THESIS REPORT ON

“AGRICULTURAL COLLEGE, GWALIOR“

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF:

BACHELOR OF ARCHITECTURE

BY

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THESIS GUIDE

PROF. (AR) VARSHA VERMA

SESSION

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TO THE

SCHOOL OF ARCHITECTURE AND PLANNING

BABU BANARASI DAS UNIVERSITY

LUCKNOW.

SCHOOL OF ARCHITECTURE AND PLANNING
BABU BANARASI DAS UNIVERSITY, LUCKNOW (U.P.).

CERTIFICATE

I hereby recommend that the thesis entitled "AGRICULTURAL COLLEGE, GWALIOR" under the supervision, is the bonafide work of the students and can be accepted as partial fulfillment of the requirement for the degree of Bachelor's degree in architecture, school of Architecture and Planning, BBDU, Lucknow.

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Recommendation Accepted

Not Accepted

External Examiner

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Table of Contents

CHAPTER – 1
INTRODUCTION

INTRODUCTION TO AGRICULTURAL

Agriculture is crucial to India's economy, contributing 15-17% to GDP and providing employment to 58% of the population, ensuring food security for millions. Despite diverse agro-climatic zones and a mix of traditional and modern practices, the sector faces challenges like dependence on monsoons, fragmented landholdings, water management issues, low productivity, and inadequate market access. Recent developments include technological advancements, government initiatives, sustainable practices, promotion of Farmer Producer Organizations (FPOs), and the rise of agri-tech startups, all aimed at enhancing productivity and transforming the agricultural landscape.

NEED FOR AGRICULTURAL COLLEGE

The need for agricultural colleges in India is driven by the importance of agriculture to the economy and society, as well as the challenges faced by the sector. Here are key reasons why agricultural colleges are essential:

1. Enhancing Knowledge and Skills

- Education and Training: Agricultural colleges provide specialized education and training to produce skilled professionals who can contribute to the agricultural sector.
- Research and Innovation: They are centers for research and development, leading to innovations in farming techniques, crop management, and sustainable practices.

2. Addressing Sector Challenges

- Modern Techniques: Equip students with knowledge of modern agricultural practices, including precision farming, biotechnology, and sustainable agriculture.
- Climate Resilience: Educate on methods to combat climate change impacts, such as drought-resistant crops and efficient water management.

3. Supporting Rural Development

- Empowering Farmers: Graduates often work directly with farmers, helping them adopt new technologies and improve productivity.
- Extension Services: Provide extension services that offer practical assistance and advice to farmers in rural areas.

AIMS AND OBJECTIVES

To provide comprehensive education and training in agricultural sciences to produce skilled professionals who contribute to agricultural advancement and rural development.

- Education and Training: Deliver high-quality education in agricultural sciences with practical skills and hands-on training.
- Research and Development: Conduct research to develop new technologies, crop varieties, and sustainable farming practices.

- Extension and Outreach: Disseminate research findings and innovative practices to farmers through training and advisory services.
- Sustainable Agriculture: Promote environmentally friendly practices like organic farming and conservation agriculture.
- Policy and Management: Prepare students for leadership roles in agricultural policy and agribusiness management.
- Technological Integration: Incorporate modern technology, such as precision farming and digital agriculture, into the curriculum.
- Community Development: Empower rural communities with knowledge and skills to improve agricultural productivity and sustainability.
- Entrepreneurship and Agri-Business: Encourage entrepreneurship and support agri-business startups with training and resources.
- Global Competitiveness: Ensure graduates are globally competitive and foster international collaborations and exchange programs.

SCOPE AND LIMITATION

- Education: Offer diverse courses in agricultural sciences and advanced degrees.
- Research: Develop new technologies, crop varieties, and sustainable practices.
- Extension Services: Provide training and advisory services to farmers.
- Community Development: Support rural projects and collaborate with various sectors.
- Resource Constraints: Limited funding and access to advanced technology.
- Geographical Diversity: Difficulty addressing diverse regional conditions.
- Farmer Outreach: Limited capacity to reach remote areas and disseminate innovations.
- Skilled Faculty Shortage: Challenges in attracting and retaining experienced faculty.

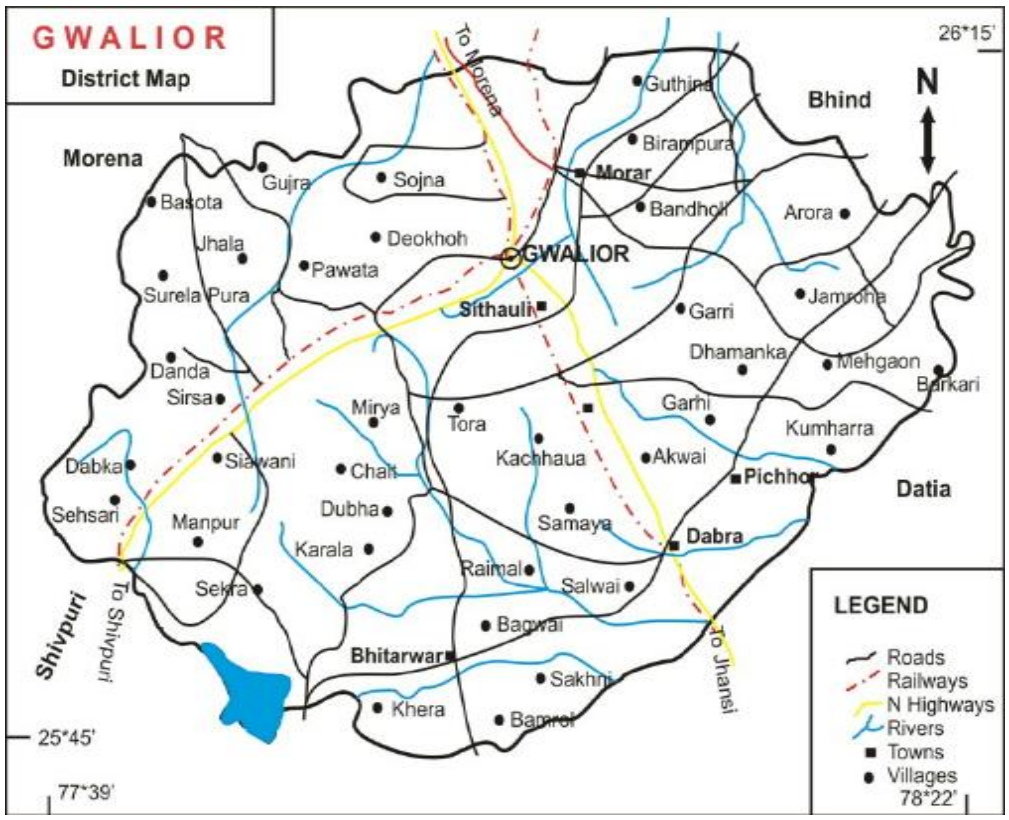
METHODOLOGY

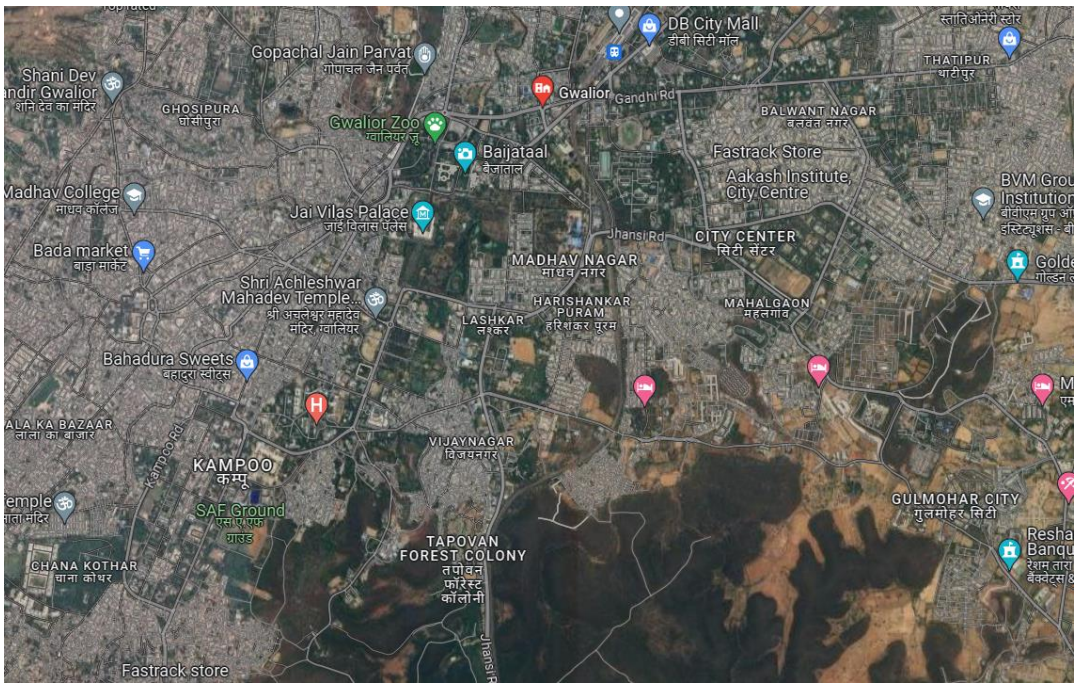
- Site study
- Literature study & Case study
- Analysis and inferences
- Formulation of concept & design concept
- Activities and interpretation of space requirements
- Concept and initialization of design
- Design development
- Final design

CHAPTER – 2
ABOUT THE CITY

ABOUT THE CITY

Gwalior, a historic city in the Indian state of Madhya Pradesh, is renowned for its rich cultural heritage and architectural marvels. Dominated by the imposing Gwalior Fort, a hilltop fortress that dates back to the 8th century, the city is a treasure trove of ancient palaces, temples, and museums. It is also known for its significant contributions to classical Indian music, being the birthplace of the legendary musician Tansen. In addition to its historical and cultural significance, Gwalior is an educational hub, housing several prominent institutions, including the Indian Institute of Information Technology and Management. The city's blend of historical grandeur and modern development makes it a unique and fascinating destination.





ABOUT THE PROJECT

LOCATION - Jhansi Rd, Turari, Gwalior, Lakhnotikhurd, Madhya Pradesh 474001

TYPOLOGY – INSTITUTIONAL BUILDING (group C as per NBC)

CLIENT – ITM COLLEGE GWALIOR

DEPARTMENTS IN AGRICULTURAL COLLEGE ARE LISTED BELOW-

1. Department of Agricultural Economics & Business Management
2. Department of Post Harvest Engineering & Technology
3. Department of Agricultural Microbiology
4. Department of Plant Protection
5. Department of Home Science (UG and PG courses)
6. Center of Agricultural Education {B.Sc. (Hons.)

The Ph.D. and PG courses are run separately by each of the five departments.

REQUIREMENTS

- ACADMIC BLOCK
- ADMINISTRATION BLOCK
- MULTIPURPOSE HALL (auditorium, library, health centre, information centre)
- CANTEEN
- LABORATORIES

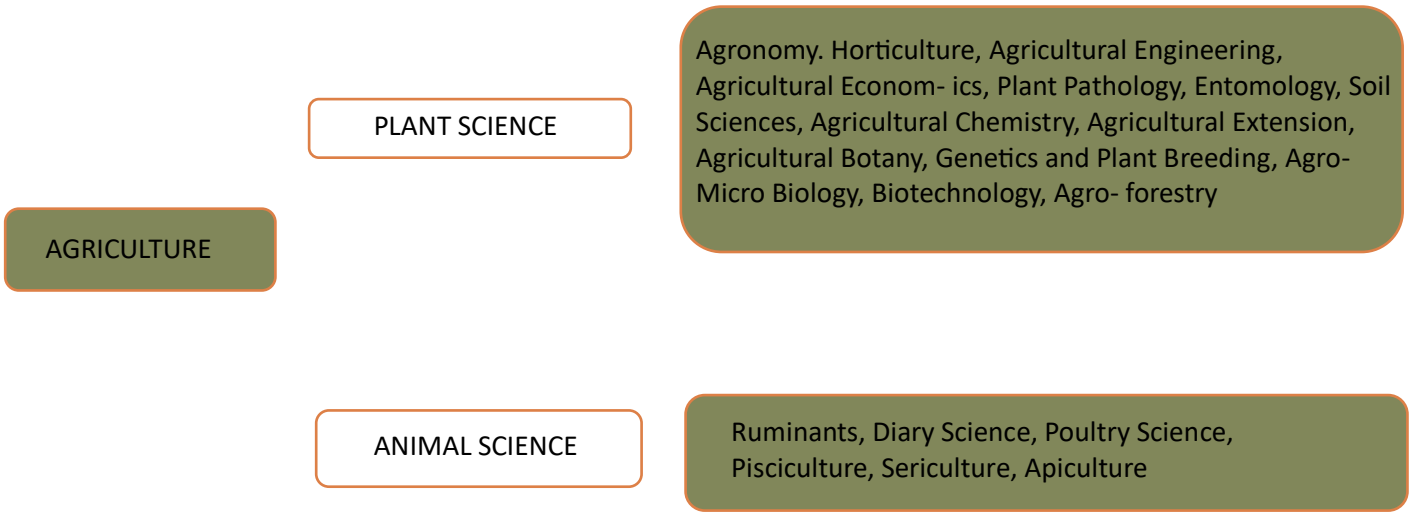
GOAL OF THE PROJECT

The goal of establishing an agricultural college is to advance agricultural education, research, and development. By educating and training professionals in fields such as agronomy, animal husbandry, and agricultural engineering, the college aims to equip graduates with the skills needed to innovate and lead in the agricultural sector. Through cutting-edge research, the college seeks to develop sustainable farming practices, new technologies, and crop varieties that enhance productivity and environmental resilience. Additionally, by providing extension services and fostering entrepreneurship, the college aims to empower rural communities, improve livelihoods, and influence agricultural policy. Through global collaborations, the college strives to maintain international standards and contribute to global agricultural advancements, ensuring a sustainable future for agriculture and rural development.

