

YOUTH SKILL DEVELOPMENT HUB

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
SCHOOL OF BUILDING AND ENVIRONMENT**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
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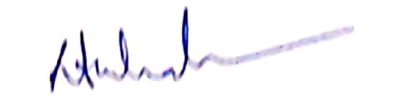
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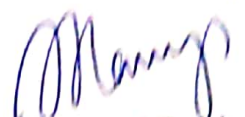
DEPARTMENT OF ARCHITECTURE

BONAFIDE CERTIFICATE

This is to certify that Thesis Report is the bonafide work of J.JEYAKAVIN (30210031) who carried out the Thesis entitled "YOUTH SKILL DEVELOPMENT HUB " under our supervision from November 2023 to May 2024


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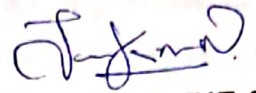

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DECLARATION

I, **JEYAKAVIN J** hereby declare that the Thesis Report entitled "Spiritual Center (For Christian Community)" done by me under the guidance of **Ar. Selvendiran** (Internal Guide), **Dr. Arulmalar kamaraj** (Internal Review Member) and **Ar. Ramji** (External Guide) Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Architecture Degree.

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JEYAKAVIN J

THESIS SYNOPSIS

This thesis explores the conceptualization, implementation, and impact of Youth Skill Development Centres (YSDC) as pivotal institutions for empowering young people. It argues that equipping youth with essential skills not only enhances their employability but also fosters personal growth, civic engagement, and overall socio-economic development. The study presents a comprehensive framework for the establishment and operation of YSDC, highlighting best practices, challenges, and strategies for success.

The thesis explores the design and development of a Youth Skill Development Centre that integrates neo-vernacular architecture principles. This approach aims to create a sustainable, culturally resonant environment that fosters the holistic growth and skill acquisition of young people. The centre will serve as a multifunctional space, addressing the educational, vocational, and recreational needs of the youth while promoting community engagement and environmental stewardship.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The Youth skill Development Centre aims to be a transformative space for nurturing the potential of young people by integrating neo-vernacular architecture and cultural identity. In an era of rapid urbanization and globalization, there is a pressing need to create environments that not only support the developmental needs of youth but also preserve and celebrate local cultural heritage. Neo-vernacular architecture, which combines modern building techniques with traditional design elements, provides an innovative approach to achieving this balance. The Youth Development Centre aims to be a vibrant hub of activity, learning, and innovation. It will provide a safe and inclusive environment where young people can explore their interests, develop their talents, and build meaningful relationships. By offering a wide range of programs and services—including educational workshops, leadership training, mentorship opportunities, and recreational activities—the centre seeks to empower youth to reach their full potential.

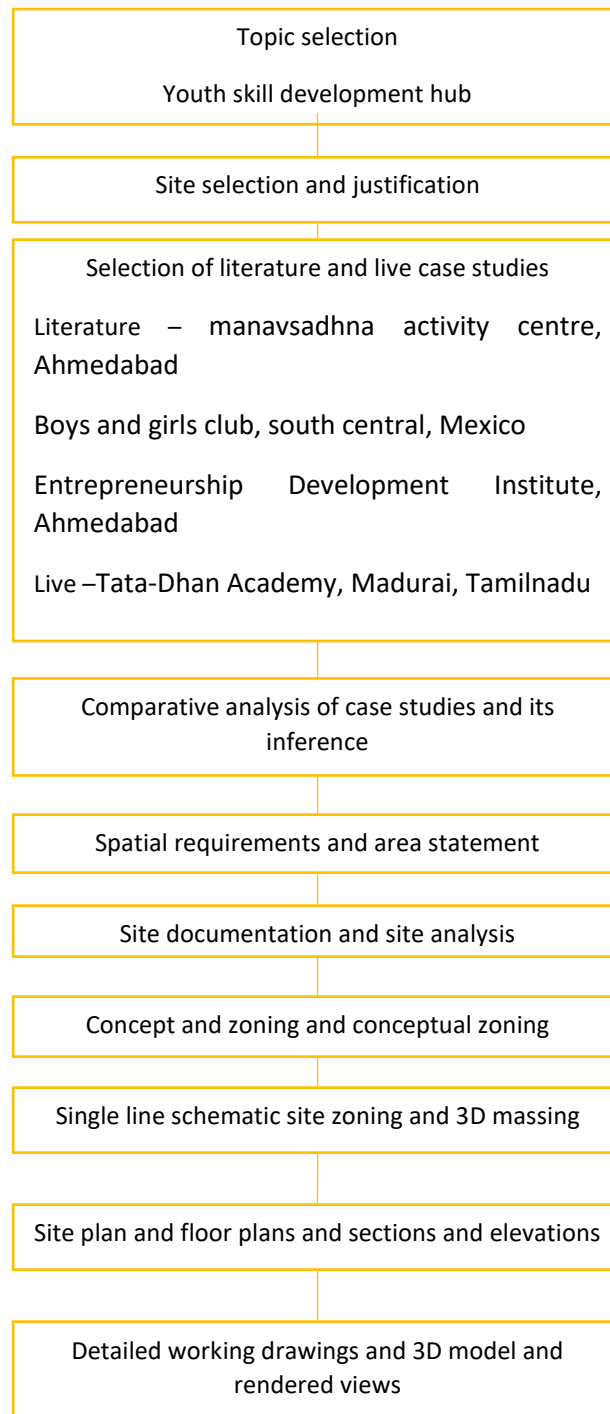
1.2 Need Of the Project

In many communities around the world, young people face significant challenges in accessing opportunities that can improve their economic status. These challenges include inadequate education and training, limited access to resources, and a lack of mentorship and support systems. Establishing a Youth Development Centre (YDC) is crucial in addressing these issues and empowering young people to achieve economic stability and growth .

1.3 Aim and Objective

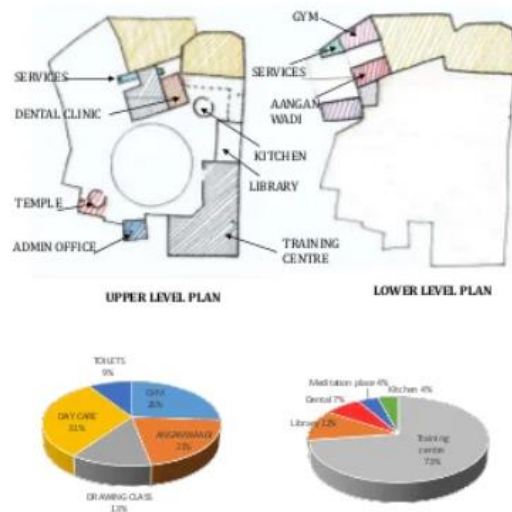
The primary aim of the Youth Development Centre is to foster holistic development among young people by creating a space that is both functionally supportive and culturally enriching. By integrating neo-vernacular architectural principles, the Centre will serve as a model for sustainable and culturally resonant design, promoting a sense of belonging and identity among its users.

1.4 Methodology



2.1.1 SPACIAL ANALYSIS:

Manavsadhna has radial organization. Here all the spaces are tend to open at the central court. The courtyard acts as a multipurpose space where children dance and play various outdoor games and also cultural programmers will be conducted. Ahmadabad is a kind of hot and dry climate. All the spaces are oriented towards the windward direction facing the open court for the cross ventilation.



2.1.2 MATERIAL ANALYSIS:

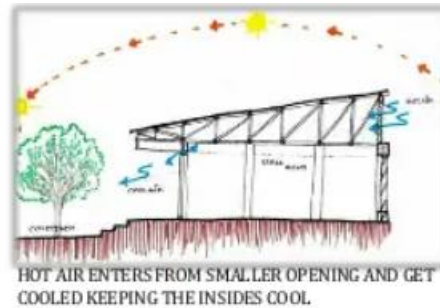
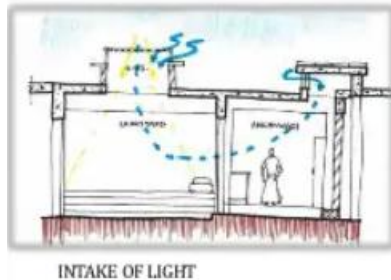
Manavsadhna is constructed as a live demonstration for the application of recycled waste as affordable, aesthetically pleasing and efficient building components. Materials are of municipal/domestic waste and prepared with simple hand operated tools by the local people. These recycle materials include –

- cement bonded fly ash bricks,
- mold compressed bricks made from landfill site waste residue,
- Stabilized soil block,
- glass bottles,
- Plastic bottles filled with ash and waste residue,
- vegetable crate wood paneling in the inner
- partition walls



Waste materials used in Manavsadhna activity center

For reinforcement coated paper waste and for door panels uses shredded packaging wrapper. Vegetable wood crates as frames for the interior partition walls and oil containers as blades make the ventilation louvers in the toilet.



Climate analysis of Manavsadhna activity center

There are different types of waste materials and construction techniques used in making walls, and the roof and floor slabs are -

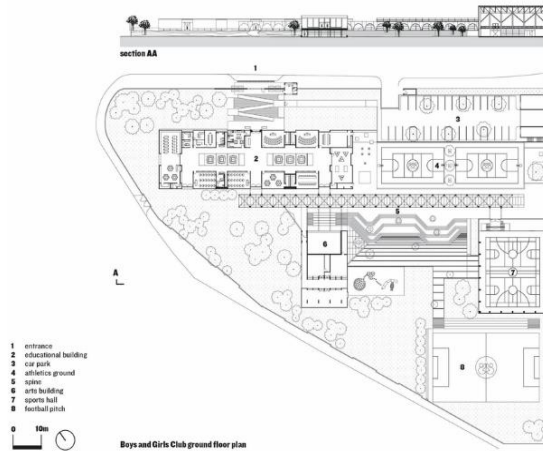
- Filler slab with glass bottles,
- Plastic bottles
- fly ash Bricks
- Stone slab
- Cement bonded particle clay tile cover
- Light conduit pipe truss with G.I. Sheet with clay tile roof

Plate 2.2 – manavsadhna activity centre - 2

2.2 Boys and girls club, south central, Mexico



Architects: Centro de Colaboración Arquitectónica (CCA)
 Project: Boys and Girls Club
 Location: south-central, Mexico.
 Area: 3500 m²
 Program: Community development and social welfare Cultural facilities Education facilities



The project was divided into three buildings: **Building A** the educational building, housing classrooms and spaces for music, art and computers, as well as a kitchen, library, and multipurpose room. Developed in a single-level volume, the building has **two adjoining central courtyards** understood visually as a single space. The patio provides natural ventilation and illumination without the need for windows on the façades, to achieve the following specific objectives: **protecting children**, as classrooms can be supervised without needing to walk long distances; **safeguarding classroom facilities** from possible vandalism and theft; and **preventing the boys and girls** being distracted during classes, by not providing views towards the sports and recreational areas.

