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INSTITUTE OF SCIENCE AND TECHNOLOGY
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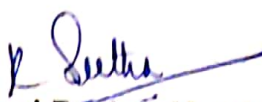
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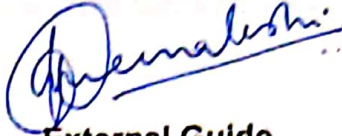
DEPARTMENT OF ARCHITECTURE

BONAFIDE CERTIFICATE

This is to certify that Thesis Report is the bonafide work of TIWISH C (39210101) who carried out the Thesis entitled "Market with Agri Research Centre" under our supervision from December 2023 to May 2024.

Internal Guide
Ar. Brindha


Internal Review Member
Ar. Seetha Visalakshi


External Guide
Ar. Meenakshi


Dean and Head of the Department

Dr. DEVYANI GANGOPADHYAY

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


Internal Examiner


External Examiner



DECLARATION

I, **TIWISH C** hereby declare that the Thesis Report entitled "**Agri Research Centre And Market**" done by me under the guidance of **Ar. Brindha** (Internal Guide), **Ar. Seetha Visalakshi** (Internal Review Member) and **Ar. Meenakshi** (External Guide) Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Architecture Degree.

DATE: 23/5/24.

PLACE: Chennai



SIGNATURE OF THE CANDIDATE

AGRI RESEARCH CENTRE AND MARKET

A THESIS

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

By

TIWISH C
(39210101)



DEPARTMENT OF ARCHITECTURE
SCHOOL OF BUILDING AND ENVIRONMENT

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
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With Grade “A++” by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI,
CHENNAI - 600 119

MAY 2024



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

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

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

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

TIWISH C

THESIS SYNOPSIS

Tamilnadu government made a proposal of market in kattankulathur, for the people around the kattankulathur because there is no market around the kattankulathur.

Here now I design a Agri research Centre combined with a design of market, here a village market. It creates an impact in the modern method of agricultural where major people are moved to urban cities who once been in agriculture field. It is a space that to teach about the modern method of farming without the pesticides and other harmful substances for human health.

Only they proposed market then I designed a research Centre according with the existing building of ATIS (Agricultural Technology Information Centre) which relates to the agricultural practices in and around the area

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

A Agri Research Centre serves as a central point for various activities related to farming, crop cultivation, livestock rearing, and other agricultural practices. These research Centre are essential components of agricultural networks, connecting farmers, suppliers, buyers, and service providers within a specific region or community. This Site consists of Two major components where are considered to be the main part of the site are –

- Agri Research Centre
- Market

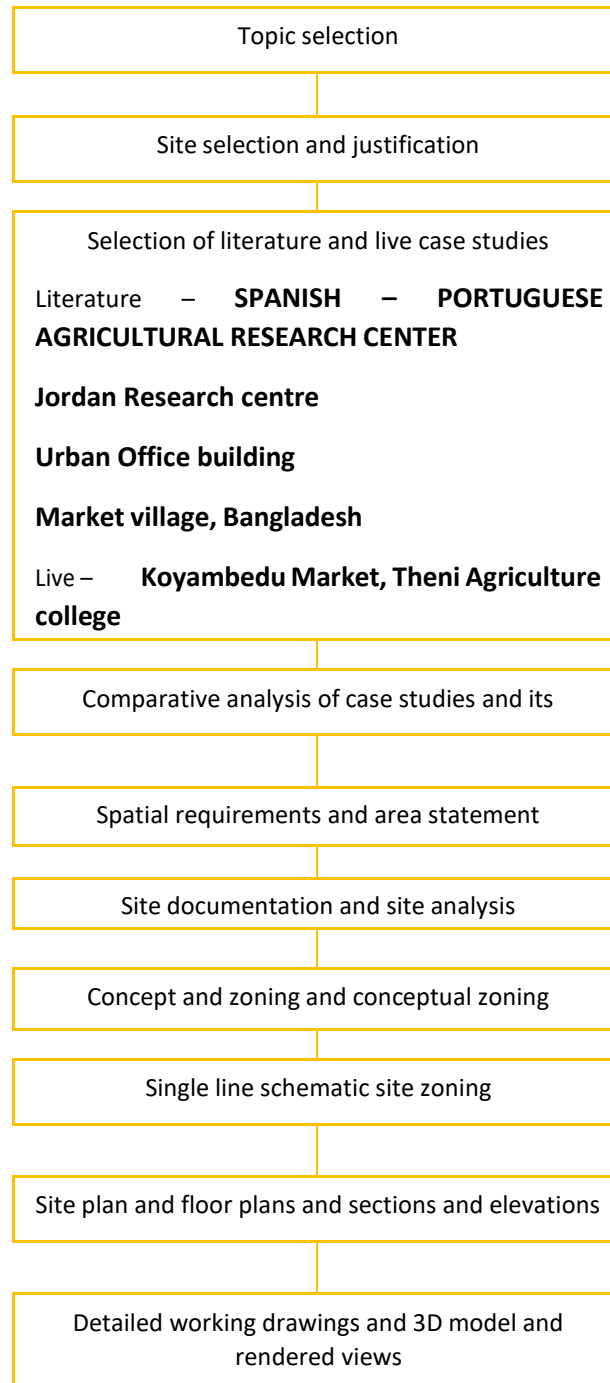
1.2 NEED OF THE PROJECT

Agriculture is most important occupation in India including Tamilnadu, but today it has become unprofitable due to irregular monsoon, prices fluctuations of agro - products and some internal weakness of agriculture sector. There is a need to some innovative activities in areas of urban too like research Centre to help farmers

1.3 AIM AND OBJECTIVE

The project aims in to create an impact in the modern method of agricultural where major people are moved to urban cities who once been in agriculture field. It is a space that to teach about the modern method of farming without the pesticides and other harmful substances for human health.

1.4 METHODOLOGY



CHAPTER 2

CASE STUDIES

2.1 SPANISH – PORTUGUESE AGRICULTURAL RESEARCH CENTER -

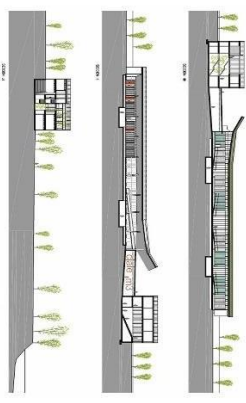
SPANISH – PORTUGUESE AGRICULTURAL RESEARCH CENTER

INTERVENTION.
Architecture is not imposed but rather becomes part of the environment. The building emerge in the landscape distancing itself from a housing environment without a clear order, with different shapes.

ENVIRONMENT IMPACT -
The site is part of a bigger area of environmental interest close to the river Formes.

CASESTUDY

Area: 4800.0 m²
Salamanca, Spain
Architect: CANVAS ARQUITECTOS
Year: 2008



The Topographic redevelopment of the site lead to two levels:

UPPER LEVEL - It has with the entrance from the street, the building is hidden in the landscape

LOWER LEVEL - opens onto the river, separating from the ground by piles that isolate the construction of possible floods.



Use of Shading structure.
Pleasant daylight.
Enhanced ventilation
Cross ventilation.





Use of curtain walls in order to allow natural lighting



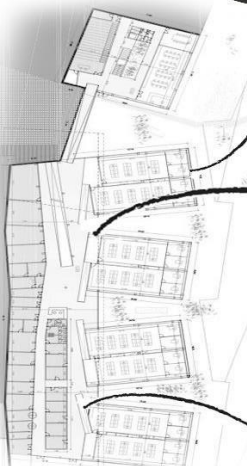
Use of Shading structure.
Pleasant daylight.
Enhanced ventilation
Cross ventilation.



Use of green roof feature acting as a cooling strategy in summer.



Usage of Shading devices Multilayer facade to control the heat gain & sunlight



The plan was simplified (not complex). The building is separated from the ground and supported on piles, the materials of the structure is revealed throughout the entire building.



A gallery of accessible facilities under the slabs runs the building all the way long. This infrastructure can solve the maintenance and further introduction of new services and technology. This solution avoids ceilings that would hide the structure and

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JORDAN RESEARCH CENTRE

Jordan Agricultural research centre is a state of art research facility located on campus of california state university, Fresno. The centre is located on southeast corner of woodrow and barstow avenues. It is a 3-story building structure

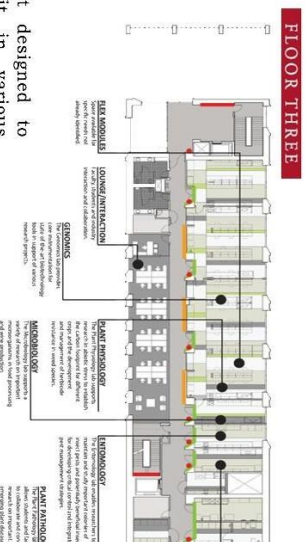
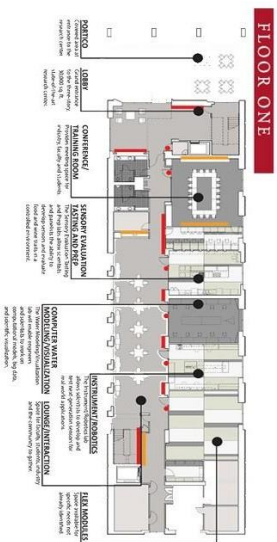
AREA - 30,000 SQ.FT
ARCHITECTS - ZGF Architects
CATEGORY - Rearsch Centre

The design Team analyzed regional climate to come op with passive building design to save 47% more energy as compared to code laboratory building. Design used to achieve energy reduction was innovative dilution solution with single exhaust system serves all area of building. Shading strategies also used throughout area to reduce solar load and assist in energy savings

It designed to fit in various types of research oriented experience in one - place. Design allows transparency and interdisciplinary and interactive spaces and other sappe like green house and tissue culture labs



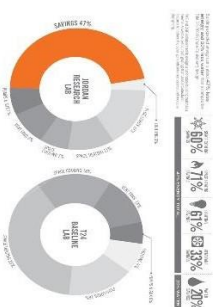
It designed to fit in various types of research oriented experience in one - place



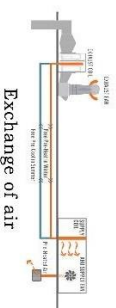
Interaction Space



Photo Gallery



Structure -
 The building is a steel concentrically braced frame type of a structure
 Farm market - To sell produce grown on research fields
 Research centre consist of teaching labs dedicated to agriculture, large theatre like classroom and open courtyard



URBAN OFFICE BUILDING

Architects: VTN Architects

Area: 1386 m²

Year: 2022

Country: Vietnam

The aim of the project is to return green space to the city and promote safe food production. Located in a newly developed area in Ho Chi Minh City, the office project demonstrates the possibility of vertical urban farming. Its facade consists of hung planter boxes with various local vegetation, allowing them to obtain sufficient sunlight. This green approach will provide safe food and a comfortable environment with minimum energy consumption, contributing to the sustainable future of the city.



Vertical Farm is designed simple construction method- it consists of a **concrete structure steel supports modularized planter boxes.**

Planter boxes are replaceable, therefore they can be flexibly arranged in accordance with the height and growing condition of plants, providing sufficient sunlight. Together with a roof garden and ground, the system provides up to 190% of the green ratio to the site area, which is equivalent to 1.1 tons of harvest. Various local edible plants, such as vegetables, herbs, and fruit trees, are selected to contribute to the biodiversity of the region. They are maintained with an organic treatment method.

Environmental strategies -

The "vertical farm" creates a comfortable **microclimate** throughout the building. Combined with glazing, the vegetation filters direct sunlight and purifies the air. It is irrigated with stored rainwater while evaporation cools the air.



