THESIS REPORT
ON

MONTESSORI SCHOOL
IN LUCKNOW
UTTAR PRADESH

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

BACHELOR OF INTERIOR DESIGN

BY

TASNIM SADAF

(ROLL NO. 1190107027)

UNDER THE GUIDANCE OF

PROF. KESHAV KUMAR

TO THE
SCHOOL OF ARCHITECTURE AND PLANNING
BABU BANARASI DAS UNIVERSITY LUCKNOW.

SESSION
2022-23

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

CERTIFICATE

I hereby recommend that the thesis entitled "**MONTESSORI SCHOOL IN LUCKNOW UTTAR PRADESH**", prepared by **TASNIM SADAF** under the supervision, is the bonfire work of the student and can be accepted as a partial fulfillment for the award of Bachelor's Degree in Interior Design, School of Architecture BBDU, Lucknow.

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ACKNOWLEDGEMENT

Our hard work never shines if do not convey our heart feel gratitude to those people from whom we have got considerable support and encourage during this project.

To start with. First and foremost, gratitude towards almighty GOD for his blessings. Then I would like to thank all my faculty members who have supported and guided me all these memorable 4 years.

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motivating mission in the past few months due to their diligent supervision.

I would further like to show my gratitude to my family members, for giving full assistance whenever required and being there with me in all ups and downs. Their motivation and support helped me to be more dedicated and inclined towards my goal.

Last but not the least all friends and loved ones who give their all kind of support and concern. I have put in my best of efforts and worked day and night to make this project a successful. Hope u too will appreciate my endeavor.

THANKING YOU

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Certificate of thesis submission for evaluation

1. Name : **TASNIM SADAF**

2. Roll No. : **1190107027**

3. Thesis Title : **MONTESSORI SCHOOL**

4. Degree for which the thesis is submitted: **BACHELOR OF INTERIOR DESIGN**

5. Faculty of University to which the thesis is submitted: Yes /No

6. Thesis preparation guide was referred to for preparing the thesis. Yes/No

7. Specification regarding thesis format have been closely followed. Yes/No

8. The content of the thesis has been organized based on the guidelines. Yes /No

9. The thesis has been prepared without resorting to plagiarism Yes /No

10. All the sources used have been cited appropriately Yes /No

11. The thesis has not been submitted elsewhere for a degree. Yes/No

12. Submitted 3 hard bound copied plus one CD Yes/No

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TABLE OF CONTENT

SYNOPSIS

CONTENT

INTRODUCTION

- Montessori is a method of education that was started by **Maria Montessori**, an Italian educator, around **1896**.
- Montessori used the term "**cosmic education**" to indicate both the universal scope of lessons to be presented and the idea that education should help children realize the human role in the interdependent functioning of the universe.
- Montessori is a method of education that is based on self-directed activity, hands-on learning and collaborative play.
- IT is a type of early childhood education where exploration is front and center. Children learn by engaging with their environment and, based on what Maria Montessori and others have observed, they develop best when given the tools to explore on their own.
- In Montessori classrooms children make creative choices in their learning, while the classroom and the highly trained teacher offer age-appropriate activities to guide the process.

HISTORY & BACKGROUND

- Montessori arrived in India in 1939.
- Rabindranath Tagore and Mahatma Gandhi were aware of her pedagogical method. By 1929, Tagore had founded many "Tagore-Montessori" schools in India (including at Shanti Niketan), and Indian interest in Montessori education was strongly represented at the International Congress in 1929.
- Montessori education was established in India in the form of preschools and schools that are now affiliated with Association Montessori International.
- In an essay from 1996, Carolyn Cottom notes that the school's objective is to prepare its students for the complex issues of society that occur at the global level. Students are taken to visit the various places of worship in India.
- They are also taught about peace education; students learn that 'the Golden Rule' is a concept that is often taught across all world religions. Furthermore, the teacher's role is not only to teach subjects to students but to act as a mentor in the child's spiritual journey.

NEED OF TOPIC

- The Montessori method of education involves children's natural interests and activities rather than formal teaching methods.
- A Montessori classroom places an emphasis on hands-on learning and developing real-world skills.
- It emphasizes independence and it views children as naturally eager for knowledge and capable of initiating learning in a sufficiently supportive and well-prepared learning environment.
- Montessori described the young child's behavior of effortlessly assimilating the sensorial stimuli of his or her environment, including information from the senses, language, culture, and the development of concepts with the term "absorbent mind".
- Students are supported in becoming active seekers of knowledge.

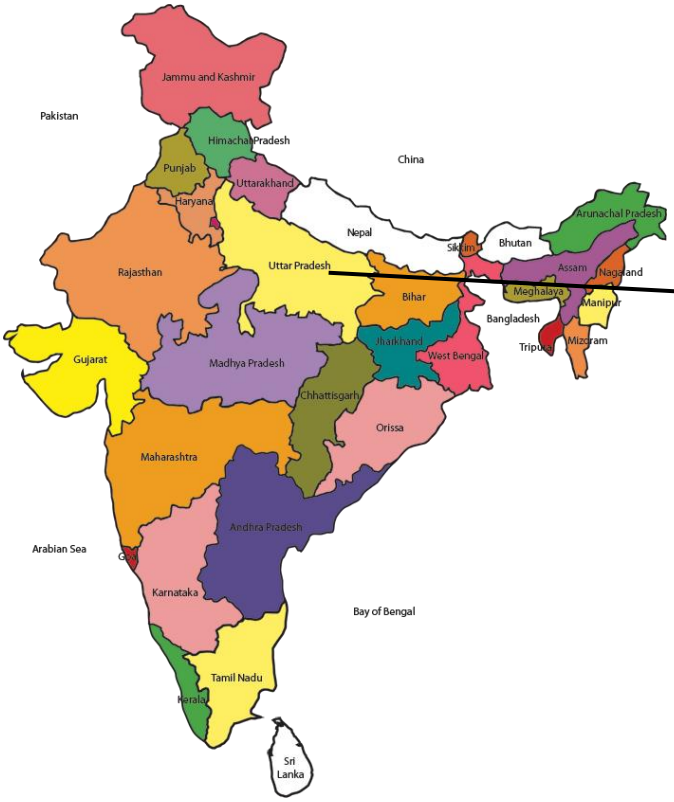
AIM

- The main purpose of Montessori education is to help every child develop essential skills already within him to master the creative learning process all through his life.
- It is all about helping him develop the skills essential for success, not only in school, but also in life.
- Helping each child develop self-confidence as an independent learner.
- To Absorbent their Mind.
- To choose their own work, and follow their interests.
- The Montessori classroom is also known as the prepared environment. This is a carefully prepared learning space where everything has a purpose and a place.
- To provides children with the environment, materials, and guidance to learn to do and think for themselves.
- It views children as born learners who are capable and willing to teach themselves when provided with the right stimulus.

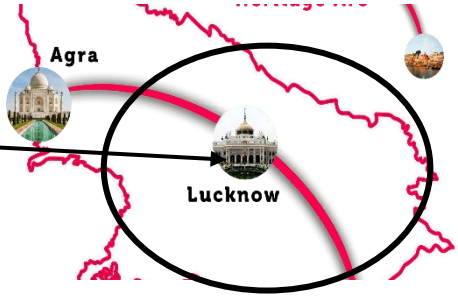
OBJECTIVE

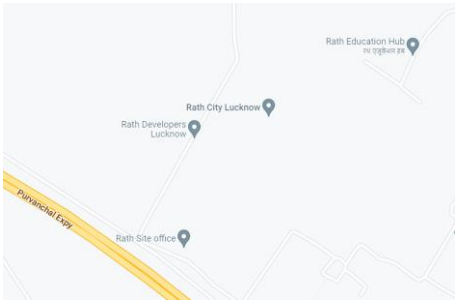
- ❑ To empower them to meet challenges and pursue goals.
- ❑ To impart knowledge to prepare global citizens.
- ❑ To encourage students to develop a sense of social responsibility.
- ❑ To enhance the quality of teaching and learning by means of innovative practices and leading edge technology.
- ❑ To create a lively and stimulating learning environment that is exciting today, as well as a preparation for the future.
- ❑ To create a caring, secure environment so that all in school feel a sense of worth.
- ❑ To develop a caring attitude for the environment.
- ❑ To create a partnership with parents.
- ❑ To observe living and inanimate things, and to recognize characteristics such as pattern and order.

SITE DETAILS



PURPOSED SITE FOR INTERIOR OF MONTESSORI SCHOOL IN RATH CITY, LUCKNOW

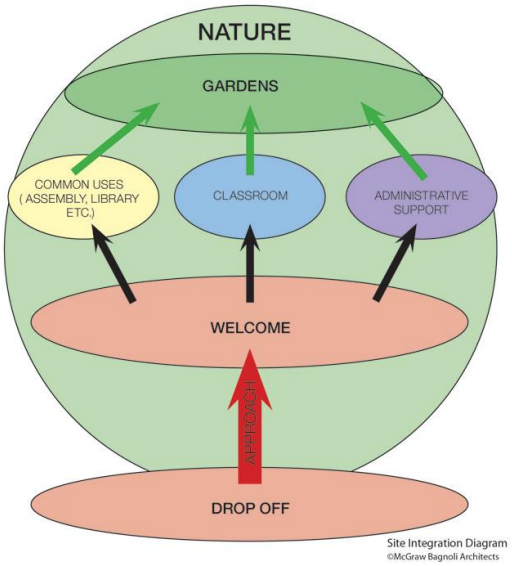




RATH CITY,LUCKNOW

PROJECT REQUIREMENTS

- ❑ Media center
- ❑ Computer labs
- ❑ Science centers
- ❑ Language labs
- ❑ Music and dance studios
- ❑ Art studios
- ❑ Dinning area
- ❑ Office space
- ❑ Reception areas
- ❑ Teacher work areas
- ❑ Small group meetings
- ❑ Conference rooms
- ❑ Bathrooms
- ❑ Classroom storage
- ❑ Maintenance tools and supplies
- ❑ Nurse's infirmary or area where sick children can be kept comfortable
- ❑ Parking
- ❑ Garden area



Site Integration Diagram
©McGraw Bagnoli Architects

METHODOLOGY

- ❑ SITE ANALYSIS
- ❑ SITE & SURROUNDINGS
- ❑ SITE CLIMATE
- ❑ CASE STUDY
- ❑ LITERATURE STUDY
- ❑ REQUIREMENT SHEET
- ❑ AREA ANALYSIS
- ❑ STANDARD SHEET
- ❑ CONCEPT SHEET
- ❑ DESIGN
- ❑ ELECTIVE
- ❑ VIEW

SWOT ANALYSIS

- To empower them to meet challenges and pursue goals.
- To impart knowledge to prepare global citizens.
- To encourage students to develop a sense of social responsibility.
- To enhance the quality of teaching and learning by means of innovative practices and leading edge technology.
- To create a lively and stimulating learning environment that is exciting today, as well as a preparation for the future.
- To create a caring, secure environment so that all in school feel a sense of worth.
- To develop a caring attitude for the environment.
- To create a partnership with parents.
- To observe living and inanimate things, and to recognize characteristics such as pattern and order.

SITE DETAIL

Located in quiet place surrounded by landscapes and inside the city which next to Purvanchal expressway	In terms of public transport, school is not connected directly to railway station.
S **Strength**	**W** **Weakness**
O **Opportunity**	**T** **Threat**
In upcoming year population of students will increase due to growing nearby Residential area located.	Leaking with fire extinguishers in emergency cases.

REFERENCES

- THE REFERENCE IS TAKED FROM HELLO SCHOOL FROM ,UKRAIN.

SITE ANALYSIS

MONTESSORI SCHOOL

INTRODUCTION

- Montessori is a method of education that was started by **Maria Montessori**, an Italian educator, around **1896**.

- Montessori used the term "**cosmic education**" to indicate both the universal scope of lessons to be presented and the idea that education should help children realize the human role in the interdependent functioning of the universe.

- Montessori is a method of education that is based on self-directed activity, hands-on learning and collaborative play.

- Montessori Education method is a method with special education process based on sensory learning. This educational method shows that children are completely fascinated by objects and materials designed to aid sensory perception.

DIFFERENCE BETWEEN MONTESSORI AND KINDERGARTEN STYLE OF LEARNING

- Kindergarten and Montessori are both very different styles of learning. Yet parents have often been confused when choosing between the two styles.

1. **The main difference:** Kindergarten is a method of education used by majority schools. On the other hand, Montessori is a method of instruction that is used to educate.

2. **Structure of education:** Kindergarten is a more structured education system where the role of a teacher is pre-defined and they follow the same technique for all students. The Montessori style uses an unstructured approach where each student is allowed to express themselves and the teacher adapts to the students style.

3. **Age:** Kindergarten style of learning is designed for children between the ages of three to five, which forms the base of their primary education. Montessori style is basically for children up to the age of six years after which it becomes optional. Studies have proven that the Montessori approach is also quite beneficial to teenagers.

3. **Teacher Role:** In Kindergarten, the teacher is the center of attention and is responsible for deciding the methods of teaching and imparting knowledge. They decide what, how and when the students learn about a topic or skills. Conversely, Montessori teachers are a guide. They have a very limited role in deciding what the children learn because they do not decide how or what the children learn. They simply introduce a topic to a student and let that child explore the various possible outcomes for that particular topic or problem.

4. **Learning Pace:** In a Kindergarten setup, the child is expected to learn at a similar pace as the other students or they are considered to fall behind. With the Montessori style, children are allowed to learn at their own pace and take their own time to learn each skill.

SITE LOCATION

LOCATON - RATH CITY,NEXT TO PURVANCHAL EXPRESSWAY, LUCKNOW
LANDMARK - POORV MADHYAMIC VIDYALAYA
CLIENT - MR. MANISH MISHRA
PROJECT TYPE - MONTESSORI SCHOOL

CONNECTIVITY

BY AIR

Lucknow Airport is located around 14 km away from the city center. Daily flights of almost all domestic airlines from Delhi, Mumbai, Kolkata, Jaipur, Chandigarh, Bangalore, Patna and other important cities serve Lucknow. So, Lucknow can be easily reached by air from anywhere in India. **Nearest Airport :** Chaudhary Charan Singh International Airport, Lucknow.

