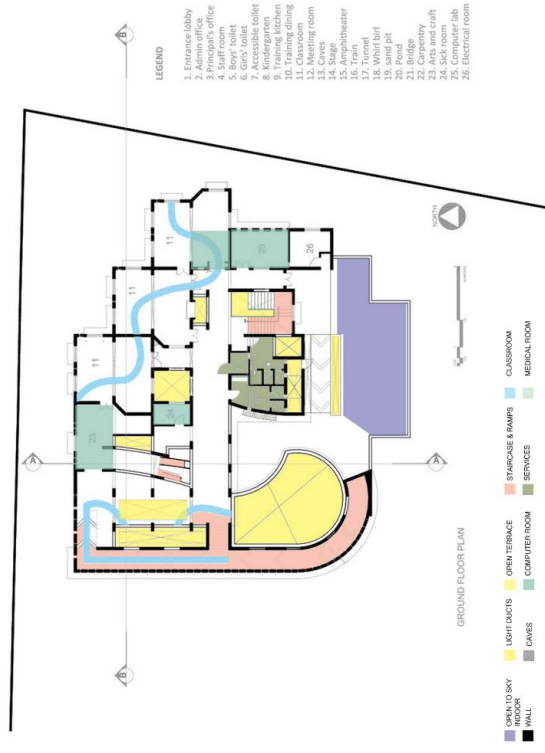
- Train in the west side of the building we can see a train compartment.
- Designed as a library on inside.
- Right next to the structure of the yellow train school, on its west facade they have designed a train compartment with the insides of a library.
- The library is naturally lit and naturally ventilated.



#### NORTH ELEVATION



- Classroom in the ground floor and the first floor have the large windows to lit the spaces with natural lights.



### SECTION B-B:

- Towards west side continues ramp to create thermal insulation from the harsh sunrays and to avoid heaten up the spaces.
- Skyliht is provided to recreational spaces and passages.
- The entire building has been designed in such a way that all rooms and passages are naturally lit.
- Hence we see the light catchers so frequently throughout the plans.

### INDOOR PLAY SPACE AND OPEN TERRACE:

- The indoor play spaces have been visually connected to the upper floors via open roof terrace and passage.



### CLASSROOM:

- The classroom having the sufficient amount of natural light and ventilation through windows.



### WEST FACING WALL:

- West facing wall consist of small openings to cutoff the harsh sun rays and to catch the wind within the spaces.



### TRANSITION SPACES:

- In the North western part the circulation spaces continue into transition spaces.



### CIRCULATION (RAMPS):

- Entire west facade of the building is dedicated to the ramp for easy accessibility of the space.
- The west jaali facade also helps in cutting off the harsh sun and the ramp acts as a buffer space for cooling the summer winds.

### SERVICE BLOCK (KITCHEN & TOILET):

- These blocks are placed in the central space of the structure and ventilated via ducts

### ACADEMIC CLASS BLOCKS AND OUTDOOR PLAY AREA:

- The classroom and outdoor play spaces are placed in the northern -east part of the site to cut off the harsh sun and create a shaded outdoor.
- Play space the classroom being naturally lit are placed such that maximum lights comes in.



### ACADEMIC BLOCKS:

- Right above the entrance and academic block they have designed an open terrace inviting the cool east coastal winds and sun for an open spaces outdoor activities in winter.



### THE BOGIE LIBRARY:

- Right next to the structure of the yellow train school, on its west facade they have designed a train compartment with the insides of a library.
- The library is naturally lit and naturally ventilated.



2.5.COMPARIVE ANALYSIS AND INFERENCE

COMPARATIVE ANALYSIS

| PROJECT              | THE RAJASTHAN SCHOOL                                                                                                                       | POLLACHI DR.N.MAHALINGAM SCHOOL                                                                                                          | THE SCHOOL KFI                                                                                                           | YELLOW TRAIN SCHOOL                                                                                                                                                                |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LOCATION             | Raj,Rajasthan                                                                                                                              | Chennai                                                                                                                                  | Chennai                                                                                                                  | Comblatore                                                                                                                                                                         |
| SITE AREA            | 17650 Sq.M                                                                                                                                 | 571 Sq.M                                                                                                                                 | 20500 Sq.M                                                                                                               | 1335 Sq.M                                                                                                                                                                          |
| TYPOLGY              | Courtyard                                                                                                                                  |                                                                                                                                          | Gathering Spaces                                                                                                         | Amphitheatre                                                                                                                                                                       |
| NUMBER OF USERS      | 450                                                                                                                                        | 120                                                                                                                                      | 560                                                                                                                      | 200                                                                                                                                                                                |
| SURROUNDING LAND USE | Athletic Grounds And Residential Area                                                                                                      | Surrounded By Commercial Area                                                                                                            | Surrounded By Green Lands And Residential Areas                                                                          | Surrounded By Play Areas And Residential Area                                                                                                                                      |
| CONCEPT              | Inspired By Organic Form Of Villages, Low-Rise Structure, Angled Walls And Semi-Open, Enclined, And Semi-Open Spaces With Triagonal Forms. | Revitalization Of An Existing School, Optimization Of Space, Integration Of Elements, Attention To Aesthetics, Including Wall Paintings. | Earth-Friendly Campus Design With An Emphasis On Integration With Existing Trees, Shaping Buildings To Reduce Heat Gain. | Utilizes Transition Spaces And Indoor Play Areas For Outdoor Classroom Placement, Combining Natural Ventilation, Features A Unique Amphitheatre Compartment Designed As A Library. |