Green walls in the facade

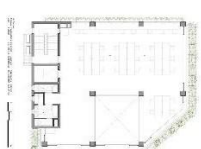
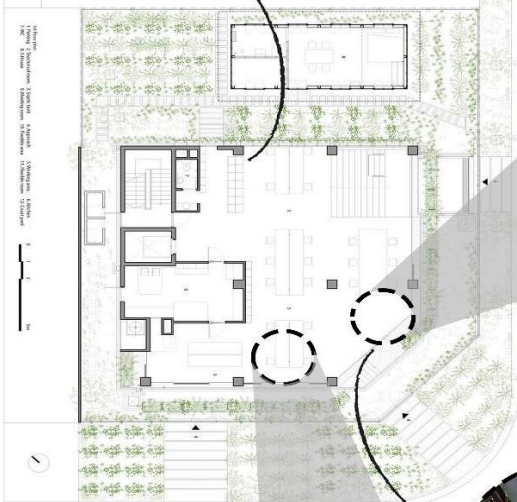
The lack of green causes various social problems such as air pollution due to the over-abundance of motorbikes, air pollution, flood, and the heat island effect. In this context,



Glasses Used in the facade



Northern wall - solid for extension with opening with cross ventilation. Has double layered brick wall with air layer for insulation



MARKET VILLAGE - BANGLADESH

Architects: Tjep and Vaastukalpa Architects

Area: 3300 m²

Year: 2018

Country: Solidaribad, Bangladesh

Amsterdam based design office Tjep, teams up with Bangladeshi based Vaastukalpa Architects to develop and build advanced market infrastructures in rural Bangladesh, a commission from the Solidaridad network.



This Network is in helping Bangladesh villages modernize their infrastructure by designing Village Super Markets - modern markets that integrate traditional stalls with modern teaching, education and community facilities. The first of these Village Super Markets have been unveiled in the district of Khulna in the summer of 2018, with a second one opening soon after in the fall of 2018 in Jessore.

New complex is owned by the local agricultural cooperative and is a symbol of fair trade, local crafts and sustainable food production.

Compare with old dutch market



The designer added that the building seeks to promote social cohesion and engagement with education by incorporating spaces for social and education functions alongside the market stalls.

Facade - constructed using Brick clad in tiles and concrete slab forms upper floor

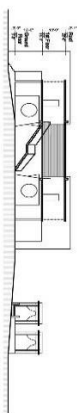


All of the buildings are constructed predominantly using brick that is clad in tiles on the level of the market stalls. A concrete slab forms the floor of the upper level, and a tensile canopy creates a lightweight roof that also allows daylight to permeate into the functional areas.



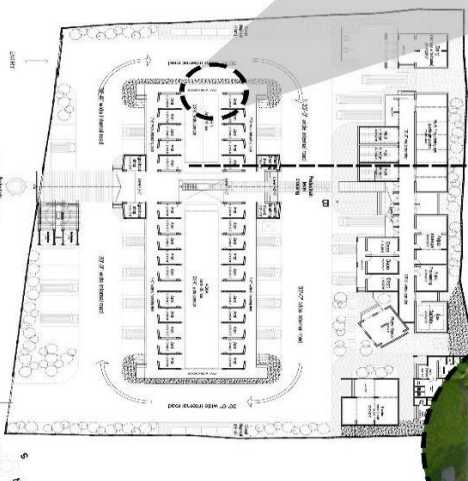
Ar. Tjepkema wanted to evoke the look and feel of the small wooden huts, called arots, that are typically used by market traders.

Tensile structure acts as roof structure on market space

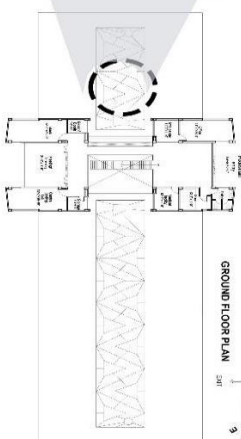


SECTION B-B

Use of traditional building materials including bamboo and locally produced red brick that is laid using typical Bengali motifs.



GROUND FLOOR PLAN



PLAN OF AROT BLOCK(HI floor)



SECTION A-A

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KOYAMBEDU MARKET

Architects - Murali Architects Chennai
YEAR - 1996
AREA - 67 acres

The market established in 1996 on 79 acres of land with 3,941 shops
 Stock from all over India to Koyambedu for Tamilnadu and from the sources of Tamil Nadu to other parts.

Koyambedu market provides livelihood for around 20,000 workers out of which 11,000 are within the site



Roads developed exclusively for the market, maintained out of shop rents though used by the general public for connectivity

FLOWERS	FRUITS AND VEGETABLE
LIGHT, EASY TO CARRY, LEVELS POSSIBLE	LESS LEVELS DUE TO WEIGHT OR LOAD
SEPARATE BUSINESS OF ITS OWN	COMMON RUTINS
LESS IN QUANTITY	MOST IN QUANTITY
SMALL IN NECESSITIES	DIVERS IN PRODUCT NECESSITIES
FRAGRANCE	PROMOTE FROM SMALL AND SHABBY
WATER REQUIRED FOR PRODUCT	WATER COMPLETED IN SPACE
WATER FROM R.O. TO RAIN	SELF BORE
LESS STORAGE SPACE REQUIRED	LARGE PROPORTION OF STORAGE SPACE
FLEXIBLE PLATFORM IN FLOOR	DEFINITIONS REQUIRED
HENCE ALL UNDER AN UMBRELLA, ONLY THUNDERBOLT EXTENSIONS	SLOPE ROOF FOR EACH SHOP TO PREVENT FURTHER CONTINUATION
HUGE TRUCKS NOT NECESSARY	HUGE TRUCKS MOVEMENT
USER INTERACTION WITH PRODUCT NOT NECESSARY - ORIENTED DISPLAY SPACES NOT REQUIRED	USERS TEST THE PRODUCT TO BUY - DISPLAY SPACE REQUIRED
NEED SPACE TO STORE AND OTHER PROCESSES	OUTER AREA AND STORAGE SPACES NO PROCESSING
NO OUTLET ROOMING	REGULAR RENTS OF FIELDS
COMMON TOILET AND SERVICES AT NOOKS	ATTACHED TOILETS FOR WHOLESALE AND RETAIL AS A MEETING WING
RETAIL AT THE INNER MOST	COMPETITELY DIFFERENT CIRCULATION FOR
SAME ENTRY FOR WHOLESALE AND RETAIL	1 BLOCK OF BUILDINGS WITH VERTICAL POSSIBILITIES OF SHOP ROOF AT THE ROOF
THROUGHOUT THE STORE ROOFS AND	THROUGHOUT THE STORE ROOFS AND
CULTURAL RESPONSE - WIDE SPREAD	THROUGHOUT THE STORE ROOFS AND
	THROUGHOUT THE STORE ROOFS AND

Official sources said the market, being maintained by the CMDA, gets just 2% gross margin for maintaining the facility. The market generates an average annual revenue of 12 crore. With an annual expenditure of Rs 11.70 crore, the profit is just Rs 30 lakh per annum. Market is been planned to change places in 3 different places mainly in Thirumazhisai and kettankulathur

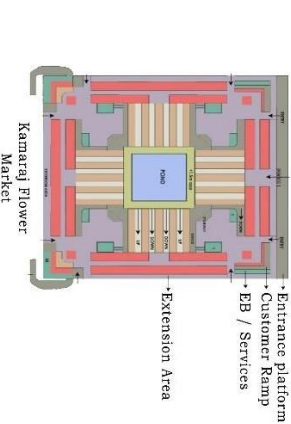
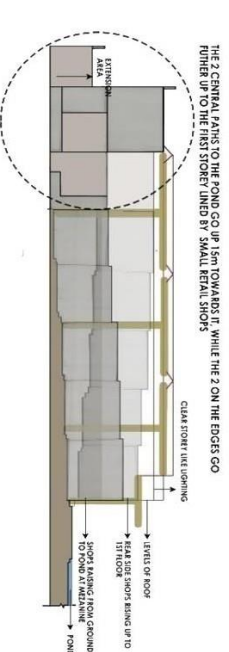


Integrate floral carving on the ceiling with embedded electrical facility pedestrian ramps and underspaces

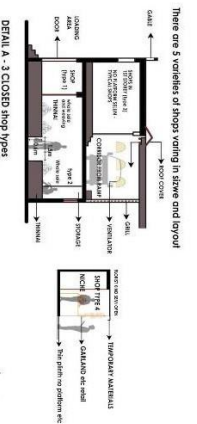
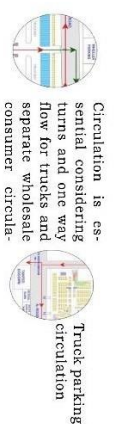
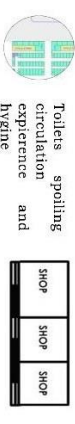
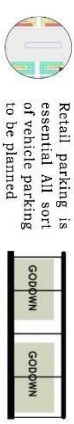


GRID PLANNING - CENTRALISED ORGANISATION - LINEAR CIRCULATION REPELITIVE MODULES
 Linearity is a must for markets for to keep people moving. But it make us feel unsafe and tired at a point This is broken by centralised organization and cutouts. This also provides diverse circulation choices all sides connected and levels interlocked by circulation corridor also facilitating easy repetition of modules and maintenance
 INTRICATE - FLORAL CARVING ON THE CEILING - WITH EMBEDDED ELECTRICAL FACILITY PEDESTRIAN RAMP AND UNDERPASS - MISCELLANEOUS VENDOR'S PARKING CLOSE TO SHOPS - UNOASIGNED

SHORTTYPE	SIZE SQFT	NUMBER	PRODUCT
WHOLESALE	2400	52	VEGETABLE
WHOLESALE	2400	12	FRUIT
WHOLESALE	1200	61	VEGETABLE
WHOLESALE	1200	46	FRUIT
WHOLESALE	1200	6	FLOWER
WHOLESALE	1200	36	FOODGRAIN
WHOLESALE	749	92	FOODGRAIN
WHOLESALE	600	105	VEGETABLE
WHOLESALE	364	364	FRUIT
RETAIL	300	404	VEGETABLE
RETAIL	300	269	FRUIT
RETAIL	300	178	FLOWERS
RETAIL	150	852	VEGETABLE
RETAIL	150	379	FRUIT
RETAIL	150	281	FLOWERS



- Flowers easy to carry. Mostly flowers come from Bangalore and north India while indigenous varieties are predominantly from Madurai surroundings. They make the space less shabby than fruits. No vehicles such as 90ft lorries or huge trucks are used.
- For easy unloading from trucks in d exterior. Grand entrance at the end of an axis (pedestrian entry) and 1st floor transition cum circulation corridors - both retail and wholesale
- Ground and firstwholesale mezzanine - pondcoultryard - retail



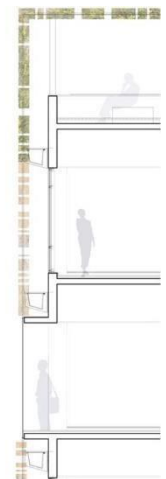
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2.6 KMC CORPORATE OFFICE -

Located in Cyber City, Hyderabad, the corporate buildings employ the idea of a double skin as an energy saving and visually striking device. The inner skin of the building is a reinforced concrete frame with commonly used aluminum windows.

The outer facade comprises of a custom cast aluminum trellis with hydroponic trays integrated for growing a variety of plant species. The trellis also has an integrated misting system in order to control and regulate the amount of water released to the plants and trays. The principal of the facade is inspired by the idea of a double-skin that allows a modulation of light and air through the building.