BY RAIL

Lucknow Railway Station at Charbagh is the main railway station. It links Lucknow with rest of India via a good number of mail and superfast trains. Passenger trains from nearby cities also ply to and from Lucknow. Several other railway stations like Gomti Nagar, Aishbagh junction etc. also serve the city.

BY ROAD

Wide road network connects Lucknow to major cities of India. Major highways that pass through Lucknow are NH25, NH28 and NH56. Buses for Lucknow are easily available from Varanasi, Allahabad, Kanpur, Agra, Jhansi, Delhi and other nearby cities. One can also hire cabs or use private cars to reach Lucknow from nearby places.

ABOUT THE CITY

Lucknow, a large city in northern India, is the capital of the state of Uttar Pradesh. It is located roughly in the center of the state, on the Gomati River about 45 miles (72 km) northeast of Kanpur. and it is also the second largest urban agglomeration in Uttar Pradesh. Lucknow is the administrative headquarters of the eponymous district and division.

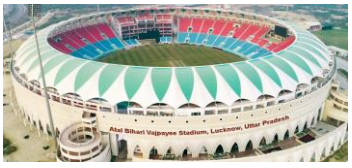
RUMI DARWAJA

HIGH COURT

CHIKAN KARI

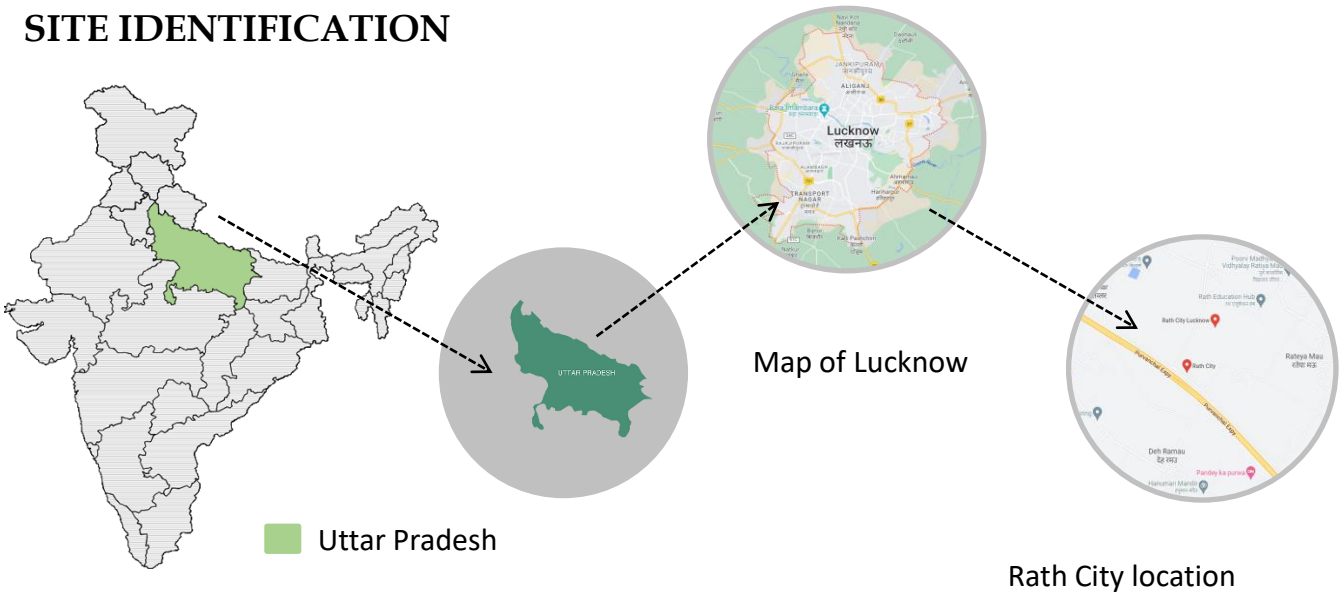
BARA IMAM BARA

RUMI DARWAJA



EKANA STADIUM

SITE IDENTIFICATION



Uttar Pradesh

Map of Lucknow

Rath City location

ABOUT THE SITE

GOOGLE EARTH IMAGE:

SITE AREA: 48515.7 Sqm.

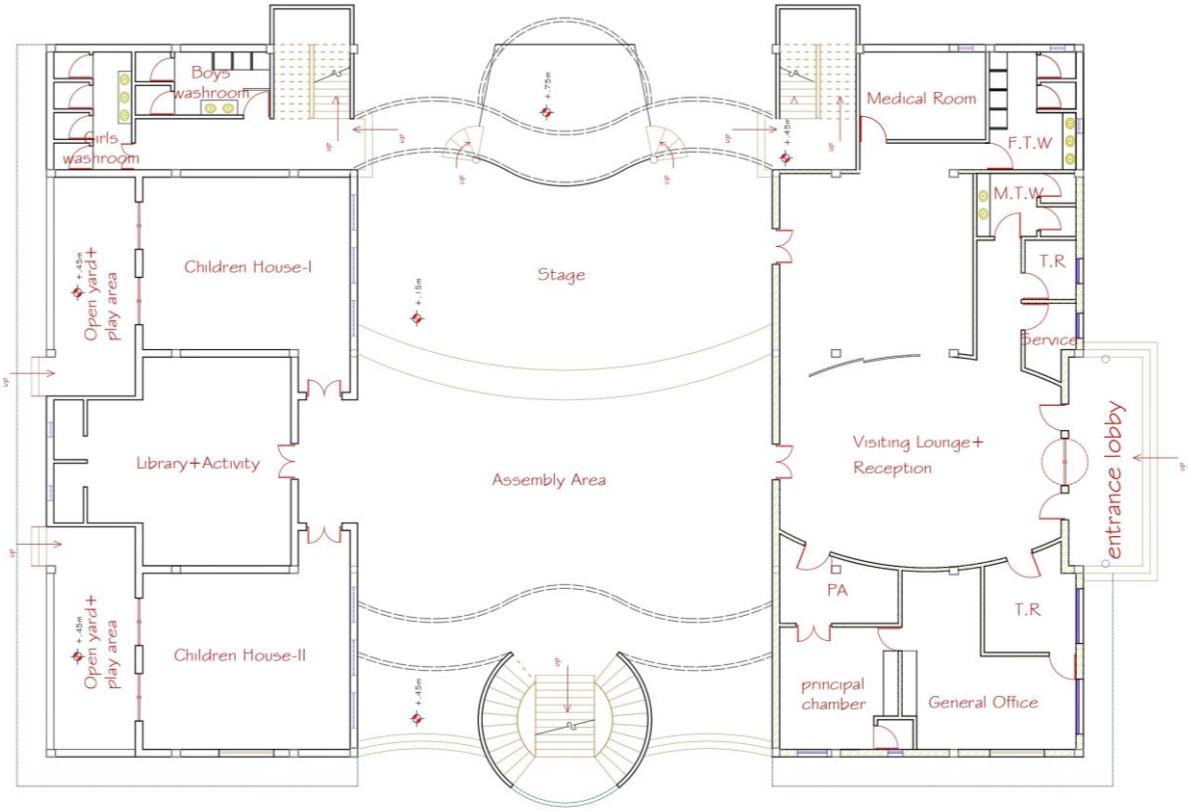
BUILD UP AREA: 924 Sqm.

CO-ORDINATES:
LONGITUDE- 26.7374° N
LATITUDE- 81.0964° E

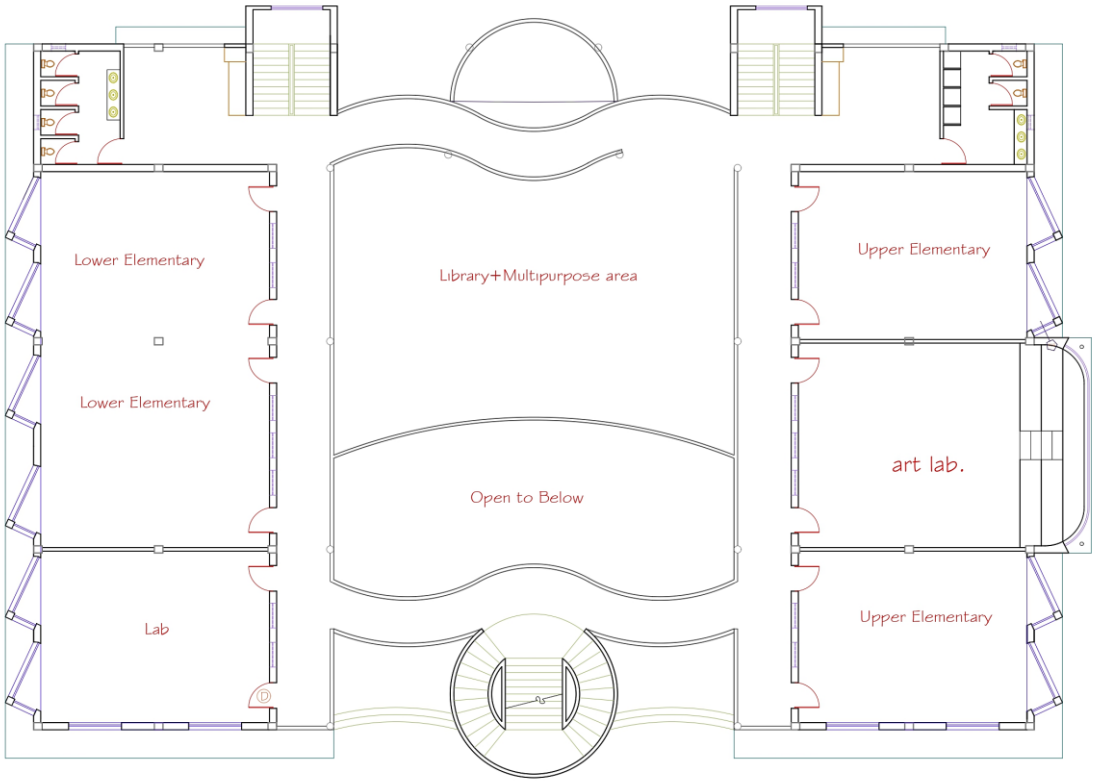
FACILITIES: Large classrooms, Montessori certified all-women faculty Trained, CCTV-monitored campus, Complete Montessori equipment's,
Library and reading room, Indoor play area and facility for outdoor play activities – both with maximum child safety features.

SITE AMENITIES: PARK, SHOPPING COMPLEX, SECURITY, PLAY GROUND.

TOTAL LAND AREA: 4494433.12 Sqft.



GROUND FLOOR



FIRST FLOOR

SITE ACCESSIBILITY

The site can accessed from various side of the city like Lucknow, Sultanpur, Ayodhya etc.
The main road Infront of the site is known as Purvanchal Expressway which connects many cities.

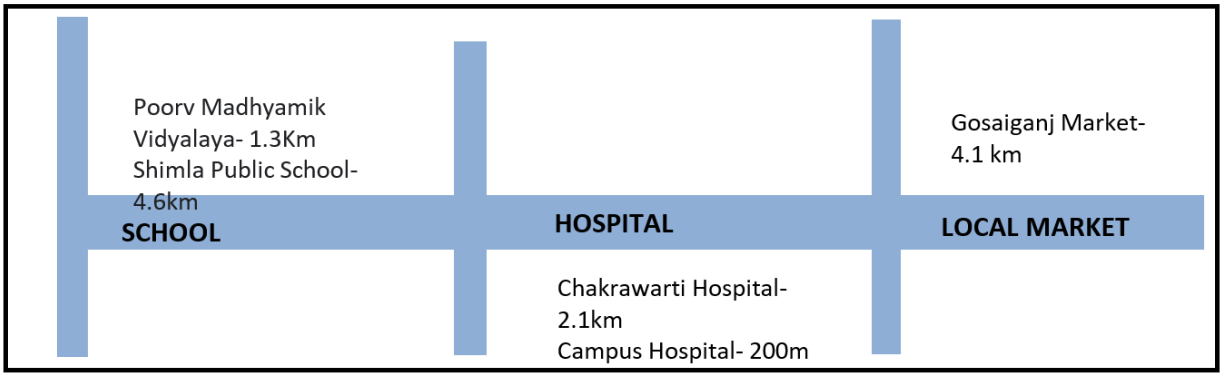
CONNECTIVITY

- ❑ Anup Ganj Railway Station. **4.9KM**
- ❑ Rahmatnagar Railway Station. **❑8.6KM**

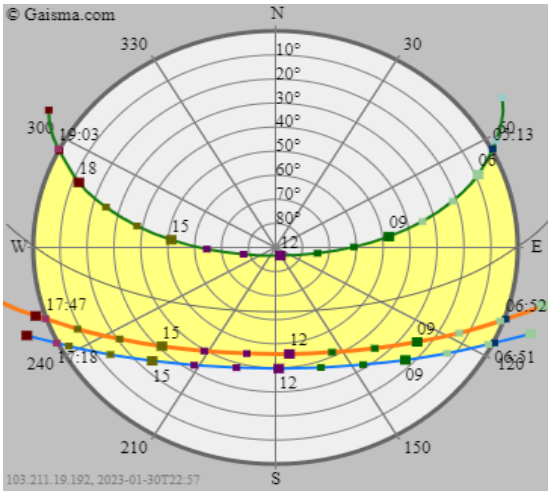
- ❑ Chaudhary Charan Singh International Airport, Lucknow. **29.3KM**