|                                 |                                                                                             |                                                                                                                       |                                                                                                                                                      |                                                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FORM AND ORIENTATION            | Building Is Oriented Towards South-East Direction                                           | Building Is Oriented Towards South Direction                                                                          | Building Is Oriented Towards North-East Direction                                                                                                    | Building Is Oriented Towards East Direction                                                                                                                                       |
| VARIETY IN LEARNING SPACES      | Courtyard Provide Space For The Circle Time And Act As A Gathering Spaces For The Block.    | Open And The Courtyard Provide Space For The Circle Time And Gathering Spaces And This Corridor Act As A Dining Area. | There Are More Than 100 Windows In The Block, The Buffer Spaces Act As A Circle Time Gathering Spaces And Provide Spaces For Outdoor Learning Areas. | The Train Library Inside A Library Area, There Is More Indoor Activity Spaces.                                                                                                    |
| ORGANIZATION OF LEARNING SPACES | The Building Block And Courtyard And Connected Through The Corridor And Rampwalk            | The Building Blocks Are Laid Out In A Circle Time And Connected To The Corridors.                                     | The Building Blocks Are Laid Out In A Circle Time And Connected To The Corridors.                                                                    | The Classrooms Connected By The Ramp And The Corridor, The Classrooms Are Organised In A Way To Bring The Outdoor Learning Spaces And The Building And The Ramp And The Corridor. |
| VEWS AND IMPACT OF NATURE       | The Classroom Overlooks Towards The Athletic Grounds And Courtyard And The Corridor Spaces. | The Classrooms Overlook Towards The Residential Area.                                                                 | The Classrooms Overlook Towards The Corridors.                                                                                                       | The Classrooms Overlook Towards The Corridor Spaces.                                                                                                                              |
| FORM OF THE CLASSROOMS          | Square And Rectangle Shape                                                                  | Rectangle Shape                                                                                                       | Rectangle Shape                                                                                                                                      | Rectangle Shape                                                                                                                                                                   |
| GATHERING SPACES                | Central Courtyard,Auditorium                                                                | Corridor And The Ground                                                                                               | Art Block,Assembly Area,Out Area,Out                                                                                                                 | Amphitheatre                                                                                                                                                                      |
| ACCESSIBILITY                   | Path Way,Corridors                                                                          | Corridors                                                                                                             | Corridors,Ramps                                                                                                                                      | Ramps,Corridors                                                                                                                                                                   |

|                                  |                                                                                                                                                                                                               |                                                                                                                                                                            |                                                                                                                                                                            |                                                                                                                                                                            |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FEASIBILITY OF CLUSTERS          | No Repeating Clusters                                                                                                                                                                                         | No Repeating Clusters                                                                                                                                                      | No Repeating Clusters                                                                                                                                                      | No Repeating Clusters                                                                                                                                                      |
| CIRCULATION                      | Vehicular Access Is Restricted Inside The Site Pedestrian Access Is Given Green Through The Site.                                                                                                             | Vehicular Access Is Restricted Inside The Site Pedestrian Access Is Given Through The Site.                                                                                | Vehicular Access Is Restricted Inside The Site Pedestrian Access Is Given Through The Site.                                                                                | Vehicular Access Is Restricted Inside The Site Pedestrian Access Is Given Through The Site.                                                                                |
| SUSTAINABILITY FEATURES          | Entirely designed for natural ventilation and daylight. Angled walls reduce heat gain and provide shade on south sides.                                                                                       | Use of materials like corrugated metal roofing and bamboo curtains and toughened thermal insulation incorporated for outdoor learning spaces and organic natural lighting. | Use of materials like corrugated metal roofing and bamboo curtains and toughened thermal insulation incorporated for outdoor learning spaces and organic natural lighting. | Use of materials like corrugated metal roofing and bamboo curtains and toughened thermal insulation incorporated for outdoor learning spaces and organic natural lighting. |
| VEGETATION                       | The site having the coconut trees and some bushes.                                                                                                                                                            | The school existing trees, incorporating them into the design.                                                                                                             | The school existing trees, incorporating them into the design.                                                                                                             | The school existing trees, incorporating them into the design.                                                                                                             |
| NATURAL LIGHTING AND VENTILATION | schools prioritize natural light and ventilation through architectural elements, such as large windows, open spaces, and angled walls. The building is designed through open, naturally ventilated corridors. | The classrooms have the sufficient natural lighting through the jalli and the metal fabrication, open spaces.                                                              | The classrooms have the sufficient natural lighting through the jalli and the metal fabrication, open spaces.                                                              | The classrooms have the sufficient natural lighting through the jalli and the metal fabrication, open spaces.                                                              |

INFERENCE:

- The schools show a commitment to integrating with their surrounding environment, whether through the preservation of existing trees, attention to local vegetation, or adaptation to the surrounding land use.
- All projects prioritize sustainability through various architectural elements such as natural ventilation, daylight, eco-friendly materials, and integration with nature.
- The design of learning spaces varies, with a focus on flexible seating arrangements, unique gathering spaces, and innovative features like the train compartment library.
- Building orientation and views are carefully considered to maximize natural light, reduce heat gain, and provide pleasing views for the users.



The Rajasthan school



Pollachi Dr.N.Mahalingam primary school



The School KFI



Yellow Train School

## 2.6. PASSIVE DESIGN STRATEGIES

### 2.6.1. Orientation and Building Layout

Optimize the building orientation to capture or block sunlight and prevailing winds as needed for ventilation and natural lighting.

Consider a compact building layout to reduce exposed surface area and heat loss/gain.

### 2.6.2. Lighting

Incorporate external shading devices like sun breaker, pergolas, or adjustable louvers overhanging eaves and terracotta roof tiles to control solar radiation and reduce overheating.

Employ intricately carved wooden screens (jaalis) and wooden shutters to control solar exposure and allow for cross-ventilation.

**Jaali screens:** Jaali screens are perforated screens that are used to let in light and air while blocking out direct sunlight. They can be used on windows, doors, and balconies to reduce heat gain and improve indoor air quality.

Install internal shading solutions such as blinds, curtains, or electrochromic glass to manage glare and solar heat gain.

### 2.6.3. Ventilation

Incorporate courtyards and open verandas to promote natural cross-ventilation and reduce the need for mechanical cooling

Implement a natural ventilation system with vents and windows to manage indoor air quality and temperature.

Use wind towers to capture prevailing breezes and channel them into the building.

Use wooden or terracotta jaali screens for windows to allow for airflow while maintaining privacy.

Design buildings to maximize passive heating by optimizing window placement, size, and glazing properties on south-facing facades.

Use thermal chimneys or Trombe walls to enhance natural ventilation and lighting.

### 2.6.4. Landscaping

Use landscaping strategically designs with trees and vegetation to provide shading, reduce heat reflection and absorption, and create microclimates that help moderate temperatures.

**Water features:** Water features such as fountains and pools can help to cool the air and improve indoor humidity levels.

