THESIS REPORT ON

“SCHOOL FOR AUTISM , LUCKNOW”

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

BACHELOR OF ARCHITECTURE

BY

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THESIS GUIDE

(PROF. MOHIT KR. AGARWAL)

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CERTIFICATE

I hereby recommend that the thesis entitled **"SCHOOL FOR AUTISM, LUCKNOW"** 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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Not Accepted

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1- INTRODUCTION

What do we really know about how children with autism obtain and process information? What do we, the "neurotypicals", know about how autistic individuals see and interpret their world? Autism is a behaviourally defined disorder characterized by impaired social interaction, delayed and disordered language and isolated areas of interest. In 1986 Temple Grandin published her first book, Emergence, in which she described growing up with autism, providing for the first time an insider's view of a different kind of life. Since then, a growing number of similar personal accounts have appeared, each adding more insight into their inner world. There has been significant efforts in understanding their behaviour and the remedies. It also had an impact on the environment and its design which has greatly influenced the field of architecture over the last few decades. Hence there is a necessity for a behavioural centered design.

Autism is one such disorder which is by and far the most challenging developmental disorder which has been overlooked by the architects as a condition that influences building design. (Mostafa.M 2008) A predominant effort has been made in exploring the scope of environmental design or the autistic children with the dawn of inclusive education in the world. The present research study accentuates the need for a fresh approach in designing educational and rehabilitative spaces for a supportive environmental intervention of autistic children[1].

[1] There is much debate over how to respectfully and sensitively refer to individuals who have an ASD diagnosis. Recently, Gernsbacher et al [59] took an empirical approach to this question and compared Google search results for the terms "autistics" and "person/s with autism." They found that 99% of the hits for the term "autistics" were from organizations led by autistic persons, whereas the first 100 Google hits for "person/s with autism" led to organizations run by non-autistic individuals. In light of these findings, I respectfully use the term "autistic individual/s / children" throughout this paper. However, I do so knowing that the most respectful designation may change with time. The way we refer to individuals diagnosed with autism may change as we learn more about the condition and as our sensitivities move with the spirit of the times.

2- SYNOPSIS

2.1- AUTISM

"Autism is a severe disorder of communication, socialisation and flexibility in thinking and behaviour, which involves a different way of processing information and of seeing the world." (Jordan, R. 1999)

In 1943, Kanner coined the term 'early infantile autism' to describe children with unusual behaviour patterns that had been present from early childhood. His original paper gave detailed descriptions highlighting extreme autism, obsessiveness, and good relationships with objects, a desire for sameness, stereotypy and echolalia. Typically, Autism is characterised by a 'triad of impairments' identified by Wing and Gould in 1979. The triad represents three broad and interacting aspects of Autism, all of which will be inconsistent with the individual chronological age.

The triad of impairments

1 **Social**

Impaired, deviant and delayed or atypical social development, especially interpersonal development. The variation may be from 'autistic aloofness' to 'active but odd' characteristics.

2 **Language and communication**

Impaired and deviant language and communication, verbal and non-verbal. Deviant semantic and pragmatic aspects of language.

3 **Thought and behaviour**

Rigidity of thought and behaviour and poor social imagination. Ritualistic behaviour, reliance on routines, extreme delay or absence of 'pretend play'.

Children under Autism can be identified based on the following 4 categories (National Autism Standards). Pupils on the autism spectrum will have different levels of support needs in relation to:

- **Understanding the social interactive style and emotional expression**

Autistic children find social interaction very effortful. They cannot easily understand commonly used implicit social messages and may find it hard to

understand or relate to how social rules change due to context, or what is considered socially 'appropriate'. The actions of autistic children are often misinterpreted as intentionally insensitive. For them to interact with people, they need help.

- **Understanding and using communication and language** - Both verbal and non-verbal (ex: gesture; facial expression; tone of voice)
- **Differences in how information is processed** can lead to a strict adherence to routines and rules and/or difficulties in planning and personal memory. Pupils on the autism spectrum have difficulties in predicting what will happen when a familiar timetable or activity is changed. Conversely, such styles of processing can lead to strengths and abilities in a number of areas (often related to factual memory or areas of interest and motivation).
- **Differences in the way sensory information is processed,** often leading to over sensitivities (often to external stimuli such as lighting, smells, or sounds), and under-sensitivities (often not noticing internal feelings such as pain, body awareness and hunger, until they become overwhelming). It should be noted that sensory sensitivities can lead to extreme levels of stress and anxiety in unfamiliar or over-stimulating environments.

2.2- AIM

To design a center for autistic children so as to create an enabling environment comprising of learning spaces, rehabilitation center and accommodation.

2.3- OBJECTIVES

- To identify their deficits and understand the role played by architectural elements in their intervention.
- To understand environmental implications for teaching strategies used for children with autism in educational spaces.
- To address the enabling aspects of environment that might improve functional performance of children with autism in educational spaces and rehabilitation spaces. For example- Visual Character, Spatial sequencing and its quality, Escape areas, Clutter free spaces, Colour, Texture, Materials, Acoustics etc.,.
- To address their needs and design accommodation based on their behavioural aspects, cultural and social aspects.

- To critically review the relevant theories and implement the learning in the design of the project.
- To understand the impact of existing structures on the intervention of autistic children.

2.4- SCOPE AND LIMITATIONS

Studying the mind-set of autistic in itself is a very vast subject hence this topic limits itself to the study and research of their behavioural aspects in educational environments and environments which help them in rehabilitation. It attempts to define quiet spaces, intervention areas, open spaces, transition spaces, circulation spaces, multi-sensory areas and inclusive education spaces for the autistic. It also attempts to understand their perception of spaces through 5 senses.

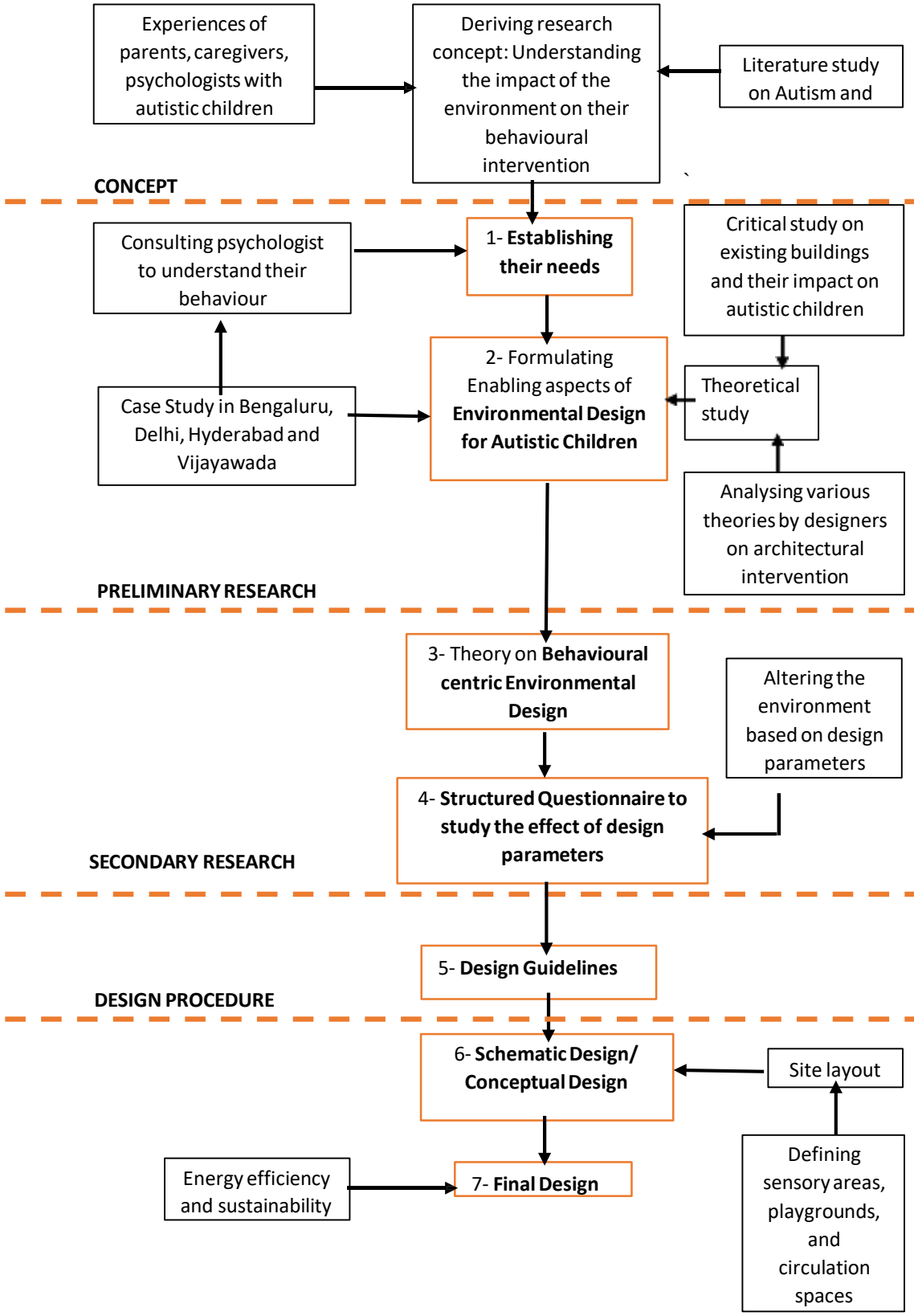
2.5- NEED FOR THE PROJECT

Centres for Disease Control & Prevention (CDC) estimates that approximately 1 in every 88 children are diagnosed with some level of autism, (one in 54 boys) a sharp jump from the previous numbers released in late 2009, and frighteningly distant rate from one in 10,000 cases seen in the 1980s.

Experts estimate that every 2-6 children out of every 1000 have Autism. The prevalence rate of autism in India is 1 in 250 (figure may vary as many cases are not diagnosed) and currently 10 million people are suffering in India. The government only recognized the disorder in 2001, till 1980s, there were reports that Autism didn't exist in India (Dr. Vinod Kumar Goyal, TOI).

These alarming rates of increase call for attention by all the fields and clearly architecture has been ignoring the effect of built environment in their development.

3- RESEARCH METHODOLOGY



4- RELEVANT THEORIES

Considering Indian context Dr Rachna Khare and Dr Abir Mullick have put forth their theories which were later tested in the environments of autistic children. According to them the following are some of the design parameters can be followed in order to integrate the space in their intervention.

1. **Provide Physical Structure**.

   Providing a physical structure not only enhances their predictability of the environment and improves their clarity about the space but also helps them in reducing their anxiety and distracted behaviour. It clearly compartmentalizes one area from the other there by reducing visual distraction and child's tendency to wander from place to place /repetitive behaviour.

2. **Maximize Visual Structure and Provide Visual Instructions**

   As autistic children are socially and verbally impaired, visual cues and visual structure helps them in understanding the space better than depending on verbal information. This includes using colour codes, numbers, symbols, picture labelling etc. Many organizations use visual cues to communicate with them. They believe that it improves their confidence and promotes their independence.

   It is not transient like verbal communication which is the major reason for their short term memory. Providing visual instructions helps them to process verbal information, understanding written messages and re-establishes attention on the task. (Dr Thomas Kishore)

3. **Offer Opportunities for Community Participation**

   The main purpose of providing an environment is to integrate them with the 'real world' and help them understand social behaviour. By incorporating everyday activities such as crossing road, shopping, using public transport and interaction with the nearby communities helps them to integrate with the society and also helps to train themselves and job opportunities in the future. (Grandin 2008; Hodgdon 2005; Siegel 1998)

4. **Present Opportunities for Parent Participation**

By allowing parent to participate in educating autistic children helps them to connect home and school environment. This also helps parents to understand various ways to interact. This can be done by providing a one way mirror between parent's room and therapy rooms / classrooms. (R.Khare, A. Mullick 2009)

5. **Maximize Future Independence**

   Education in other words is to help students acquire knowledge and sharpen their skills to have an independent and productive life. Autistic children should also be educated in the same way. Many organization have spaces like kitchen, vocational activity area, commodity store, bakers and confectionery, computer room, dressing area as self-help activities to help autistic children in being independent in the future.

6. **Offer Generous Space Standards**

   A generous space standard may help them deal with social stimulus comfortably (Humphrey 2005). Children are known to wander from place to place with their hands away from their bodies. Therefore some architects use double than the usual standards while designing spaces like corridors and transition spaces .Crowded spaces makes them uncomfortable which effects their behaviour negatively (Mostafa. M 2008).

7. **Provide Withdrawal Spaces**

   As much as integrating them with the common environment is encouraged, an escape area is a very vital space to avoid unnecessary stress and anxiety. Withdrawal area is used as a place for particular students to get away from distractions and stimulations and regain some self-control. A quiet corner in the classroom or an alcove in any large area can act as an escape area (R Khare, A.Mullick 2009).

8. **Maximize Safety**

   Autistic children are unaware of safety and precautions due to their mental deficits. They are attracted to different objects and sometimes are obsessed with them, forgetting their own safety. A constant supervision is difficult and hence the environment itself should be carefully designed avoiding sharp edges, slippery surfaces, electrical outlets, breakable objects and enhancing railing heights, visual cues for harmful objects, secured boundary etc,.

9. **Maximize Comprehension**

By designing spaces that have clarity and simplicity, it would require less effort in understanding the environment. A clear layout, zoning, proper sequencing of spaces, simple forms and clutter free space help autistic children in understanding the space clearly.

10. **Minimize Sensory Distractions**

    Visually segregating spaces, covering windows, one to one work areas are encouraged by designers while designing learning environment. Colour plays an important role in their sensory distraction. Using subtle colours as background and contrasting colour as main activity will draw their attention.

11. **Provide Sensory Integration**

    Sensory dysfunction is the "inability to modulate, discriminate, coordinate or organize sensation adaptively" (R. Khare and A.Mullick). No matter where they fall on the autism spectrum, sensory dysfunction makes children with autism either oversensitive or under sensitive to the sensory input; this effects their perception and understanding to the surrounding environment. The children those are hyposensitive they search for such opportunities in the environment, and those who are hypersensitive try to run away or get extremely disturbed with the presence of these visual, tactile, auditory and other sensory stimulations.

12. **Provide an acoustical environment**

    Autistic children are prone to be distracted with surrounding noise. By using acoustical materials as flooring, roofing and wall materials one can achieve a noise free environment.

5- LITERATURE STUDY AND REVIEW

5.1- NETLEY SCHOOL FOR AUTISTIC, LONDON

View of the internal courtyard

Street frontage of building entrance to the center

Netley ASD Unit is a specialist facility for autism built within the existing grounds of Netley Primary School. The form of the single storey 4300 sq.ft building, determined by site constraints, is a single storey 'L plan' with solid boundaries as shown in the figure, enclosing a courtyard. Entry to the community centre is electronically controlled in one wing through a controlled door on Netley Street, and to the ASD in the other through a controlled gate into the courtyard, with a second controlled entrance at the junction of the building's two wings.

- **Access to the building**: Controlled access makes the building secure to contain children running, as well as excluding unwelcome intruders.
- **Spaces in the center:** The unit accommodates two teaching spaces and a multi- purpose therapy room in addition to a staff office, toilets and storage areas, in a single storey design. The building also accommodates an adult education unit. This includes a crèche, which is used by Camden LEA as a community facility.
- **Classroom area**: The classrooms (two) are designed as 3D spaces with different areas defined in plan and section to create diversity within a

View of one classroom showing full length windows and roof lighting.

single space. Both classrooms incorporate a 'one-to-one' or withdrawal space and a separate wet-room area.

- **Lighting and ventilation:** Both classrooms have extensive, floor to ceiling windows providing good daylight and views to the courtyard. Roof lights to the rear of each classroom provide additional lighting during the day and ventilation.

  Providing many openings on walls and on roof have both positive and negative impact. As discussed, positive factor being not depending on artificial lighting and ventilation and negative being, this can distract the children as the numerous openings invites chaos and confusion in class area. Usage of blinds or opaque paper are some solutions followed by the staff to avoid distraction.

- **Visual comfort:** High ceilings give an airy feeling to all spaces, including corridors in both units, and artificial lighting has been designed to come from the same direction as the daylight. Simple and clean surfaces without any intricate detailing to reduce distraction. Visual cues are also provided for them to understand space and objects.

- **Colours and texture:** The circulatory areas and transition spaces used subtle Lilac and classrooms are painted white. All the walls are neatly plastered and painted. The classrooms are muted, with neutral colours to both walls and floors. The exception to this is the entrance hall, where the architects have employed colour and used a curved, green wall to create a more welcoming but calm atmosphere.

- **Construction technology**: No sustainability measures were incorporated, but high levels of insulation, natural ventilation natural day lighting (use of sun pipes) and condensing boiler contribute to low energy consumption. Externally all materials were selected for low maintenance, and timber cladding is protected by large roof overhangs, other finishes being brick, aluminium and slate roofing. Canted and curved walls were incorporated in the design as safety measure for the children.

5.2 - WHITTON GATEWAY ASD UNIT, LONDON

Credit: GA Architects

Whitton Gateway ASD Unit is a specialist facility for 15 children on the autism spectrum in London. The unit is situated within the grounds of the existing campus of a school and also doubles up as a school community facility. This is a standalone building with three classrooms, sensory room, communal space and supported facilities.

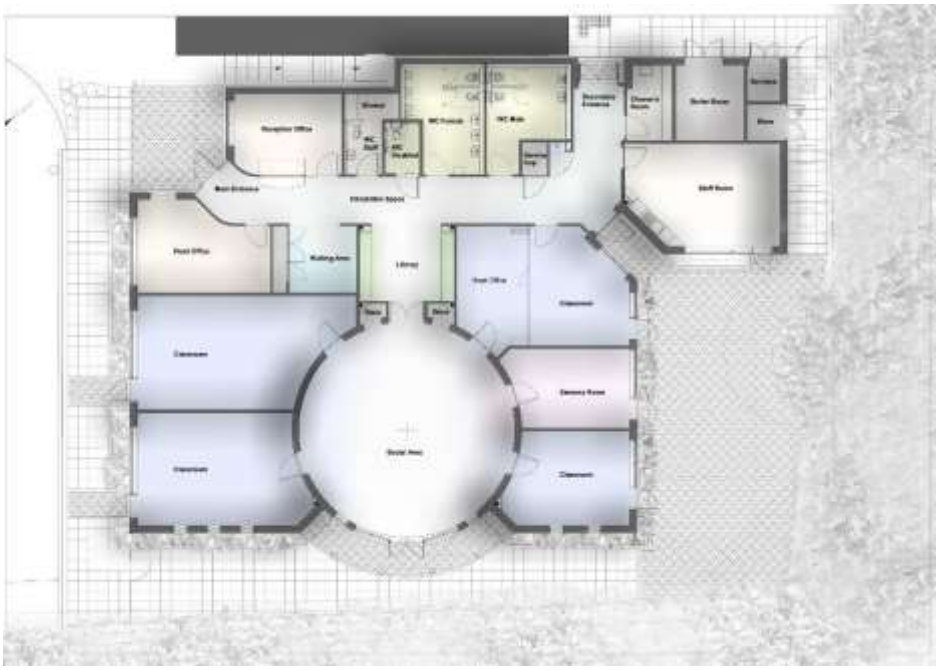
- **Entry to the building**: The ASD unit is in a corner of the school grounds away from the entrance. Hence a separate access was created which allows the children to be dropped off discretely at the door, rather than being taken through the busy playground in the morning and evening.
- **Orientation of the building**: The building in a sense turns its back on the existing school and is intended to be inward looking, private and discrete, with a desire by the architects to create some secluded green space for the children of the unit.
- **Transition space**: Circulation space would not just be a corridor but would be the main social space and 'heart' of the building. Hence the entry and circulation space are designed giving a circular form. All but one of the classrooms open directly into this circular assembly, which also is connected to the library and external green space. The space is well lit by picture and clerestorey windows and is designed to be calming and non-institutional.

External side of the classroom

classrooms are considerably larger than would be the case for mainstream children, with a classroom average of 4–5 m2 per child for up to eight children, rather than 2–3 m2 for classrooms of 25–34 children. Classrooms are also designed to be clutter-free with generous integral storage.

Each are well lit by a 'picture' window wall, which looks into and provides access to the private green space. The classrooms do not incorporate a one to one space within themselves.

- **Lighting and ventilation:** All picture windows to classrooms and the main court space have internal blinds to allow teaching staff to diffuse sunlight as required. These may however be susceptible to interference by the children. Artificial lighting has dimming control, which can be operated by the staff to adjust lighting levels as required. The main circular court space is naturally ventilated by a mono-draft, 'wind-catcher' system in the roof, rather than by any mechanical ventilation, which can be noisy and distracting.
- **Visual comfort:** Classrooms have extensive use of pinboard space for visual cues. All but one of the classrooms has good visual links to the private, external play space around two sides of the building. The internal court space also operates as a spill out zone for children who need to take time out from classroom activity.
- **Colours and texture:** The building has a muted colour scheme which supports the spatial hierarchy utilising both green and blue colours which research shows to be calming. All paints and adhesives are non-toxic and water-based.
- **Construction Technology**: The building's materials and surfaces are robust. Walls are block-work and plaster, with an extremely hard-wearing cord carpet on the floor.
- **Safety and Precaution**: All but one of the classrooms has good visual links to the private, external play space around two sides of the building. The external space has an extensive CCTV system utilised for security and monitoring. Also the site is next to a busy road and so has a 2 metre high reflective acoustic fence around the two exposed sides of the building.



Ground floor plan as built

5.3- NEW STRUAN – A CENTER FOR AUTISM, ALLOA, SCOTLAND

External façade of the building

Soft landscaped play area

New Struan is an independent school run by the Scottish Society for Autism (SSA). The building also functions nationally as an Autism Centre encompassing other functions including an autism advisory service, a centre for education and training in autism, an education outreach service and a research, diagnosis and assessment centre.

- **Plan of the building:** The plan of the building is an upside down 'T' shape, with the horizontal section of the 'T' running east to west which includes spaces like reception, cafe and training rooms. Diagnosis and assessment are

then contained within the spine of the 'T', beyond a set of secure doors. The spine runs north to south and contains a single storey atrium space of circulation with classrooms either side looking east and west into external play areas which are secure. The atrium is the 'social heart' of the school and is a powerful orientation device.