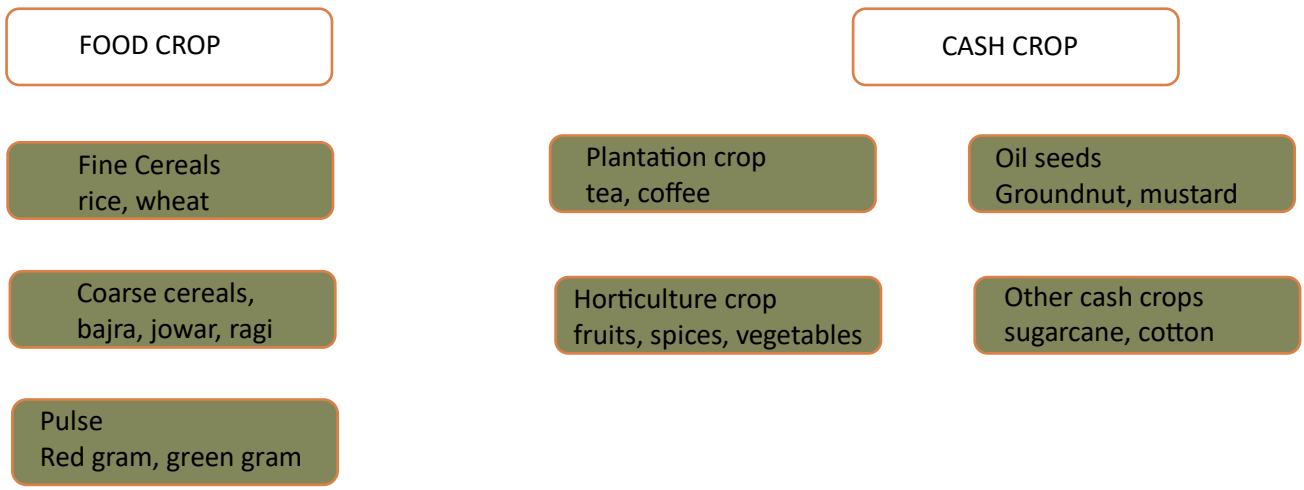
CHAPTER – 3
AGRICULTURE IN INDIA

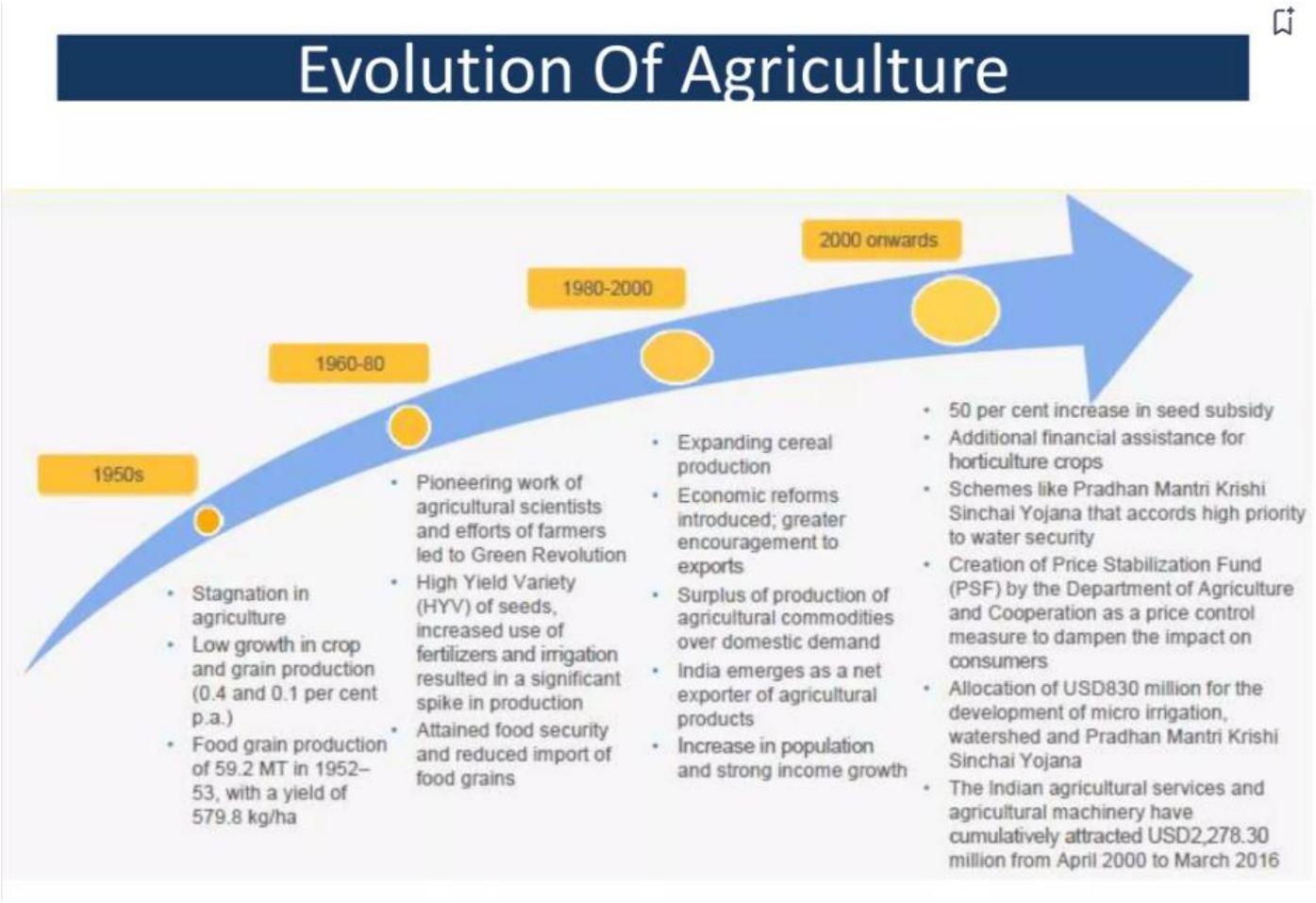
AGRICULTURE

- Agriculture is the science and art of cultivating plants and livestock (food, fiber, forest products, horticultural crops, and their related services).
- The major agricultural products can be broadly grouped into foods, fibers, fuels and raw materials.
- Food classes include cereals (grains), vegetables, fruits, oils, meat, milk, fungi and eggs.
- Over one-third of the world's workers are employed in agriculture, second only to the service sector.



TYPES OF CROPS IN INDIA





EARLY INDIAN HISTORY

- Indian agriculture began by 9000 BCE as a result of early cultivation of plants, and domestication of crops and animals.
- By 9000 BCE- Wheat, barley, and jujube were domesticated in the Indian subcontinent.
- By 8000-6000 BCE- Domestication of sheep and goat soon followed, was visible in Mehrgarh.
- By the 5th millennium BCE- agricultural communities became widespread in Kashmir.
- 5th millennium BCE- 4th millennium BCE- The first evidence of cultivation of cotton. The Indus cotton industry was well developed and some methods used in cotton spinning and fabrication continued to be practiced till the modern Industrialization of India.
- Native Tropical Fruits- mango, muskmelons.
- The Indians also domesticated hemp, which they used for a number of applications including making narcotics, fiber, and oil.
- Sugarcane was originally from tropical South Asia and Southeast Asia.
- Wild Oryza rice appeared in the Belan and Ganges valley regions of northern India as early as 4530 BCE and 5440 BCE respectively.
- 2nd millennium BC- rice cultivation in the Kashmir and Harappan regions.

INDUS VALLEY CIVILIZATION

- The farmers of the Indus Valley grew peas, sesame, and dates.
- Rice was cultivated in the Indus Valley Civilization.
- Mixed farming was the basis of the Indus valley economy.
- By around 4500 BCE- Irrigation was developed in the Indus Valley Civilization.
- The size and prosperity of the Indus civilization grew as a result of this innovation, which eventually led
- to more planned settlements making use of drainage and sewers.
- Around 3000 BCE- Sophisticated irrigation and water storage systems were developed by the Indus Valley Civilization.
- An early canal irrigation system was developed in 2600 BCE in India.
- Archaeological evidence of an animal-drawn plough dates back to 2500 BC in the Indus Valley Civilization.

VEDIC PERIOD – POST MAHA JANAPADAS PERIOD (1500 BCE – 200 CE)

Jute was first cultivated in India, where it was used to make ropes and cordage

IN THE LATER VEDIC TEXTS (C. 1000-500 BC)

- There are repeated references to iron being found here.
- Cultivation of a wide range of cereals, vegetables and fruits is described. Meat and milk products were part of the diet.
- Animal husbandry was given importance.
- The soil was ploughed several times.
- Fallowing and certain sequence of cropping were recommended.
- Cow dung provided the manure.

THE MAURYAN EMPIRE (322–185 BCE)

Categorized soils and made meteorological observations for agricultural use.

Other Mauryan facilitation included construction and maintenance of dams and provision of horse- drawn chariots - quicker than traditional bullock carts.

EARLY COMMON ERA-HIGH MIDDLE AGES (200-1200 COMMON ERA (CE)

- The Tamil People cultivated a wide range of crops such as rice, sugarcane, millets, black pepper, various grains, coconuts, beans, cotton, plantain, tamarind and sandalwood. Jack fruit, coconut, palm, areca and plantain trees were also known.

- Systematic ploughing, maturing, weeding, irrigation and crop protection was practiced for sustained agriculture.
- Water storage systems were designed during this period. Crystallized sugar was discovered by the time of the Gupta's (320-550 CE).

DURING THE CHOLA EMPIRE (875-1279)

Chola rule land was transferred and collective holding of land by a group of people slowly gave way to individual plots of land, each with their own irrigation system.

LATE MIDDLE AGES- EARLY MODERN ERA (1200-1757 CE)

- The construction of water works and aspects of water technology in India is described in Arabic and Persian works. The diffusion of Indian and Persian irrigation technologies gave rise to irrigation systems which bought about economic growth and growth of material culture.
- Agricultural 'zones' were broadly divided into those producing rice, wheat or millets. Rice production continued to dominate Gujarat and wheat dominated north and central India.
- Land management was particularly strong during the regime of Akbar the great (reign: 1556-1605), under whom scholar-bureaucrat Todarmal formulated and implemented elaborated methods for agricultural management on a rational basis.

AGRICULTURE IN COLONIAL BRITISH ERA (1757–1947 CE)

The second half of the 19th century saw some increase in land under cultivation and agricultural production expanded at an average rate of about 1 percent per year by the later 19th century. Agricultural performance in the inter war period (1918–1939) was depressing. From 1891 to 1946, the annual growth rate of all crop output was 0.4 percent, and food-grain output was practically stagnant.

REPUBLIC OF INDIA (1947 CE ONWARDS)

- The Bhakra-Nangal multipurpose dam was among the earliest river valley development schemes.
- The Grow More Food Campaign (1940s) and the Integrated Production Program (1950s) focused on food and cash crops supply respectively.
- The many 'production revolutions' initiated from 1960s onwards included Green Revolution in India, Yellow Revolution (oilseed: 1986-1990), Operation Food (dairy: 1970-1996), and Blue Revolution (fishing: 1973-2002) etc.
- Various institutions for agriculture related research in India were organized under the ICAR - Indian Council of Agricultural Research (est. 1929).

- During 2003-04, agriculture accounted for 22 % of India's GDP and employed 58 per cent of the country's workforce.

TYPES OF FARMING IN INDIA

1. SHIFTING AGRICULTURE:

This farming practice is mainly used by tribal groups to grow tuber and root crops. Land is obtained by clearing a forested area and planting crops there. When the land is no longer fertile, another area of land is cleared and the crops are shifted there.

2. SUBSISTENCE FARMING:

This is a widely-practiced farming technique can be seen all over India. The farmer and/or his family grow grains for themselves or for sale at the local market.

3. INTENSIVE AGRICULTURE:

This farming practice can be seen in densely populated areas in India. It is an attempt to maximize the output of the land, through the use of every possible effort. It requires a huge amount of capital in addition to a great deal of human labour, but more than one crop can be raised per year.

4. EXTENSIVE AGRICULTURE:

This is the modern type of farming that can be seen largely in the developed world and in some parts of India. It relies largely on machinery as opposed to a human labour force and raises one crop per year.

5. COMMERCIAL AGRICULTURE:

The goal of commercial agriculture is a high yield, so that produce can be exported to other countries or areas for profit. Wheat, cotton, sugarcane, and corn are some commercial crops and they are grown in states including Gujarat, Punjab, Haryana, and Maharashtra.

6. PLANTATION AGRICULTURE:

This style is often used for crops which require a lot of space and a long growing period, such as rubber, tea, coconut, coffee, cocoa, spices, and fruits. Plantations are only capable of producing a single crop. Plantation agriculture is practised in Kerala, Assam, Karnataka, and Maharashtra.

7. DRY LAND FARMING:

As the name suggests, dry land farming is practised in the more arid and desert-like areas of the country, including northwest and central India. Crops such as gram jowar, bajra, and peas have lower water requirements and can therefore be grown in these conditions.

8. WET LAND FARMING:

Many areas of India are affected by heavy monsoon rains and subsequent flooding. Well-irrigated areas, such as those in the northeast India and the Western Ghats, are suitable for farming rice, jute, and sugarcane.

9. TERRACE CULTIVATION/FARMING:

Terracing is an agricultural practice that suggests rearranging farmlands or turning hills into farmlands by constructing specific ridged platforms. These platforms are called terraces.

