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Reinterpreting Autism Care: A Holistic Approach To An Autism Center for ASD Individuals

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REINTERPRETING AUTISM CARE: A HOLISTIC APPROACH TO AN AUTISM CENTRE FOR ASD INDIVIDUALS

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I

DECLARATION

I hereby declare that the Thesis entitled “REINTERPRETING AUTISM CARE: A HOLISTIC APPROACH TO AN AUTISM CENTRE FOR ASD INDIVIDUALS” was carried out by me during the year 2024 in partial fulfilment of the requirement for the award of the degree of Bachelor of Architecture of the APJ Abdul Kalam Technological University. This thesis is my effort and has not been submitted to any other University.

Kollam

June 2024 Jesna Joshy

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ABSTRACT

Autism spectrum disorder (ASD) is a neurological and developmental disorder that affects how people interact with others, communicate, learn, and behave. Although autism can be diagnosed at any age, it is described as a “developmental disorder” because symptoms generally appear in the first 2 years of life.

Autism rates are increasing in India, with approximately 4,046,199 individuals diagnosed, including 1,301,859 children, equating to 330.89 cases per 100,000 children. Factors such as heightened awareness and improved healthcare access contribute to this rise. However, the scarcity of facilities and support services remains a challenge, with fewer than 10,000 psychiatrists nationwide.

The 2011 census reveals that 1 in 10 households in India includes a person with a disability, with 78,64,636 children affected. UNESCO's 2019 report highlights the lack of formal education access for many children with disabilities, emphasizing the need for early identification and intervention. With the recognition of 21 disability types under the RPWD Act of 2016, addressing these challenges requires a comprehensive approach, including early detection and timely intervention.

The study will explore the physical and psychological needs of people with autism. The necessary tools and guidelines to architecturally address the specific sensory requirements of individuals with autism will be studied. The centre will be a positive learning and therapeutic space imparting academic, vocational, and life skill training to people with autism for their overall well-being.

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Chapter 1

Introduction

Autism Spectrum Disorder (ASD) is a developmental disability stemming from brain differences, which may have genetic or unknown origins. Individuals with ASD exhibit unique behaviours, communication styles, interactions, and learning patterns, often without distinct physical traits. The severity of symptoms can vary greatly among individuals. (American Psychiatric Association)

Diagnosing ASD relies on observing a child's behaviour and development, without a definitive medical test. While ASD can sometimes be identified in children as young as 18 months, a reliable diagnosis by an experienced professional typically occurs by age 2. However, many individuals may not receive a formal diagnosis until later in life, potentially delaying crucial early interventions and support. The current state of autism diagnosis and treatment in India faces challenges, with parents often experiencing delays or having to travel for diagnosis. Early interventions are crucial, with a growing focus on parent-assisted programs for social skills development before formal diagnosis. However, the limited number of autism centres (roughly 160) presents a significant barrier, with each centre unable to adequately serve the large population of diagnosed individuals (4,046,199). This highlights the urgent need for expanded and standardized autism services nationwide to ensure equitable access to care. (Singh et al.)

1.1 Aim

To create a specialized centre for autistic children and adults, incorporating learning spaces, rehabilitation facilities, accommodations, and recreational areas to support their diverse needs in one cohesive environment.

1.2 Objective

- Analyse the behaviour and activity patterns of individuals with autism.
- Assess the influence of architectural environments on their behavioural development.
- Identify environmental factors that could enhance the functional performance of children with autism in educational and rehabilitation settings, such as visual character, spatial sequencing, escape areas, clutter-free spaces, colour, texture, materials, and acoustics.
- Design accommodations based on their behavioural, cultural, and social needs.

1.3 Scope

This research focuses on studying the behavioural aspects of individuals with autism within educational and rehabilitation environments. It aims to define various types of spaces, including quiet spaces, intervention areas, open spaces, transition spaces, circulation spaces, multi-sensory areas, and inclusive education spaces tailored for autistic individuals. Additionally, it seeks to understand their perception of spaces through all six senses.

1.4 Limitation

Due to the scarcity of studies on autism, this study aims to address the impact on future facility designs for Autism centres. The scope of autistic treatment types and their effectiveness across various age groups differs, hence the study will focus on children aged 1.5 to 17 years and will provide only vocational training for the ASD adults.

1.5 Methodology

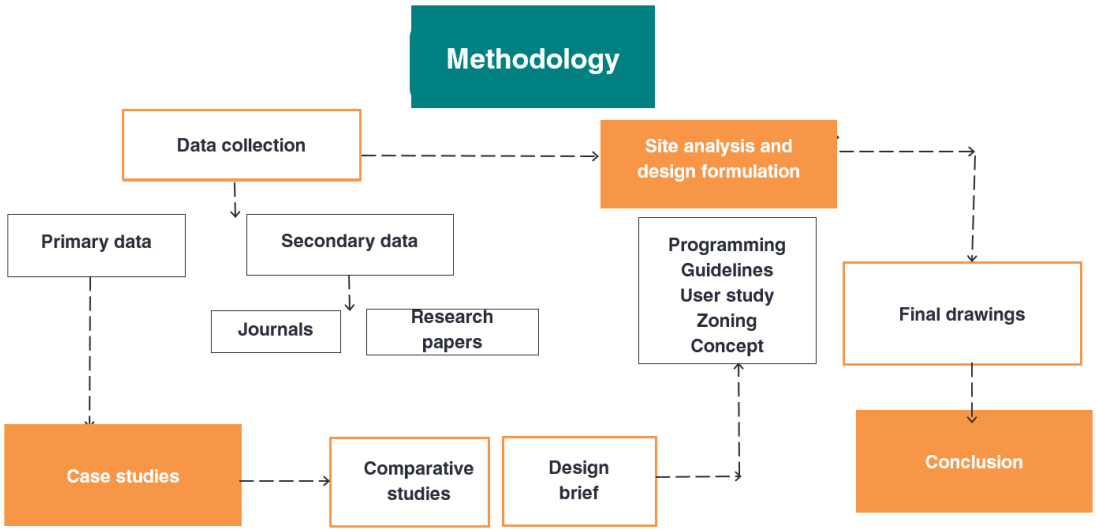

Table 1 Methodology flowchart

1.6 Statistics

Autism, a challenging developmental disorder, has often been overlooked by architects in influencing building design. In April 2018, the CDC reported a diagnosis rate of 1 in 59 children in the US. However, recent studies suggest a higher prevalence, estimating that approximately 1 in 44 children in the US have autism spectrum disorder (ASD). Globally, the World Health Organization (WHO) notes that around 1 in 100 children has ASD. (Singh et al., 2023) Notably, ASD affects more boys than girls, with a ratio of 3.7% of boys to 0.9% of girls. Despite these reported figures, many experts believe

the actual prevalence of ASD to be higher, especially considering that data indicates a rising trend worldwide in 2022. The frequency of autism in low- and middle-income countries remains largely unknown, with some studies suggesting higher prevalence rates.

The autism rate in India is increasing annually, with a rate of 290.95 per 100,000 people and 330.89 per 100,000 among children. India has approximately 4,046,199 diagnosed cases, with 1,301,859 children affected. Accurate data on the evolution of autism rates is challenging to obtain, but recent studies indicate a rising trend, possibly due to improved awareness, diagnosis, and healthcare access. About 18 million individuals in India are diagnosed with autism, with 1 to 1.5 percent of children aged two to nine affected. However, there is a scarcity of facilities and support services for autism, with less than 10,000 psychiatrists in India, mostly concentrated in urban areas. Despite a growing number of mental health professionals, the demand for services surpasses the available supply, highlighting the need for broader strategies to address the gap.

India currently has approximately 160 autism centres, mostly established on a small scale and lacking comprehensive services. Each institution offers different services, leading to challenges in receiving proper care and treatment, especially for individuals in early developmental stages. With a total diagnosed population of 4,046,199 individuals with autism, the ratio of autistic individuals to autism centres is approximately 25,288 to 1. This imbalance highlights the difficulty in providing adequate support and services to meet the needs of the autistic population in India.

Genetics do play a role in autism. But healthcare providers have only identified specific genetic causes in 10% to 20% of cases. These cases include specific genetic syndromes associated with ASD, such as fragile X syndrome, and rare changes in genetic code.

Autism is hereditary. When one child receives an ASD diagnosis, the next child has about a 20% greater risk of developing autism than normal. When the first two children in a family have ASD, the third child has about a 32% greater risk of developing ASD.

1.7 Research rationale

Autism spectrum disorder poses lifelong challenges, particularly in communication and social interaction. Many adults with autism struggle to secure stable employment and relationships, facing isolation and a heightened risk of suicide. Recent studies underscore significant gaps in support and resources for autistic individuals, underscoring the urgent need for improved understanding and assistance. (Singh et al. (2022)

From a design perspective, there's a growing interest in exploring how architecture can positively impact the lives of autistic children. This involves delving into sensory design approaches and creating environments that cater to their specific needs, aiming to enhance their overall well-being. The research endeavours to develop architectural design guidelines tailored to address these challenges, recognizing the broader importance of advocating for greater inclusion and support for autistic individuals within society.

Architecture, as a discipline, involves shaping the physical environment to support specific functions and influence desired behaviour. This environment consists largely of sensory elements such as textures, colours, patterns, and acoustics. In the context of autism, these sensory elements are crucial as they significantly impact autistic behaviour and cognition. Understanding and effectively integrating these sensory elements are essential for addressing the core challenges of the disorder.

Chapter 2

Data Collection

2.1 About Autism

Autism spectrum disorder (ASD) is a neurological and developmental disorder that affects how people interact with others, communicate, learn, and behave. Although autism can be diagnosed at any age, it is described as a “developmental disorder” because symptoms generally appear in the first 2 years of life. (Centers for Disease Control and Prevention)

People with ASD may behave, communicate, interact, and learn in ways that are different from most other people. There is often nothing about how they look that sets them apart from other people. The abilities of people with ASD can vary significantly. For example, some people with ASD may have advanced conversation skills whereas others may be nonverbal. Some people with ASD need a lot of help in their daily lives; others can work and live with little to no support. (Mayo Clinic)

Autism spectrum disorder is a condition related to brain development that impacts how a person perceives and socializes with others, causing problems in social interaction and communication. The disorder also includes limited and repetitive patterns of behaviour. The term "spectrum" in autism spectrum disorder refers to the wide range of symptoms and severity. (American Psychiatric Association).

2.1.1 What is ASD?

Autism vs. autism spectrum disorder (ASD) — what's the difference?

The American Psychiatric Association changed the term autism to autism spectrum disorder globally in 2013. ASD is now an umbrella term that covers the different levels of autism. The autism spectrum includes conditions that providers used to consider separate, including:

1.Autism.2. Asperger syndrome.3. Pervasive developmental disorder — not otherwise specified (PDD-NOS).

Healthcare providers don't officially recognize Asperger syndrome as its own condition anymore. They used to consider Asperger and autism as different conditions. The symptoms that were once part of an Asperger's diagnosis now fall under the autism spectrum. Providers consider Asperger's a mild form of autism. Some people still use the term Asperger's syndrome to describe their condition. (Lord et al.)

Autism spectrum disorder includes conditions that were previously considered separate — autism, Asperger's syndrome, childhood disintegrative disorder and an unspecified form of pervasive developmental disorder. Some people still use the term "Asperger's syndrome," which is generally thought to be at the mild end of autism spectrum disorder. (Mayo Clinic)

ASD begins before the age of 3 years and can last throughout a person's life, although symptoms may improve over time. Some children show ASD symptoms within the first 12 months of life. In others, symptoms may not show up until 24 months of age or later. Some children with ASD gain new skills and meet developmental milestones until

around 18 to 24 months of age, and then they stop gaining new skills or lose the skills they once had. (Centers for Disease Control and Prevention)

As children with ASD become adolescents and young adults, they may have difficulties developing and maintaining friendships, communicating with peers and adults, or understanding what behaviours are expected in school or on the job. They may come to the attention of healthcare providers because they also have conditions such as anxiety, depression, or attention-deficit/hyperactivity disorder, which occur more often in people with ASD than in people without ASD. (American Psychiatric Association)

2.1.2 Levels of ASD

ASD Level 1: Requiring Support-Level 1 is the mildest, or "highest functioning" form of autism, which includes those who would have previously been diagnosed with Asperger's syndrome. Individuals with ASD level 1 may have difficulty understanding social cues and may struggle to form and maintain personal relationships. A child with level 1 autism may understand and speak in complete sentences, but have difficulty engaging in back-and-forth conversation. Children with ASD level 1 experience some inflexibility of behaviour, like difficulty switching between tasks, staying organized, and planning. (Lord et al.)

ASD Level 2: Requiring Substantial Support-Social communication and repetitive behaviours present themselves more obviously in children with ASD level 2 than in children with level 1 autism. Children on this level have challenges in verbal and nonverbal communication, as well as reduced or abnormal responses to social cues. Inflexibility of behaviour is also more pronounced than in ASD level 1. Repetitive behaviours appear more frequently and may be obvious to casual observes. Likewise,

children with level 2 autism may have difficulty coping with changes in routine, which can cause challenging behaviour.

(Centers for Disease Control and Prevention)

ASD Level 3: Requiring Very Substantial Support-ASD level 3 is characterized by severe challenges in social communication as well as extremely inflexible behaviour. Children with level 3 autism will be nonverbal or have the use of only a few words of intelligible speech. Initiation of social interaction is very limited, as well as response to others. An individual at this level may interact with others abnormally, and only to meet immediate needs. Individuals with level 3 autism exhibit marked inflexibility of behaviour, with extreme difficulty coping with changes to routine. At this level, restrictive or repetitive behaviours interfere with the individual's ability to function. Changing focus from one activity to another may come at great difficulty and cause significant distress. (American Psychiatric Association)

2.1.3 Behavioural patterns

Individuals with Autism Spectrum Disorder (ASD) often face challenges in social communication and interaction. For instance, they may avoid eye contact, fail to respond to their name, or exhibit limited facial expressions and gestures. These difficulties can manifest early on, with delays seen in engaging in interactive games and sharing interests with others. Moreover, individuals with ASD often display restricted or repetitive behaviours and interests, such as lining up toys, repeating words or phrases, and adhering strictly to routines. Additionally, they may exhibit stereotypical movements and have unusual reactions to sensory stimuli. (Centers for Disease Control and Prevention). Alongside these characteristics, individuals with ASD may experience delays in language, movement, or cognitive skills, as well as

hyperactivity, impulsivity, or inattention. Other associated features include epilepsy, gastrointestinal issues, and atypical emotional responses. These diverse characteristics highlight the complex nature of ASD and the varied challenges individuals with this condition may encounter. (Lord et al.)

2.1.4 Sensory dysfunction

1.Intensity: Autistic individuals may experience sensory stimuli, such as light, colour, and smell, with either higher (hypersensitive) or lower (hyposensitive) intensity compared to neurotypical individuals. 2.Sensory overload: Occurs when autistic individuals are overwhelmed by excessive sensory input, such as background noise or tactile sensations, as their brains struggle to filter out irrelevant information. (Henshall) 3. Gestalt perception: Difficulty in separating foreground and background information, leading to perceiving everything as a whole rather than individual components, particularly evident in visual perception. (Baron-Cohen) 4. Fragmented perception: Difficulty processing multiple pieces of information simultaneously, resulting in only processing part of a scene or conversation while ignoring others. 5.Delayed perception: Autistic individuals may experience delays in processing sensory information, making it challenging to understand or learn new things, especially when faced with an overload of information.6. Distorted perception: Senses may become distorted or misinterpreted, leading to phenomena such as poor spatial awareness, double vision, or perceiving objects in two dimensions, particularly exacerbated during periods of information overload. (Frith)7. Sensory shutdown: Occurs when individuals with autism cannot cope with overwhelming sensory stimuli, leading to a shutdown of one or more senses to block out stimuli and cope with the overload, often resulting in withdrawal and retreat into their own world. (Silberman)8. Sensory processing refers to how the nervous

system processes and responds to sensory information. The brain must interpret incoming sensory data to formulate appropriate responses. While most individuals develop and process sensory information effortlessly, those with autism often experience unusual sensory responses, according to Henshall (2008). This can manifest as actively seeking out or avoiding sensory stimuli, such as covering ears to block out sounds. (Henshall)

There are seven sensory systems within the nervous system: vision, hearing, vestibular (movement and head position), olfaction (smell), gustation (taste), tactile (touch, pressure, pain, temperature), and proprioceptive (body movement and position). Hyposensitive individuals, found at one end of the spectrum, struggle to perceive acute sensory details and may require more stimulation to process sensory information effectively. They often enjoy bright environments, crowds, rich scents, and tight hugs or clothes. In less stimulating environments, they may self-stimulate by creating noise or movement. On the opposite end of the spectrum are hypersensitive individuals, who process sensory details to an exaggerated degree. They dislike environments with bright lights, crowds, or unfamiliar textures and scents. They may struggle with proximity to others, being touched, or manipulating small objects. Predictable and neutral environments are preferred by hypersensitive individuals to support their sensory needs. Hypersensitive individuals may have difficulty understanding sensory feedback, such as pain or temperature, and may struggle with object localization due to focusing on the overall outline rather than specific details. Conversely, hyposensitive individuals may overstimulate themselves in less engaging environments by creating noise or movement. (Silberman)

2.1.5 Causes

Autism spectrum disorder has no single known cause-

1.Genetics and family history of autism (Kim et al.)

2.Environmental factors- factors such as viral infections, medications or complications during pregnancy. (Elsabbagh et al.)

3.Gender- Boys are about four times more likely to develop autism spectrum disorder than girls are. (Baio et al.)

4.Extremely preterm babies- Babies born before 26 weeks of gestation (Baio et al.)

5.Parents' ages- older parents have chances of conceiving ASD affected children (Baio et al.)

Autism spectrum disorder (ASD) is a complex condition with multiple potential causes, including genetics and environmental factors. Genetic factors play a significant role, with various genes implicated in ASD, either through inherited mutations or spontaneous changes. Some genetic disorders, such as Rett syndrome or fragile X syndrome, are associated with ASD, while others affect brain development or communication between brain cells. Environmental factors are also under investigation, including viral infections, medications or complications during pregnancy, and exposure to air pollutants. These factors may potentially trigger ASD, although research in this area is ongoing. Certain factors increase the risk of ASD, such as male sex, family history of the disorder, and the presence of other medical conditions like fragile X syndrome or tuberous sclerosis. Extremely preterm birth and older parental age may also be associated with an increased risk of ASD, though further research is needed to confirm these connections.

2.1.6 Diagnosis

Obtaining an autism diagnosis can be challenging as there is no definitive laboratory test for the condition. However, healthcare providers can conduct specialized screenings and evaluations. The process typically involves several steps:

1. Developmental surveillance: Healthcare providers review the child's developmental history and behaviour, often relying on parental observations recorded over time. Developmental monitoring is an ongoing process that involves observing a child's growth and discussing their skills and abilities with parents and caregivers. It focuses on tracking whether the child is meeting typical developmental milestones in areas such as play, learning, speech, behaviour, and movement. Parents, grandparents, early childhood educators, and healthcare providers all play a role in developmental monitoring. During well visits, doctors or nurses may ask questions or engage in interactive activities with the child to assess their development and milestone achievement. (Baio et al.)

2. Developmental screening: This formal step involves using questionnaires to assess the child's development and compare them to typical developmental milestones for their age. While not diagnostic, it helps determine if further evaluation is needed. Developmental screening is a formal process conducted during well-child visits, even in the absence of known concerns. The American Academy of Paediatrics recommends developmental and behavioural screening at specific ages, including 9 months, 18 months, and 30 months. Additionally, screening for autism spectrum disorder (ASD) is recommended at 18 months and 24 months. Screening involves questionnaires and checklists comparing a child's development to peers of the same age, covering language, motor skills, cognition, behaviour, and emotions. Healthcare providers,

educators, or other professionals can conduct screenings, and parents may be asked to complete questionnaires. Screening may be conducted earlier or more frequently if concerns arise, especially if the child is at high risk for ASD or displays behaviours associated with ASD. Parents are encouraged to request screening if not routinely offered by their child's healthcare provider. (Baio et al.)

3. Formal evaluation: Conducted by trained specialists such as child psychologists or developmental-behavioural paediatricians, this evaluation involves observing the child, administering structured autism spectrum tests, and gathering information from parents through questionnaires. The results provide insight into the child's strengths and challenges, aiding in the formal diagnosis process. A brief screening test does not provide a diagnosis but can indicate whether further evaluation by a specialist is warranted. If an area of concern is identified, a formal developmental evaluation may be recommended. This evaluation, conducted by trained specialists such as developmental paediatricians, child psychologists, or occupational therapists, involves observing the child, administering structured tests, and gathering information from parents or caregivers through questionnaires. The results highlight the child's strengths and challenges and help determine if they meet criteria for a developmental diagnosis. The diagnosis of autism spectrum disorder (ASD) now encompasses several previously separate conditions, including autistic disorder, pervasive developmental disorder not otherwise specified (PDD-NOS), and Asperger syndrome. Healthcare providers can assist in navigating the diagnostic process and provide guidance and support to families.

The DSM-5-TR provides the diagnostic criteria for autism diagnosis. The criteria include deficits in social communication and social interaction, as well as restricted, repetitive patterns of behaviour, interests, or activities. The DSM-5-TR criteria have

changed from previous versions of the DSM, eliminating subcategories such as Asperger's syndrome and PDD-NOS. (Baio et al.)

Tests for ASD diagnosis in the early years

Currently, there is a series of tests specifically designed for the diagnosis of children with ASD that facilitate the early assessment of the child. Next, we refer to those that are more common and have a higher scientific recognition.

- Checklist for Autism in Toddlers (CHAT). Allows early detection of the disorder by observation of deficits in three areas, for children between 18 and 36 months:

a. Social skills: lack of joint reference gaze and significant limitation in the interest in and emotional involvement with others.

b. Communication: absence of protodeclarative function.

c. Imaginative ability: lack of or deficit in social play and symbolic activity.

- Autism Diagnostic Observation Schedule (ADOS-G). This is a tool for the standardized observation of social behaviour of children involved with different types of materials and tasks.