Atrium circulation – Heart of the building

- **Classroom space:** The classrooms are integrated with this atrium space with small niche or anterooms which act as transition area. The classrooms are smaller than the usual and can only accommodate 6 children. Unlike the other 2 schools the individual open space provided in the classroom has glazed surface so as to make them feel visually connected. Classrooms also have individual work station space, pin board area, circular group areas etc.
- **Lighting and ventilation**: The classrooms have clerestorey windows with louvers which diffuses direct sunlight and throws it onto the ceiling. Roof windows provide a good lighting and cross ventilation in the classrooms and in the atrium space. All artificial lighting has high frequency ballast and dimming control.
- **Colours and Texture:** The classroom is designed to be muted in colour, allowing teachers to add stimuli as required i.e, using muted colours as background and contrast colours as foreground detailed activity. Finishes such as carpets and wall colours are clearly coded to support the spatial hierarchy. The architects have chosen muted 'earth' colours. The atrium walls are neutral, allowing the children's paintings to personalise the space.
- **Acoustics**: All the classrooms are sound insulated to a very high standard (150 mm dense concrete masonry wall, with 19 mm thick dense plaster either side).
- **Play area:** The building is surrounded by soft landscaped play area for the children. It is visually connected to the classrooms of the unit.

6- COMPARITIVE STUDY OF THE SCHOOLS

Table 1

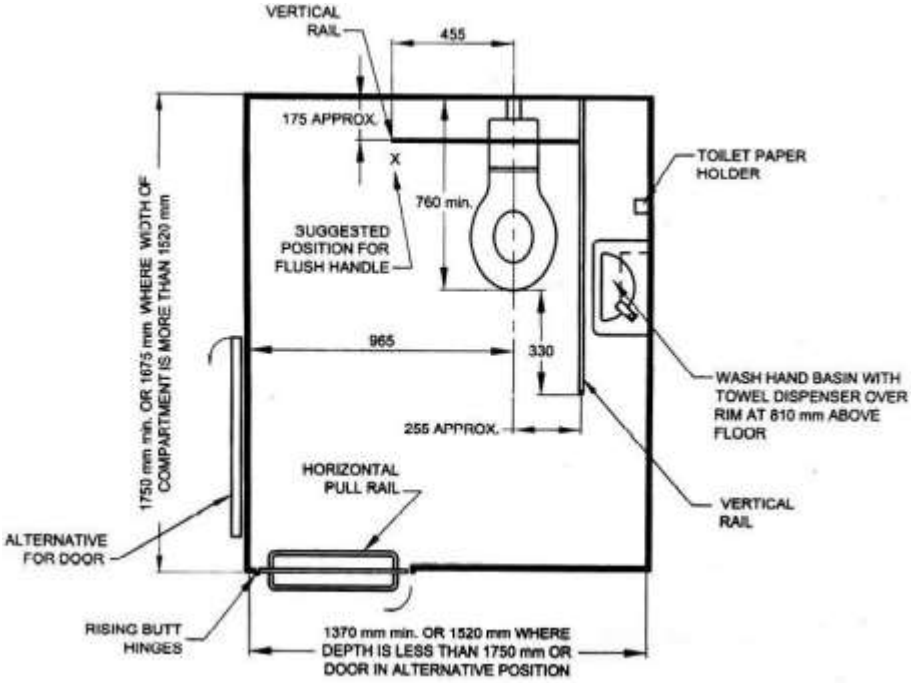
Aspect	Netley school for Autistic	Whitton gateway unit for ASD	New Struan- A center for autism
Location	Heart of the city, Surrounded by tall	A part of main school; Ample open space in and around the school.	Located in the outskirts of the city; Ample open space around the school.
Orientation	L- Shaped building oriented towards N-S direction,	Secluded from the main school, this unit turns its back to the main school building.	T- Shaped building oriented in N-S direction.
Accessibility	Electronically controlled entries from both streets.	Separate entry from the other side of the site to drop off the children at door step.	Only front entry into the atrium, accessible by parents to drop off children at door step.
Spaces in the unit	Two teaching spaces, a multi-purpose therapy room, staff office, toilets and storage areas.	4 classrooms, social area, a library, storage space, staff area, circulation space, reception and toilets.	Reception, cafe and training rooms. Diagnosis and assessment rooms, external play areas, class rooms and toilets.
CLASSROOM SPACE			
Area	Not mentioned	2-3 sq.m per child and upto 8 children in one class	Not mentioned
Lighting	Roof lighting, Floor to ceiling windows, Natural daylighting using Sun pipes.	Floor to ceiling windows, clerestorey windows, Artificial lighting with dimming control.	Clerestorey windows with louvers, roof lighting, artificial lighting wth dimmers
Ventilation	Good ventilation through windows on one side	Cross ventilation in 2 classrooms	Sill- roof windows for proper ventilation.
Visual comfort	High ceilings, simple and clean	Numerous pin board areas, visual	Numerous pin board areas,

	surfaces, proper visual cues.	connectivity with private and external courtyard.	visual connectivity with external play area.
Transition Space	L – Shaped external courtyard connecting all the areas in the school.	Circular social space with wind catcher roofing system; connects all classrooms	T-Shaped atrium connecting all the area in the school with proper roof lighting.
Colours and Texture	Circulation spaces – Mild Lilac Classrooms - White	Muted colour scheme with green and blue coloured walls.	Muted "earth" colours.
Construction Technology	No sustainable methods, high insulation, natural day lighting techniques. Timber cladding, brick, aluminium and slate roofing being other materials.	Cement block plastered walls, hard cord carpets as flooring.	150mm thick concrete wall with 19mm internal and external plaster.

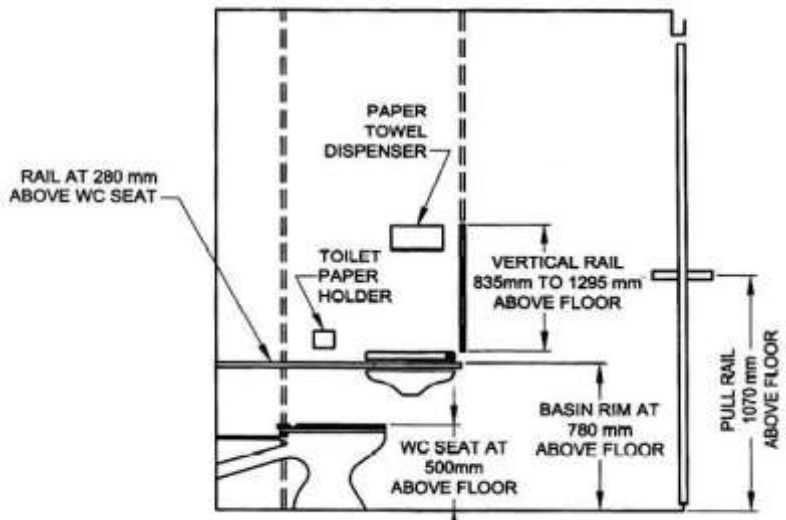
7- STANDARDS FOR SPECIAL CHILDREN (NBC 2009)

Table 2

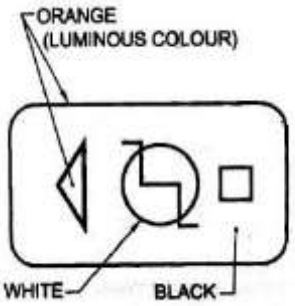
ASPECT	MIN REQUIREMENT	MAX REQUIREMENT
Stairs - Tread	**300mm**	**-**
Stairs – Riser	**-**	**150mm**
Ramp (Slope)	**Slope 1:12 (For short distances)**	**Slope 1:20**
Ramp (width)	**1800mm**	**-**
Door (width)	**900mm + 380 mm (for the wheel chair)**	**-**
Door handle position	**-**	**800mm from FFL**
Wheelchair Manoeuvring space	**1450mm x 1500mm**	**1550mm x 1400mm**
Working table	**-**	**800mm wide x 600mm deep x 750mm high**



TYPICAL WASHROOM PLAN



TYPICAL WASHROOM SECTION



SIGNAGE USED AT THE ENTRANCE

8- MY PERSPECTIVE –CONNECTING SENSORY SENSITIVITIES WITH THE SURROUNDING SPACES

After a critical analysis of the literature study and conversation with the psychologist, autistic children can be categorised into 2 types.

Hypo sensitive (under sensitive)

Hyper sensitive (over sensitive)

The following are the precautions that should be taken while designing spaces for the children.

8.1- SIGHT: Our sight helps us to define objects, people, colours, contrast and spatial boundaries. Children with an ASD may experience the following differences.

Hypo: Objects appear quite dark to them and hence it is advised to use as many mild colours as possible so that their sight sensitivity can be improved.

Hyper: Easier and more pleasurable to focus on one detail rather than the whole object. It is henceforth advised to give simple details on the walls, windows, doors etc.

The following are some of the architectural elements which are to be carefully scrutinized while designing spaces for the autistic.

- **Lighting:** Various theory have surfaced concerning the sensory issues. For example some say that there should be limitation the daylight and ventilation but the other contradict the same. At the same time majority of them agree in reducing the usage of fluorescent light as the individuals affected with autism are vulnerable to sub visible flicker of the bulb which leads to headaches, eye strain and increased repetitive behaviour. Schools for autistic children use day lighting which according to eminent psychologists helps them in their cognitive abilities and improves overall health.

  There should be some spaces where children can look in and out but not the classrooms as they can be very distracting. The provision of day lighting should be the least distracting and maximize the usage of incandescent

lighting. Graded lighting with various intensities in one particular room helps them to get exposed to various types of lighting.

This picture depicts the usage of different types of lighting in one room and also encouraging the use of day lighting.

Another example of depicting the usage of different types of lighting.

- **Colour and Texture:** The perception of colours by autistic children differ from the neurotypicals due to the defect in their sight because of chemical imbalances and neural deficiencies. Stating the discussion with Dr Thomas Kishore, Reader in Health Psychology Department, HCU, most of the children with ASD see colours with greater intensity than neurotypical children. For these children, red appears nearly fluorescent, vibrating with intensity. A small proportion of the children see the colour as neurotypical children do and 5% of them see muted colours i.e., they perceive every colour as grey.

  Using subtle colours in the background and contrast colours as the main activity will draw their attention. Fascination to spiral and the like patterns makes them sit at one place. The usage of glazed or polished tiles should minimized; matt finished tiled can be altered with textured tiles for them to distinguish between the textures. These areas will then act as "MULTI SENSORY AREAS". If carpets are being used then one can use both hard and soft material. Several ancient cultures, including Egyptian and Chinese, practised "Chroma therapy" or using colours to heal. This is used today as holistic or alternative treatment in many health centers.

a) Red- Used to stimulate body and mind and increase circulation but mostly its usage is avoided as children perceive this colour with greater intensity which hurt their sight.

b) Yellow- Helps in stimulating nerves and purify body; risky as it can cause anxiety or cheerfulness based on their sensitivity. Hypo sensitive children react in a positive manner but causes anxiety in hyper sensitive children.

c) Orange- Helps in healing lungs and heart and increase energy levels. Very energizing colour for both sensitivities.

d) Blue- Believed to soothe illness and treat pain also increase their productivity. Dark shades can be overly depressing whereas light shades such as Caribbean Sea Water have a calming and soothing effect.

e) Green- Helps in maintaining good health. Considered one of the safest colours as it maintains tranquillity without making the children overly depressing like blue. Psychologists suggest that soft tones of green are the best colours for autistic children.

f) Black- Extremely depressive and should be avoided and can create feelings of loss and oppression, causing the child to draw back inside.

g) White- Similar to blue this colour can be either very soothing or very agitating based on their sensitivities.

This picture depicts the usage of subtle colours as background and contrast colours for important details.

Notice that the background of all the rooms are subtle colours like peach, cream etc. And also the flooring uses different colours.

- **<u>Visual Character:</u>** A very simple and clutter free spaces must be designed as children under this spectrum can very easily be distracted by confusing designs and shapes. Spaces should be organized and compartmentalised according to their activities. For 10 children and a teacher, a minimum of 15'x20' room should be designed. Too small spaces can be suffocating where as too large spaces can be very distracting.

  Open plan classrooms and multipurpose rooms with open design is very problematic and very confusing. One solution can be creating areas that are

organised and free flow areas. Fletcher Thompson believes that "ceiling heights must be kept low, spatial volumes small and learning spaces intimately proportioned, especially when teacher-student interaction is primarily one-on-one." One can create an un-distracting and functional area by thinking about the activities that happen in that room. Bookshelves, walls, furniture, soft furnishings and variety in flooring materials can all be used to create a calm, structured environment, and to help autistic children recognise the activities of a room.

Simon Humphrey, a renowned architect in field on autism, suggested that by eliminating shadows and junctions around the window has a calming effect on the minds of children.

This picture depicts the usage of minimal materials yet interesting how children fill their space with life and colour.

.

This is an example of a reduction of detail around a window which helps eliminate shadows and junctions whilst also having a calming effect. Note the absence of architraves and skirting.

8.2- HEARING: One of major impairment in children with ASD thereby effecting their communication and the ability to balance themselves (to an extent)

Notice that the above room is modified according to acoustics by using a more texturally neutral sound absorbent material, with light pale shades or light-coloured corkboards instead of carpet.

Hypo: Mostly have only one ear functioning and therefore they sometimes do not recognize certain sounds. Children under this sensitivity enjoy loud noises and crowded places. Incorporating large open spaces helps in their social interaction and can help them in distinguishing between the sounds.

Hyper: Contrary to the above these children have magnify the noise, listen to every detail. Hence it becomes very difficult to them to concentrate on one particular thing. A solitary space should be provided away from the clamorous spaces for the children to aid them in learning.

- **Acoustics:** My understanding of autism is that they struggle to discriminate different sounds and are more sensitive to it. Any building must respond to this in terms of impact of sound, flanking and reverberation time. This can be achieved by using opaque materials roof in order to reduce the impact of rain, mass wall construction using acoustical materials. Areas that have fewer auditory distractions can help improve attention while lessening verbal stimulations or outbursts. Use of noise and echo treatment in all classrooms, especially speech rooms to increase attention span. Moreover, all the classrooms should have the option of being acoustically modified; so autistic children are gradually placed from spaces that have total acoustic treatment to non-treated rooms in order to endure the external world.

8.3- TOUCH: This is a very important sensory activity for the children to distinguish between various objects and react accordingly.

Hypo: They have ability to withstand high pain and are known for self-harm. Attracted to heavy objects.

Hyper: Touch sensitive, very particular about their clothing; they only like certain types of material and expect the surrounding to possess the same. Curtain cloth, carpets must be of the gentle material.

Notice that elements and materials used in this corridor are elementary and uncomplicated. Use of a materials should be non-abrasive and smooth.

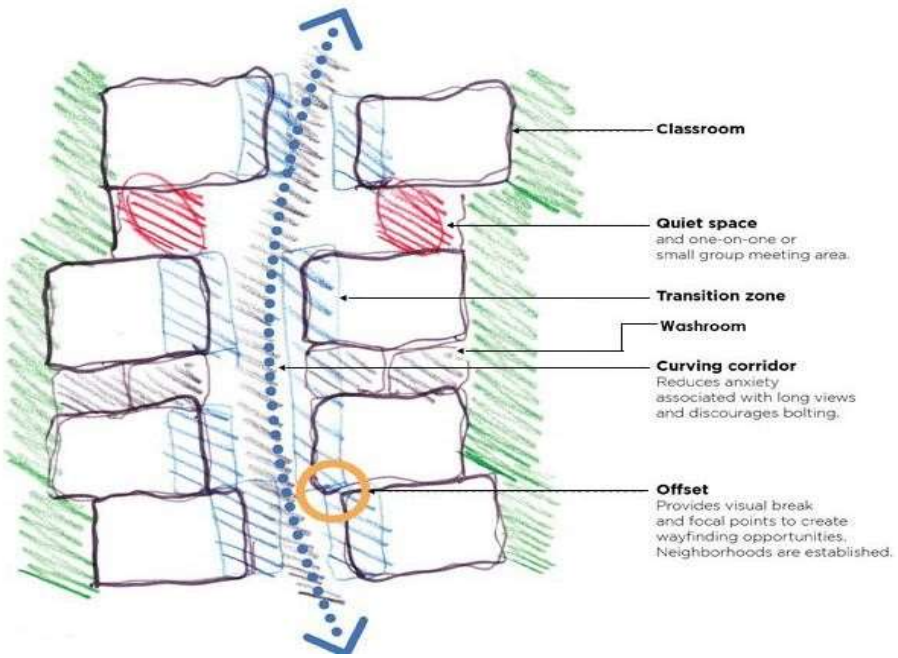
- Materials and Elements: Complexity in the detail of the building causes visual distractions and sometimes obsession. By using limited pallet of materials and reducing hard edges visual distractions can be limited. Quality of spaces can be enhanced by carefully selecting the materials and adaptable furnishings that foster their development and learning. Sensory elements that are soft, such as beanbag chairs, stuffed couches, swings, carpeting, and water have an advantage and proved to be beneficial for autistic children. Hence there is a necessity to provide such sensory opportunities at a school for their exploration.

8.4- SMELL: Highly responsive to various types of smell. Children with ASD may experience the following

Hypo: Non responsive to any type of smells be it their own body odour. Sometimes they go lick the object to identify it. Avoid any sharp and needle like surfaces.

Hyper: Highly responsive to every odour. This sensory activity overpowers their other senses. Toilets, kitchen and the like spaces are usually places far from their learning spaces.

- **Spatial sequencing**: Rooms that develop odours like toilets and kitchen must be placed away from the therapy rooms to reduce distractions. If it becomes inevitable to place such room beside therapy room then the orientation of the room and wind direction must be considered and placed such that the air from the toilet/kitchen does not pass through the classroom. The following diagram



Retrieved from http://harrodd-r.com/autism-and-design

depicts a probable solution for designing spaces for the autistic children.

- **Quiet space:** Autistic children require more personal space than normal children and this should be considered when designing classrooms, halls and anything that will contain social interactions. In places were educational activities are done there should be space large enough for one caretaker and one student.

9- REFINED LEARNINGS FROM THE LITERATURE

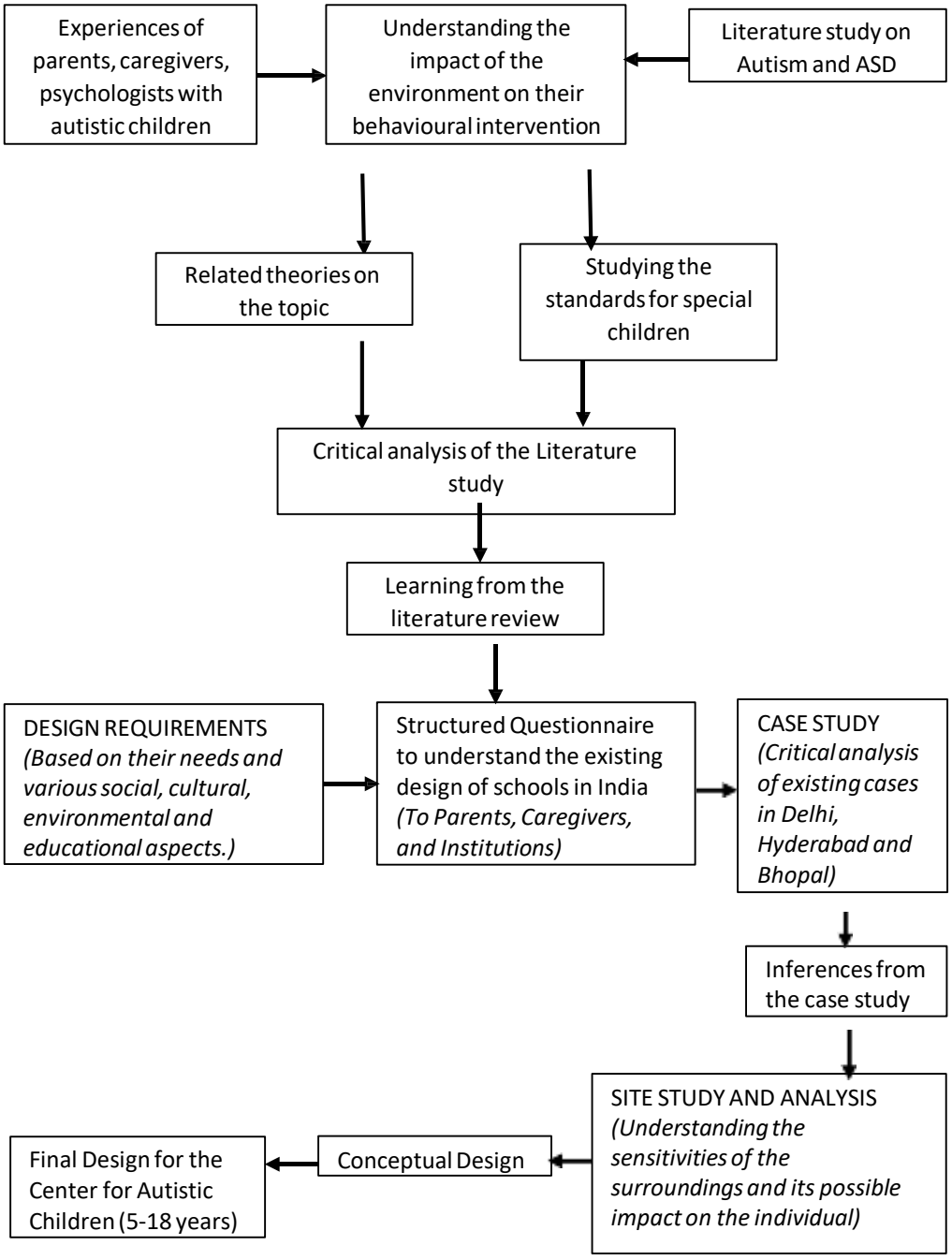
- The building should have a simple layout which reflects order, calm, clarity and has good signage and transition space.
- Autistic children may show different sensitivities to spaces: some will be frightened by large, open spaces and wish to withdraw to smaller spaces, while others will not like enclosed spaces. Providing a mix of larger spaces with smaller ones to withdraw to when anxious can help.
- Designing low sensory-stimulus environments reduces sensory overload, stress and anxiety i.e, by proper positioning of spaces like toilets and kitchen away from the classroom and therapy areas, using non flickering lighting fixtures, providing good acoustics etc.
- The provision of pleasant, well-proportioned space, with plain, bare walls decorated in muted soft colours will allow teachers to introduce stimulus, (such as wall displays of work or information), gradually to suit pupils needs.
- Classrooms can be arranged so that teachers may employ different teaching methods, with spaces for individual work or screened personal workspaces.
- Containment in the class base for reasons of supervision, safety or security by the use of two door handles, at high and low-level, must neither compromise escape procedures, nor violate human rights, (in that children must not be locked up unless they are secured or detained legally in secure provision).
- Robust materials should be used where there are children with severe disabilities and safety precautions for doors, windows, glass, plaster and piped or wired services are required.
- There is a need to balance security and independence and to find the right mix between tough materials and special equipment on the one hand and ordinary, everyday items on the other, in order to avoid an institutional appearance, at the same time eliminating risks.
- Simple or reduced detailing and changes of plane may reduce the opportunity for obsessiveness.
- The building should have non reflective surfaces, non-confusing textures, and reduced corridor area to eliminate running opportunities.