The Club is located at the boundary between two municipalities, Tecámac and Ecatepec, with a catchment area of **15 low-income neighborhoods within a two-kilometer (1.2-mile) radius**. This area is located within a special crime prevention zone set up by the federal Interior Ministry. Ecatepec and Tecámac have a combined population of 2,070,000, with **the highest population density, insecurity and crime levels in Mexico**.

Building B is the arts building. It is used for less academic activities: a hall for dance classes, a dojo, as well as a large multipurpose area for students' temporary art exhibitions and similar events. The building also has a semi-open auditorium for music recitals, dance performances and all kinds of talks, and is fluidly connected with the main staircase leading to the central patio. The building is complemented with a space designed exclusively for teenagers, who can relax in a safe environment; training sessions and talks are held here to inform young people about the risks of taking drugs and other addictions, as well as sex education and other topics.

Building C is the sports building and consists of a large roofed space adaptable to all kinds of activities and sports. This building's north-facing orientation provides natural lighting thanks to its saw-tooth roof.

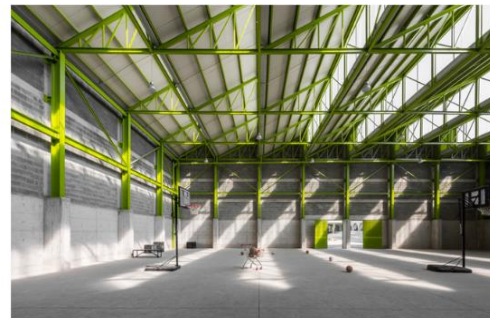


Plate 2.3 – Boys and girls club - 1



The three buildings are connected by a covered corridor that functions as a guiding axis and to organize the overall space. This element—composed of 24 vertebrae in the form of arches—is the back-bone of the architectural design. The arcade is an ingenious geometric structure of exposed concrete arches. **Each of the 24 modules represents a human vertebra reflecting the idea that comprehensive education and training is the foundation for a better future.**

The project is completed with various sports and recreational areas:

- basketball courts,
- soccer pitches,
- squares,
- parks and gardens,
- as well as broad esplanades and stairways that sculpt the natural topography and that flow into adjacent spaces, open and free of definition.



The youth club sits between two municipalities with the worst crime rates in the country. **‘There are no jobs in this area, so these kids’ parents have to travel far away to work,’**

‘All the nearby buildings have a lot of graffiti, but this one is pristine. The community owns it and takes care of it.’

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39210031**

Plate 2.4 – Boys and girls club - 2

2.3 Entrepreneurship Development Institute, Ahmedabad

Concept of Design of Entrepreneurship Development Institute

The main idea behind the design adheres to the brief provided by the committee of EDII. The brief mentions a well-landscaped campus with minimal use of artificial energy. It calls for a modernist approach with elements of traditionality. Thus, the design resulted in a vernacular structure with influence from Islamic and Colonial architecture prevalent in Ahmedabad.

The design has influences from the architect's thesis study in California on Indian-Islamic architecture. As a firm practicing a modernist approach, the campus is an exemplar of Indian Modernism. The area of courts is in proportion to the height of the campus with interconnected courts and corridors. The structure follows a brick-concrete construction similar to the campus of IIM in Ahmedabad.

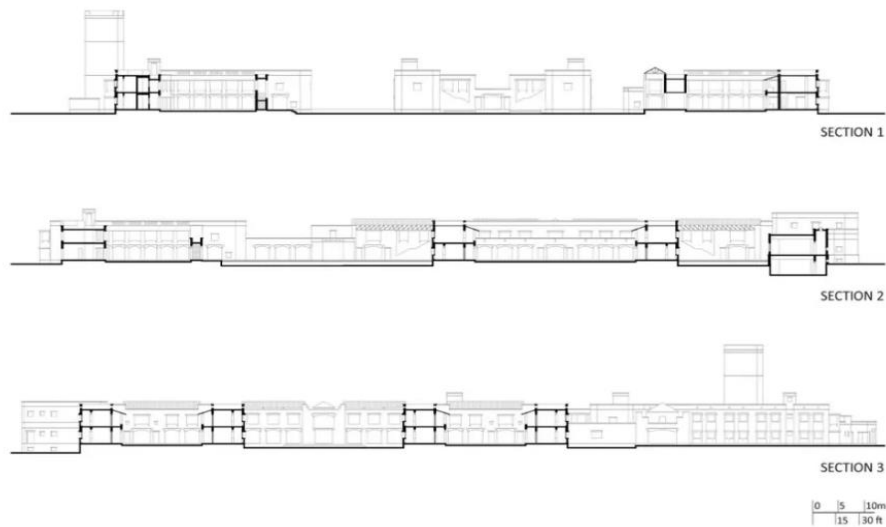
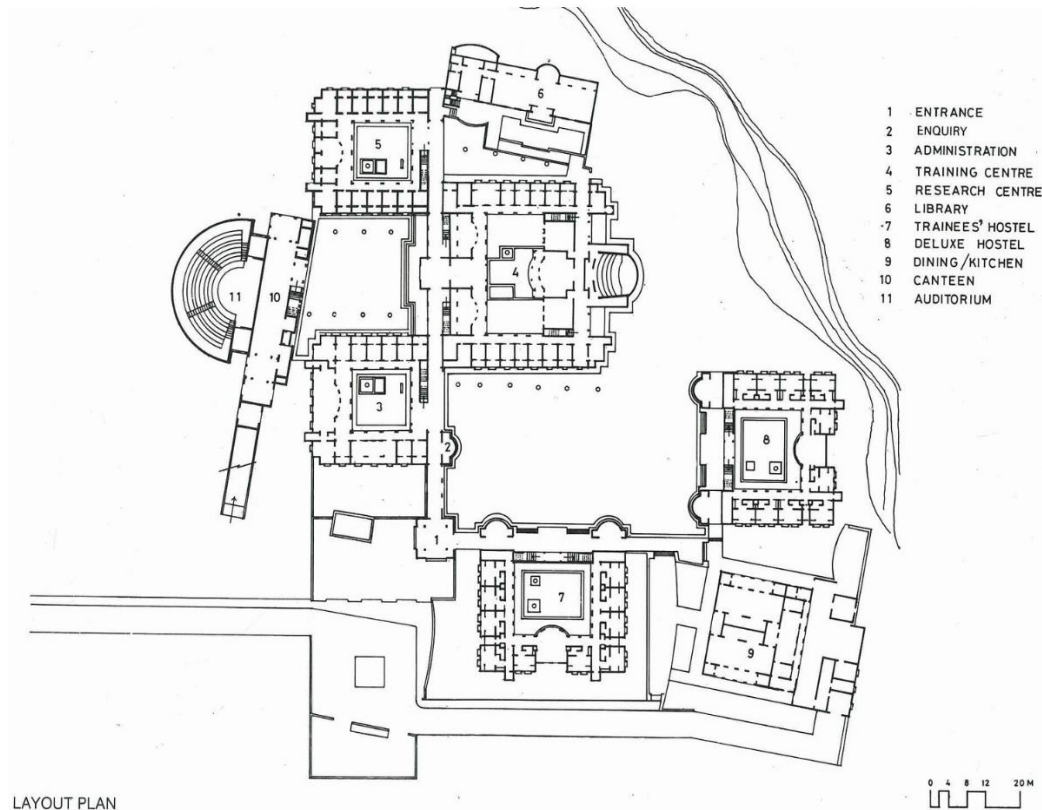


Plate 2.5 – Entrepreneurship Development Institute - 1



The design of this horizontally spreading campus with an introverted environment is based on the concept of segregation of various functions, courtyard planning and the use of spacious verandahs and corridors. Besides the internal courtyards in the individual building blocks, the outside spaces between the blocks are so organized as to set the buildings with a foreground which in the third dimension merges into infinite space.

The main circulation spine stretching from the entrance pavilion to the library interlinks the various departments. It is so articulated as to provide a varying visual experience, enriched by the three-dimensional treatment and the series of inside and outside spaces. To introduce new facilities, the spine can be extended and new departments attached.

The campus consists of seven blocks interconnected by axes on two axes on the east. Block A and B are hostel blocks that are similar in design. Block A is one-storeyed with ten rooms, whereas Block B is two-storeyed with twenty rooms. The rooms have attached bathrooms and air-conditioned. The planning of each room is modular, with an area of 29.16 sq. m. Block C is at a corner point between A and B. It consists of two dining halls with kitchen and catering facilities. All blocks except Block E shares a large courtyard, whereas blocks D and F share a smaller court with Block E. Block J is a library and forms another court with blocks E and F. However, the classrooms follow modular planning arranged to achieve maximum ventilation. Apart from the seven blocks, an auditorium functions at the rear end of the site.

Plate 2.6 – Entrepreneurship Development Institute - 2

2.4 Tata-Dhan Academy, Madurai, Tamilnadu

Project: Tata-Dhan Academy
 Location: Madurai, Tamilnadu
 Architect: Chandavarkar & Thacker Architects Pvt Ltd, Bengaluru
 Client: Dhan Foundation, Madurai
 Design Team: Prem Chandavarkar, Mehul Patel, Shyamala Shankar
 Structural Engineers: B.L. Manjunath & Co., Bengaluru
 Services Engineers: Semac, Bengaluru
 Civil Contractors: TAPL, Nagercoil
 Project Area: 55,000 sqft (Phase 1)
 Initiation of Project: March 2006
 Completion of project: October 2009

Around the constraints, the academy is designed as two clusters of modules in a fractal, chequered pattern connected by verandas. Again, the design can be perceived as an abstract of the Chettinad House, where devices like courtyards, verandas and split-levels account for the overall climate control of the house. The modules are placed around a court that allows ventilated units with defined hierarchies to have a play in built-open spaces. Conceptually, the architects propose an alternative way of looking at built educational environments by treating the Institute as a 'community of learners', rather than as a functional facility. The hierarchy of spaces and the humble scale of the institute combine with local materials and forms to resemble, in essence, a traditional Indian habitat.