- Childhood Autism Rating Scale (CARS). Evaluates 15 aspects of behaviour.

- Gilliam Autism Rating Scale (GARS). This is organized into four categories: stereotypes, communication, social interaction and developmental disturbances.

Intervention Models in Children with Autism Spectrum Disorders

- Behaviour Observation Scale for Autism (BOS), This is a scale based on the analysis of recorded video sessions.

- ACACIA. This is an instrument designed for the assessment and analysis of communicative behaviour and social/interpersonal skills in children with serious developmental disorders.

- List of indicators of autism typical of the 18–36-month stage by Rivière, which describes 22 behaviours and traits that can be detected in cases where one can see the presence of this disorder (Lord et al.).

2.1.7 Treatment

Current state of diagnosis and treatment- Very often, a clinical diagnosis serves as a gateway for interventions and services – with some parents having to wait for years, or travelling across the country, to get a confirmed diagnosis of autism. Delays in interventions can be costly for neurodevelopmental conditions such as autism, given the importance of critical periods in brain development. (American Psychiatric Association) Early interventions are associated with the best outcomes. Within such a framework, if a child presents with social behavioural difficulties –he/she could be referred to a parent/non-specialist assisted programme on evidence based actionable strategies in social skills development. This child might eventually get a clinical diagnosis of Autism or Social Communication Disorder – but would have already benefited from an early intervention. Autism treatment typically involves behavioural interventions or therapies aimed at teaching new skills to address core deficits and reduce symptoms. Each child with autism receives an individualized treatment plan tailored to their unique needs. Starting interventions early is crucial to maximize lifelong benefits. Many individuals with autism also have co-occurring medical conditions like gastrointestinal issues, seizures, and sleep disturbances, which may require additional treatment with behavioural therapy, medications, or both. Early intensive behavioural treatments often involve the entire family and a multidisciplinary team of professionals. As children age, their treatment plans may be adjusted to accommodate their changing needs. During adolescence, transition services can help

develop independence skills essential for adulthood, focusing on employment opportunities and job skill training. (Baio et al.) There are many types of treatments available. These treatments generally can be broken down into the following categories, although some treatments involve more than one approach:

1.Behavioural Approaches

Behavioural approaches focus on changing behaviours by understanding what happens before and after the behaviour. Behavioural approaches have the most evidence for treating symptoms of ASD. They have become widely accepted among educators and healthcare professionals and are used in many schools and treatment clinics. A notable behavioural treatment for people with ASD is called Applied Behaviour Analysis (ABA). ABA encourages desired behaviours and discourages undesired behaviours to improve a variety of skills. Progress is tracked and measured. Two ABA teaching styles are Discrete Trial Training (DTT) and Pivotal Response Training (PRT). DTT uses step-by-step instructions to teach a desired behaviour or response. Lessons are broken down into their simplest parts, and desired answers and behaviours are rewarded. Undesired answers and behaviours are ignored. PRT takes place in a natural setting rather than clinic setting. The goal of PRT is to improve a few “pivotal skills” that will help the person learn many other skills. One example of a pivotal skill is to initiate communication with others.

2.Developmental Approaches

Developmental approaches focus on improving specific developmental skills, such as language skills or physical skills, or a broader range of interconnected developmental abilities. Developmental approaches are often combined with behavioural approaches. The most common developmental therapy for people with ASD is Speech and Language Therapy. Some people with ASD communicate verbally. Others may

communicate through the use of signs, gestures, pictures, or an electronic communication device. Occupational Therapy teaches skills that help the person live as independently as possible. Sensory Integration Therapy to help improve responses to sensory input that may be restrictive or overwhelming. Physical Therapy can help improve physical skills, such as fine movements of the fingers or larger movements of the trunk and body. The Early Start Denver Model (ESDM) is a broad developmental approach based on the principles of Applied Behaviour Analysis. It is used with children 12-48 months of age. Parents and therapists use play, social exchanges, and shared attention in natural settings to improve language, social, and learning skills.

3.Educational Approaches

Educational treatments are given in a classroom setting. One type of educational approach is the Treatment and Education of Autistic and Related Communication-Handicapped Children (TEACCH) approach. TEACCH is based on the idea that people with autism thrive on consistency and visual learning. It provides teachers with ways to adjust the classroom structure and improve academic and other outcomes. For example, daily routines can be written or drawn and placed in clear sight. Boundaries can be set around learning stations. Verbal instructions can be complimented with visual instructions or physical demonstrations.

4.Social-Relational Approaches

Social-relational treatments focus on improving social skills and building emotional bonds. Some social-relational approaches involve parents or peer mentors. The Developmental, Individual Differences, Relationship-Based model (also called “Floor time”) encourages parents and therapists to follow the interests of the individual to expand opportunities for communication. The Relationship Development Intervention

(RDI) model involves activities that increase motivation, interest, and abilities to participate in shared social interactions. Social Stories provide simple descriptions of what to expect in a social situation. Social Skills Groups provide opportunities for people with ASD to practice social skills in a structured environment.

5.Pharmacological Approaches

There are no medications that treat the core symptoms of ASD. medication might help manage high energy levels, inability to focus, or self-harming behaviour, such as head banging or hand biting. Medication can also help manage co-occurring psychological conditions, such as anxiety or depression,

6.Psychological Approaches

Psychological approaches can help people with ASD cope with anxiety, depression, and other mental health issues. Cognitive-Behaviour Therapy (CBT) is one psychological approach that focuses on learning the connections between thoughts, feelings, and behaviours. During CBT, a therapist and the individual work together to identify goals and then change how the person thinks about a situation to change how they react to the situation.

7.Complementary and Alternative Treatments

Some individuals and parents use treatments that do not fit into any of the other categories. These treatments are known as Complementary and Alternative treatments. Complementary and alternative treatments are often used to supplement more traditional approaches. They might include special diets, herbal supplements, chiropractic care, animal therapy, arts therapy, mindfulness, or relaxation therapies.

2.1.8 Proxemics

Intimate zone- less than 61cm

Personal zone- 61cm to 122cm

Social zone- 122cm to 365.7cm

Public zone- greater than 365.7cm

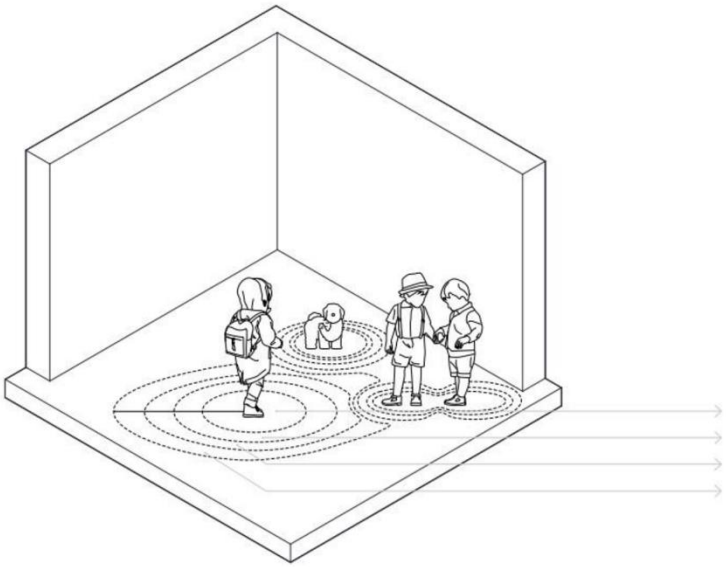

Figure 1 Proxemics of ASD individual

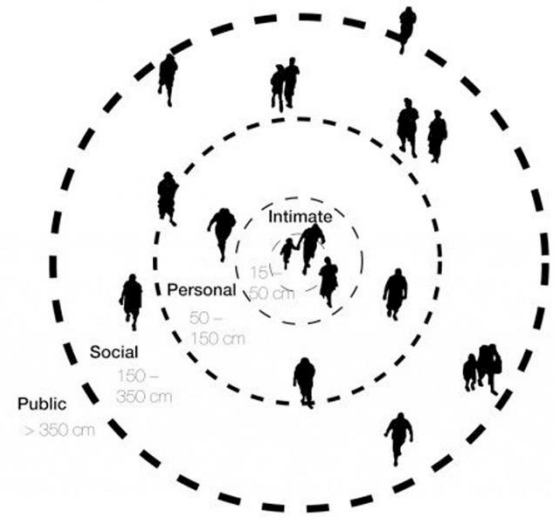

Figure 2 Proxemics of neurodivergent individual

2.2 Design guidelines

2.2.1 Autism Aspectss™ design index

ASPECTSS™ Framework provides the primary research and design datum throughout both the research phases of assessment of space and problem definition, as well as the development of design guidelines. The Autism ASPECTSS™ Design Index, published in 2013, is a research-based framework of 7 architectural principles developed to be used as a design framework for multiple purposes and at different scales. These purposes include built environment assessment and auditing; development of autism-sensitive and autism inclusive design solutions; and as a frame of reference for Post-Occupancy Evaluation. These processes can also be found at multiple scales from interior spaces to buildings to clusters of buildings to urban settings such as campuses and neighbourhoods.

Through an examination of various common sensory environment issues such as acoustics, texture, and lighting, Mostafa formulated a set of design principles encapsulated by the acronym ASPECTSS™: Acoustics, Spatial Sequencing, Escape Spaces, Compartmentalization, Transition Zones, Sensory Zoning, and Safety.

1.Acoustics: This principle advocates for controlling the acoustical environment to minimize background noise, echo, and reverberation within spaces utilized by individuals with ASD. The degree of acoustical control should vary based on the required focus in the activity within the space, as well as the skill level and severity of autism of its users. For instance, a gym may require a higher level of acoustics compared to a classroom.

2.Spatial Sequencing: This principle is rooted in the inclination of individuals with autism toward routine and predictability. It dictates that spaces should be arranged in a logical order reflecting the typical schedule of such spaces, minimizing disruptions between them.

3.Escape Spaces: Spaces should be provided to offer relief for autistic users from the overstimulation found in their environment. These spaces may include small partitioned areas or crawl spaces in quiet sections of a room, or quiet corners throughout a building. They should offer a neutral sensory environment with minimal stimulation that can be customized by the user to meet their sensory needs.

4.Compartmentalization: Each space or environment should have a sensory input limit. Each compartment should serve a single and clearly defined function with corresponding sensory qualities, defining its purpose and distinguishing it from neighbouring compartments.

5.Transition Zones: These zones aid users in recalibrating their senses as they transition between different levels of stimulation. Transition zones can take various forms, from distinct nodes indicating a circulation shift to full sensory rooms that facilitate recalibration.

6.Sensory Zoning: Spaces should be organized based on their sensory quality rather than their programmatic function, contrary to typical architectural design practices. By grouping spaces according to their allowable stimulus level, spaces are organized into zones of high stimulus and low stimulus.

7. Safety: A point never to be overlooked when designing learning environments, safety is even more of a concern for children with autism who may have an altered sense of

their environment. Fittings to protect from hot water and an avoidance of sharp edges and corners are examples of some of these considerations.

The objective of this paper is to illustrate the application of the ASPECTSS™ principles to the design development of the Advance Education Centre. The 7 principles were used to guide the programming and design criteria development at all levels, including detailed program development, contextual considerations, and whole-school issues such as zoning and spatial organization.

Whole School Issues:

1. Context and Community: Design includes community-linked services to promote inclusion and interaction. Visual simplicity reduces over-stimulation, while natural lighting and ventilation are utilized. Noise exposure is minimized in high-focus areas.

2. Zoning: Functional organization considers sensory zoning over conventional zoning. Groupings emphasize sensorial compatible functions, accessed through one-way circulation systems.

3. Way-finding, Navigation, Circulation, and Spatial Sequencing: A one-way circulation system aligns with the daily schedule, aiding navigation and independence. Circular nodes act as transition zones between sensory zones. Visual aids and signage assist way-finding, employing pictorial language alongside written words.

4. Fire Safety and Evacuation: Evacuation strategy ensures safe movement for challenged individuals, with secure refuge spots away from evacuation flow.

These design guidelines reflect a holistic approach to architecture, addressing the unique needs of individuals with autism and promoting inclusion and independence within the educational environment. (Mostafa, Magda)

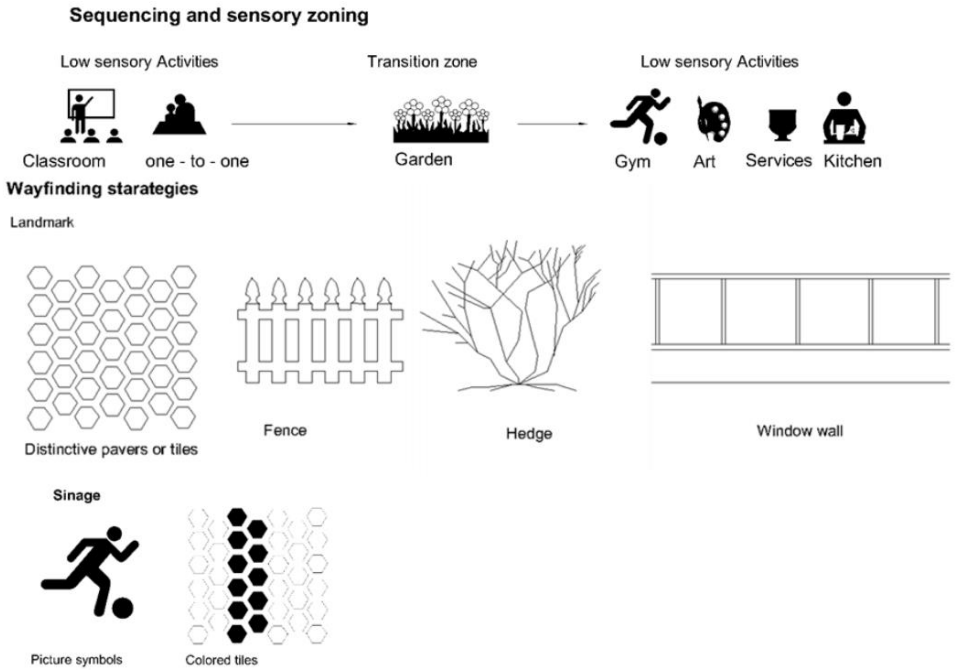

Figure 3 Dr.Magda Mostafa design principles

2.2.2 Universal design

Principle 1: Equitable Use

- Guidelines:

  - 1a. Ensure identical or equivalent means of use for all users.

  - 1b. Avoid segregation or stigmatization of any users.

  - 1c. Ensure equal provisions for privacy, security, and safety.

  - 1d. Design to appeal to all users.

Principle 2: Flexibility in Use

- Guidelines:

  - 2a. Offer choice in methods of use.

  - 2b. Accommodate both right- and left-handed users.

  - 2c. Facilitate accuracy and precision.

  - 2d. Allow adaptability to user's pace.

Principle 3: Simple and Intuitive Use

- Guidelines:

  - 3a. Simplify design, eliminating unnecessary complexity.

  - 3b. Be consistent with user expectations.

  - 3c. Accommodate varying literacy and language skills.

  - 3d. Arrange information based on importance.

  - 3e. Provide effective prompting and feedback.

Principle 4: Perceptible Information

- Guidelines:

  - 4a. Present essential information redundantly using different modes.

  - 4b. Ensure adequate contrast between information and surroundings.

  - 4c. Maximize legibility of essential information.

  - 4d. Differentiate elements to facilitate description.

  - 4e. Ensure compatibility with various sensory techniques.

Principle 5: Tolerance for Error

- Guidelines:

  - 5a. Arrange elements to minimize hazards and errors.

  - 5b. Provide warnings of hazards and errors.

  - 5c. Incorporate fail-safe features.

  - 5d. Prevent unconscious actions in tasks requiring vigilance.

Principle 6: Low Physical Effort

- Guidelines:

  - 6a. Enable a neutral body position during use.

  - 6b. Use reasonable operating forces.

  - 6c. Minimize repetitive actions.

- 6d. Reduce sustained physical effort.

Principle 7: Size and Space for Approach and Use

- Guidelines:

- 7a. Ensure clear line of sight to important elements for seated or standing users.

- 7b. Make reach to all components comfortable for both seated and standing users.

- 7c. Accommodate variations in hand and grip size.

- 7d. Provide adequate space for assistive devices or personal assistance.

2.2.3 Simon Humphreys principles

Architect Humphreys, drawing from his experience with his autistic brother and research in the field, proposed several design criteria for spaces catering to autistic children:

1. Calmness, order, and simplicity: Inspired by medieval architecture, Humphreys advocated for limited colors and textures, using the same materials for walls, pillars, and floors to create a sense of calmness and simplicity. Courtyards in each block and adherence to the golden ratio facilitated a simple circulation and visual references.

2.Minimal details and materials: To minimize visual distractions and maintain a sense of order, Humphreys emphasized the use of minimal details and materials, including curved walls and muted colours.

3.Proportion: Harmonious proportions, based on principles like the Golden Ratio, were employed to create interior spaces conducive to the needs of autistic individuals.

4.Natural light: While supporting the entry of sunlight into autistic spaces, Humphreys cautioned against issues such as glare, dazzling, shadows, and excessive contrasts, which may overstimulate or confuse autistic individuals. Thoughtful consideration of

sunlight entry methods, such as skylights, clerestories, and strip windows, was recommended.

5.Proxemics: Recognizing differences in relationships with others, Humphreys advocated for more space in autism centers, including classrooms, corridors, and halls, to accommodate the unique proxemics needs of individuals with ASD.

6. Containment: Humphreys suggested the incorporation of spaces where individuals with ASD can be monitored while having the freedom to wander safely. Inspiration was drawn from ancient architecture, particularly Zen courtyards and natural forms known for their containment.

7. Observation: Hideous observation places were recommended to observe individuals with ASD without direct intrusion, providing opportunities for monitoring their activities discreetly.

8.Acoustics: Acknowledging sensory sensitivities, Humphreys highlighted the importance of good acoustic spaces for individuals with ASD, as they may be easily distracted by sounds and have difficulty differentiating them. (Humphreys, Simon)

2.2.4 Autism spectrum disorders- from genes to environment

The authors aimed to decrease frustration and arousal by subdividing space to prevent overstimulation and excessive social interactions, which included providing a retreat box for calming down, allowing activities like climbing and rolling to reduce overarousal and encourage social interactions, and including toys for repetitive movements to accommodate stereotypies. Additionally, they sought to diminish flight behaviours and encourage approaches by ensuring robust and firmly anchored

structures to avoid interruptions during play, designating areas for close tactile contact and rough play to foster social interaction, and implementing physical boundaries, such as in the activity house, to promote rewarding social interactions within stimulating activities.

Richer & Nicoll (1971) utilized various design criteria, some of which are echoed by later authors. These include the subdivision of spaces to create distinct areas, as observed in Mostafa's (2008) intervention in a classroom. Prioritizing safety and robustness of elements, furniture, or fixtures was another key aspect. They aimed to minimize caregiver intrusion to allow children freedom for play and interaction, while also incorporating a retreat box for moments of solitude or calming. Selecting durable elements and materials was emphasized, although instances of design flaws were noted, such as non-bite-proof PVC covers and improperly installed water fountains. Controlled sensory stimulation across different subspaces was offered, ranging from minimal (retreat box) to highly stimulating areas like the activity house or stimulus wall. Additionally, they implemented light dimmers to enable staff to adjust atmospheres as needed.

The research process and methodology were designed to assess the validity of design suggestions for children with ASD (Khare & Mullick, 2008). These suggestions encompass organizing the physical structure with clear visual and physical boundaries for definite activity contexts, maximizing visual structure through concrete cues like colour coding, numbers, signs, and labels, and providing visual instructions using written guidance, images, pictures, and schedules. They also involve offering community participation opportunities in social activities, involving parents in school activities to address educational needs, and creating inclusion and interaction

opportunities with peers. Teaching everyday life and vocational skills for future independence, ensuring generous spatial standards to address personal space concerns, and providing withdrawal spaces to mitigate stress in socially demanding situations are also key components. Additionally, maximizing safety to minimize associated risks, arranging spaces clearly with direct routes, zoning, and simple forms for comprehension, and maximizing accessibility for movement impairments and other difficulties are emphasized. The suggestions further entail allocating sufficient space for learning activities and tasks assistance, maximizing durability and minimizing maintenance costs of equipment and materials, and minimizing sensory distractions, except those strategically set for specific purposes. Facilitating sensory integration through multisensory stimuli, providing flexibility for various functional skills and teaching paradigms, and allowing monitoring for assessment and planning by controlling distractions and intrusions for safety and effective activity planning are also integral to the approach. British architect Christopher Beaver has extensively discussed strategies for designing architectural environments suitable for individuals with ASD (Beaver, 2003; 2006; 2010). These strategies include redesigning corridors to serve as functional spaces, such as playrooms, to alleviate congestion in other areas and allow children to appropriate the space. Incorporating ample spaces to accommodate children's activities without crowding is also emphasized. Additionally, Beaver recommends introducing curved walls for aesthetic appeal and practical use, considering acoustics by avoiding highly reflective materials to mitigate noise issues, and ensuring safety in shower and toilet designs while providing sufficient facilities for common use. Other recommendations include underfloor heating or radiant ceiling panels for optimal airflow, addressing window safety concerns, designing lighting fixtures for durability and aesthetic integration, and providing "quiet rooms" for

calming tantrums or sensory overload. Creating sensory rooms and gardens to offer various sensory stimuli and selecting a suitable colour palette to establish warm yet not overstimulating environments are also highlighted.

The architectural design responses to the needs of individuals with ASD can be categorized into several key areas:

1. Imagination: Addressing resistance to changes and limited imagination by providing a clear and easily readable structure within the building. Strategies include colour coding of doors, pictograms, and transitional threshold spaces to facilitate transitions between spaces.

2.Communication: Accommodating impairments in verbal and non-verbal communication through visual supports and concrete cues. Neutral visual backgrounds and minimal detailing help reduce distractions and aid communication.

3.Social Interaction: Providing spaces that accommodate individuals' peculiar proxemics and varying social interaction preferences. A combination of ample and intimate spaces allows for both social interactions and opportunities for retreat.