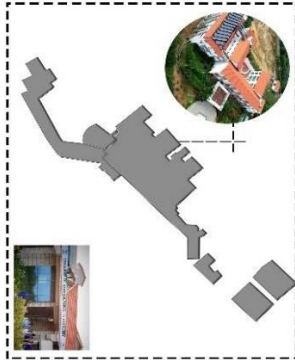
This is in contrast to the business-as-usual idea of the 'green wall', which is a simple application on a surface purely serving an aesthetic, not a performative function. In this project, the screen also takes on an aesthetic function of a dynamic façade where assorted species are organized in a way to create patterns, as well as bloom at various times of the year, bringing attention to different parts of the building façade through the changing seasons.



3.1 STANDARDS

STANDARDS -

The College of Agricultural Technology in Theni, Tamil Nadu, was established in 2010. It is affiliated with the Tamil Nadu Agricultural University. Situated at foot hills of Western Ghats, the entry point to the fertile and ever green Cumbum Valley, adjacent to River Vaigai includes globally acceptable practices in delivery of education and developing research culture.



Consist of research centre some labs and equipments are been used by the people for the educational uses and for farming purpose used in the agriculture research centres



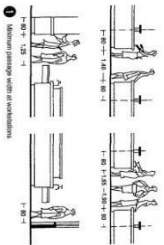
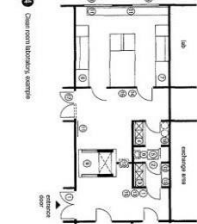
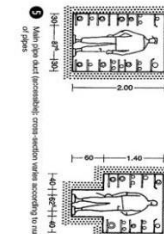
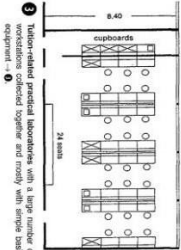
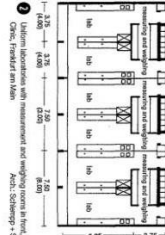
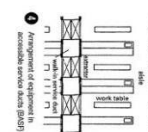
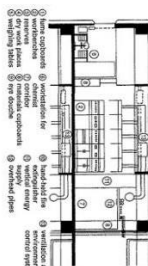
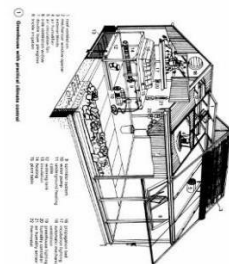
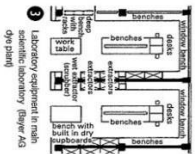
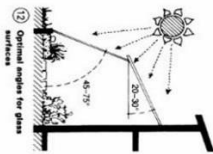
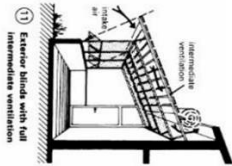
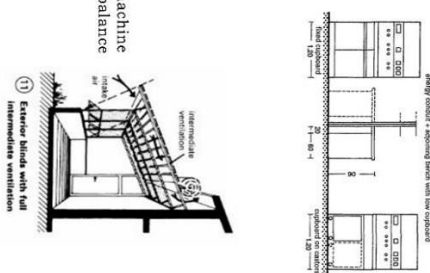
Biotechnology lab -
Used for the Research
purpose



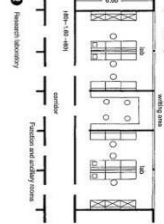
Seed Growth lab -
Used for the Research
purpose



Brine meter
Crown corking
Hand sealing machine
Top weighting balance



According to subject:
Chemistry and biology laboratories have permanently installed laboratory benches. Rooms have a high rate of air exchange and frequently additional fume cabinets with air extraction $\rightarrow$ 204
→ for work producing gas and smoke, fume cabinets are often installed in their own room (fume rooms).
Physics laboratories mostly have mobile benches and sophisticated electrical equipment in cable trays at the wall or suspended from the ceiling. Low rate of air exchange $\rightarrow$ p. 204. There are special laboratories for specific requirements, e.g. isotope laboratories for work on radioactive substances in various safety classes.



Research-related laboratories, mostly in smaller rooms with special equipment and additional practical spaces like weighing and measurement rooms, centrifuge and autoclave rooms, fuming kitchens, air-conditioned and cold storage rooms with constant temperature, photographic/dark rooms etc. → ②.

Clean room laboratories are used for work requiring especially dust-free filtered air, e.g. in microelectronics or for particularly dangerous substances, whose release into the surrounding rooms should be prevented by special air circulation and filtering (microbiology, gene technology) → ①.

The determining design unit for the laboratory workstation is the laboratory bench, permanently installed or mobile, whose dimensions together with the associated work and passage areas define the laboratory axis, which forms the basic spatial unit → ①

GREENHOUSES

The ventilation of greenhouses should be calculated such that, when fully ventilated, the inside temperature can be held close to that outside. For this it is necessary that about 20% of the roof area consists of a ventilated strip or windows that can be opened readily to an adequate supply of fresh air must also be ensured.

Structure and fittings grid
Good structural grids to achieve mostly column-free rooms have the following dimensions:

7.20 x 7.20 m, 7.20 x 6.40 m, 8.40 x 8.40 m, normal storey height
4.0 m, clear room height ≥ 3.0 m.

The structural grid is a multiple of the typical planning grid of 120 x 120 cm (diometric system), reinforced concrete frame construction, as pre-cast elements or cast in situ, is preferred on account of the flexibility of plan.

CHAPTER 4

SITE SELECTION AND ANALYSIS

4.1 SITE SELECTION:

Contribute to food security, promote sustainability, and create green spaces in urban environments.

Chennai, being a densely populated city, could greatly benefit from locally grown produce, reduced carbon footprint, and increased community engagement.



Figure 1 SITE 01

Semmenchery, Navalur, Tamilnadu - 6000112

12°51'19"N 80°13'38"E

Area – 30,800 m².

SWOT Analysis

Strength- **Natural Beauty:**

- Presence of natural elements like water bodies, greenery, or scenic views.
- Opportunities for incorporating nature into the architectural design.

Weakness- **The site is closer to educational institutions**

Opportunities- **Public Spaces and Recreation:**

- Creating public spaces that enhance community interaction.
- Opportunities for recreational facilities or green spaces.

Treats- **Natural Disasters:**

4.2 SITE SELECTION:

Contribute to food security, promote sustainability, and create green spaces in urban environments.

Chennai, being a densely populated city, could greatly benefit from locally grown produce, reduced carbon footprint, and increased community engagement.



Figure 2 SITE 02

kattankulathur, Tamilnadu -

Area – 18 acres.

SWOT Analysis

Strength- **Natural Beauty:**

- Presence of natural elements like water bodies, greenery, or scenic views.
- Opportunities for incorporating nature into the architectural design.
- Present in side of national highway
- Educational institutes near

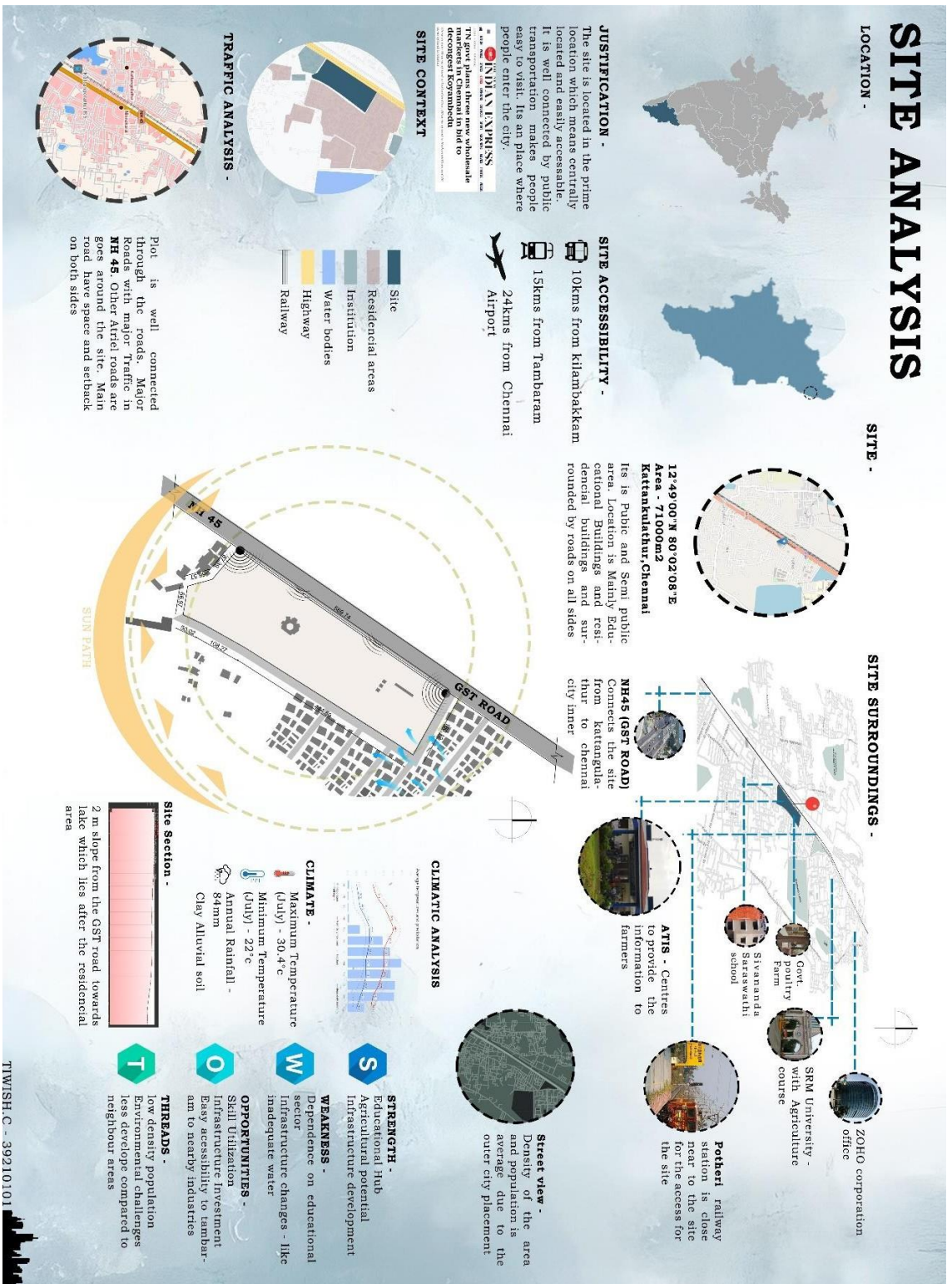
Weakness – under develop areas

Opportunities- **Public Spaces and Recreation:**

- Creating public spaces that enhance community interaction.
- Opportunities for recreational facilities or green spaces.

Treats- **Natural Disasters**

4.3 SITE ANALYSIS:



CHAPTER 5

ARCHITECTURAL DESIGN

5.1 DESIGN PROGRAM

PLANTS TYPES -

Hydroponic, aeroponic, and aquaponic farms can cultivate a wide variety of plants, including vegetables, herbs, fruits, and flowers. Here are some examples of plants commonly grown in each type of system:

Hydroponic Farms:

Leafy greens: Lettuce, spinach, kale, arugula, Swiss chard

Herbs: Basil, cilantro, parsley, mint, oregano

Fruit-bearing plants: Tomatoes, cucumbers, peppers, strawberries

Root vegetables: Radishes, carrots, beets

Flowers: Marigolds, petunias, pansies

Aeroponic Farms:

Leafy greens: Lettuce, spinach, kale, microgreens

Herbs: Basil, cilantro, parsley, thyme

Fruit-bearing plants: Strawberries, tomatoes, peppers

Root vegetables: Potatoes, radishes (less common due to the nature of aeroponic systems)

Flowers: Orchids, decorative foliage plants

Aquaponic Farms:

Leafy greens: Lettuce, Swiss chard, watercress, bok choy

Herbs: Basil, mint, chives, lemon balm

Fruit-bearing plants: Strawberries, tomatoes (less common due to space limitations and water conditions)

Some root vegetables like radishes and carrots can also be grown, though less common than leafy greens and herbs.