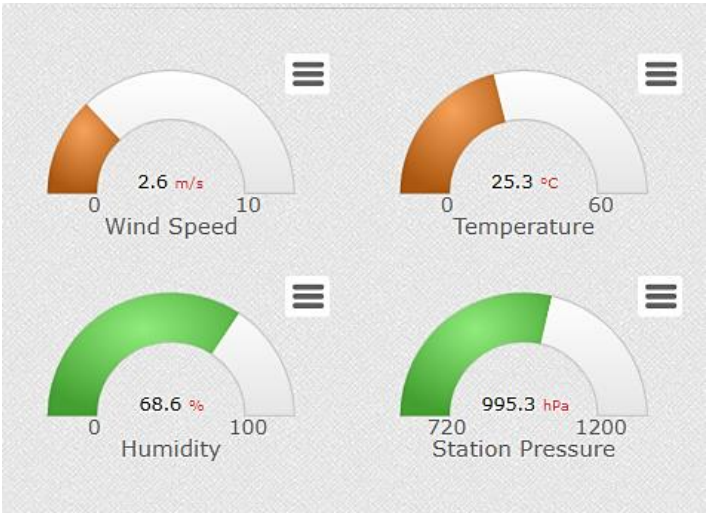
- ❑ Gosaiganj Bus Stand, Lucknow. **4.6KM**

- ❑ Purvanchal Expressway, Lucknow. **2KM**



SUN PATH DIAGRAM





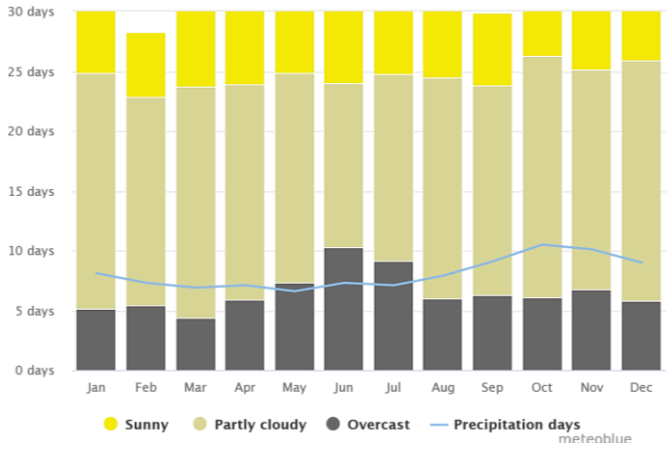
The graph below shows the average values of various meteorological parameters over the year in Lucknow.

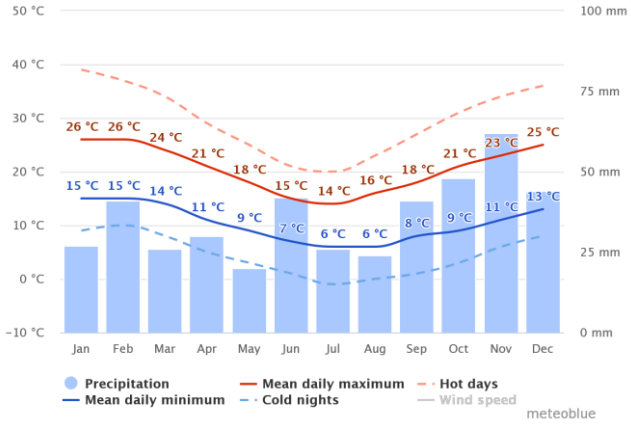
CLIMATE DATA

All Year Climate & Weather Averages in Lucknow

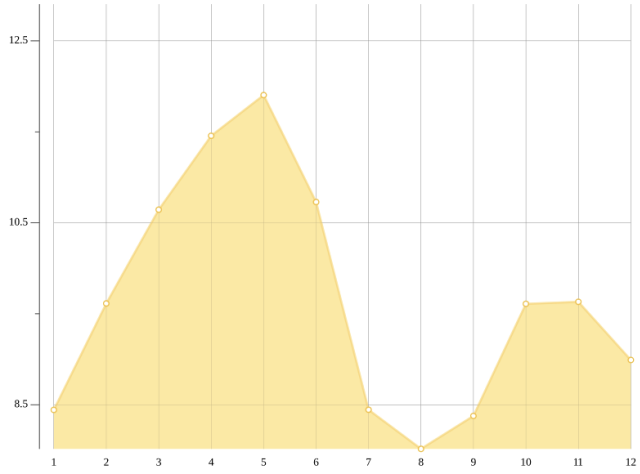
- ❑High Temp: 40 °C
- ❑Low Temp: 8 °C
- ❑Mean Temp: 25 °C
- ❑Precipitation: 55.9 mm
- ❑Humidity: 65%
- ❑Dew Point: 17 °C
- ❑Wind: 7 km/h
- ❑Pressure: 1008 mbar
- ❑Visibility: 4 km

AVERAGE PRECIPITATION , CLOUDY, SUNNY,





AVERAGE MAX. & MIN. TEMPR. IN LUCKNOW

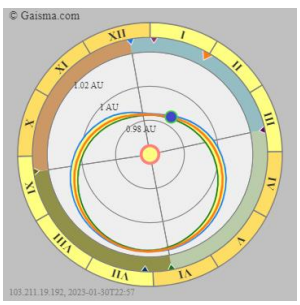


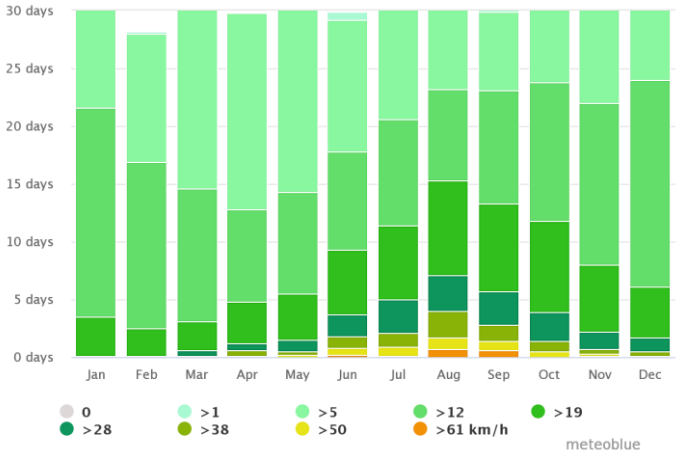
AVERAGE DAILY SUNHOURS PER MONTH IN LUCKNOW

QUICK CLIMATE INFO:-

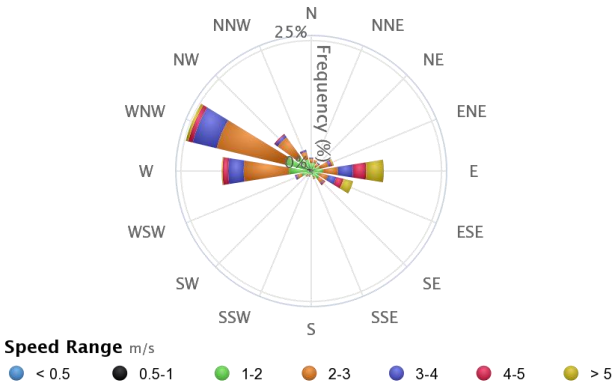
Hottest Month	June (33 °C avg)
Coldest Month	January (15 °C avg)
Wettest Month	July (194.7 mm avg)
Windiest Month	June (9 km/h avg)
Annual precip.	670.3 mm (per year)

SEASONS GRAPH AND EARTH'S ORBIT





AVERAGE WIND SPEED IN LUCKNOW



WIND ROSE FOR **LUCKNOW**

The wind rose for Lucknow shows how many hours per year the wind blows from the indicated direction

Date	Sunrise	Sunset	Length	Change	Dawn	Dusk	Length	Change
Today	06:52	17:47	10:55		06:28	18:12	11:44	
+1 day	06:52	17:48	10:56	00:01 longer	06:28	18:12	11:44	00:00 equal length
+1 week	06:49	17:53	11:04	00:09 longer	06:25	18:17	11:52	00:08 longer
+2 weeks	06:44	17:58	11:14	00:19 longer	06:20	18:21	12:01	00:17 longer
+1 month	06:30	18:08	11:38	00:43 longer	06:07	18:31	12:24	00:40 longer
+2 months	05:58	18:23	12:25	01:30 longer	05:34	18:47	13:13	01:29 longer
+3 months	05:29	18:39	13:10	02:15 longer	05:04	19:03	13:59	02:15 longer
+6 months	05:31	18:55	13:24	02:29 longer	05:06	19:20	14:14	02:30 longer

SUNRISE, SUNSET, DAWN AND DUSK TIMES, TABLE

LITRATURE STUDY

DISCOVERY ELEMENTARY SCHOOL

INTRODUCTION:

Client: Arlington Public Schools
Location: Arlington, VA
Scope: Primary & Elementary Schools
Completion: 2015
Size: 98,000 SF

Discovery Elementary School is Arlington Public Schools' first elementary school designed in the 21st century. While built to address rapidly growing student enrollment in Arlington, the school was designed to meet a larger goal – to prove what can truly be achieved with a new public-school facility. To this end, careful attention was focused on designing and building a school that supports how and where students learn. Every nook and cranny of the school is arranged to create a seamless integration between design, sustainability, and learning.

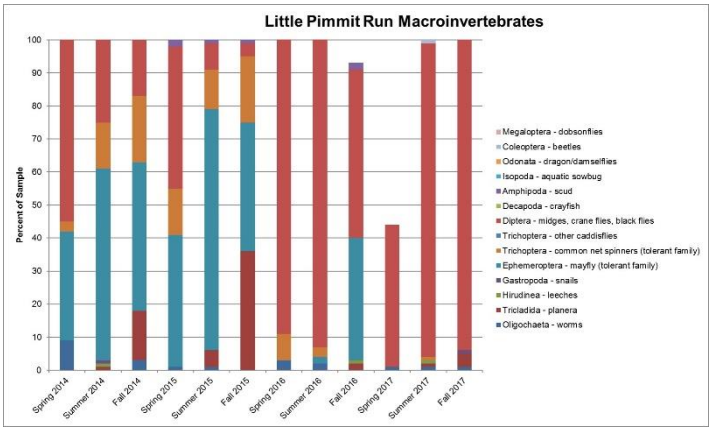
RELEVANCE:

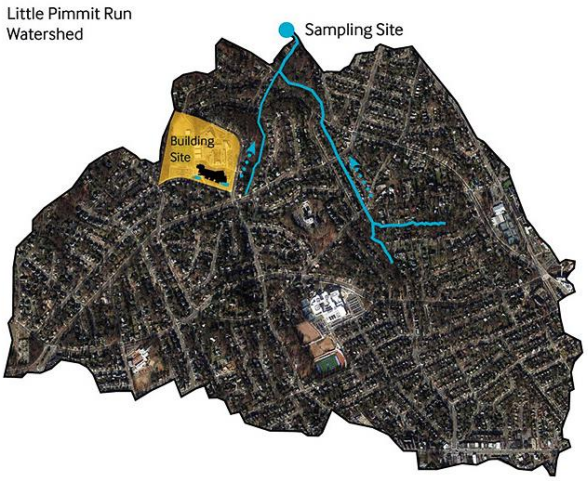
The Discovery Elementary School well designed school in world which make it selection important to understand the design feature of the area and issue faced. My selection becomes more important in reference to understand the design of the context and aspects of school planning. Recognizing that students are the creators of our collective future, Discovery Elementary sets the stage for the development of the skills necessary for long-term stewardship of our world.

SITE

Discovery Elementary School. Dr. Erin Healy, Principal 5241 North 36th Street Arlington, Virginia, USA.

Latitude: 38°52’51” N
Longitude: 77°06’15” W



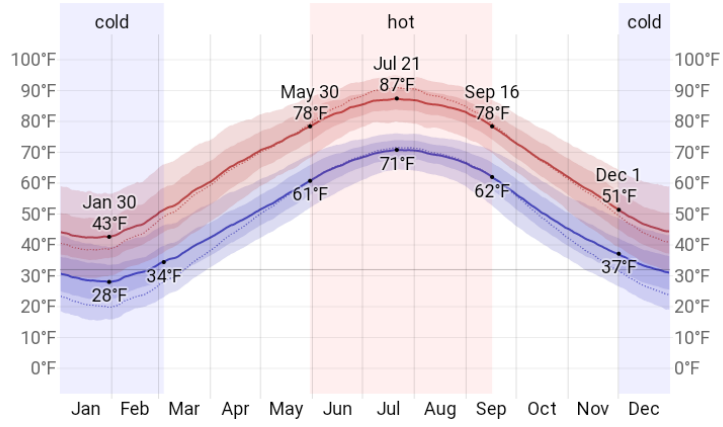


Climate:

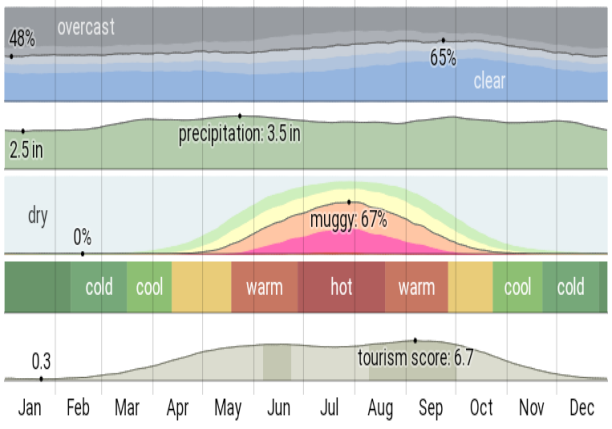
- **Summer High:** the July high is around 88°
- **Winter Low:** the January low is 27°
- **Rain:** averages 43 inches of rain a year
- **Snow:** averages 15 inches of snow a year

Connectivity:

- 17.6 km away from **Union Metro Station**
- 6.3 km away from **Bus Stand**
- 14.4 km away from **Ronald**



Maximum & Minimum temperature



Maximum & Minimum temperature per month

SCALE

98,000 square meters School Discovery isn't just a school building. Every aspect of the environment is built for and used for learning. We aspire to its example, and strive to implement innovative, research-based, future-proof practices that mirror the potential of this space.