4.Sensory Difficulties: Addressing sensory sensitivities by carefully selecting colours, textures, and lighting to avoid overstimulation. Thermostatic taps and careful material selection help prevent sensory-related injuries. Multisensory stimulation rooms offer opportunities to regulate sensory perception and reduce anxiety.

5.Behavior and Safety: Designing elements in the built environment with consideration for potential behavioural issues. Ensuring fixtures and fittings are securely anchored to prevent accidents and addressing the possibility of aggressive behaviour through appropriate design choices in bathroom equipment, lighting fixtures, and hardware.

2.2.5 School Design Guide - Primary & Post Primary School Specialist Accommodation for Pupils with Special Needs

2 Classroom Schedule of Accommodation
Primary

Special Educational Needs (SEN) Base

Item No.	Name	Area (m²)
1	Central Activities Space	80.00
2	Classroom- Base 1 (excluding toilets & storage)	70.00
3	Classroom- Base 2 (excluding toilets & storage)	70.00
4	Toilets & Shower Area *1 x Toilet/Shower for Assisted Users* *1 x Independent Use* *1 x Ambulant Disabled*	20.00
5	Quiet Space 1- associated with Class Base 1	12.00
6	Quiet Space 2- associated with Class Base 2	12.00
7	Multi Activity Room	20.00
8	Staff Toilets	10.00
9	Storage	25.00
10	Cleaner Store	5.00
11	Office	20.00
12	Daily Living Skills	15.00
	Sub-Total	**359.00**
13	Internal Walls & Partitions @ 7%	25.13
14	Circulation @ 21%	75.39
	Total	**459.52**
	Total Rounded Off	**460.00**
	External	
15	Secure external classroom/play area	50.00 per classroom
16	Sensory Garden (where school site area permits)	100.00
17	Parking Spaces	6

2 Classroom Schedule of Accommodation
Post Primary

Special Educational Needs (SEN) Base

Item No.	Name	Area (m²)
1	Central Activities Space	80.00
2	Classroom- Base 1 (excluding toilets & storage)	70.00
3	Classroom- Base 2 (excluding toilets & storage)	70.00
4	Toilets & Shower Area *1 x Toilet/Shower for Assisted Users* *1 x Independent Use* *1 x Ambulant Disabled*	20.00
5	Quiet Space 1- associated with Class Base 1	12.00
6	Quiet Space 2- associated with Class Base 2	12.00
7	Multi Activity Room	20.00
8	Staff Toilets	10.00
9	Storage	25.00
10	Cleaner Store	5.00
11	Office	20.00
12	Daily Living Skills	15.00
13	Practical Activity Room	50.00
	Sub-Total	**409.00**
13	Internal Walls & Partitions @ 7%	28.63
14	Circulation @ 21%	85.89
	Total	**523.52**
	Total Rounded Off	**524.00**
	External	
15	Secure external classroom/play area	50 per classroom
16	Sensory Garden (where school site area permits)	100.00
17	Parking Spaces	6

4 Classroom Schedule of Accommodation
Post Primary

Special Educational Needs (SEN) Base

Item No.	Name	Area (m²)
1	Central Activities Space	80.00
2	Classroom- Base 1 (excluding toilets & storage)	70.00
3	Classroom- Base 2 (excluding toilets & storage)	70.00
4	Classroom- Base 3 (excluding toilets & storage)	70.00
5	Classroom- Base 4 (excluding toilets & storage)	70.00
6	Toilets & Shower Area *1 x Toilet/Shower for Assisted Users* *2 x Independent Use* *2 x Ambulant Disabled*	30.00
7	Quiet Space 1- associated with Class Base 1	12.00
8	Quiet Space 2- associated with Class Base 2	12.00
9	Quiet Space 3- associated with Class Base 2	12.00
10	Quiet Space 4- associated with Class Base 2	12.00
11	Multi Activity Room	20.00
12	Staff Toilets	10.00
13	Storage	25.00
14	Cleaner Store	5.00
15	Office	20.00
16	Daily Living Skills	20.00
17	Practical Activity Room	50.00
	Sub-Total	**588.00**
13	Internal Walls & Partitions @ 7%	41.16
14	Circulation @ 21%	123.48
	Total	**752.64**
	Total Rounded Off	**753.00**
	External	
15	Secure external classroom/play area	50 per classroom
16	Sensory Garden (where school site area permits)	100.00
17	Parking Spaces	12

Figure 4 Area standards for schools

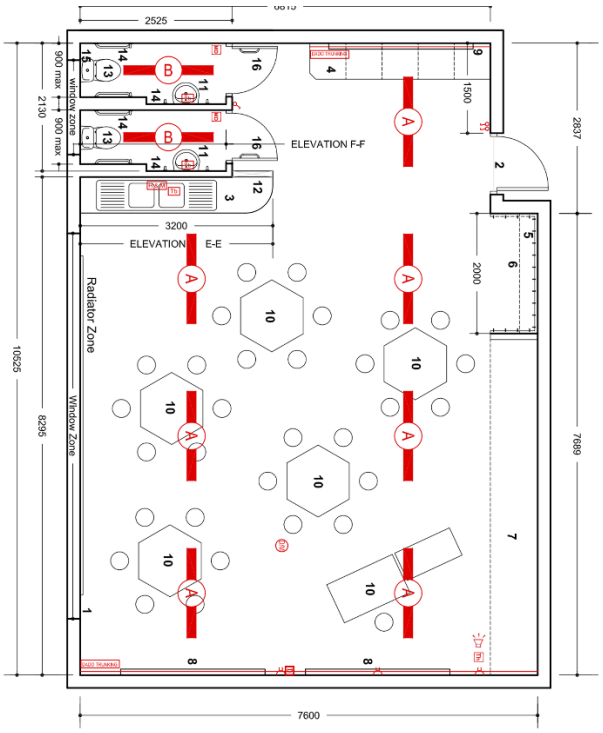

Figure 5 Primary school classroom layout

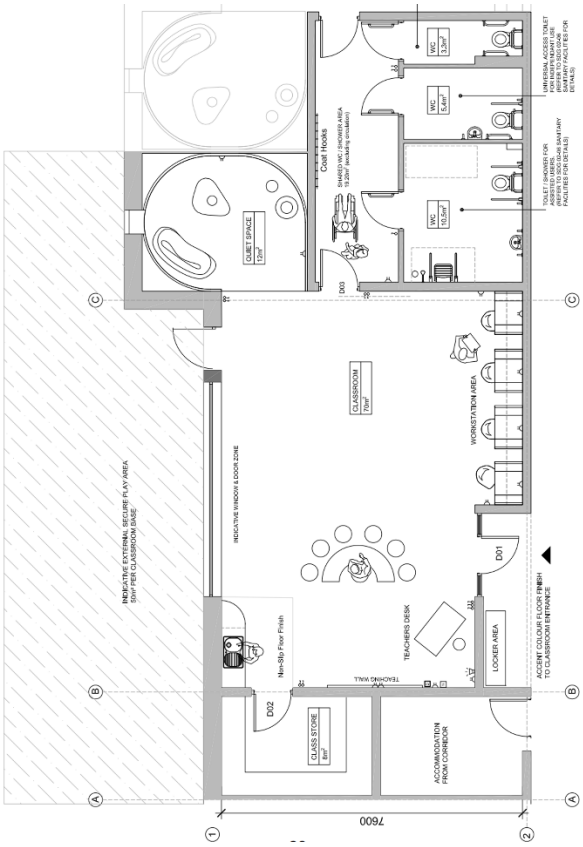

Figure 6 1:6 classroom layout

School of Architecture, Bishop Jerome Institute, Kollam 2023-2024

2.2.6 Guidelines prescribing minimum standards for registration of Therapy Centres in Kerala

To reduce disabilities, especially in children, therapies like physiotherapy, occupational therapy, speech therapy, and psychological therapy are crucial. Therapy centers use various tools and methods tailored to each disability. They implement plans to improve individuals' lives, helping them integrate into society. Lifelong therapy may be needed for many, highlighting the vital role of these centers in disability management. Standardizing therapy centers involves several key components: common facilities and infrastructure, standardized furniture and fixtures, essential equipment and instruments, qualified human resources, adherence to legal requirements, uniform processes and procedures, consistent record maintenance, safety measures, a grievance redressal and feedback system, and regular monitoring and evaluation.

Therapy centers for autism must adhere to specific standards across several areas. Infrastructure includes adequate space and appropriate furniture and fixtures. Necessary equipment and materials must be provided. Human resources are managed to ensure a suitable number of therapists per specialty. If the center employs more therapists, additional space, furniture, and equipment must be made available to accommodate them.

6.6.I: INFRASTRUCTURE

A) SPACE

Sl. No	*Purpose*	*Size*
1	*Waiting area with reception*	*As per the requirement and work load of the centre (Min 100 sq feet*
2	*Consultation Room*	*One room (Size 50 sq.feet)*
3	*Speech Therapy room*	*One speech therapy room (Size: 40 sq feet) Room should have adequate space to accommodate therapist, patient and one parent*
4	*Clinical psychology/ rehabilitation psychology room*	*One therapy room - Size: 100 sq feet Room should have adequate space to accommodate therapist, child and one parent*
5	*Occupational therapy room*	*One room - Size :200 sq feet*
6	*Physiotherapy*	*One room Min 100 sq feet*
7	*Room for special educator*	*One room - Size :50sq feet*
8	*Other facilities*	*One accessible toilet inside the building premises or inside the therapy centre and drinking water.*

Table 2 Infrastructure requirement

B) FURNITURE & FIXTURE

COMMON AREA

Sl.No	*Items*	*Quantity*
1	Visiting chairs at waiting area	3
2	Consultation Table	1
3	Chairs in consultation room	4
4	Computer with printer	1
5	Storage space for test/therapy materials	1

SPEECH THERAPY

Sl.No	*Items*	*Quantity*
1	Table	1
2	Chairs	3

CLINICAL PSYCHOLOGY/ REHABILITATION PSYCHOLOGY

Sl.No	*Items*	*Quantity*
1	Table	1
2	Chairs	3

OCCUPATIONAL THERAPY

Sl.No	*Items*	*Quantity*
1	*Table*	*1*
2	*Chairs*	*3*
3	*Examination Table/Couch*	*1*
4	*Foot Step*	*1*

PHYSIO THERAPY

Sl.No	*Items*	*Quantity*
1	Treatment couch	1
2	Table	1
3	Chair	2
4	Footstep	1

Table 3 Furniture and fixtures requirement

ASSESSMENT MATERIAL

Sl. No	*Test/item*	*Quantity*
1	INCLEN and ISSA diagnostic tool for ASD	1
2	BKT	1
3	VSMS	1
4	Behavioural Checklist	1
5	Assessment of Language Development (ALD)	1
6	Communication Matrix	1
7	Sensory profile-2	1
8	Developmental Checklist	1

Speech Therapy

Sl.No	*Test/item*	*Quantity*
1	Oral cavity assessment kit (Tongue depressor ,glove ,straws, horns, bubbles, torch ,ice cream sticks)	*1set*
2	Toys (Animals. Birds, vehicles)	*1 set*
3	Multisensory stimulation materials : Poky ball ,bumpy ball ,sticky thing	*1 set*
4	Books : Interactive books	*1 set*
5	Story books	*1set*
6	Books with colourful big pictures	*1 set*
7	Cause effect toys : popping toys, rotating toys Pulling pushing toys, winding up toys	*1 set*
8	1/2/3 piece puzzles, bouncer, mat,	*1 set*
9	Things for pretend play : doctor set, kitchen set, tool kits	*1set*
10	Sequencing story pictures / Flash card	*1 set*

Table 4 Assessment material requirement

Occupational Therapy

Sl.No	Equipment	Quantity
1	Peg board	1
2	Cause and effect toys(xylophone/light and sound toys/key operated toys)	1
3	Art and craft materials(paint, crayons/modelling clay/play dough/water play/kinetic sand/sand)	1
4	Bean bag/Crash pad	1
5	Sensory/ tactile texture floor mats set/ Tactile activities-Pulses like Rice/beans	1
6	Rattle toy for sensory motor	1
7	Brush and touch stimulation set	1
8	Therapy ball 60cm/90 cm	1
9	Tricycle/Bicycle/Stationary cycle	1
10	Swing	1
11	Balance board	1
12	Trampoline	1
13	Therapy mat	2
14	White board/Black board/Soft board	1
15	Simple puzzle	1
16	Activities of daily living training kit –buttoning/zipper board/lacing	1
17	Stacking rings/cups	1
18	Coloured beads	1
19	Scooter board	1
20	Weighted blanket/weighted jacket/weighted toys	1

Physiotherapy equipment

Sl.No	Equipment	Quantity
1.	Muscle and nerve stimulator	1
2.	Thera band	1
3	Hand grip	1

CLINICAL PSYCHOLOGY/ REHABILITATION PSYCHOLOGY

Sl.No	Equipment	Quantity
1	Cognitive retraining materials like beads/ shapes/ flash cards etc	1

Table 5 Equipment requirement

2.2.7 Handbook on Early Intervention Centres, Government of India

Union Ministry of Health & Family Welfare, way back in February 2013, launched Child Health Screening and Early Intervention Services initiative under the umbrella of the then National Rural Health Mission (NRHM) to provide targeted, comprehensive care to children aged 0-18 years. The programme identified 30 health conditions for screening and management including birth defects like clubfoot, cleft lip, congenital heart disease, and deficiency conditions like anaemia, goitre, rickets, developmental delays and certain childhood diseases like rheumatic heart disease, otitis media and dental caries. The screening is implemented at various levels by facility-based screening for newborns at health facilities (public sector) and for home deliveries by Accredited Social Health Activists (ASHAs). Special teams undertake at least twice-yearly visits to Anganwadi centres (centres in villages that provide basic health care) to screen children aged 6 weeks to 6 years, and, at least once a year, they visit all Government and Government-aided schools to screen children in the age group of 06-18 years. The children identified as requiring further management are referred to District Early Intervention Centres (DEIC) for confirmation of their diagnosis and further care.

The unit should have enough space for providing facilities in separate rooms, including:

- Physiotherapy
- Occupational therapy
- Speech and Language Therapy
- Counselling/ Behavioural Support
- Family Education & Training

- Preparatory School
- Waiting Hall and Paediatric Centre

The layout of the unit may be aligned at the ground floor (preferably) or first floor with accessible features so as to ensure seamless movement of children with disabilities availing different facilities. The ambience of the unit should be designed with appropriate pictorial and aesthetic presentation and proper sunlight and circulation of air needs to be ensured.

Trans-disciplinary approach is an accepted rehabilitation therapy system of our times. It is defined as “the sharing of roles across disciplinary boundaries so that communication, interaction, and cooperation are maximized among team members”. A substantial result is the evolution of a shared goal or “shared meaning” between the members of the team and with members of family. Trans-disciplinary team consists of professionals of different disciplines who are capable of influencing the developmental process of a child at risk through their respective professional expertise. Here the child is addressed as a ‘whole individual’ and not as a ‘particular disability’. a child with autism might need the service of an occupational therapist to enhance his fine motor skills to improve hand writing or to enhance overall motor muscles to assist in the deglutition problems. The same child would need physiotherapy to address gross motor skills to improve his balance issue. he may need speech therapy for improving the phonation problems and autistic for curricular comprehension.

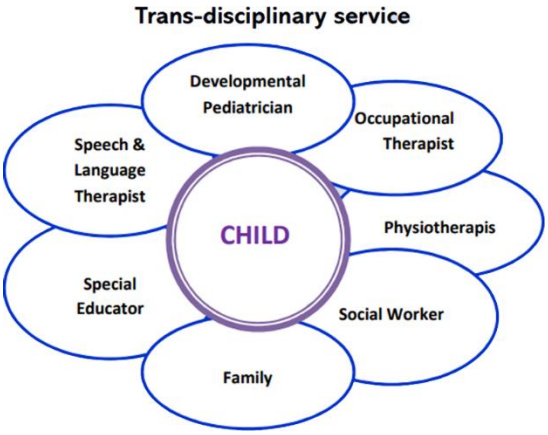

Figure 7 Transdisciplinary service

Requirements

1	Entrance lounge cum waiting room	12'x12' (150 sq. ft.)
2.	Registration and anthropometry	13'X15' (200 sq. ft.)
3.	Nursing /nutrition	10'X10' (100 sq. ft.)
4	Sensory Integration Unit: 480 sq. ft. divide in to two arts	a) 12'X20' (240 sq. ft.) b) 12'X20' (240 sq. ft.)
5	Paediatric Examination Room : 280 Sq. ft.	14'X20' (280 sq. ft.)
6	Dental room	15'x 12' (180 sq. ft.)
7	Speech & Language Assessment Room	10'x11' (110 sq. ft.)
8	ECG cum ECHO room	13'x15' (200 sq. ft.)
9	Laboratory	10'X20' (200 sq. ft.)
10a	Psychological Testing Room 1	10'X10' (100 sq. ft.)
10b	Psychological Testing Room 2	10'X10' (100 sq. ft.)
11	Early Intervention Occupational Therapy	20'X50' (1000 sq. ft.)
12	Play Area	14'X30' (420 sq. ft.)
13	Vision Assessment Room 1. One 21 ft. X 11 ft. = 230 sq. ft. 2. Second 10 ft. x 11 ft.=.110 sq. ft. 3. Third Stimulation room 10ft. X 11ft=110 sq. ft.	230 sq. ft.+110 sq. ft.+110 sq. ft.Total 450 sq. ft.
14	Hearing Assessment Room	9'X 20' (180 SQ FT)
15.	Pantry	70 sq. ft.
16	Gender Specific and User-friendly toilets	100 sq. ft.
17.	Manager and data entry room	10'X12' (120 sq. ft.)
18.	Two More OPD : OPD 1 + OPD 2	10'x11' (110 sq. ft.) + 10'x11' (110 sq. ft.)
19.	Special education room	10'x11' (110 sq. ft.)
20	Social worker room	10'x11' (110 sq. ft.)
21	Plaster room	10'x11' (110 sq. ft.)
22	Store	10'x11' (110 sq. ft.)

Table 6 Medical area requirement

2.3 Design Approach

2.3.1 Sensory design theory

The prevalence of sensory difficulties among individuals with autism remains a topic of debate, as sensory phenomena, though often reported, are not currently necessary for diagnosis. However, architectural solutions considering sensory development have shown success. Similar to a "sensory diet," Sensory Design Theory, pioneered by architect Magda Mostafa, aims to optimize therapy environments for autistic individuals. By creating secure and comfortable spaces, therapy sessions become more efficient, aiding in behaviour modification and skill acquisition. Implementing this theory in treatment facilities involves dividing the space into two distinct areas: a high stimulus public interface for training and conferences, and a low stimulus area for treatment activities. This typically requires separate volumes, with the treatment facility designed to integrate inwardly and communicate only with controlled environments, while the public interface interacts with the surrounding environment. The theory caters to the diverse spectrum of autism disorders by adapting spaces to individual needs, providing safety, comfort, and opportunities for adaptation. Altering space characteristics such as colour, texture, sound, and lighting enhances therapy effectiveness, particularly in managing acoustics. Furthermore, Sensory Design Theory involves a comprehensive analysis of context, community integration, navigation, spatial sequencing, classroom and therapy spaces, and outdoor learning areas. These aspects support therapeutic sessions for skill development, with a focus on facilitating integration into society for individuals with autism.

2.3.2 Neurotypical approach

The Neuro-Typical Approach stands in contrast to the Sensory Design Theory in their strategies for enhancing the integration of individuals with autism spectrum disorders (ASD). While both aim to develop essential skills for integration, the Neuro-Typical method adopts a more direct approach focused on everyday circumstances. Unlike the Sensory Design Theory, which prioritizes customizing environments to accommodate sensory sensitivities, the Neuro-Typical Approach emphasizes exposure to typical daily settings. By immersing individuals in environments resembling common public spaces, this method aims to foster familiarity and adaptability to diverse situations encountered in everyday life. The Neuro-Typical Design Theory seeks to enhance autistic individuals' ability to generalize space and function by creating environments with varying sensory characteristics but similar functions. Through exposure to environments resembling urban and public spaces, individuals are encouraged to adapt to the stimuli encountered in these settings over time. In practice, treatment facilities following the Neuro-Typical Approach may feature areas designed to mimic everyday spaces, such as streets, classrooms, and restaurants. However, unlike the Sensory Design Theory, there is a lack of empirical evidence supporting the effectiveness of the Neuro-Typical Approach. Therefore, further research is needed to evaluate its outcomes and efficacy compared to sensory-focused design strategies.

2.4 Spatial considerations

2.4.1 General classroom design

Classrooms in the low-stimulus area of the school accommodate an average of 7 students with a minimum of 3 teachers and assistants. They are acoustically designed to minimize external noise and internal echoes, featuring a compartmentalized layout with activity stations visually separated by low partitions, levels, or flooring. Stations are organized based on sensory requirements, with high-focus functions in well-lit areas for alertness without distraction. Natural lighting is introduced above eye-level to avoid glare, with north-facing windows for indirect sunlight and cross ventilation. Optimal furniture layouts are consistent for each activity, with provisions for floor play and organized resources to avoid distraction. (Mostafa,Magda)

A quiet space for calming and organization, located in the lowest stimulus area, offers refuge for over-stimulated or overwhelmed children. This sensory neutral space includes customizable items like cushions, textures, and sensory tools for individual needs. It serves to calm children before and after classes, promoting receptiveness to tasks. Joint observation rooms adjacent to classrooms feature one-way mirrored windows and AV equipment for training purposes, avoiding air fresheners and distractions like wall charts. Design standards for ASD-friendly classrooms prioritize simplicity, low stimulus, indirect lighting, good acoustics, and tamper-proof elements.