These are just examples, and the actual types of plants grown can vary depending on factors such as climate, market demand, and the specific goals of the farm. Additionally, advancements in technology and research continually expand the range of plants suitable for cultivation in hydroponic, aeroponic, and aquaponic systems.

TIME DURATION

The duration for a single plant to grow varies widely based on the specific plant species, environmental conditions, and cultivation practices. Here are approximate time durations for some common plants grown in hydroponic, aeroponic, and aquaponic systems in India:

Hydroponic Farming:

Leafy greens like lettuce, spinach, and kale: Depending on the variety and growing conditions, they can be ready for harvest in about 3 to 6 weeks.

Herbs such as basil and cilantro: They can be harvested within 4 to 6 weeks after planting.

Fruit-bearing plants like tomatoes and cucumbers: These plants usually take longer to mature, typically around 8 to 12 weeks or more before they start producing fruits.

Flowers such as gerberas and carnations: The time to maturity varies based on the specific variety, but it often ranges from 8 to 12 weeks or longer.

Aeroponic Farming:

Leafy greens: Similar to hydroponic farming, the growth duration for lettuce, spinach, and kale is typically 3 to 6 weeks.

Herbs: Basil, cilantro, and other herbs can be ready for harvest within 4 to 6 weeks.

Fruit-bearing plants: Depending on the variety and conditions, strawberries, cherry tomatoes, and peppers may take around 8 to 12 weeks or more to mature.

Flowers: Marigolds, petunias, and other flowers may take 8 to 12 weeks or longer to reach maturity and bloom.

Aquaponic Farming:

Leafy greens: Lettuce, kale, and other leafy greens usually have a growth duration of 3 to 6 weeks.

Herbs: Basil, mint, and other herbs can be harvested within 4 to 6 weeks after planting.

Fruit-bearing plants: Strawberries and certain tomato varieties may take around 8 to 12 weeks or more to mature and produce fruits.

Root vegetables like radishes and carrots: Depending on the variety, they can be harvested in about 6 to 10 weeks.

WATER CONSUMPTION

Sure, here's a general overview of how plants grow in hydroponic, aeroponic, and aquaponic systems, along with their water consumption per day and duration of life:

Hydroponics:

In hydroponic systems, plants grow in a soilless medium, with their roots submerged in a nutrient-rich water solution.

Water consumption per day varies depending on factors like plant type, size, and environmental conditions, but it generally ranges from 0.5 to 1 liter per plant per day.

The duration of life for plants in hydroponic systems is similar to traditional soil-based cultivation methods. It depends on the specific plant species being grown and how well it's cared for. However, in optimal conditions, plants grown hydroponically may mature faster and produce higher yields compared to traditional methods.

Aeroponics:

In aeroponic systems, plants are suspended in the air, and their roots are periodically misted with a nutrient-rich water solution.

Water consumption in aeroponic systems tends to be lower compared to hydroponics because the misting method delivers water directly to the roots, minimizing waste. On average, it can be around 0.2 to 0.5 liters per plant per day.

The duration of life for plants in aeroponic systems can be similar to or slightly longer than hydroponic systems due to the efficient delivery of nutrients and oxygen directly to the roots.

Aquaponics:

Aquaponic systems combine hydroponics with aquaculture, where fish are raised in a symbiotic environment with plants.

Water consumption in aquaponic systems can vary widely depending on factors like the size of the fish tank, the number of plants, and the type of plants being grown. On average, it can range from 1 to 2 liters per plant per day.

The duration of life for plants in aquaponic systems is similar to hydroponics since they receive nutrients from the fish waste in the water. However, the overall lifespan of plants in aquaponic systems can be influenced by factors such as water quality, fish health, and system maintenance.

PLANTS GROW IN INDOOR AND OUTDOOR WITH AND WITHOUT LIGHT

Indoor or Controlled Environment Plants:

These are plants that thrive in indoor or controlled environments with artificial lighting and climate control.

Examples include leafy greens like lettuce, spinach, kale, and herbs such as basil, cilantro, and mint.

They are suitable for indoor hydroponic, aeroponic, or aquaponic setups on various floors of the high-rise building.

Balcony or Terrace Plants:

These plants can tolerate outdoor conditions but may still benefit from some protection and controlled watering.

Examples include compact fruit-bearing plants like strawberries, cherry tomatoes, and peppers, as well as certain herbs.

They can be grown in hydroponic or aeroponic systems placed on balconies, terraces, or rooftop gardens of the high-rise building.

Vertical Growing Systems:

These plants are chosen for their ability to grow vertically, maximizing space utilization in high-rise buildings.

Examples include vine plants like tomatoes, cucumbers, and beans, as well as certain ornamental climbers.

They can be grown in vertical hydroponic or aeroponic systems installed on walls, balconies, or within interior spaces.

Rooftop Gardens or Sky Gardens:

These are larger-scale growing environments situated on the rooftops of high-rise buildings.

Suitable plants include a wide variety of crops, from leafy greens and herbs to fruits, vegetables, and ornamental plants.

They may utilize a combination of hydroponic, aeroponic, and traditional soil-based methods, depending on space availability and resource considerations.

Specialized Indoor Farms:

These are dedicated indoor farming facilities within high-rise buildings, employing advanced hydroponic, aeroponic, or aquaponic technologies.

Crops grown include a diverse range of plants, optimized for resource efficiency, yield, and quality.

They contribute to local food production and sustainability efforts, providing fresh produce to residents or commercial markets.

PLANTS ARE BEEN PLANTED OR CULTIVATED IN PARTICULAR AREA IN HYDROPONIC, AEROPONIS AND AQUAPONIC

Hydroponic Systems:

Plant spacing: In hydroponic systems, plants are typically spaced closer together compared to traditional soil-based cultivation methods because they don't compete for nutrients in the same way.

Crop selection: Leafy greens and herbs are commonly grown in hydroponic systems due to their efficient use of space and relatively quick growth.

Density: Depending on the specific crop and system design, you might plant anywhere from 1 to 4 plants per square foot (0.09 square meters) in a hydroponic setup.

For example, in a 100-square-foot (9.29-square-meter) area, you might be able to plant anywhere from 100 to 400 plants, depending on the spacing and type of crop.

Aeroponic Systems:

Plant spacing: Aeroponic systems allow for even tighter plant spacing compared to hydroponics because plants receive nutrients directly through misting, eliminating the need for root space.

Crop selection: Similar to hydroponics, leafy greens, herbs, and certain fruiting plants can be grown aeroponically.

Density: In aeroponic systems, you might plant anywhere from 2 to 6 plants per square foot (0.09 square meters), or even more densely depending on the specific system and crop.

Using the same 100-square-foot area as an example, you might be able to plant anywhere from 200 to 600 plants in an aeroponic setup.

Aquaponic Systems:

Plant spacing: In aquaponic systems, plants are typically spaced similarly to hydroponic systems, as they receive nutrients from the water containing fish waste.

Crop selection: Leafy greens, herbs, and some fruiting plants can be grown in aquaponic systems, but the selection may be more limited compared to hydroponics or aeroponics.

Density: Similar to hydroponic systems, you might plant anywhere from 1 to 4 plants per square foot (0.09 square meters) in an aquaponic setup.

Using the same 100-square-foot area as an example, you might be able to plant anywhere from 100 to 400 plants in an aquaponic system.

AQUAPONIC AND HYDROPONIC PLANTS GROW WITHOUT NATURAL LIGHTNING AND ARTIFICIAL LIGHTINGS

Aquaponic Plants:

Lettuce (*Lactuca sativa*): Certain varieties of lettuce can tolerate low-light conditions and are suitable for aquaponic systems.

Watercress (*Nasturtium officinale*): Watercress is a semi-aquatic plant that can grow in partially shaded conditions, making it suitable for aquaponic setups.

Basil (*Ocimum basilicum*): While basil typically requires ample sunlight for optimal growth, some varieties can tolerate lower light levels and can be grown in aquaponic systems with reduced lighting.

Mint (*Mentha* spp.): Mint is a hardy herb that can tolerate shade and still grow well in aquaponic environments.

Chives (*Allium schoenoprasum*): Chives are a low-light herb that can thrive in aquaponic systems with minimal lighting.

Hydroponic Plants:

Spinach (*Spinacia oleracea*): Spinach is a leafy green that can grow in low-light conditions and is suitable for hydroponic systems with limited or no artificial lighting.

Arugula (*Eruca sativa*): Arugula is another leafy green that can tolerate shade and is well-suited for hydroponic cultivation in environments with reduced light.

Swiss Chard (*Beta vulgaris*): Swiss chard is a hardy leafy green that can grow in partial shade, making it suitable for hydroponic systems without natural or artificial lighting.

Microgreens: Some microgreens, such as radish microgreens, can grow in low-light conditions and are well-suited for hydroponic cultivation.

Fenugreek (*Trigonella foenum-graecum*): Fenugreek is an herb that can grow in partially shaded conditions and is suitable for hydroponic systems with reduced lighting.

5.2 AREA STATEMENT

AREA STATEMENT

URBAN FARM					
S.NO.	DESCRIPTION	AREA/PERSON	NO. OF USERS	NO. S	AREA(SQ. M.)
1	HYDROPONICS FARM	300	1	6	1800
2	AQUAPONICS	300	1	1	300
3	SANITIZING ROOM	2	5	14	140
4	MUSHROOM FARM	100	1	4	400
5	AEROPONICS FARM	200	1	3	600
6	WAREHOUSE	100	1	1	100
7	PROCESSING AND	300	1	3	900
8	STORAGE	100	1	3	300
9	GERMINATION ROOM	66	1	2	132
10	PREPARATION	60	1	2	120
	TOTAL				4792

INTERACTIVE SPACES					
EXHIBITION					
S.NO.	DESCRIPTION	AREA/PERSON	NO. OF USERS	NO.S	AREA(SQ. M.)
1	EXHIBITION HALL	2.3	100	1	230
2	GALLERY	2.3	80	1	184
3	STORE	20%			82.8
	TOTAL				496.8

AGRO-MARKET					
S.NO.	DESCRIPTION	AREA/PERSON	NO. OF USERS	NO.S	AREA(SQ. M.)
1	RETAIL STORE	2.3	80	1	184
2	COUNTER	2.3	50	1	115
3	BAGGAGE LOCKER	20%			59.8
4	SECURITY OFFICE	10	1	1	10
	TOTAL				368.8

CAFETERIA					
S.NO.	DESCRIPTION	AREA/PERSON	NO. OF USERS	NO.S	AREA(SQ. M.)
1	DINING(INDOOR+OUT	1.3	100	1	130
2	KITCHEN	20%			52
3	STORE ROOM	20%			52
4	DISH WASHING AREA	5%			13
5	COUNTER	5%			13
	TOTAL				260

Despite the benefits of using pesticides to improve food safety, intensive and widespread use of chemical pesticides can increase soil pollution, thereby increases environmental and health risks these are alternate techniques