The essential (and distinguishing) feature of terracing agriculture is excavating and moving topsoil to form farmed areas and ridges. The trick is that water flows down to lower platforms when the upper ones are full. Thus, the amount of water is distributed more or less evenly, not just at the foot of the hill.

10. CONTRACT FARMING:

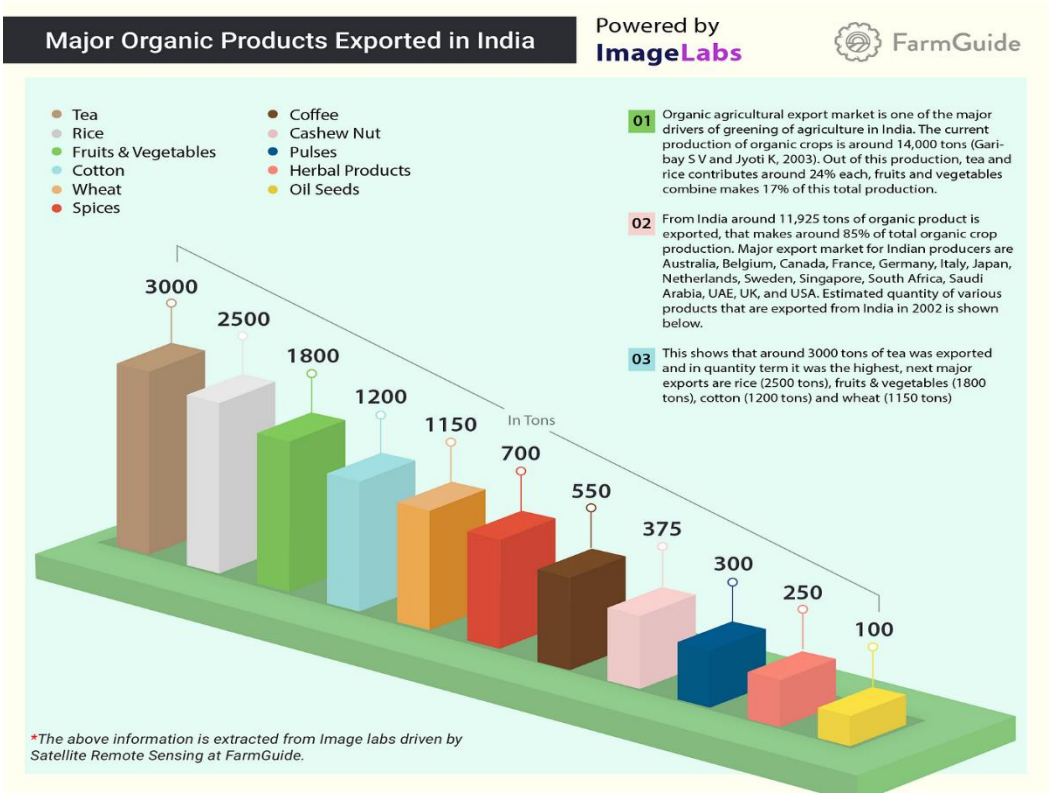
Contract farming is defined as agricultural production carried out according to an agreement between a buyer and farmers, which establishes conditions for the production and marketing of a farm product or products.

11. SUSTAINABLE AGRICULTURE:

This is the practice of farming using principles of ecology. Unlike organic agriculture, sustainable agriculture focuses on the ability of providing food on the long-term. As such, besides artificial fer- tilizers and pesticides it also does not allow the use of agricultural machines running on non-renewable resources.

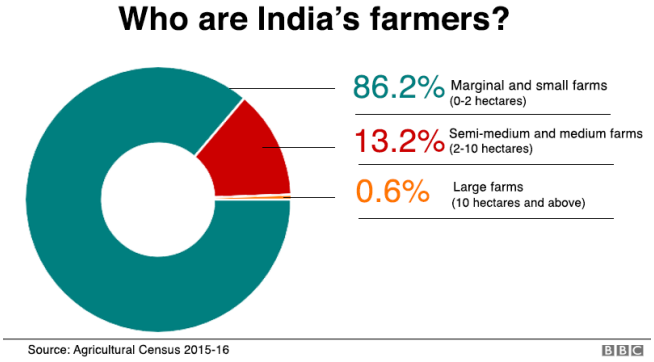
12. VERTICAL FARMING:

Vertical farming is the practice of growing produce in vertically stacked layers. The practice can use soil, hydroponic or aeroponic growing methods. Vertical farms attempt to produce food in challenging environments, like where arable land is rare or unavailable. The method helps mountainside towns, deserts and cities grow different types of fruits and vegetables by using skyscraper-like designs and precision agriculture methods.

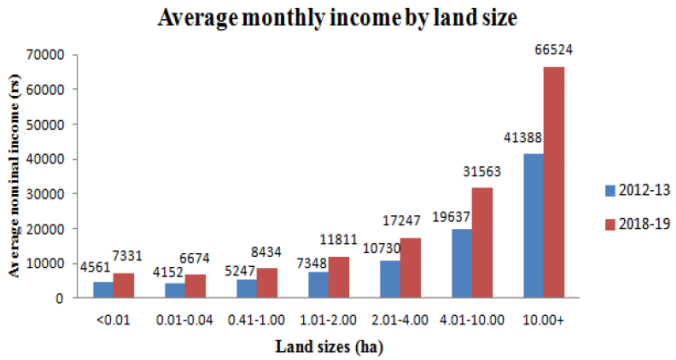


ROLE OF AGRICULTURAL IN INDIAN ECONOMY

- According to the Economic Survey (2017-2018), Indian agriculture sector accounts for 17-18 percent of India's gross domestic product (GDP) and provides employment to around 50% of the country's workforce.
- Share in national income: From the very beginning, agriculture is contributing a major portion to our national income. In 1950-51, agriculture and allied activities contributed about 59 per cent of the total national income. Although the share of agriculture has been declining gradually with the growth of other sectors.
- Agriculture plays vital role in generating employment: In India over two-thirds of our working population are engaged directly on agriculture and also similarly depend for their livelihood.



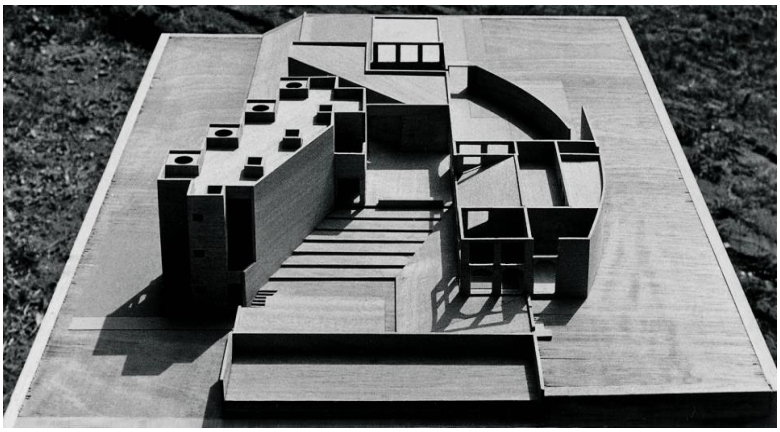
- The real gross value added by agricultural sector in India in fiscal year 2018 amounted to about 20.7 trillion Indian rupees. A decreasing trend in real gross value can be attributed to decreasing agricultural prices, with most of them below the minimum support prices, along with an increase in urbanization and the expansion of the country's services and manufacturing industries.
- Organic farming started mostly as trial operations on farms less than one acre in size. The total organic area is about 5.71 million hectares. Sugar crops are mainly cultivated using this method.



CHAPTER – 4
LITERATURE STUDY

GALBABHAI FARMERS' TRAINING INSTITUTE BANAS, PALANPUR, NORTH GUJARAT

PROJECT OVERVIEW
AREA: 11,000 sqft
ARCHITECT: Ar. Anant Raje
CATEGORY: Training center



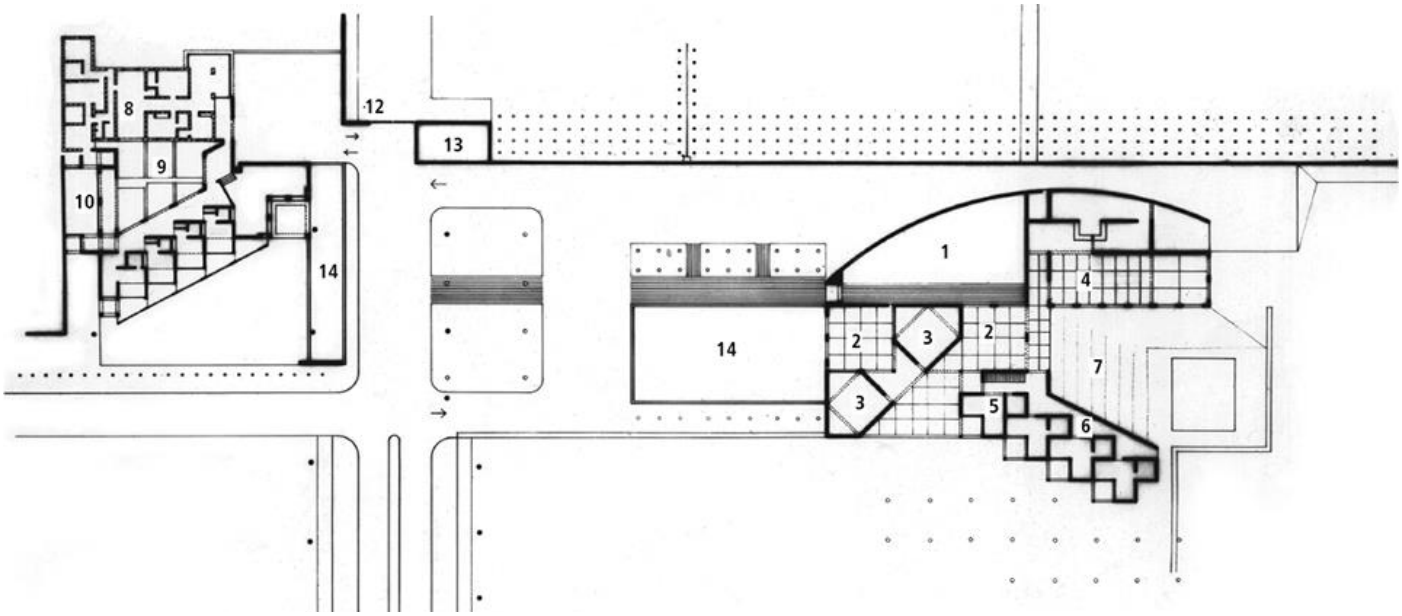
INTRODUCTION

This is an institute set up for rural dairy farmers under a program set up by the National Dairy Development Board (NDDB) in Palanpur, Gujarat, to impart basic training in cooperative dairy farming to villagers in surrounding districts.

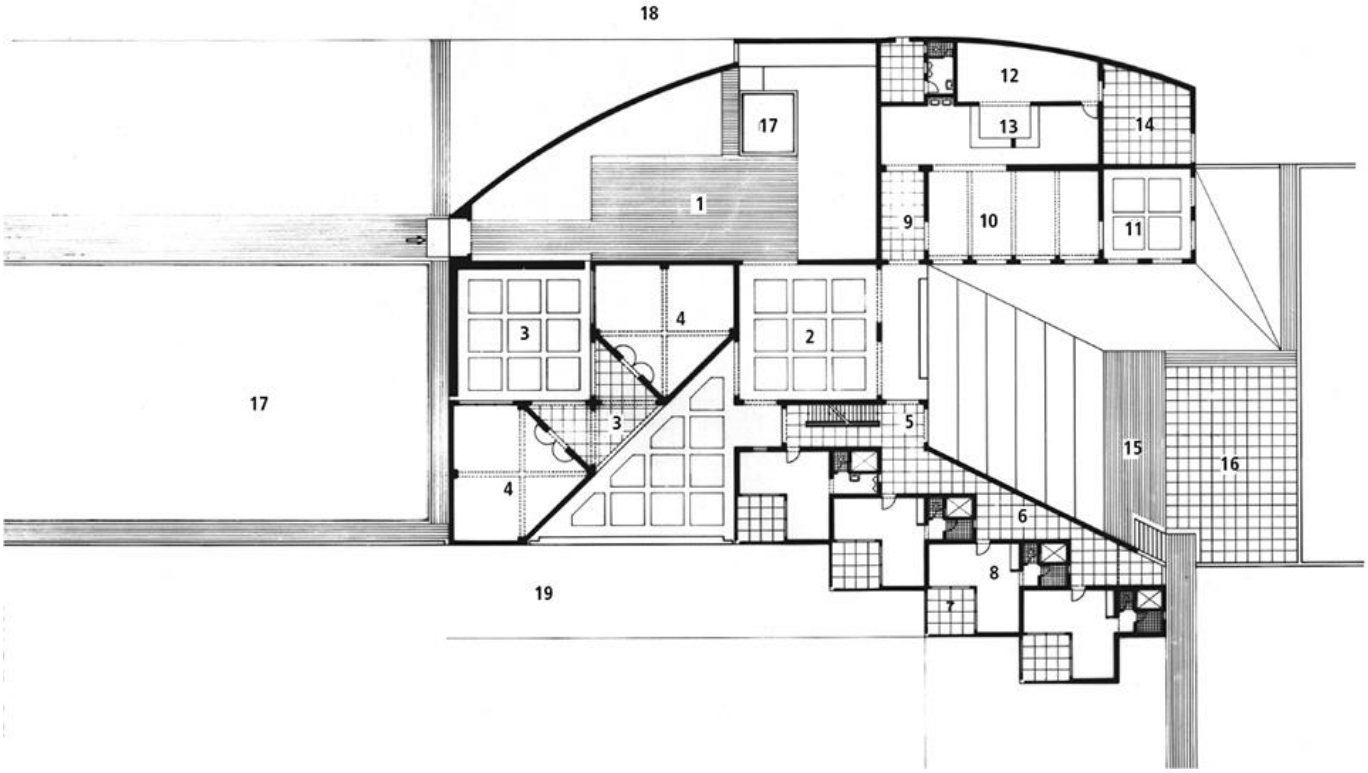
It is set amidst wheatfields, where the institute consists of a hierarchy of courtyards enclosed by stone walls.