### **2.6.5.Reclaimed and eco friendly Materials**

Use reclaimed, recycled, or sustainable building materials to reduce the environmental impact of construction and improve indoor air quality.

Source reclaimed or locally available materials like teak wood, Athangudi tiles, and Chettinad bricks to reduce the environmental impact of construction.

### **2.6.6.Green Roofs and Living Walls**

Green roofs can help to reduce heat gain in the summer and improve indoor air quality by filtering pollutants out of the air.

Employ advanced green roofing technologies that incorporate modular, lightweight planting systems.

## 2.7. VARIATIONS OF CLASSROOM

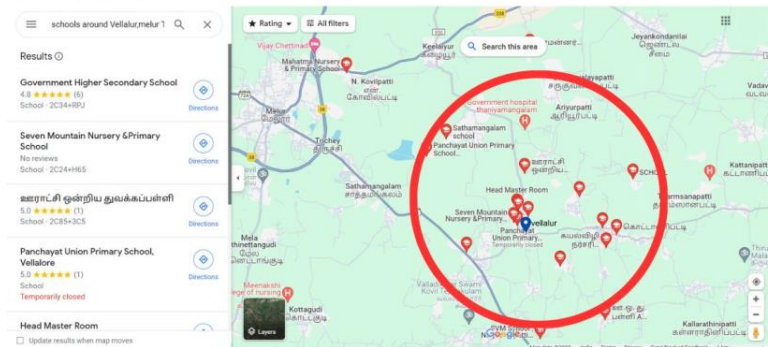
[illegible]

Technical drawing of a dining table and chairs. The table is rectangular with a length of 140 cm and a width of 75 cm. It has a central longitudinal groove. The drawing includes a side view showing the table's profile and a top view showing the table with four chairs. The chairs have a curved backrest and a seat. The drawing is labeled "Dining table and chairs" and "Technical drawing".

## 4. Chapter- SITE SELECTION AND ANALYSIS AND ZONING

### 4.1 SITE SELECTION

#### Site selection:



In this area there are lot of primary schools and few middle & higher secondary schools around the site.

- The primary schools are built under the “One primary school per village” scheme.

The private schools that need to travel nearly 15–18 km from the village.

Private schools near the site:

- Mahatma Matriculation School- Alagarkovil -19 km
- C.E.O.A.Matric.Hr.Sec.School-Melur-15km
- Milton Matric Hr Sec School-Melur-17km

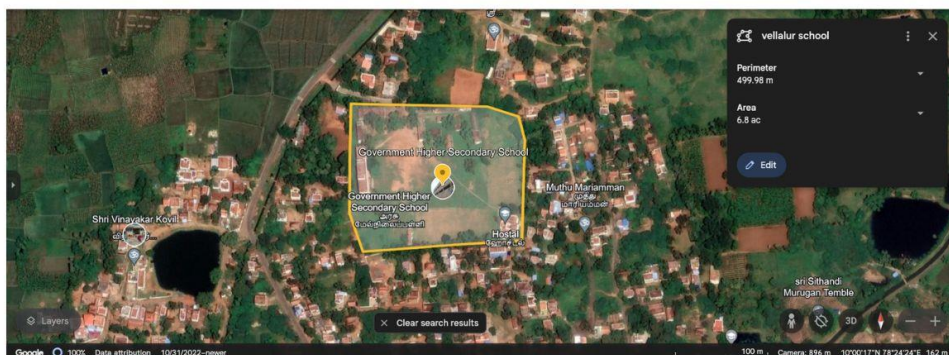
This indicates that there is no proper government higher secondary school in this area and have lot of primary schools and very few of middle schools and having some private school but need to travel nearly 15-18km.

- Particularly the Vellalur government school is a large and old one in this area and it is launched in 1961.
- Compare to other government schools in this area. This vellalur government school has the huge site area .

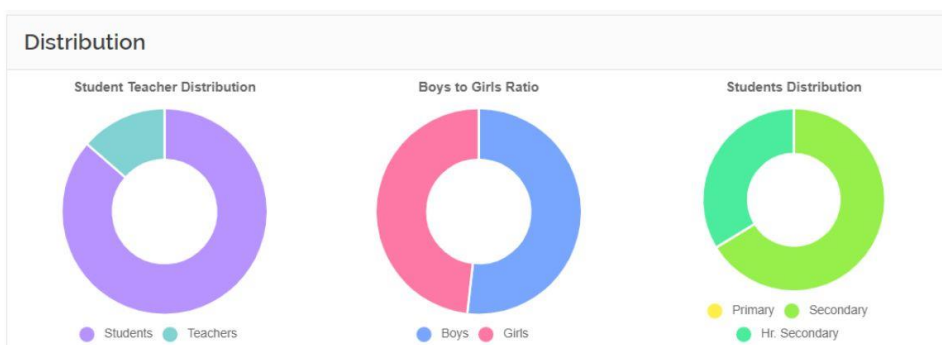
|                       |                  |
|-----------------------|------------------|
| Established           | 1961             |
| Level                 | Higher Secondary |
| Type                  | Co-Ed            |
| Board                 | Others           |
| Medium Of Instruction | Tamil, English   |
| No. of students       | 305              |
| No. of Teachers       | 48               |

Source:

- <https://schools.org.in>
- <https://directory.edugorilla.com>



Government higher secondary school,vellalur,Madurai,Tamil nadu  
 Latitude and longitude : 10°00'17"N 78°24'25"E  
 Area: 6.5 acres (26304.6sq.m)



### Site Justification:

- The users of the Vellalur government school are from 18 villages. Now the school is in abandoned condition because it was not maintained properly.
- So the users are going to the nearby Uranganpatti government middle school, and the middle school is unable to serve the increased number of population.
- So the village people put up a petition to reconstruct the school building with all the amenities.

| Infrastructure                                                                      |                                                                                       |                                                                                       |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| • School Code                                                                       | 33240803902                                                                           |                                                                                       |
| • Status of Building                                                                | Government                                                                            |                                                                                       |
| Facilities in Govt.Hr.S.Vellalur, Melur, M..                                        |                                                                                       |                                                                                       |
|  |  |  |
| Library                                                                             | Playground                                                                            | Mid-day Meal                                                                          |