10-DESIGN GUIDELINES

Table 3

ASPECT	STANDARDS USED IN CASE STUDY and TSS FOR SPECIAL CHILDREN
ORIENTATION OF THE BUILDING	**N-S direction for the maximum usage of sunlight and warmth in cold countries.**
ACCESSIBILITY	**Electronically controlled and monitored entrances. Pick up and drop off points at the entrance to the school.**
SPACES IN THE UNIT	**Classrooms, therapy rooms, sensory rooms, soft landscaped play area, library, storage, toilet, cafeteria, lunch room, transition space, atrium, one to one assessment area and quiet spaces.**
AREA REQUIRED	**2-3 sq.m per child and not more than 8 children per classroom.**
LIGHTING	**Floor to roof windows with opaque blind curtains, roof windows, clerestorey windows and artificial lighting with dimmers. No incandescent lighting.**
VENTILATION	**Sill to windows for proper ventilation, wind catcher roofing systems.**
COLOURS AND TEXTURE	**Muted colour scheme; white, muted earth colours, light green and blue.**
VISUAL COMFORT	**High ceilings, visual connectivity between classrooms and play areas, visual cues, non-reflective flooring and pin board areas.**
TRANSITION SPACE	**Considered as heart of building as a most effective social area; usually circular.**
SPATIAL SEQUENCING	**Toilets and kitchen are placed far away from the classrooms and therapy rooms.**
SAFETY MEASURES	**No sharp edges, minimum detailing, ample room size, ceiling height and corridor width.**
ACOUSTICS	**Opaque roofing material in order to reduce the effect of rain, mass wall construction.**
STAIRCASES	**Min 300mm wide Tread, Max 150mm high riser and 50mm Kerb space. (TSS standard for special standard)**
RAMP	**Min 1800mm wide, Min 1:12 slope ; Max 1:20 slope (TSS standard for special standard)**
DOOR	**Min 900mm + 380 mm (for the wheel chair), Handle position – 800 mm from FFL (TSS standard for special children)**
WHEELCHAIR MANOUEVRING SPACE	**1450mm x 1500mm buffer space (TSS standard for special children)**

11-DESIGN METHODOLOGY



12-CASE STUDIES

1- ACTION FOR AUTISM – NEW DELHI

2-I SUPPORT FOUNDATION (AUTISM SPECIALISED SCHOOL) LUCKNOW

12.1 - ACTION FOR AUTISM – NEW DELHI

Location: Pocket 8, Jasola Vihar, New Delhi

Orientation: NE – SW

Building Typology: Institutional building for autistic children and adults

Climate: Hot and dry

The front façade of the building

Area: App 600 sq.m

INTRODUCTION

Action For Autism (AFA), New Delhi is the pioneering, national and non-profit autism society of India. The organisation provides support and services to individuals with autism and those who work with them in South Asia. Founded in 1991, this parent organisation began with the goal to "put autism

on the Indian map." Awareness of autism in India has grown tremendously in the past decade, and their activities have also changed to meet current needs in India. According to AFA, there are currently 17 lakh people with Autism in India. The organisation works through direct services, advocacy, and research to improve the lives of children with autism and their families. They are also committed to assisting other countries in South Asia achieve legal recognition of autism and develop services for children and families.

The center was started by Merry Barua along with other parents whose children are autistic, in a small room at Chiragali. Currently she is the Head of the institution which comprises of 60 students and 25 teachers. To more effectively orchestrate national activities for autism, this organisation expanded and was relocated to the AFA National Centre for Advocacy Research and Training at Jasola vihar in 2006.

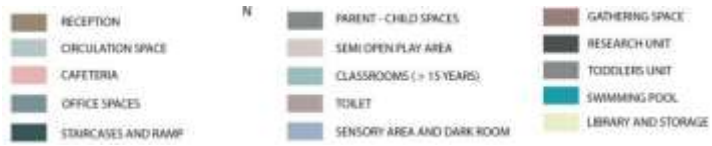
This 4 storeyed center comprises of 8 classrooms for the secondary children, 5 Parent- child intervention rooms, 2 Sensory rooms, 2 Occupational therapy rooms, a library and a Research unit. The center caters to 60 individuals of age 3years to 34 years. They not only train the individuals in the triad impairment but also guide them about the future independence. The center also employs high functioning autistic adults in their office which boosts their confidence.

GROUND FLOOR

The ground floor comprises of reception area, office area, seating area, cafeteria, library, a storage area, swimming pool, outdoor play area and toilet. The corridor connecting all these areas is only 1.5m wide which makes it difficult for children to walk without any assistance.

1- The children walk from the reception to the cafeteria to buy food and then head to their class. This way they learn how to use money.

2- Swimming pool is used during summer which according to the staff is an effective way to teach sensory skills.



3 The seating area in the reception is very spacious and some children use this area as an escape space.

4 The counter present outside the reception sells the products made by the children during their arts and crafts class.

5 The play area present outside the building is used by secondary children during their playtime.

FIRST FLOOR

The first floor comprises of parent-child intervention wing which has 5 rooms, 3 classrooms, 1 sensory room and toilet. The corridor in the Parent- child wing is only 1m which makes it difficult for two people to walk simultaneously. The other corridor leading to sensory room and other classrooms is 1.5m wide which makes it difficult for children to walk without any assistance.

FIRST FLOOR PLAN

1- **Parent- child wing:** This area in an early intervention zone where the parent of the child below 3 years is trained to understand the complication of the disorder. Parents are also taught to understand the behavioural and cultural aspects of the children. This way the intervention not only happens in the center but also at home. 4 rooms have a look through window frame beside the door so that parents can look into the class without distracting the children.

Lighting and ventilation: The corridor leading to these rooms is dark, gloomy and narrow (1m wide) with no proper natural light. The rooms are well lit and ventilated naturally; also there is a provision of artificial lighting in every room.

Notice that the corridor is narrow and poorly lit.

Colours and texture: All the walls are rough textured and coloured white. Since this area is for toddlers, the walls are decorated with sensory stimulating materials such as charts depicting fruits, vegetables, colour coded activity tags etc. Children sometimes tend to harm themselves by scratching the walls and circumambulations around the furniture and accidentally hit the walls. There is a necessity of smooth finished walls with variegated textures for them to distinguish between the materials.

Acoustics: The rooms are not treated acoustically; the noises from the adjacent class are very much audible which distracts the children from concentrating on their activity. Some of the rooms use curtains as acoustical materials but given the number of children and their ability to make noise, curtains are not sufficient.

2 **Semi open play area**: This area is for low functioning children who cannot interpret safety. The semi open area is covered all around by with MS grill. Playing with other children promotes social interaction.

3 **Sensory area**: This is a one to one intervention area where the child is taught by projecting videos and pictures on the wall. Low functioning children use this space as it is dangerous to let them play outside without assistance. Due to the space constraint (the area of this space is about 10sq), the personal space of the child is compromised which triggers anxiety and develops seizures.

Lighting and ventilation: The room is well ventilated with windows on one side. The requirement of this room does not indicate the provision of a window as children are taught in the darkroom with the help videos and pictures on OHP.

4 **Toilet:** The toilet provided is not children friendly; they need assistance to use the washroom.

SECOND FLOOR


SECOND FLOOR PLAN

The second floor comprises of 4 classrooms for secondary children (high functioning), 3 classrooms for primary children (low functioning), 1 sensory room, 1 storage area and toilet. The corridor in the secondary children classroom is only 1m which makes it difficult for two people to walk simultaneously. The other corridor leading to sensory room and other classrooms is 1.5m wide which makes it difficult for children to walk without any assistance.

1- Classroom area (Secondary children): The classroom is approximately 10sq.m and accommodates 6 children per classroom with a teacher student ratio of 1:6. Some experts consider this as extra burden on one teacher. The usual ratio followed elsewhere is 1:3.


Picture depicting typical classroom

The classroom has spaces for sitting, weaving, computer education and storage space. There is a look through window from the corridor so that parents can look at the activities by the children without disturbing the class. Only in secondary classrooms computer education is provided; the teachers believe that these children learn better and faster over the computer than over the blackboard.

Lighting and ventilation: Although the classrooms are well lit and ventilated by windows on one side, the views through the windows are distracting so the management blocked the windows with opaque sheets.

Picture depicting the opaque sheets over the windows

Colours and texture: All the walls are rough textured and coloured white. The walls are very dull with no decorative pictures or images. Many organisations use colour coded picture cards over muted colour walls to communicate with children. Since this area is for secondary children, communication is not an issue. Although they are repetitive in their behaviour, they can communicate with others.

Acoustics: The area of the rooms being just 8sq.m and not being acoustically treated distracts the children from concentrating on their activity.

Primary classroom

2- **Classroom area (Primary children):** There are 3 classrooms for children between 3 – 10 years age. The furniture is these rooms are compatible with the children. The classroom is approximately 10sq.m and accommodates 5 children per classroom with a teacher student ratio of 1:5.

Lighting and ventilation: The classrooms are well ventilated by 2 windows on two sides. It becomes very difficult for children to concentrate on their activity. Hence the management covered the windows with curtains to block both light and ventilation. They encourage using artificial lighting and Ventilation forthese children. **Colours and texture**: All the walls are rough textured and coloured white. The walls are very dull with no decorative pictures or images. Although the area is for primary children, the walls are not decorated with colour coded picture activities. The use of colour tape on the ground acts as a compartmentalising of the space. This makes children feel as their personal space and helps them to calm down.

Acoustics: The area of the rooms being just 8sq.m and not being acoustically treated distracts the children from concentrating on their activity. Some of the rooms face the road, therefore the vehicular noise and the street noise distract children.

3- **Semi open play area**: This area is for low functioning children who cannot interpret safety. The semi open area is covered all around by with MS grill. Playing with other children promotes social interaction.

THIRD FLOOR

The entire floor is dedicated to research and diagnostic unit. The organisation recently collaborated with UCLA on a research on Autism. There is also a gathering space for parents to meet the teachers once in a month to check the progress in this floor.

THIRD FLOOR PLAN

COMMON SPACES IN THE CENTER

1- Circulation Space

Ground floor - Circulation space is rarely used by individuals. Walk from cafeteria to office.

First and Second floor - Parent child wing and the toddler classrooms are connected by narrow corridor. Secondary classrooms are connected with a well-lit corridor of 1.5m wide

Third floor - Corridor connects the research unit with the gathering space.

Unorganised Circulation Space in 2nd floor

Circulation space in every floor is narrow and accommodates many other activities along with circulation such as play area, storage, fire safety etc. The main circulation space is 1.5m which is very unsafe

walk with their hands away from the body.

Children usually wander in the corridor as the space has no distractions.

2 Swimming pool

Swimming pool in the ground floor

Swimming pool is operated during the summer days and summer camp. This is a sensory technique to teach children the sense of water. According to the teachers this proves to be an effective sensory technique for children to learn quickly.

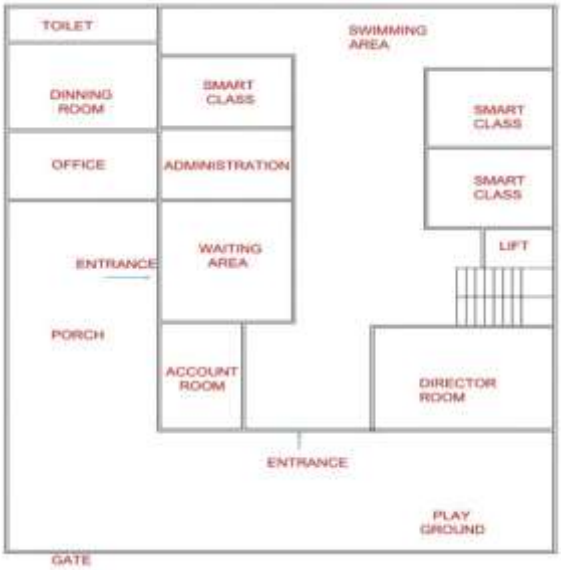
3 Play Areas

Play area in the ground floor

The play area in the ground floor is adjacent to the parking facility. It is located beside the entrance to the building. This is a dead space and is not used by children as they are intimidated with the vehicles around them. High functioning group of children use this play area during their play time. The play areas in first and second floor are covered with grill.

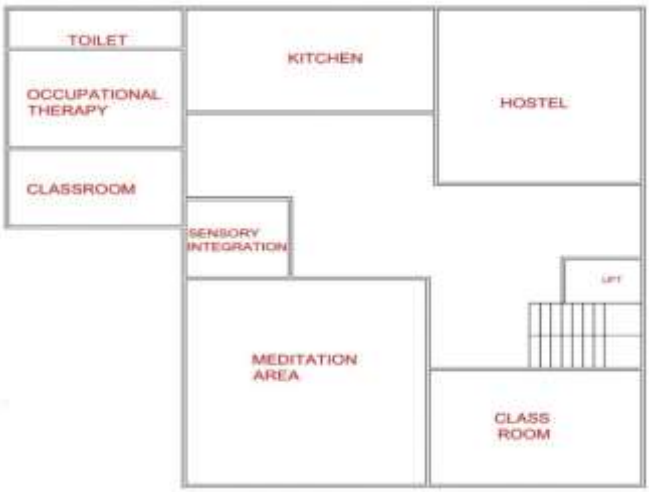
12.2 - I SUPPORT FOUNDATION (AUTISM SPECIALISED SCHOOL) LUCKNOW

- I Support Foundation is a not-for-profit organisation for autistic children in Lucknow .It was established in the year 2014 by Ms. Bobby Ramani in her college days.
- Living with the family and being sister to autistic brother, she started this organisation with the aim to work for special children and create awareness in the society.
- The **ground floor** of around 5000sqft includes director room, account room, administration, waiting area, swimming area ,open space for activity.
- A regular private arrangement is transformed into multi day care community for youngsters with handicaps. Every one of the rooms are transformed into study halls.



GROUND FLOOR

- The **first floor** includes sensory integration, meditation area, occupational therapy, classrooms kitchen, office space,1 home room, practice zone and basic washroom.
- A regular private arrangement is transformed into multi day care community for youngsters with handicaps. Every one of the rooms are transformed into study halls**.**



FIRST FLOOR

LOCATION	A/33 south city Raebareli road Lucknow
ORIENTATION	SN-WE
BUILDING TYPOLOGY	Residential building for Autistic children and adults
CLIMATE	Hot and dry
AREA	Approx. 5000 sq feet.
YEAR BUILT	2014
NUMBER OF STUDENTS	41 (4–5 m^2 per child for Up to eight children classroom)
AGE	3-20
FACILITIES	5 classrooms, 3 Parent child intervention rooms, 2 Sensory rooms, 2 Occupational therapy rooms, a library and a Research unit.

- **Lighting and ventilation:** The passage prompting these rooms is dim, bleak and slender (1m wide) with no appropriate common light.
- **Hues and surface:** All the dividers are unpleasant finished and shaded white. Since this territory is for babies, the dividers are brightened with tangible animating materials.
- **Acoustics:** The rooms are not treated acoustically.
- **Semi open play zone:** This region is for low working youngsters who can't translate wellbeing. The semi open region is secured all around by with MS flame broil. Playing with other kids advances social cooperation.
- **Sensory territory:** This is a coordinated intercession region where the tyke is instructed by anticipating recordings and pictures on the divider.
- **Lighting and ventilation:** The room is all around ventilated with windows on one side. The necessity of this room does not show the arrangement of a window as kids are instructed in the darkroom with the assistance recordings and pictures on OHP.
- **Toilet:** The can gave isn't youngsters benevolent; they need help to utilize the washroom.

SECOND FLOOR

- The **second floor** involves sports area, gym area other activity room for Zumba ,party for children.

13-COMPARITIVE STUDY OF THE SCHOOLS

Aspect	Action for Autism, New Delhi	NIMH, Hyderabad	Sparsh – a special school, Hyderabad
Location	Located in the residential area in the outskirts of the city surrounded by park, water plant and Agra canal.	Located in a dense residential area in the heart of the city, surrounded by schools, pharmaceutical centers and market area	Residential building turned into a school, located in residential area.
Orientation	NE - SW	S-N	SW-NE
Access to the building	Single and secured entrance to the building	Separate entrance and exit gate	Accessible by everyone, no security.
Spaces in the unit	10 classrooms, 5 Parent child intervention rooms, 2 sensory rooms, a library, indoor and outdoor play area, cafeteria, research unit, gathering space , office space, reception and toilets.	7 secondary classrooms, 6 primary classrooms, 1 kitchen, 1 computer education room 2 rooms for autistic children, 2 vocational training rooms, 6 office and staff rooms and 4 toilets.	7 classrooms, tv room, storage space, exercise area, sensory area, kitchen, sick room, quiet space, lobby and toilets.
CLASSROOM AREA			
Area	Approx 10 sq.m for 6 children	Approx 12 – 20 sq m for 6 children	Approx 6sqm for 6 children
Lighting	Windows and artificial lighting	Windows and artificial fluorescent lighting	Windows and Artificial lighting
Ventilation	Good ventilation through windows on one side.	Cross ventilation in every classroom. All the classrooms face either	Cross ventilation in 2 classrooms.

		courtyard or playground.	
Visual comfort	High ceilings, simple and clean surfaces but no proper visual cues.	High ceilings, spacious corridors, Tactile environment with no proper visual cues.	No visual connectivity between the spaces. No proper visual cues.
Transition Space	Long L shaped narrow corridor.	Long and wide (2m) L shaped corridor.	Linear and T shaped corridor connecting all the rooms
Colours and Texture	All rooms are coloured white and have rough texture	All rooms are coloured beige and have rough texture.	Muted colour scheme with red, orange, maroon and beige coloured walls. Smooth finish. Visually disturbing space
CIRCULATION AREA			
Width	1 to 1.5m wide	2m wide	3 – 4 m wide
Lighting and ventilation	Properly lit and ventilated by windows opening to courtyards	Corridor opens into courtyard, well lit and ventilated. Artificial lighting is also used.	Artificially lit even during the day time using fluorescent tube light. No proper light or ventilation.
Colour and Texture	White coloured which gives a spacious feeling. Rough textured	Beige coloured spacious corridor.	Maroon coloured dark corridors

Observation and Recommendation

- The classroom should be at least 20'x15' with a student teacher ratio of 3:1. Every classroom must accommodate only one activity as multiple activity distracts their concentration.
- Subtle colours must be used for the walls with contrast colours as backgrounds of important details. Autistic children devote their attention on the details and therefore one must try and accommodate minimum and essential details in the structure. For example patterns or paintings on the wall affect their temper; they critically analyse paintings to understand the deeper meaning and lose their temper if the painting conveys a negative meaning.
- A mirror must be accommodated in speech and occupational therapy room for them to interact with themselves and understand their task. Mirror is an essential element in their progress. It conveys the voices of colours, shadows, movement and their echoes, silence, spaces and distance.
- Sensitivity to resonating sounds is very alarming in autistic children which the 'neuro typicals' fail to notice. Areas that have fewer auditory distractions can help improve attention while lessening verbal stimulations or outbursts.
- Spaces must be clutter free as visually distracting design can be very confusing; people on the spectrum tend to be visually-orientated. Clean lines without much detailing and sparse decorations helps autistic children to concentrate on their task.
- An organized environment can be achieved by creating stations, or segregating areas according to activities. A small space can feel suffocating, while a space that is too open can bring on a free-falling feeling.
- Autistic children need a quiet space to control their temper tantrums and which helps them in being calm and organize their behaviour.
- The designed space must provide lots of level difference which helps in enhancing their fine motor skills and also allows the management to be vigilant.

14-SITE LOCATION

LOCATION –SECTOR - 3, AWADH VIHAR YOJNA, LUCKNOW
SITE AREA -6.02 ACRE
PLOT OWNERSHIP – GOVERNMENT PROPERTY

NEAREST SERVICES AND FACILITIES- CHARBAGH RAILWAY STATION -13 Km
CHARBAGH BUS STAND -13 Km
ALAMBAGH BUS STAND – 19 Km
CCS AIRPORT – 12 Km
MEDANTA HOSPITAL -500 m
POLICE CHAUKI-1 Km
ASSECCIBILITY –
AMAR SHAHEED PATH- 60 meters wide
LANDMARK-
AWADH SHILPGRAM

SITE PLAN

Proposed Site has located in developed and urbanized area, has two side road connectivity, build up Vs ground is in balanced manner. Site is totally plain in nature and has no levels but due to left unused the site has become uneven .