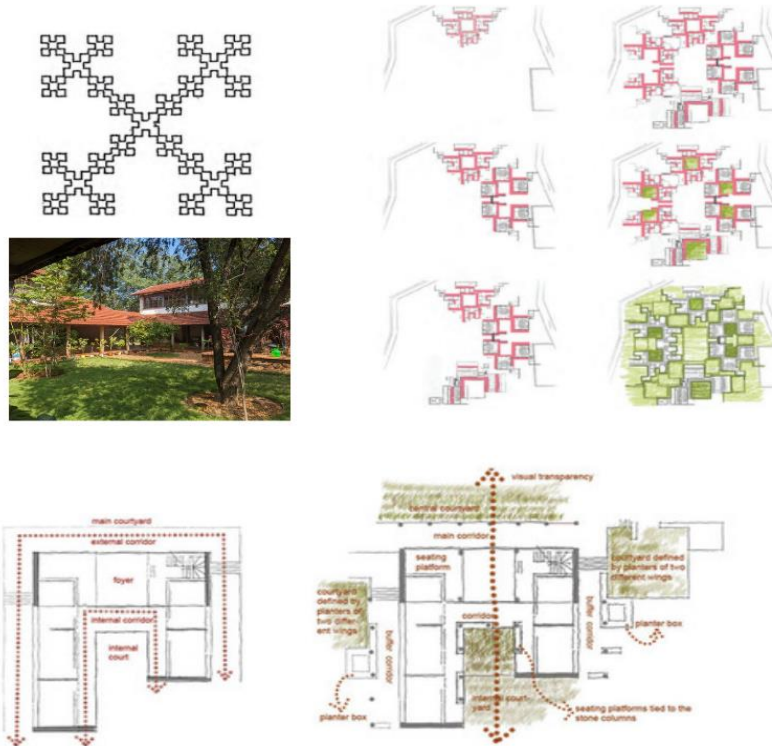
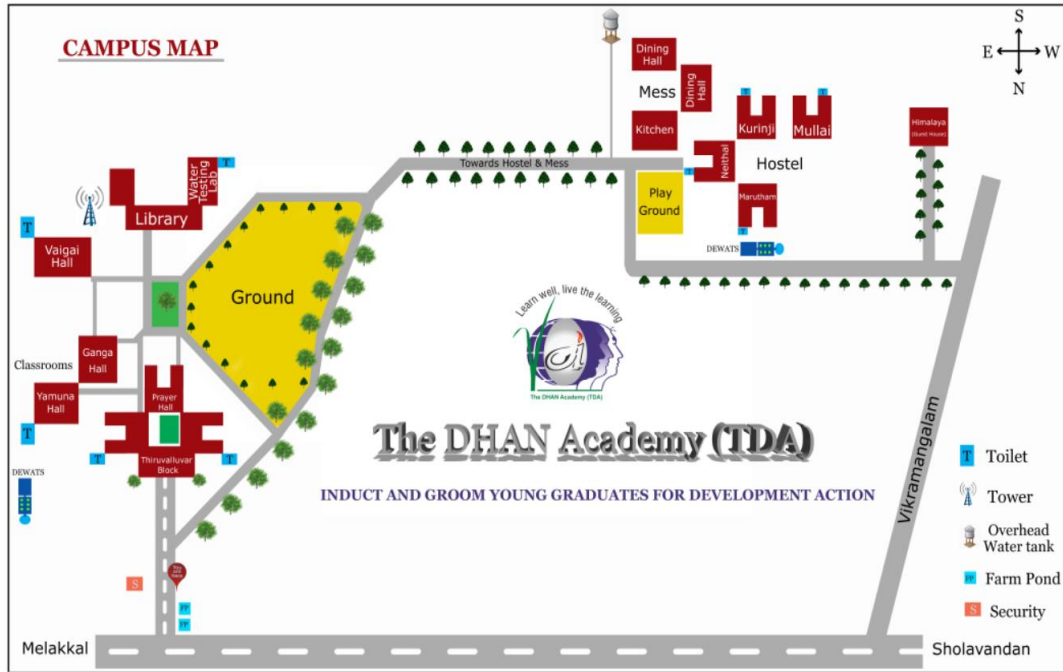


Plate 2.7 – Tata-Dhan Academy - 1



Why would a contemporary project like this adopt a vernacular vocabulary? The building could very well have been a modern expression on the same terrain, with the same set of constraints. The architects intend to align the building vocabulary with the culture of the place. There is a careful effort to study the Chettinad House to understand the patterns of spatial organisation, concepts of scale and intimacy, and nuances of materiality; not just to copy, but to adapt and improvise in order to create a familiar environment. The series of modules in chequered patterns are carefully detailed as a response to the climate of the place and the spirit of a learning environment. To a culture obsessed with image, the building may not look like an institution, but it is important to ask whether we build to create objects of commodity or environments of activity

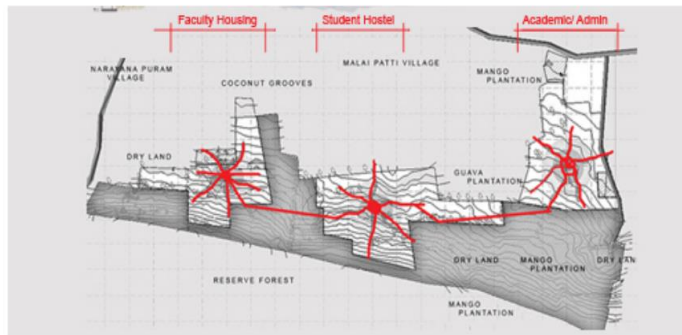


Plate 2.8 – Tata-Dhan Academy - 2



The palette of materials range from chipped local granite in steps and columns to vibrant oxides and terracotta tiles; from stone-rubble masonry walls to glass and steel of the facades. These materials are brought together in architectural spaces designed for congregation, interaction and chance encounters. While the verandas provide a buffer for the heat, the split-levels and double-height spaces support conventional currents, making this institute independent of air-conditioning, while the units borrow maximum natural light. Simple and effective concepts rooted in the architecture of the place make the architecture of the Tata-Dhan Academy a self-sustaining learning environment.



→ stew mat

→ lab area



the roof was covered with straw mat which will act as an alternative for false ceiling



water was placed in a pot all over the academy for the **peacock** . due to its large population in that surrounding area



← terracotta roof

← cavity between roof

← steel sheet



→ Straw mat is used to cover the steel sheet and it will give an traditional look to the space but after some years its started to tear down



- the red oxide flooring gives the essence of the culture of the locality
- the classroom was planed to imitate the outdoor courtyards (oat) to give them a different feel from ordinary school classroom feel
- the classrooms are made in a different pattern comparing to the conventional class rooms which we are using in our day today life.



Thennai is used as an activity and a gallery space to show their works

Even the till the sill level the oxide is used all over the building



- the flooring in the entire building was done with oxide. in oxide they also explored different shades red and yellow oxide which is predominantly used in that region
- every classroom has a proper connectivity to other places or blocks. The corridors are connected to the space called thennai which is used as a gathering space in that neibourhood

program

- the total population of the academy is 10 to 15 students only they wont take more than that per batch.
- they will select those students based on a interview which can happen in 13 different states where Dhan foundation in working .
- They will also provide full sponsorship to all the selected students for the 2 years of course period .
- later the will place these students in any of the NGO related to their course and it was compulsory for them to work there for 3 years.



