BREAKING STIGMA:

GROWTH SANCTUARY FOR DOWN SYNDROME CHILDREN

Tokha,Kathmandu

By:
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**A thesis submitted in partial fulfillment
of the requirements for the
Degree of Bachelor of Architecture**

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KHWOPA ENGINEERING COLLEGE
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CERTIFICATE

This is to certify that the thesis entitled **BREAKING THE STIGMA: A GROWTH SANCTUARY FOR CHILDREN WITH DOWN SYNDROME** at ***Tokha, Kathmandu***, submitted to the Department of Architecture of Khwopa Engineering College by **Ms. Alisha Nakarmi** of Class Roll No. 04/ B.Arch./076 has been declared successful for the partial fulfillment of the academic requirement towards the completion of the degree of Bachelor of Architecture of Purbanchal University.

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ABSTRACT:

This architectural thesis focuses on designing a **Growth Sanctuary for Down Syndrome Children** in Tokha, Kathmandu—a peaceful urban edge selected to balance accessibility and tranquility. The project aims to create a supportive, inclusive environment that nurtures the physical, emotional, and social development of children with Down Syndrome from infancy to adolescence. The methodology combines literature review, site analysis, case studies, and consultations with parents and caregivers to guide a user-centered and empathetic design approach. Emphasis is placed on inclusive planning principles such as spatial awareness, routine, wayfinding, and sensory design.

The sanctuary is conceptualized as a **journey from social exclusion to inclusion**, divided into three progressive phases: **Phase A (Early Intervention), Phase B (Transitional Learning), and Phase C (Vocational & Social Integration)**. Phase A supports infants and their parents through therapy, bonding spaces, and early stimulation. Phase B introduces structured learning, play, and therapy, while Phase C focuses on vocational training and creative expression to support independence. Alongside child-centered zones, the sanctuary incorporates facilities for parents, staff, and therapeutic outdoor spaces like sensory gardens, challenge zones, and nature trails to promote healing and interaction. Spatial design avoids institutional aesthetics and instead fosters a sanctuary-like atmosphere that feels safe, warm, and familiar.

This project demonstrates how architecture can act as a medium of **healing, empowerment, and social change**. By supporting children with Down Syndrome and their families through thoughtful spatial planning, the sanctuary aims to break stigma, foster inclusion, and encourage dignity. The design not only responds to functional needs but also embraces emotional, developmental, and societal dimensions—making the built environment a catalyst for growth, care, and connection.

Keywords

Down Syndrome, Inclusive Design, Growth Sanctuary, Early Intervention, Therapeutic Architecture, Social Inclusion, Child-Centered Design, Tokha, Nepal, Spatial Awareness, Wayfinding, Vocational Training, Architecture for Disability

DECLARATION:

I, AlishaNakarmi, hereby declare that the thesis entitled **"BREAKING THE STIGMA : Growth Sanctuary for down syndrome**", submitted in partial fulfillment of the requirements for the degree of Bachelor of Architecture at Khwopa Engineering College,Purbanchal University, is the result of my own independent research, design, and analysis.

This work has been carried out under the guidance and supervision of Ar. Sushma Bajracharya.I affirm that the work presented here is original, and has not been submitted, either in part or in full, to any other institution or university for the award of any degree, diploma, or certification.

All external sources of information, data, illustrations, and references have been duly acknowledged within the text and listed in the references in accordance with academic standards.

I take full responsibility for the authenticity and accuracy of the content of this report.

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I would like to extend my sincere gratitude to my thesis supervisor, **Ar. Sushma Bajracharya**, for her invaluable guidance, encouragement, and unwavering support throughout the course of this thesis. Her critical insights, professional expertise, and thoughtful feedback have been instrumental in shaping the direction and depth of this research. I am deeply appreciative of the time and attention she has dedicated to my work.

I am equally thankful to the **Department of Architecture** for providing the academic framework, resources, and encouragement that have made this thesis possible. The department's commitment to fostering critical thinking and innovation has played a significant role in the successful completion of this project.

This thesis stands as a culmination of the academic mentorship and institutional support I have received, for which I remain truly grateful.