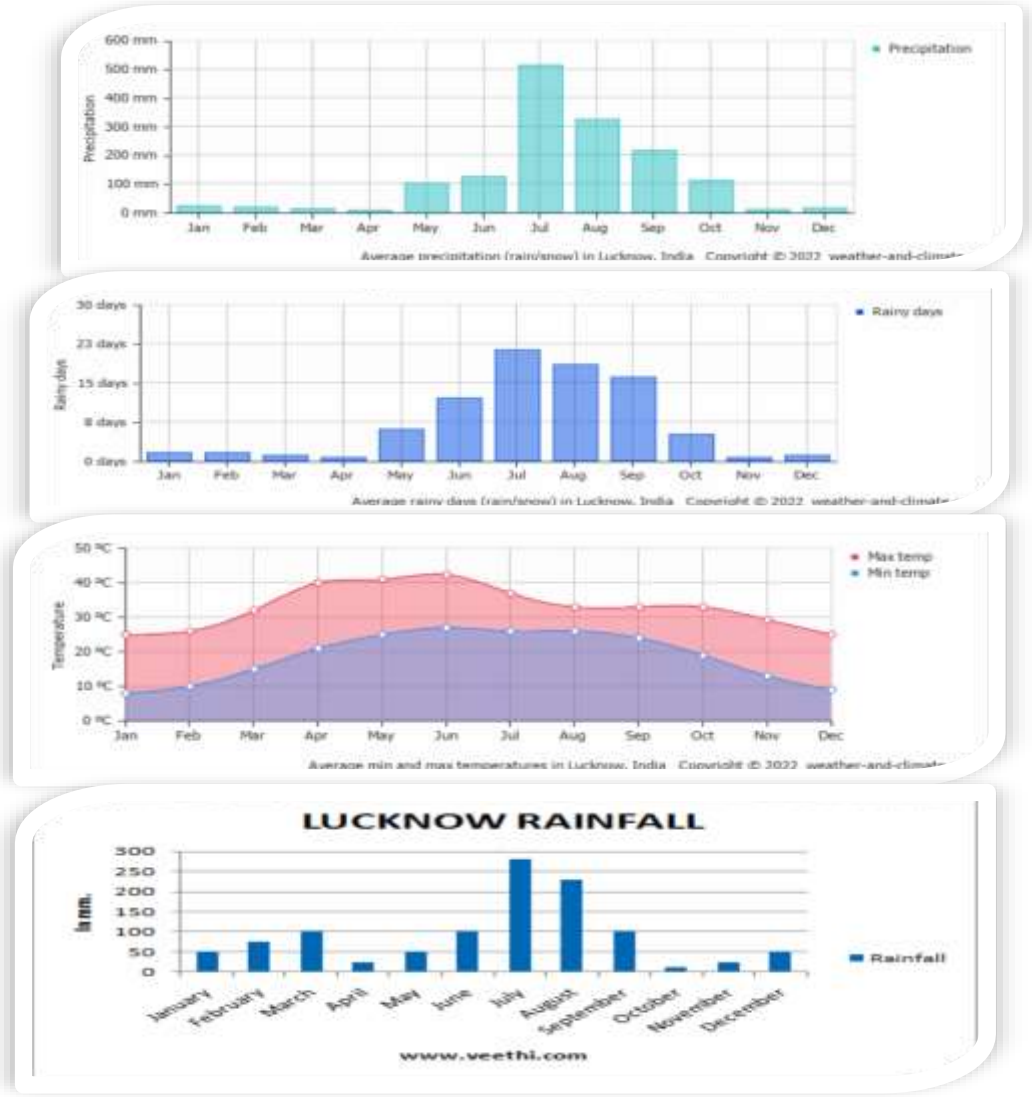
CLIMATIC ANALYSIS

Proposed site(LUCKNOW) comes under, humid subtropical climate with cool, dry winters from mid-November to February and dry, hot summers with sunshine from March to mid-May. It expresses variant range of characteristics ;

AVERAGE RELATIVE HUMIDITY – 69% (Range 46-86)

PRECIPITATION LEVEL – 915 mm per year

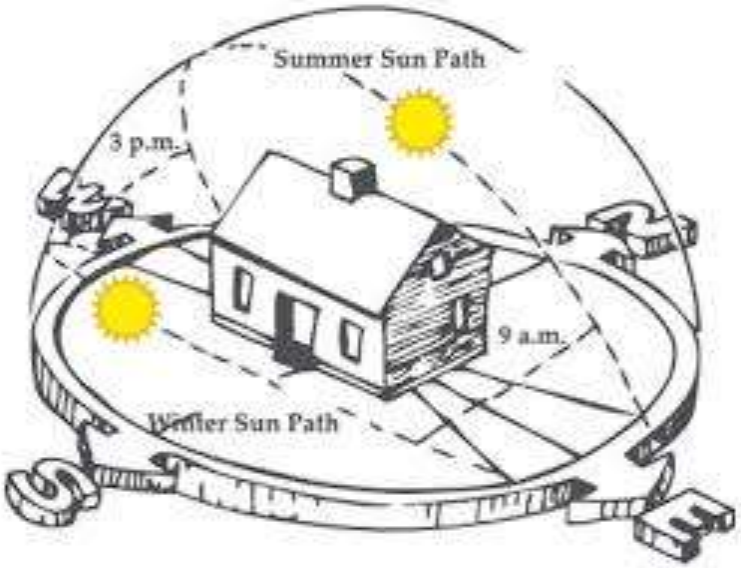
TEMPERATURE – SUMMER 26-45 C **, WINTER** 10-27 C



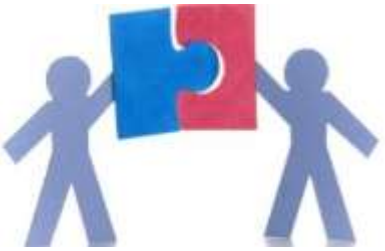
Soil type - The major position of the district is occupied by soils locally known as "Bhur" or "Silty Sand" on the ridges. "Matiyar" or "Clay Soils" occurs along topographic lows and "Dumat or Loamy soils" in the level lands. Clay is dominant in the areas where "Reh" (Usar) prevails.

WIND DIRECTION - The predominant average hourly wind direction in Lucknow varies throughout the year. The wind is most often from the east for 3.8 months, from June 5 to September 28, with a peak percentage of 56% on August 5 .

SUN PATH DIAGRAM



15 -CONCEPT - PUZZLE



WHY PUZZLE?

• Puzzle indicates the mystery and complexity of Autism; reflecting this attribute in the design is crucial as children with Autism are very difficult to interpret and understanding their interpretation of space is a challenge. A simplistic design would suffice if the design include various spaces to explore and includes the aspect of 'something new' for children to learn things easily.

• Each puzzle piece indicates the children with Autism waiting for the rest of picture to fit- the 'fit' in the puzzle would be another child with Autism or us 'the Neuro typicals' - to complete the picture and give it a meaning. The design of the center should be such that the different blocks go hand-in-hand with one another and form the center to make it a better place for children to live and learn.

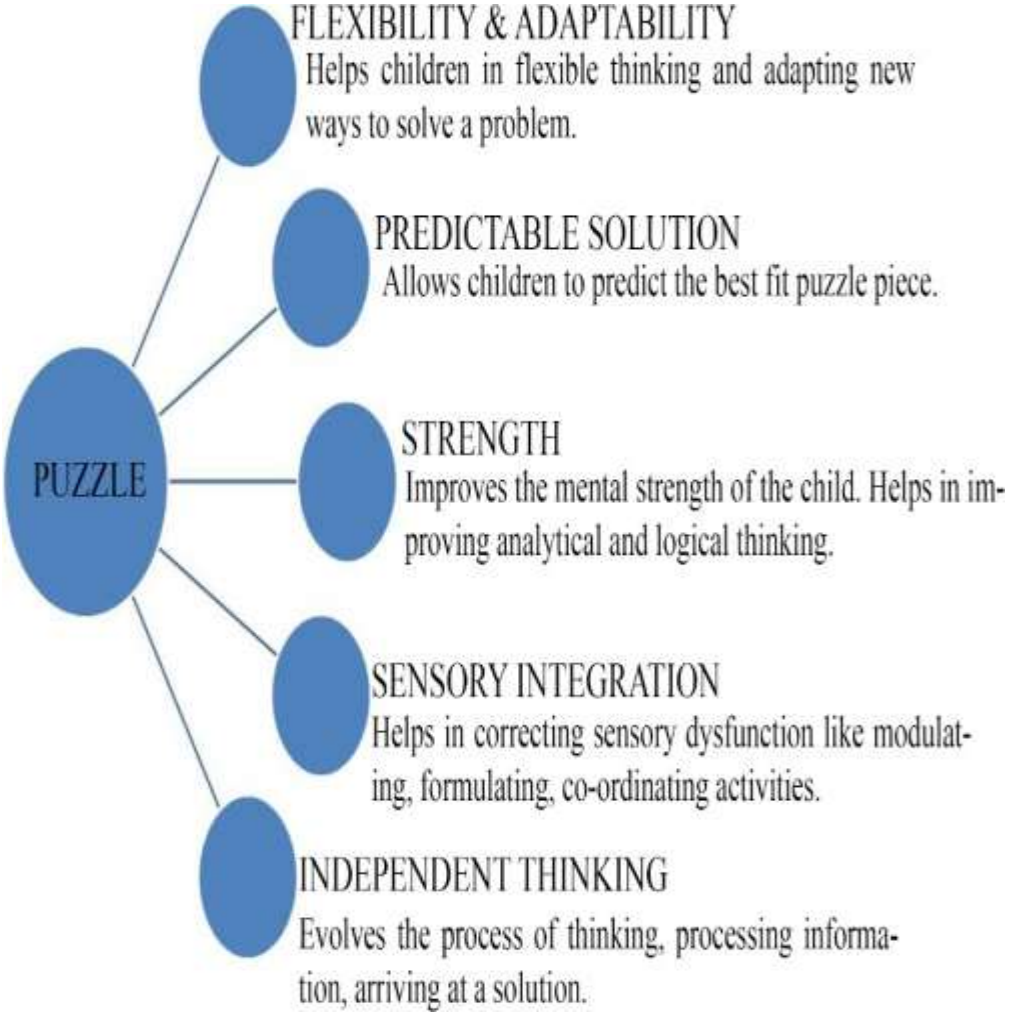
• Each puzzle piece is different and unique but gives a meaning when put together properly in the big picture. The design of the blocks and spatial sequencing has only one correct possibility to provide a 'fit in environment'.

Design must be based on their interpretation of spaces and sequenced based on their predictability of spaces.

•Indicates the diversity of the individuals effected with Autism. The main aim of the center is to unite the diversified spectrum of Autism and provide a meaningful platform for their betterment.

•Logical way to arrive at a solution. A 'FIT IN ENVIRONMENT' and an Ingenuous environment.

Based on the concept, case study and literature study, the following are parameters to be followed in the design for the center.



Picture depicts the inability of the child understand the space due to the long pathway leading to it. Designers play an important role in determining spaces which are SIMPLE and COMPREHENDABLE by the child which helps them in their betterment.

FLEXIBILITY & ADAPTABILITY

The combination of triad dysfunction results in the broad spectrum of functional skills and interests in Autism. Therefore there must be flexibility in the design and must also be adaptable by children in the spectrum. This will help in

1Including the individual educational skills and needs of children with autism rather than following the main stream school methods. This will help the child to adapt the new method easily as it is user friendly

2Working with regular teachers along with therapists. Helps them feel comfortable and not alienated.

3 Re-arranging the classrooms for 1-1, group and parallel sessions. This way none of the sessions are disrupted.

4 Using multi-sensory teaching methods both in the classroom and outside.

PREDICTABLE & NON-THREATENING

1Complexity in design confuses children with low functioning Autism; layout, spaces, shape and form must be as simple as possible.

2Non-threatening environment leads to reduced level of anxiety. (R.Khare 2007)

3Sense of clarity has a calming effect on children and they show reduced level of challenging behaviour. (R.Khare 2007)

4 Children will feel more comfortable and safe in the environment.

SENSORY INTEGRATION

Sensory dysfunction is the 'inability to modulate, discriminate, co-ordinate or organize sensory activities adaptively'. (M Mostafa 2008). By including sensory skills it helps children to

1Integrate sense like rolling, jumping, vibrations, music, and different visual experience for better understanding

2 Calm themselves and develop tolerance in over reactive children.

3Improves concentration and attention span and reduces behaviour tantrums in children.

SAFETY & SECURITY

Children with Autism are unaware of the dangers in the environment due to their impaired imagination and communication skills. Their sensory dysfunction attracts them to harmful objects & equipment. Therefore there is a need to integrate safety and security while designing.

The environment should offer

1- Safe use if fixtures, equipment and fittings.

2- Controlled access to high risk areas.

3 Supervision and ease of observation

4 Presence of help indicators both visual and auditory.

FUTURE INDEPENDENCE

Education in a broader sense is to provide an environment & opportunities for children to acquire knowledge and skills to lead a productive and independent life. Same goals applies to children with Autism.

• Self-help training

• Domestic skill training

• Vocational training

Spaces accommodating the above activities must be provided to expose children to the 'real-world' scenario.

1. - LINKING ACTIVITIES WITH CONCEPT

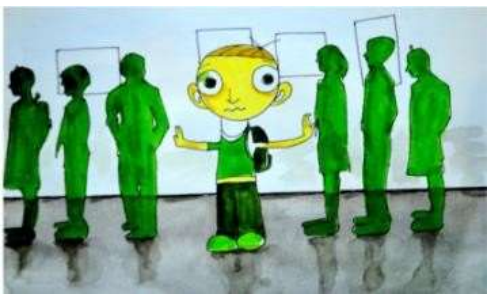
- QUIET SPACE - Adaptable and safe environment with no distracting views. At the same time child should not feel suffocated in the space.

(Ethics of containment)

- SENSORY INTEGRATION - Away from the hustle bustle of the city and away from all the sensory distractions like sound and smell. Spatial

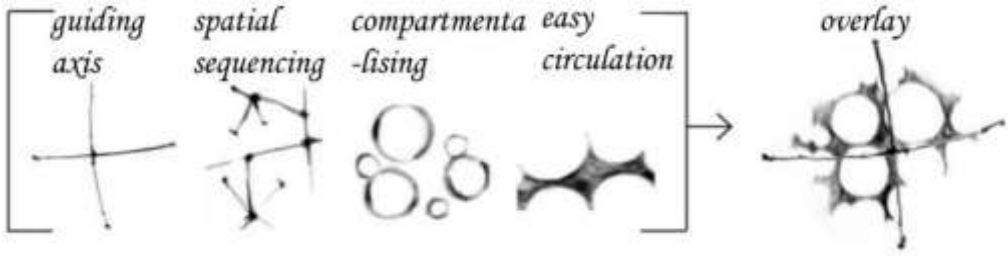
sequencing plays an important role in enhancing their sensory activities.

- PROXEMICS - Sensitive to touch; lavish circulation spaces. Group activity spaces would function better if provided outside.



- LEGIBILITY - All the spaces must be clearly defined; no clash of activities in a space. Visual cues must be provided to ease their comprehension.

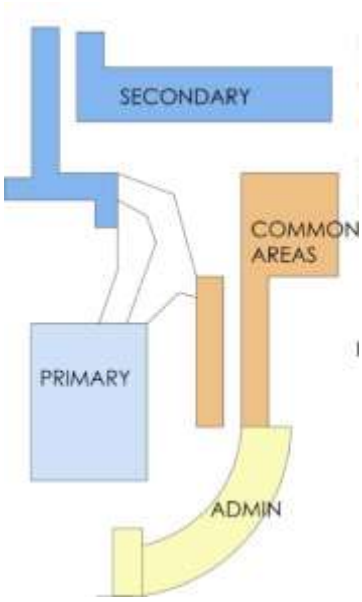
16-DESIGN DEVELOPMENT



Puzzle is complete when all the puzzle pieces fall in the right place. This has been translated into architectural language where each puzzle piece represents blocks, central axis, and circulation pathways, open and closed spaces which are overlaid to find a solution to the design.

INITIAL DESIGN STRATEGY

STAGE - 1



PROS

1All the buildings are located in close proximity.

2Common areas connecting Primary and Secondary blocks.

3 Admin block as high sensory stimulation area with respect to the form.

4 Hierarchy of open spaces

CONS

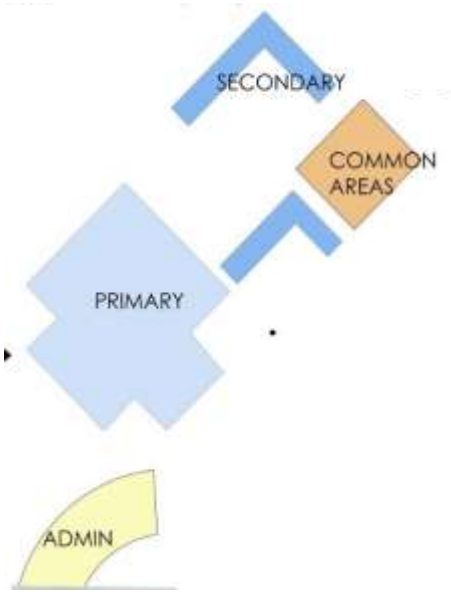
1- No visual connectivity between spaces.

2 Long corridors – artificial lighting.

3 Entry to the building highly sensory stimulating which is non-welcoming.

4 No proper physical connectivity between primary and secondary blocks

STAGE – 2



It was very important to create visual connectivity because of their social impairment, it is difficult for children to interact with others.

Visual access creates a defined pathway from home to school and back to home.

PROS

1- A guiding axis leading to all the blocks.

2- Deliberate tilt in the placement of the blocks according to the existing wind direction.

3- Common area nearer to all blocks but away from classroom area for reduced distractions.

CONS

1 Common central courtyard between both the school blocks. Very intimidating space.

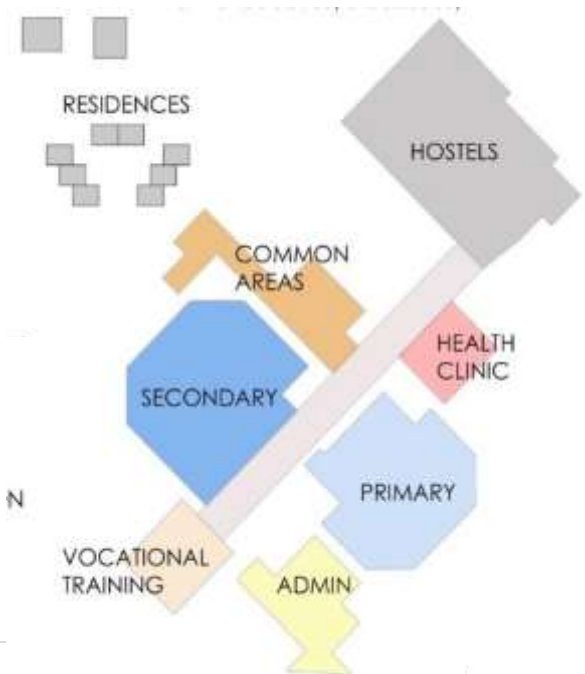
2 Secondary block is not a continuous block.

3 Common area away from administration block.

STAGE – 3

It was very important to create visual connectivity because of their social impairment, it is difficult for children to interact with others.

Visual access creates a defined pathway from home to school and back to home.



Shape and form of the building were based on the behavioural aspects, sensory stimulations and psychology of the children based on the literature study and case study.

FINAL STAGE

17 DESIGN PRINCIPLES

- Visual corridor to visually access all the blocks; also the level differences and varying heights of the blocks help them differentiate the blocks.
- Restricted vehicular entry to one side of the site both physically and visually
- Sensory pathway connecting all the blocks covered with various textured and scented shrubs and plants.
- Courtyards amidst all the blocks as a small gathering space rather than large intimidating gathering space.
- Various levelled terraces in secondary block.
- Colour coded blocks for easy navigation between the spaces and easy identification of the activities.
- Vocational Training Center for future development of the child.
- Non-threatening and predictable environment with no repetitive patterns and textures on the buildings.
- All blocks have different windows and colour coded doors for easy identification of the blocks and the built spaces..

18 AREA ANALYSIS

S No	ACADEMIC BLOCK	SQM
1	Class room (20)	20*45
2	library	108
3	Sensory room (2)	2*18
	(4)	4*36
	(1)	1*24
	(1)	1*25.2
4	Staff room (2)	2*30
	(2)	2*39
5	Therapy room (4)	4*20
	(2)	2*30.5
6	Caretaker room (2)	2*24.6
7	Quiet room (4)	4*30

S no	Vocational block	SQM
1	Entrance lobby	54
2	Vocational room (4)	4x45
3	Multipurpose hall	190

S No.	Admin block	SQM
1	Reception and waiting	
2	Director room	28.6
3	Principal room	28.6
4	Councelling room	25.65
5	Clerk room (3)	3x20
6	Accountant room	25
7	Store room	2x16
8	Server room	2x16
9	Obsevation room	18
10	Board room	25
11	Conference room	62
12	Consultant room	17.2

S No	Multipurpose hall	SQM
1	office	16
2	VIP guest room	16
3	Green room	2x 36.8
4	HALL	192

S No	Girls hostel	SQM
1	Entrance lobby	48
2	Warden	18
3	mess	72
4	rooms	50x15
5	kitchen	32
6	pantry	18
7	utility	15
8	store	14

S No.	Boys hostel	SQM
1	Entrance lobby	75
2	Mess	71
3	Room	41x15
4	kitchen	37.7
5	pantry	20
6	store	15.7
7	utility	18.86

S No	residence	SQM
1	TYPE 2	753
2	TYPE 3	1644

S No	infirmary	SQM
1	Waiting and reception	31
2	lobby	29.6
3	Doctor room	20
4	Ward	16
5	Dressing room	20
6	Pharmacy	20

S No	Canteen	SQM
1	cafateria	120
2	kitchen	29.7
3	store	12.95
4	toilet	2x3.24

20-CONCLUDING COMMENTS

This paper has focused on providing a critique of the existing literature with respecting the design of educational environments for Autistic children, drawing out a number of key design criteria. It has then focused on a number of designs to assess in practice the implementation of those criteria and to discover where possible further innovative approaches may exist.

There is clearly a requirement for an architect to be aware of the issues contained within the critique of the literature study. Where these issues are not addressed they will have a detrimental effect on the ability of the child to learn or function effectively within their environment. The opportunity exists to create designs which rather than the provision of a neutral container provide 'environments for learning'. Clearly this type of space allows teachers and other professionals to utilise the environment in a way that benefits 'visual learning.' Through this approach the term 'learning space' becomes particular to the experience of the individuals who use it.

Lastly, the literature which exists with respect to designing for autistic children is not readily available to designers. Educational professionals and architects would both benefit if design guidance were available in a concise and accessible form. Furthermore, design programmes involving the betterment of autistic children by investigating the 'creation of the classroom environment as learning tool,' would bring in tremendous change in their intervention.