→ Seating's are places under every tree in the campus in between blocks

Plate 2.9 – Tata-Dhan Academy – 3

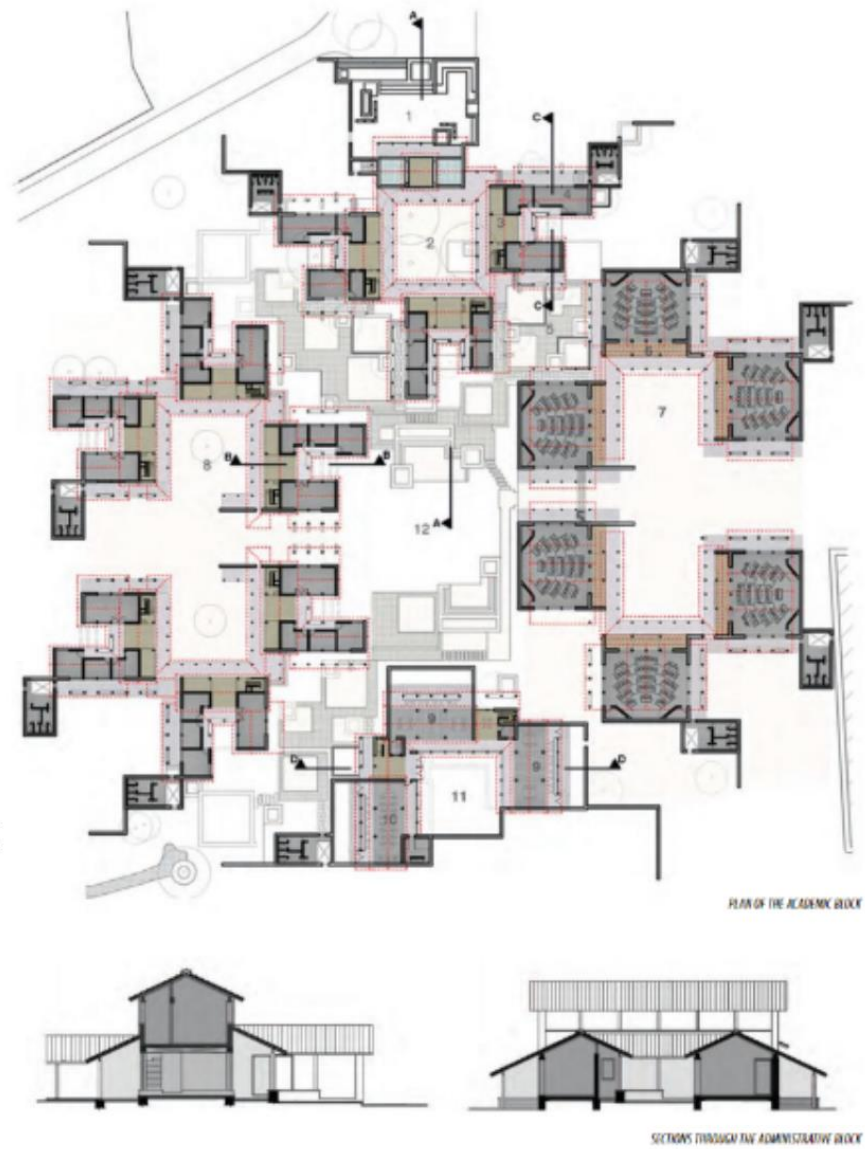


Plate 2.10 – Tata-Dhan Academy – 4

CHAPTER 3

DATA COLLECTION AND STANDARDS

3.1 Skills to Develop Around the Site

S No	Sector	Trades	Target (Persons)	Budget (₹)
1.	Tourism and Hospitality	- Billing Executive - Chef-de-partie - Assistant Catering Manager - Assistant Facility Manager - Front Office Associate - Guest House Caretaker - Guest Relations Manager - Kitchen Helper - Laundry Machine Operator - Meeting, Conference and Event Planner	4,000	₹6.71 Crores
2.	Healthcare	- General Duty Assistant - Blood Bank Technician - Cardiac Care Technician - Diabetes Educator - Emergency Medical Technician – Basic - Medical Records & health Information Technician	2,000	₹5.82 Crores
3.	Agriculture & Food Processing	- Sustainability, Modern Fishing & Safety Training - Boat & Ship Repair - Export based training for fisherman cooperative	3,500	₹4.97 Crores
4.	Retail & Wholesale	- Sales Associate - Team Leader - Store Manager - Cashier	850	₹2.72 Crores
5.	Construction	- Foreman – Electrical Works (Construction) - Metal Inert Gas/Metal Active Gas/Gas Metal Arc Welder (MIG/MAG/GMAW) - Mason Marble, Granite and Stone - Foreman Wet Finishing and Flooring - Bar Bender and Steel Fixer - Assistant Electrician	3,500	₹10.24 Crores
6.	Textile and Apparel	- Cutting Supervisor - Knitting Machine Operator - Fabric Checker	1,500	₹2.79 Crores
Total Training Target and Training Cost			16,250	₹33.72 Crores

Agriculture and Allied Sector

Agriculture and allied sectors contribute around 12% to the District's GVA. Agriculture in the District is dominated by fishing, which contributes to more than 50% of the agricultural output, and livestock. Cultivation has seen major decline owing to droughts in the recent years. The major crops cultivated in the district are paddy, millets, groundnut, sesame, among others

Industrial Sector

Recent growth in the manufacturing sector (8% CAGR between 2011-12 and 2016-17) has enabled a growth of the Industrial sector 4% per annum over the last 5 years. The sector is dominated by the Manufacturing and Construction sub-sectors - they account for around 98% of the output. Textiles, food processing, other chemicals and non-metallic products are some of the key industries in the District.

Table 4: Profile of Manufacturing Sector from ASI (2014-15)

	No. of Units	No. of Employee	Gross Value Added (share in total GVA)	Share of Employment	Average workers per unit
Spinning, weaving and finishing of textiles	104	31,847	49%	47%	306
Other chemical products	150	22,929	12%	34%	153
Non-metallic mineral products n.e.c.	56	2,758	8%	4%	49
Printing and service activities related to printing	27	2,392	3%	4%	89
Paper and paper products	19	2,244	3%	3%	118
Plastics products	5	1,927	2%	3%	385
Others	66	2,733	19%	4%	392
Total (all sectors)	442	68,178	100%	100%	154

Source: Annual Survey of Industries 2014-15



Figure 5: GVA of Agri and Allied Sectors (2016-17)



Source: Directorate of Economics and Statistics, TN

Non-formal education

Non-formal education programs offer practical skills training and hands-on learning experiences that supplement formal education. These programs often focus on vocational skills, digital literacy, entrepreneurship, leadership, and soft skills development. By acquiring these competencies, youth enhance their employability, entrepreneurship potential, and overall adaptability in the job market.

Formal	Non-Formal
Full-time educational pathway	Complementary learning activities
Structured, planned, facilitated	Structured, planned, facilitated
Schools, colleges, universities	Courses, workshops, seminars, training
Diplomas & degrees	Skills & capabilities

Youth Aspirations

The aspirations of the youth are largely oriented towards white collared jobs, especially in the IT-ITES, Media & Entertainment and BFSI sectors

There is negative perception in the community about blue-collared jobs TNSCVT (tamilnadu state council of vocational training) is Offering the below listed Skill Development Courses:

- 1) Certificate in Carpentry
- 2) Certificate in Plumbing
- 3) Certificate in Cutting & Tailoring
- 4) House Wiring & Electrical Appliance Repairing
- 5) Motor & Transformer Rewinding
- 6) Mobile Phone Repairing

- 7) Certificate in House Keeping
- 8) Certificate in Office Management
- 9) Certificate in Storekeeper
- 10) Certificate in Financial Accounting
- 11) Certificate in Quality Control Assistant
- 12) Certificate in Data Entry Operator

Entrepreneurship and Business Development

Business Fundamentals: Basics of business planning, finance, and management.

Entrepreneurship Skills: Idea generation, pitching, market research, and business model canvas.

Leadership and Team Building: Developing leadership qualities and effective team management skills.

Networking and Communication: Building connections and effective communication strategies.

Carpentry, Plumbing, and Electrical Skills: Hands-on training in these trades.

Automotive Repair and Maintenance: Basics of vehicle maintenance and repair. Interior

3.2 Materials

For construction Vernacular architecture uses locally available materials. they are affordable by anyone in the society and it is climate responsive for that region. those materials are mud walls, thatched roofs, stone walls, mosaic flooring, red oxide flooring etc.

These materials increase will sustainability. It was mostly used in rural areas for its low-cost level with some adaptive techniques we can use these materials in larger scale like urban built forms. Like mud, stone blocks are also effective and it will be energy efficient.

Some of the materials are,

- Rammed earth
- CSEB blocks (compressed stabilized earth blocks) or mud blocks
- Bamboo
- Lime and mud plastering

- Oxide flooring
- Athangudi tiles
- Terracotta

Rammed earth:

The term "rammed earth" is a construction method for creating walls that involves compacting layers of dirt or earth combined with a little water inside a formwork. As a consequence, the construction is strong, long-lasting, and ecologically benign. This method has been employed in numerous regions of the world for centuries and is considered a sustainable building technique

Rammed earth construction has various benefits, including:

Sustainability:

It is an eco-friendly alternative due to the use of locally obtained earth and minimum energy during building.

Thermal Mass:

Rammed earth walls have high thermal mass, which helps regulate indoor temperatures and reduces heating and cooling requirements.

Durability:

Rammed earth walls that are properly built can last for millennia, withstanding weathering and giving structural stability.

Rammed earth walls are naturally fire-resistant and pest-resistant when compared to various typical building materials.

Aesthetics:

Rammed earth walls have a distinct and appealing natural appearance and texture.

Rammed earth building, however, may not be ideal for all places, particularly in areas with high rainfall or where the soil composition is unsuitable.

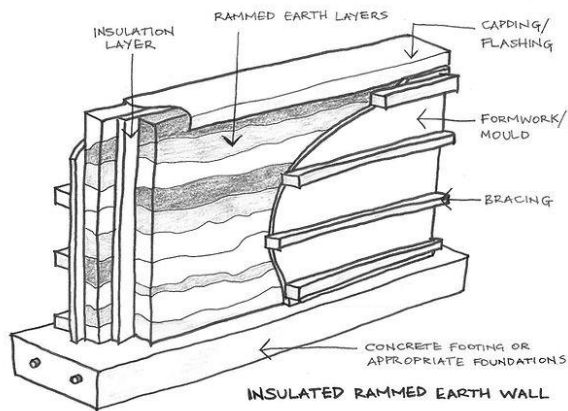


Figure 1- rammed earth wall
installation(adaptarchitecture.com)



Figure 2- various shades of rammed earth wall

CSEB Blocks:

Compressed Stabilized Earth Blocks (CSEB) are building blocks produced from locally obtained soil, sand, and a little amount of stabilizer such as cement or lime. These blocks are compacted manually or with a hydraulic press, resulting in a solid and stable building material. CSEB blocks are extensively utilized in environmentally friendly and sustainable construction procedures, particularly in areas where excellent quality construction materials are rare.

Here are some significant characteristics and advantages of CSEB blocks:

Sustainability:

Because CSEB blocks use local soil, they support sustainable construction by eliminating the need for construction material shipping. When compared to traditional bricks or concrete blocks, the manufacturing method uses less energy.

Cost-effectiveness: Because the basic ingredient is soil, which is typically abundant, CSEB blocks might be a cost-effective alternative to traditional building materials, particularly in rural or impoverished areas.

Thermal Insulation:

The thermal insulation capabilities of CSEB blocks help to manage indoor temperatures and reduce the need for artificial heating and cooling. Because of the inclusion of cement or lime in the mixture, properly stabilized CSEB blocks provide good fire resistance.

Versatility:

CSEB blocks have a wide range of applications, including walls, foundations, and other load-bearing constructions.

Construction Ease:

The blocks have uniform dimensions, making them easy to stack and work with during construction. This may result in shorter building times.

Earthquake Resistance:

When paired with other construction techniques, CSEB construction can be constructed to improve earthquake resistance.

Soil suitability:

Not all soils are suited for CSEB and earth building in general. But many soils may be used for generating CSEB with a little bit of knowledge and expertise. Organic soils and topsoil are not acceptable. Knowing a soil's characteristics is crucial to producing, in the end, high-quality products. After a brief training, some straightforward sensitivity analysis may be carried out. Sandal lite soils will benefit more from cement stabilization. Clayey soils will benefit more from lime stabilization.