2.4.2 Specialized therapy spaces design

A centre for autism typically includes specialized spaces for speech, occupational, and psychomotor therapy, among others. These spaces, except for speech therapy, are

categorized as high stimulus functions and are grouped accordingly within a sensory zone. Each function is acoustically separated using high-quality wall systems, with natural and indirect lighting to avoid visual distraction. Fluorescent lighting is avoided due to its potential to cause discomfort. Shared resource areas and observation rooms are also provided. Speech therapy rooms, requiring a low-stimulatory environment for high-focus activities, are located within the low-stimulus zone and may be soundproofed. Research has shown the preliminary success and long-term sustainability of performance of speech and communication in soundproofed speech therapy rooms (Mostafa, 2006). It is important, however, not to provide only soundproofed rooms, to avoid a “greenhouse” effect, where the child is only able to communicate in an acoustically controlled room and is unable to generalize these skills outside the classroom. In this design, a group of rooms with various levels of soundproofing are made available. In this way, the child can graduate from one level of acoustical control to the other as he or she acquires the necessary skills with the ultimate objective of generalizing communication skills in a non-controlled environment.

The art therapy area incorporates various activities, including painting, printing, sculpture, and pottery, located on an outdoor terrace. These activities are organized in stations kept partially visually and spatially separate. Natural lighting is achieved through a skylight, creating an enjoyable and creative environment. Located above the pre-vocational workshop, artwork can be integrated to help students create beautiful and functional objects such as simple furniture, leather goods, and home accessories. A large storage and preparation area are made available.

The sensory room, based on the Snoezelen concept, assists students in regulating sensory stimulation. It contains equipment such as vibrating platforms, speakers, and

LED projectors, which can be adjusted by the student. Different designs may include multi-coloured fibre optic lighting, bubble mirrors, and sound-absorbing cork floors. Enclosed swimming pools and hydrotherapy areas, providing tactile stimulation through sensory pools with adjustable jets, are typically located farthest from classrooms and the low-stimulus zone. (Mostafa,Magda)

2.4.3 Outdoor Learning Spaces design

Outdoor spaces are crucial for environmental awareness and learning, offering freedom without feeling observed. Small outdoor classroom courtyards facilitate small-group social interactions, while larger playground areas allow for broader social engagement. These spaces provide autist children with sensory readjustment opportunities. Various outdoor spaces include sensory gardens, formal vocational gardens, and formal playfields. Sensory gardens feature textured pathways, water-play areas, ball pools, and aromatherapy gardens. Formal vocational gardens support skill development through gardening and projects like herbal packaging and floral arrangements. Formal playfields are designated for organized sports. Guidelines for designing therapeutic gardens for autistic children emphasize security, safety, and supervision, with specialized spaces for sensory integration and motor activities. Spaces should offer opportunities for directed play therapy and self-help skills, with visual cues for orientation and special lighting considerations. Flexibility, nature interaction, clear layout, and ease of maintenance are also essential design considerations.

2.4.4 Biophilic design

Biophilia, stemming from the Greek words "bios" and "philia," refers to the innate human affinity for life and living things. Incorporating natural elements into built

environments has been shown to reduce stress, enhance productivity, and improve overall well-being. In schools, features such as natural lighting, outdoor learning spaces, and views of nature can increase attention, retention, and creativity among students while decreasing disciplinary issues and symptoms of conditions like autism. Designers often integrate elements like air, water, sunlight, color, plants, and scenic views to create connections to nature, which can stimulate curiosity and exploration. Unprogrammed spaces allow students to engage with their surroundings freely, fostering imagination and self-directed learning. (Mostafa,Magda)

2.4.5 Life skill training

Rooms for life skills training are crucial in autistic, particularly for middle and high school levels, focusing on teaching independence in activities like cooking, cleaning, and managing finances. These skills can be taught at stations within classrooms or in separate rooms equipped with kitchen, laundry, and bedroom furniture. Students may engage in activities as assistants to staff members. Educators or paraeducators work with individuals or small groups simultaneously in multiple stations, necessitating a visible timetable near the door. Each activity space should resemble a typical household environment, with realistic kitchen and laundry equipment. Some schools create simulated grocery stores to teach purchasing skills, linked with meal preparation exercises.

2.4.6 OT/PT room

In autistic schools, a dedicated area for occupational and physical therapists is essential for one-on-one work with students. These professionals aim to reduce learning barriers and enhance students' independence in the classroom. When designing an OT/PT room,

prioritize an open and flexible layout to accommodate various movements and equipment tailored to individual student needs. Consider the number of students using the space simultaneously and provide adequate storage for equipment.

Each therapy room has different characteristics and requires a different quality of space. For example, the psychomotor therapy room is designed in a more linear proportion allowing directional movement along its length. A preparation/storage space is located at one end and is accessible via a large rolling horizontal panel that opens onto a shelved area directly behind where the students begin their activity. The therapist can prepare and organize the necessary equipment on these shelves from the adjacent resource and equipment storage area, allowing independent and structured access to the students without over-stimulation and distraction. These resource areas are located between, and accessible from, two adjacent therapy rooms, economizing on space and expensive equipment that can be shared. The occupational and physical therapy rooms are organized in a similar fashion. (Mostafa,Magda)

2.4.7 Escape room

Withdrawal spaces, also known as quiet spaces, are considered essential for individuals with autism according to experts in the field. These spaces provide a calm environment where individuals can retreat during moments of agitation or distress. In learning environments, a corner of the classroom or an alcove can be designated as a withdrawal space, offering a temporary soothing shelter for autistic individuals. Additionally, specialized calming spaces within autism centers are necessary, equipped with soothing elements such as sensory toys, appropriate colors, tactile surfaces, good acoustics, and gentle lighting. These spaces serve as private retreats for individuals who cannot find

solace in temporary calm areas within classrooms. However, it's important that these spaces are only used during extreme situations to prevent isolation and maintain social connections, which can be challenging for individuals with autism. (Mostafa,Magda)

2.4.8 Diagnostic area

This area, comprising rooms for parents, assessment and diagnosis, specialists, intake and conferencing, and training, is designed to provide a welcoming atmosphere and easy accessibility from the visitor's parking area, entrance, chairman's office, and center faculty. Resources such as brochures and reading material are available from the resource library. The diagnostic room resembles a small classroom with various stations and is visually accessible from an observation room. The diagnostic specialist, observing parents, and training activities can use this observation room. The center is used for intake of new students, provision of outside assessment services, and extra-curricular support for special needs individuals. The atmosphere is respectful, private, and welcoming to reassure both parents and children. (Mostafa,Magda)

2.4.9 Parent support spaces

Parents of autistic students are deeply committed to actively participating in their children's schools. They invest considerable time on campus, engaging with administrators and staff, overseeing their children, and contributing through volunteer work in classrooms. Therefore, designing for autistic should consider their needs, including providing community spaces where they can store their belongings, interact with other parents, share resources, organize fundraisers, and socialize. Designated areas like libraries, auditoriums, or multipurpose rooms can serve these purposes. The school design should also be inviting as a community hub, featuring a prominent

entrance, clear signage, accessible and inviting waiting areas, and suitable meeting spaces. These elements contribute to creating a welcoming environment for parents and encourage their active involvement in the school community. (Mostafa,Magda)

2.4.10 Layout and travel distance

When planning the layout and adjacencies of spaces, it's important to separate high-stimulus zones from low-stimulus areas. Examples of high-stimulus places include art rooms, media rooms, cafeterias, gyms, and makerspaces, while low-stimulus zones consist of classrooms, one-on-one chat settings, and study spaces. Transitional spaces between these activities help mitigate differences and allow students to prepare and adjust accordingly. Minimizing travel distance within the school is crucial for all students, especially those with disabilities who may require additional time and assistance. Centralizing facilities such as physical education, music, art, the library, cafeteria services, and elevators facilitates easier travel. In multi-story buildings, multiple elevators may be necessary to ensure appropriate travel distances for impaired students. (Mostafa,Magda)

2.4.11 Furniture

Furniture items used in treatment centers for autism require specific characteristics tailored to young patients with sensory deficiencies. They should be easy to perceive, with simple shapes and neutral colors to avoid distractions. Materials like wood and textiles are preferred, while reflective surfaces should be avoided. A refuge space, often in the form of an armchair, provides a calm environment during overstimulation and should be adaptable to patient needs. As therapy progresses, furniture should transition to typical household items to promote integration. When selecting furniture for autism

centers, careful consideration should be given to factors such as color, dimensions, textures, and minimal decoration. It's advisable for all spaces to include cupboards to store equipment and toys when not in use. Avoiding movable objects like fans or exhaust fans is recommended, as they can distract individuals with autism and produce unwanted sounds. (Mostafa,Magda)

2.4.12 Lighting

Flickering fluorescent lighting should be avoided as it can be disturbing to individuals with ASD. Compact fluorescent lighting may be acceptable, but fittings should always be checked for appropriate diffusers. Flexibility in lighting levels is important, as the lighting level suitable for waking hours may not be suitable at night. (Mostafa,Magda)

2.4.13 Colour Perception in Children with Autism

Color selection in building design is crucial, especially for individuals with autism, as colors can evoke various emotional responses. Neutral, calming colors are preferred, while stimulating colors should be avoided. Autistic individuals often perceive colors with greater intensity, with red appearing fluorescent and vibrant. Overstimulation caused by intense colors can negatively affect behavior. Earth tones are recommended, and busy patterns should be avoided due to difficulties in processing complex patterns. Tranquil hues like pale blue, soft green, or muted purple can encourage calmness and appropriate behavior. Lighter versions of favourite colors are preferable to avoid overstimulation. Soft neutrals such as ivory, beige, and light mocha reduce visual stimulation. Stark white colors should be avoided, along with busy curtain patterns and colourful decorations, to create a soothing environment.

2.4.14 Safety

Designing interior spaces for individuals with autism requires careful consideration of various factors to ensure their safety and well-being. Every design element, including color, materials, lighting, furniture arrangement, and fixtures, should contribute to creating a calm and secure environment. For instance, bathroom fittings should be placed at suitable heights to prevent hazards, while electrical switches and devices should be positioned out of reach to avoid accidents. Door handles should be designed for easy and safe operation, with one-sided locks avoided to prevent individuals from getting trapped. Non-slippery tiles are essential in autistic spaces to prevent falls, considering their unusual movements. Revolving or double-part double-swing movable doors should be avoided due to potential visual distortion that may cause fear in individuals with autism. Additionally, furniture like frameless chairs should be provided to ensure safe seating and prevent climbing. Handrails should be securely fixed at appropriate heights, with horizontal bars avoided to deter climbing behavior. Transparent plastic panels for windows offer a safer alternative to glass, being less fragile and unbreakable. These considerations help create an environment that promotes safety and comfort for individuals with autism. (Mostafa,Magda)

2.4.15 Security

Ensuring safety and security in schools is paramount, addressing both external threats and internal student safety within classrooms. Transparency in communal areas promotes passive surveillance, aiding in preventing bullying incidents. Special attention must be given to prevent wandering or elopement behaviours common among some special education students, with careful placement of entry/exit points and gated

access to outdoor areas like sensory gardens. Utilizing existing security measures such as limited entry points, secured vestibules, perimeter fencing, security cameras, and alarm systems is essential. Additionally, potential hazards within the school, such as mechanical rooms or storage areas, must be closely monitored. Design considerations should prioritize accessibility for students with disabilities, including those with autism and cognitive difficulties, ensuring their safety and facilitating operational procedures, including emergency evacuation protocols. (Mostafa,Magda)

2.4.16 Scale and proportion

Individuals with autism have specific sensitivities to the proportions of spaces. Small spaces may feel suffocating to them, while overly large spaces can be confusing and disorienting. Open plans and long spaces may lead to visual distraction, making it difficult for them to navigate easily. While it's often believed that individuals with autism require wider spaces for better imagination and comfort, research suggests that hypo-sensitive individuals may actually prefer smaller, more intimate spaces. This highlights the importance of considering the specific sensory needs of each individual. Proxemics, or the study of personal space, varies among hyper-sensitive and hypo-sensitive individuals with autism. Therefore, it's crucial to arrange education spaces according to the sensory sensitivities of students, ensuring that hyper-sensitive individuals are not placed in cramped spaces while hypo-sensitive individuals may require more confined areas. Transitional spaces, such as corridors, should be wider than usual to accommodate the repetitive behaviours often exhibited by individuals with autism, such as hand-flapping. Additionally, wider corridors provide opportunities for social interaction, facilitating relationships among individuals with autism.

Chapter 3

Case studies

3.1 Methodology

Collection of two case study data each from three sets of building typology prescribed.

1.Medical

2.Educational

3.Residential

3.2 Literature case studies

1. One place kids centre, Canada
2. Northern institute of autism, Australia
3. Sweetwater spectrum community, California

3.2.1 One kids place early intervention centre

Project name: One kids place early intervention centre

Location: Canada

Architect: Mitchell Architects

Project type: Healthcare

Size: 3836sqm

Year completed: 2011

One Kids Place (OKP) offers a diverse range of services for children, youth, and families dealing with physical, developmental, and communication delays and disabilities. The facility also hosts the Clinic of the North Bay Paediatric Group, comprising all paediatricians in the area. The building is a single-story structure with a primary public circulation system designed for intuitive navigation. It features abundant access and views to the outdoors, centred around a courtyard serving as an outdoor therapy area, quiet reflection space, and sheltered play area. This courtyard acts as a focal point for public circulation, enhancing accessibility and orientation. To ensure freedom of movement for all children, the center is designed as a single-story structure at ground level. Spaces are organized around an intimate courtyard, providing a sheltered outdoor environment for therapy, respite, and recreation. Visual connections to the outdoors, particularly the courtyard, are emphasized throughout the building to enhance accessibility, natural light, and orientation.

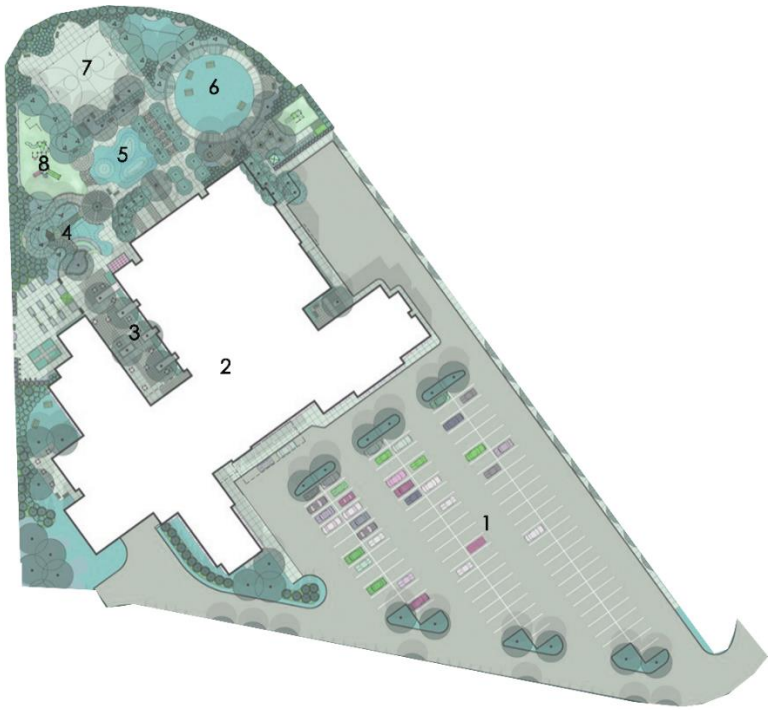

Figure 8 Masterplan of One kids place early intervention center

The center is divided into two main areas: the entry area with administration and resource rooms, and the eastern area with more private spaces for children and healthcare workers, including treatment rooms, classrooms, and therapy rooms. Natural light is maximized throughout the building, with features such as clerestory windows, pyramidal skylights, and floor-to-ceiling glass walls providing ample daylight to circulation spaces and public-access offices. The building incorporates sustainable design features such as a 10-foot saltwater aquarium in the lobby, colourful resin panels above the main waiting area, and artwork by local artists to engage and calm children. Other sustainable elements include radiant heating with high-efficiency boilers, energy-efficient lighting with bi-level dimming, automated daylight harvesting, on-site stormwater retention, low-VOC materials, and a Living Green Wall for bio-filtration.

Figure 9 Ground floor plan of One kids place

1.Lobby/waiting area
2.paediatric clinic
3.day clinic
4.therapists' workstations
5.therapy room
6.family resource room
7.administration
8.staff lounge
9.gymnasium
10.classroom
11.courtyard
12.services

3.2.2 Northern institute of autism

Project name: Northern institute of autism

Location: Australia

Architect: HEDE Architects

Project type: Education

Size: 3836sqm

Year completed: 2011

Awards:2013 AIA State/Regional Awards

The Northern School for Autism, one of two campuses in Australia, caters to 144 students diagnosed within the autism spectrum. The teacher-to-student ratio is 1:3. Students are grouped into separate sub-schools based on their position on the spectrum scale, with divisions including Senior, Middle, and Intermediate schools. Classrooms have limited windows aimed at the outside, reducing internal distractions and promoting focus. Earthly, subdued colours are used in the design to create a calming environment suitable for students with ASD. Small learning spaces and access to the outdoors support self-calming and provide sensory stimulation. Learning environments

are organized around a central courtyard, with individual access to play areas from all learning spaces. Classrooms are arranged along curved circulation routes to minimize distractions and maintain focus. Play areas include bike trails and sand pits, catering to sensory activities favoured by students with ASD. The colour scheme throughout the school is selected to accommodate students' sensitivity to environmental factors.

Figure 10 Masterplan of Northern school

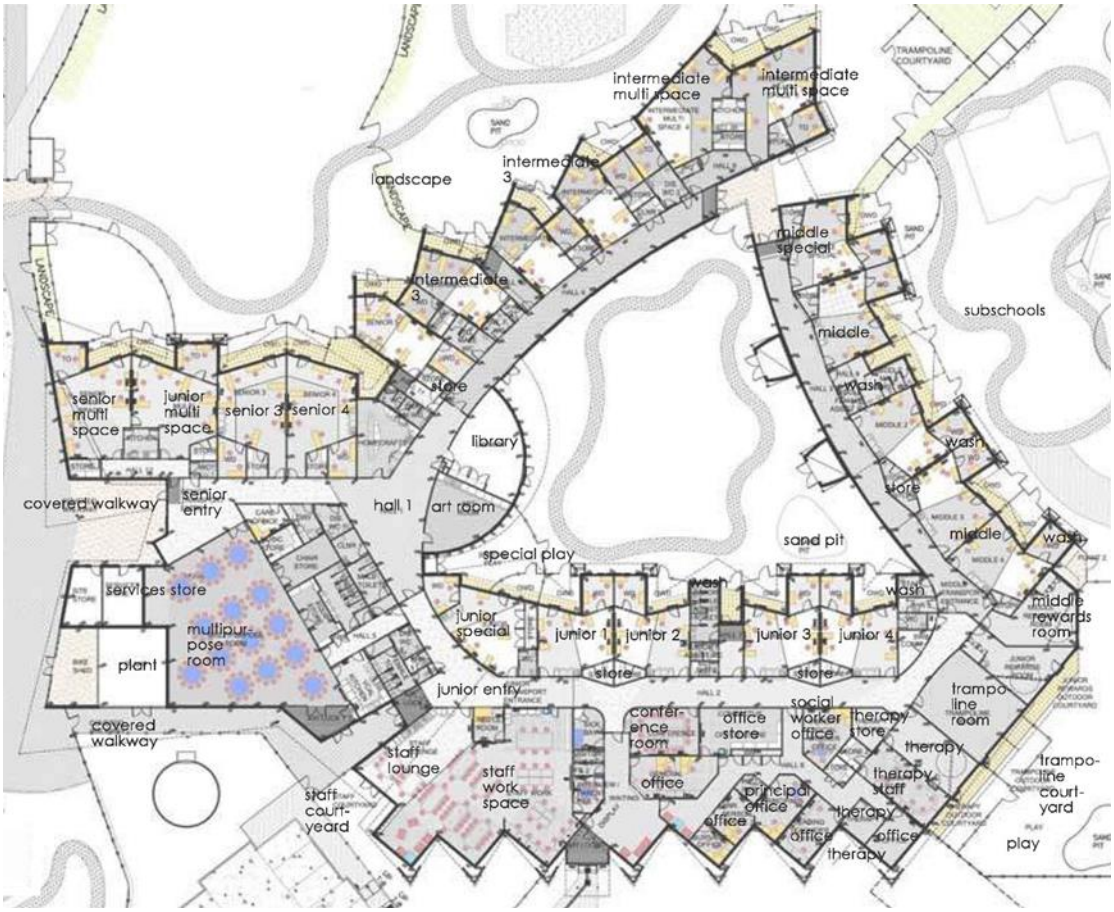

Figure 11 Ground floor plan of Northern school

Figure 12 Typical classroom unit

Each learning unit includes:

1.Main learning area (Intermediate): The primary instructional space for academic activities. 2. Withdrawal room (Quiet Learning): A designated space for individual or small group activities requiring a quieter environment. 3.Outdoor Withdrawal Zone:

Outdoor space for quiet activities or sensory breaks. 4.Undercover Area (Roofline): Sheltered space with access to northern sunlight and the sub-school area, providing protection from the elements. 5.Outdoor Playspace: Specifically designed without trees or landscaping to prevent students from eating or destroying them. Features include areas for bike riding, climbing, and sand play, which are highly enjoyed by students.

3.2.3 Sweetwater spectrum community

Project name: Sweetwater spectrum community

Location: 369 5th St W, Sonoma, CA 95476, United States of America

Architect: Leddy Maytum Stacy Architects

Project type: Residential

Size: 1207sqm for residence+213.6sqm for centre=1420sqm

Year completed: 2013

Sweetwater Spectrum is a new national model of supportive housing for adults with autism, offering life with purpose and dignity. Designed by Leddy Maytum Stacy Architects, the 2.8-acre site provides a permanent home for 16 adults and their support staff. The four 3,250 sq.-ft four-bedroom homes include common areas as well as a bedroom and bathroom for each resident. Sweetwater Spectrum also incorporates a 2,300-square-foot community centre with exercise/activity spaces and a teaching kitchen; a large therapy pool and spas; and an urban farm, orchard, and greenhouse.