Alisha Nakarmi
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1. INTRODUCTION :

Figure 1.1 : Facial Structure of Down Syndrome Children

Down syndrome is a genetic condition where people are born with an extra chromosome. A person diagnosed with Down syndrome has an extra copy of chromosome 21, which means their cells contain 47 total chromosomes instead of 46.

Down – after Dr. Langdon Down who first recognized the distinctive characteristics of Down syndrome.

Syndrome– a collection of distinctive characteristics or symptoms,

The Growth Sanctuary of Down Syndrome is the space where it breaks the societal stigma and all the barriers they have to face and provides them a safe space to learn, grow and to make them live a satisfied life.

IT IS A GENETIC CONDITION RATHER THAN A DISEASE.

1.1. BACKGROUND:

Down Syndrome, also known as trisomy 21, is a genetic condition caused by the presence of an extra copy of chromosome 21.This additional genetic material alters the course of development and causes the characteristics associated with Down syndrome.

In most cases, parents of children with Down syndrome do not have any genetic abnormalities themselves. The likelihood of having a child with Down syndrome increases with the mother's age—from very low in younger mothers to about 3% in women over 45. The condition typically occurs randomly and is not linked to any specific behavior or environmental factor.Down syndrome is caused by the presence of an extra copy of chromosome 21. Normally, each parent contributes 23 chromosomes, but in this case, a third 21st chromosome is added during conception. Diagnosis can happen before birth through screening and diagnostic tests or after birth

Figure 1.2 : Child with Down Syndrome

through clinical observation and genetic testing. In many countries, pregnancies diagnosed with Down syndrome are often terminated, depending on various social and personal factors.

Although there is no cure, proper care, education, and support can significantly improve quality of life. Some individuals with Down syndrome attend regular schools, while others benefit from specialized learning environments.As adults, many are able to work in supported job settings, although ongoing assistance in managing financial or legal matters is often necessary. With proper medical care, individuals can live well into their 50s or 60s. Routine health check-ups are important throughout their lives to address common health concerns associated with the condition.

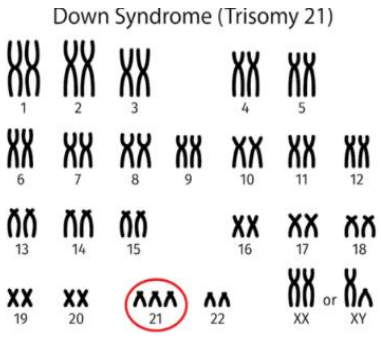

Figure 1.3 : Extra Copy of Chromosome 21

1.2. HISTORY:

Earliest known case of Down Syndrome found in genomic evidence from an infant buried at Poulnabrone dolmen, Ireland. At Ancient civilizations, Infants with disabilities were often killed or abandoned.