The school shares the site with an existing middle school and has been master planned for future middle school expansion. Open, programmable space is preserved as much as possible by situating a full third of the building's footprint on existing slopes. The school tiers into an existing hill to minimize the perception of its size while featuring exterior materials that are residential in nature and scale.

AREA PROGRAMME:

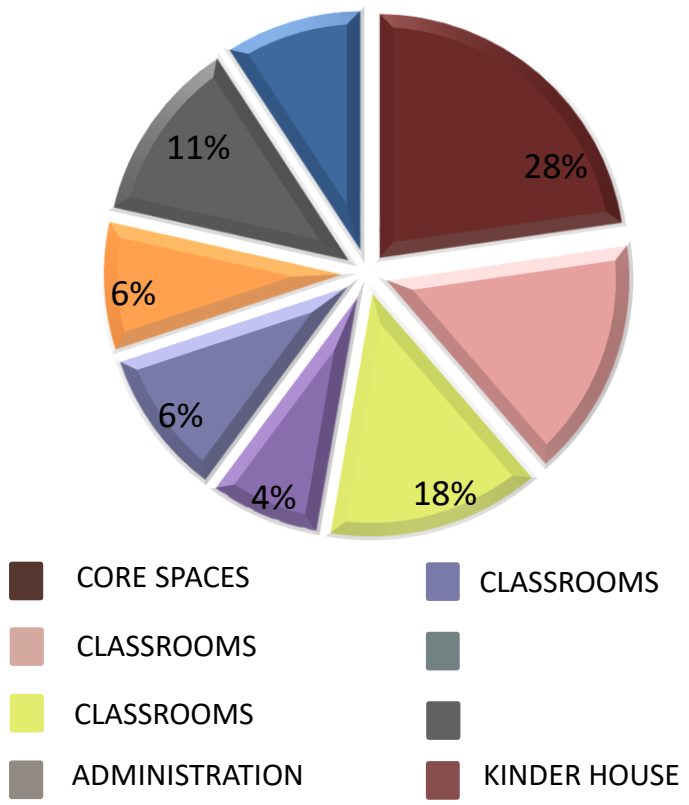
LOCATION	Arlington, VA
CATEGORY	• Nursery to secondary CBSC board.
COMPLETION YEAR	• 2014
STUDENT TEACHER RATIO	• Till primary :: 15 : 1 • Secondary :: 30 : 1
STUDENTS STAFF	• STUDENTS : 1160 • STAFF : 135
CIRCULATION	• The School is conceived as 3 separate wings, with the kindergarten carefully isolated from the secondary school, • The teaching sections for both divisions are accessed through separate entrances
LAYOUT OF CLASSROOM	• While teaching the students are facing the blackboard and while group assignments the furniture gets oriented in groups of desks.
LIGHT VENTILATION	• All the rooms have big external facing windows and glazed window facing the passage • The central area has parapet walls for ventilation in the passages
ORIENTATION OF THE BUILDING	• The south heat does not fall directly on the window • Southwest wind enters the building from openings
TYPE OF STRUCTURE/ MATERIALS	• R.C.C. framing with brick structure • A screen wall clads in basalt stone, juxtaposed against a large exterior flight of steps, creates a distinctive architectural feature, while also helps in softening the threshold between the outdoor play areas and the surrounding neighborhood.

AREA PROGRAMME:

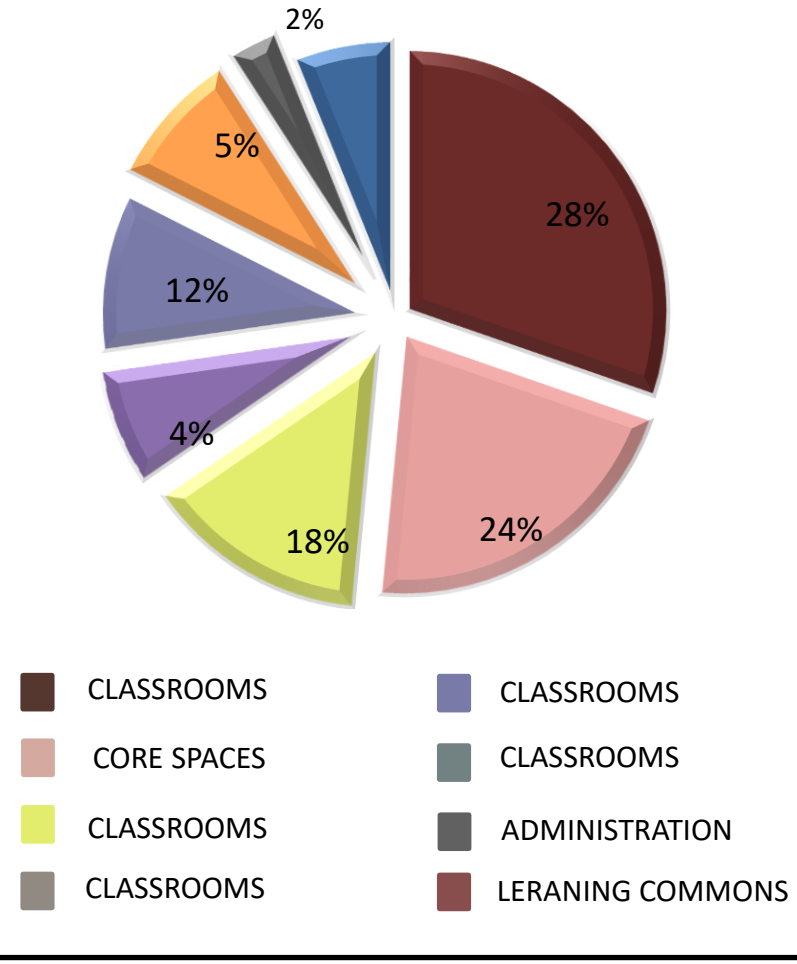
AREA CHART:

SITE	• 10,000 m^2
CLASSROOM	• 50 m^2 • 1.67 m^2 / pupil
STAFF ROOM	• 65 m^2
LIBRARY	• 130 m^2 • 4 m^2 / pupil if 30 students are using the library at a time
ADMIN OFFICE	• 240 m^2
CAFETERIA	• 385 m^2 • 1.2 m^2 / pupil for 300 places
MUSIC / DANCE / EXTRA CARECULAR	• 85 m^2 • 2.8 m^2 / pupil
ART ROOM	• 85 m^2 • 2.8 m^2 / pupil
LABORATORY	• 100 m^2 • 3.2 m^2 / pupil
ROOMS FOR PREPARATION AND MATERIALS	• 37.5 m^2
COMPUTER LAB	• 95 m^2 • 3.16 m^2 / pupil
MULTIPURPOSE HALL	• 470 m^2 • 0.47 m^2 / place
PARKING	
TOILET BLOCK	• 30 m^2
PASSAGE WIDTH	• 3m wide passage
LIFTS	• 2 lifts
STAIRCASE	• 5 staircases on ground and 1st floor • 4 staircases on 2nd, 3rd and 4th floor
TOILETS	• 3 toilets on 1st, 2nd and ground floor • 2 toilets on 3rd and 4th floor • Staff rooms have separate toilets
WATER STORAGE TANKS	• OHT and UGT provided
ELECTRIC METER ROOM	• Provided on site
VEGETATION	• Big trees on the boundary with lawn and small shrubs around the building landscaped beautifully
SECURITY	• CCTV at entry points are continuously monitored. • There is a lady attendant in every vehicle. • First Aid Box, GPRS and CC TV cameras are in every bus.
TRANSPORT	• They encourage parents to use transport in order to avoid traffic jam on the road and also to save fuel.
MAINTAINANCE	• Walls are painted every year in summer vacation plus checked for any kind of structural distortion. • Other staff members like cleaners, gardeners are present for daily maintenance.

AREA DISTRIBUTION (1st FLOOR)



AREA DISTRIBUTION (2nd FLOOR)



CONCEPTUAL PLAN:

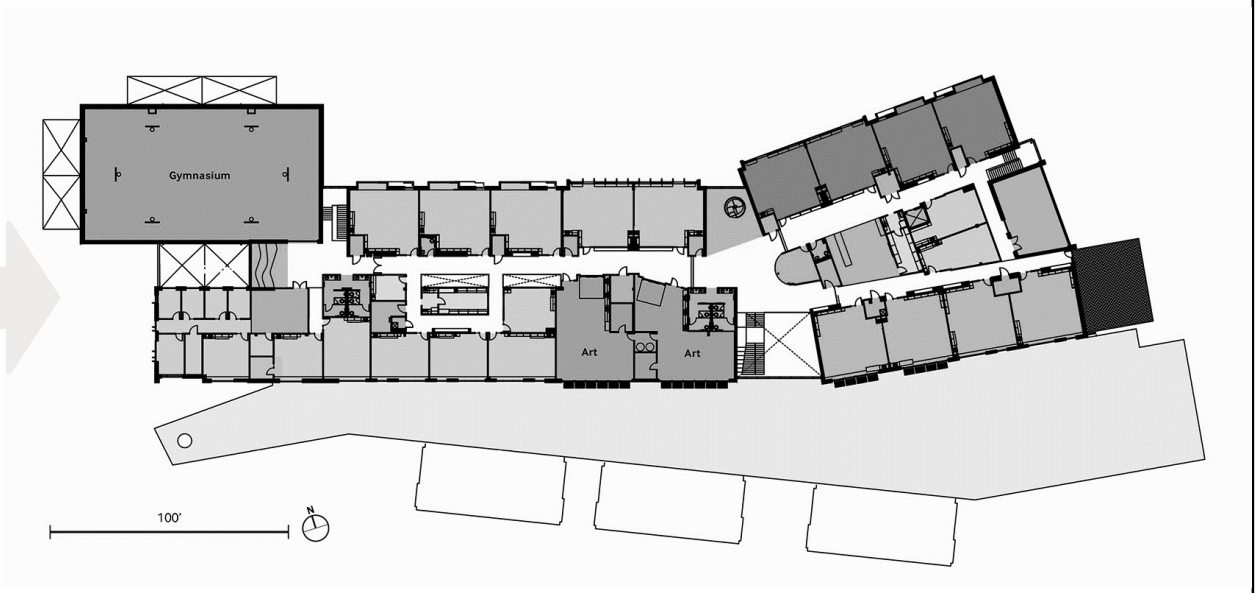
Every corner of Discovery Elementary has been designed to create a seamless interface between design, sustainability and learning. There are two important design criteria for this case, one is to focus on children and create a happy and interesting learning environment; the other is to design a green building in response to the climate change crisis, making contributions to energy regeneration in the region and the whole world. As a green building, Discovery Primary School supports learning-based learning and encourages students to become stewards of a sustainable environment through service and leadership.

SITE PLAN:

The school's design takes advantage of the topography of the site to create distinct, tiered academic zones and separate exterior play spaces for early childhood, primary, and elementary grade levels. The school's wayfinding goes beyond basic navigation to support a larger vision of spatial organization that reflects each grade's expanding curriculum and identity. As students progress through the school, their "world expands" – with the first floor themed around animals found in earth eco-systems and the second floor themed around the elements of the sky and heavens. Students start out as Backyard Adventurers in Kindergarten and finish Fifth Grade

FIRST FLOOR

SECOND FLOOR



ZONING:

The spaces divide galleries into different specializations, also distinguishing the children's gallery with its own orientation section. The architecture constantly works to enhance the feeling of wonder and belonging to allow the visitor to explore and discover. The environment is thus envisioned as a learning landscape, a place that creates a sense of calm that is conducive to education.

First Floor - Earth

K BACKYARD ADVENTURERS Local Fauna

1 FOREST TRAILBLAZERS Materials

2 OCEAN NAVIGATORS Water

- Core Spaces
- Administration
- Learning Commons
- Mechanics / Support
- PK/K Backyard Kinderhouses
- 1st Grade - Forest
- 2nd Grade - Ocean
- Specialty Classrooms

Second Floor - Sky

3 ATMOSPHERE AVIATORS
Air

4 SOLAR SYSTEM PIONEERS
Light

5 GALAXY VOYAGERS
Energy

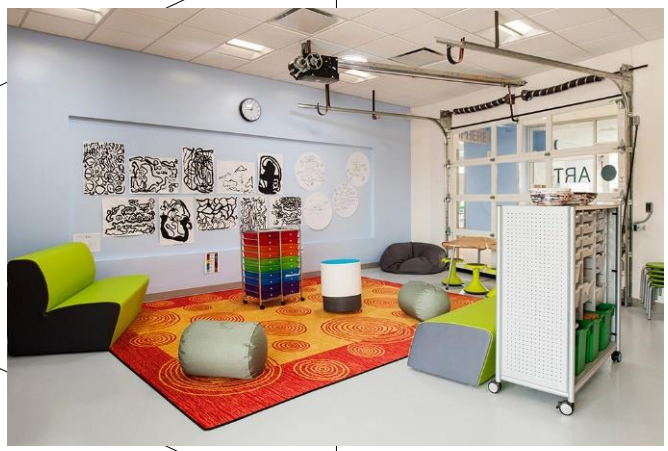
- Core Spaces
- Administration
- Learning Commons
- Mechanics / Support
- 3rd Grade - Atmosphere
- 4th Grade - Solar System
- 5th Grade - Galaxy
- Specialty Classrooms

SECTION

SECTION OF TIERED PV TRAYS STEPPING WITH THE SUN TO COLLECT LIGHT

DESIGN APPROACHES

- The design of student classrooms pays more attention to flexibility and diversity, such as foldable partition walls, retractable garage doors, and various furniture that can be freely combined to support the collaboration between teachers and cross-inspiration between subjects.
- Across the school, one-on-one technology enables research and collaboration to take place anytime, anywhere.
- Dry erase boards and magnetic walls encourage student expression and self-confidence; Scrabble and LEGO walls provide imaginative wings for language and spatial exploration; A full day of fun and play before and after school.
- To support engagement at every scale, the school features an extensive array of exterior playscapes and interior furniture including stools, bean bags, benches, height-adjustable tables and chairs, reading steps, and even a two-story slide – all of which encourage creative expression and student choice.