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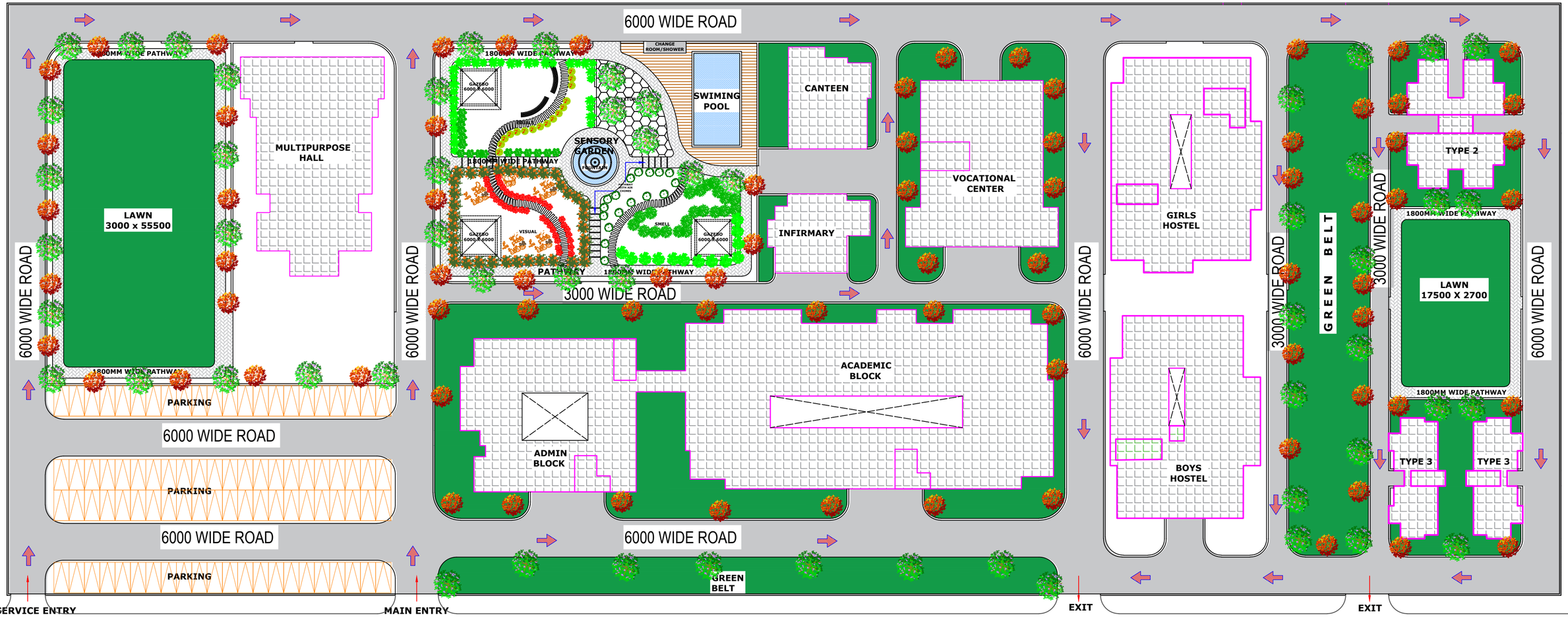
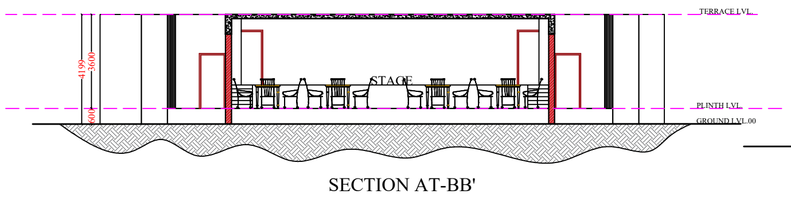


SITE PLAN



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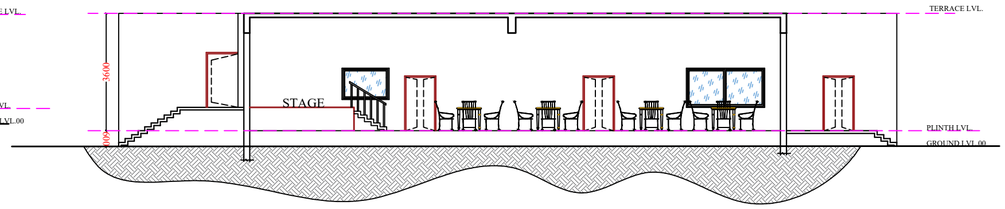
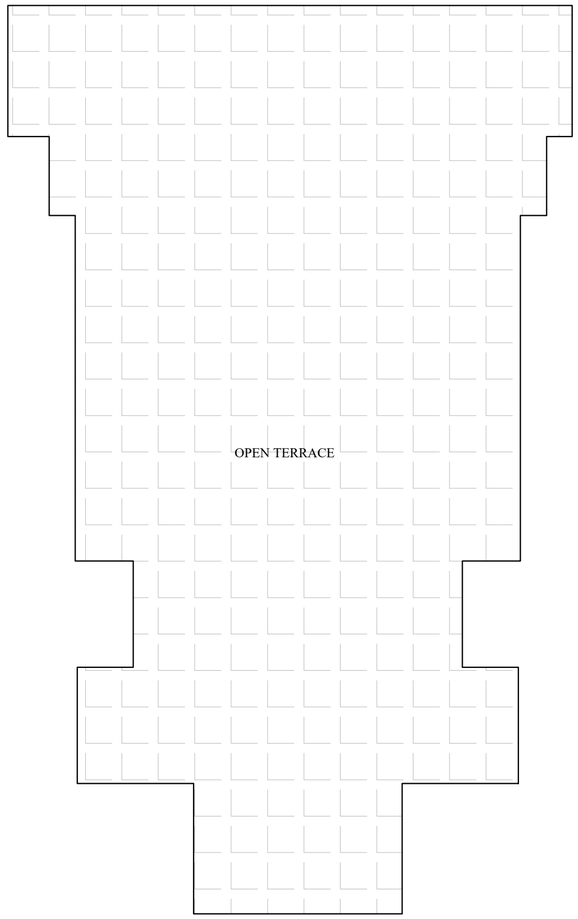
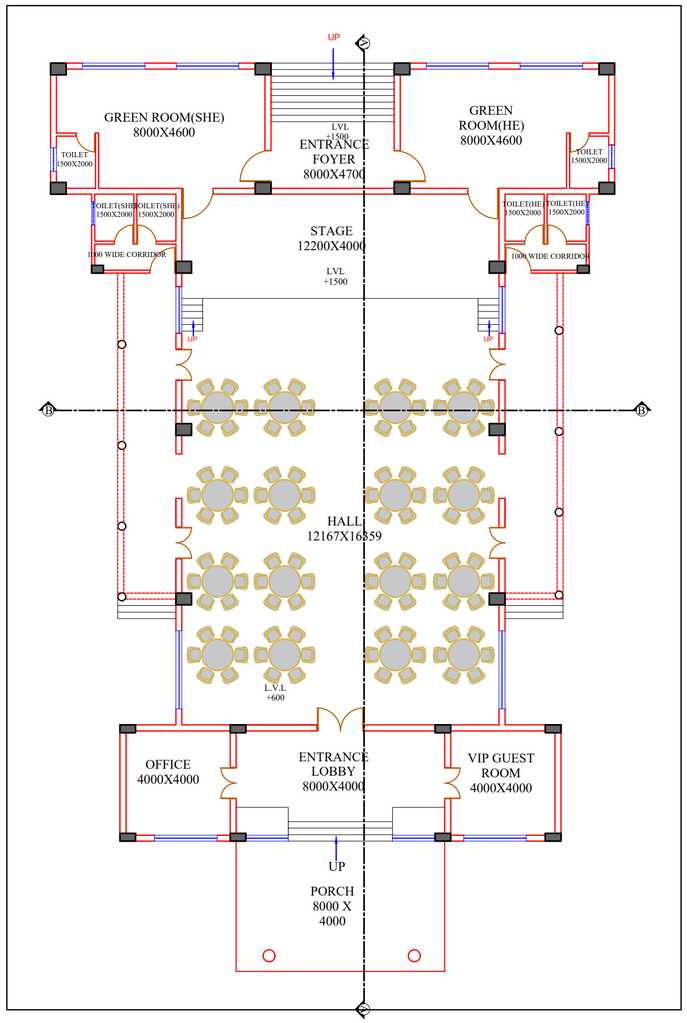
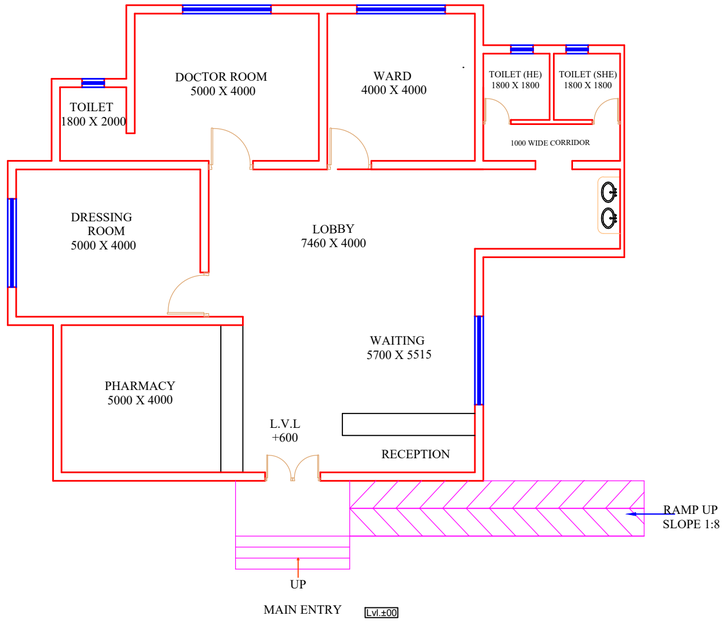


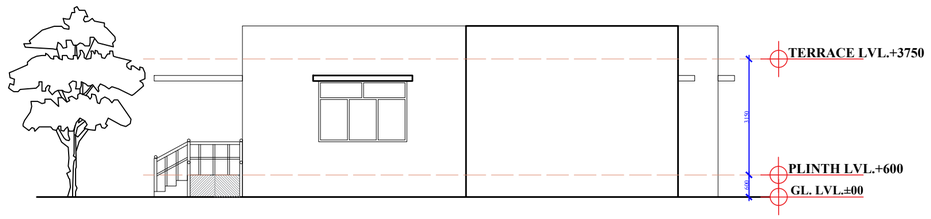




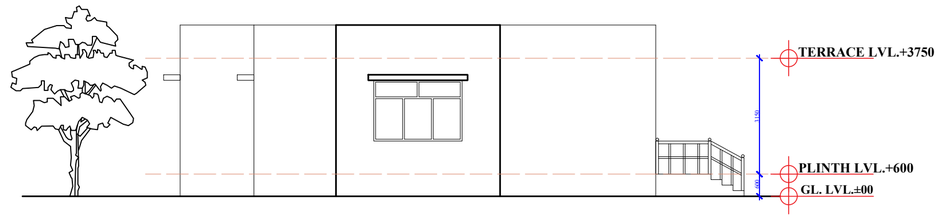
MULTIPURPOSE HALL



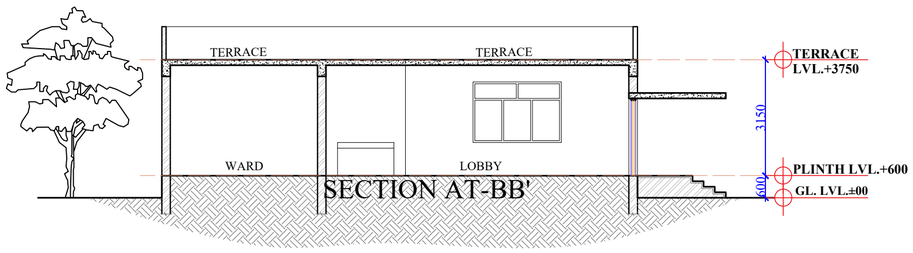
INFIRMARY



RIGHT SIDE ELEVATION



LEFT SIDE ELEVATION



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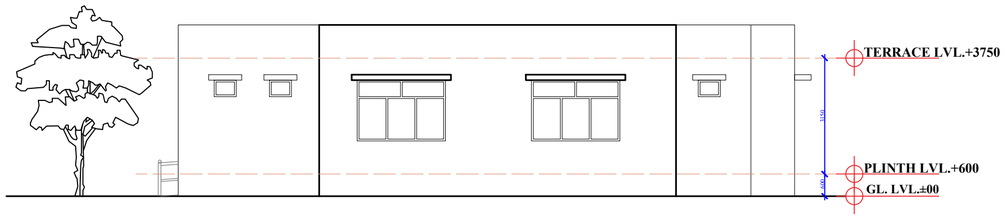

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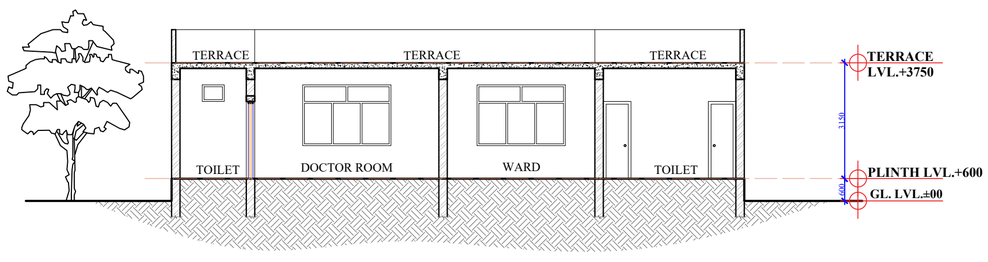

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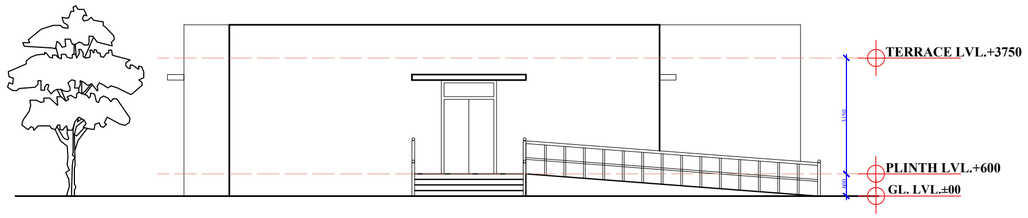

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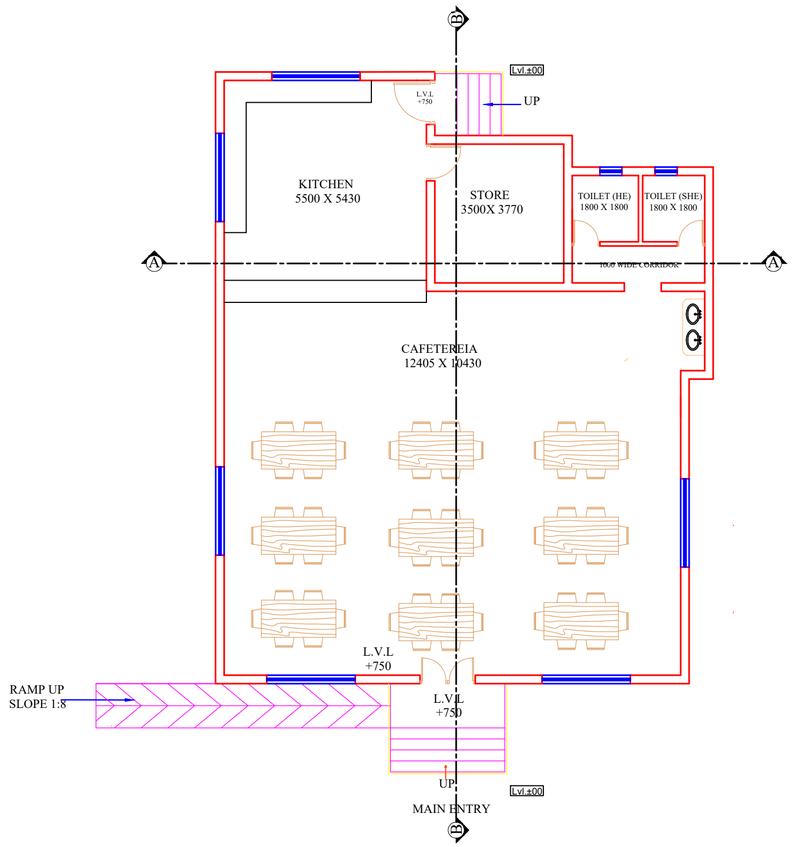
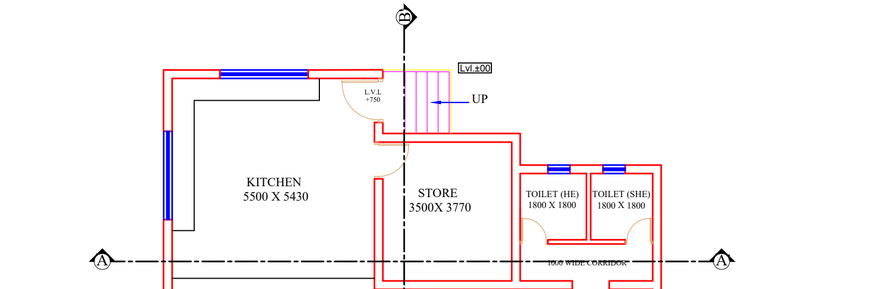


CANTEEN PLAN



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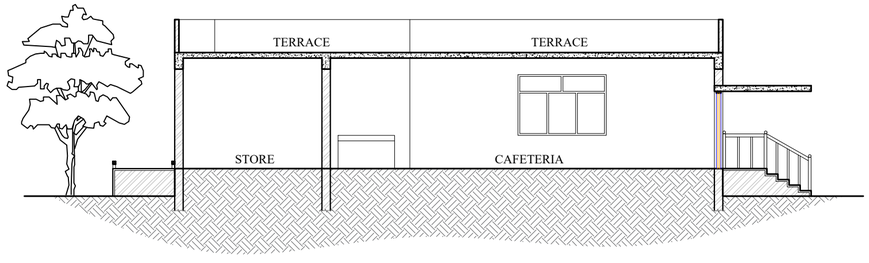

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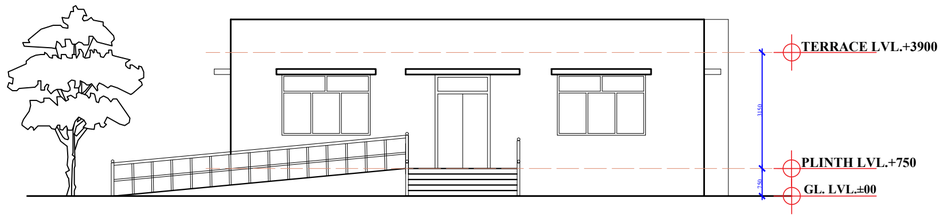

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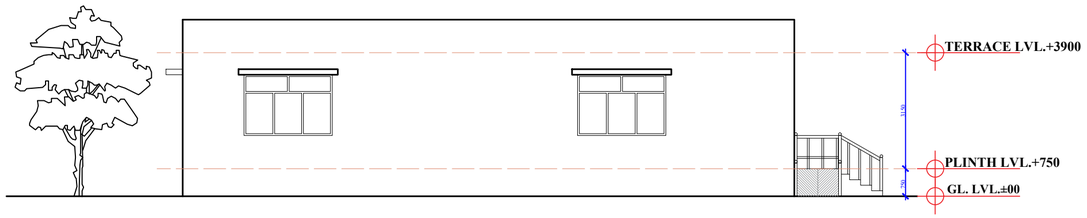

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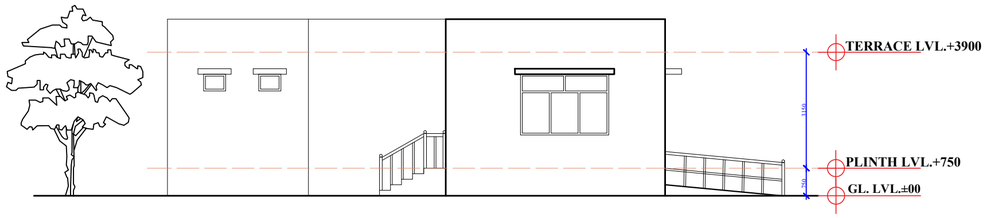
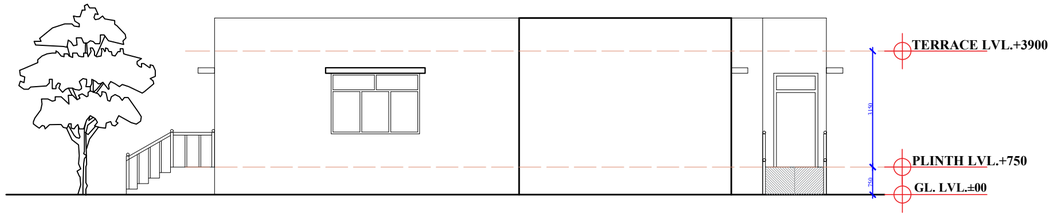
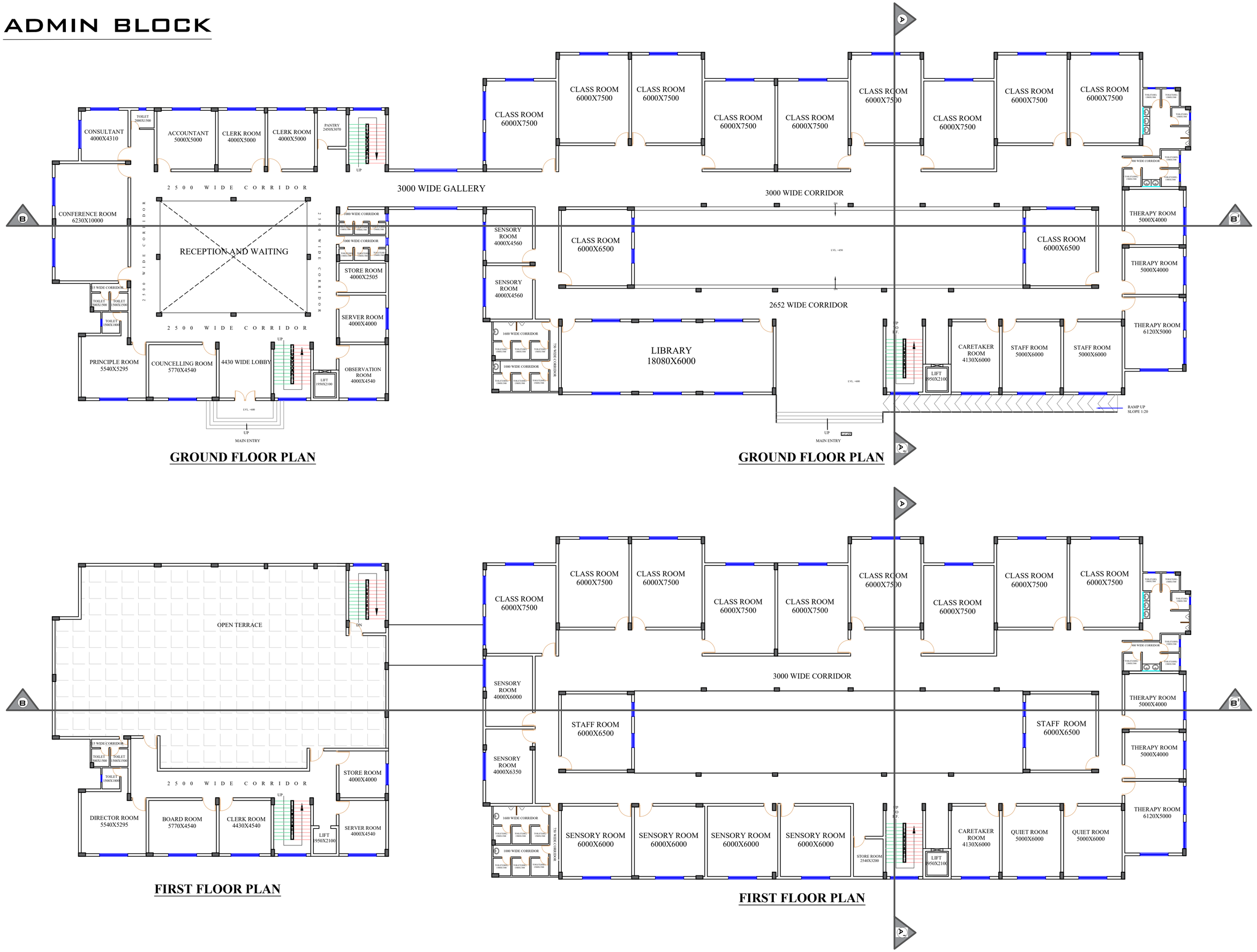