PLANTS GROWN IN THIS METHOD

HYDROPONICS - Lettuce, Spinach, Kale, Coriander, Basil

AEROPONICS - Broccoli, cucumber, Greenbeans, spinach

AQUAPONICS - Lettuce, cabbages, Basil, Beans

Figure 3 AREA STATEMENT

RESEARCH FACILITIES					
S.NO.	DESCRIPTION	AREA	UNITS	AREA	
1	GENERAL DRY LAB	30	1	30	
2	MICROBIOLOGY LAB	30	1	30	
3	VIROLOGY LAB	30	1	30	
4	BACTERIA TEST LAB	30	1	30	
5	NEMATOLOGY LAB	30	1	30	
6	INSECTICIDE	30	1	30	
7	GROWTH ROOM	40	1	40	
8	COOLBOTS	20	3	60	
9	UTILITY ROOM	30	1	30	
10	PHYTOCHEMISTRY	40	1	40	
11	AGRONOMY	50	1	50	
12	GENETICS RESEARCH	80	2	160	
13	RECEPTION, FOYER	50	1	50	
14	LAB HELPERS' ROOM	12	1	12	
15	CHANGING ROOM			54	
16	LABORATORY CHIEF	15	1	15	
17	SCIENTIST'S OFFICES	12	10	120	
18	MEETING ROOM	36	1	36	
19	AHU	30	1	30	
	TOTAL			877	
20	ANCILLIARY SPACE	3%		26.31	
	TOTAL			903.31	

TRAINING FACILITIES					
S.NO.	DESCRIPTION	AREA/PERSON	NO. OF USERS	NO. S	AREA(SQ. M)
1	THEORY ROOM	2.4	30	3	216
2	PRACTICAL ROOMS	3	15	1	45
3	EQUIPMENT STORE	30	1	1	30
5	STAFF ROOM	3	10	1	30
6	REST ROOMS	50			100
7	LIBRARY			1	190
8	AUDIO-VISUAL ROOM	2.5	30	1	75
	TOTAL				686

SERVICES				
S.NO.	DESCRIPTION	UNIT AREA	NO.S	AREA(SQ.M)
1	ELECTRICAL ROOM	3	3	9
2	GENERATOR ROOM	15	1	15
3	JANITOR'S STORE	15	2	30
4	GUARD HOUSE	40	1	40
5	MECHANICAL ROOM	20	2	40
6	WATER TREATMENT FACILITY	100	1	100
	TOTAL			234

PARKING				
S.NO.	DESCRIPTION	AREA/UNIT	NO.S	AREA(SQ.M.)
1	4 WHEELERS	18	15	270
2	2 WHEELERS	2	50	100
3	BICYCLE	1.4	30	42
4	TRUCK	30	3	90
	TOTAL			502

MARKET				
S.NO.	DESCRIPTION	AREA/UNIT	NO.S	AREA(SQ.M.)
1	MARKET SPACE	201	201	400

5.3 PROGRAM

AGRI - RESEARCH CENTRE AND MARKET

An **RESEARCH CENTRE** serves as a central point for various activities related to farming, crop cultivation, livestock rearing, and other agricultural practices. These hubs are essential components of agricultural networks, connecting farmers, suppliers, buyers, and service providers within a specific region or community.



PROGRAMS

- Research and Development
- Crop Improvement and Breeding
- Innovation and Technology
- Knowledge Dissemination
- Sustainability and Environmental Conservation



NEED

Agriculture is most important occupation in India including Tamilnadu, But today it has become unprofitable due to irregular monsoon, prices fluctuations of agro - products and some internal weakness of agriculture sector. There is a need to some innovative activities in areas of urban too like research centre to help farmers

SCOPE

- **TRAINING CENTRE**
- **TESTING LABS**
- **URBAN FARMS**
- **VERTICAL FARMING**
- **PROCESSING UNIT**

CONTRIBUTION IN GDP

At Time of independence agri sector contribute more than 50% of India's GDP. currently, it contributes less than 20% of Indian GDP. Day by day contribution of agriculture is



Due to natural calamities Agriculture is gradually decrease due to some factors



URBAN FARMING TECHNOLOGIES

- Greenhouse
- Hydroponics
- Aquaponics
- Aeroponics
- Modern Consideration Of Vertical Farming

SPACES

- Green Wall Consideration
- Green roof
- Development Lab
- Specimen Labs
- Hybrid Lab
- Space For Generation
- Seed Development Zone
- Lab Supported Room
- Incubation Room

URBAN AGRICULTURE

- Urban agriculture -
- Roof farming
- Indoor farming
- Vertical farming

RESEARCH DIVISIONS

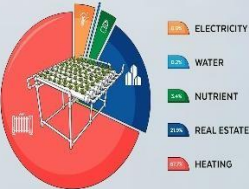
- Agronomy
- Entomology
- Pathology

PROGRAMS

HYDROPONICS

Hydroponics is a method of growing plants that takes advantage of this fact by providing all of the nutrients, in their inorganic form, in a liquid solution with or without solid media.

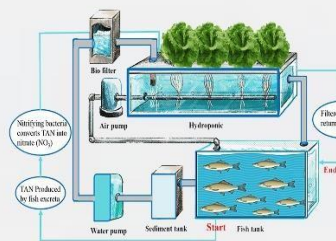
97% - Less Farm Land
93% - Less Water
50% - Less Energy



Hydroponics are been practising by some farms in Chennai like

- Balcony Crops
- Kryzen biotech
- Way2grow
- Acqua Farms
- Citygreens

AQUAPONICS



Aquaponics is a cooperation between plants and fish and the term originates from the two words aquaculture (the growing of fish in a closed environment) and hydroponics (the growing of plants usually in a soil-less environment). Aquaponic systems come in various sizes from small indoor units to large commercial units.

The Aquaponic General Cycle

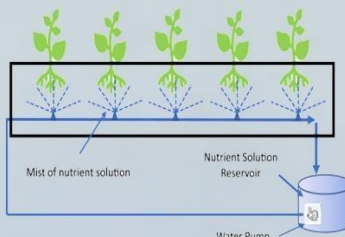


AEROPONICS

Aeroponics is the practice of growing plants in an air or mist environment without the use of any substrate. That is, the plant roots are suspended in the air and are misted or sprayed periodically with a nutrient solution or aerosol of nutrient solution.

Aeroponics is best suited for green leaves, herbs, marijuana, strawberries, tomatoes and cucumbers.

- Up to 95% less water than outdoor farming
- No pesticides or harmful chemicals.
- Fewer food miles and reduced carbon footprint
- No fertiliser runoff into waterways



Despite the benefits of using pesticides to improve food safety, intensive and widespread use of chemical pesticides can increase soil pollution, thereby increases environmental

PLANTS GROWN IN THIS METHOD

HYDROPONICS - Lettuce, Spinach, Kale, Coriander, Basil

AEROPONICS - Broccoli, cucumber, Green beans, spinach

AQUAPONICS - Lettuce, cabbage, Basil, Beans,

A **WHOLESALE MARKET** has been proposed by the government in Kattankulathur. Here due to low population around the area of Kattankulathur the area has been designed small due to the less crowd.

The site is located in the prime location which means centrally located and easily accessible. It is well connected by public transportation makes people easy to visit. Its an place where people enter the city.

TWO BLOCKS

- **PRODUCTION WITH EDUCATION BLOCK**
- **PRODUCTION WITH RESEARCH BLOCK**

PRODUCTION WITH EDUCATION BLOCK contains of works in production and educational purposes which help in both for educational and simultaneously it bring the people like students, farmers and a common man to educate about the modern techniques and development over the new method of farming

PRODUCTION WITH RESEARCH BLOCK contains of works in production and RESEARCH purposes which help in both for educational and simultaneously it bring the people like students, farmers and a common man to educate about the modern techniques and development over the new method of farming



AGRICULTURAL RESEARCH CENTRE

MARKET SPACE



5.4 EDUCATIONAL BLOCK

PRODUCTION WITH EDUCATION BLOCK

PRODUCTION WITH EDUCATION BLOCK contains of works in production and educational purposes which help in both for educational and simultaneously it bring the people like students, farmers and a common man to educate about the modern techniques and development over the new method of farming.



It consist of aquaponic and hydroponic plants as main part and has aeroponic plants where here techniques are been educated and been trained. They are been trained and educate the students to get a exposure to the new technique of farming and booming technologies

Depending on the nature of research conducted at the center, specialized laboratories for scientific experiments, computer simulations, or other hands-on learning activities. These labs would facilitate practical learning and experimentation.

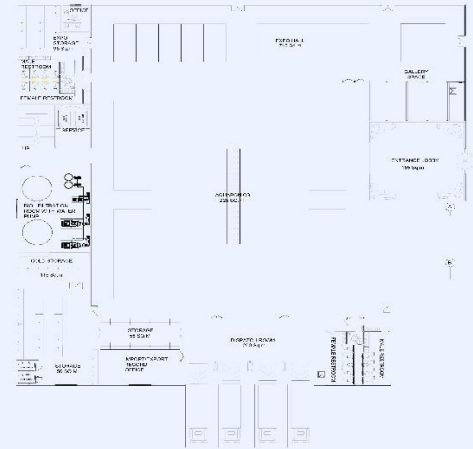
EXPO HALL - In Expo Hall, newly introduced techniques and newly researched products are been showcased, expo is open for people from outsource also not only from here but also from all new innovations.

Here 3 floor consists of various plants and production is differ in time and duration, separate lift truck is been placed at every storage room for the easy access to the each floor.

Dispatch room at back side of floor and storage of importing goods with dispatching goods. Cold storage and hydroponic plants on center of the block



Placement of aluminum frame combine with hydroponic pipe connect with floor vice aluminum frame



STAFF AND CONFERENCE ROOM - Because of the educational block, staff room and conference for the educational teaching staffs and working staffs are ben in first floor away from the crowd and the public

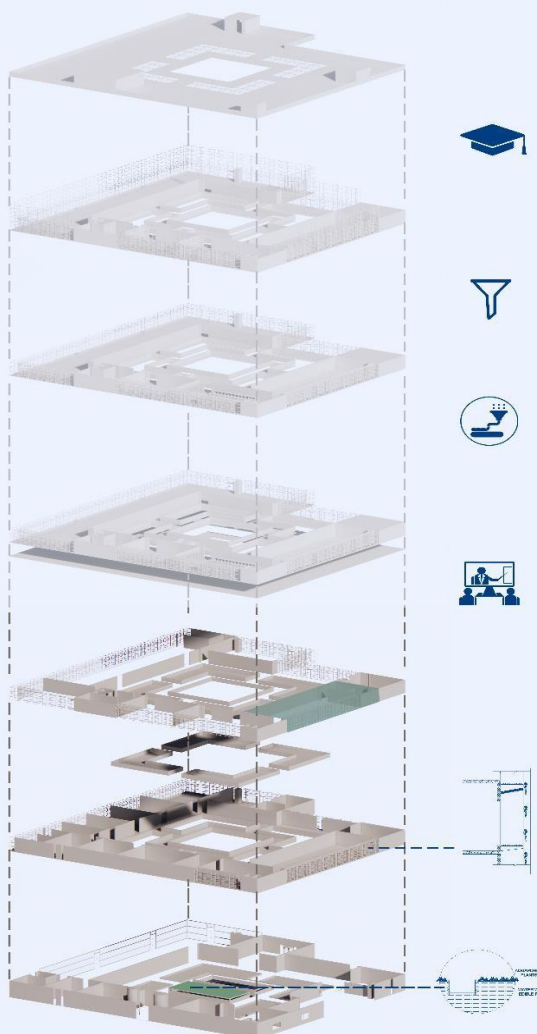
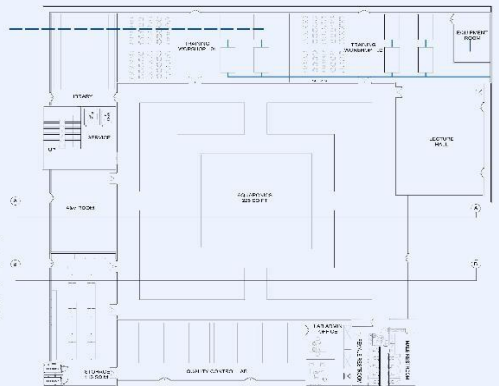
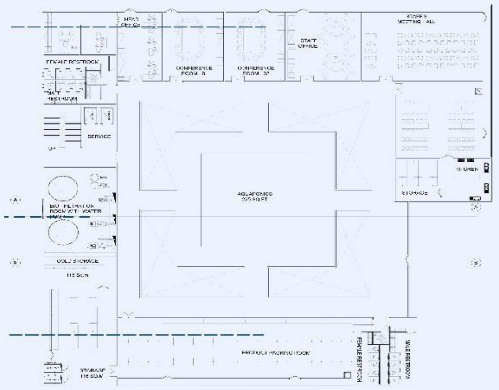
FILTRATION ROOM - Here filtration is take place where placed in double height due to the height of water tank filter and motor which pumps and filtrate the water from the aquaponic pond to the plants.