The design for housing adults with autism integrates evidence-based guidelines from a research study by the Arizona State University Stardust Center and School of Architecture. Safety, security, and customization are paramount considerations. The

major design strategies encompass various aspects: Firstly, ensuring legibility through a clear spatial organization delineating public, semi-public, semi-private, and private spaces. Secondly, establishing an experiential hierarchy that extends from individual rooms to broader community areas. Thirdly, providing opportunities for previewing spaces and accessing retreat areas for quiet and calm. Additionally, maintaining predictability with consistent design across all homes to enhance resident comfort and familiarity. Moreover, creating serene spaces with reduced sensory stimulation through familiar forms, subdued colours, and indirect lighting. Further, incorporating simple universal design strategies for generous accommodation and equal access. Careful selection of healthy materials and systems promotes indoor air quality and comfort. The design also prioritizes energy efficiency, water efficiency, and overall sustainability, meeting LEED Gold standards with zero net energy design and passive solar orientation. Finally, sustainable practices include the use of renewable materials, low-VOC finishes, and recycling of construction waste.

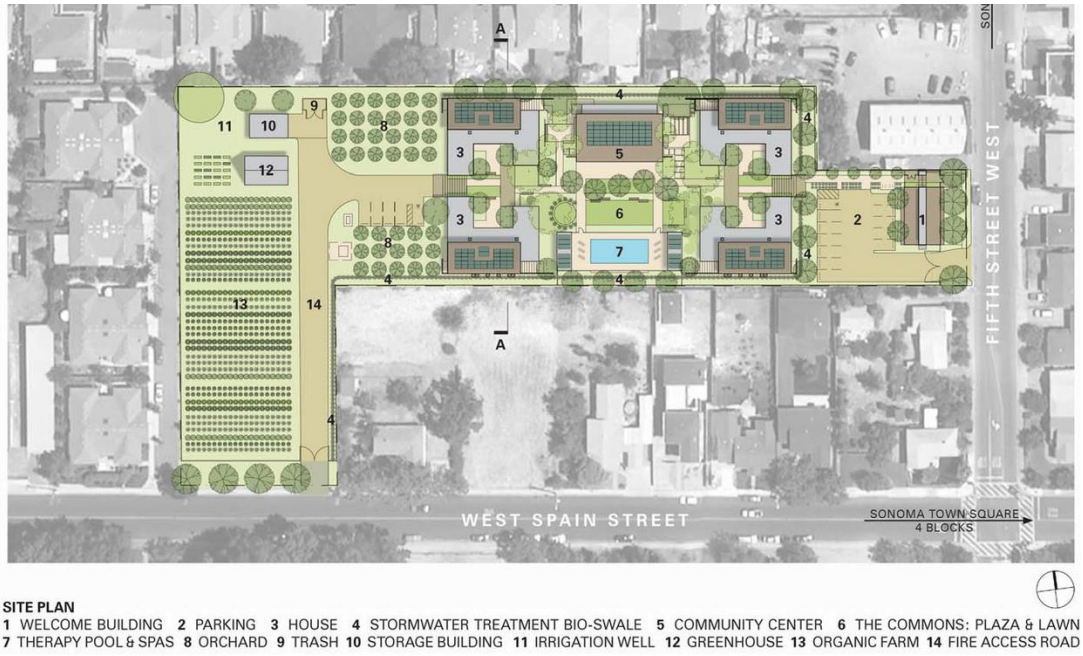

Figure 13 Masterplan of Sweetwater spectrum community

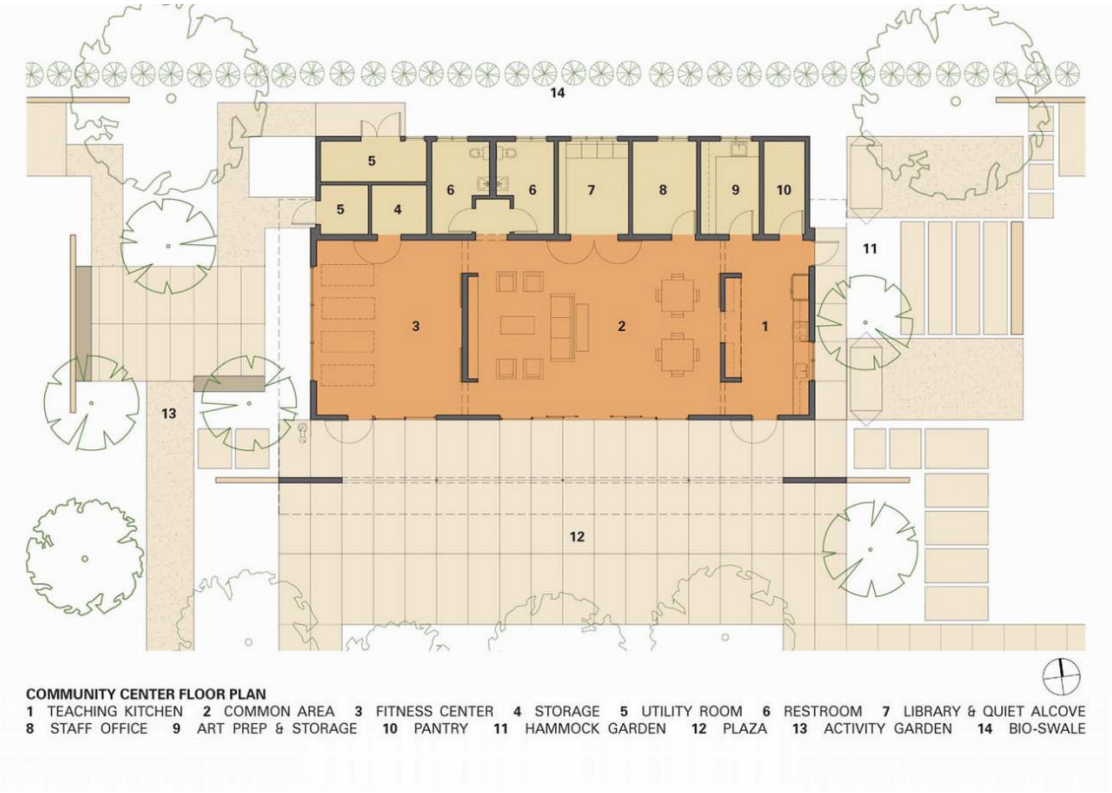

Figure 14 Floor plans of Sweetwater spectrum community

3.3 Live case studies

1. Child Development Centre, Thriuvananthapuram
2. Prasanthi special school, Kozhikode
3. NISH-Chintha, Palakkad

3.3.1 Child Development Centre

Project name: Child Development Centre

Location: Medical College Campus, Chalakkuzhi, Thiruvananthapuram

Architect: Unknown

Project type: Healthcare

Size: 4000 sqm

Year completed: 2010

The Child Development Centre, established by the government of Kerala, focuses on early-child and adolescent care, education, premarital counselling, and women's welfare. It has played a crucial role in reducing childhood disabilities and developed the Thiruvananthapuram Development Chart for assessing child development in community settings. The centre offers state-of-the-art clinical, research, teaching, and training services in child and adolescent care and development, specializing in outpatient consultations for various mental disabilities. Therapeutic sessions are scheduled by appointment only, with no provision for inpatient wards. The building's planning emphasizes vertical zoning, with departments organized vertically rather than horizontally, utilizing passenger lifts for vertical circulation. The service area occupies 40 percent of the structure, with service cores located towards the building's end.

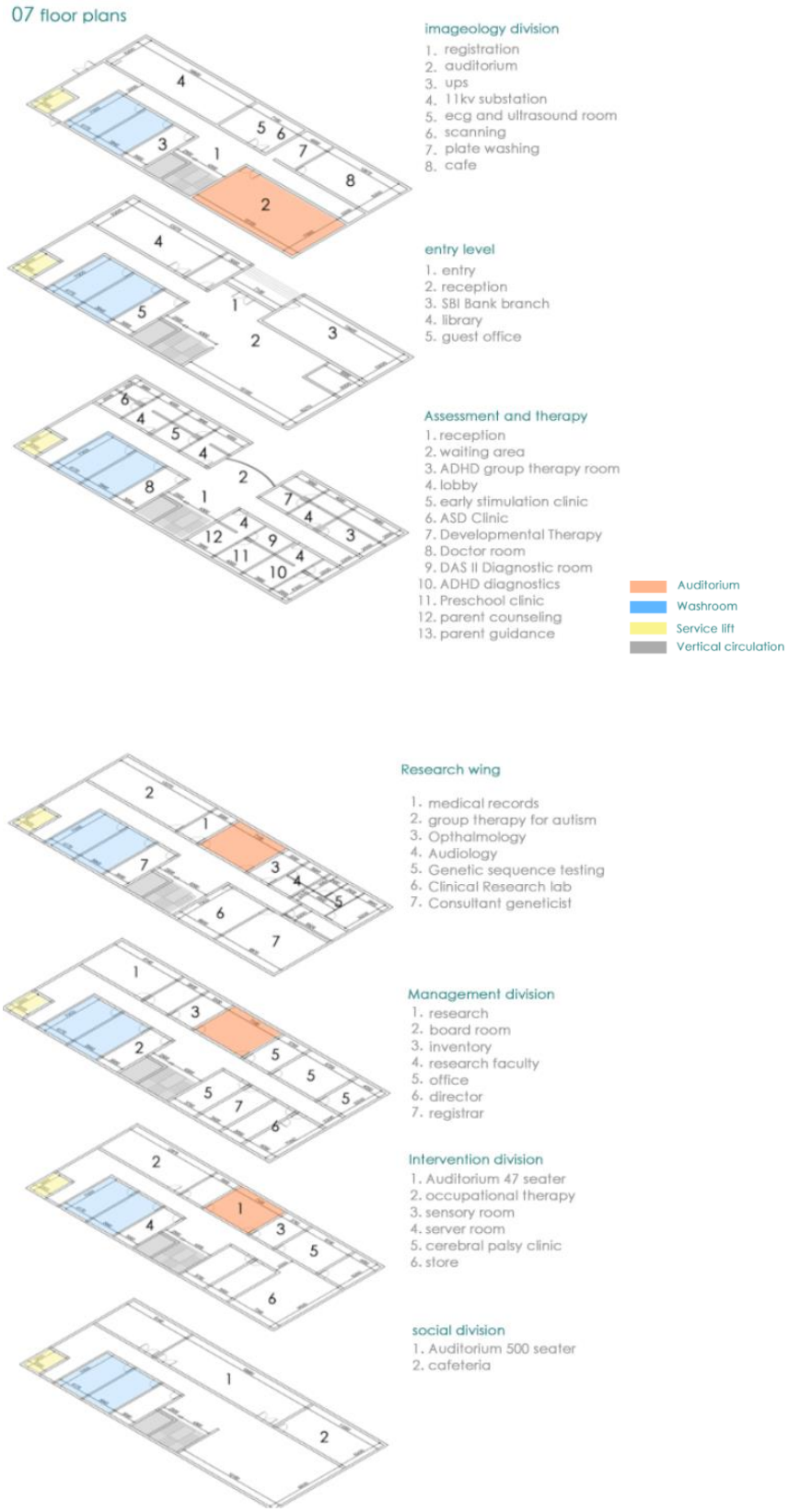

Figure 15 Floor plans of CDC

3.3.2 Prasanthi special school

Project name: Prasanthi special school

Location: Prasanthi Nagar, Pantheeramkavu, Kerala

Architect: Space A.R.T Architects

Project type: Educational

Size: 400 sqm

Year completed: 2010

Dr. Ramakrishnan Palat established the Prasanthi School for Children with Special Needs in Kozhikode, Kerala, in 2000. Renowned for its dedication to autism and special needs education, Prasanthi employs a thoughtful spatial layout to enhance the learning environment, with a central focus on a communal lawn area. The school prioritizes proper facilities, including well-furnished classrooms featuring student artwork, though the library requires further development to meet educational needs adequately.

Class	Age (From-To)	Total number of students	Girls	Boys
Preschool A	3-6 years	5	3	2
Preschool B	3-6 years	5	3	2
Pre- primary A	5-9 years	7	2	5
Pre –primary B	5-8 years	8	3	5
Pre-primary C	7-11 years	8	1	7
Primary A	8-13 years	9	4	5
Primary B	8-13 years	8	4	4
Primary C	8-12 years	9	5	4
Primary D	7-13 years	9	3	6
Secondary A	9-12 years	9	4	5
Secondary B	7-14 years	8	1	7
Secondary C	11-16 years	9	-	9
Secondary D	10-14 years	9	1	8
Autism spectrum disorder	6-14 years	7	2	5
Care group	11-18 years	7	4	3
Pre – vocational A	12-18 years	10	-	10
Pre –Vocational B	12-17 years	10	-	10
Total number of classes= 17		Total number of students = 137	Total number of girls= 50	Total number of boys =87

Table 7 Class wise distribution of students

Admission is open to disabled children aged 3 to 18, with vocational classes available for those over 15. The curriculum is tailored to individual needs across various classes, including preschool, primary, secondary, and specialized divisions for autism spectrum disorder. Counseling is offered to parents upon admission, with academic goals set every three months based on students' abilities and progress evaluated by faculty members. Curricular activities vary from preschool to secondary classes, focusing on practical skills development such as puzzles, numerical concepts, and daily living tasks. The school provides resources like toys, equipment, and teaching materials for each class, including specialized amenities such as baby chairs in pre-primary classes and attached toilets in the care group.

The infrastructural facilities

SL. NO.	Facilities	Present /Absent	Number	Measurement
1	Classrooms	Present	15	300x300cm
2	Toilets	Present	15	150x250cm
3	Library	Not separate	-	-
4	Office room	Present	1	300x300cm
5	Seminar Hall	Present	1	1333x400cm
6	Counsellors room	Present	1	300x300cm
7	Therapy room	Present	1	300x380 cm
8	IT Room	Present	1	300x380cm
9	Kitchen & Dining hall	Present	1	1333x400cm
10	Ramp	Present	1	-
11	Well	Present	1	-
12	Wheel chair	Present	9	-
13	Dining chair	Present	75	-
14	Dining table	Present	15	-

Table 8 Infrastructure at Prasanthi special school

Facilities also include separate therapy halls for yoga, dance, speech, and physiotherapy, along with administrative and dining facilities. Despite accessibility features like ramps, the lack of a lift may pose challenges for students with mobility issues. The school prioritizes recreational activities, providing sports equipment and musical instruments, though the library remains underdeveloped.

Efforts are made to create a barrier-free environment, with spacious classrooms equipped with benches, desks, and storage shelves. The school aims to enhance its educational offerings further to support the diverse needs of its students and foster holistic development.

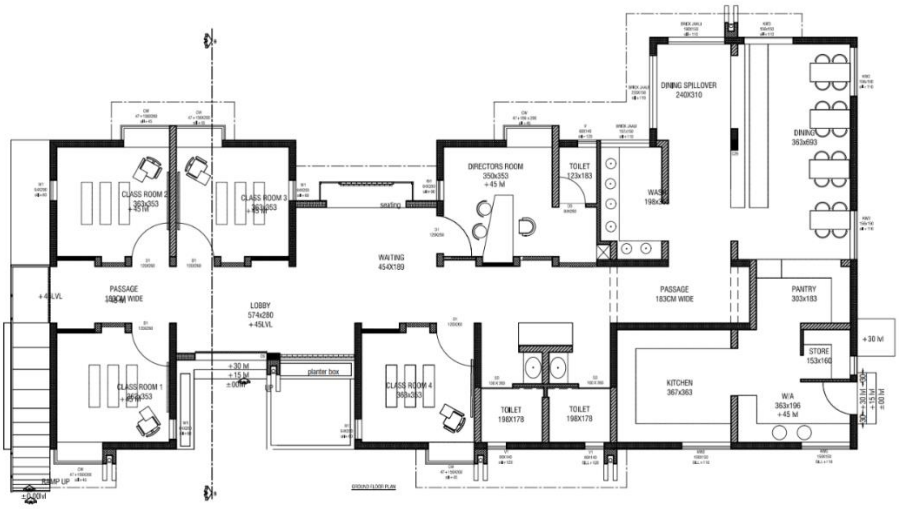

Figure 16 Kindergarten floor plan

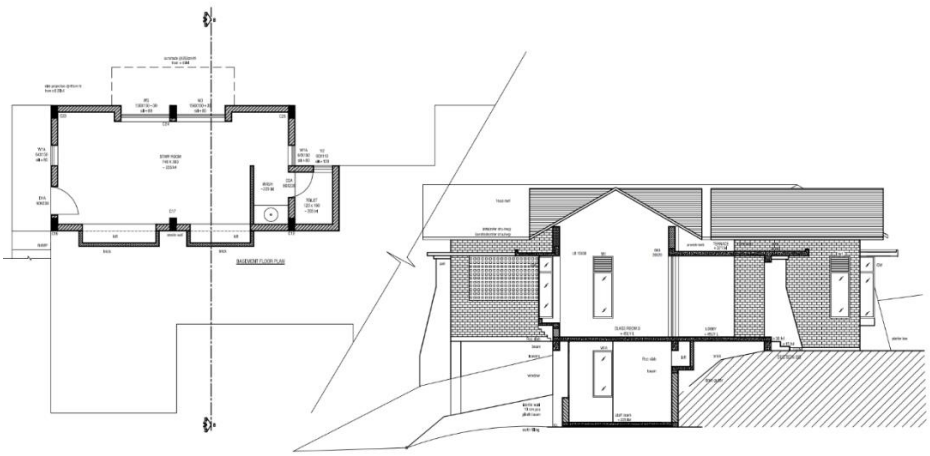

Figure 17 Kindergarten basement and section

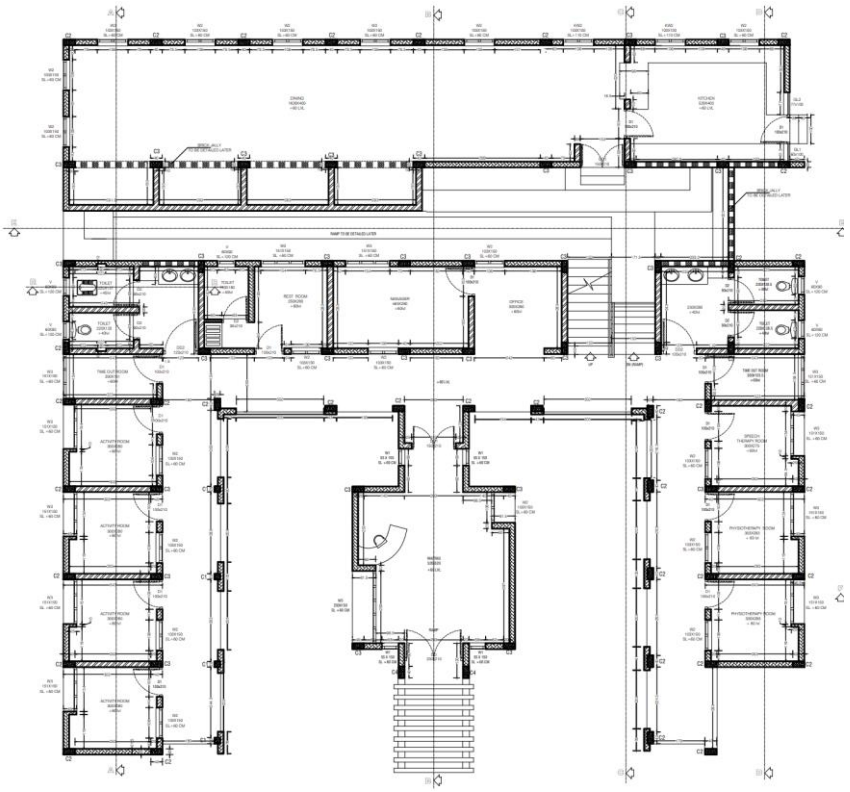

Figure 18 Ground floor plan of Prasanthi special school

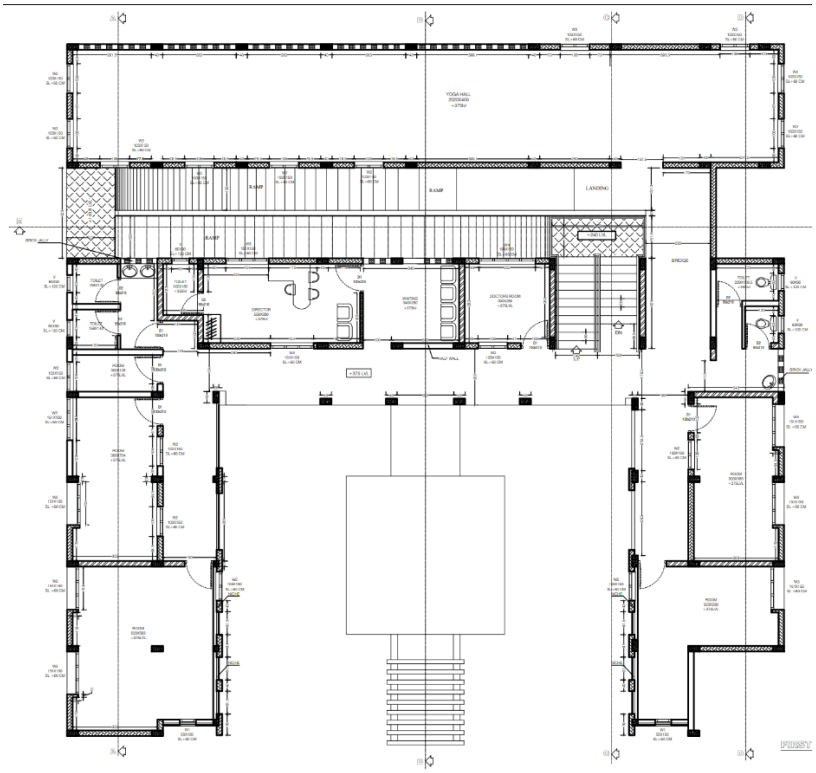

Figure 19 First floor plan of Prasanthi special school

3.3.3 NISH-Chintha

Project name: NISH-Chintha

Location: Mulanjur PO, Ottapalam, Palakkad

Architect: Ar. Arjun Rajan

Project type: Residential

Size: 2450 sqm

Year completed: 2014

Nish-Chinta embodies worry-free assisted community living for families with intellectually disabled children. Founded with the goal of offering collaborative yet independent living and learning opportunities for individuals with conditions such as autism, cerebral palsy, and Down syndrome, it has evolved from a parental initiative into a self-sustaining, inclusive community.