BACK SIDE ELEVATION



RIGHT SIDE ELEVATION

ADMIN BLOCK



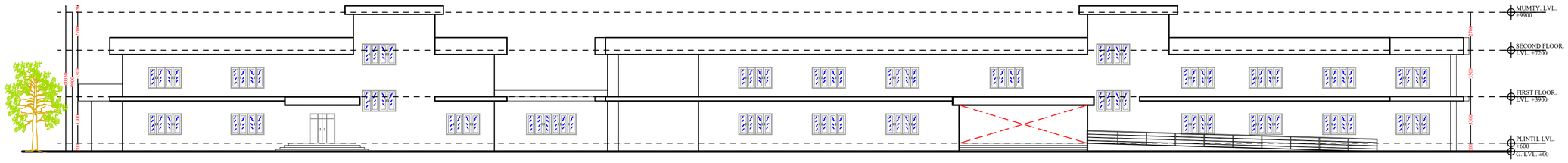
GROUND FLOOR PLAN

GROUND FLOOR PLAN

FIRST FLOOR PLAN

FIRST FLOOR PLAN

ADMIN BLOCK



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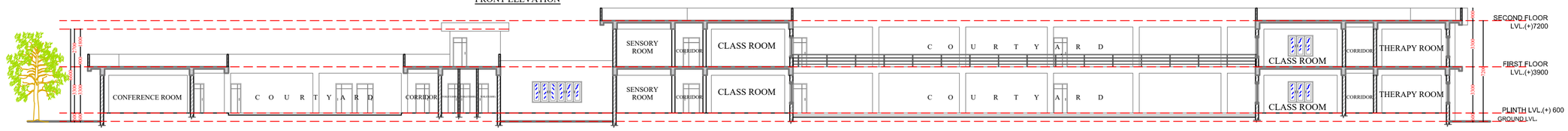

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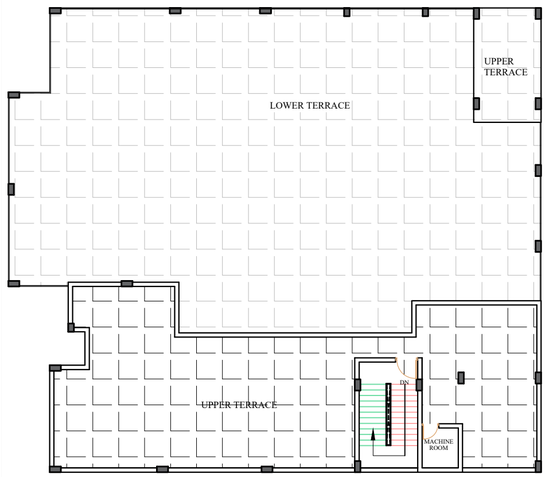
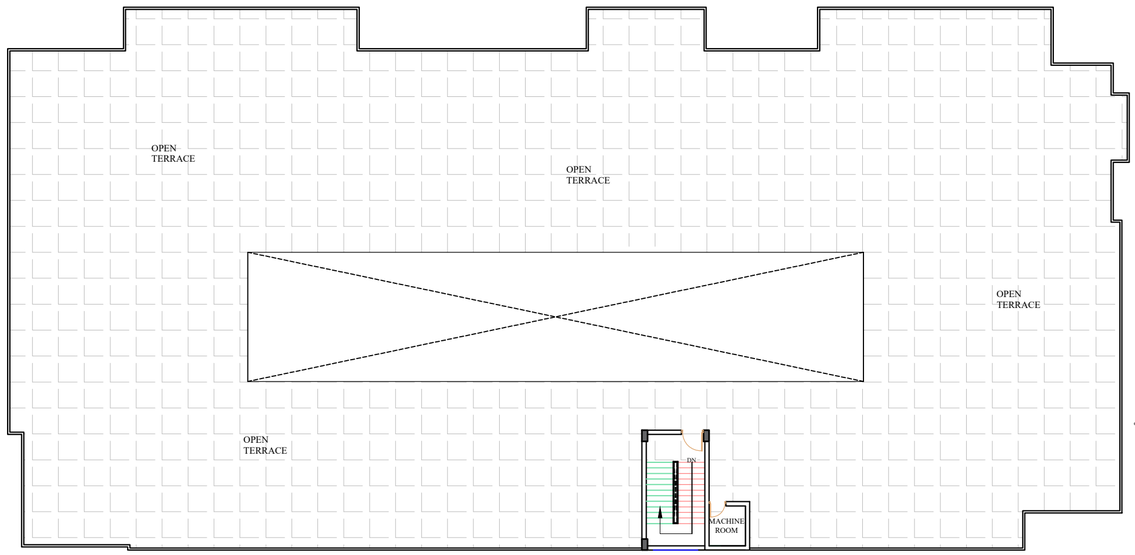
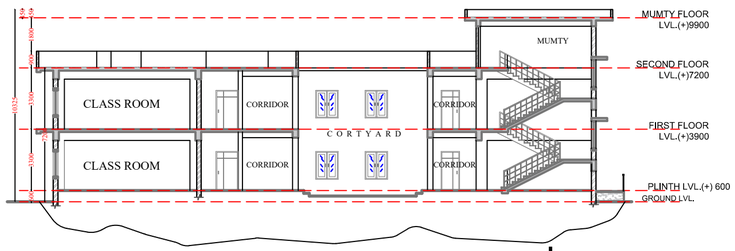


TERRACE FLOOR PLAN





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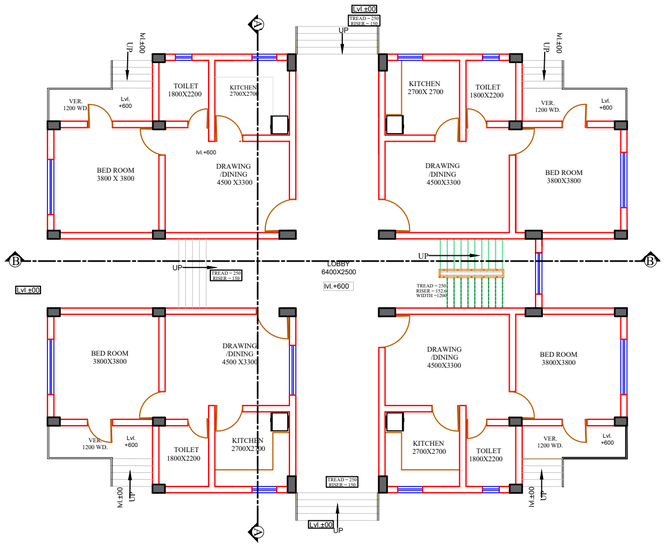
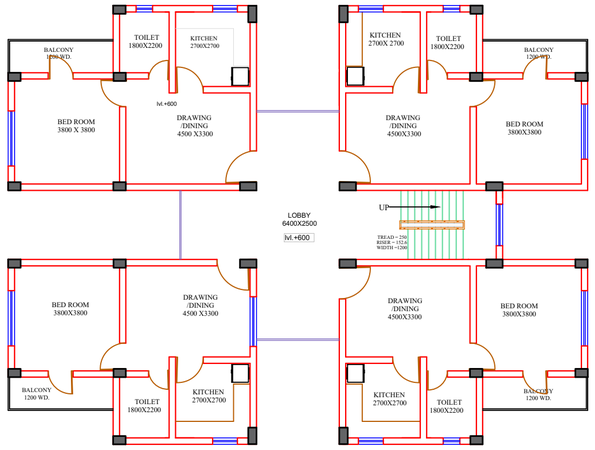
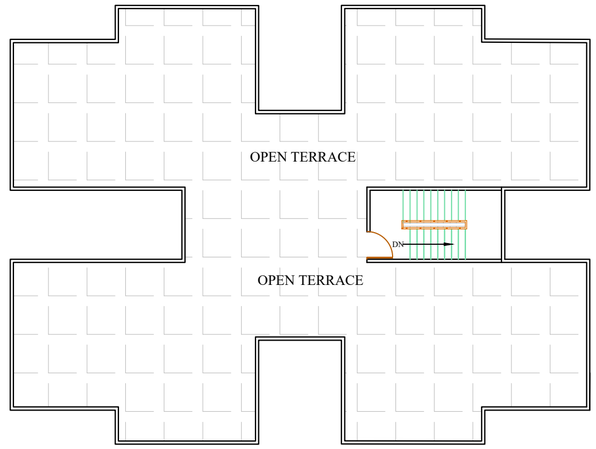


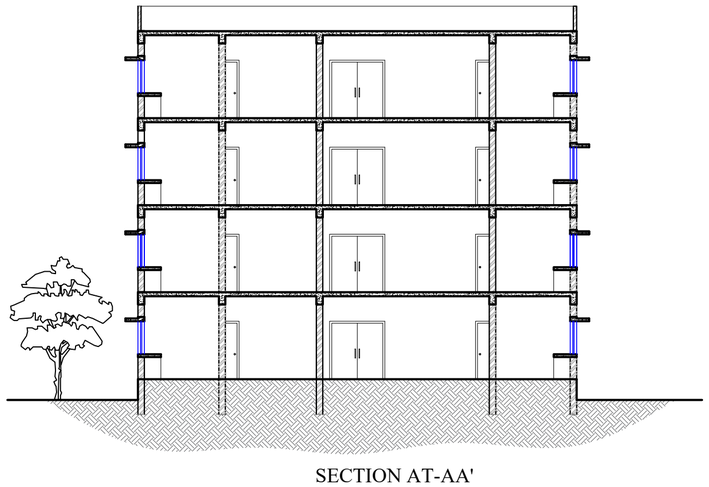
GROUND FLOOR PLAN



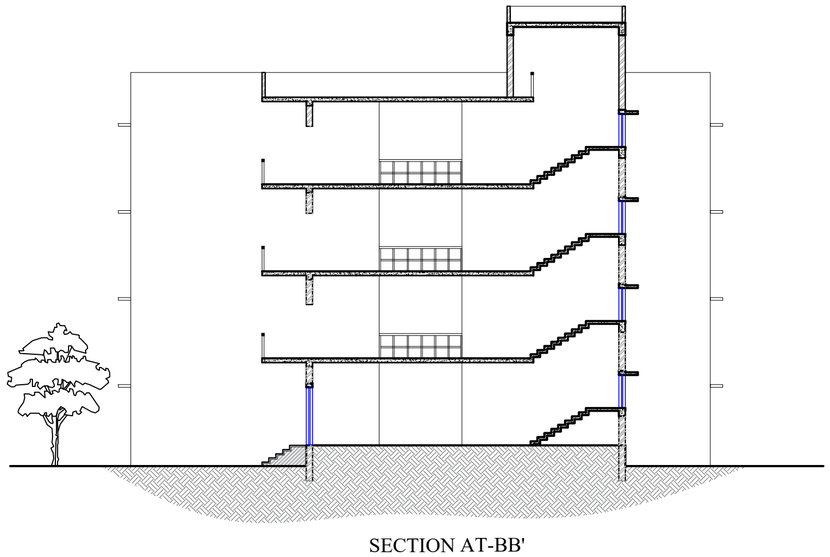
FIRST FLOOR TO THIRD FLOOR PLAN



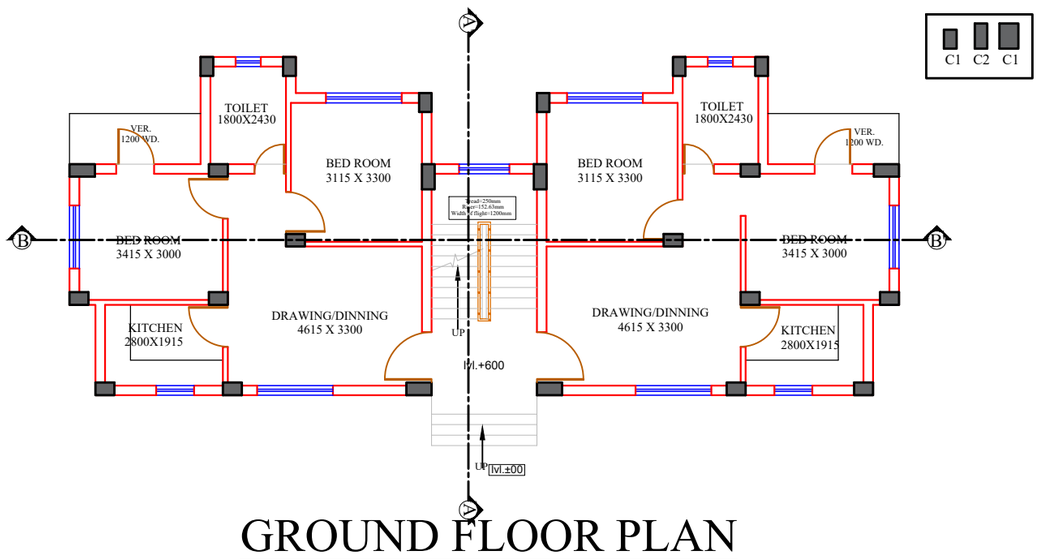
TERRACE PLAN



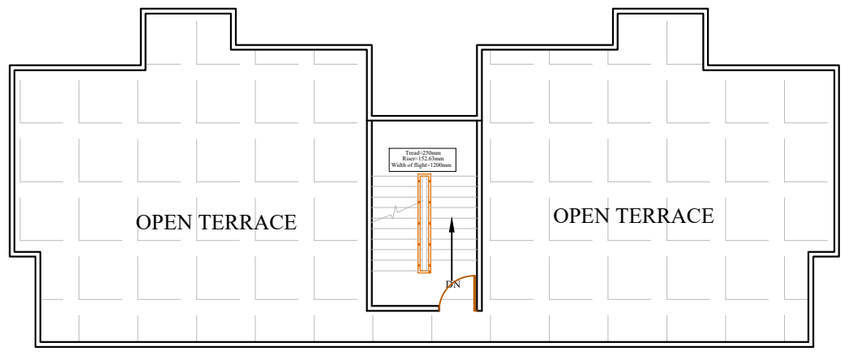
SECTION AT-AA'



SECTION AT-BB'



GROUND FLOOR PLAN



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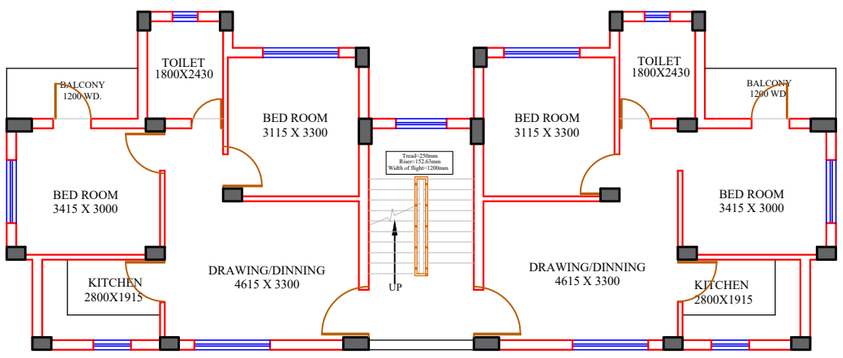

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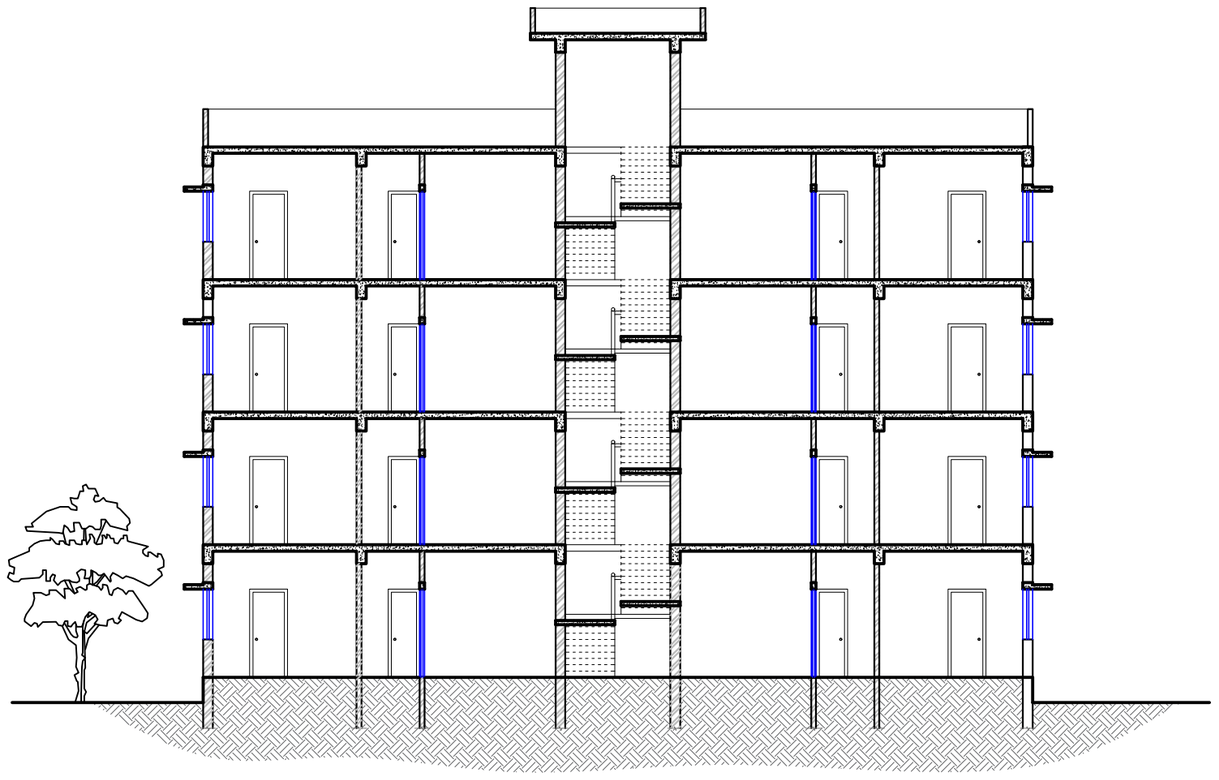
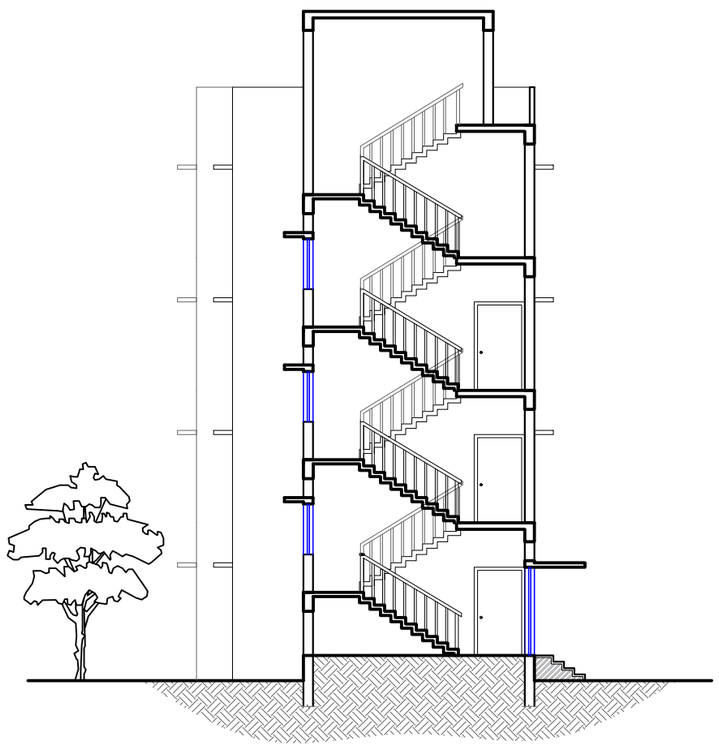