STORAGE AND PACKING ROOM - Each floor has separate storage compartments which is capable for storage of each floor, it also help in separate the products with the date and expiry of each product.

TRAINING WORKSHOP - Training workshop is been conduct for the students and for the public to know how to handle the new evolving farming techniques and to grow plants within their compact area

SECTION OF FACADE - Facade is covered with hydroponic system which is combined with aluminium cast rod along with the pipes simultaneously passes with hydroponics system which transmit water from the top floor towards down

SECTION OF AQUAPONIC - In Ground, the floor is covered with aquaponic plant where edible fishes are under the bed of plants light is been fall on the side of walk way and bed. The feed for fishes is given through the side of walk way



PRODUCTION WITH EDUCATION BLOCK

PRODUCTION WITH EDUCATION BLOCK contains of works in production and educational purposes which help in both for educational and simultaneously it bring the people like students, farmers and a common man to educate about the modern techniques and development over the new method of farming



EDUCATION BLOCK contains of works in production and educational purposes which help in both for educational and simultaneously it bring the people like students, farmers and a common man to educate about the modern techniques and development

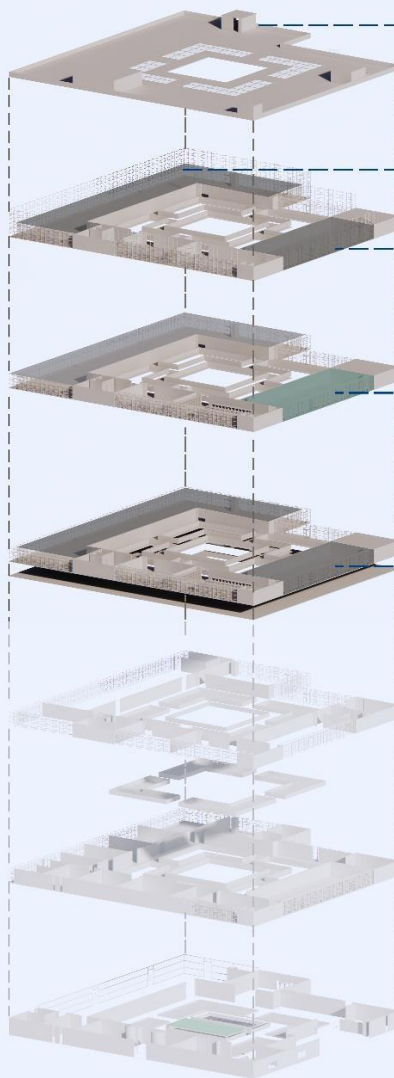
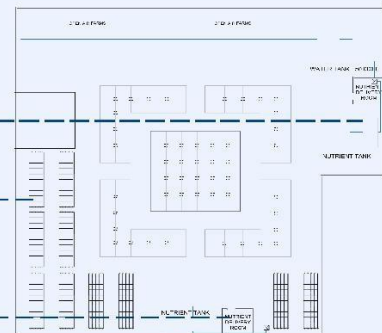
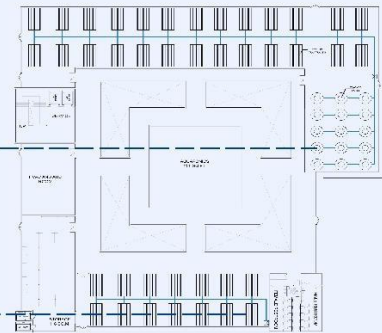
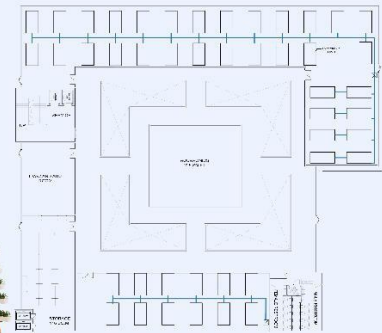
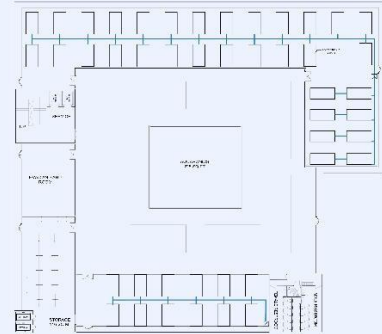
Production and educational purposes which help in both for educational and simultaneously it bring the people like students, farmers and a common man to educate about the modern techniques and development over the new method of farming

It consist of aquaponic and hydroponic plants as main part and has acropnic plants where here techniques are been educated and been trained. They are been trained and educate the students to get a exposure to the new technique of farming and booming technologies



Hydroponics is a method of growing plants that takes advantage of this fact by providing all of the nutrients, in their inorganic form, in a liquid solution with or without solid media.

Leafy greens - plants like spinach, lettuce and kale
Herbs plants - basil, cilantro, oregano and parsley
Fruit bearing plants - fruit bearing plants - tomatoes, cucumber, pepper and strawberries
Root vegetables - Radishes, carrots and bets
Flowering plants - Marigold, petunias and pansies



WATER TANK - Water tank with the capacity of 50000 is the per day consumption of water in the building. Nutrient delivery room is placed in the top of floor to get along with the water which is nearby. It can combine to pass through the pipes to get the sufficient water and nutrient to the plants

Other typical floor are grown as usual normal hydroponic plants with different structures as well as production, like Herbs, basil, cilantro, oregano and radishes

HYDROPONIC TRELLIS - A Vertical Hydroponic system that uses an A-frame system, hydroponic wall, and bottles to grow crops.



HYDROPONIC LABORATORY PLANTS - Certain plants are not grow in normal conditions and require certain temperature these plants are grown in this labs also used for production

HYDROPONIC TOWER - A Vertical Hydroponic system that uses an A-frame system, hydroponic wall, and bottles to grow crops. It can be used to grow a variety of crops, including herbs, lettuce, spinach, broccoli, strawberries.



PLANTS GROWN IN SHORT DURATION - Vegetables and plants like Spinach, lettuce, and kale can harvest in a duration of 3 to 6 weeks because they are leafy vegies which is take shorter time to grow

A - FRAME OR TRELLIS FRAME - A-frame hydroponics, also known as the A-frame N.F.T. system, is a hydroponic growing method that uses channels or troughs shaped like the letter 'A' to grow plants.



WATER TANK - Water tank with the capacity of 50000 is the per day consumption of water in the building.

SOLAR PANEL - Solar panel is been used to run the building which is similar to sustainable to reuse the natural energy for the production, help in reduce the electricity consumption

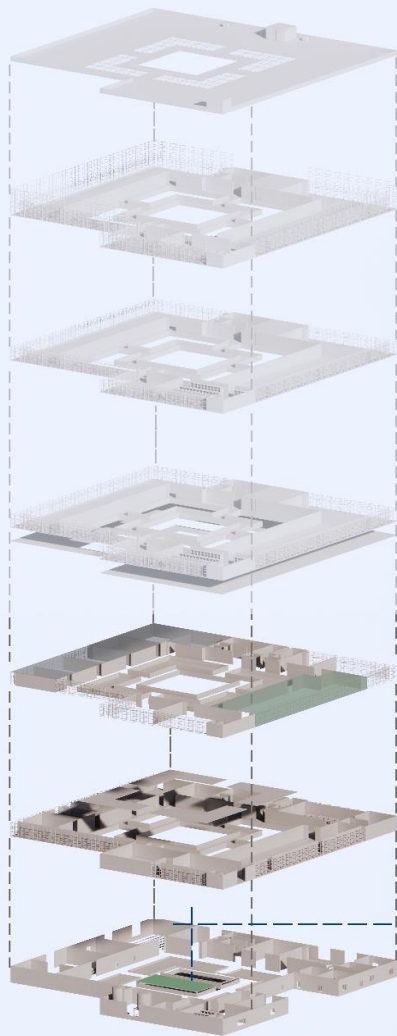
NUTRIENT DELIVERY ROOM - Nutrient delivery room is placed in the top of floor to get along with the water which is nearby, it can combine to pass through the pipes to get the sufficient water and nutrient to the plants

5.5 RESEARCH BLOCK

PRODUCTION WITH RESEARCH BLOCK



RESEARCH BLOCK consist of the labs and research materials and its restricted from the public and used by mainly research people ,research students ,scientists and lab technicians. Restricted from the educational block .



PRODUCTION WITH RESEARCH BLOCK contains of works in production and research purposes which help in both for research and simultaneously it being the people like students, farmers and a common man to educate about the modern techniques and development over the new method of farming.

It consist of aquaponic and hydroponic plants as main part and has aeroponic plants where here techniques are been educated and been trained. They are been trained and educate the students to get a exposure to the new technique of farming and booming technologicls



FILTRATION ROOM - Here filtration is take place where placed in double height due to the height of water tank filter and motor which pumps and filtrate the water from the aquaponic pond to the plants.

Dispatch room at back side of floor and storage of importing goods with dispatching goods. Cold storage and hydroponic plants on center of the block. Here 3 floor consits of various plants and production is differ in time and duration. separte lift truck is been placed at every storage room for the easy access to the each floor.



STAFF AND CONFERENCE ROOM - Because of the research block, staff room and conference for the educational teaching staffs and working staffs are ben in first floor away from the crowd and the public



SECTION OF FACADE - Facade is covered with hydroponic system which is combined with aluminium cast rod along with the pipes simultaneously passes with hydroponic system which transmit water from the top floor towards down



STORAGE AND PACKING ROOM - Each floor has separte storage compartments which is capable for storage of each floor. it also help in separte the products with the date and expiry of each product.