The planning of Nish-Chinta primarily consists of three components: 15-unit and 7-unit residences, as well as an institutional building. The design flexibility allows buyers to purchase a plot of land and construct a customized house according to their specific needs and preferences. The community layout prioritizes accessibility, with inner roads designated for wheelchair access only and outer roads for vehicular transportation. Waste management is also integrated, with plastic and dry waste collected by the municipality and wet waste processed in an on-site biogas plant. Water supply is sourced from a rainwater harvesting tank with a capacity of 100,000 litres and an overhead tank. Additionally, accessible toilets are mandated as per common guidelines, ensuring inclusivity and convenience for all residents.

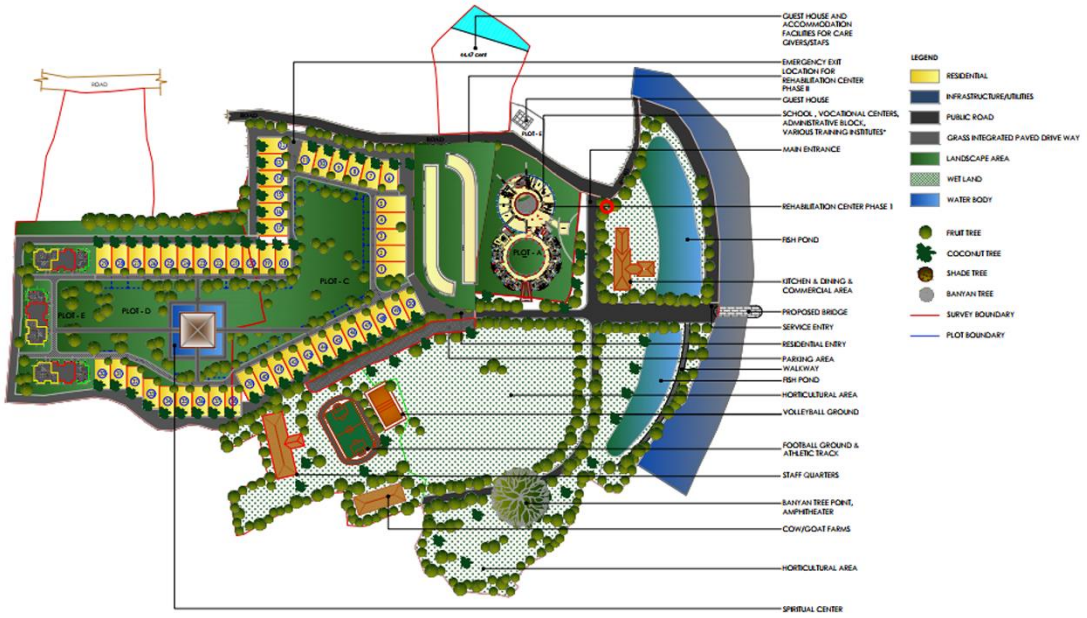

Figure 20 Masterplan of NISH Chintha

3.4 Inferences

Child Development Centre: Pros:

1.Vertical Zoning: Organizing departments vertically optimizes space and facilitates easy navigation through the building. 2.Accessibility: Utilizing passenger lifts enhances accessibility for individuals with mobility impairments.3. Maximized Service Area: Allocating 40% of the structure to service areas ensures efficient operations and maintenance.4. Focus on Outpatient Care: Specializing in outpatient consultations reduces the need for inpatient wards, promoting community-based care.

Child Development Centre Cons:

1.Potential Navigation Challenges: Vertical zoning may lead to confusion for some users, especially those unfamiliar with the building layout. 2.Limited Natural Light: Restricted windows aimed outside may result in reduced access to natural light for certain areas within the building. 3.Less Emphasis on Outdoor Spaces: Limited mention

of outdoor therapy areas or recreational spaces may limit opportunities for outdoor activities and therapy sessions.

One Kids Place Early Intervention Centre: Pros:

1.Single-Story Design: Ground-level construction enhances accessibility for all users, including those with mobility impairments.2.Intuitive Layout: Dividing the center into two main areas simplifies navigation and organization for both staff and visitors.3.Abundant Natural Light: Features like clerestory windows and pyramidal skylights maximize natural light, promoting a healthy indoor environment.4.Integrated Sustainable Features: Incorporating sustainable elements such as a Living Green Wall and stormwater retention contributes to environmental responsibility.

One Kids Place Early Intervention Centre Cons:

1.Limited-Service Cores: Service cores located towards the building's end may lead to longer travel distances for certain users.2. Potential Overcrowding: High demand for services may strain the facility's capacity, leading to overcrowding and longer wait times.3. Outdoor Space Constraints: While a central courtyard is provided, its size and amenities may not fully meet the diverse needs of users for outdoor therapy and recreation.

Inferences:

1.Spatial Efficiency: Child Development Centre prioritizes vertical zoning for efficient space utilization, while One Kids Place emphasizes intuitive layout and accessibility through a single-story design. 2.Natural Light: One Kids Place excels in maximizing natural light, enhancing the indoor environment and user experience. 3.Outdoor Access: While both centers provide outdoor spaces, One Kids Place may offer more

opportunities for outdoor therapy and recreation due to its emphasis on a central courtyard.4. Sustainability: Both centers incorporate sustainable features, but One Kids Place stands out with its integrated sustainable elements like the Living Green Wall and stormwater retention system.

Northern Institute of Autism: Pros:

1.Tailored Learning Spaces: Classrooms are organized based on students' positions on the autism spectrum, with divisions accommodating their needs.2.Limited Distractions: Classrooms have restricted windows aimed outside, reducing internal distractions and promoting focus.3.Calming Environment: Earthy, subdued colors create a calming atmosphere suitable for students with ASD, enhancing their learning experience.4.Sensory Stimulation: Access to outdoor spaces and small learning areas supports self-calming and provides sensory stimulation, catering to students' sensory needs.5.Focused Design: Classrooms arranged along curved circulation routes minimize distractions and maintain focus, optimizing the learning environment for students.

Northern Institute of Autism Cons:

1.Limited Outdoor Landscaping: Outdoor play spaces are specifically designed without trees or landscaping, potentially limiting natural elements for sensory experiences.

Prasanthi Special School: Pros:

1.Diverse Curriculum: The school offers a tailored curriculum across various classes, including specialized divisions for autism spectrum disorder, catering to individual needs. 2.Holistic Development: Facilities include separate therapy halls for yoga, dance, speech, and physiotherapy, promoting holistic development beyond academic

learning.3. Barrier-Free Environment: Efforts are made to create a barrier-free environment, ensuring accessibility for all students and promoting inclusivity.4. Recreational Activities: The school prioritizes recreational activities, providing sports equipment and musical instruments, fostering physical and creative expression.

Prasanthi Special School Cons:

1.Lack of Elevator: The absence of a lift may pose challenges for students with mobility issues, potentially limiting accessibility within the school.2. Underdeveloped Library: The library may remain underdeveloped, potentially limiting access to resources and hindering academic development.

Inferences:

1.Customized Learning: Both institutions prioritize tailored learning environments to meet the diverse needs of students with autism spectrum disorder. 2.Sensory Considerations: While the Northern Institute of Autism focuses on minimizing distractions and providing sensory stimulation, Prasanthi Special School emphasizes holistic development through diverse activities and facilities.3.Accessibility: Prasanthi Special School's efforts to create a barrier-free environment demonstrate a commitment to inclusivity, despite the lack of an elevator.4.Academic Resources: Both schools may benefit from further development of library facilities to enhance academic support and enrichment opportunities for students.

NISH-Chintha: Pros:

1.Customized Living Spaces: Residents can purchase plots and customize homes to their specific needs and preferences, promoting independence and personalization.2.Inclusive Community Layout: The community prioritizes

accessibility, with designated wheelchair-accessible inner roads and integrated accessible toilets, ensuring convenience for all residents.3.Environmental Sustainability: Waste management and water supply systems, including on-site biogas plant and rainwater harvesting tank, demonstrate a commitment to environmental sustainability.4.Flexibility and Adaptability: Design flexibility allows for the construction of customized homes, accommodating diverse needs and preferences within the community.

NISH-Chintha Cons:

1.Limited Residential Capacity: The focus on individualized residences may limit the overall residential capacity compared to larger communal living arrangements.2. Potential Isolation: While the emphasis on personalized living spaces promotes independence, it may result in decreased social interaction among residents.

Sweetwater Spectrum Community: Pros:

1.Comprehensive Facilities: The community incorporates a range of facilities, including common areas, therapy pool, spas, urban farm, and greenhouse, catering to various needs and interests of residents.2.Evidence-Based Design: Design strategies are informed by evidence-based guidelines, ensuring safety, security, and comfort for residents with autism.3.Focus on Sensory Considerations: Design features aim to reduce sensory stimulation, promoting a calm and comfortable living environment for residents.4.Environmental Sustainability: The community prioritizes energy efficiency, water efficiency, and overall sustainability, meeting LEED Gold standards and incorporating sustainable practices.

Sweetwater Spectrum Community Cons:

1.Limited Personalization: While the community offers comprehensive facilities, the design may lack the level of customization available in individually owned homes, potentially limiting personalization for residents.2. Potential Overstimulation: Despite efforts to reduce sensory stimulation, the presence of communal areas and facilities may still pose challenges for residents sensitive to sensory stimuli.

Inferences:

1.Residential Model: NISH-Chintha emphasizes individualized living spaces, promoting independence and personalization, while Sweetwater Spectrum Community offers comprehensive facilities within a communal living environment.2.Accessibility and Sustainability: Both communities prioritize accessibility and environmental sustainability, integrating features such as accessible infrastructure and sustainable design practices.3.Personalization vs. Community: NISH-Chintha prioritizes personalization and adaptability, while Sweetwater Spectrum Community focuses on providing a supportive communal environment with comprehensive facilities.

Chapter 4

Site Study

4.1 Selection criteria

Several criteria were employed to evaluate potential sites, directly influencing the des-

Accessibility: Ensuring ease of access for all individuals, including those with mobility challenges.

1. Proximity to hospitals: Considering convenient access to medical facilities in emergencies or for specialized care needs.
2. Visual aesthetics and sensory experiences: Prioritizing sites with pleasing surroundings and minimizing disturbances.
3. Safety: Ensuring a secure environment for occupants and visitors.
4. Connection between urban and suburban areas: Enhancing integration and accessibility for diverse communities.
5. Surrounding residential environment: Considering the needs and preferences of potential users.
6. Access to green spaces: Prioritizing sites with natural surroundings to promote well-being.
7. Odor and noise considerations: Selecting locations free from intolerable smells and minimizing external noise sources.

4.2 Introduction

The site for the proposed project is located in Aakulam, Trivandrum, with coordinates at 8°31'49.1"N 76°53'44.4"E. It spans an area of 20 acres, equivalent to approximately 84,907 square meters, and features an elevation level difference of 17 meters. The proposed land use for this site is institutional, catering to specific functions and activities. Ownership of the land is private, indicating control and management by a non-governmental entity. Permissible coverage on the site is set at 35%, allowing for substantial development while maintaining open spaces and greenery.

The current state of the site reveals a natural landscape abundant with trees and vegetation, with locals utilizing a portion for irrigation purposes. Situated within a valley topography, the site offers inherent safety benefits for neurodivergent individuals by acting as a physical barrier from the surrounding neurotypical world. Despite its partial seclusion, the site enjoys close proximity to commercial areas and convenient access from major transportation routes. Access to the site primarily occurs via Ulloor Aakulam Road due to its linear shape, which presents an advantage for institutional designs, facilitating straightforward circulation routes.

4.2.1 Connectivity

The site is conveniently linked to National Highway 66 via a by-road, ensuring easy connectivity for individuals seeking treatment from various parts of India. Additionally, it enjoys proximal access to both the airport and rail networks, facilitating convenient transportation. Key areas associated with the site include recreation and healthcare, with top healthcare facilities such as the National Institute of Speech and Hearing, Medical College Trivandrum, and KIMS Hospital situated in close proximity. For recreational

activities, nearby attractions include Trivandrum Zoo, Aakulam Lake, Magic Planet, and Veli Tourist Village. The site also benefits from its proximity to major commercial areas, notably Lulu Mall, providing residents and visitors with diverse amenities and services.

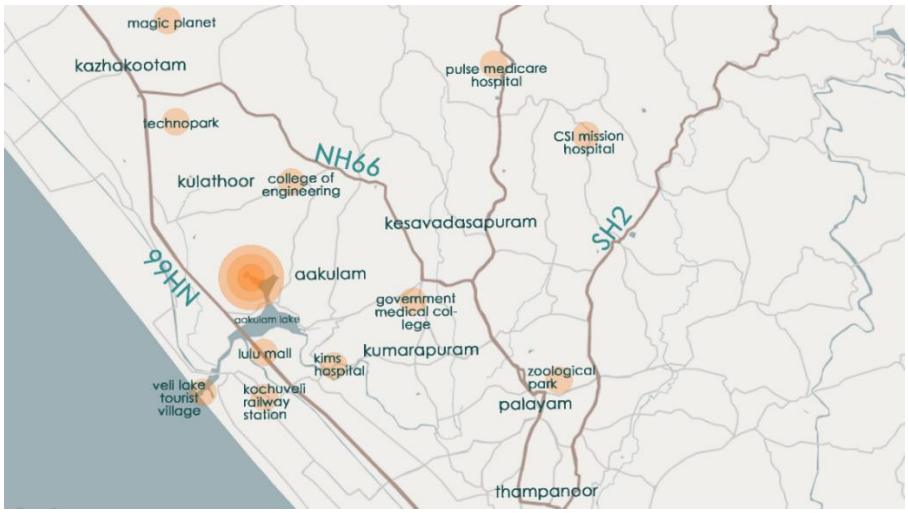

Figure 21 Site connectivity

4.2.2 Site features

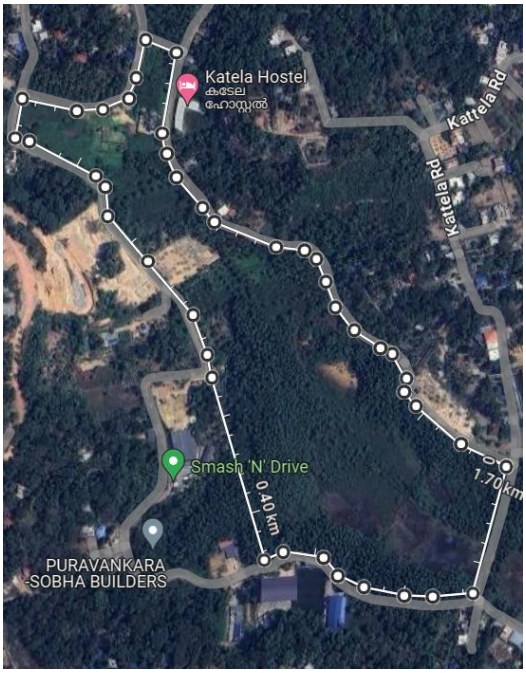

Figure 22 Site boundary

The site is accessed from a 6m wide road, with a single-entry gate centrally located along the main road. Boundary walls enclose approximately 80% of the defined site boundary, with a roadway measuring 4m wide on the southeast portion and 2m wide on the northeast portion. Situated in a residential area with a mix of educational buildings, the site features dense vegetation primarily towards its boundaries, particularly in the southwest region, while the central area has grass cover. Drainage at the north portion of the site can be directed to the existing drainage channel outside the site, although the existing drain is partially closed.

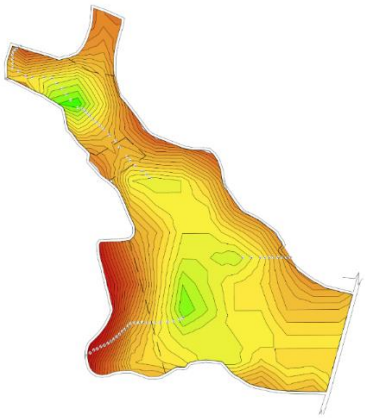

Figure 23 Relief map

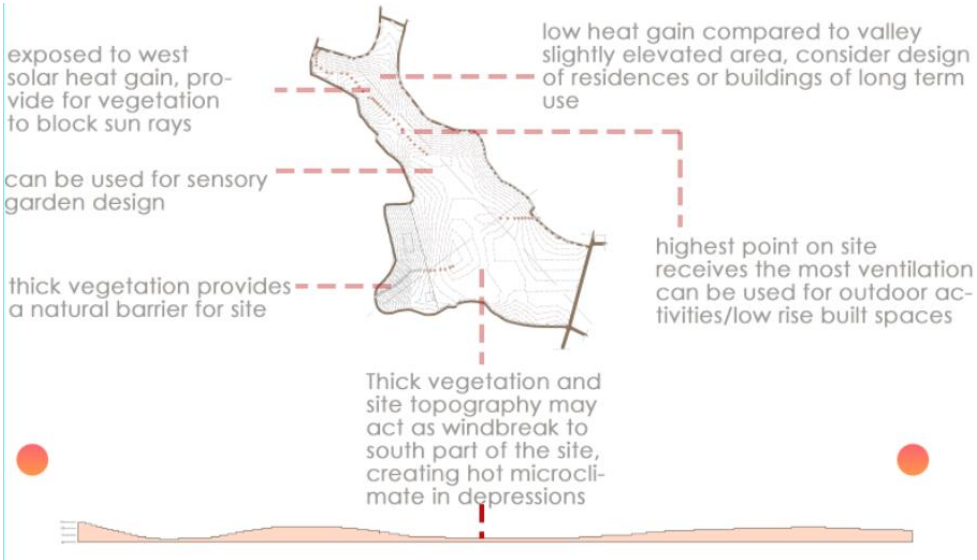

Figure 24 Site study

4.3 SWOT Analysis

1. Strength: The site's abundant vegetation offers diverse potential spaces for various activities, providing opportunities for engagement and recreation in different settings.
2. Weakness: The valley formation across major portions of the site presents challenges for building construction, potentially complicating design and development efforts.
3. Opportunity: There is potential to create internal views within the site and incorporate varied levels, allowing for dynamic spatial experiences. Additionally, the thick vegetation offers opportunities to play with light and shadow, enhancing the aesthetic and sensory qualities of the environment.
4. Threat: The absence of exterior views may limit the site's connectivity with its surroundings, potentially impacting user experience and sense of place. Furthermore, future developments in the area could increase traffic flow, posing safety and accessibility concerns. Additionally, existing wildlife on the site may pose risks to occupants and visitors, requiring careful management and mitigation strategies.