Soil for cement stabilisation: it is more sandy than clayey	Gravel = 15%	Sand = 50%	Silt = 15%	Clay = 20%
Soil for lime stabilisation: it is more clayey than sandy	Gravel = 15%	Sand = 30%	Silt = 20%	Clay = 35%

Figure 4-soil type for various stabilisation in CSEB (earth-auroville.com)

The average stabilizer proportion is rather low:

	Minimum	Average	Maximum
Cement stabilisation	3 %	5 %	No technical maximum
Lime stabilisation	2 %	6 %	10%

Figure 3- soil stabilizer proportion(earth-auroville.com)

The project requirements and the soil condition will determine which stabilizer is used. Sandiest soils and those that need to reach a higher strength rapidly should use cement. For particularly clayey soil, lime will be used more often, but it will take more time for the lime to solidify and produce sturdy blocks

MAKING OF CSEB BRICKS:

Blocks made of compressed earth can be stabilized or not. However, they are often stabilized by lime or cement. Because of this, we prefer to refer to them as CSEBs (Compressed Stabilized Earth Blocks) nowadays.

Buildings may now be higher and have walls that are thinner yet have significantly superior compressive strength and water resistance thanks to the contribution of soil stabilization. The blocks with cement stabilization need to be cured for four weeks following production. Following this, they may cure naturally and be used as regular bricks using a mortar that contains stabilized soil cement.

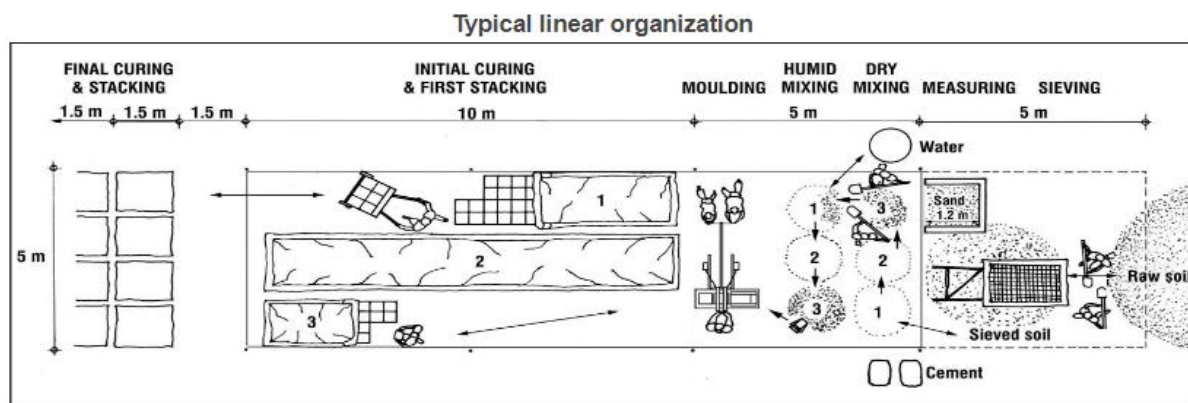


Figure 5 - Making process of CSEB (earth-auroville.com)

CSEB Composite Columns:

The circular block 240 and the circular block 290 are two varieties of round hollow CSEB that have been developed. Concrete cemented with cement is used to strengthen these blocks. The same cement-sand mortar, CSM 1: 3, is used to lay both types of blocks. Because stabilized earth mortar shrinks, it cannot be utilized for this composite process and will not stick to the steel rods. The steel rods cannot be higher than 1.5 m since doing so makes impossible for the blocks to slide down the column. As a result, certain extension rods are frequently installed with 50 times the bar diameter overlap.

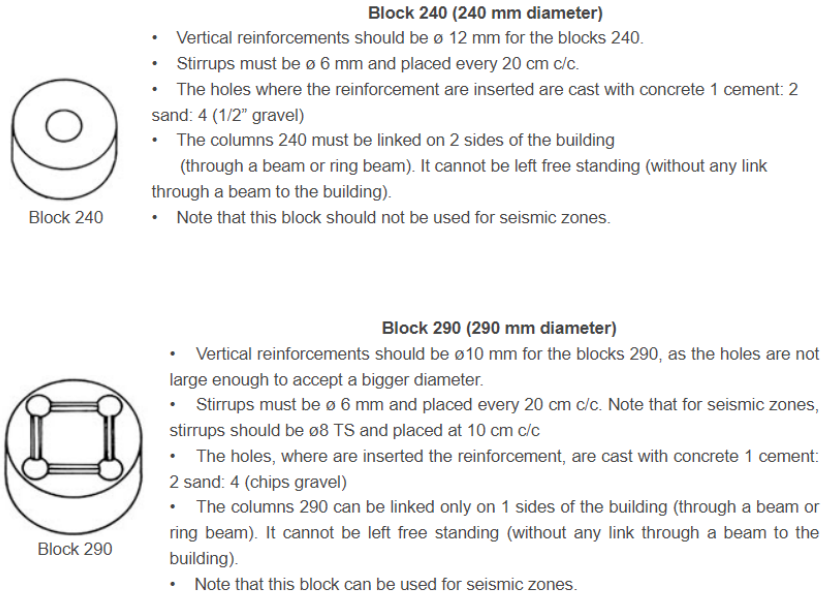


Figure 6 - composite column types details(earth-auroville.com)



Figure 7 - CSEB composite column construction(earth-auroville.com)

The Auram equipment:

In the Auroville Earth Institute's, a variety of tools have been explored and created for earthen construction. It includes things like quality-control tools for manufacturing blocks, handling tools, hand equipment, scaffolding, and rammed earth machinery. It also includes presses for compressing stabilized earth blocks.

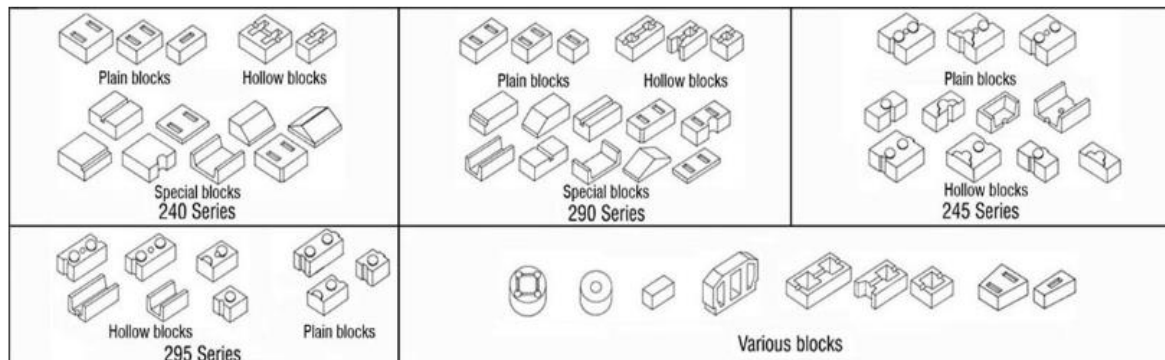


Figure 8 – Different blocks of CSEB



Figure 39 – auram equipment

This equipment is frequently utilized on the Auroville building sites, and it is continuously updated and upgraded. Our metal shop Aureka creates the Auram equipment in Auroville. The series productions are always restricted to a few machines (10 at a time), since our equipment is continuously improved. As a result, we can guarantee that consumers receive the most cutting-edge and effective model.



Compressed stabilised earth blocks by the Auram press 3000

Comparison of the wall structures:

The comparison between the CSEB, Rammed earth and conventional concrete walls

Characteristic	CSEB Brick Walls	Rammed Earth Walls	Concrete Brick Walls
Raw Materials	Made from earth, stabilizers, and minimal cement. Typically uses local, abundant, and low-impact materials.	Made from earth, which is abundant and sustainable. May require minimal stabilizers	Made from cement, sand, and aggregates, which have a higher environmental impact due to resource extraction and energy consumption.
Embodied Carbon	Generally low, especially if locally sourced and stabilized with minimal cement.	Low, as earth is a natural, low-carbon material.	Higher due to the energy-intensive process of cement production.
Energy Efficiency	Requires less energy for production and transportation, especially if sourced locally	Requires less energy for production and transportation, especially if sourced locally.	Requires more energy due to the energy-intensive process of brick manufacturing and transportation.
Insulation Properties	Offers good thermal mass and insulation properties, aiding in temperature regulation.	Offers good thermal mass and insulation properties, aiding in temperature regulation	Offers limited insulation properties and may require additional insulation materials.
Moisture Resistance	Requires protection against moisture, and resistance can vary based on the stabilization and curing process	Vulnerable to moisture without proper sealing, making it unsuitable for wet or humid climates.	Generally resistant to moisture but may develop cracks over time, potentially allowing water penetration.
Strength	Strength can vary depending on soil quality and stabilization methods. May not be suitable for heavy loads.	May not be as strong as concrete, limiting its use in high-load-bearing applications. May not be as durable as concrete in harsh conditions	Strong and suitable for a wide range of load-bearing applications.
Maintenance	Requires maintenance, including resealing and replacing damaged blocks	May require occasional maintenance, such as resealing or patching minor cracks.	Minimal maintenance is typically required but may involve patching cracks or repointing mortar joints over time.

Aesthetics	Natural and earthy appearance can be aesthetically pleasing	Natural and earthy appearance can be aesthetically pleasing.	Various finishes and designs available, but may not have the same natural appeal.
Local Sourcing	Can often be sourced locally, reducing transportation-related emissions.	Can often be sourced locally, reducing transportation-related emissions	May require transportation of materials over longer distances.

Table 1- general comparison of the wall structures

Filler slab:

In a filler slab, a portion of the concrete in a typical reinforced cement concrete slab is swapped out for a filler material, which might be waste material, to provide an economic benefit over an RCC slab. The fundamental idea behind a filler slab is that, in an RCC slab of a particular depth, the cement mix in the lower part of the slab serves just as dead weight and makes no contribution to the compression load that concrete in an RCC slab ordinarily absorbs. The bottom half of the slab can therefore be used to accept an appropriate lightweight filler material in place of the concrete. Savings are possible since rebuilding the concrete lightens the slab. without sacrificing the slab's strength and quality, be increased in both amount and quality of steel reinforcement. Hollow burned clay bricks, Mangalore tiles, concrete blocks, bricks, coconut shells, terracotta pots, and other materials are frequently utilized as filler materials.