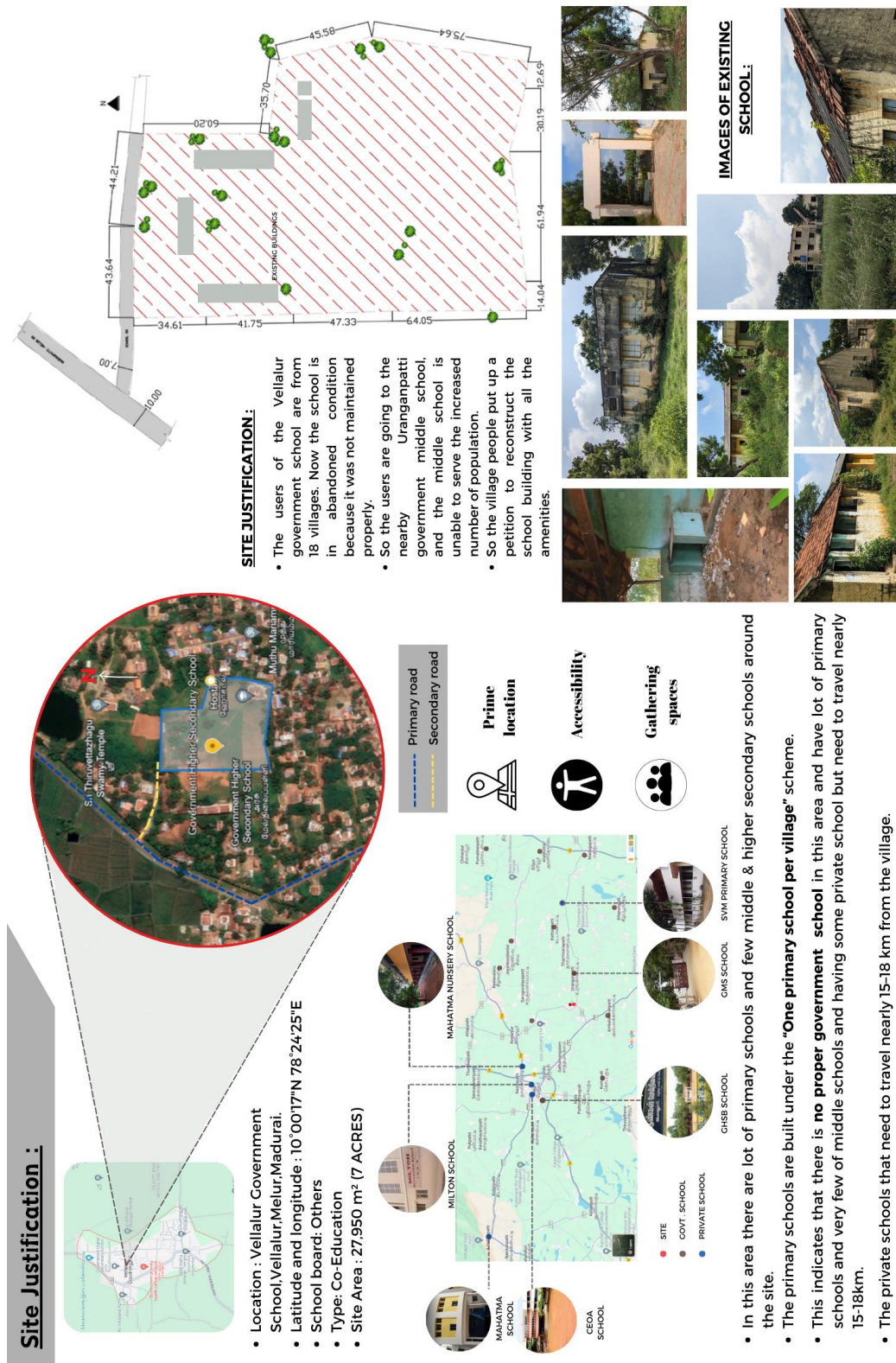
Source:

- <https://schools.org.in>
- <https://directory.edugorilla.com>

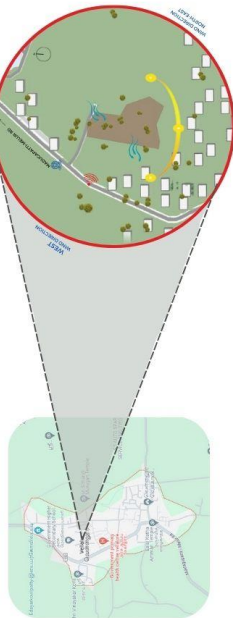
## 4.2 IMAGES OF EXISTING SITE



## 4.3 SITE JUSTIFICATION

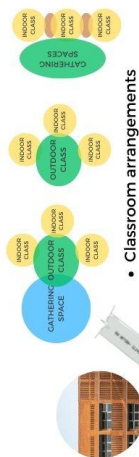


## Site Analysis :



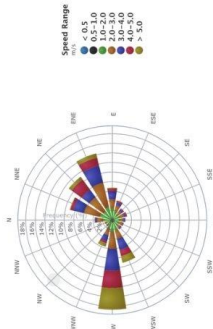
- Location : Vellalur Government School, Vellalur, Melur, Madurai.
- Latitude and longitude : 10°00'17"N 78°24'25"E
- School board: Others
- Type: Co-Education
- Site Area : 20,500 m<sup>2</sup>
- Climate: Hot and Dry

### CLUSTERS:



• Classroom arrangements

### WIND ROSE:



- The site has major wind flow from North east to West direction and those area is not covered with buildings or other obstruction.

### INFERENCE FROM THE SITE ANALYSIS :

- The entry or exit to the site is from the two sides of the site.
- The admin and staff room blocks are laid in the north-east corner of the site.
- The building blocks are laid according to the wind flow of the building.
- The wind is diverted toward the central gathering spaces and the building blocks.
- Through the Jaalis and the gaps in the walls and large windows, etc.
- And the gathering space is a centric space for all the blocks and it is accessed by the corridors, rampwalks, etc.