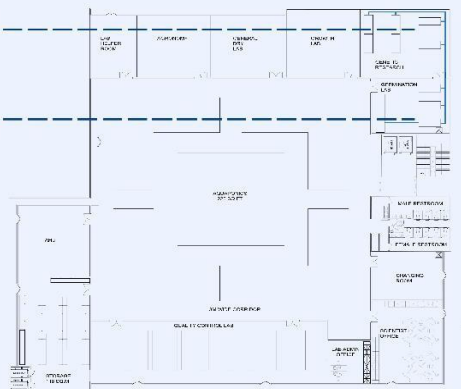
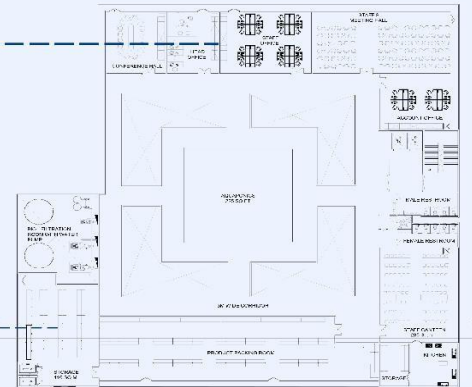
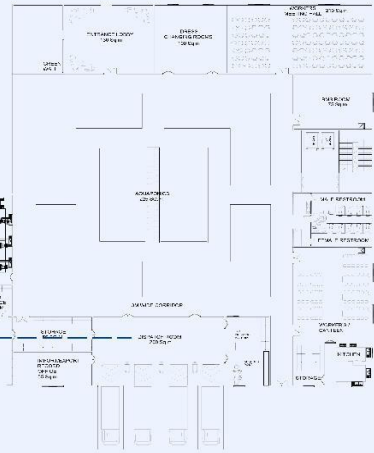
GROWTH LAB - Growth lab is placed near labs of agronomy with genetic research and its development over the growth and cultivation



GERMINATION LAB - Germination lab is used for the germination, growth and seed growth over the plants to the duration of span of plants



SECTION OF AQUAPONIC - In Ground, the floor is covered with aquaponic plant where edible fishes are under the bed of plants light is been fall on the sides of walk way and bed. The seed for fishes is given through the side of walk way



PRODUCTION WITH RESEARCH BLOCK



PRODUCTION WITH RESEARCH BLOCK contains of works in production and research purposes which help in both for research and simultaneously it bring the people like students, farmers and a common man to educate about the modern techniques and development over the new method of farming

PRODUCTION WITH RESEARCH BLOCK plants are also cultivated and produce by using advanced methods. They are,

- Leafy greens
- Herbs
- Fruit bearing plants
- Root vegetables
- Flowering plants

Types of Plants -

Leafy greens - plants like spinach, lettuce and kale
Herbs plants - basil, cilantro, oregano and parsley
Fruit bearing plants - fruit bearing plants - tomatoes, cucumber, pepper and strawberries
Root vegetables - Radishes, carrots and beets
Flowering plants - Marigold, petunias and pansies

Time duration -

Leafy greens - 3 to 6 weeks to harvest
Herbs plants - 4 to 6 weeks after planting
Fruit bearing plants - 8 to 12 weeks from mature
Root vegetables - 8 to 12 weeks from mature
Flowering plants - 8 to 12 weeks or longer

Water consumption -

Leafy greens - 0.5 to 1 litre per day for per plant
Herbs plants - 0.5 to 1 litre per day for per plant
Fruit bearing plants - 1 to 3 litre per day for per plant
Root vegetables - 2 to 3 litre per day for per plant
Flowering plants - 0.5 to 1 litre per day for per plant

WATER TANK - Water tank with the capacity of 50000 is the per day consumption of water in the building. Nutrient delivery room is placed in the top of floor to get along with the water which is nearby, it can combine to pass through the pipes to get the sufficient water and nutrient to the plants

Other typical floor are grown as usual normal hydroponic plants with different structures as well as production, like Herbs, basil, cilantro, oregano and radishes

HYDROPONIC LABORATORY PLANTS - Certain plants are not grown in normal conditions and require certain temperature these plants are grown in this lab also used for production

A - FRAME OR TRELLIS FRAME - A-frame hydroponics, also known as the A-frame N.F.T. system, is a hydroponic growing method that uses channels or troughs shaped like the letter 'A' to grow plants.

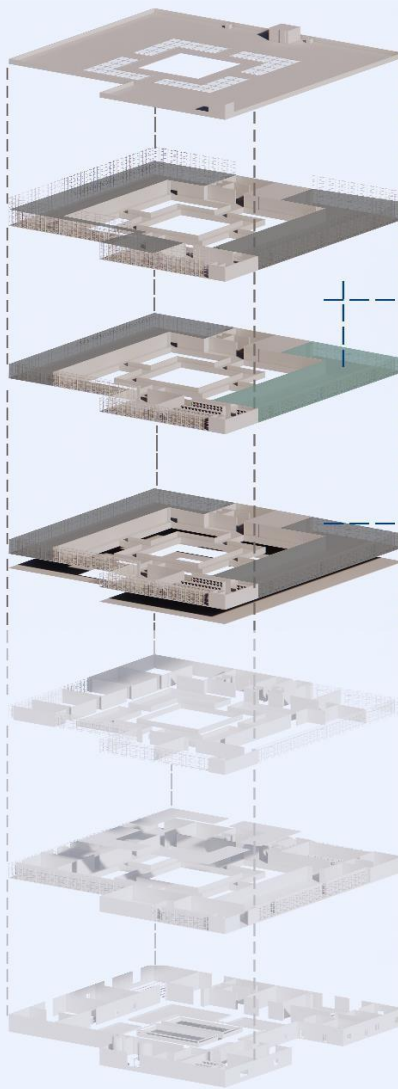
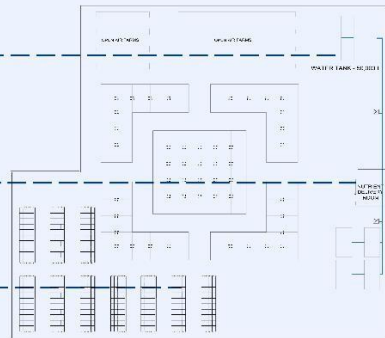
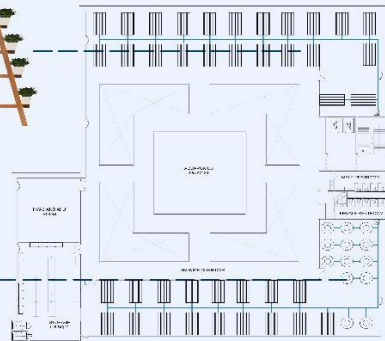
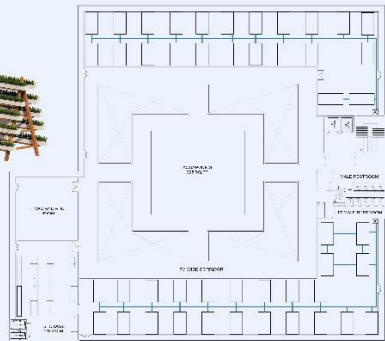
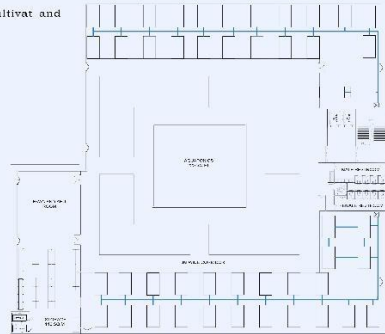
PLANTS GROWN IN SHORT DURATION - Vegetables and plants like **Spinach, lettuce, and kale** can harvest in a duration of **3 to 6 weeks** because they are leafy vegies which is take shorter time to grow

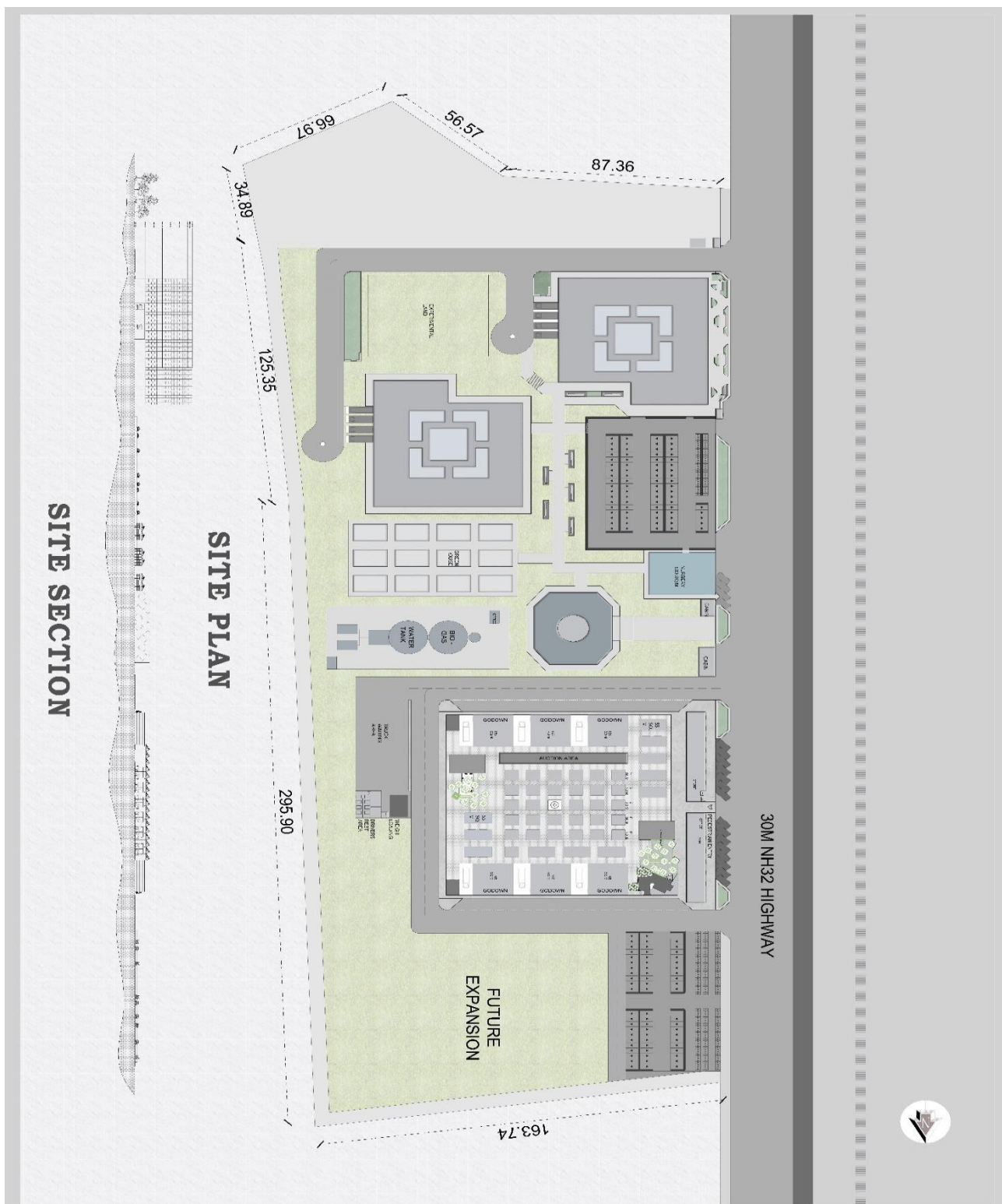
HYDROPONIC TOWER - A Vertical Hydroponic system that uses an A-frame system, hydroponic wall, and bottles to grow crops. It can be used to grow a variety of crops, including herbs, lettuce, spinach, broccoli, strawberries.