The following criteria must be fulfilled before the filler materials is chosen:

- The substance must be inert (non-reactive).
- Given that the hydration of concrete is impacted, the restriction must be implemented with respect to of water absorption.
- It needs to be lightweight, that will reduce the structure's total weight, and cost-effective as compared to the price of replacing the concrete.
- The slab's size and the reinforcing spacing must be met by the material's size and thickness.

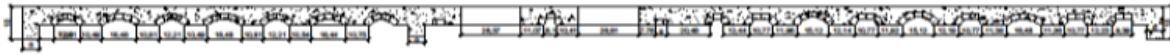
SUSTAINABILITY:

Efficiency of Materials:

Filler slabs often utilize less steel and concrete than conventional solid slabs. This decrease in material usage aids in resource conservation and lowers the building industry's carbon impact.

Energy Efficiency:

The hollow areas in filler slabs can offer advantages for thermal insulation, assisting in more effective temperature control indoors. This may result in less energy being used for heating and cooling, improving building energy efficiency.



Reduced Transportation expenses:

Because filler slabs require less materials to be delivered to the building site, transportation expenses are reduced. Additionally, this can lessen the negative effects of building on the environment.

Longevity:

Filler slabs that have been designed and built well can last a long time, minimizing the need for regular restorations or replacements, but can be expensive.

Structural Integrity:

Filler slabs have been created to preserve a building's structural integrity while lowering the total dead load. They can sustain the necessary loads and give stability to the structure thanks to proper design and reinforcing.

Slab	Item	Cement (Kg)	Steel (Kg/m ³)	Cost (Rs/m ²)
Two-way	Convectional slab of 120 mm thick	38.4	71	415
	Filler slab 150 mm thick	32	4	346
	Saving (%)	16	44	17
One-way	Convectional slab of 120 mm thick	48	6.5	450
	Filler slab 150 mm thick	32	3.5	338
	Saving (%)	33	46	25

Advantages:

Due to the use of less steel and concrete and cheaper filler materials, it costs 20% less than a conventional RCC slab.

The air pocket created by the tile's curves acts as a fantastic thermal insulator, therefore careful planning is necessary to ensure the structural integrity of a filler slab while taking into account the negative regions and reinforcing areas.

Better quality-controlled filler slabs are robust and long-lasting.

The living room-like temperatures provided by the heat-resistant air gaps between the filler slabs. Infill slabs provide thermal comfort in hot, humid areas.

By recycling hazardous substances into the soil and earth, this system automatically controls trash when materials like keyboards, used plastic, and bottles are used as fillers.

Disadvantages:

The filler slab method demands for knowledge. If a professional isn't contacted for its design and construction, there is a chance that mistakes will be made.

The rebars may rust if they come into contact with clay-based filler solutions. ample protection should be taken to prevent this, as well as ample cover for reinforcement

Terrace slopes must be carefully constructed for the aforementioned reasons, and all rainfall downpipes must be obstruction-free. Terrace upkeep must be ensured with sufficient attention.

Athangudi Tiles:

The Athangudi tile flooring, which is produced solely in the Athangudi, Chettinad district, in Tamil Nadu, is one of the more sophisticated flooring types. Using the locally produced sand, Athangudi tiles developed their own distinctive style of regional workmanship. It is a handmade tile. Sand and color oxides are mixed to a running paste, a metal frame with a glass base is casted, metal partitions are made in accordance with the intricate designs of the tile, the color mix is poured into the cast, cement and sand are sprinkled on top, the mixture is leveled, and the cast is removed once it has partially dried. Extra mortar is then scraped off the tile's edges and is moved to a water tank for two days of curing after being given time to dry. Tiles are typically 18 mm thick, and they are polished first with rice husk and then with coconut oil. In contrast to the red oxide flooring that was scattered over the area, this was in the form of tiles. Homes in Chettinad with this flooring date back more than 50 years.

Although these traditions have also served as an inspiration for industrialized manufacturing, such as the manufacture of ceramic tiles, one characteristic of them is that the preparation and execution procedures require time

Making Of Athangudi Tiles:

The production procedure is executed with great competence and accuracy. Locally sourced sand and clay are sieved/filtered and pulverized into a fine powder. Cement is combined with water and formed into dough. Clean glass frames are put on a high framework. To create the tile, a square frame of wood is put over the glass.

- The process begins with the preparation of a metal stencil with the desired design (a floral patterns or geometric pattern) inside of a metal frame.
- A glass plate identical in size as the tile is used to support the frame. The glass sheet is trimmed to tile size.
- A cement mixture is then made. Cement is colored with vibrant pigments. A craftsman mixes colored cement.



- Manually poured into patterned moldings on a piece of glass is a liquid slurry combination of cement and colored oxide.
- A different-colored cement mixture is poured into the template's chosen divisions. A vibrant pattern is left on the glass once the frame has been in place for a few minutes.
- The tile is then filled with a three-fourth inch layer of sand, cement, and tiny stone aggregates after a small amount of local sand is applied. The wet cement is covered with a layer of sand that is dry.
- The craftsman removes the surplus dirt from the frame with precision. Cement mortar is then placed into the frame.
- Newly produced tiles are exposed to the sun to dry. eight to twelve days, these tiles are piled and preserved in a water bath.
- To compress the tiles, they are removed after 24 hours and given time to dry. To dry out completed tiles, husk is spread over them to absorb extra moisture. The husk's natural oils give the food a pleasant flavor.



3.3 Need For The Integration Of Vernacular Materials:

The vernacular construction will focus on the local environment, lifestyle, climate, and other characteristics. Even in the absence of any technology, they deliver comfort within the structure through passive tactics, material selection, construction techniques, orientation, and so on. Understanding the notion of vernacular architecture in a certain place will aid in the construction of a low-energy, eco-friendly structure.

A region's history of culture is frequently closely related to vernacular materials. Their incorporation into contemporary building practices promotes a feeling of identity and cultural continuity by preserving and celebrating local traditions, architectural aesthetics, and construction methods.

Vernacular building materials are frequently chosen for their resistance to regional climatic conditions. These materials can increase a building's resistance to harsh weather conditions and the effects of climate change.

The globe is confronted with a slew of significant energy and environmental concerns. Direct energy is employed in building construction, operation, refurbishment, and deconstruction. Almost all renewable resources are on the edge of extinction, and we are compelled to find a solution for consuming less energy and causing less effect to the building over its entire life cycle, but the answers already exist in the shape of traditional vernacular construction.

Benefits Of Integrating The Vernacular Materials:

- Rammed earth is used to insulate buildings from heat, noise, and dust from the outside world. This lowers the need for mechanical components to be thermally insulated, which lowers the building's operating costs.
- local dirt is used to create the elegant flooring known as Athangudi. It offers the floor a long-lasting shine that makes it sustainable and enhances its beauty.

- With increased attention being paid to environmentally friendly constructed forms and sustainable solutions, architects have had some success in designing structures near to nature that offer warmth and renewal in the face of the chaotic rush of desires.
- Vernacular resources are frequently abundant and locally obtained, which minimizes the environmental impact of transportation. In comparison to other modern building materials, they also frequently have little embodied energy and are renewable, which makes them a more sustainable option.
- Vernacular materials are frequently picked for their adaptability to regional climate circumstances. They can resist local weather patterns, control temperature, and offer natural insulation, which improves energy efficiency and comfort for users.
- By using conventional building methods and materials that are directly connected to a region's history and legacy, the use of vernacular materials helps in maintaining cultural continuity and uniqueness.
- Vernacular materials are frequently less expensive than imported or specialist materials, which lowers building expenses. Additionally, local craftsmanship and building methods are frequently suitable for using these materials, potentially cutting labor costs.
- Many locally produced materials have shown to be resilient and durable over time. Buildings with greater durability and sustainability may result from this.
- Vernacular materials may be incorporated to create distinctive, locally relevant designs for buildings that stand out in the increasingly globalized world of architecture.

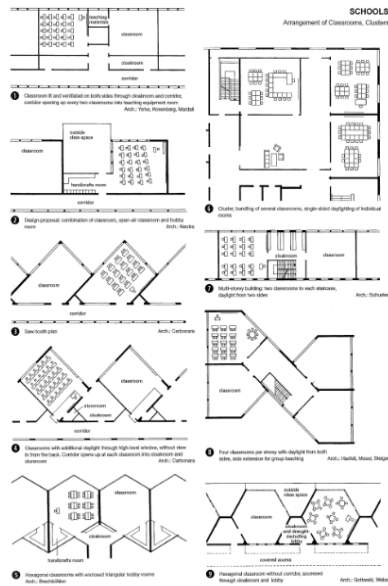
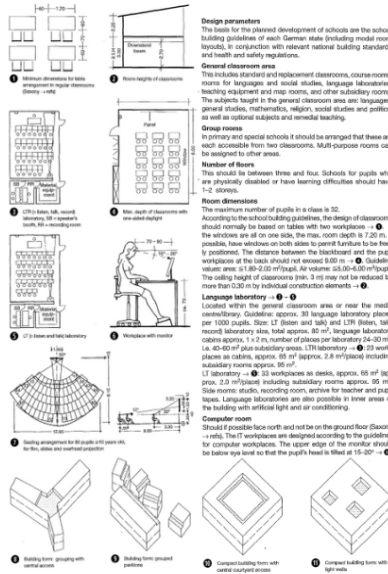
Limitations Of Integrating Vernacular Materials In Contemporary Architecture:

- It is necessary to carefully plan and make design alterations in order to integrate vernacular materials with contemporary building systems (such as HVAC, electrical, and plumbing).
- In metropolitan or rapidly growing places, vernacular materials cannot always be easily accessible. This can increase expenses and provide logistical problems.
- Some locally available materials can have shape, size, and adaptability restrictions, which could limit design flexibility and innovation.

- Utilizing local resources frequently relies on the skills of craftsmen and builders who are familiar with conventional building methods. In some places, it might be difficult to find skilled workers.
- Some locally available materials can have shape, size, and adaptability restrictions, which could limit design flexibility and innovation.
- Certain vernacular materials, such as thatch or untreated wood, can be susceptible to moisture damage, rot, or pest infestations if not adequately protected.

Integrating vernacular materials with contemporary construction techniques and technologies can be challenging. Ensuring proper bonding, structural stability, and safety can require additional expertise.