DESIGN

- The project includes two sets of classrooms with residential rooms for 24 students, dining and other facilities connected with a regular dairy plant.
- This standardization allowed for a rapid and economical construction process.
- The project also features an auction hall with raised platform for loading and unloading produce.
- The series of loggias making up the dormitories do not open on the courtyard placed in their center in order to achieve maximum privacy
- The compound is enclosed by stone walls, and the buildings' openings are spanned by concrete lin- tels and are deeply recessed to provide additional shade.



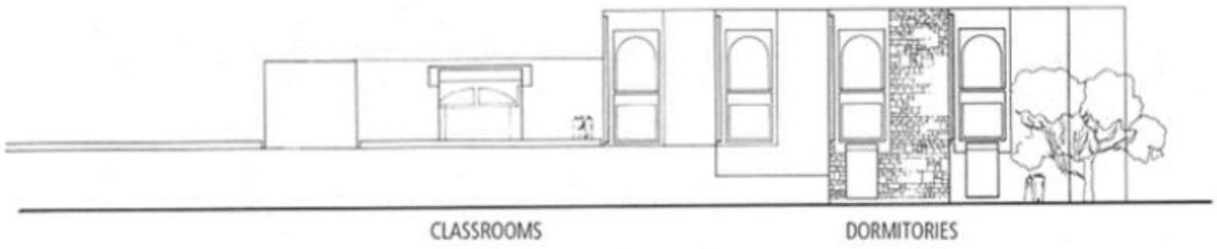
1. Arrival court
2. Court
3. Classroom
4. Kitchen–dining
5. Office
6. Dormitories
7. Amphitheatre
8. Existing guest house
9. Court
10. Dining
11. Guest room
12. Entry to existing dairy
13. Existing gate cabin
14. Pool

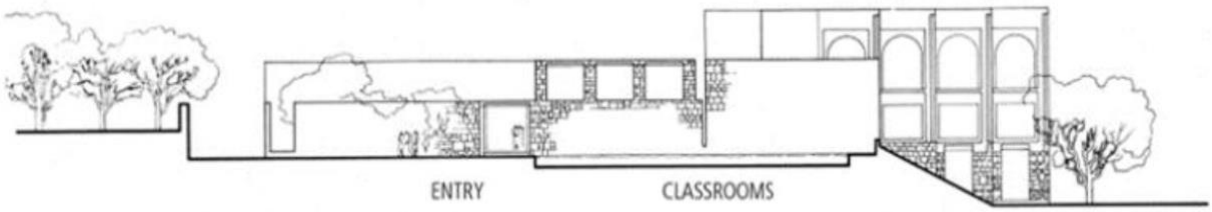


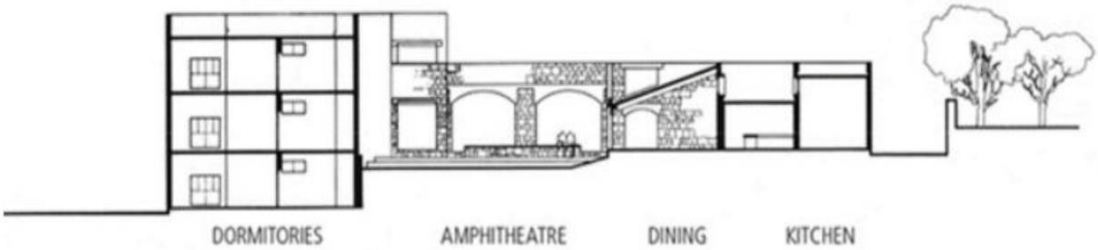
1. Arrival court
2. Entrance court
3. Classroom court
4. Classrooms
5. Entry to dormitory
6. Lobby
7. Light well
8. Rooms
9. Entry to dining
10. Dining veranda
11. Dining court
12. Kitchen
13. Service station
14. Yard
15. Amphitheatre
16. Raised platform
17. Water pool
18. Service road
19. Agriculture fields

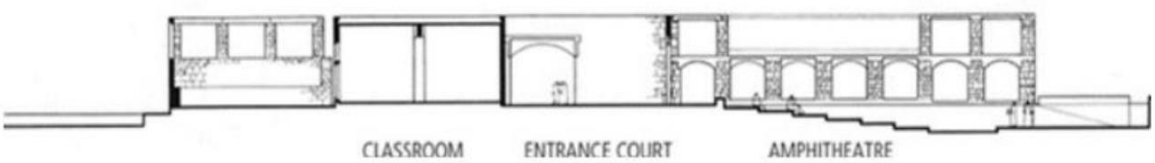
- The complex, built in the midst of wheat fields, consists of two distinct clusters respectively housing the school and residential units.
- The former group of structures, accessed by a courtyard, is designed as a house, with several courts and rooms where people can gather, and a verandah used as a dining space.
- Indoor and outdoor areas are clearly defined so as to reflect the villagers' perception of space and seclusion.
- The series of loggias making up the dormitories do not open on the courtyard placed in their center in order to achieve maximum privacy.
- The compound is enclosed by stone walls, and the buildings' openings are spanned by concrete lintels and are deeply recessed to provide additional shade.

- The exposed stone facades and arched lintels used throughout convey a visual unity to the overall design.
- The courts form important places in the working of the institute as well as form link to various areas of living, teaching and dining activities. The bigger court becomes the amphitheater with grassed terraces linking the lower part of the contours
- The grouping of various activities that form the buildings are oriented according to the priorities of wind, light and shade.
- Thus, the dormitories occupy the prevailing wind direction, teaching areas on the North side and the kitchen on the East side.
- The wall that forms the arrival court keeps the view of the factories on site away from the internal activities of the Institute.









MATERIALS

Rough stone masonry wall and smooth exposed concrete porches and lintels, used for elements of light, set against the landscape of wheat fields and mango trees.

STRUCTURE

- The buildings are of load-bearing stone, quarried from nearby quarries. Openings are spanned by concrete lintels, and are deeply recessed to provide shade from the hot sun.
- The buildings are based on the repetition of 4.5-meter-wide structural bays roofed with a barrel vault concrete shell.

CONCLUSION

- The spaces are woven surrounding an outdoor space or a courtyard.
- The building follows the topography of the land on which it is built.
- The fields surround the building thus enabling a better learning for the trainees.
- Simple and minimalistic details and details are made us of.
- The public spaces are placed on the lower level, while that on the above are dedicated to dorms.

2. KRUSHI BHAWAN ODISHA, INDIA

PROJECT OVERVIEW

ARCHITECTS: Studio Lotus

AREA: 130000 ft2

CATEGORY: Government building

CLIMATE: Tropical climate; hot in the day, cooler at night

INTRODUCTION

Krushi Bhawan is located in Bhubaneshwar, the state capital of Odisha; home to multiple agrarian communities, the state is the third largest contributor to India's grain supply.

It is a Government Facility developed for Government of Odisha's Department of Agriculture & Farmers' Empowerment.

SURROUNDINGS: The building is adjacent to the old ministry office with ancillary structures of power in the vicinity, such as the Police Commissionerate Building and the State Guest House.

Project Site In Urban Context

PLANNING

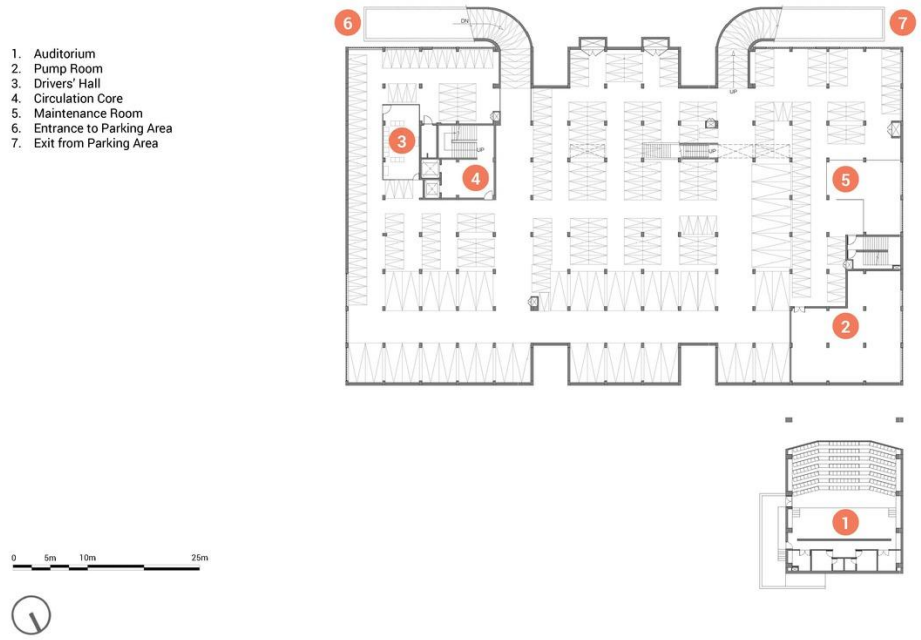
- Krushi Bhawan was originally planned as a purely administrative space; Studio Lotus took a cue from Königsberger's original vision for Bhubaneswar where he saw the Capitol Complex with a host of government offices becoming “a lively point of public life". Thus, the architects' suggestion to include public functions and community spaces to create a building that would add to the city's social infrastructure was willingly embraced by the Clients.
- The building is Four story high with a basement for car parking and a roof top.
- It's a concrete structure based on a grid of approximately 15 feet by 15 feet.

ENTRANCE

- From the main gate are two pathways-one for the public to an elevated plaza that has community
- spaces and landscaped areas, and another that leads to access for employees.
- The primary entrance pathway is lined by laterite lattices and trees, and performs multiple functions from a common area for employees to congregate in and eat together during lunch hour, to a place for hosting small gatherings.

GROUND FLOOR PLAN

- The Ground floor is a free-flowing public space that opens out into a Plaza, which is an extension of the street.
- This floor comprises of a learning centre, a gallery, a library, and training rooms, training rooms, a gallery, and an auditorium used both by the department and for public events.



Basement Floor Plan

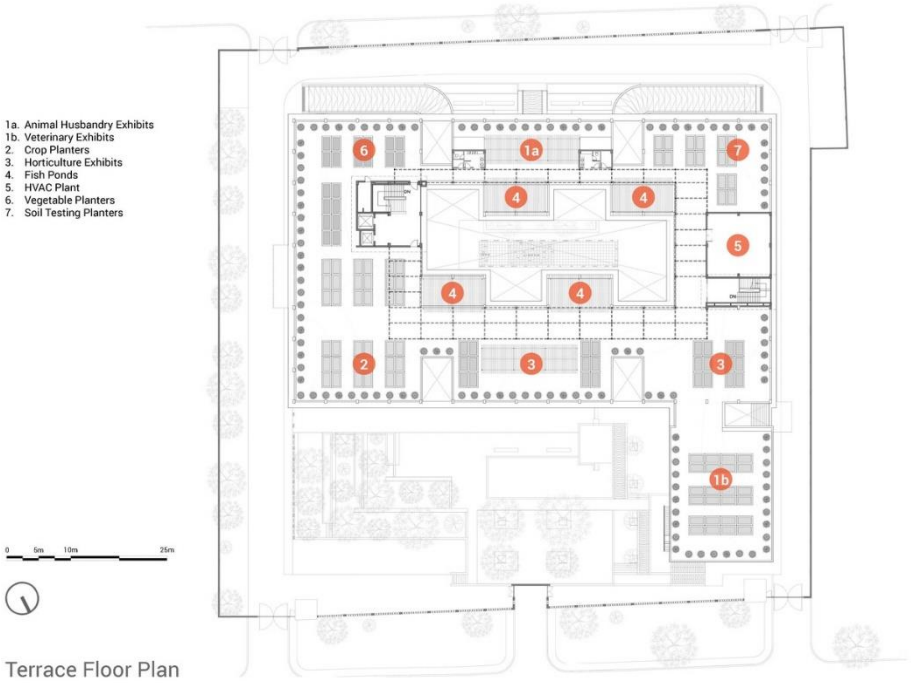
- Through exhibitions, workshops, hats (weekly markets), lectures and school visits, these public spaces become a hub for imparting skills and sharing knowledge that engage diverse sections of the city's population.
- The Public Plaza consists of a garden with native Flora, featuring an informal amphitheatre and a pond that cools the forecourt.