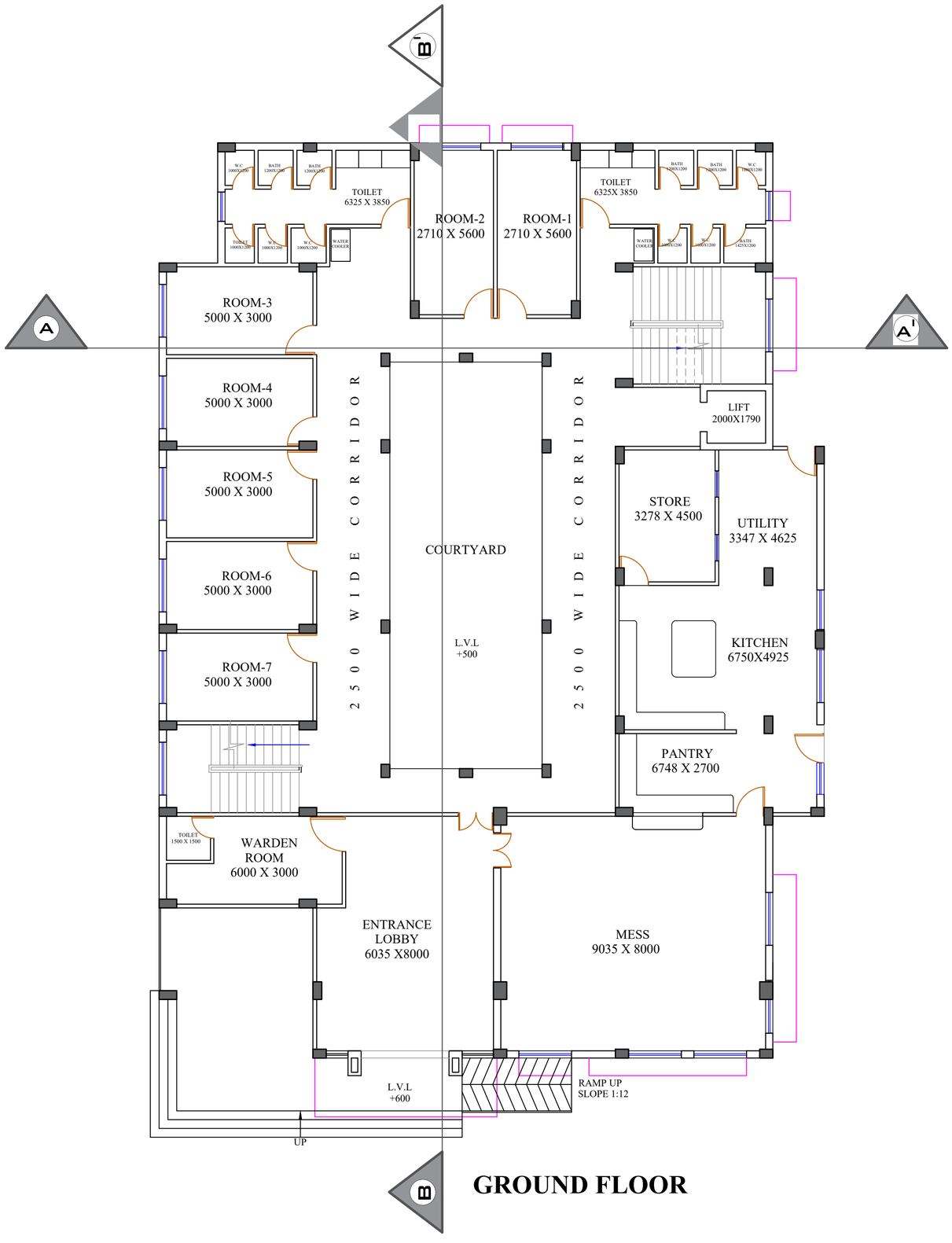
SECTION AT-BB'



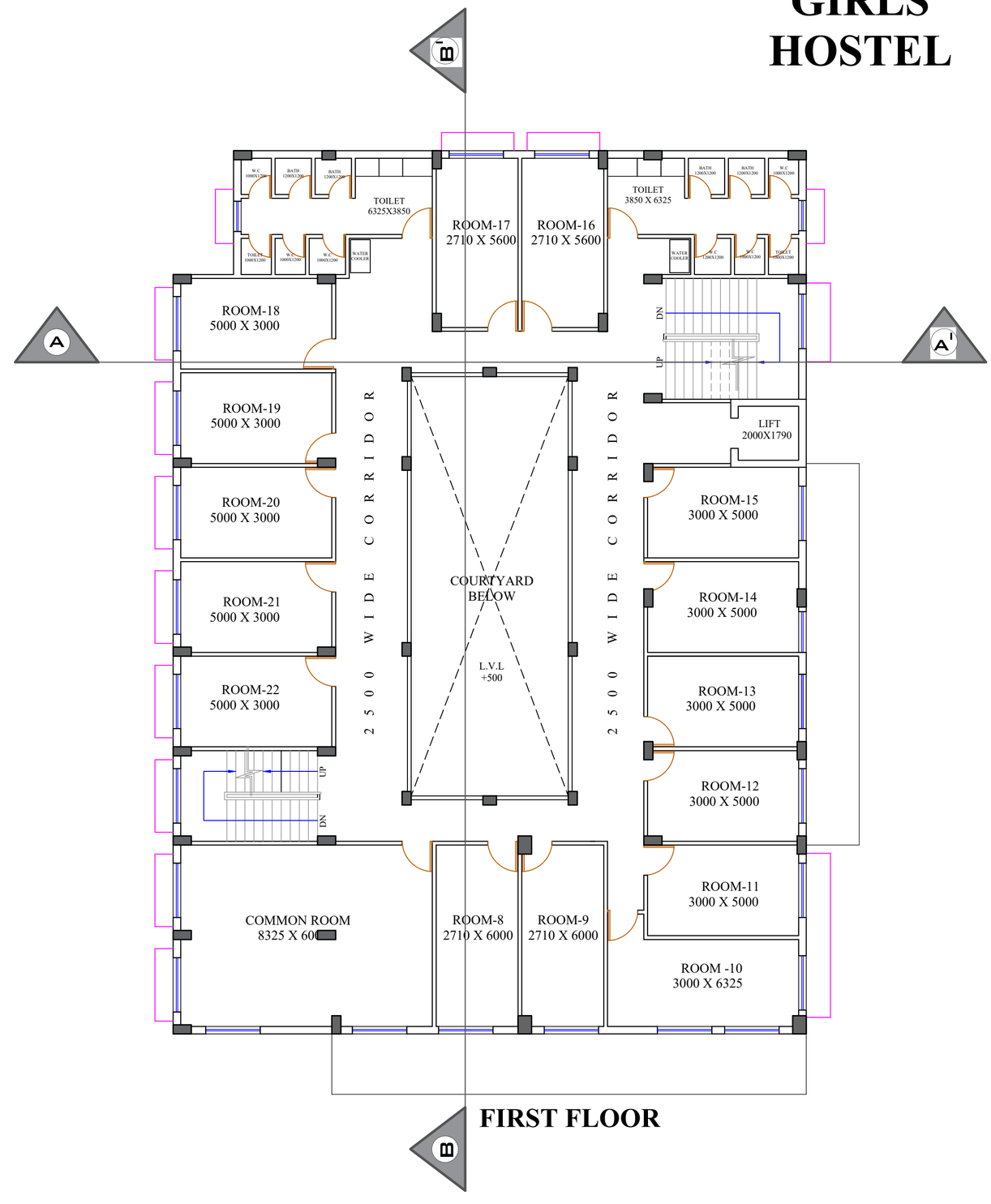
SECTION AT-AA'