Chapter 5

Design program

5.1 User groups

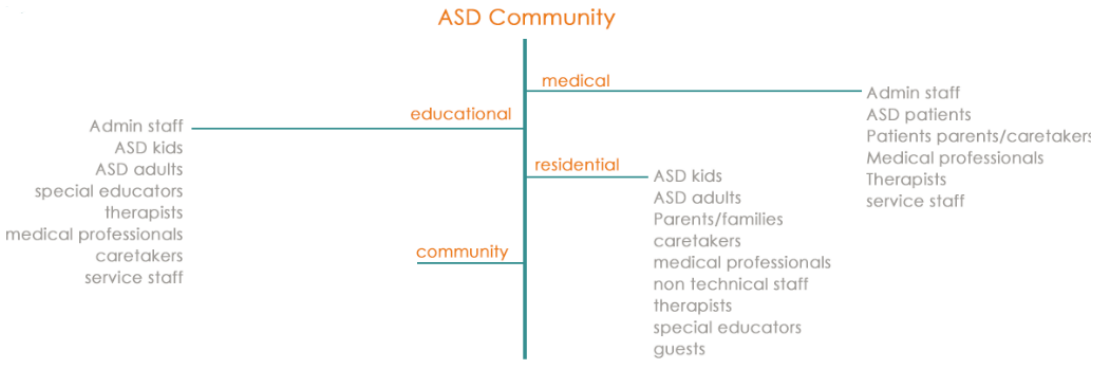

Table 9 Flowchart of user groups

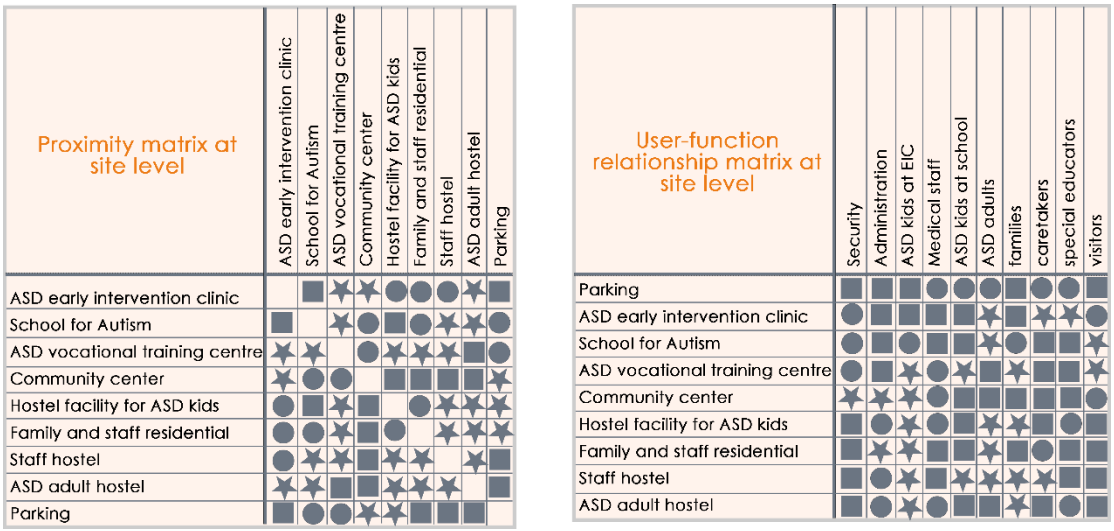

Table 10 Matrix study

5.2 Program flowchart

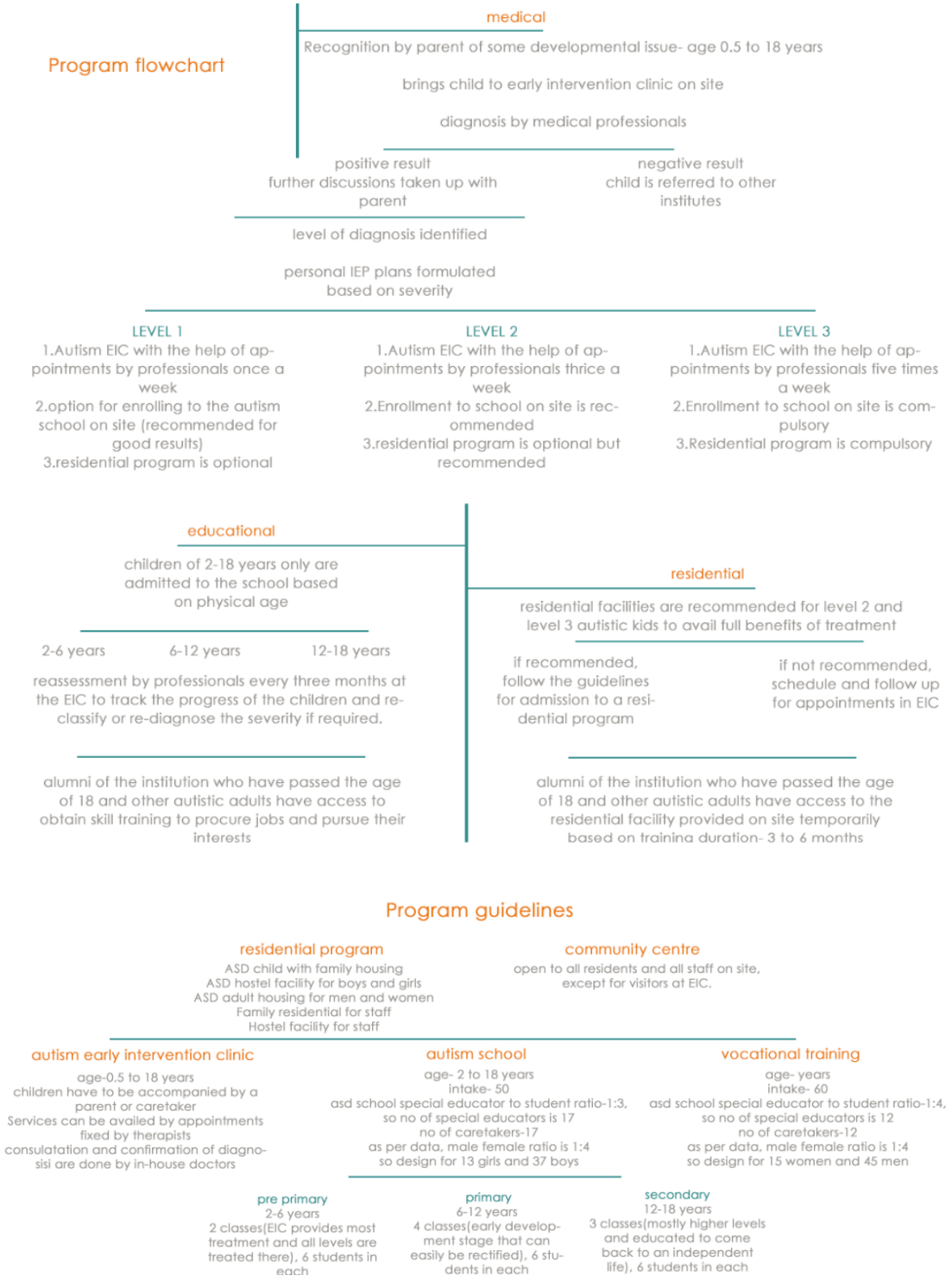

Table 11 Program flowchart

5.3 Area Statement

ASD early intervention clinic							
Sl.no	Programme	Nature of space	No.of users at a time	Area per user (sqm)	Area (sq.m)	No. of units	Total Area (sq.m)
1.	reception cum lobby	public	50	5.2	260sqm	1	260sqm
2.	doctors reception and waiting area	public	30	4.2	127sqm	1	127sqm
3.	administration	semi public	17	17.2	293sqm	1	293sqm
4.	patient lounge	public	50	1.12	56sqm	1	56sqm
5.	staff lounge	semi public	20	2	40.8sqm	2	81.6sqm
6.	parental guidance	public	25	1.9	48sqm	1	48sqm
7.	day clinic	public	26	14.8	386sqm	1	386sqm
8.	genetic testing lab	private	4	11	44sqm	1	44sqm
9.	clinical research lab	private	4	29.75	119sqm	1	119sqm
10.	ecg and ultrasound	private	4	35.2	141sqm	1	141sqm
11.	individual therapy rooms	private	2	13.65	27.3sqm	3	82sqm
12.	group therapy	private	20	2.2	45.5sqm	3	136sqm
13.	occupational therapy	private	6	14.36	86.2sqm	1	86.2sqm
14.	specialists meeting room	private	10	4	40sqm	1	40sqm
15.	sensory room	private	2	20	40sqm	1	40sqm
16.	cafeteria	public	50	1.2	60sqm	1	60sqm
17.	feeding room	private	2	5.2	10.5sqm	1	10.5sqm
18.	pharmacy	public	3	60	180sqm	1	180sqm
	area						2190.3sqm
	circulation	25% of built up area					547.5sqm
	TOTAL						2737.8sqm

School for autism							
Sl.no	Programme	Nature of space	No.of users at a time	Area per user (sqm)	Area (sq.m)	No. of units	Total Area (sq.m)
1.	reception and lobby	public	25	1.4	35.25sqm	1	35.25sqm
2.	administration	semi public	10	26.8	268.4sqm	1	268.4sqm
3.	staff room	private	17	1.55	25.5sqm	2	50.8sqm
4.	physiotherapist office	private	2	11.5	23sqm	4	92sqm
5.	speech therapist office	private	2	8	16sqm	2	32sqm
6.	psychologist office	private	2	7.5	15sqm	3	52sqm
7.	library	semi public	50	0.75	37.5sqm	1	37.5sqm
8.	sports hall	semi public	100	3.06	306sqm	1	306sqm
9.	multipurpose hall	semi public	50	3.6	180sqm	1	180sqm
10.	kitchen	private	-	1.4	130sqm	1	130sqm
11.	mess hall	semi public	130	1.5	180sqm	1	180sqm
12.	classroom	private	8	8.75	70sqm	9	630sqm
13.	escape room	private	2	6	12sqm	9	108sqm
14.	washroom	private	2	5.25	10.5sqm	9	94.5sqm
15.	art room	private	7	12.5	75sqm	2	150sqm
16.	hydrotherapy	private	10	12.2	122sqm	1	122sqm
17.	occupational therapy	private	6	9.1	55sqm	1	55sqm
18.	speech therapy	private	7	5.7	40sqm	2	80sqm
19.	physiotherapy	private	2	10	40sqm	2	80sqm
20.	sensory room	private	2	10	40sqm	2	80sqm
21.	music room	private	6	4.2	25.2sqm	4	100.8sqm
22.	dance/yoga room	private	6	5.2	36.2sqm	4	144.8sqm
23.	computer lab	semi public	24	4.6	110.4sqm	1	110.4sqm
24.	ADL room	private	24	5.18	124.5sqm	1	124.5sqm
25.	play room	private	8	2.5	20.5sqm	3	61.56sqm
	area						3305.51sqm
	circulation	25% of built up area					826.37 sqm
	TOTAL						4131.88 sqm

ASD vocational training centre							
Sl.no	Programme	Nature of space	No.of users at a time	Area per user (sqm)	Area (sq.m)	No. of units	Total Area (sq.m)
1.	administration	semi public	10	18	180sqm	1	180sqm
2.	dance room	private	11	5.1	57sqm	3	171sqm
3.	music room + recording studio	private	6	4.2	29.57sqm	6	177.4sqm
4.	painting and crafts studio	private	11	5.4	54sqm	3	162sqm
5.	photo lab	private	16	4	60sqm	2	120sqm
6.	drawing studio	private	11	6.2	62sqm	3	186sqm
7.	computer lab	semi public	16	4.6	69sqm	2	138sqm
8.	washroom	private	2	5.2	10.5sqm	6	63sqm
9.	stitching room	private	16	10.35	155.2sqm	1	155.2sqm
10.	teaching and baking kitchen	private	16	5.18	77.7sqm	1	77.7sqm
11.	multipurpose hall	semi public	60	3.8	230sqm	1	230sqm
	area						1660.3sqm
	circulation	25% of built up area					415.07sqm
	TOTAL						2075.37sqm

Residential zone							
Sl.no	Programme	Nature of space	No.of users at a time	Area per user (sqm)	Area (sq.m)	No. of units	Total Area (sq.m)
1.	ASD child family cottage-2BHK	private	4	22	88sqm	16	1408sqm
2.	boys dorm with caretaker room	private	4	27	108sqm	8	864sqm
3.	girls dorm with caretaker room	private	4	27	108sqm	4	432sqm
4.	ASD male housing- 5BHK(+caretaker room)	private	5	32	160sqm	11	1760sqm
5.	ASD female housing- 5BHK(+caretaker room)	private	5	32	160sqm	4	640sqm
6.	family housing for technincal staff	private	4	22	88sqm	16	1408sqm
7.	housing for technical staff- 4BHK	private	4	19.25	77sqm	13	1001sqm
8.	guest housing	private	4	22	88sqm	2	176sqm
	area						7689sqm
	circulation						
	TOTAL						7689sqm

Community center							
Sl.no	Programme	Nature of space	No.of users at a time	Area per user (sqm)	Area (sq.m)	No. of units	Total Area (sq.m)
1.	communal dining hall	public	180	1.33	240sqm	1	240sqm
2.	kitchen	private	300	1	300sqm	1	300sqm
3.	library	public	262	0.75	196.5sqm	1	196.5sqm
4.	grocery store	public	262	3	786sqm	1	786sqm
5.	atm	public	1	7.9	7.9sqm	1	7.9sqm
6.	gym	public	50	4	200sqm	1	200sqm
7.	staff lounge	semi public	91	1.5	136.5sqm	1	136.5sqm
8.	resident lounge	semi public	142	1.5	213sqm	1	213sqm
9.	feeding room	private	2	4.8	9.6sqm	1	9.6sqm
10.	pharmacy	semi public	262	0.3	78.6sqm	1	78.6sqm
11.	care room	semi public	3	25.6	77sqm	1	77sqm
12.	amphitheatre	public	200	0.8	162.2sqm	1	162.2sqm
13.	auditorium	public	300	2.3	700sqm	1	700sqm
	area						3107.3sqm
	circulation						776.82sqm
	TOTAL						3884.12sqm

TOTAL AREA STATEMENT							
Sl.no	Programme	Nature of space	No.of users	Area per user (sqm)	Area (sq.m)	No. of units	Total Area (sq.m)
1.	ASD early intervention clinic	public	50+	54.75	2737.88sqm	1	2737.88sqm
2.	School for Autism	semi public	50+	82.6	4131.88sqm	1	4131.88sqm
3.	ASD vocational training centre	semi public	60+	34.5	2075.37sqm	1	2075.37sqm
4.	Residential zone	private	262	30	7689sqm	1	7689sqm
5.	Community center	semi public	262	64.7	3884.12sqm	1	3884.12sqm
	area						20518.25sqm
	circulation	25% of carpet area(for bridge/walkway connections)					5129.56sqm
	TOTAL						25647.81sqm

Table 12 Area statement

SITE AREA= 84907.8 sqm

BUILT UP AREA=25647.81sqm

COVERAGE=30%

permissible coverage=35%

FSI=0.3

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5.4 Zoning

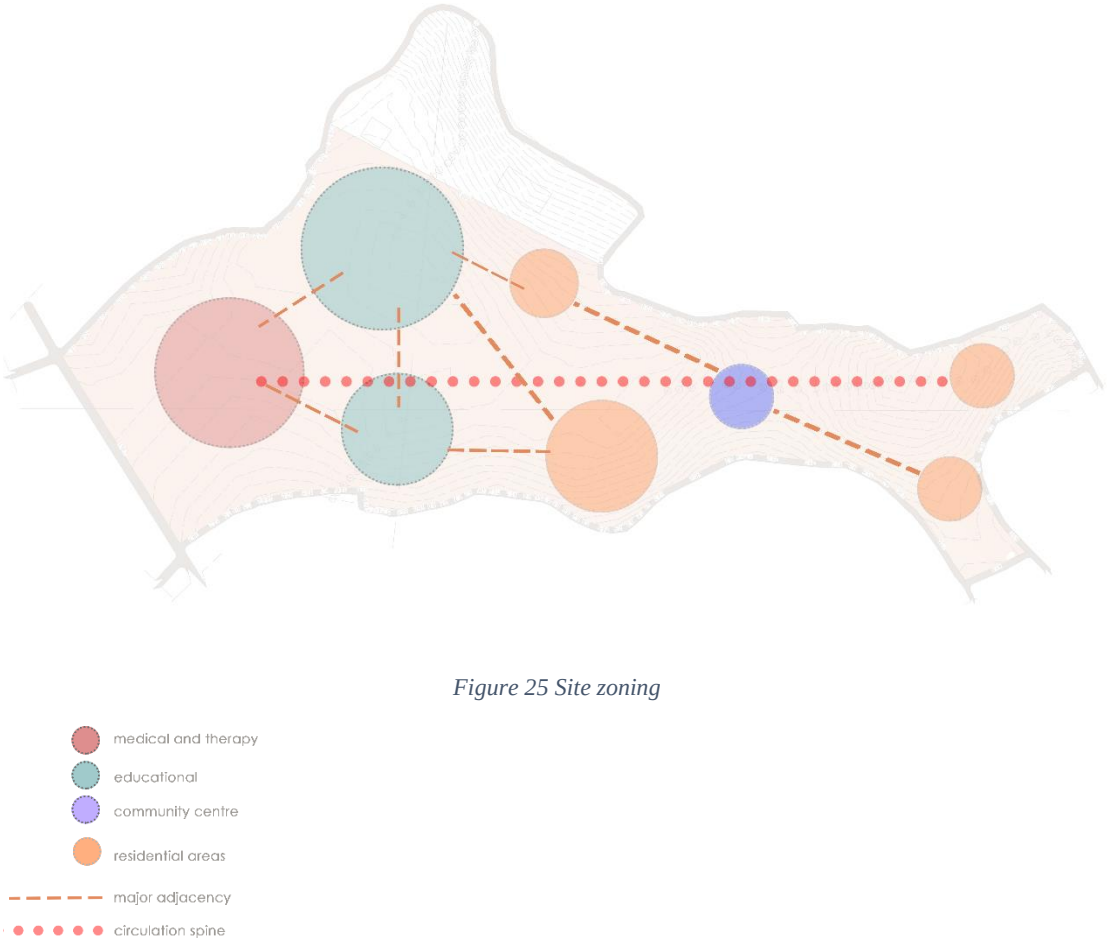


Figure 25 Site zoning

Medical and therapy area is zoned towards the entrance area so as to restrict access from the medical centre visitors to the rest of the site unnecessarily. Educational areas are zoned to the middle portion of the site so as to have easy access from the residential areas. community centre is zoned towards the highest point on the site to signify community inclusion and visibility to all spaces from the communal centre. Residential areas comprise of two parts- ASD residential and staff residential. ASD residential is zoned towards the main areas considering walkable distance of 48m per minute. Staff residential is zoned further away from the site