Ground Floor Plan

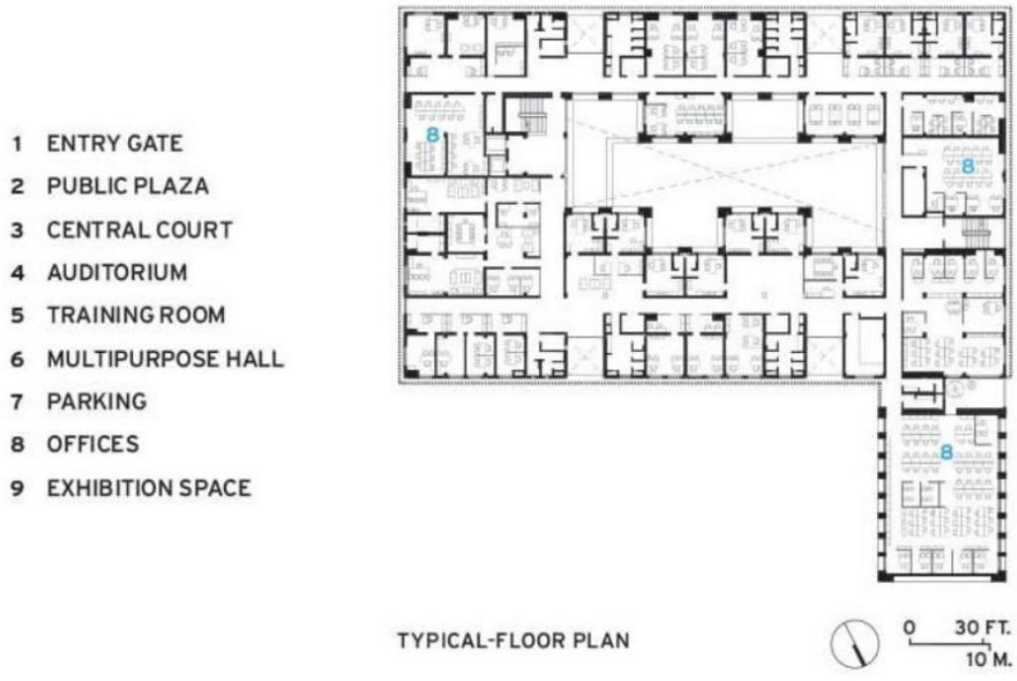
FIRST, SECOND, THIRD FLOOR

The offices for the State department and Directorates - which require restricted access - have been placed on the first, second and third floors. This allows the offices to be secured off, making it possible to keep most of the other facilities open to public even on holidays.

Administrative centre has been designed as an office for a team of nearly 600 people, in addition to accommodating spaces for community engagement and learning.



Terrace Floor Plan



DESIGN AND MATERIALS

The craftsmanship and extensive sustainable features of the architecture are a tribute to the vision of

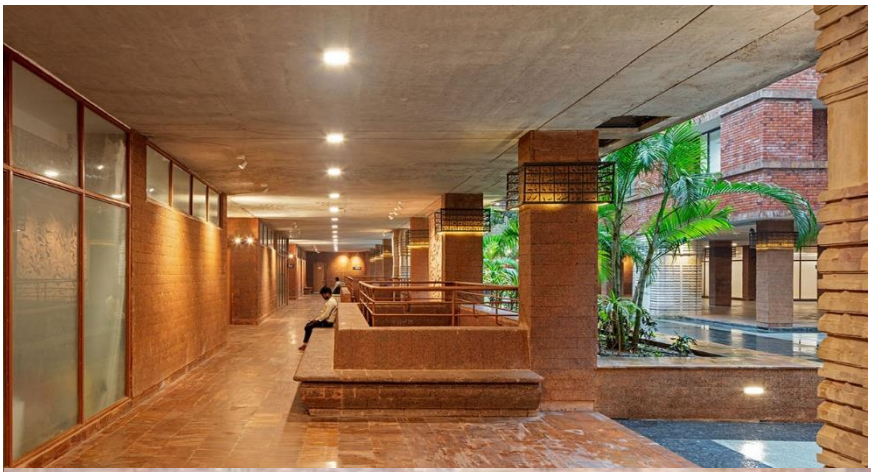
A. Otto Konigsberger, the German-born architect and planner who laid out the modern city of Bhubaneshwar.

The exposed columns surrounding the central courtyard are made of local sandstone and laterite. The Pedestal level and North Wing- use locally-sourced laterite and khondalite stone.

Central court- use hand-carved khondalite lattices are used here which provide a sense of enclosure. Agricultural motifs have been displayed across the building through a variety of craft techniques - Bas-relief carvings in laterite along the Public Plaza, which depict ripe paddy crops illustrated in the Odia Pattachitra (cloth-based scroll paintings) style.

B. In the Central Court, a Crop Calendar has been created on a stone inlay floor, which displays the harvesting cycles for the most prevalent crops in Odia farmlands.

C. The upper floors of Krushi Bhawan feature a distinctive brick façade inspired by Ikat patterns of Odisha handlooms, created using clay in three different colors that represent the geographical diversity of the region. And the tribal craft of dhokra, or metalwork, is evident everywhere-in light fixtures and screens with animal figures and foliage.



CONCLUSION

- This building is built according to the vernacular of Odisha.
- The locally available materials have been made use of.
- To restore the lost art and culture, the art has been incorporated on the walls of the complex.
- The ground floor consists of public spaces while the top most floors are for the regional agricultural offices.
- The terrace is utilized for farming displays to the visitors.

CHAPTER – 5
CASE STUDY

NATIONAL AGRICULTURAL SCIENCE MUSEUM NATIONAL AGRICULTURAL SCIENCE COMPLEX (NCAR), NEW DELHI

PROJECT OVERVIEW

ARCHITECTS: -

AREA: 2136.77 sqm (22 acres of total complex area)

CATEGORY: Museum

INTRODUCTION

- National Agricultural Science Museum is situated in the National Science Complex, which is located on the main Dev Prakash Shastri Marg at a strategic location in the New Delhi.
- The Complex was built by the Indian Council of Agricultural Research (ICAR) spread over an area of around 22 acres with multi-dimensional state of the art facilities like a National Agricultural Museum, Conference halls, training halls, lecture halls, exhibition hall, guest house, offices of the International and national organizations of agricultural research, National Academy of Agricultural Sciences (NAAS), Association of Agricultural Universities of India, etc.
- The NASC complex is the first museum dedicated to agriculture in the country. The museum portrays the development of agriculture in India since prehistoric time and

the present state-of-the-art technology in agriculture in our country, with a futuristic projection.

- It also provides complete knowledge on the subjects through easy and interactive audiovisual medium.

PLANNING

The building is 2 storeys high.

There are 150 exhibits categorized under 10 major sections such as: -

- Six Pillars of Agriculture,
- Agriculture in Prehistoric Era,
- Indus Valley Civilization,
- Vedic & Post Vedic Era,
- Sultan & Mughal Era,
- Advent of British,

Advancement of agricultural sciences in

Independent India,

Global Issues related to Agriculture,

Towards a Food-Secure Future, and Children's Section.

There's also a 30-seater auditorium

CHILDREN'S SECTION:

- There is an exclusive section for children where information on sources of food, photosynthesis, ecology system, balanced diet, Greenhouse effect etc. exhibited through interactive games and animations.
- The various topics here have been displayed through computer and posters.
- Some other attractions include documentary film on agricultural festivals, water cycle system, speaking statue and the marine and fresh water aquarium.

DIVISIONS UNDER NCAR

- Crop science
- Horticultural science
- Natural resource management division
- Agricultural engineering
- Animal science
- Fisheries science
- Agricultural extension
- Knowledge management
- IP&TM and PME
- Human resource management unit
- National agricultural higher education project
- Natural agricultural science fund
- International relations
- Administration
- Finance
- Plan implementation and monitoring section
- Technical coordination

CONCLUSION

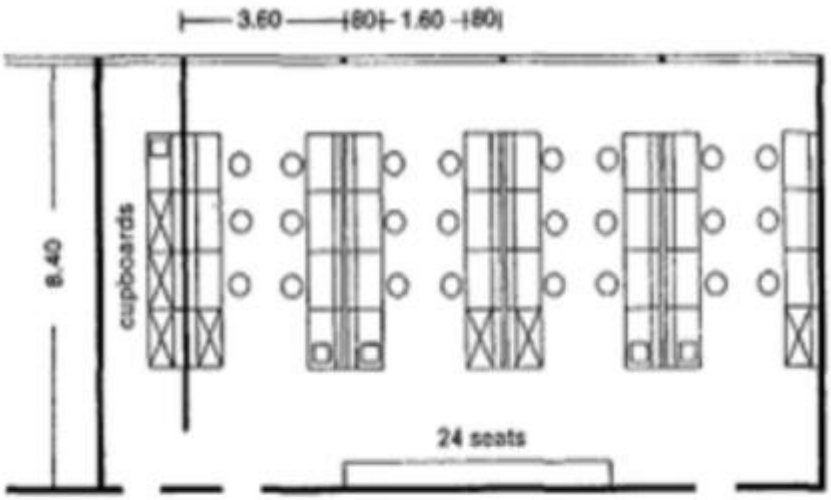
This case study was made to understand various spaces required in an agricultural museum.

The museum consists of various spaces that weave in the history of agriculture in India. Most exhibits here are either prototypes or the museum's collection.

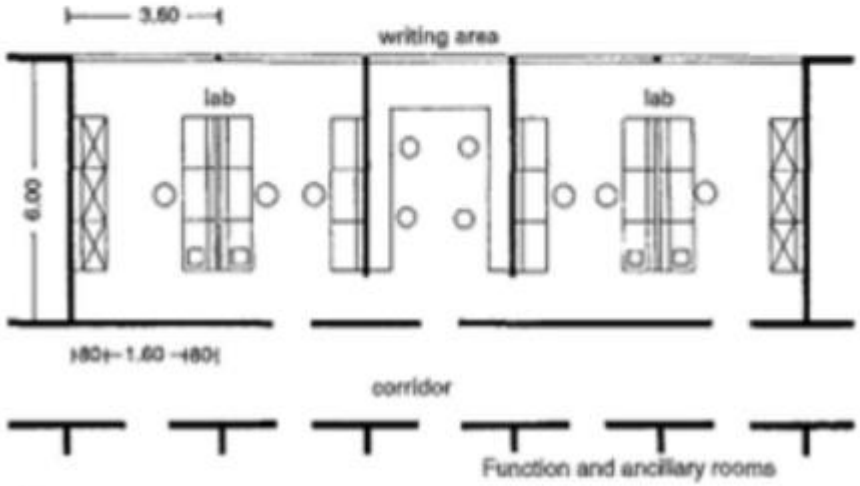
CHAPTER – 5
DESIGN STANDARDS , BYE LAWS AND AREA STATEMENT

DESIGN STANDARDS (NEUFERT'S)

- Tuition-related practical laboratories with a large number of workstations collected together and mostly with simple basic equipment.
- Research-related laboratories, mostly in smaller rooms with special equipment and additional practical spaces like weighing and measurement rooms, centrifuge and autoclave rooms, rinsing kitchens, air-conditioned and cold storage rooms with constant temperature, photographic/dark rooms etc Chemistry and biology laboratories have permanently installed laboratory benches. Rooms have a high rate of air exchange and frequently additional fume cupboards with air extraction for work producing gas and smoke. Fume cupboards are often installed in their own rooms ('stink rooms').
- Clean room laboratories are used for work requiring especially dust-free filtered air, e.g., in micro- electronics or for particularly dangerous substances, whose release into the surrounding rooms should be prevented by special air circulation and filtering (microbiology, gene technology).



3 Teaching and practical laboratory

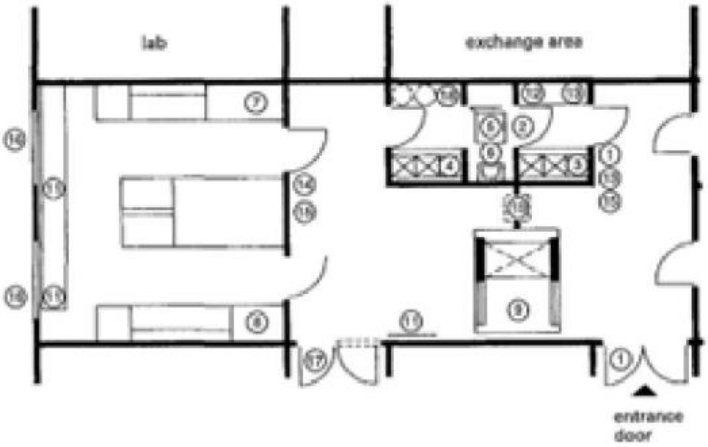


2 Research laboratory

Lab safety level 3
① warning sign
② double-door safety lobby, self-closing doors
③ outdoor clothing
④ protective clothing
⑤ floor trough (pos. disinfectant mat) in front of shower
⑥ hand wash basin with disinfectant dispenser
⑦ workbench (clean bench) with separate special filter
⑧ extractor
⑨ autoclave (in lab or building)
⑩ flat panel radiator (7.5 cm from wall)
⑪ control and monitoring cupboard: electricity box, emergency mains off-switch, error board
⑫ pressure difference display readable from inside and out with acoustic alarm
⑬ emergency telephone, telephone
⑭ two-way intercom, electric door opener
⑮ windows: gas-tight, non-combustible, leaded
⑯ pass-door: fireproof

Lab safety level 4
⑰ three-chamber safety lobby. Doors self-closing and gas-tight
⑱ personal shower (L-3 system can be upgraded*). Collect and disinfect waste water
⑲ gas-tight, enclosed workbench, separate air supply and extraction, additional special filter
⑳ autoclave with lockable doors on both sides, disinfect condensation
㉑ flood lock
㉒ autoclavable container for used protective clothing

*) Only required if upgrading to L-4 lab.



Laboratory workstations

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 → ❶ – ❶.

Standard dimensions for the normal working bench:
120 cm width in practical laboratories, several times that in research laboratories, 80 cm depth work surface including socket strip → ❺ – ❻.

Benches and fume cupboards are mostly in the form of a building block system: element widths 120 cm, fume cupboards 120 and 180 cm → ❼.

The socket strip is an independent element with all electricity supply systems. Benches and low-level cupboards are placed in front of it → ❺ – ❼.

Steel tubing supports the construction of laboratory benches, whose work surfaces are of artificial stone panels without joints, seldom tiled, and chemically resistant plastic panels. Low-level cupboards are of wood or plastic-coated chipboard. Supply services are fed from above out of the ceiling cavity or from below through the floor structure.