Slide

Two story slides + creative wall
Theme of animals found in earth eco-systems.

Kinderhouses+Hedge

Scrabble & Lego walls
Hedge which enclose backyard

Collaboration Commons

Two story slides + creative wall
Theme of animals found in earth eco-systems.

Classroom

Simple elegant class with some color

Dining Commons

Best for Daylighting uses with the help of glass glazing

Cloud Commons

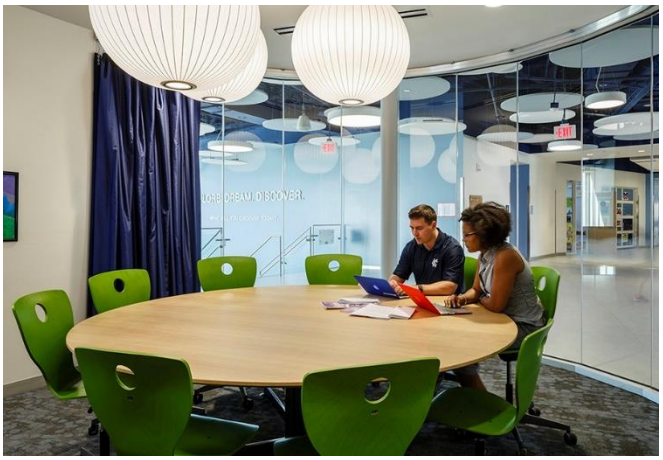
a vibrant wing of the Lower School designed like an enchanting neighborhood with bright skies above.

Library

With different style of shelving

Teacher's work room with partition of glass for sound barrier

Teacher Work Room



NET-ZERO AND OTHER SUSTAINABLE DESIGN FEATURES

Discovery Elementary School's solar panels and geothermal well-field are not the only sustainability features the school has to offer.

- **Solar Thermal Water Heating**

A solar thermal water heating system is used in the school's kitchen. Water is circulated from the storage tank and through flat-plate solar collectors to produce pre-heated water. This pre-heated water is then introduced into the geothermal water heating system, which supplies heat at a consistent 120°F. This process reduces the energy load on the geothermal heat pumps and allows solar energy to play a key role in heating water for use in the school's kitchen.

- **Low-Flow Plumbing Fixtures**

The low-flow plumbing fixtures that are installed throughout the school have flow rates that exceed the energy- and water-savings targets mandated by APS. It is estimated that 288,700 gallons of water will be saved per year, 36% lower than a building equipped with baseline, standard-flow fixtures.

- **Lighting**

Discovery Elementary School's design incorporated lots of daylight to encourage a vibrant learning environment while reducing the need to use artificial light (and thus, electricity). The school has 100% LED lighting and uses occupancy and automatic lighting controls to conserve electricity in unoccupied rooms.

NET-ZERO IN THE CLASSROOM

- Discovery Elementary School was named as a tribute to astronaut John Glenn, who lived across the street from the school site at the time he became the first American to orbit the Earth in 1962.
- Thus, it is fitting that Discovery Elementary School has adopted an innovative, inquiry-based learning environment for its K-5 students.
- Each grade level is assigned a theme that reinforces the curriculum and moves from a micro-level to a macro-level scale: for example, Kindergartners(INFANT) start in the backyard and each grade on up through 5th grade expands outward in the solar system.
- The school building and grounds provide numerous hands-on learning opportunities for teachers and students alike.
- The solar lab is connected to a digital dashboard that tracks energy usage and other statistics, enabling teachers to use real data in their lessons. The school even has a built-in solar calendar that is coordinated with an inlaid stone pattern on the school's plaza to help students tell time and mark the changing seasons.

1700 solar panels on the school's roof functioning as power source and lab

FURNITURE USED IN ELEMENTARY SCHOOL

Hokki & Hokki+Tumbler Stool - an ergonomic seat that corrects the sitting posture, which can transform the conventional static sitting posture into a dynamic form. Hokki's protruding, spherical bottom resembles a tumbler, allowing the body to turn in all directions, so in order to sit more steadily, it is necessary to keep the feet on the ground and the spine straight, which effectively stimulates the entire musculoskeletal system.

Upholstered chair series of Shift+ Landscape- This group of upholstered furniture consists of two functional elements, base cabinets and seats, available in both linear and curved forms. The seat has 3 fixed height dimensions. The curved base units and seating elements can be combined linearly and, The product meets the fire resistance requirements of Pc level (low) and Pb level (medium) and S40 fabric, and additional flame retardants can be added according to the requirements of Pa level (high).

Compass-VF four-leg stackable seat- Frame in powder-coated or chrome-plated round steel tubes, with seat shell in beech plywood.
6 fixed-height chair sizes are available to suit school children of different ages and heights; based on a variety of use environments, there are also seat designs with casters.

Pantomove Chair- Ergonomic star base seating solution.
Designer: Verner Panton
There are two forms of fixed height and adjustable height. The seat shell is made of double-wall structural polypropylene (LuPo). There is also a hook on the back of the chair to hang the chair on the table.

Puzzle free curve type campus desk- 6 fixed height sizes. Table top made of wood resin particleboard coated with melamine resin, bottom made of welded round steel tube legs and rectangular steel tube frame. There are adjustable screws at the bottom of the table legs. Consists of welded round steel tube legs and rectangular steel tube frame. The Puzzle curve table can be freely connected and combined.

Rondo Lift-KF - Height-adjustable stand-and-sit lift table - The base is available with lockable castors or sliding elements. There is a manual switch on the edge of the table top, and the manual switch is equipped with a safety cover to prevent accidental deployment of the inflatable legs. The table top is available in round or square (90 cm) with folding and sliding top for easy and safe transport.

Shift+ Base can be stacked with four-legged desks - there are fixed heights and stepped height adjustments that can be locked with an Allen wrench. The highlight is the design of the legs, two with sliding elements, two with lockable castors. Such a design facilitates free movement. The desk board is two mirrored concave-convex shapes, so it can be combined and connected with each other to create a variety of forms such as circles and lines.

Uno-M, Uno-M-Step sliding desk -
According to the European DIN EN 1729 furniture design specification for educational institutions, the desk has 6 fixed heights, or can be adjusted to 5 fixed heights with an Allen wrench. Top made of melamine-coated wooden opal chipboard; base with sliding elements for soft and hard surfaces; hooks for bags; and book trellis (can also be hung with matching seat).

Innovative projects like Discovery Elementary School are critical to transforming our buildings, spaces, and places so that they can continue to sustain future generations. Giving students the opportunity to see and experience their school building as a living laboratory encourages greater understanding and stewardship for their planet and community. By setting high goals for energy performance and involving students in the effort, Discovery demonstrates a new threshold of academic and industry leadership.

– Mahesh Ramanuja CEO, United States Green Building Council (USGBC)

OBSERVATION:

- Discovery Elementary School has an array of high-tech and high-efficiency features.
- It inspires students and teachers to use the building creatively to facilitate everyday learning and lifelong exploration.
- Throughout the school one to one technology enables research and collaboration to happen anytime. anywhere.
- with a reconfigurable range of learning spaces, the positive correlation between learning, high performance architecture, and student engagement continues to find expression in all types of unanticipated ways demonstrating that Discovery should continue to provide meaningful settings for educational practices that are always evolving.

DESIGN ANALYSIS:

- To support engagement at every scale, the school features an extensive array of exterior playscapes and interior furniture including stools, bean bags, benches, height adjustable tables and chairs, reading steps, and even a two-story slide- at of which encourage creative expression and student choice.
- Inside classrooms, flexible details such as foldable partitions, retractable garage doors, and various furniture offerings support teacher collaboration and cross pollination.
- Discovery's public spaces are defined by a large roof canopy with a cedar soffit that runs the length of the school and serves as the school's "front porch." In addition to shading large expanses of glass that provide a strong visual connection to the outdoors.
- The roof overhang provides covered outdoor dining and play spaces. At the main entry, the roof extends out as a canopy with an oculus, which allows the entry plaza to serve as a large solar calendar that indicates both time of day and time of year.
- On the north side, the school uses playful arrangements of cool colors, such as greens and blues, echoing the natural expression of moss that grows on the north side of trees.

CONCLUSION:

- Innovative projects like Discovery Elementary School are critical to transforming our buildings, spaces, and places so that they can continue to sustain future generations.

- Giving students the opportunity to see and experience their school building as a living laboratory encourages greater understanding and stewardship for their planet and community.

- I think what is most important about this building is that it allows teachers to think about how we learn and how students learn.

- Curriculum is just something the state gives to us and you can teach that anywhere, but with this space, we can really get creative, and experiment, and shepherd meaningful experiences for students.

CASE STUDY

BIRLA OPEN MINDS INTERNATIONAL SCHOOL

INTRODUCTION:

Location: Anorakala, Lucknow, Uttar Pradesh
Scope: Primary & Elementary Schools
Completion: 2015
Site: 98,000 SF
Latitude: 26.7374° N
Longitude: 81.0964° E

Birla Open Minds International School (BOMIS), under the guidance of Birla EdTech Limited. offers comprehensive solution for education that envelopes the individual's learning period right from the formative early years to K-12 schooling. Birla Open Minds International School (BOMIS) encompasses wide - ranging interests in the sphere of high quality education with dedication to excellence.
Our first Birla Open Minds School initiated its operations in 2010, and today it has grown to 65+ Preschools and 55+ K-12 Schools in PAN India.

RELEVANCE:

Birla Open Minds International School well designed school in world which make it selection important to understand the design feature of the area and issue faced. My selection becomes more important in reference to understand the design of the context and aspects of school planning. The ranging interests in the sphere of high-quality education with dedication to excellence.

CONNECTIVITY:

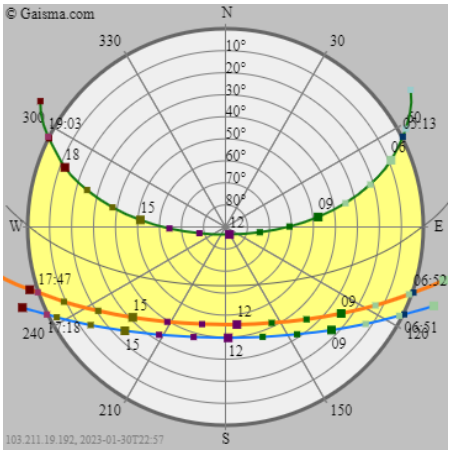
- 7.5 km away from **Awadh Bus Station**
- 10.5 km away from **Indira Nagar Metro Station**
- 10 km away from **Polytechnic**

SUN PATH DIAGRAM

CLIMATE DATA

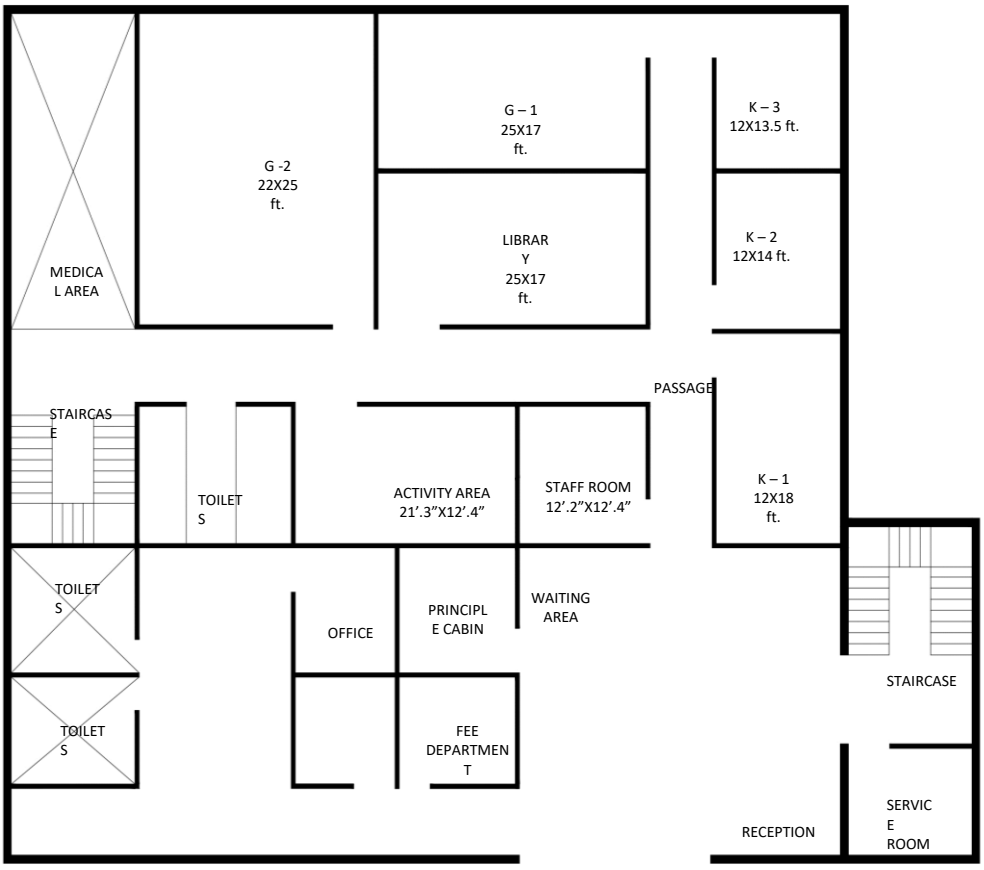
All Year Climate & Weather Averages in Lucknow

- High Temp: 40 °C
- Low Temp: 8 °C
- Mean Temp: 25 °C
- Humidity: 65%



SITE PLAN:

The school's design takes advantage of the topography of the site to create distinct, tiered academic zones and separate exterior play spaces for early childhood, primary, and elementary grade levels. The school's wayfinding goes beyond basic navigation to support a larger vision of special organization that reflects each grade's expanding curriculum and identity. The interior have Thematic and Integrated approach.