### Bye laws :

- Site area : 20500 sq.m
- Road width : 7-9m min
- Max height of building : 15m (G+3)
- Floor Space Index : 1.5
- Plot coverage : 60% (13325 sq.m)
- Set back : 3-7m
- Corridor Width : 2m min

### VEGETATION:



- The vegetation is pretty good on and around the site, but the site is not well maintained.
- The site has the Neem tree and the Pongami tree, which are full of bushes that are not maintained.
- The site is closer to the residential area, and the main road is also nearer to the site.
- ROAD - Less traffic noise.

### ROADS:



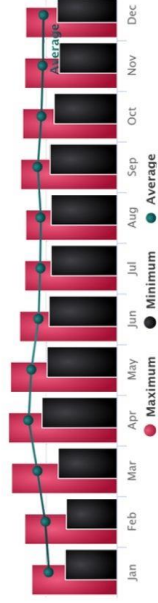
- Primary road
- Secondary road

- The school site can be well connected through the main road, the Blue is the major road connecting the school and the village around the site.
- The Yellow is the secondary road, which is the school road that connects the main road to the school.
- The site has one primary road which have the minimum number of vehicular passing and the secondary road is belongs to the school, so the less sound is from the primary road.

### ACCESSIBILITY:

- The site can be accessed by two-wheelers and a bus. The intersection of the roads makes a school bus stop, so it is easy for the students to travel.

### TEMPERATURE:



- The site faces a high temperature during the months of April and May. This month, most students have their academic holidays.

## 4.4 SITE ZONING



SCALE -1:700



SCALE -1:700



SCALE -1:700



# THE SCHOOL

"EDUCATION IN THE TRUE SENSE HELPING THE INDIVIDUAL TO BE MATURE AND FREE" -J.KRISHNAMURTI

## SYNOPSIS :

- THE MAIN DESIGNING A "RETHINKING GOVERNMENT SCHOOL" IS TO PROVIDE A BETTER LEARNING EXPERIENCE IN A NATURAL AND SUPPORTIVE ENVIRONMENT FOR THE STUDENTS.
- THIS SCHOOL IS TO RECONSTRUCT THE ABANDONED SCHOOL IN A DIFFERENT WAY, EMPLOYING A TRASTITIONAL METHOD TO EDUCATE THE STUDENTS .
- THIS SCHOOL CAMPUS IS DESIGNS IN SUCH A WAY THAT IT IMPROVES CREATIVITY,PHYSICAL AND MENTAL STRENGTH AND SOCIAL DEVELOPMENT.

## ISSUES FACED BY GOVERNMENT SCHOOL :

- THE SCHOOL IN RURAL AREAS FACE A VARIETY OF DIFFICULTIES SUCH AS LITTLE FUNDING,POOR INFRASTRUCTURE,LOW MAINTENANCE AND RESTRICTED ACCESS TO MODERN AMENITIES. THESE PROBLEMS NEED FOR CREATIVE SOLUTION THAT MINIMIZE THEIR NEGATIVE EFFECTS ON THE SCHOOL ENVIRONMENT WHILE GIVING STUDENTS AND EMPLOYEES.
- COMFORT
- SAFETY
- WELL-BEING THEIR HIGHEST PRIORITY.



CUTTING TREES



LITTLE FUNDING



RESTRICTED MODERN AMENITIES



POOR MAINTENANCE



## SITE JUSTIFICATION

- LOCATION : VELLALUR GOVERNMENT HIGHER SECONDARY SCHOOL.
- LATITUDE AND LONGITUDE : 10°00'17"N 78°24'25"E
- SCHOOL BOARD : OTHERS
- TYPE : CO - EDUCATION
- SITE AREA : 27,950 SQ.M (7 ACRES)

- THE USERS OF THE VELLALUR GOVERNMENT SCHOOL ARE FROM 18 VILLAGES.NOW THE SCHOOL IS IN ABANDONED CONDITION BECAUSE NOT MAINTAINED PROPERLY.
- SO THE USERS ARE GOING TO BE NEARBY URANGANPATTI GOVERNMENT MIDDLE SCHOOL IS UNABLE TO SERVE THE INCREASED NUMBER OF POPULATION.
- SO THE VILLAGE PEOPLE PUT UP A PETITION TO RECONSTRUCT THE SCHOOL BUILDING WITH ALL THE AMENITIES.

- IN THIS AREA THERE ARE LOT OF PRIMARY SCHOOLS AND FEW MIDDLE & HIGHER SECONDARY SCHOOL AROUND THE SITE.

- THE PRIMARY SCHOOLS ARE BUILT UNDER THE"ONE PRIMARY SCHOOL PER VILLAGE "SCHEME.

- THE PRIVATE SCHOOL THAT NEED TO TRAVEL NEARBY 15-18 KM FROM THE VILLAGE PRIVATE SCHOOLS NEAR THE SITE :

- MAHATMA MATRICULATION SCHOOL -ALAGARKOVI -19KM
- C.E.D.A. MATRICULATION HR.SEC. SCHOOL-MELUR -15KM
- MILTON MATRICULATION HR.SEC. SCHOOL-MELUR-17KM

- THIS INDICATES THAT THERE IS NO PROPER GOVERNMENT HIGHER SECONDARY SCHOOL IN THIS AREA AND HAVE LOT PRIMARY SCHOOLS AND VERY FEW MIDDLE SCHOOLS AND HAVING SOME PRIVATE SCHOOL BUT NEED TO TRAVEL NEARBY

- PARTICULARLY THE VELLALUR GOVERNMENT SCHOOL IS A LARGE AND OLD ONE IN THIS AREA AND IT IS LAUNCHED IN 1961.
- COMPARE TO OTHER GOVERNMENT SCHOOLS IN THIS AREA .
- THIS VELLALUR GOVERNMENT SCHOOL HAS THE HUGE SITE AREA.