Ventilation

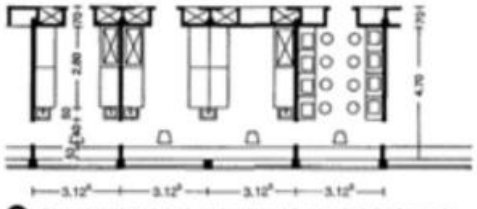
Of low- or high-pressure systems, the latter are particularly recommended for multi-storied institute buildings with large-scale air requirements, in order to reduce the ducts' cross-section. Cooling and humidification as required. Ventilation equipment has the highest demand for space of all services installations.

All laboratories in which work with chemicals takes place must have artificial ventilation and extraction.

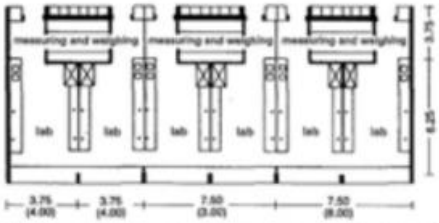
Air changes per hour: chemistry laboratories 8 times
biology laboratories 4 times
physics laboratories 3–4 times
(in the extraction area)

Electrical installation

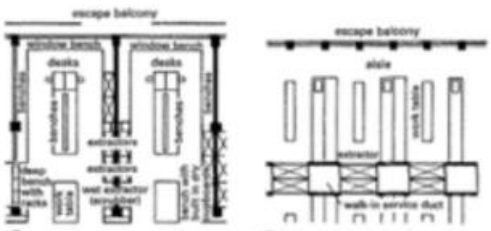
Each building will need its own transformer station if the numbers of connections are high or if special electricity supplies are specified. Electrical service rooms must be enclosed in fire-resistant walls and may not be crossed by other pipework or cables.



❶ Room dimensions derive from size of bench (workstation). Services and cupboards are in the corridor wall. Weighing room is separate.

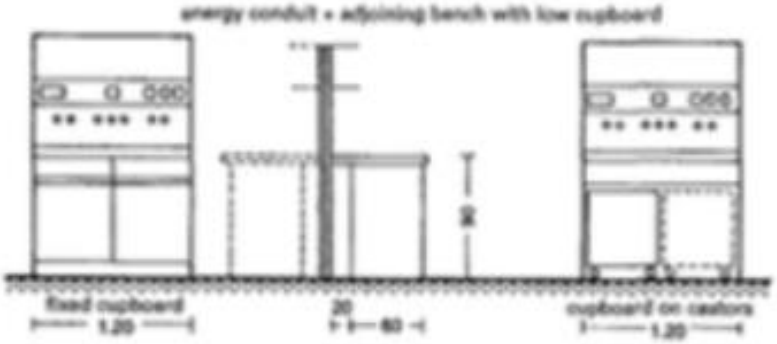


❷ Uniform laboratories with measurement and weighing rooms in front, University Clinic, Frankfurt am Main — Arch.: Schlempp + Schwethelm

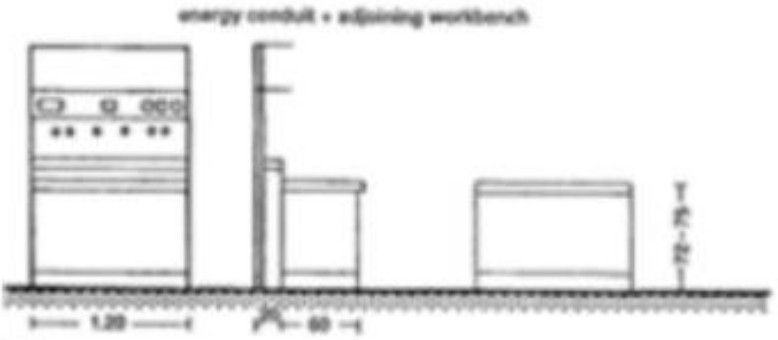


❸ Laboratory equipment in main scientific laboratory (Bayer AG dye plant)

❹ Arrangement of equipment in accessible service ducts (BASF)



❺ Chemistry laboratory bench



❻ Physics laboratory bench

Table 11 Schools and Educational Institutions

(*Clause* 4.2.5.1)

Sl No.	Fixtures	Nursery School	Non-Residential		Residential	
			Boys	Girls	Boys	Girls
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Water closets	1 per 15 pupils or part thereof	1 per 40 pupils or part thereof	1 per 25 pupils or part thereof	1 per 8 pupils or part thereof	1 per 6 pupils or part thereof
ii)	Ablution tap	One in each water closet	One in each water closet	One in each water closet	One in each water closet	One in each water closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals				
iii)	Urinals	—	1 per 20 pupils or part thereof	—	1 per 25 pupils or part thereof	—
iv)	Wash basins	1 per 15 pupils or part thereof	1 per 60 pupils or part thereof	1 per 40 pupils or part thereof	1 per 8 pupils or part thereof	1 per 6 pupils or part thereof
v)	Bath/showers	1 per 40 pupils or part thereof	—	—	1 per 8 pupils or part thereof	1 per 6 pupils or part thereof
vi)	Drinking water fountain or taps	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof
vii)	Cleaner's sink	← 1 per each floor →				

Table 12 Hostels

(*Clause* 4.2.5.1)

Sl No.	Fixtures	Resident		Non-Resident		Visitor/Common Rooms	
		Males	Females	Males	Females	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Water closets	1 per 8 or part thereof	1 per 6 or part thereof	1 for up to 15 2 for 16 to 35 3 for 36 to 65 4 for 66 to 100	1 for up to 12 2 for 13 to 25 3 for 26 to 40 4 for 41 to 57 5 for 58 to 77 6 for 78 to 100	1 per 100 up to 400 Over 400 add at 1 per 250	2 per 100 up to 200 Over 200 add at 1 per 100
ii)	Ablution tap	One in each water closet	One in each water closet	One in each water closet	One in each water closet	One in each water closet	One in each water closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals					
iii)	Urinals	1 per 25 or part thereof	—	Nil up to 6 1 for 7 to 20 2 for 21 to 45 3 for 46 to 70 4 for 71 to 100	—	1 per 50 or part thereof	—
iv)	Wash basins	1 per 8 persons or part thereof	1 per 6 persons or part thereof	1 for up to 15 2 for 16 to 35 3 for 36 to 65 4 for 66 to 100	1 for up to 12 2 for 13 to 25 3 for 26 to 40 4 for 41 to 57 5 for 58 to 77 6 for 78 to 100	1 per WC/ Urinal	1 per WC
v)	Bath/showers	1 per 8 persons or part thereof	1 per 6 persons or part thereof	—	—	—	—
vi)	Cleaner's sink	← 1 per each floor →					

AREA STATEMENT CHART

INTAKE - UG 480 & PG 200			Requirement of Infrastructure for Agriculture			
SL.NO.	DETAILS	NO. OF ROOMS	DIMENSION		AREA (SQ.FT)	TOTAL AREA (SQ.FT)
			LENGTH	WIDTH		
1	SMART LECTURE HALL - CAPACITY 60	12	40'	30'	1200	14400
2	TUTORIAL ROOM	6	20'	20'	400	2400
3	LABORATORY (UG+PG)	32	60'	30'	1800	59400
3.A	LABORATORY (UG+PG) - AS / DRAWING	31				
3.B	LABORATORY (UG+PG) - AS / DRAWING	1				
4	CENTRAL LABORATORY	1	50'	36'	1800	1800
5	LIBRARY	1	72'	30'	2160	2160
6	EXAM CELL (300 CAPACITY)	1	20'	12'	240	240
7	EXAM HALL CUM AUDITORIUM(CAP-422)	1	100'	50'	5000	5000
8	EVALUATION ROOM	1	36'	20'	720	720
9	PRINCIPAL / DEAN OFFICE	1	24'	20'	480	480
10	P.A. ROOM	1	12'	10'	120	120
11	OFFICE OF HEAD 12 NOS	11	24'	12'	288	3168
12	FACULTY ROOM (PROFESSOR)12 NOS	12	24'	10'	240	2880
13	ASST. PROFESSOR 24 NOS	24	10'	12'	120	2880
14	LECTURER 72 NOS	72	10'	8'	80	5760
15	COMMITTEE ROOM	1	30'	20'	600	600
16	ASSISTANT ADMINISTRATIVE OFFICER	1	20'	12'	240	240
17	ASSISTANT ACADEMIC OFFICER INCLUDING STAFF	1	20'	12'	240	240
19	CLERICAL / TECHNICAL STAFF	12	24'	10'	240	2880
20	COMMON UTILITY ROOM	1	36'	20'	720	720
21	CANTEEN (KITCHEN WITH STORE)	1	20'	12'	240	240
22	SEATING	1	36'	20'	720	720
22	OUTDOOR SEATING					
23	WASH ROOM (WITH TOILET & URINARY FACILITIES + LADIES)	10	20'	12'	240	2400
24	VEHICLE SHED	1	80'	10'	800	800

CHAPTER – 6
SITE ANALYSIS

ABOUT THE SITE

The Site is located at ITM University Rd, Gwalior, Madhya Pradesh 475001

Site is located at Srinagar - Kanyakumari highway under government property under the development plan.

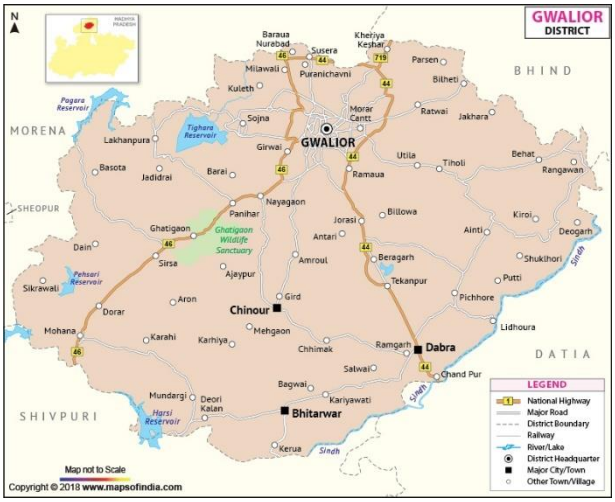
Site is surrounded by industrial and farm area Site is strategically located on the outskirts of the city. Most of the area is commercial.

The site is alongside 30 M wide road at the Srinagar - Kanyakumari highway.

Project details -

Site Area 44978.687 square m F.S.I - 2.5

Maximum 44978 sq.m -11.09 acres Permissible builtup 112447 sq.m



SITE CONNECTIVITY

ITM UNIVERSITY, GWALIOR IS SITUATED AT THE OUTSKIRTS OF THE CITY. SURROUDING LAND IS MOSTLY AGRICULTURAL AND INDUSTRIAL LAND, CONNECTIVITY BY NATIONAL HIGHWAY 44.

STRENGTH

Being situated on a national highway provides easy accessibility for students, faculty, and visitors, enhancing the college's visibility and potential for attracting talent.

The college's location on a national highway allows for easy access to agricultural events, conferences, and trade fairs, enabling students and faculty to network with industry experts and stay updated on the latest trends.

WEAKNESS

Being located on a national highway may expose the college to pollution and noise, potentially affecting the quality of life for students, faculty, and staff, as well as agricultural experiments and livestock.

While the highway location offers accessibility, it may also pose transportation challenges for students and faculty who rely on public transit or non-motorized modes of transportation, especially if the college lacks adequate shuttle services or bike lanes.

OPPORTUNITIES

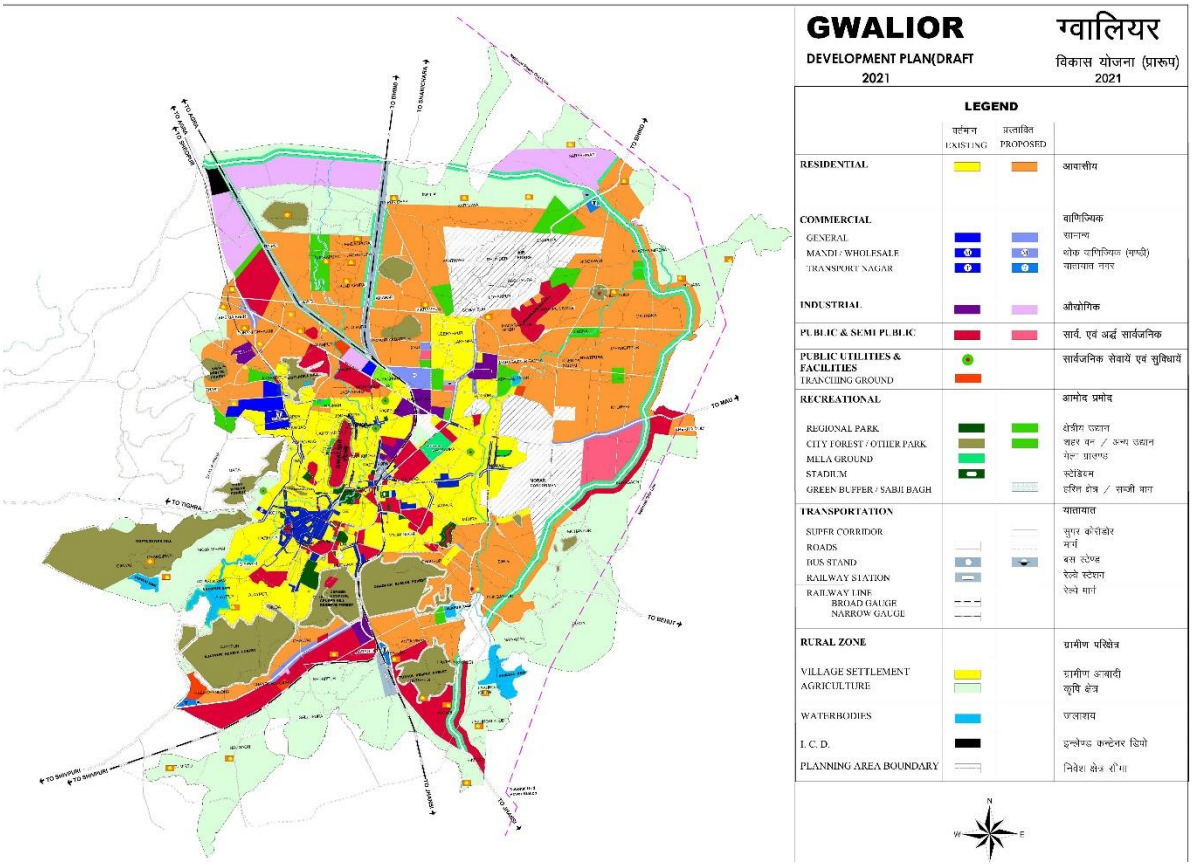
The college can leverage its strategic location to introduce new programs or specializations in areas such as agribusiness, sustainable agriculture, or food science, tapping into emerging market opportunities and addressing industry demand. The college can establish outreach programs and extension services to engage with local farmers, businesses, and residents along the national highway, offering expertise, training, and resources to support agricultural development and sustainability efforts.