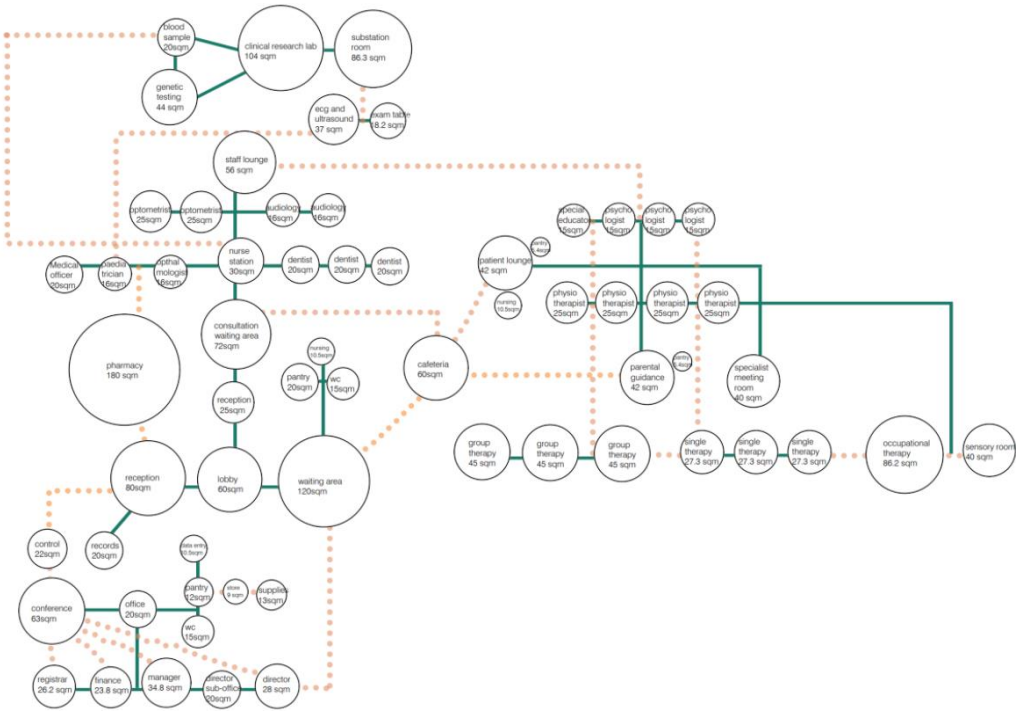


Table 13 Early intervention centre zoning

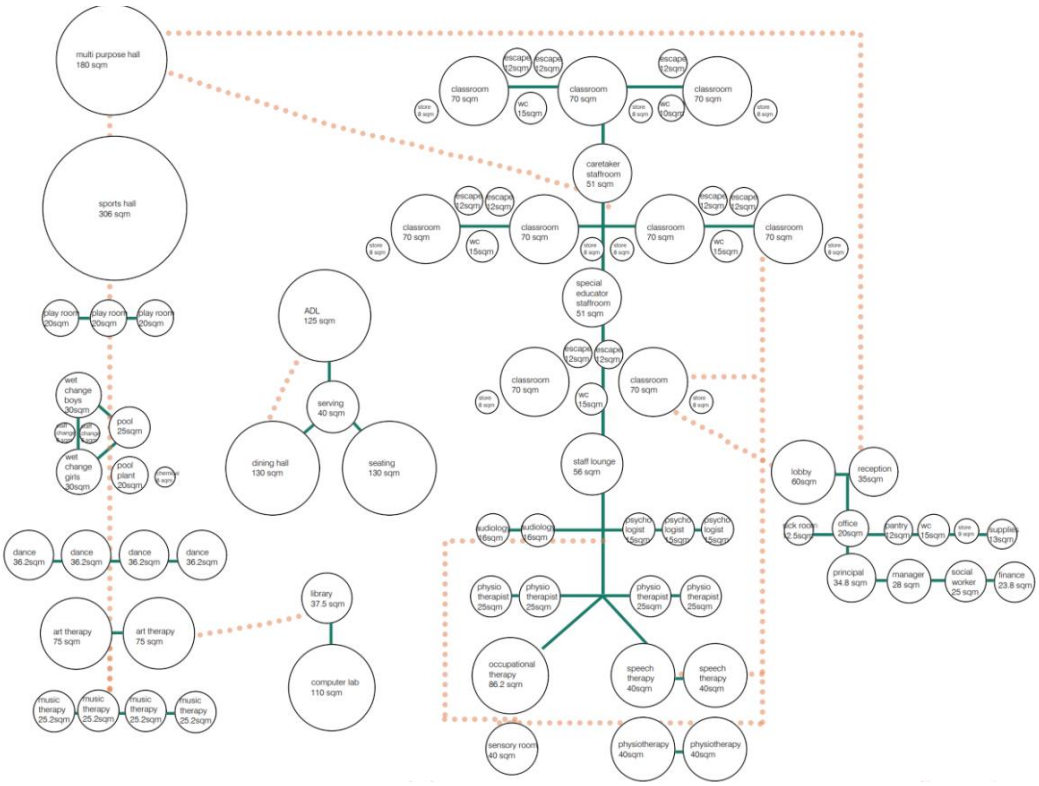


Table 14 School zoning

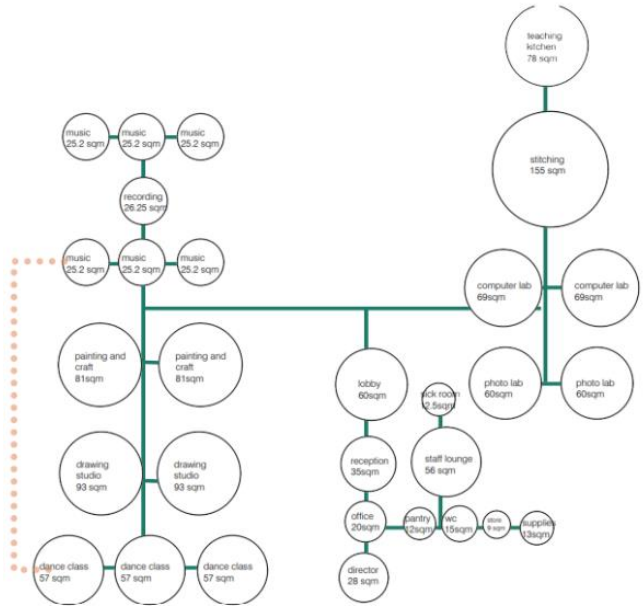


Table 15 Vocational centre zoning

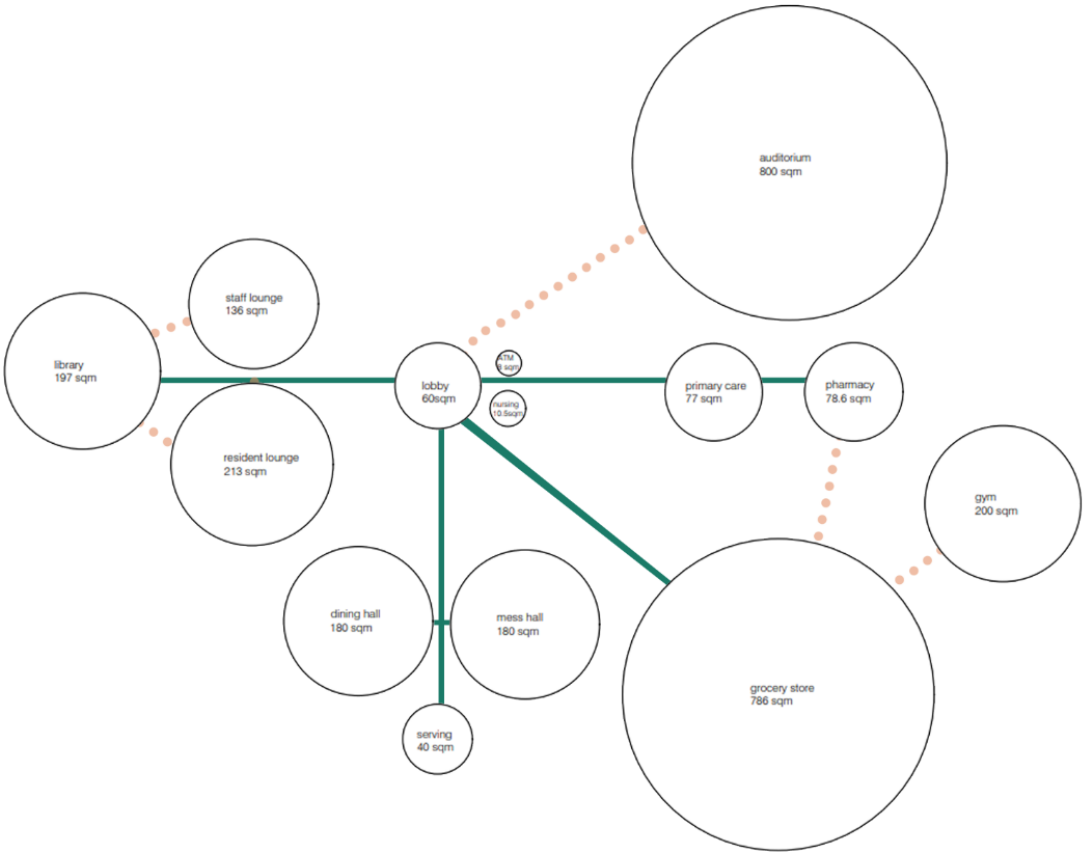
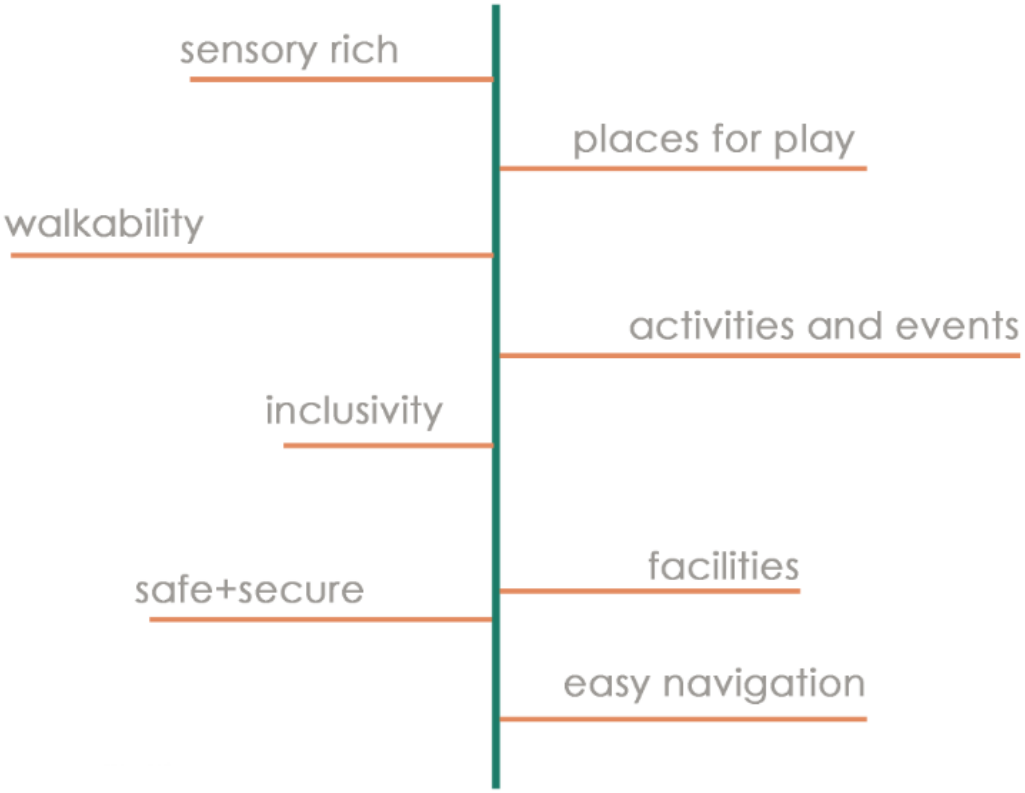


Table 16 Community centre zoning

5.5 Concept

Bridging the gap- bridging the gap of community inclusion between neurotypical and neurodivergent individuals, involves creating environments that are welcoming and supportive for autistic individuals. The design here acts as the bridge and the gap refers to the social exclusion felt by Autistic individuals. This includes designing communities with features and accommodations that cater to their unique needs, such as sensory-friendly spaces, clear communication methods, and understanding social dynamics. By fostering understanding, acceptance, and accessibility, we can create inclusive communities where neurodivergent individuals can truly thrive and feel valued members of society.



Design Guidelines for Autism-Sensitive Architecture:

Acoustics: Use sound-absorbing materials and soundproofing to control noise levels and create a calm environment.

Spatial Sequencing: Arrange spaces logically with visual cues and signage to guide individuals and maintain predictability.

Escape Spaces: Design retreat areas with adjustable lighting, comfortable seating, and calming stimuli for decompression.

Compartmentalization: Clearly define each space's purpose with visual cues to reduce confusion and promote independence.

Transition Zones: Include areas with varying sensory characteristics to facilitate smooth transitions and sensory adaptation.

Sensory Zoning: Group spaces by sensory qualities to accommodate preferences and sensitivities.

Safety: Prioritize safety with features like rounded edges, non-toxic materials, and secure fixtures.

Whole School Considerations:

Context and Community: Use natural lighting, visual simplicity, and noise control to foster integration and reduce over-stimulation.

Zoning: Organize spaces by sensory compatibility and functional needs with clear circulation systems.

Wayfinding and Circulation: Implement clear signage and paths aligned with daily schedules for easy navigation.

Fire Safety and Evacuation: Develop safe evacuation plans with designated refuge spots and secure routes away from high-traffic areas.

Additional Considerations:

Color Perception: Use calming colors and natural elements for a soothing visual environment.

Safety: Ensure all design elements contribute to a safe environment by minimizing potential hazards.

Security: Implement controlled access, surveillance, and emergency alert systems for safety and preventing unauthorized access.

Scale and Proportion: Design wide corridors and open spaces for diverse sensory needs and provide transitional areas for sensory adaptation.

Lighting: Use natural light and adjustable artificial lighting to create a comfortable environment, avoiding flickering or harsh lights.

Voids are open spaces intentionally created in the design to connect the built environment with the surrounding natural elements. These voids symbolize the gap addressed in the design concept and represent how neurodivergent individuals interact with such open spaces.

The openness of the design emphasizes transparency, both physically and visually, integrating the space with nature. This aligns with the aim of catering to autistic inclusion by providing environments that are calming and conducive to sensory experiences.

By encouraging interaction with the unbuilt environment, users learn through direct experience, enhancing their understanding and connection with the surroundings. This approach supports the holistic integration of individuals, including neurodivergent individuals, within the designed spaces.

5.6 Masterplan

Figure 26 Masterplan

5.7 Landscape plan

Figure 27 Landscape plan

5.8 Service plan

Figure 28 Service plan

5.9 Ground floor plan

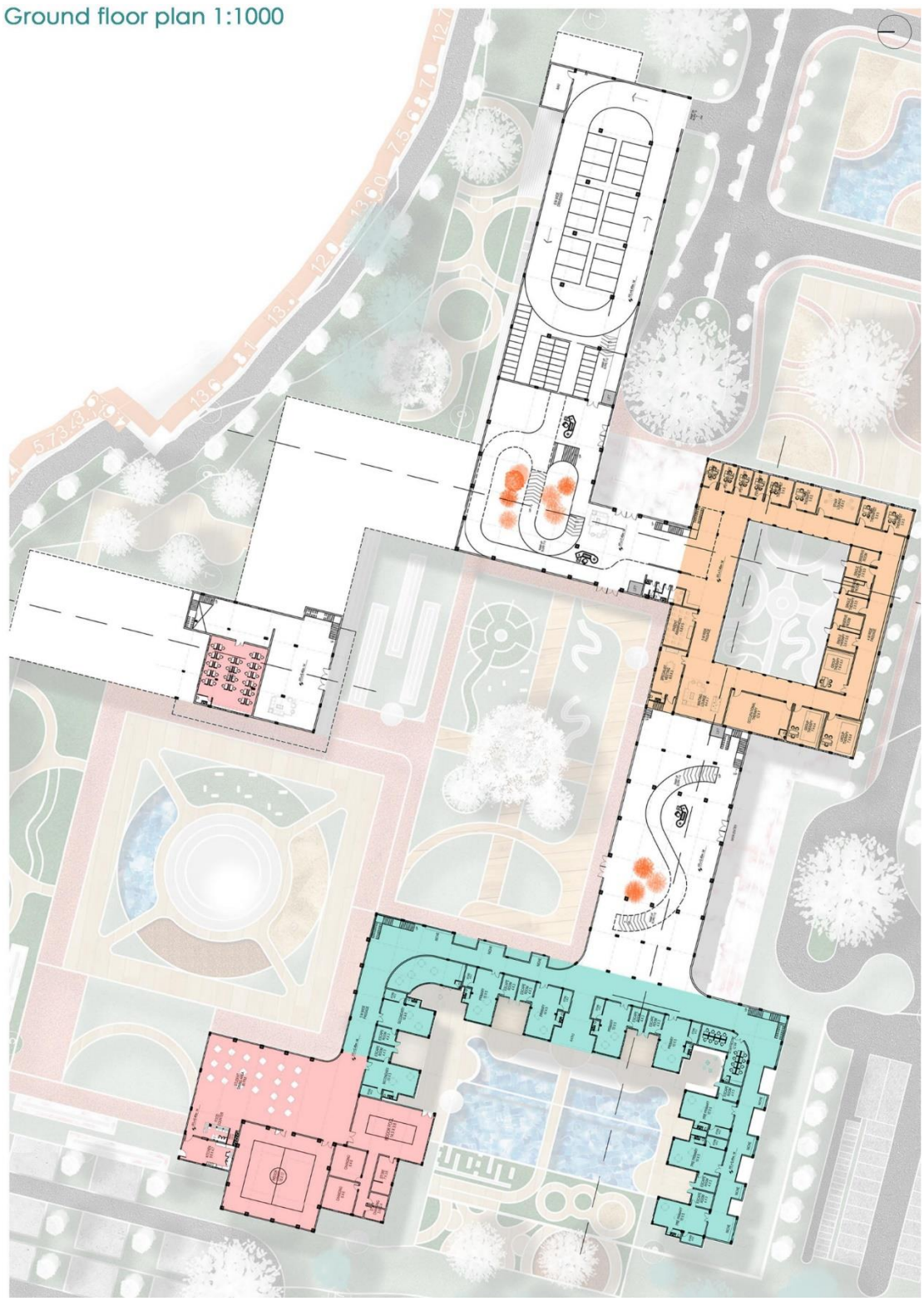


Figure 29 Ground floor plan

5.9 First floor plan

Figure 30 First floor plan

5.10 Sections and elevations

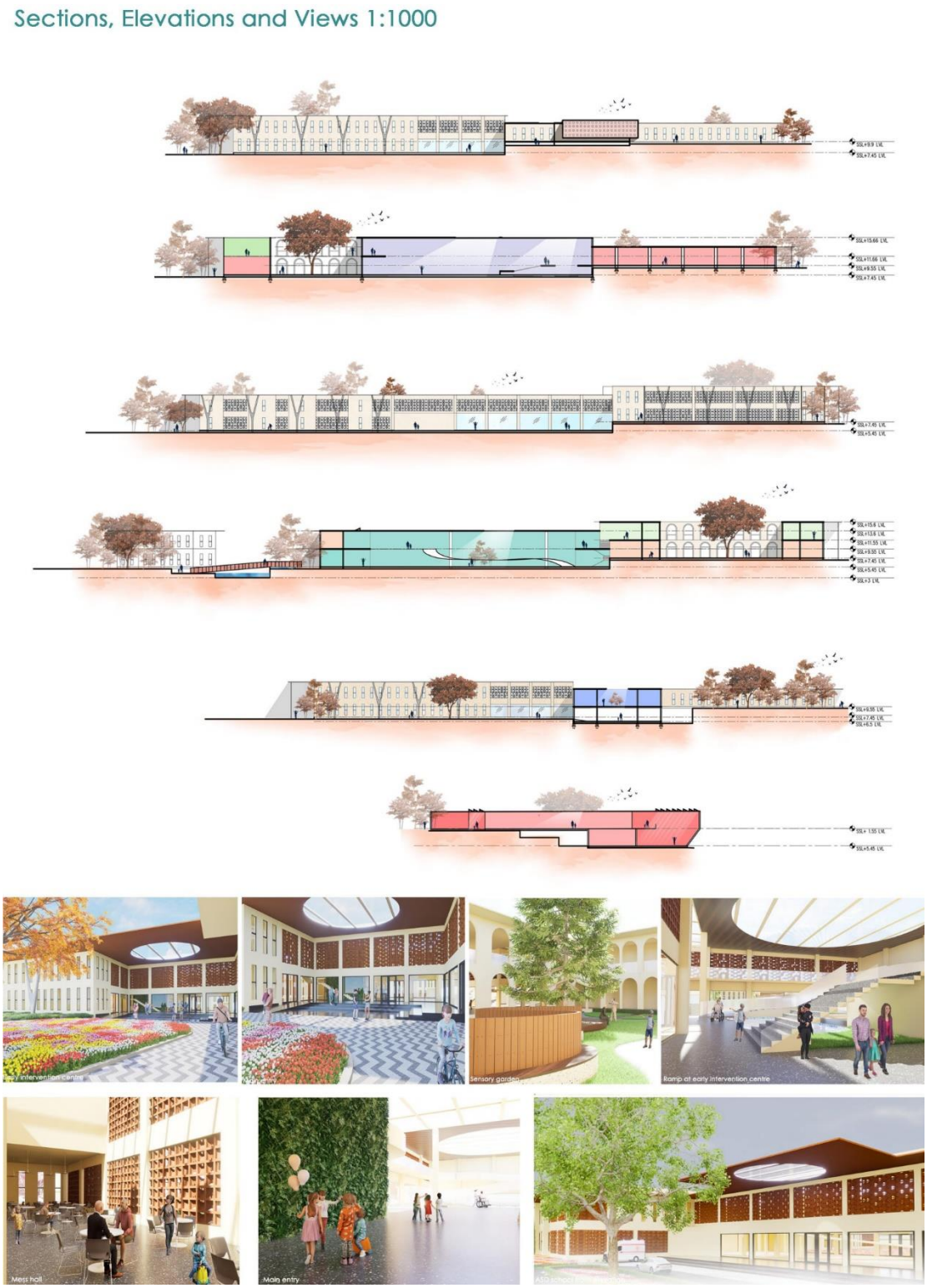


Figure 31 Sections and elevations

5.11 Building Services

Figure 32 Electrical layout

Figure 33 Plumbing layout

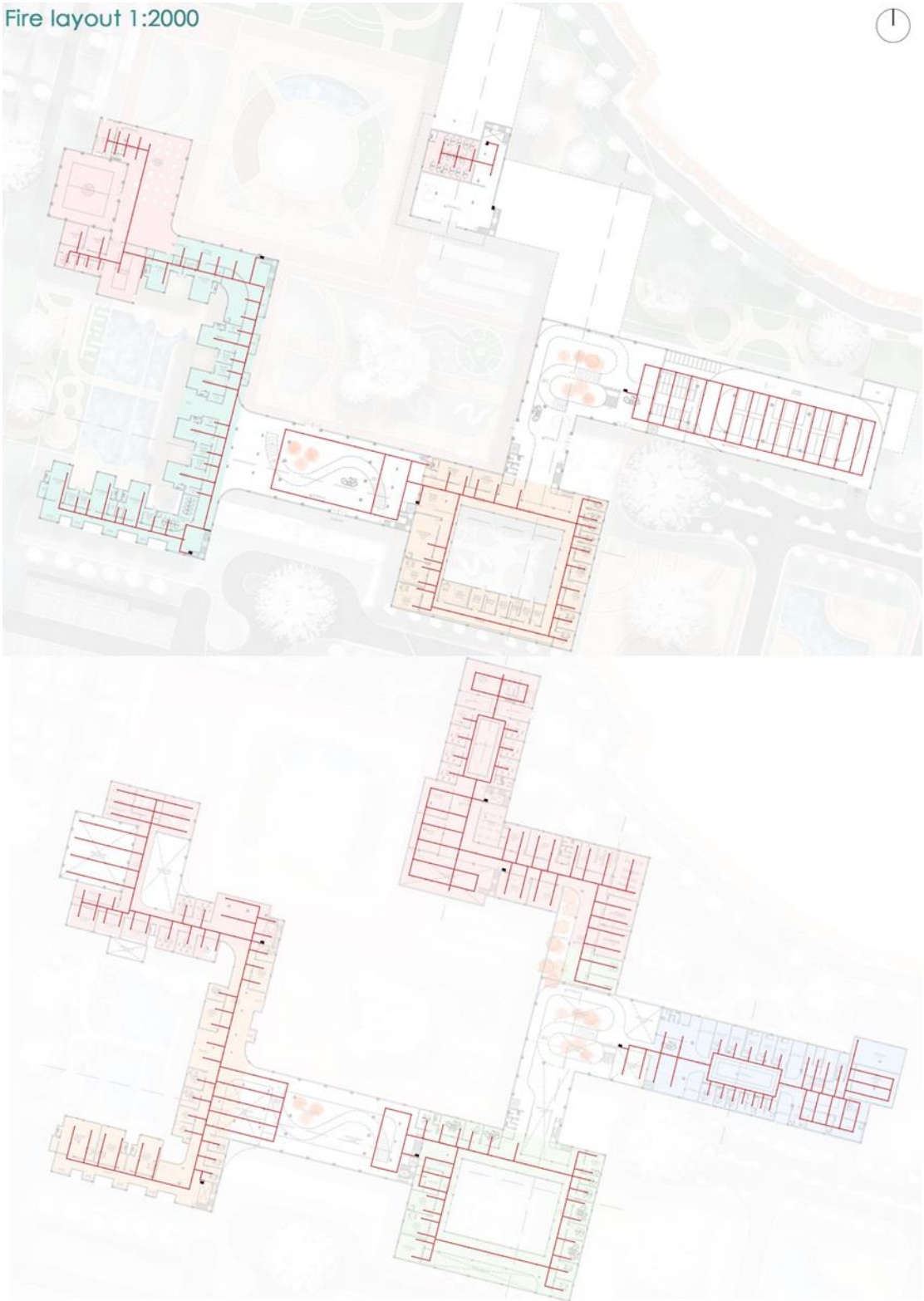


Figure 34 Fire sprinkler layout

Chapter 6

Conclusion

Autism Spectrum Disorder (ASD) is a developmental disability that impacts communication, behavior, and social interactions, with causes rooted in genetic and unknown origins. Given the broad range of symptoms and behaviors associated with ASD, early and accurate diagnosis is critical for effective intervention. However, in India, limited resources and comprehensive facilities pose significant challenges to timely diagnosis and treatment. This research aimed to design a specialized center for autistic individuals, offering integrated learning, rehabilitation, and recreational spaces to support their unique needs. By understanding the behavioral and environmental needs of autistic individuals, the study explored how thoughtful architectural design can positively impact their development and well-being.

The research highlighted the importance of sensory elements in designing spaces for autism. The ASPECTSS™ framework, emphasizing principles such as acoustics control, spatial sequencing, escape spaces, and safety, was identified as essential in creating environments that cater to the sensory and behavioral needs of autistic individuals. These principles are crucial in developing autism-sensitive design solutions and guiding the design criteria for educational and rehabilitation spaces. A critical finding of this study is the pressing need for more autism centers in India. With approximately 160 centers serving over 4 million diagnosed individuals, the current infrastructure is insufficient, leading to long waits and travel for families seeking services. This underscores the urgent need to expand and standardize autism services nationwide to ensure equitable access to care. The study further emphasized that

thoughtful architectural design can significantly enhance the lives of people with autism. By creating spaces that cater to their specific needs, architects can improve social interactions, learning experiences, and overall quality of life for autistic individuals. This research contributes to the development of autism-friendly environments and advocates for greater inclusion and support for individuals with ASD in society. From a design perspective, the research explored the impact of sensory elements such as texture, color, pattern, and acoustics on autistic behavior and cognition. The integration of these elements is crucial in addressing the core challenges of autism. The ASPECTSS™ framework provided a structured approach to designing spaces that support the unique needs of autistic individuals, guiding the development of the Advanced Education Centre's design criteria. Whole school issues such as context and community integration, sensory zoning, way-finding, and safety were addressed through a holistic approach to architecture. This approach ensures that the physical environment supports the specific functions and behaviors desired, promoting inclusion and independence within educational settings.

In conclusion, this research underscores the importance of specialized architectural design in supporting the needs of autistic individuals. By incorporating principles from the ASPECTSS™ framework and Sensory Design Theory, architects can create environments that significantly improve the quality of life for autistic individuals. This study advocates for expanded autism services and highlights the need for inclusive, well-designed spaces that cater to the diverse needs of individuals with ASD, ultimately fostering greater understanding, acceptance, and support within society.

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