## PROGRAM DERIVED :



ADMIN



INDOOR GAMES



LABORATORY



SPORTS



ARTS



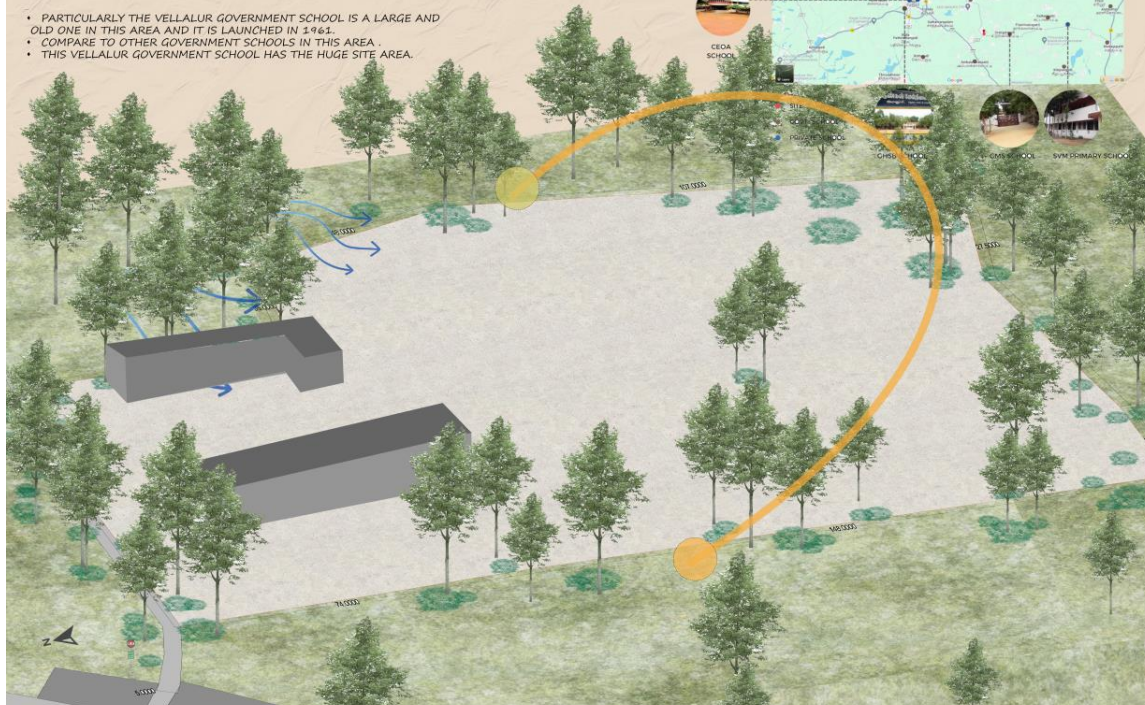
LIBRARY



GATHERING SPACES



CLASSROOM



## IMAGES FO EXISTING SCHOOL

• THESE ARE THE EXISTING IMAGES OF THE SITE. THE SITE AND THE BUILDINGS ARE NOT PROPERLY MAINTAINED.



## SITE ANALYSIS

### VEGETATION :

• THE VEGETATION IS PRETTY GOOD IN AND AROUND THE SITE, BUT THE SITE IS NOT WELL MAINTAINED.  
• THE SITE HAS THE NEEM TREE AND THE PONGAMI TREE, WHICH ARE FULL OF BUSHES WHICH IS NOT MAINTAINED.



### ACCESSIBILITY :

• THE SCHOOL SITE CAN BE WELL CONNECTED THROUGH THE MAIN ROAD ,WHICH IS MENTIONED IN THE BLUE LINE IS AMAJOR ROAD CONNECTING THE SCHOOL AND THE VILLAGES AROUND THE SITE.  
• THE YELLOW IS THE SECONDARY ROAD WHICH CONNECTS THE MAIN ROAD AND THE SITE.  
• THE SITE HAS ONE PRIMARY ROAD WHICH HAVE THE MINIMUM NUMBER OF VEHICULAR ACCESS AND THE SECONDARY ROAD IS BELONGS TO THE SCHOOL SO WHICH HAVE THE LESS VEHICULAR ACCESS.  
• THE SITE CAN BE ACCESSED BY TWO WHEELERS AND A BUS.  
• THE INTERSECTION OF THE ROAD MAKES A SCHOOL BUS STOP .IT IS EASY FOR THE STUDENTS TO ACCESS THE



### NOISE :

• SOUTH SIDE OF THE SITE IS NEARER TO THE RESIDENTIAL AREA .  
• THE MAIN ROAD IS ALSO NEARER TO THE SITE.

### WIND DIRECTION :

• THE SITE HAS MAJOR WIND FLOW FROM NORTH EAST TO WEST DIRECTION AND THOSE AREA IS NOT COVERED

### FORM :

• DIVIDING THE SITE INTO TWO PARTS ONE FOR GAMES AND ANOTHER ONE FOR THE BLOCKS.  
• SO IT CREATES A RECTANGULAR SHAPE.  
• THE SHAPE CREATES A FORM AND VOIDS IN BETWEEN THE BLOCKS ALLOWING THE AIR FLOW INTO THE BUILDING.  
• THE BLOCK ARE ORIENTED IN A COURTYARD TO COURTYARD CONCEPT .