FRONT ELEVATION

GIRLS HOSTEL

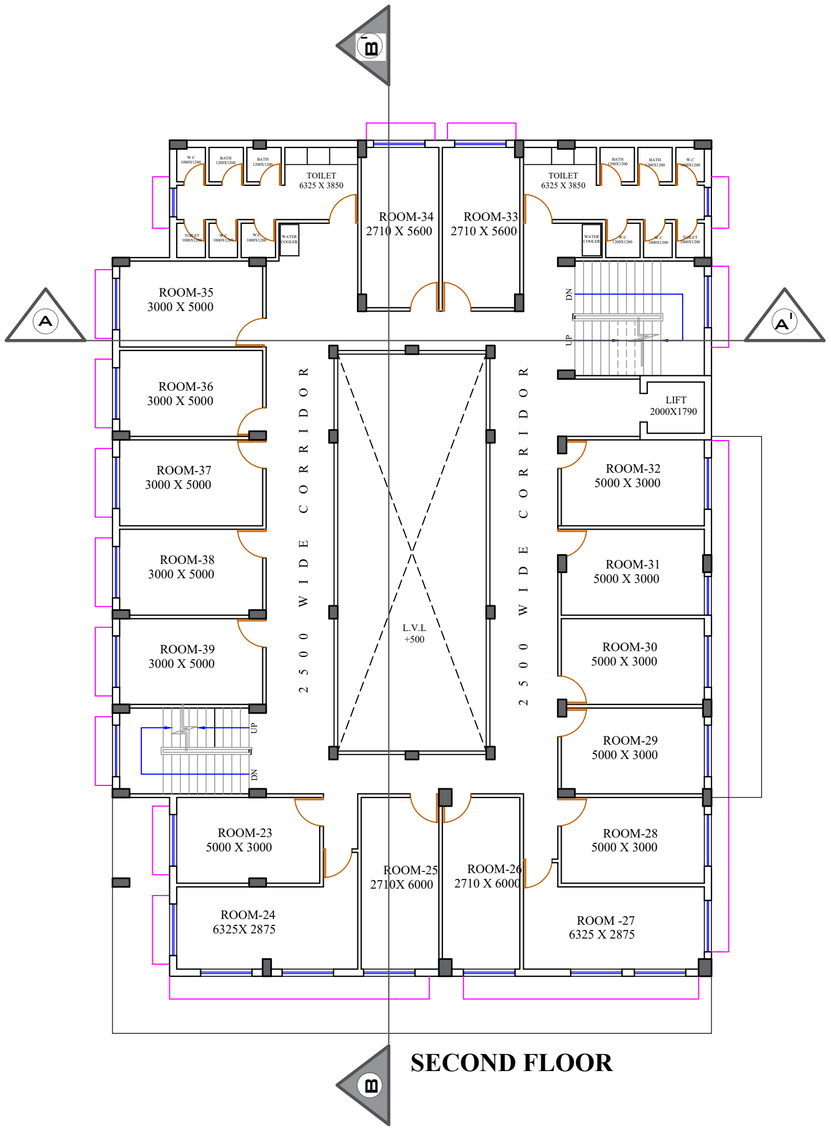


GROUND FLOOR

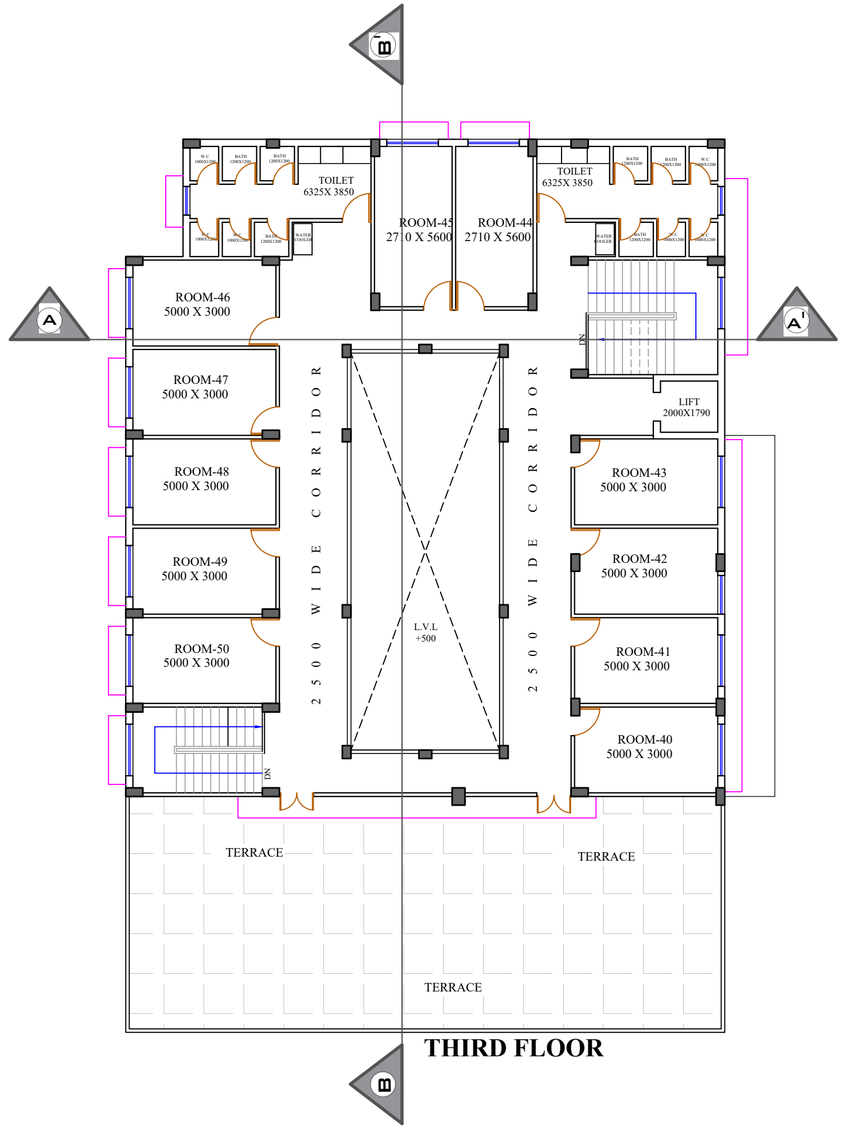


FIRST FLOOR

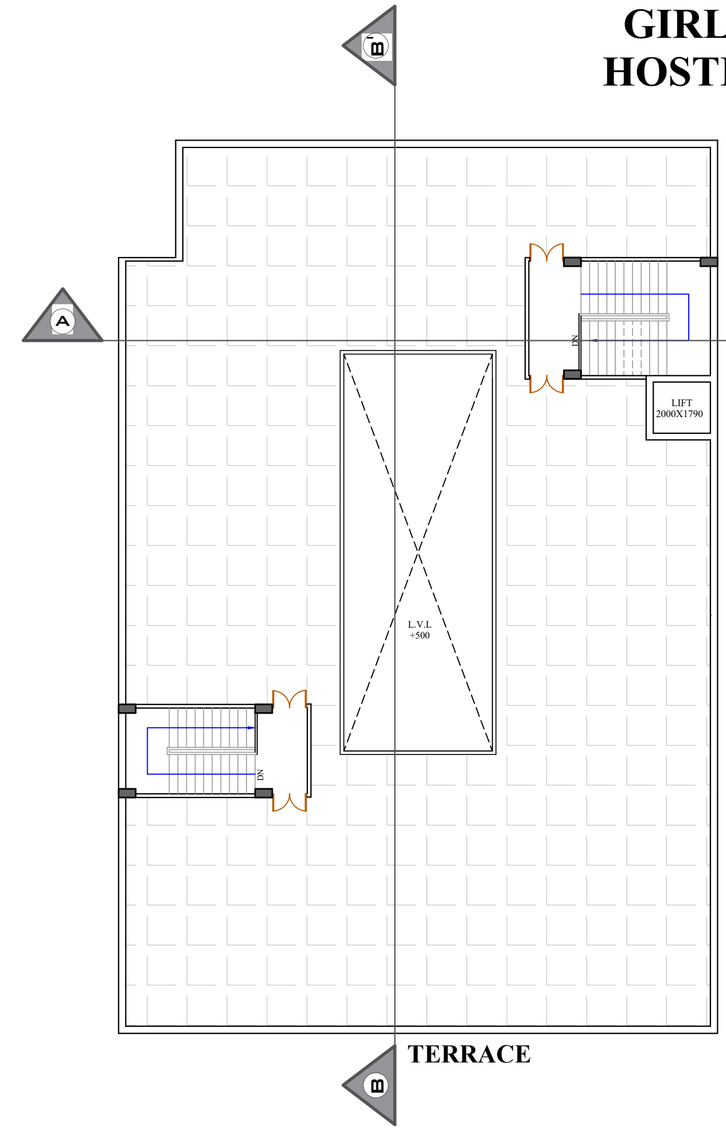
GIRLS HOSTEL



SECOND FLOOR

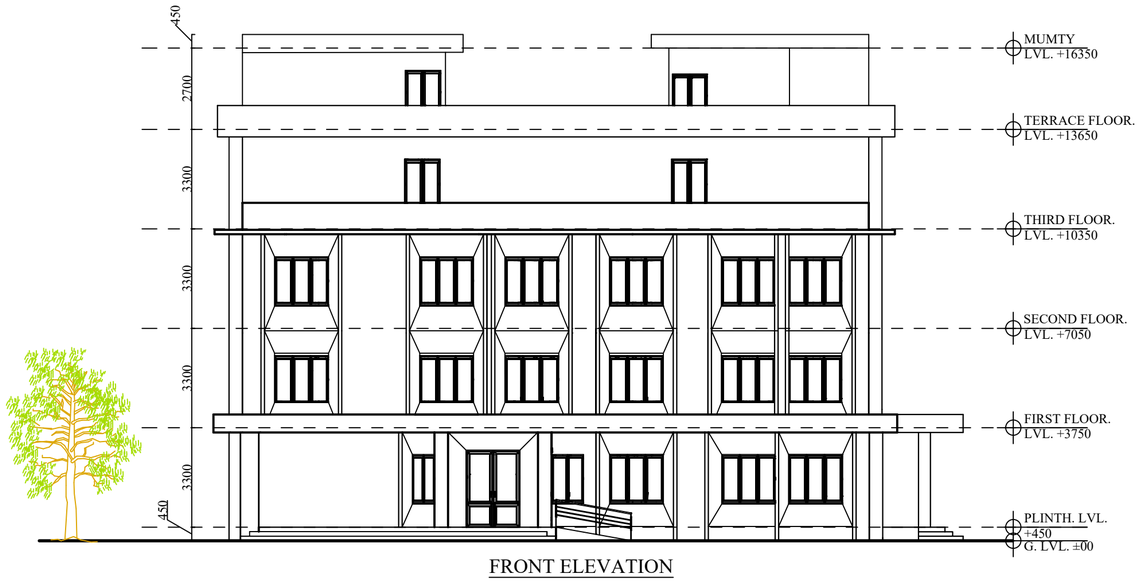


THIRD FLOOR



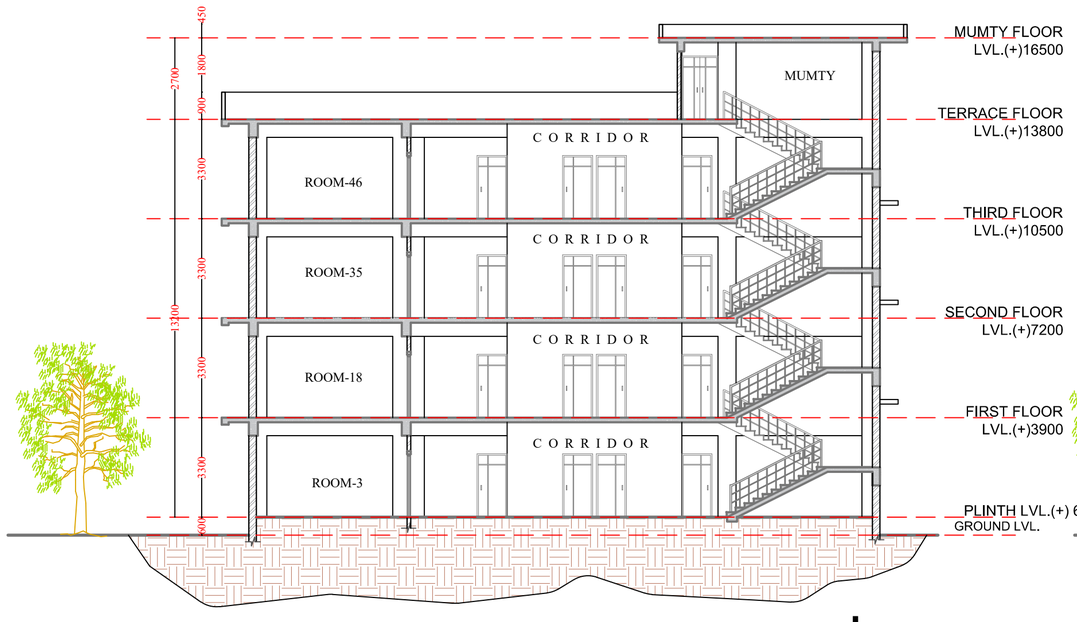
TERRACE

GIRLS HOSTEL

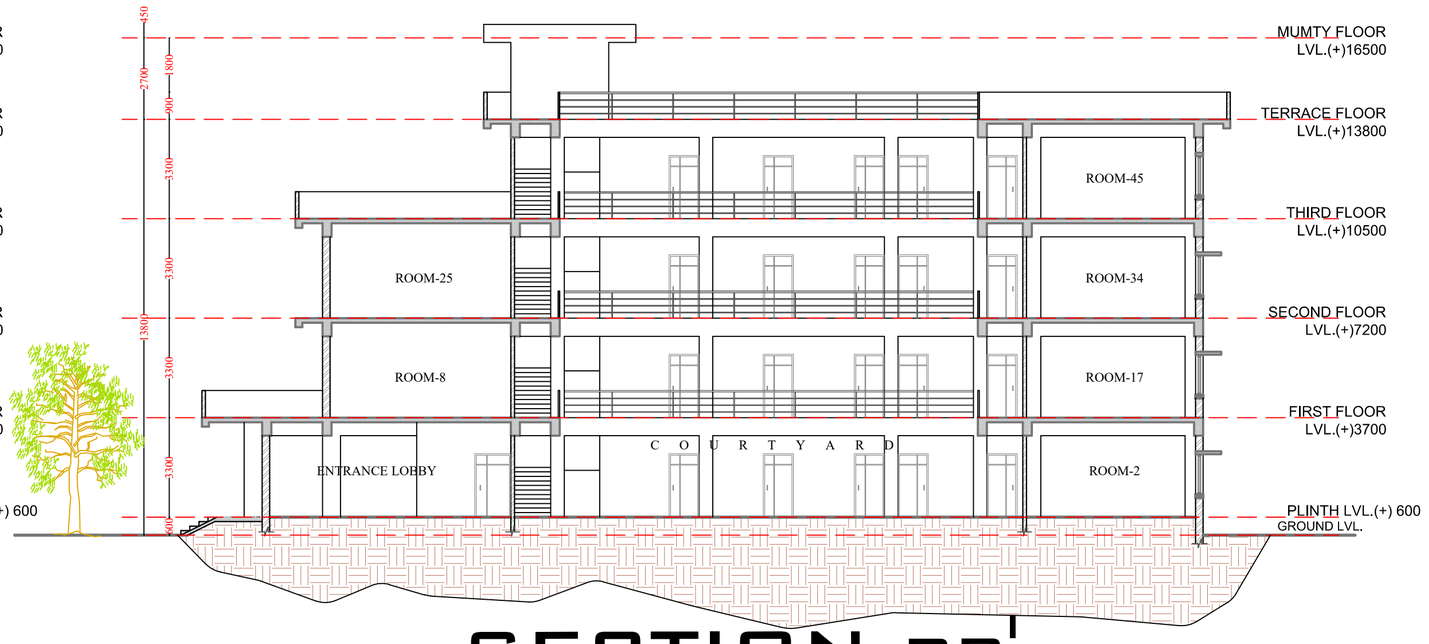


FRONT ELEVATION

RIGHT SIDE ELEVATION

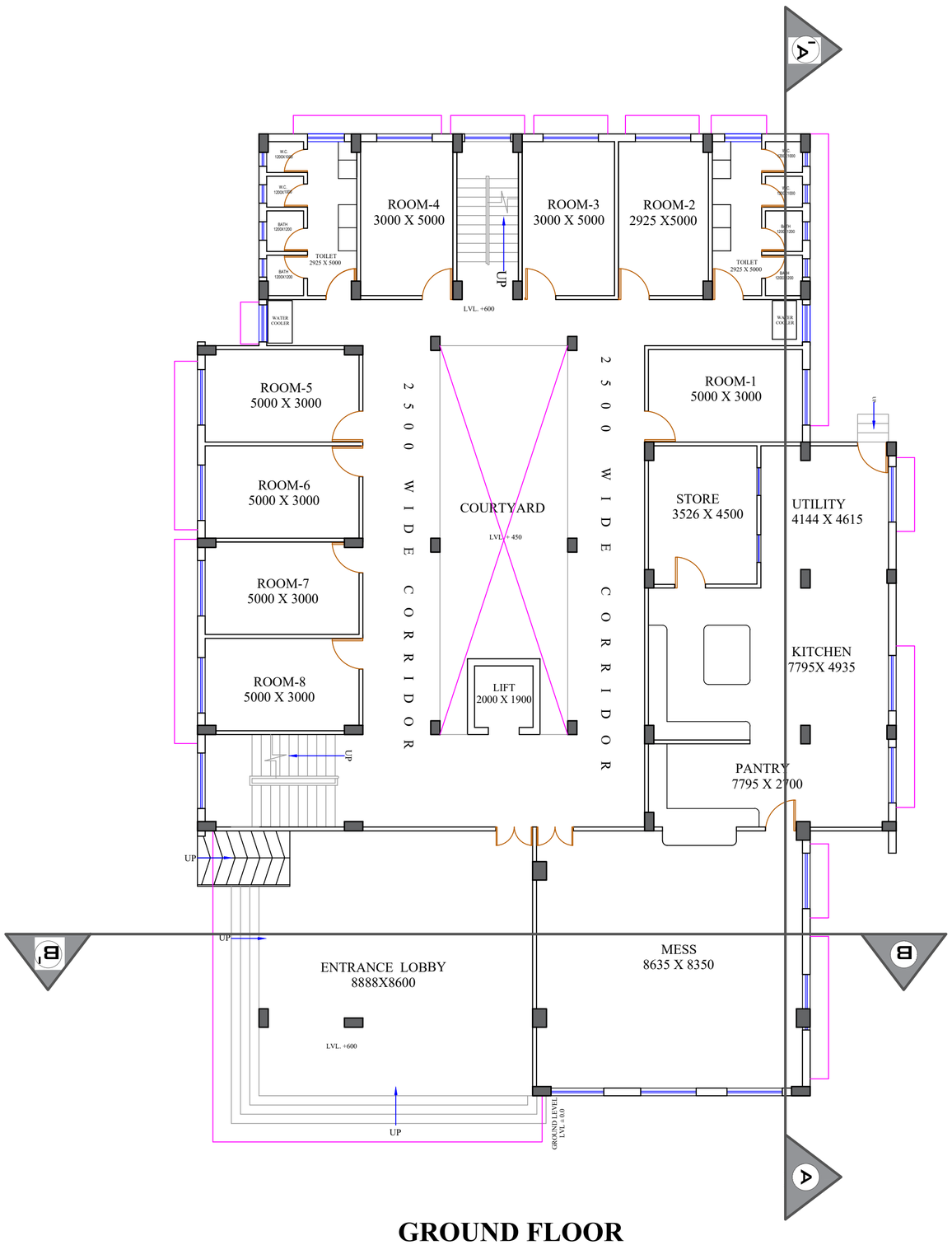


SECTION AA'

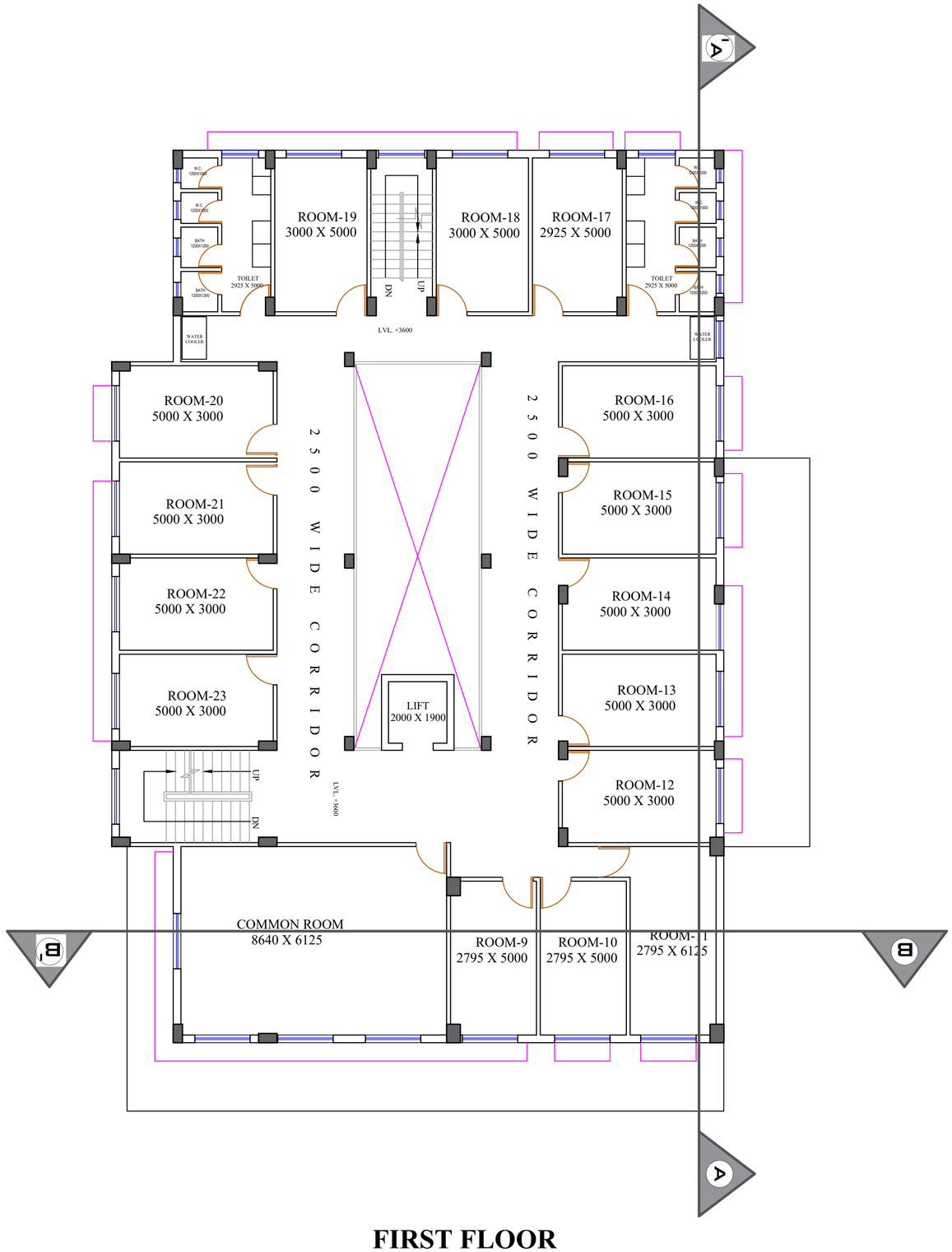


SECTION BB'

BOYS HOSTEL

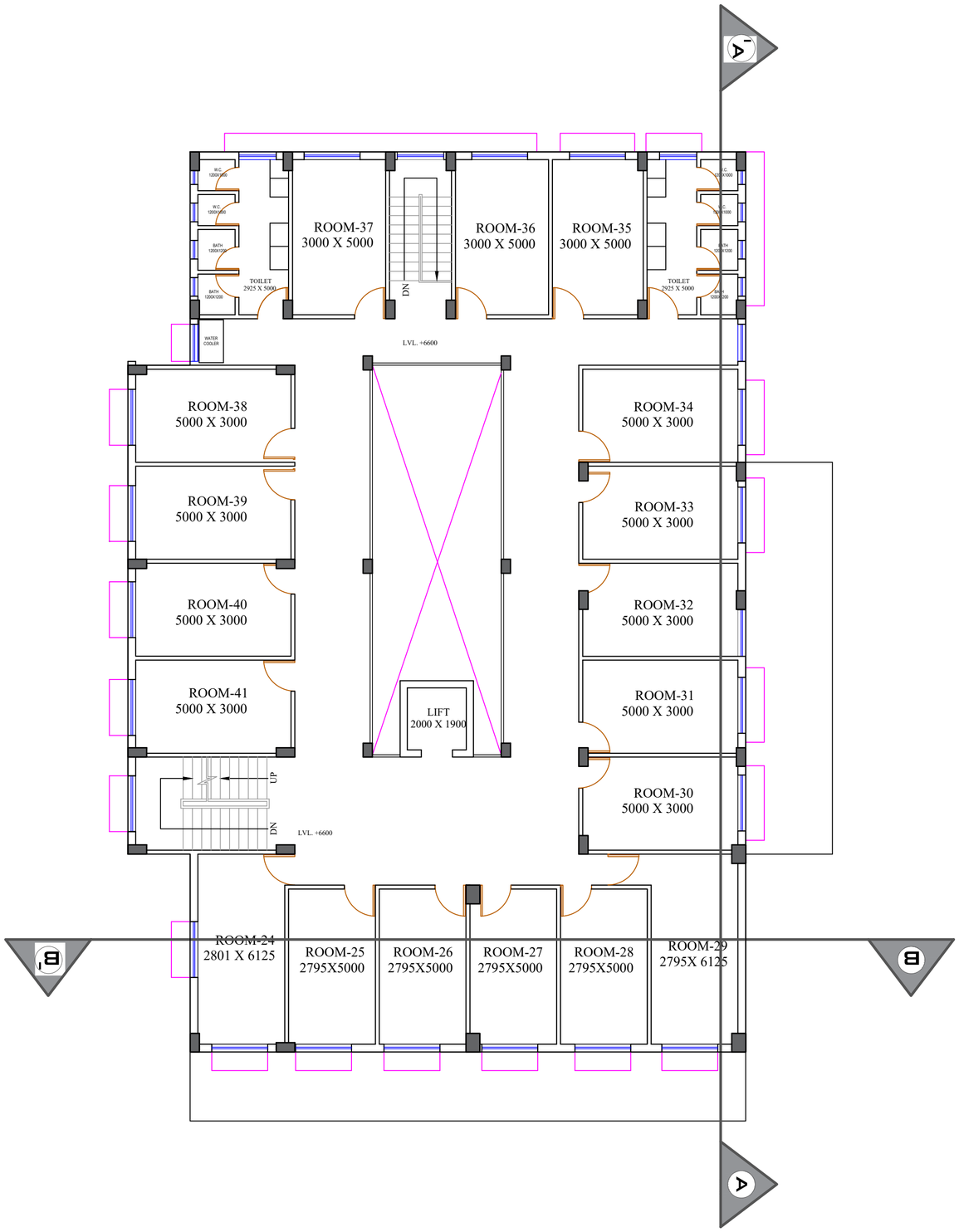


GROUND FLOOR



FIRST FLOOR

BOYS HOSTEL



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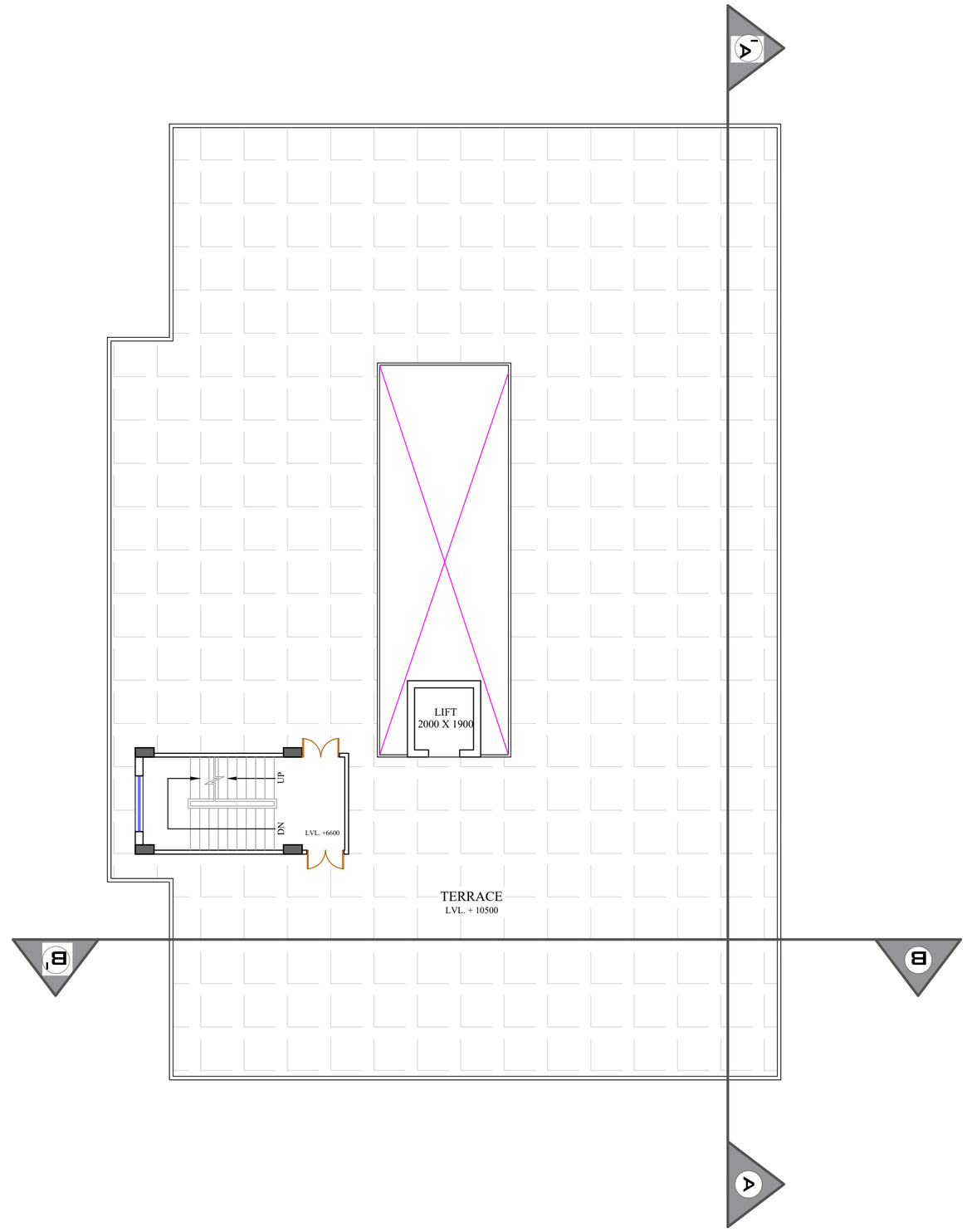
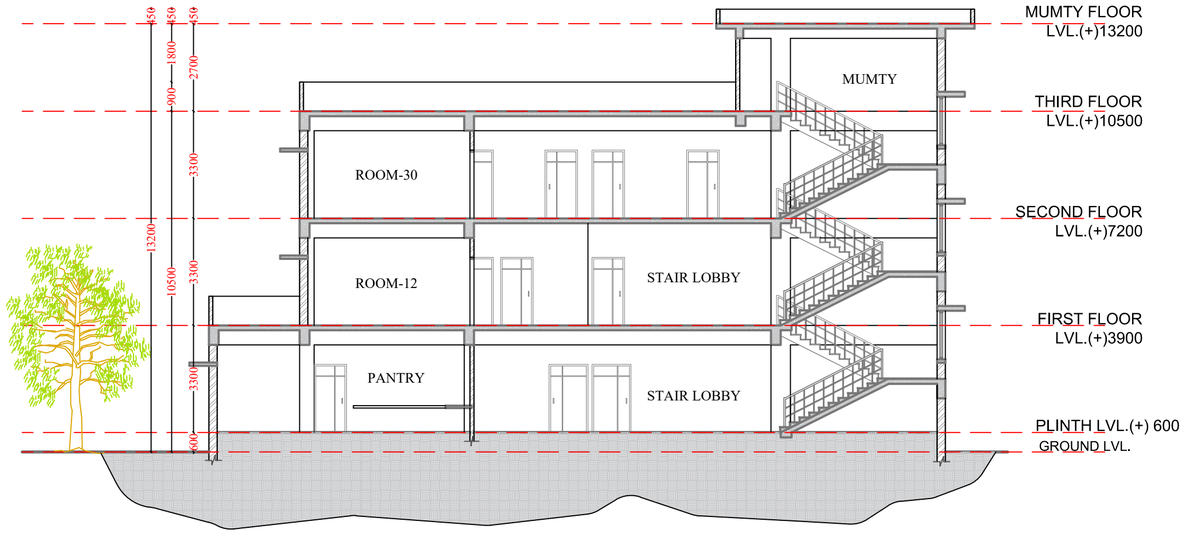
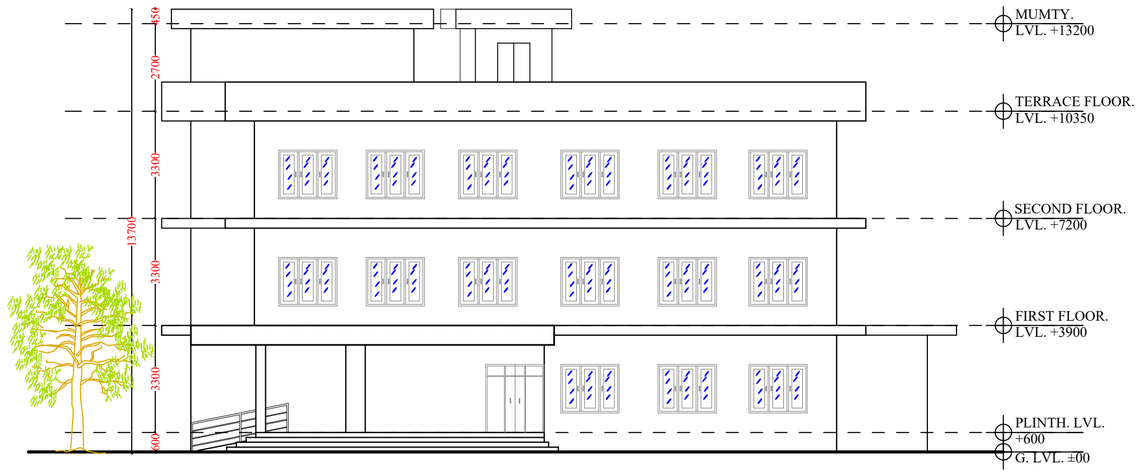


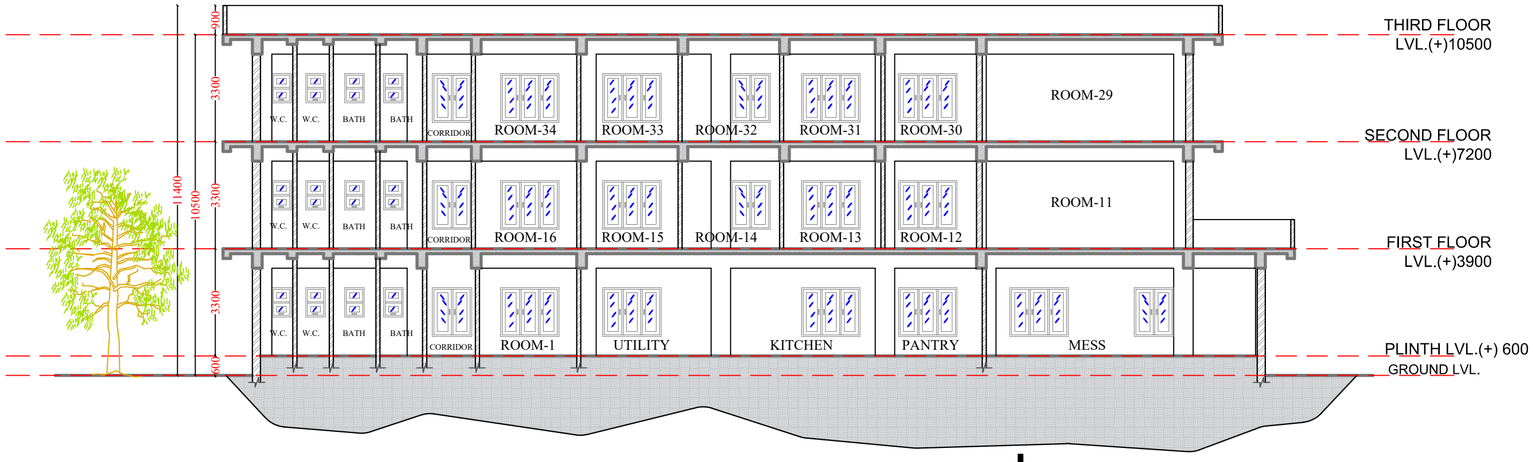
TERRACE



SECTION BB'



FRONT ELEVATION



SECTION AA'

BOYS HOSTEL