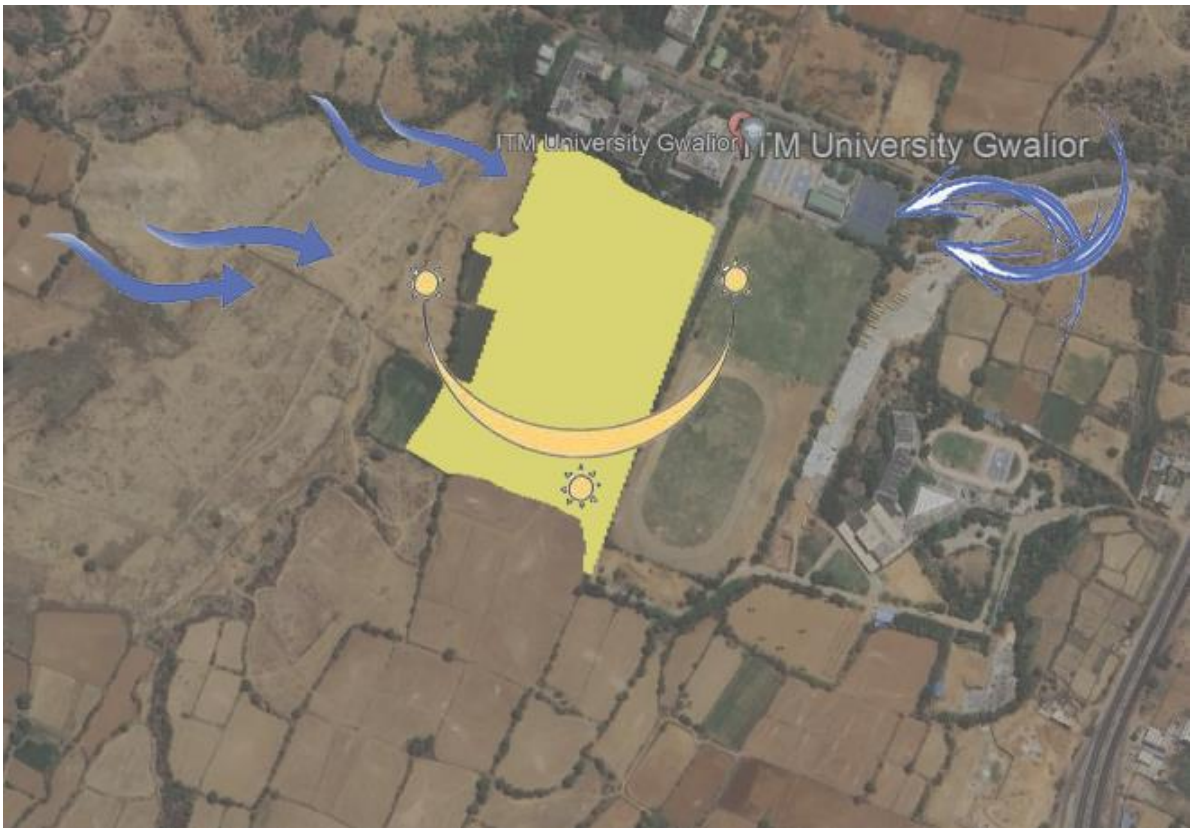
THREATS

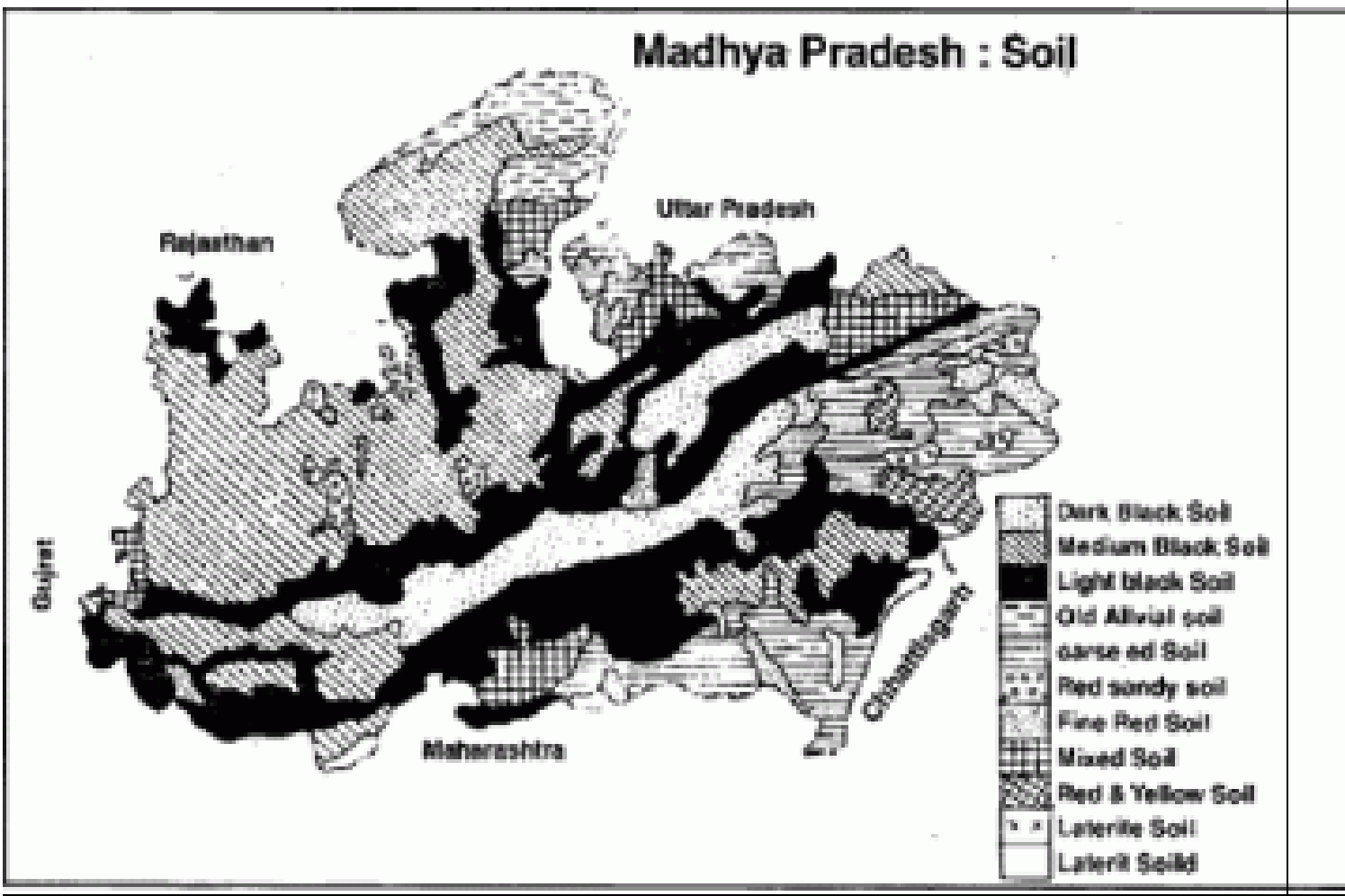
Fluctuations in commodity prices, government policies, and global market conditions can impact funding for agricultural education, research, and extension programs, posing financial challenges for the college.

Changes in agricultural regulations, land-use policies, and environmental standards could affect the college's operations, requiring adjustments in curriculum, facilities, and research priorities to remain compliant and relevant.