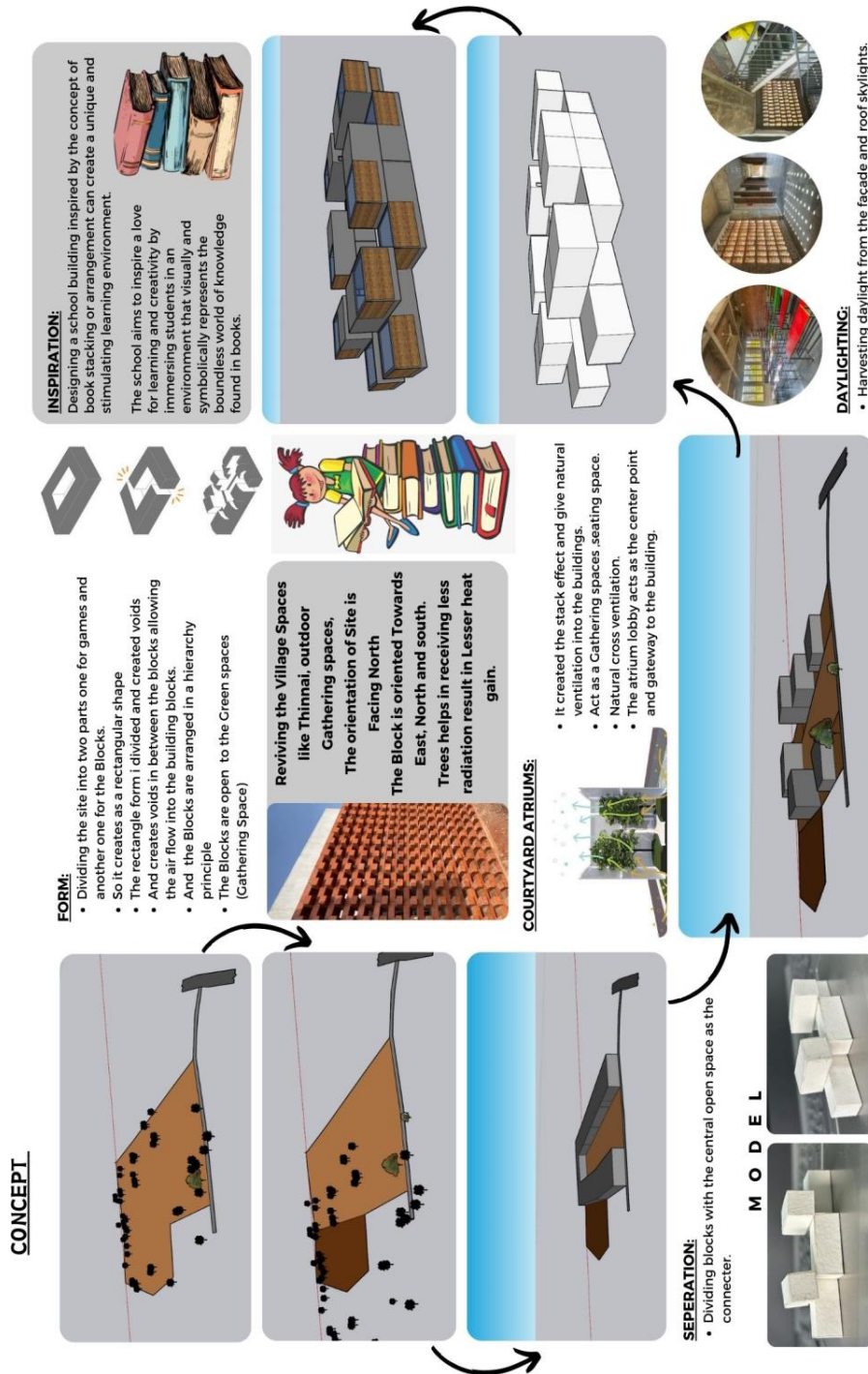
### INFERENCE FROM THE SITE ANALYSIS :

• THE ENTRY OR EXIT TO THE SITE IS FROM THE TWO SIDES OF THE NORTH PART OF THE SITE.  
• THE BLOCKS ARE ARRANGED IN A HIERARCHY CONCEPT.  
• THE BLOCKS ARE ARRANGED ACCORDING TO THE WIND AND SUN DIRECTION.  
• THE WIND IS DIVERTED TO THE CENTRAL GATHERING SPACES AND THE BLOCKS.  
• THROUGH JAALI WALLS, OPENINGS AND THE LARGE WINDOWS.  
• THE CENTRAL GATHERING SPACES IS A CENTRIC SPACE FOR ALL THE BLOCKS AND IT IS ACCESSED BY THE CORRIDORS AND THE RAMPS.



## 5. Chapter- ARCHITECTURAL DESIGN

### 3.1. CONCEPT



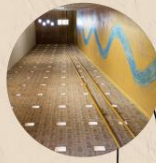
## DESIGN INTENT

- IMPLEMENTING PASSIVE DESIGN STRATEGIES IN A RURAL SCHOOL- SIGNIFICANCE OF PROVIDING ECO FRIENDLY AND COMFORTABLE LEARNING ENVIRONMENTS IN RURAL AREAS.
- EXPLANATION OF PASSIVE DESIGN STRATEGIES INCLUDING NATURAL VENTILATION LIGHTING SHADING ETC...

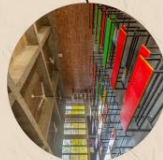
NATURAL LIGHTING AND VENTILATION INSIDE THE BUILDING THROUGH JAALI LARGE WINDOWS ETC.



THE VERTICAL FINS WILL ACT AS A SUN BREAKER AND A SHADING DEVICE MOSTLY IT IS PROVIDED IN THE SOUTH AND THE WEST SIDE OF THE SITE.



FOR EASY ACCESS TO THE DIS-ABILITIES PERSONS. MULTIPLE ENTRY / EXITS THROUGH RAMPS.



THE BUILDING MATERIALS ARE EXPOSED TO REDUCE COST AND GIVE THE BUILDING AN EARTHY RUSTIC FEEL. THE ENTIRE SPACE IS CREATED IN SUCH A WAY THAT DAYLIGHT COULD REACH AT EVERY CORNER BY PROVIDING JAALI PATTERNS OPEN SPACES SKY LIGHTS ETC.

## COURTYARD TO COURTYARD CONCEPT

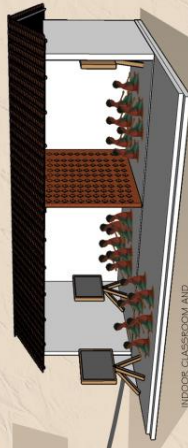
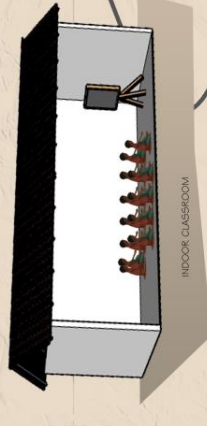


- COURTYARD
- TRANSITION SPACE
- FORMAL CLASSROOM
- INFORMAL CLASSROOM
- TRANSITION SPACE
- COURTYARD

- COURTYARD CREATED THE STACK EFFECT AND GIVE NATURAL VENTILATION INTO THE BUILDINGS.
- DIVIDING THE BLOCKS WITH CENTRAL COURTYARD SPACE ACTS A CONNECTOR TO THE BLOCKS
- ACCES FOR THE FORMAL AND THE INFORMAL CLASSROOM THROUGH FOLDABLE PARTITION WALL DOOR.
- SO TO KEEP THE IDEAL START TO THE GURUKULAM CLASSROOM, BRING FORMAL AND INFORMAL TO THE INDOOR AND OUTDOOR CLASSROOMS.
- THE FORMAL CLASSROOMS ACTS AS A NORMAL CLAS ROOM
- THE INFORMAL CLASSROOMS ACTS AS A OUTDOOR CLASSROOM AND INTERACTIVE SPACE OR GATHERING SPACES.