3.4 Standards



	Places	m ² /room	No.	1 cohort 4 classes 120 pupils	2 cohorts 8 classes 240 pupils
General teaching rooms					
classrooms	24-32	50-66	4	328-490	592-748
group rooms	12-18	36-50	2	200-264	400-528
multi-purpose rooms	32	72	1	90	72
side rooms	18-36	18	1	18	24
teaching equipment room	18-36	18	1	18	24
Specialist classrooms					
work room	16	24	1	1	24
side room	32	72	1	1	24
music room					
School library/media centre				60	72
Administration				36	102
head teacher's room	12-18	36	1	36	60
secretariat	18-24	36	12	36	60
teachers' room	24-30	18	1	18	1
side room	12	12	1	1	1
parents' meeting room	12	12	1	1	12
caretaker's room	12	12	1	1	12
Communal areas				92	92
kitchen canteen	24	1	24	24	24
dining/multi-purpose room	18-24	1	18	18	50
side room				18	18
Utility areas				24	85
caretaker's workshop	18	1	18	1	18
room for cleaning materials	12	1	12	1	12
store room	1	1	24	1	36
Caretaker's flat				1	80
Sports hall				1	600
Open-air sports facilities					
break areas with gymnasia and play equipment				600	1200
school garden				150	300
playing field				1 pitch	1 pitch
100 m track				400	400
long jump facility					
gymnastics lawn					
Subtotals				328-390	592-748
general classrooms				328-390	592-748
specialist classrooms				60	96
school library/media centre				60	72
administration				36	102
utility areas				24	85
Total				448-510	928-1064
m ² /pupil				4.0	4.2

1 Model room programme, primary school, school building regulations (Germany → m²)

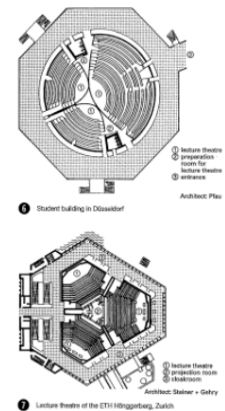
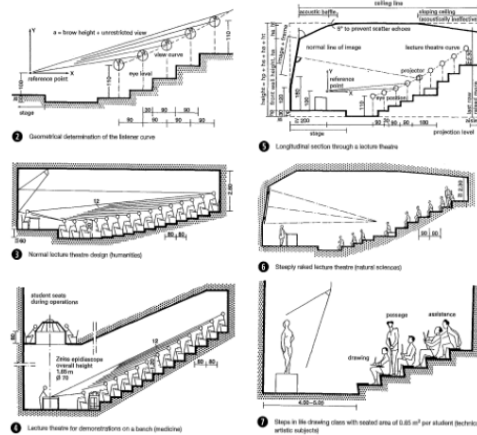


Plate 3.2.1 – Standards

CHAPTER 4

SITE SELECTION AND ANALYSIS

4.1 Site Selection

The site is selected in **Ramanathapuram** district in Tamil Nadu, Because There is and where large number of youths are going into politics and some other harmful activities due to the lack of money and job. Migration to other districts is also high due to lack of facilities and education in the industrial skills field.



Coordinates - 9°22'25"N 78°50'19"E

Location – Ramanathapuram

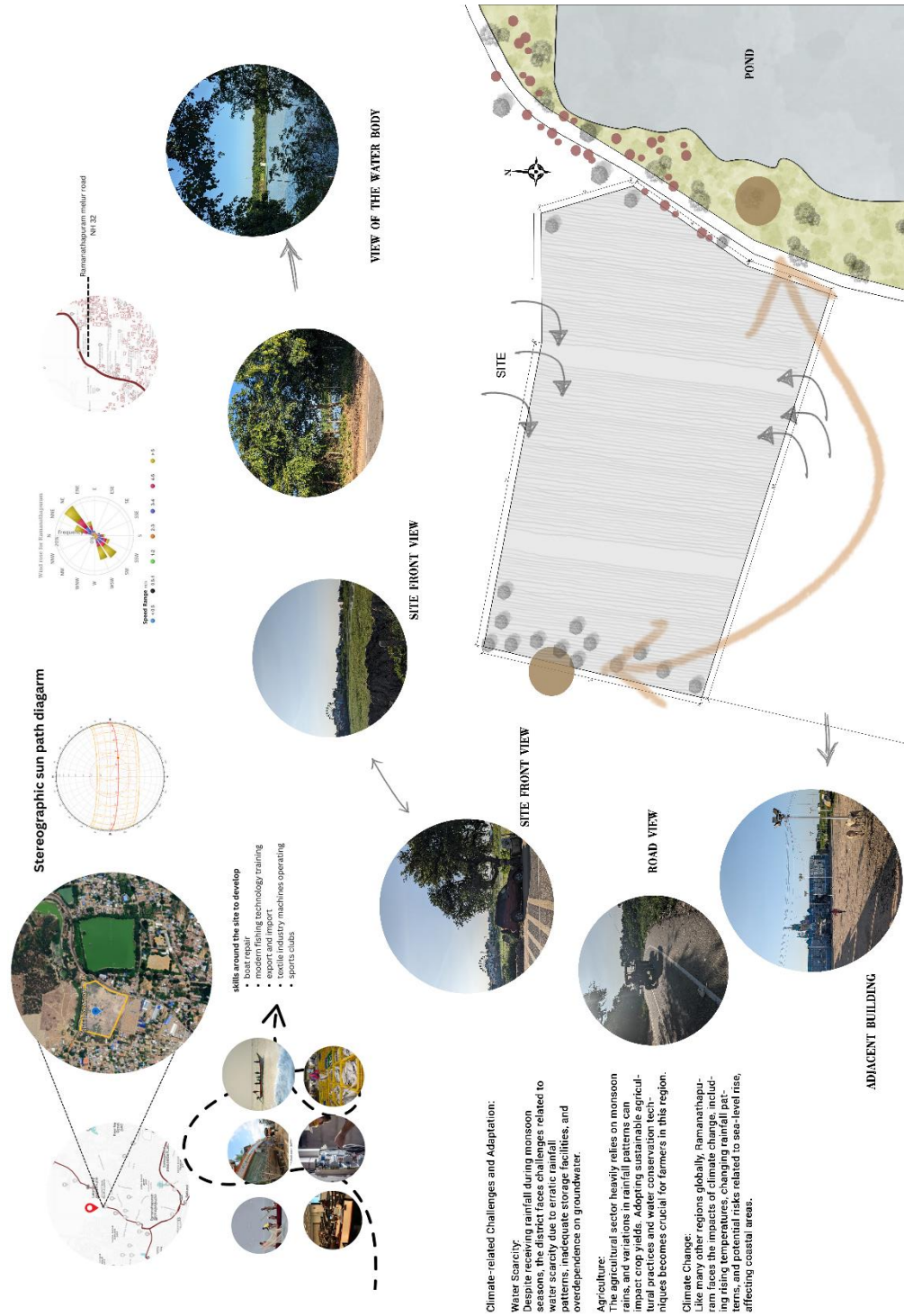


Plate 4.1 – Site Analysis -1

SITE ANALYSIS

YOUTH SKILL DEVELOPMENT HUB

JEEYAKAVIN J
392100831

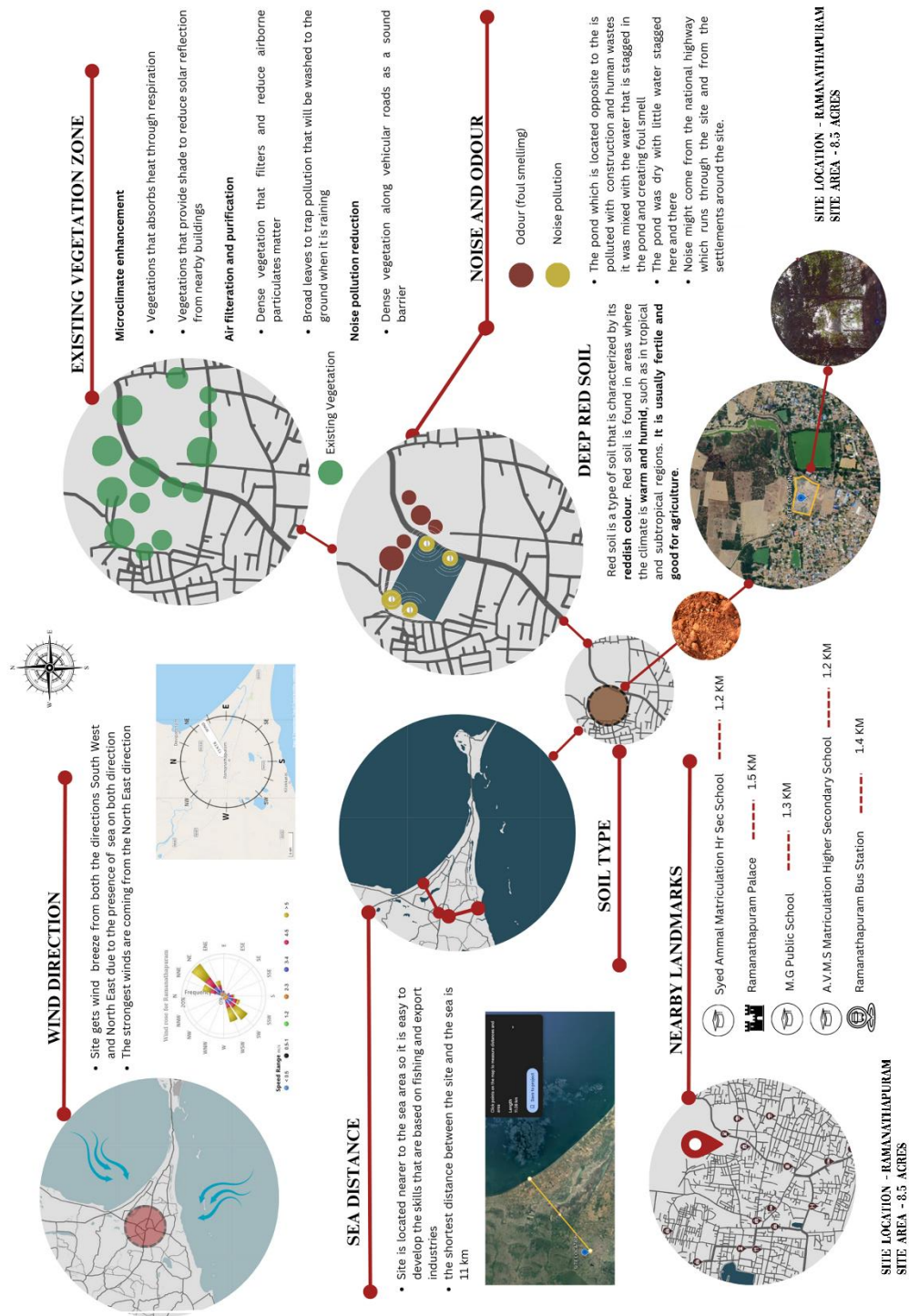


Plate 4.2 – Site Analysis -2

CHAPTER 5

ARCHITECTURAL DESIGN

5.1 Design Program and Spatial requirements

The Youth Skill Development Hub aims to empower young individuals by providing them with the skills and knowledge needed to thrive in the modern economy. The hub will offer vocational training, educational resources, and a supportive environment that fosters personal and professional growth.