CLIMATIC CONDITIONS AND LAND USE






Madhya Pradesh : Soil
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Light black Soil
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Red sandy soil
Fine Red Soil
Mixed Soil
Red & Yellow Soil
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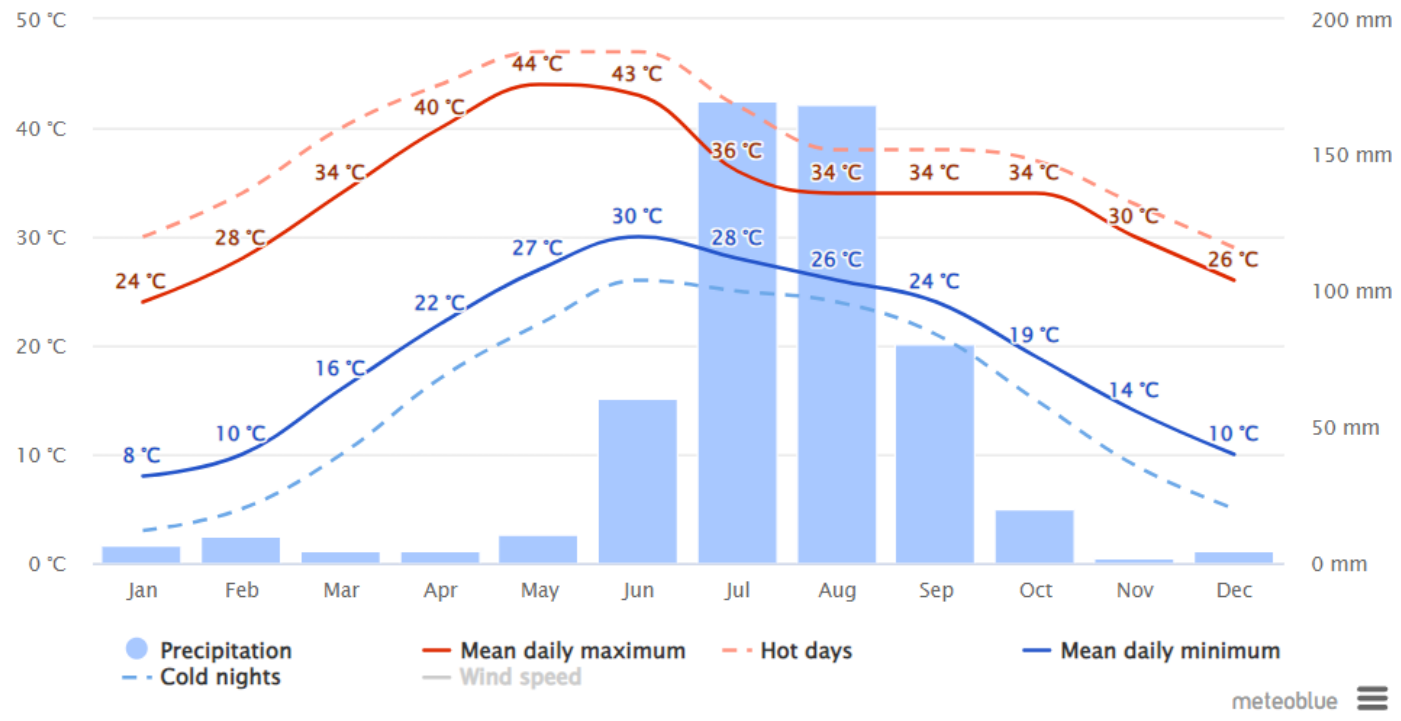
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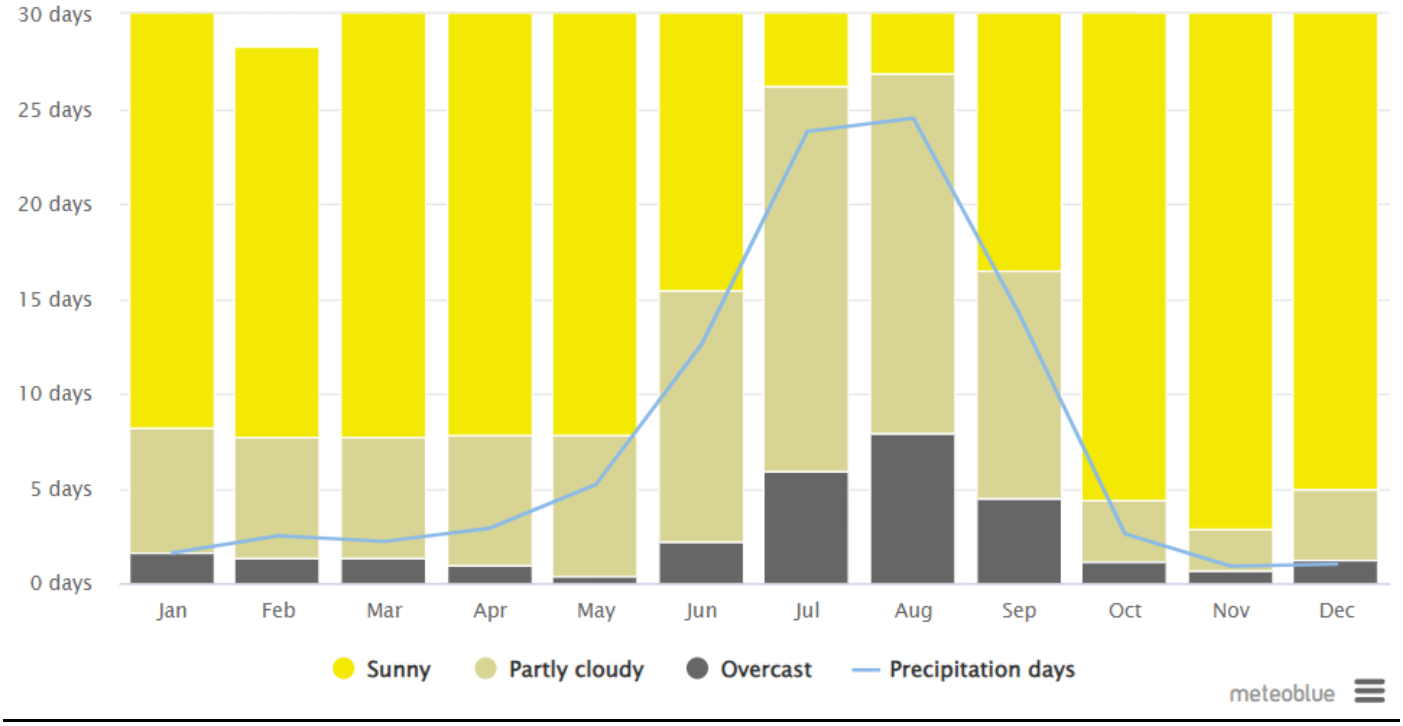
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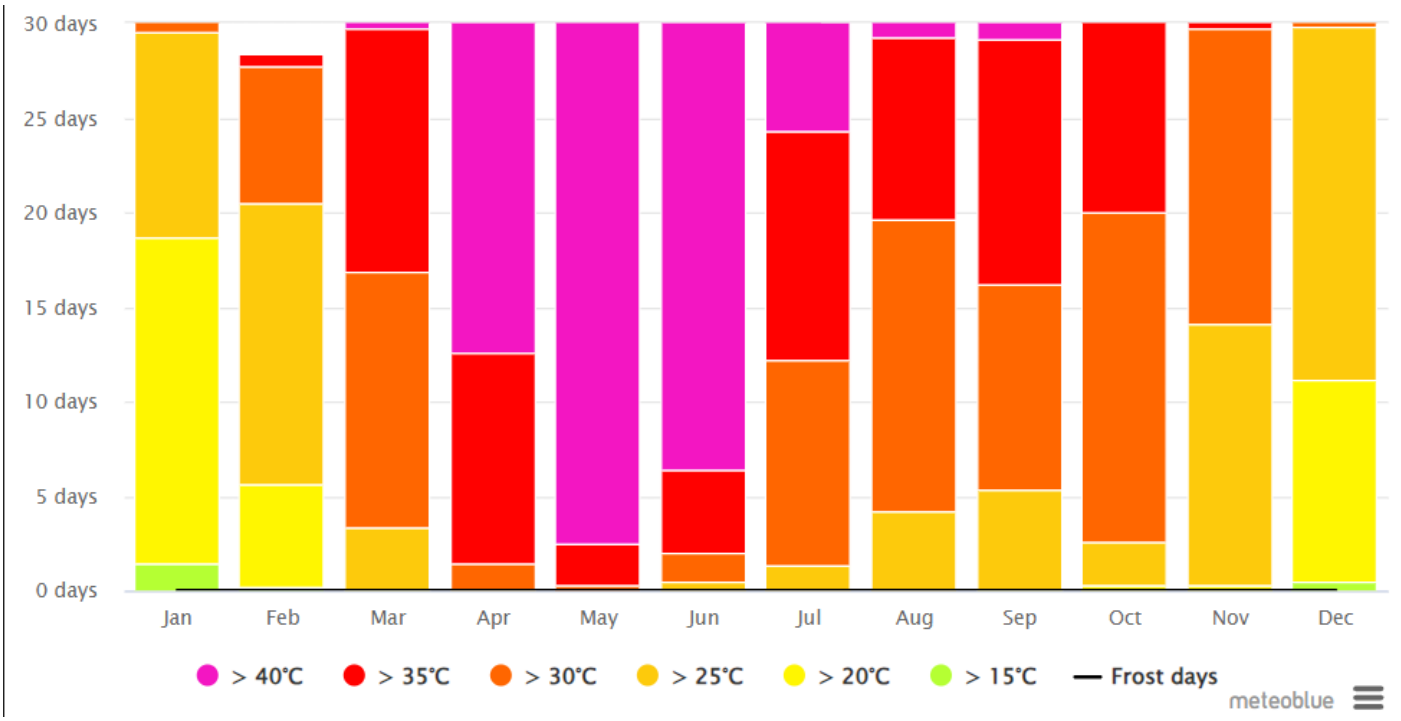
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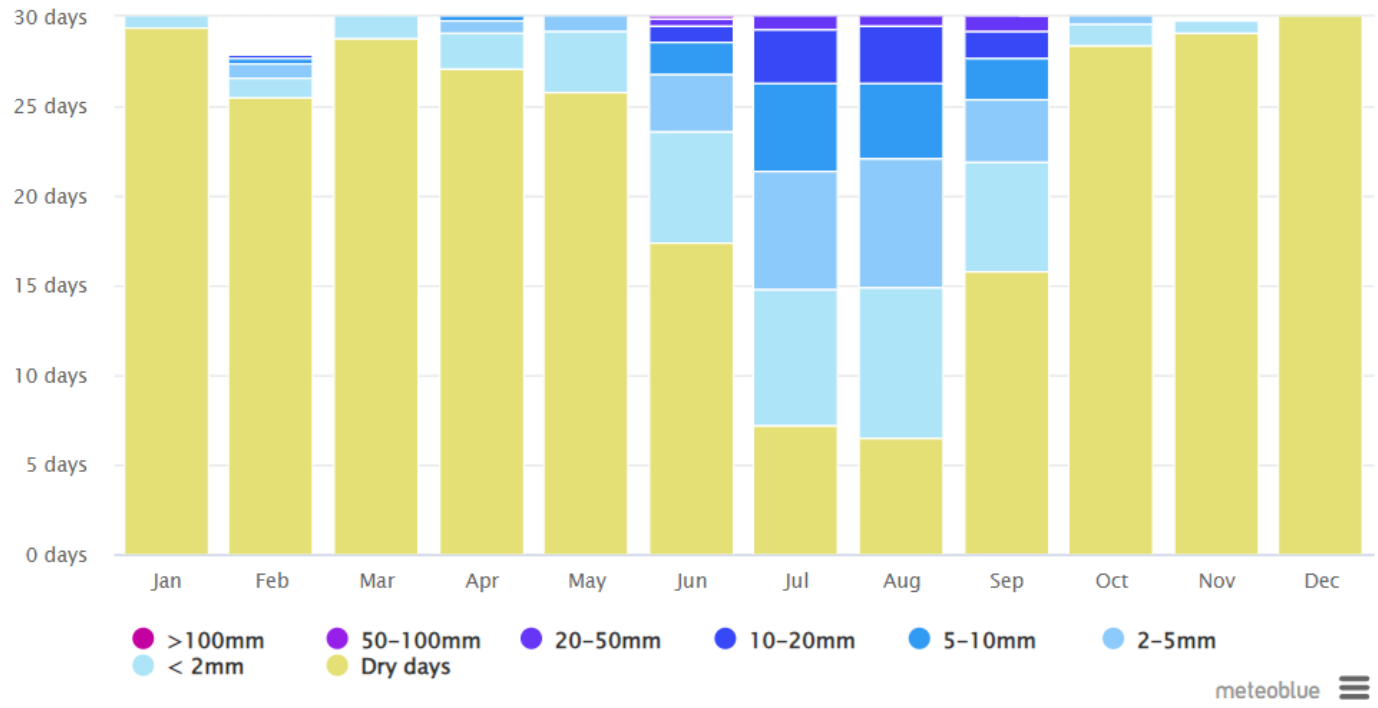
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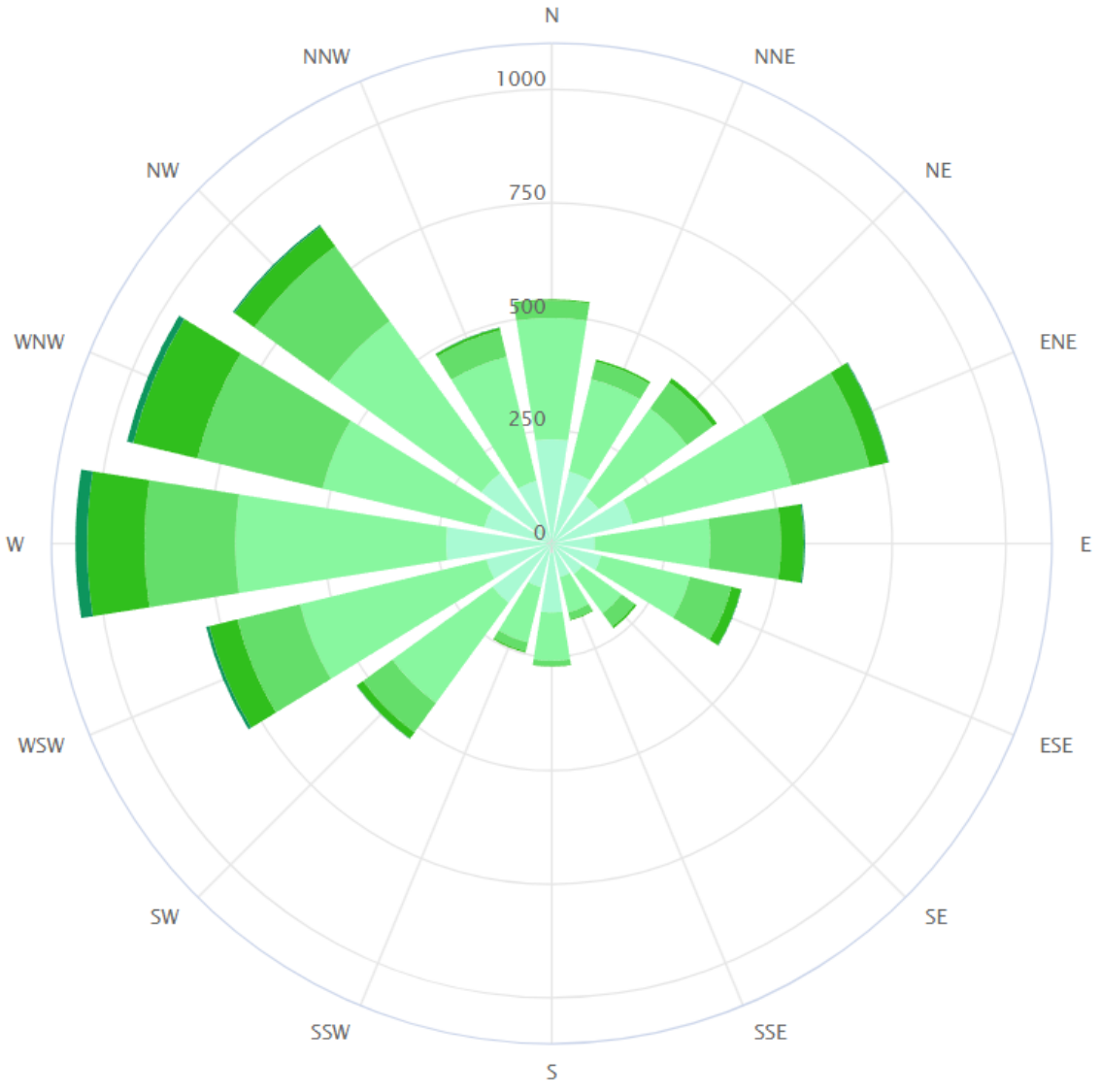
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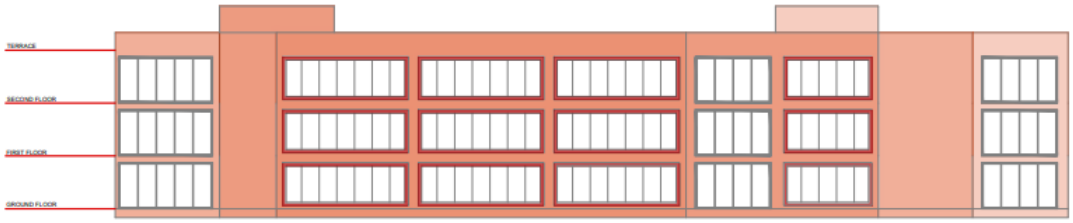
CHAPTER – 7
PLAN SECTION AND ELEVATION

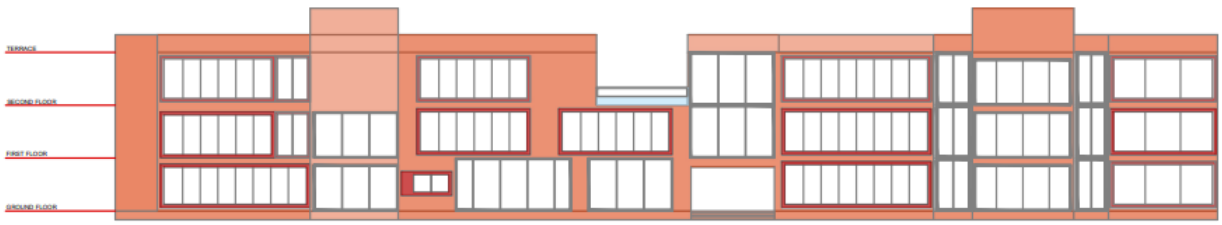
G R O U N D F L O O R

F I R S T F L O O R

SECOND FLOOR



EAST ELEVATION



SOUTH ELEVATION