## CONCEPT

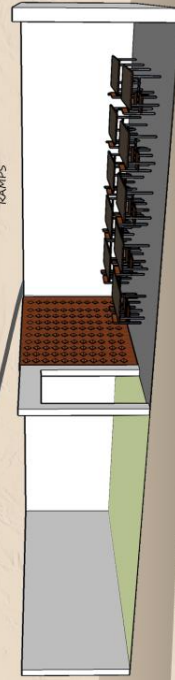
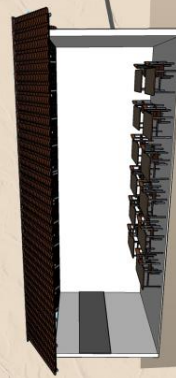
EARLIER DAYS THE GURUKULAM CLASS ROOM WAS IN AN OUTDOOR ROOM.



PARTIALLY THE ROOM WAS BROUGHT TO SEMI OPEN SPACE.

- BRINGING BACK TO THE OUTDOOR CLASSROOM
- MOST OF THE GOVERNMENT BUILDINGS INCLUSIVE DESIGN MISSING.
- INCORPORATING THE INCLUSIVE DESIGN STRATEGIES TO THE GOVERNMENT SCHOOL.
- FOR EASY ACCESS TO THE DIS-ABILITIES PERSONS.

BUT NOW A DAYS IT SEEMS FORCEFULLY PUSHED TO AN INDOOR CLASSROOM.



- INDOOR CLASSROOM
- OUTDOOR CLASSROOM

SHYAM GANESH .M - 39210085

### 3.2. SITE PLAN



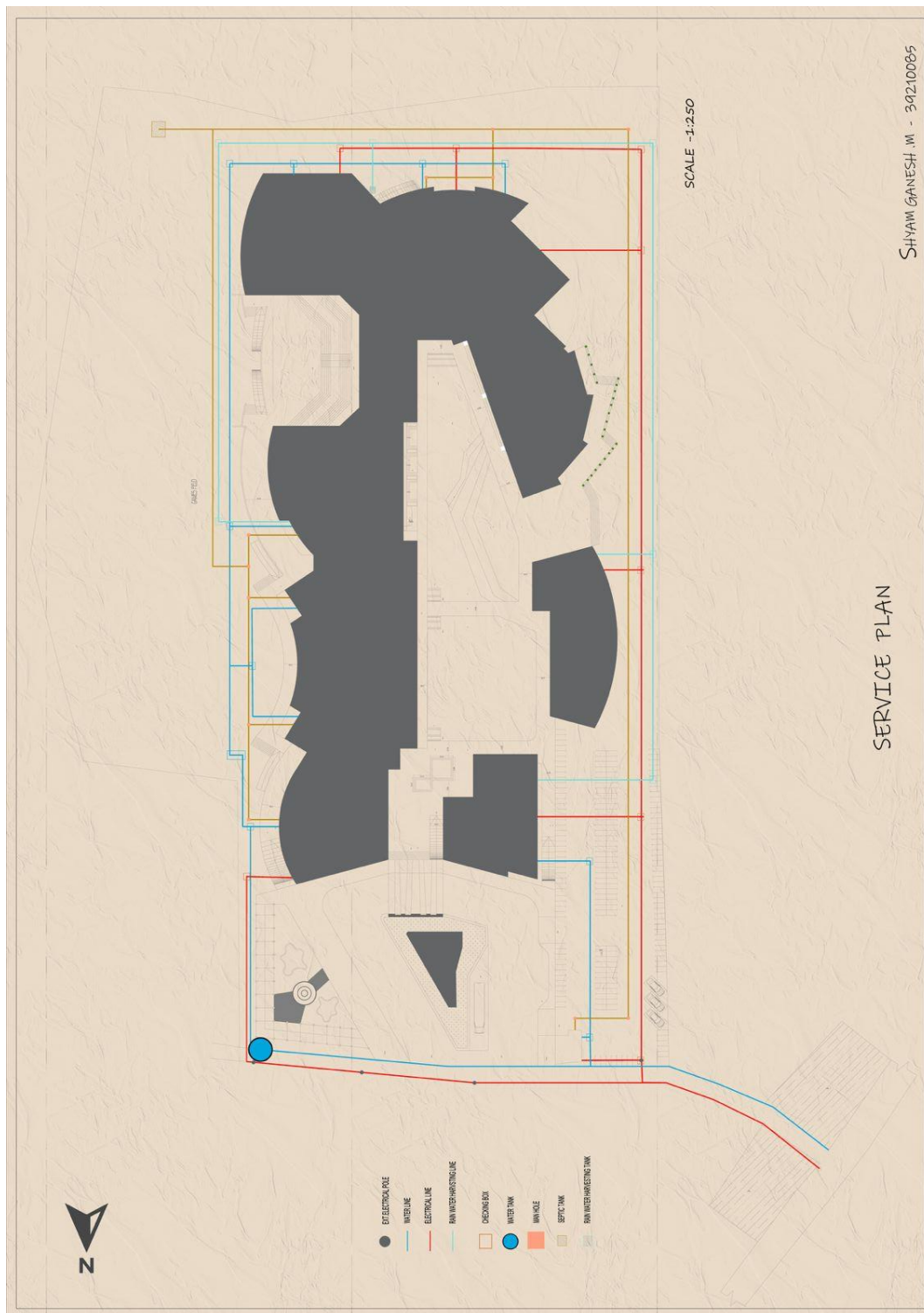
### 3.3. GROUND FLOOR PLAN



### 3.4. FIRST FLOOR PLAN



### 3.5. SERVICE PLAN



### 3.6. ROOF PLAN AND DETAIL DRAWING



SHYAM GANESH .M - 39210085

## 6. Chapter- REFERENCE

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[\(Archello\)](#) [\(Azure Magazine\)](#)

[\(RTF | Rethinking The Future\)](#) [\(Azure Magazine\)](#)

[Green Evolution on The School KFI](#) [\(Green Evolution\)](#)

[Yellow Train School Official Website](#)