Objectives:

Provide comprehensive skill development and vocational training.

Create a supportive and inclusive environment for learning and growth.

Foster community engagement and collaboration.

Promote sustainable practices and awareness

Space Requirements:

Administrative Area:

Reception and information desk

Offices for staff and administration

Meeting rooms

Storage rooms

Restrooms

Training and Workshop Spaces:

Computer labs with internet access

Classrooms for theoretical instruction

Workshops for hands-on training in various trades (e.g., carpentry, plumbing, electrical work, tailoring)

Specialized labs (e.g., culinary arts, automotive repair)

Equipment storage rooms

Learning Resources:

Library with books, magazines, and digital resources

Study areas with desks and seating

Quiet rooms for individual study or tutoring sessions

Common Areas:

Multipurpose hall for events, seminars, and community gatherings

Cafeteria or dining area

Lounges and informal meeting spaces

Outdoor courtyard or garden

5.2 Design Ideas

Orientation:

Position buildings to minimize direct sun exposure and maximize natural ventilation. Orient structures to take advantage of prevailing winds.

Openings and Ventilation:

Incorporate large windows, louvers, and vents to facilitate cross-ventilation and promote airflow. Use operable windows to control airflow as needed.

Shading Elements:

Install overhangs, awnings, or shading devices to shield windows and walls from direct sunlight while allowing natural light inside.

Building Materials Selection:

Heat-Resistant Materials:

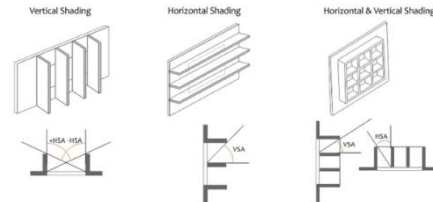
Opt for materials that resist heat absorption, such as light-colored or reflective roofing materials to reduce heat gain.

Thermal Insulation:

Use insulation in walls and roofs to minimize heat transfer into the building and maintain comfortable indoor temperatures.

Natural and Sustainable Materials:

Choose locally sourced materials that are suited to the climate, like bamboo, thatch, or adobe, which can offer thermal comfort.



Rat Trap Bond

Roof Design

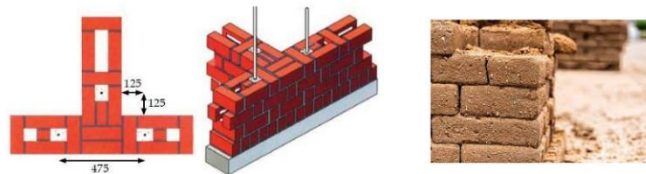
Extend roof overhangs to provide shade for walls and windows, shielding the building from direct sunlight while allowing for ventilation.

Windows and Openings: Shading Devices: Use external shading devices like awnings, shutters, or louvers to block direct sunlight while allowing natural light and airflow.

Cross-Ventilation: Position windows strategically to promote cross-ventilation, allowing for the passage of breezes throughout the building.

Operable Windows: Include operable windows to control airflow and adjust ventilation as needed.

- The cavities in the masonry act as thermal insulators. Thus, the interiors remain cooler in summer and warmer in winter.
- Rat Trap masonry uses fewer bricks and mortar reducing the cost of masonry up to 30% when compared with conventional brick masonry.



Roofing Materials:

Reflective Roofing: Use light-colored or reflective roofing materials like ceramic tiles, metal sheets, or reflective coatings. These materials reflect sunlight, reducing heat absorption, and maintaining cooler indoor temperatures.

Wall Construction:

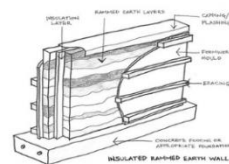
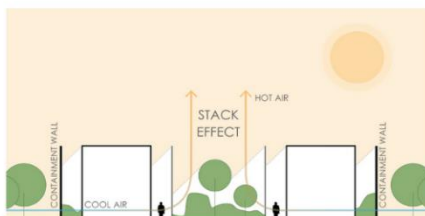
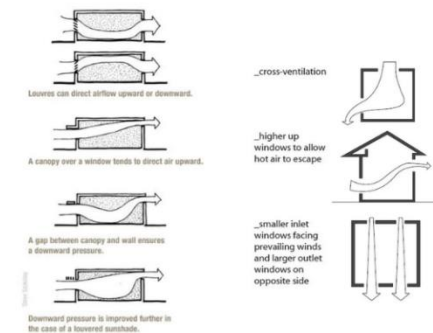
Thermal Mass Materials: Incorporate materials with high thermal mass like adobe, rammed earth, or concrete blocks for exterior walls. These materials absorb and store heat during the day, releasing it slowly at night, stabilizing indoor temperatures.

Insulation:

Proper Insulation: Install insulation in walls, roofs, and ceilings using materials like foam boards, reflective foils, or aerated concrete blocks. Proper insulation minimizes heat transfer, improving indoor comfort and energy efficiency.

Shading Elements:

Overhangs and Awnings: Design roofs with extended overhangs or install awnings and shading devices over windows. These provide shade, reducing direct sunlight exposure, and preventing heat gain indoors.



- Sun-dried earth bricks one of the poorest conductors of heat.
- Traditionally constructed with thick walls and roofs and with very small openings

5.3 Detailed Drawings



Plate 5.2 – Site Plan



Plate 5.3 – Institute Ground floor plan, Concept

YOUTH SKILL DEVELOPMENT



Plate 5.4 – First Floor, Section, Accommodation

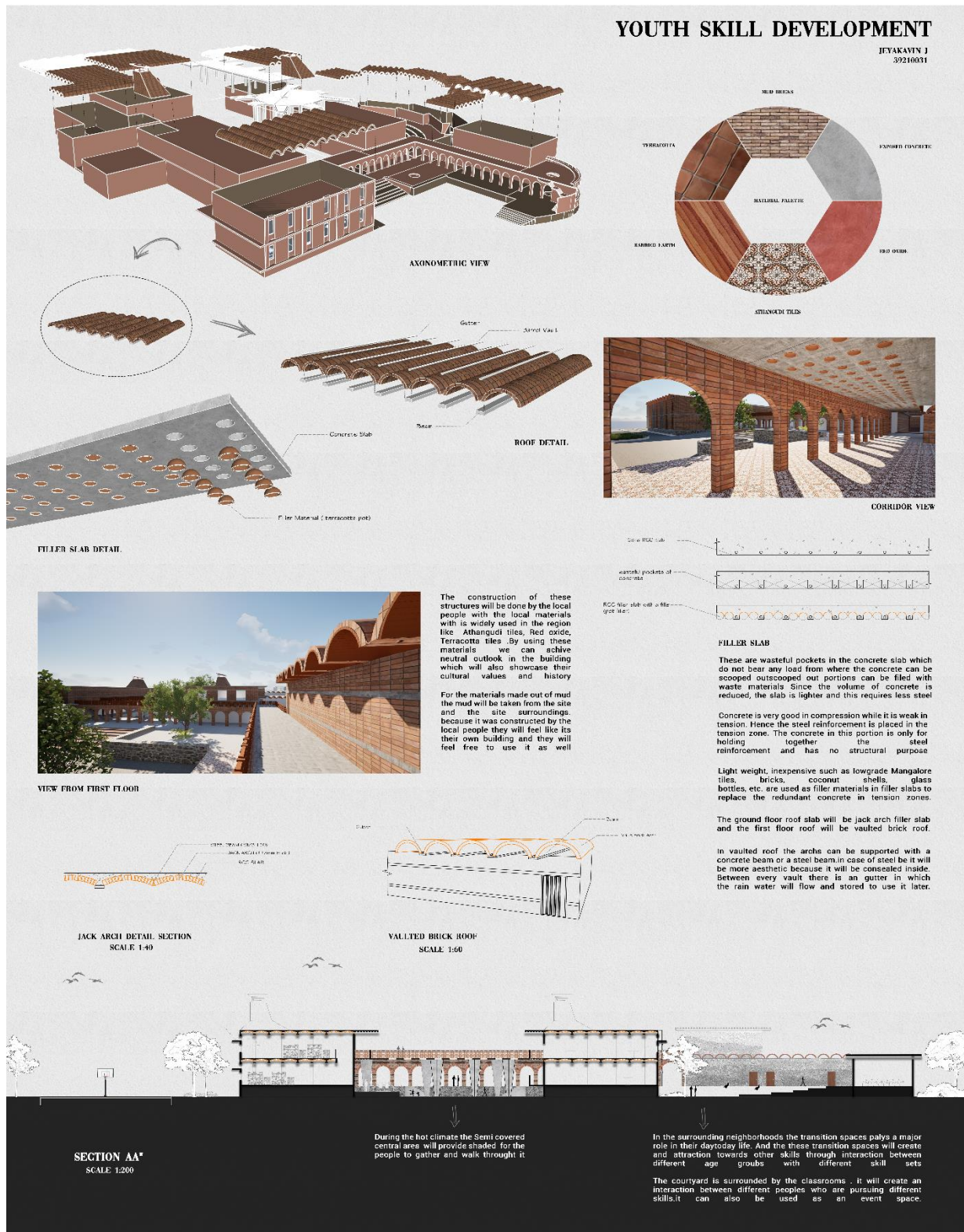


Plate 5.5 – Section, Construction Details Of Roof

CHAPTER 6

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