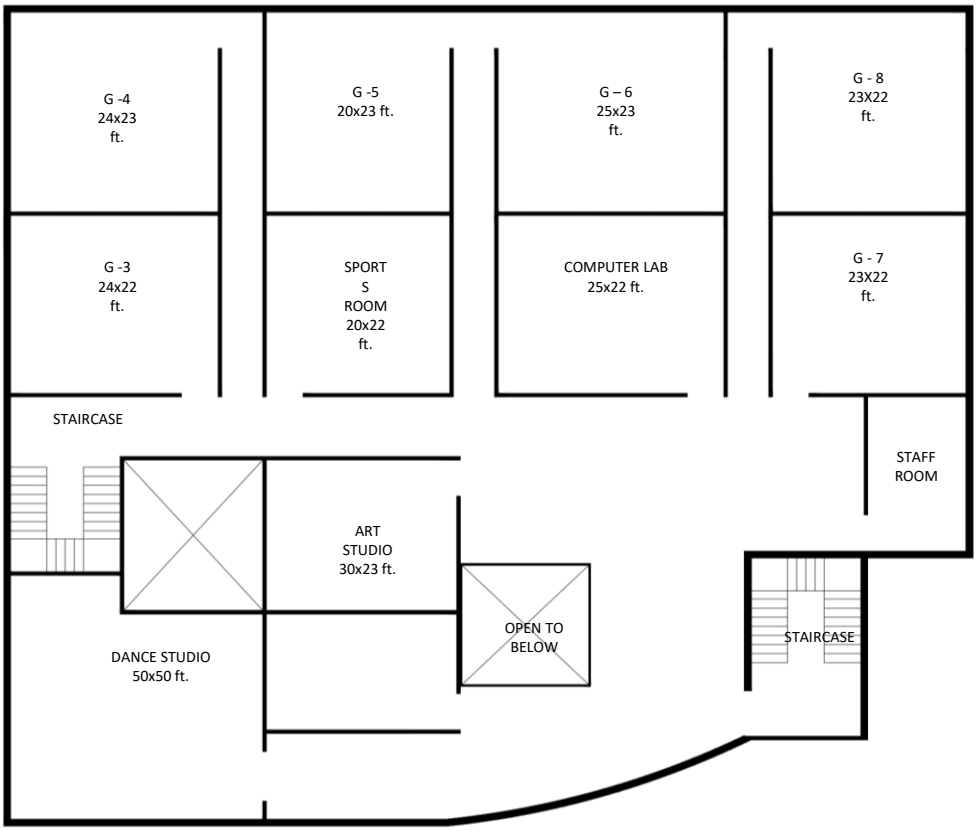
HEADS:

- ENTRANCE
- RECEPTION
- WAITING AREA
- PRINCIPLE CABIN
- FEE DEPARTMENT
- STAFF AREA
- KINDERGARTEN CLASSES
- ACTIVITY AREA
- LIBRARY
- CLASSES
- MEDICAL ROOM
- WASHROOM

FIRST FLOOR PLAN

HEADS:

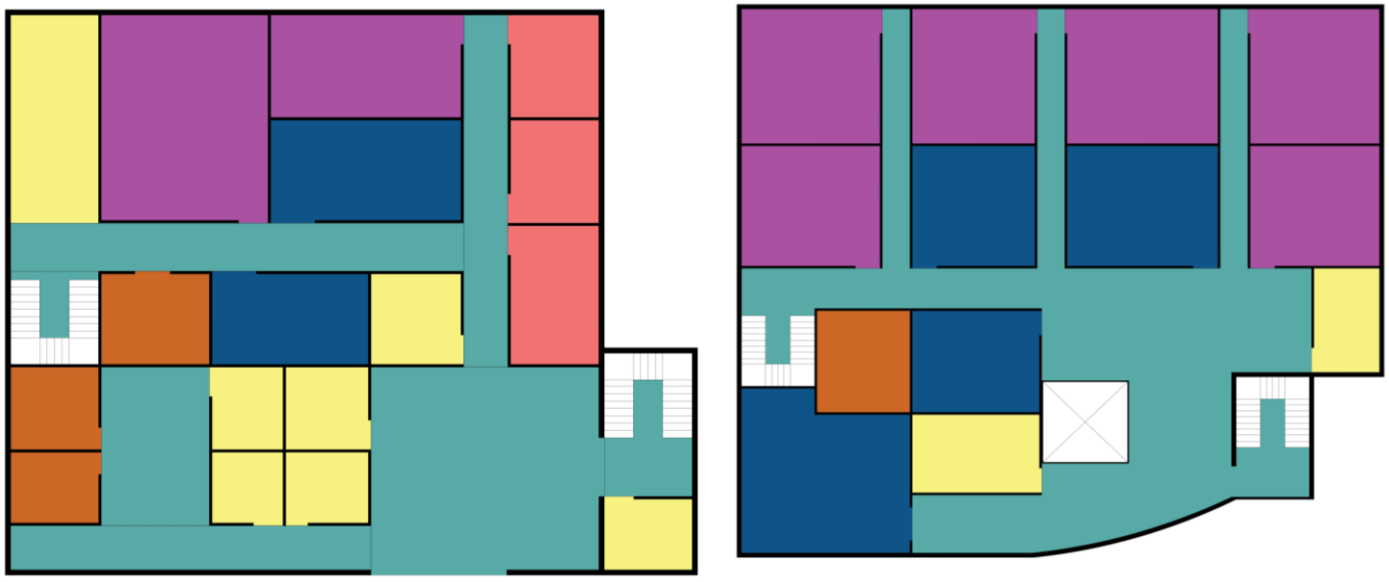
- CLASSES
- CORRIDOR
- SPORTS ROOM
- COMPUTER LAB
- STAFF ROOM
- ART STUDIO
- DANCE STUDIO
- WASHROOM



SECOND FLOOR PLAN

ZONING:

The spaces divide galleries into different specializations, also distinguishing the children's gallery with its own orientation section.



Corridors
Other Amenities
Services
Kindergarten
Classroom
Toilet

INTERIOR APPROACHES

- The design of student classrooms pays more attention to flexibility and diversity, such as furniture that can be freely combined to support the collaboration between teachers and cross-inspiration between subjects.
- To support engagement at every scale, the school features an extensive array of exterior playscapes and interior furniture including stools, ottomans, benches, tables and chairs, cabinets,reading steps– all of which encourage creative expression and student choice.

At the Entrance, there is a Waiting & Reception area

Textured Granite in Flooring

Curved Art Deco Chair

KINDERGARTEN CLASSROOM INTERIOR

1. Storage with height of 2.5 ft.
2. Table with the 2 ft.
   Chair – 1 ft.
3. Round table with diameter 2 ft.
4. Chair with height of 1 ft.
5. Rubber flooring in all Kindergarten classroom
6. Almirah with height of 5 ft.

CORRIDOR

Theme based Activity area

Wooden Fencing for designing purpose

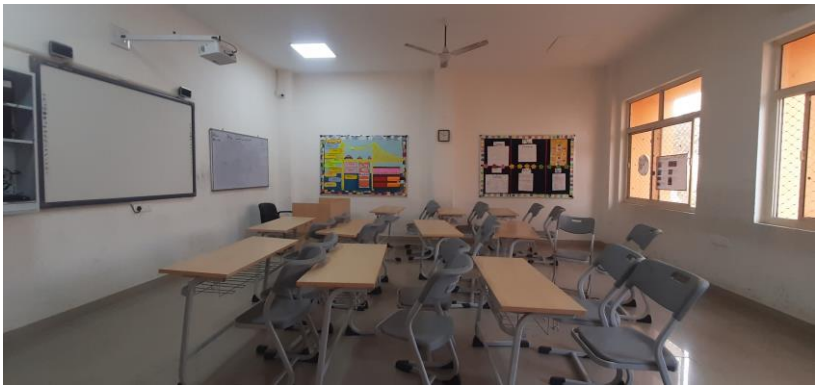
LIBRARY INTERIOR

Table – 2.5 ft
Chair – 1.5 ft

Different kind of Book Shelves

Table – 2 ft
Chair – 1.25 ft

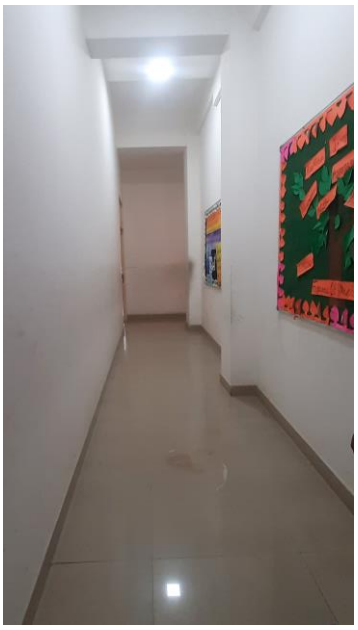
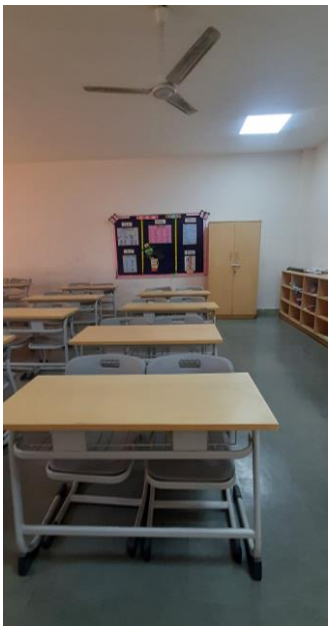
PRIMARY CLASSROOM INTERIOR



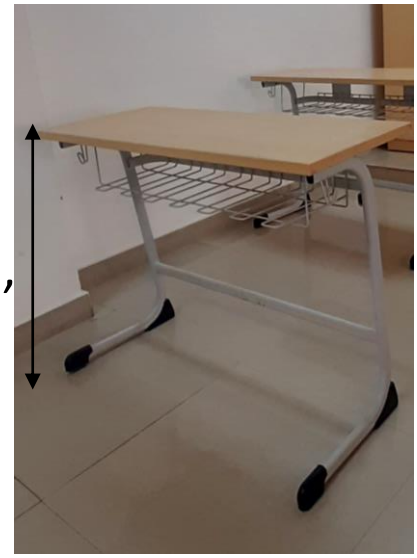
Vitrified Tiles in floor

Bench around Pillar

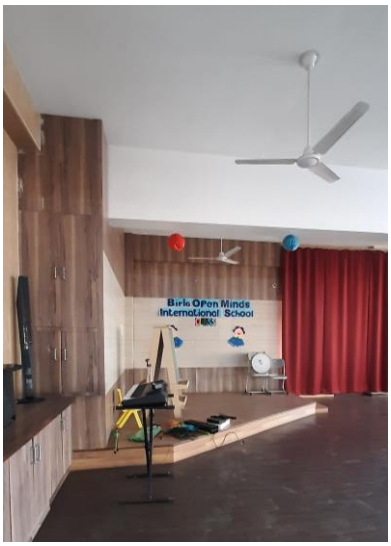


- All classes have one Almirah & Storage cabinet.
- Vitrified Flooring used in all over second floor.
- Uno-M, Uno-M-Step desk is used in all classes.
- All the materials help bring down the maintenance.
- All wall is finishes in Paint.
- Ceiling height is 12’.



DANCE STUDIO INTERIOR

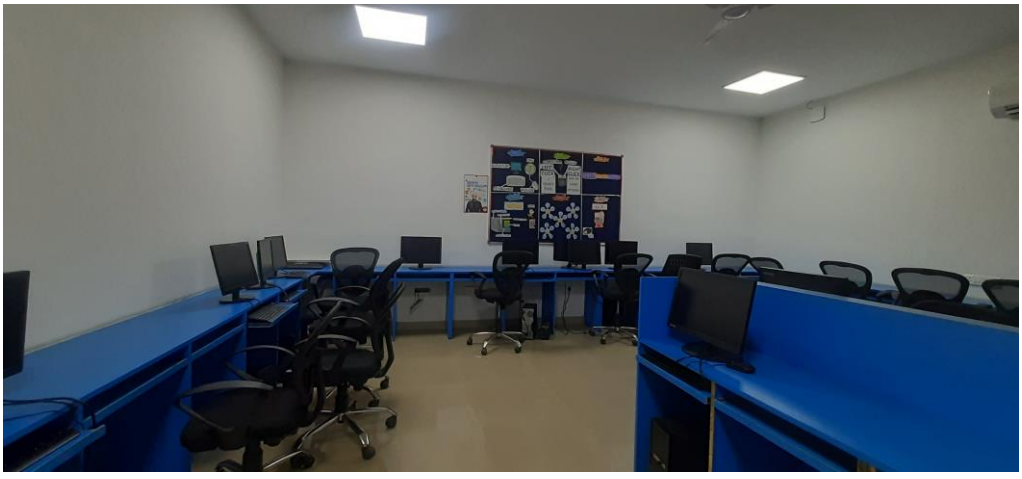


Wooden flooring in Dance Studio

Porcelain tiles in Corridor

All the material used in Dance Studio is wood because of Injury prevention, sound amplification foot support balance.

COMPUTER LAB



- The Interior of Computer Lab is very minimal.
- Whole lab is finished in white Paint , to enhance the interior blue desk is used.
- Height of Computer desk is 1.75 ft.

CORRIDOR VIEW

ART ROOM

Rustic Ottomans handmade.

Cable Spool Table with height of 1.5 ft.

OBSERVATION:

- Birla Open Minds International School have very Minimal Interior with efficiency features.
- All the Classes have different theme of education.
- The School provides a nurturing environment wherein young children feel loved, cared, secured , respected and valued.
- The Birla Open Minds Logo underlines the philosophy of 'Transformation' at all levels. A Geometric Triangular shape melts into free form- that of birds taking flight.