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NUTRIENT DELIVERY ROOM - Nutrient delivery room is placed in the top of floor to get along with the water which is nearby, it can combine to pass through the pipes to get the sufficient water and nutrient to the plants

SOLAR PANEL - Solar panel is been used to run the building which is similar to sustainable to reuse the natural energy for the production. help in reduce the electricity consumption

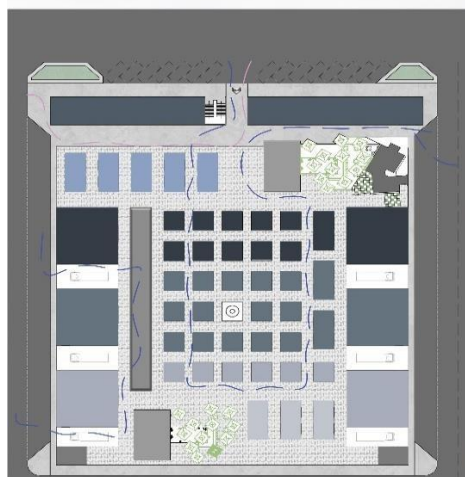




5.6 MARKET



- FARMERS MARKET
- FLOWER SHOPS
- FRUITS MARKET
- VEGETABLE MARKET
- FOOD GRAINS
- CAFETERIA
- PARKING
- LANDSCAPE
- PEDESTRIAN



WHOLESALE MARKET

A **WHOLESALE MARKET** has been proposed by the government in Kattankulathur. Here due to low population around the area of Kattankulathur the area has been designed small due to the less crowd.

It is a market similar to village to town market which has simple placement of circulation and placement of spaces like

- Wholesale Shop
- Semi Wholesale Shop
- Retail Shops
- Farmers Market
- Flowers Market

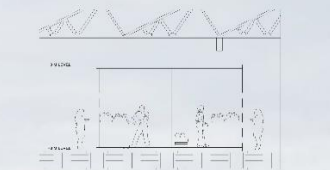
A **WHOLESALE SHOP** consists of vegetable, fruit and grain wholesale market where people could bought products and goods in bulk order for the both residential and commercial purposes like hotels, restaurants, hostels and educational institutes



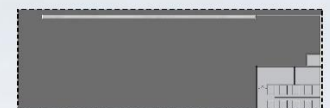
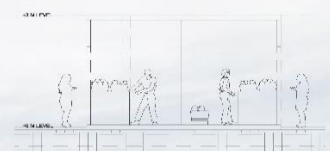
A **SEMI - WHOLESALE SHOP** consists of vegetable, fruit and grain small in scale compare to wholesale market where people could bought products and goods in bulk order for the both residential and commercial purposes like hotels, restaurants, hostels and educational institutes



A **RETAIL SHOP** consists of vegetable, fruit and grain retail market where people could bought products and goods in small order for the both residential and commercial purposes like small shops, commercials and residential



CAFETERIA are placed on both entry of pedestrian and other cufe in back of the market for use of drivers and workers which access easily in between the work



A **FLOWER MARKET** in the front of the market space where near the road side due to the life of flowers, its hieratically placed in front of the market. Flower market is often used by people which is placed in front



- FARMERS MARKET
- FLOWER SHOPS
- FRUITS MARKET
- VEGETABLE MARKET
- FOOD GRAINS
- CAFETERIA



SAWTOOTH TRUSS - Sawtooth Truss is used in the roof of the market space while cover almost all area over the top of the market. In Auction area this play a major role in reduction of direct sun light and heat wave in lat area. Sawtooth allow the sunlight throw the one side and resist sunlight on other side, the placement of truss is towards the east or west side where mostly sun falls on and reduce the heat.

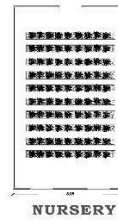
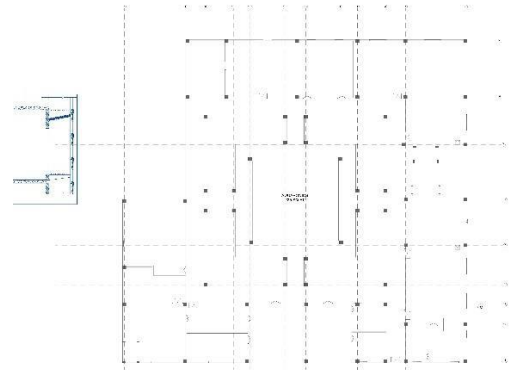
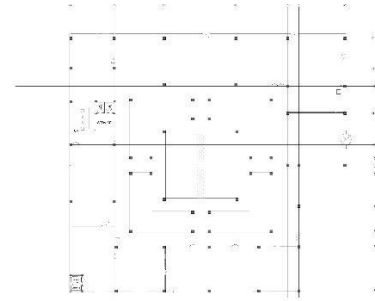
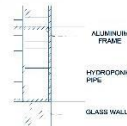
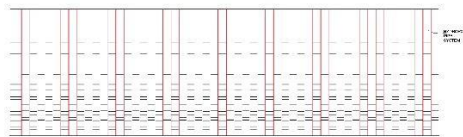
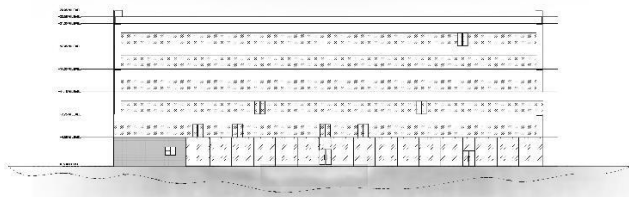
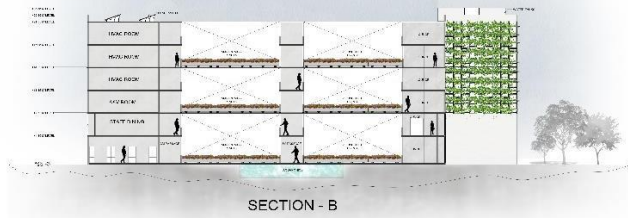
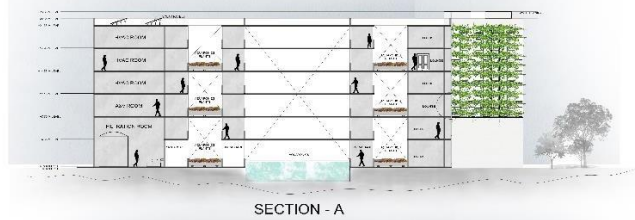


A **RETAIL SHOP** consists of vegetable, fruit and grain retail market where people could bought products and goods in small order for the both residential and commercial purposes, mostly here retail shops are been placed in most number because of residential and public

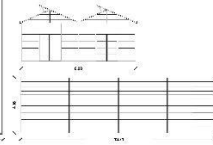
WEIGHT AREA AND REST AREA - are Here last the rest area for drivers and workers been placed with attach to the bathroom. Its been placed at the end of the market apart from the rush area



SECTION AND ELEVATION



GREEN HOUSE



DETAIL -



FACADE SECTION -

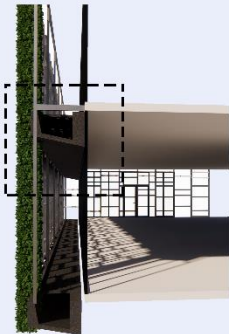
In all floors, the hydroponic pipe is layed at ever row which is combined with alu-minium frame . This aluminum frame passes the water to the plants which is helps to grow. Drain is placed in between the floor and facade skin. Concrete Drain slab is placed in the area where people can come to maintain the plants and to clean the area. ilt has with of 1M span from floor to facade

Facade is act as the micro climate part of the building which helps to change the local climate around the building. External temperetare will be reduced due to the green facade

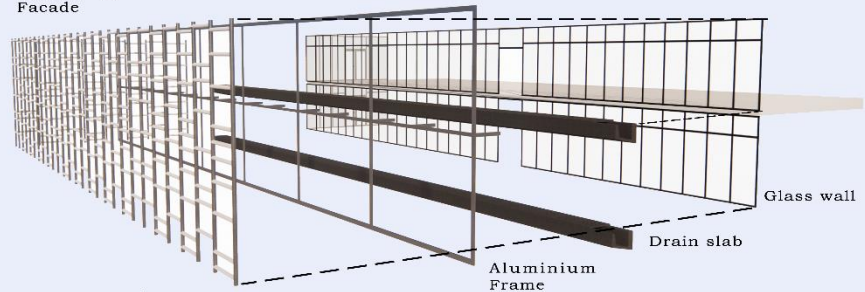


Drain slab connected with the alumi-num frame and the concrete floor of the building, where here aluminium frame act as a skin of the facade

Here facade act as not only the climat-ic factor but also for the use of pro-duction of greens



Hydroponic System in Facade



Glass wall

Drain slab

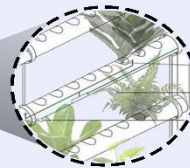
Aluminium Frame

HYDROPONIC PLANT GROWING SYSTEM IN LAB -

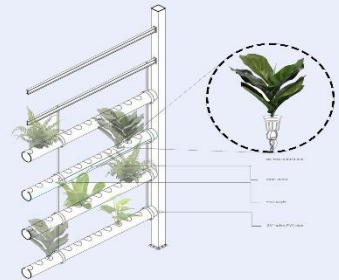
In Hydroponics, certain plants are not grown in certain conditions, they are been grown under the light and certain tempera-ture which is been used as a production system of the plants.

Plants that are grown in these conditions are - fruits which are grow in cold condi-tions like strawberries

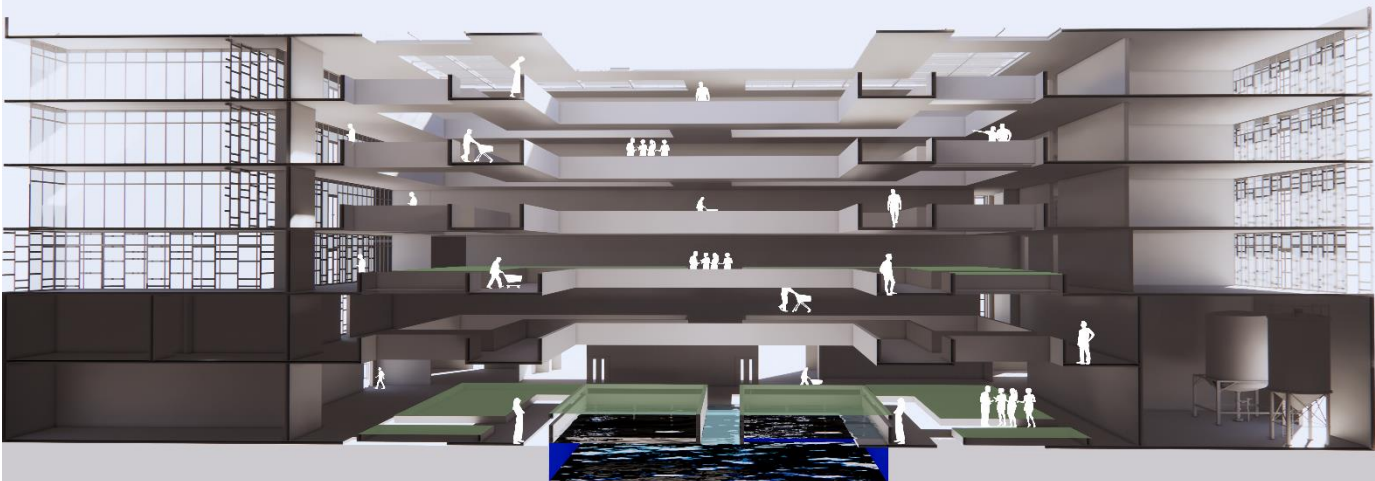
These tray are used to grow various number of plants in single area within a few days or weeks



HYDROPONIC POT -
Hydroponics pot used to hold the plants



BLOCK SECTION -



CHAPTER 6

References

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