CONCLUSION:

- Birla Open Minds is a futuristic school in pursuit of giving children the advantage of a truly future-ready learning environment.
- Giving students the opportunity to see and experience their school building as a living laboratory encourages greater understanding and stewardship for their planet and community.
- I think what is most important about this building is that it allows teachers to think about how we learn and how students learn.
- Curriculum is just something the state gives to us and you can teach that anywhere, but with this space, we can really get creative, and experiment, and shepherd meaningful experiences for students.

CONCEPT

SUSTAINABILITY

INTRODUCTION

- Sustainable design is an essential aspect of design these days.
- It is the fastest growing sector in the design industry and a growing number of potential clients expect and demand it.
- Increasingly, Interior Designers embrace the opportunity to meet consumer demand and create interior spaces that have a healthier impact on their clients and a lesser impact on the environment whilst improving their own living/working environment.
- Sustainable interior design is not just creating green spaces by using eco-friendly furniture or products. Deeper than that. Sustainable interior design is focusing on minimizing the negative impact on the environment and also considers social, performance, and financial implications while creating green spaces that can promote people's well-being by utilizing renewable or recycled resources.

WHY SUSTAINABILITY?

I am sure we all feel the weather in recent years is not right. Climate change is a serious issue that we are causing. We are in a place where we all have to face reality and stop harming our planet as soon as possible for us and future generations.

- The required aim of sustainable design is to produce places, products and services in a way that reduces use of non-renewable resources, minimizes environmental impact, and relates people with the natural environment.
- Sustainable design is general reaction to the global "environmental crisis", i.e., rapid growth of economic activity and human population, depletion of natural resources, damage to ecosystems and loss of biodiversity.

DIFFERENCE BETWEEN SUSTAINABLE INTERIOR DESIGN AND GREEN INTERIOR DESIGN

- They have similar meanings as both designs approach to minimize the impact on the environment while creating beautiful spaces. Although "sustainable" interior design and "green" interior design are slightly different.

- Green Interior design's main focus is to create environmentally-friendly homes by using eco-friendly products and energy-efficient appliances.

- Sustainable interior design is not simply just choosing eco-friendly products and creating a space. Sustainable interior design is to consciously and carefully create a healthy environment, high-quality and long-lasting designs by using sustainable interiors while respecting the planet.

- Eco interior design has almost the same meaning as green interior design. Eco-friendly home interior design or environmentally-friendly home interior design means simply designs that do not harm the plant.

KEY ELEMENTS

- Cost reduction
- Increased productivity
- Improved health
- Waste minimization
- Better use of materials
- Environmental protection
- Noise avoidance
- Better quality of life

THEME

- Scandinavian design is a design movement characterized by simplicity, minimalism and functionality that emerged in the early 20th century, and subsequently flourished in the 1950s throughout the countries.

- It has this natural blend that feels approachable.

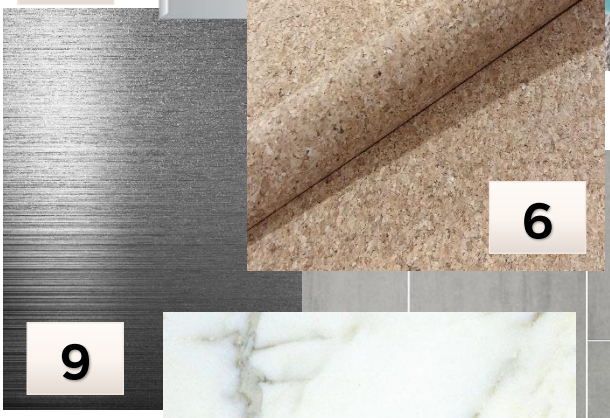
- It is a nice blend between styles, oftentimes people would think about it being a blend of a little bit of midcentury modern and a little bit of modern but then there's this warmth to it.

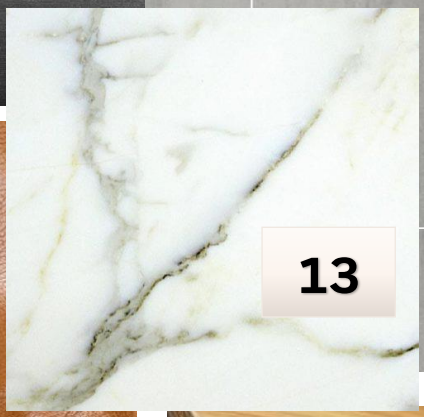
ELEMENTS OF SCANDINAVIAN DESIGN

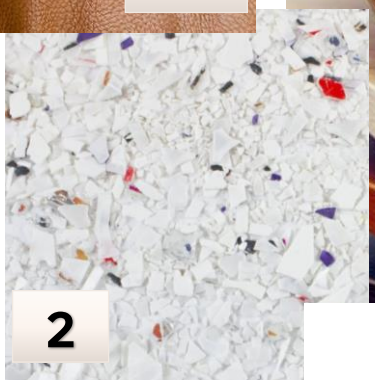
- Functionality
- Clean lines
- Natural materials
- Understated design that follows function
- Light, neutral colors
- Muted, dark hues
- Airy spaces filled with light
- Wood furniture and wood accents
- Multifunctional and flexible designs
- Tactile fabrics
- Hanging plants and lush greenery
- Natural textiles
- Steel, brass, or copper accents
- Artworks as focal points in a minimalist space

MOOD BOARD

MATERIAL BOARD







53

1. Granorte :

- It consists of cork floor tiles.
- Sizes :910 x 300 ,10.5 mm thickness

2. Smile Plastics

- Smile Plastics puts them in their panels. They provide them in 2×1 meters.

3. Sphera energetic

- The Sphera Energetic range brings new dynamics to homogeneous vinyl flooring.
- It offers a playful combination of a coordinated color palette and designs with different intensity and scale, with thickness 2mm.

4. Patch plants

- Patch Plants helps you by giving consultations and explaining on the website how to take care of each plant so that you can make the most of them.

5. Glass

- Glass is an infinitely sustainable interior design material because it is infinitely recyclable.

6. Cork

- Cork is one of the best sustainable interior design materials you can use in your Interior.
- Its natural variations in tone and texture, which create richness and depth.
- Cork is waterproof, fire retardant, and antimicrobial, so it can be used on walls, floors..etc

7. Recycled Plastic

- While recycling is on the rise today, it's clear that society still has a long way to go to achieve greater plastic sustainability.
- Every minute, over 1 million plastic bottles are sold, and the overall demand for single-use plastics remains high.

8. Polypropylene Plastic

- Polypropylene plastic is a sustainable material. It is entirely recyclable.
- Polypropylene is often used to make plastic pallets and other material handling goods depending on their required applications.

9. Metal (Steel, Aluminum)

10. Leather

11. Wood

12. Tile

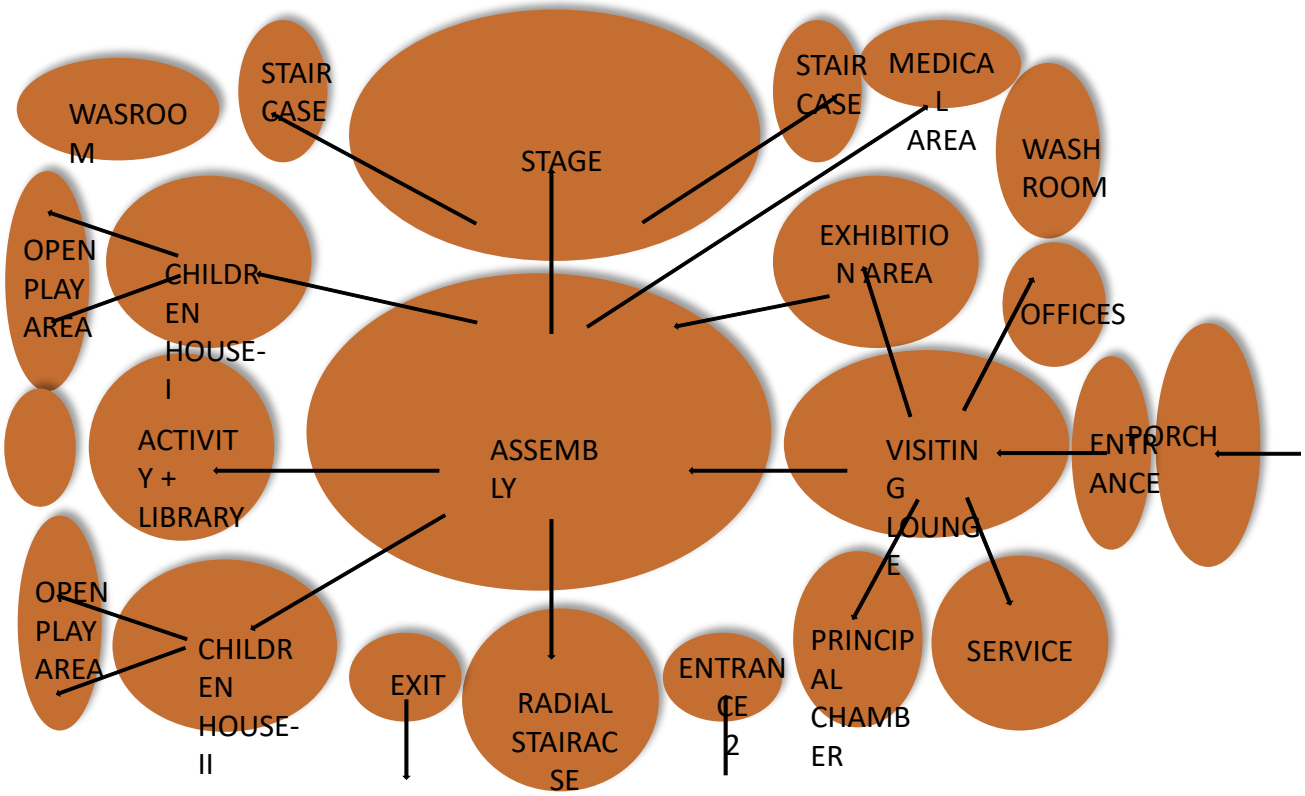
13. Natural Marble

14. Paint

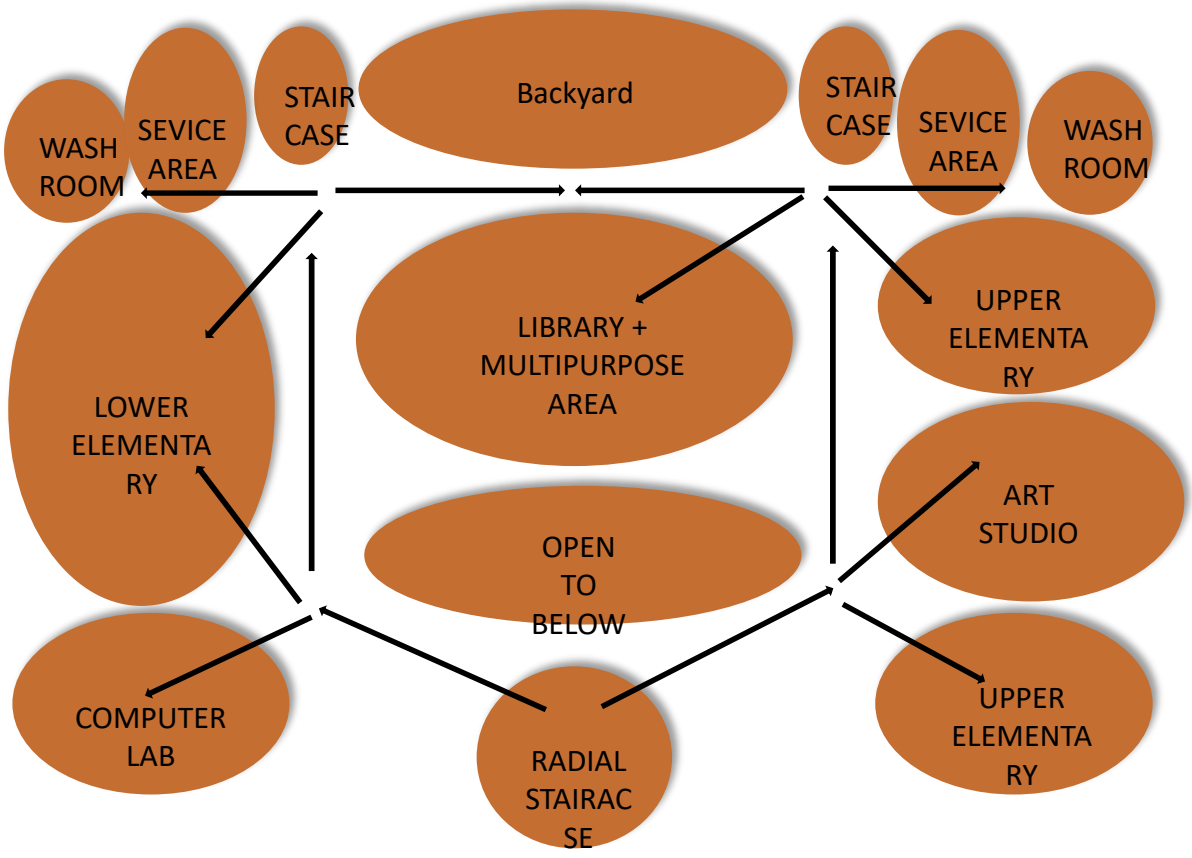
15. Stone

16. MDF

BUBBLE DIAGRAM



BUBBLE DIAGRAM OF GROUND FLOOR



BUBBLE DIAGRAM OF FIRST FLOOR

STANDARD DIMENSIONS

	in	cm
A	40–48	101.6–121.9
B	24 min.	61.0 min.
C	18	45.7
D	22–30	55.9–76.2
E	78 min.	198.1 min.
F	24–27	61.0–68.6
G	36–39	91.4–99.1
H	8–9	20.3–22.9
I	2–4	5.1–10.2
J	4	10.2
K	44–48	111.8–121.9
L	34 min.	86.4 min.
M	44–48	111.8–121.9
N	54	137.2
O	26–30	66.0–76.2
P	24	61.0
Q	30	76.2
R	15–18	38.1–45.7
S	29–30	73.7–76.2
T	10–12	25.4–30.5
U	6–9	15.2–22.9
V	39–42	99.1–106.7

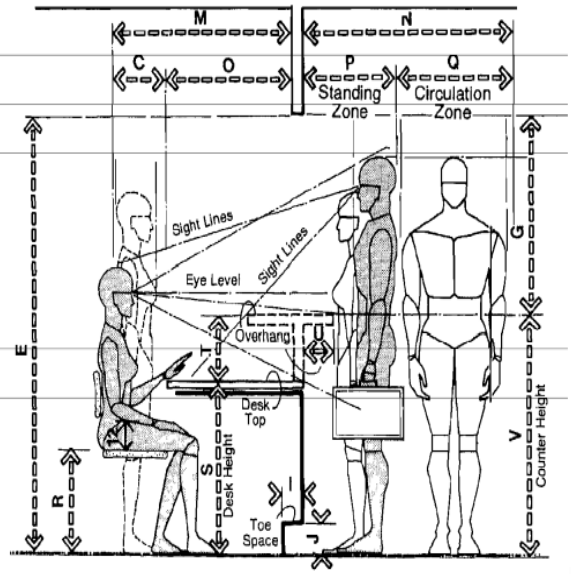


Fig. 2 Receptionist's workstation/desk height.

	in	cm
A	30–39	76.2–99.1
B	66–84	167.6–213.4
C	21–28	53.3–71.1
D	24–28	61.0–71.1
E	23–29	58.4–73.7
F	42 min.	106.7 min.
G	105–130	266.7–330.2
H	30–45	76.2–114.3
I	33–43	83.8–109.2
J	10–14	25.4–35.6
K	6–16	15.2–40.6
L	20–26	50.8–66.0
M	12–15	30.5–38.1
N	117–148	297.2–375.9
O	45–61	114.3–154.9
P	30–45	76.2–114.3
Q	12–18	30.5–45.7
R	29–30	73.7–76.2
S	22–32	55.9–81.3

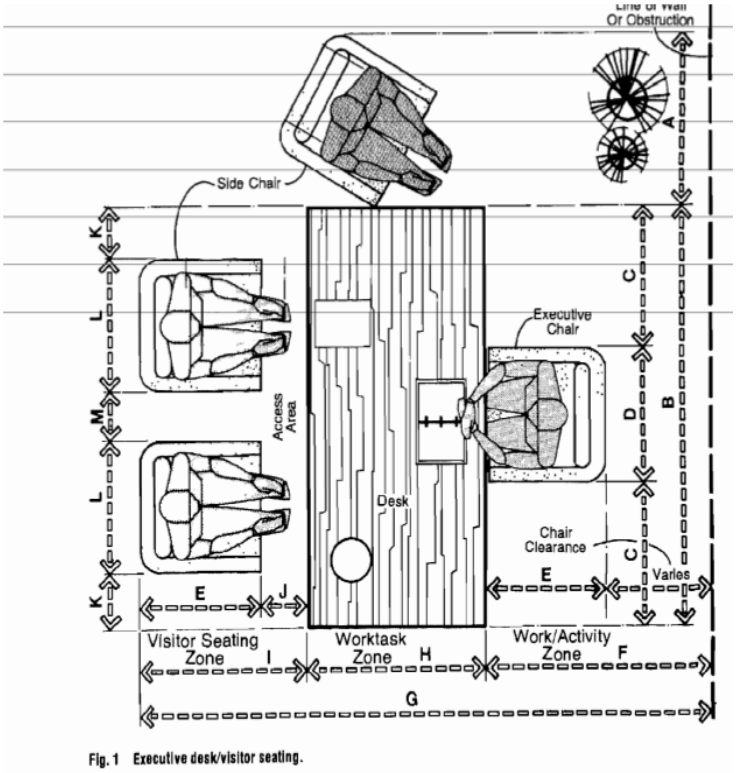


Fig. 1 Executive desk/visitor seating.

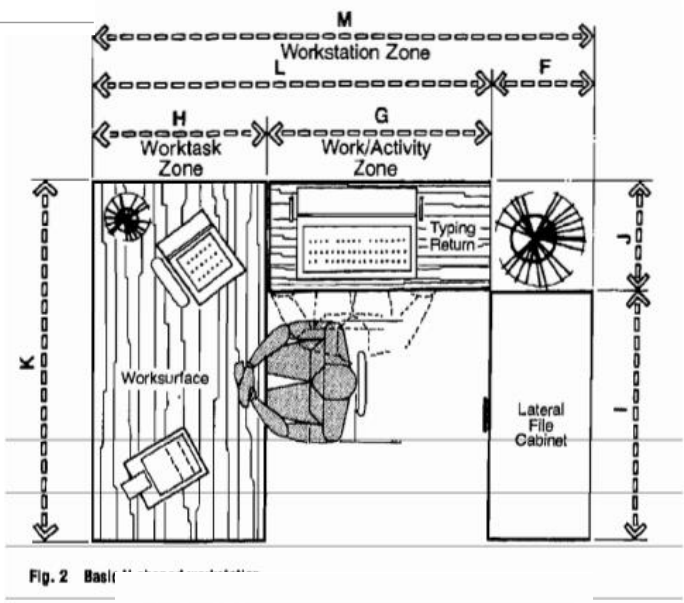
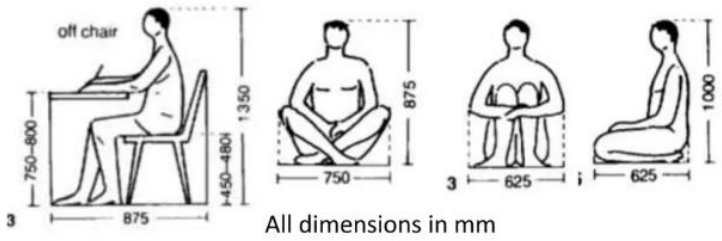


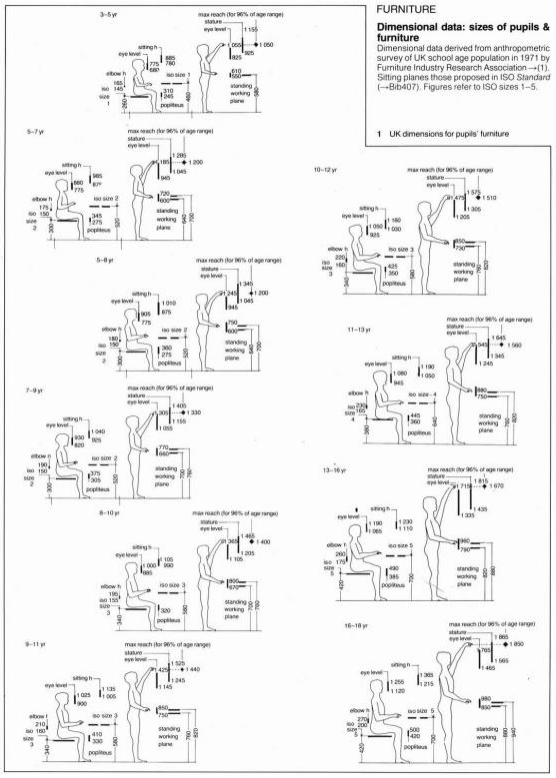
Fig. 2 Basi

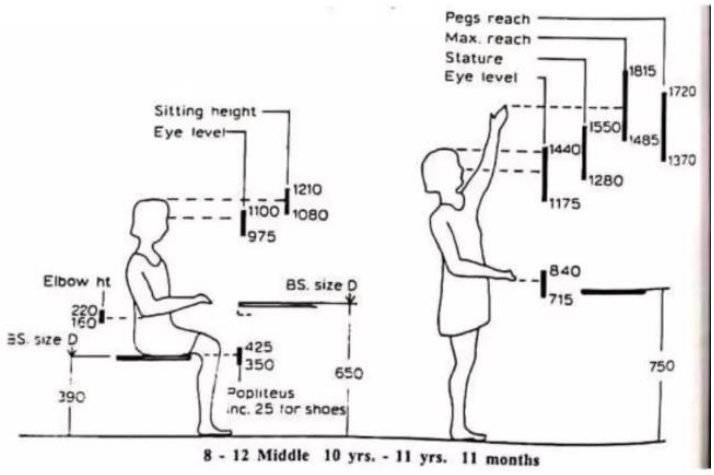
	in	cm
A	26–27	66.0–68.6
B	14–20	35.6–50.8
C	7.5 min.	19.1 min
D	29–30	73.7–76.2
E	7 min.	17.8 min.
F	18–24	45.7–61.0
G	46–58	116.8–147.3
H	30–36	76.2–91.4
I	42–50	106.7–127.0
J	18–22	45.7–55.9
K	60–72	152.4–182.9
L	76–94	193.0–238.8
M	94–118	238.8–299.7

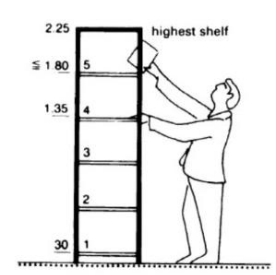
RECEPTION AND OFFICE

FURNITURE STANDARDS



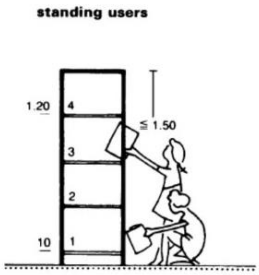




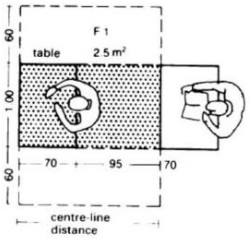


⑩ **Height of five-shelf unit**

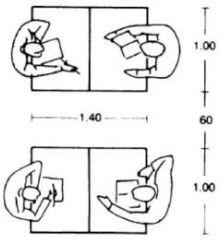
⑪ **Bookshelf for schoolchildren**



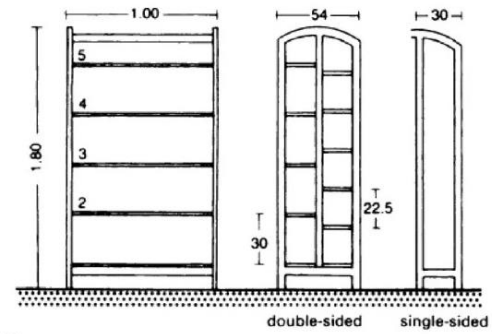
⑫ **Height of four-shelf unit for small children**



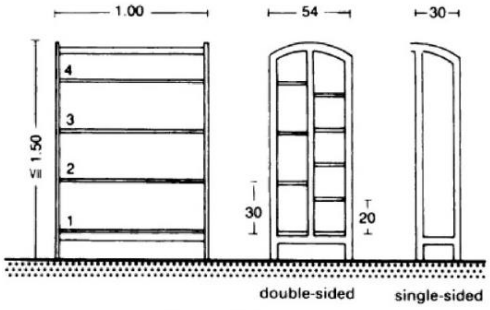
① **Floor area for an individual workstation**



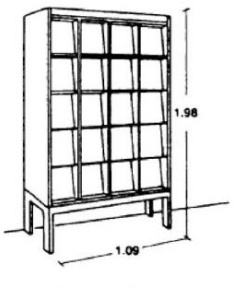
② **Minimum distances between tables**



(For Teenagers and Adults)



(for children)



⑬ **Periodical rack**

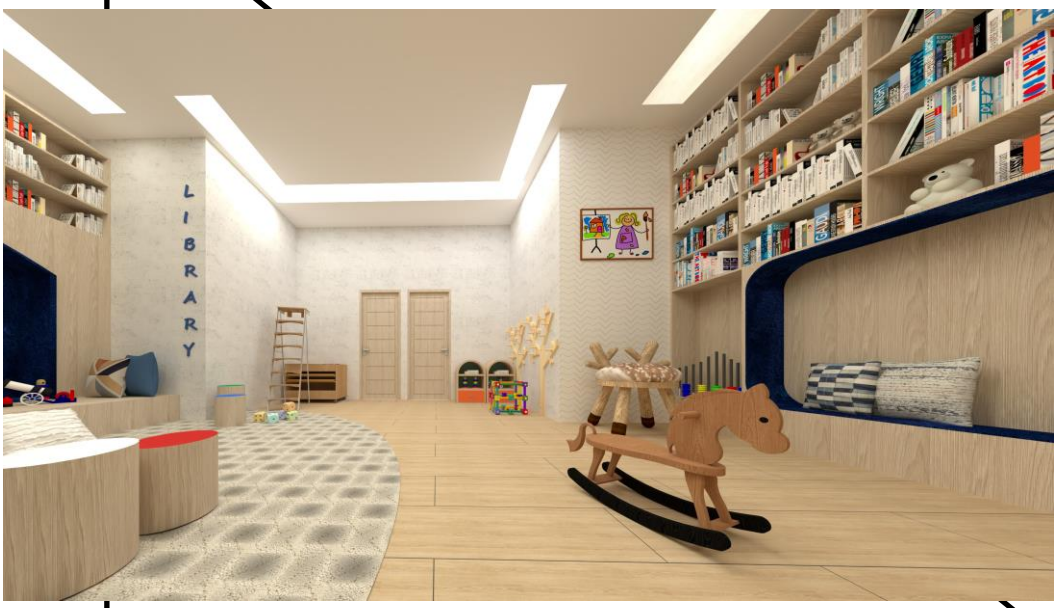
(*dimensions in cm)

DRAWINGS


ELECTIVE

3D VIEWS

3D VIEW OF LIBRARY + ACTIVITY AREA



3D VIEW OF LIBRARY + ACTIVITY AREA

3D VIEW OF CHILDREN HOUSE II

3D VIEW OF CHILDREN HOUSE I

3D VIEW OF RECEPTION AREA & LOUNGE AREA