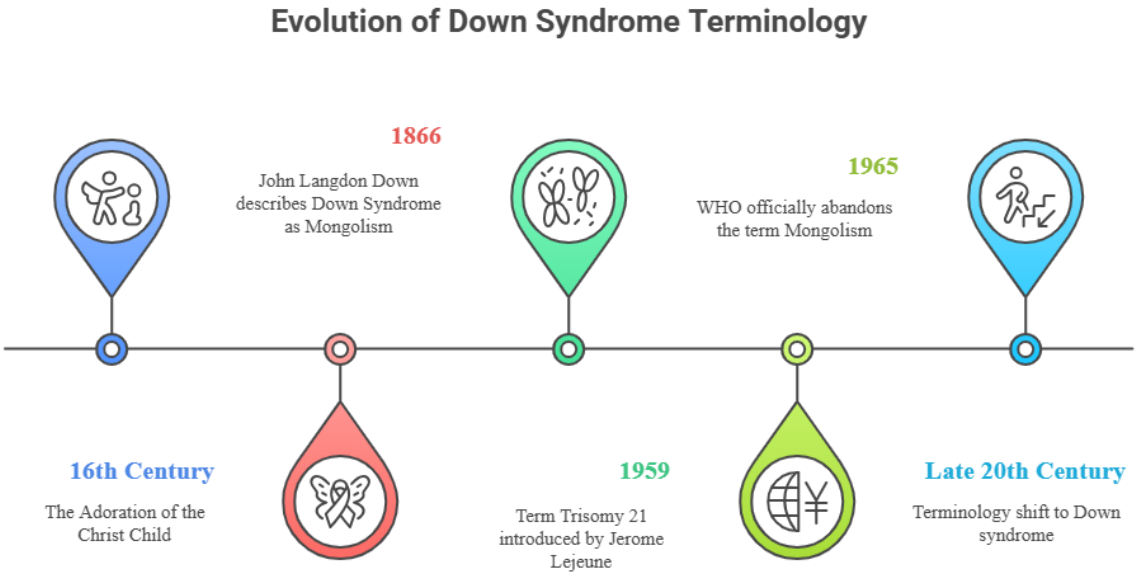

Figure 1.4 : Historical Timeline of Down Syndrome

1.3. PRESENTSCENARIO:

Down syndrome (DS), also referred to as trisomy 21, is the most commonly diagnosed chromosomal condition globally. It affects roughly 1 in every 1,000 to 1,100 live births, which translates to an estimated 3,000–5,000 new cases each year across the world (United Nations, 2025).

In high-income countries such as the United States, nearly 6,000 babies are born with Down syndrome annually, or approximately 1 in every 700 live births (Centers for Disease Control and Prevention [CDC], 2024). In contrast, some European nations such as Denmark and Iceland have reported sharp declines in the number of babies born with Down syndrome — largely due to widespread use of prenatal screening and subsequent pregnancy termination. In Denmark, for instance, more than 95% of pregnancies diagnosed with DS are terminated (Wikipedia, 2025a). These statistics reflect not only medical trends but also deeper societal debates about disability, inclusion, and ethics.

Over recent decades, improved healthcare and early intervention programs have significantly enhanced the life expectancy and quality of life for individuals with DS. Where once the average life expectancy hovered around 25 years in the 1980s, it has now increased to around 50–60 years in developed countries, thanks to medical advances and better support systems (Global Down Syndrome Foundation, n.d.). In many low- and middle-income countries, children with Down syndrome may not receive timely diagnosis or necessary care. Misconceptions, stigma, and a lack of inclusive infrastructure continue to affect the lives of those with the condition. Global awareness campaigns such as World Down Syndrome Day, observed on March 21st, aim to bring attention to these disparities and promote the rights, dignity, and well-being of individuals with DS worldwide (United Nations, 2025).

Ultimately, while the global medical community has made significant strides in improving the lives of people with Down syndrome, much work remains in ensuring equal opportunities and social acceptance, particularly in developing regions where resources and awareness remain limited.

1.4. CONTEXT OF NEPAL:

In Nepal, the exact prevalence of Down syndrome remains undetermined due to the absence of comprehensive national data. As of 2016, the Down Syndrome Society Nepal (DSSN), a non-governmental organization dedicated to supporting individuals with Down syndrome, had registered approximately 350 cases. The DSSN continues to receive 10–15 new cases monthly, indicating a rising trend. However, the lack of systematic data collection hampers accurate assessment of the condition's national prevalence.

Figure 1.5 : Participation of individuals with Down Syndrome and supporters

Source- World Down Syndrome Day 2024

A study by Mishra et al. (2022) examined the caregiving burden among 96 mothers of children with Down syndrome enrolled in the DSSN. The findings revealed that 77.1% of these mothers experienced a high level of caregiving burden. Notably, 89.6% reported feeling consistently overwhelmed by their child's condition. Financial strain was a significant concern, with 55.2% of mothers always experiencing financial difficulties related to caregiving. Additionally, 57.3% had to make work adjustments, 60.4% faced emotional adjustments, and 53.1% reported physical strain due to caregiving responsibilities. The study also found a significant association between the caregiving burden and the mother's age at delivery.

These challenges are compounded by societal factors. Individuals with Down syndrome in Nepal are often categorized under the broader umbrella of intellectual disabilities, leading to their specific needs being overlooked. Social stigma, limited awareness, and poverty further exacerbate the difficulties faced by these individuals and their families. The scarcity of specialized organizations and support systems means that many caregivers lack access to necessary resources and assistance

1.5. .TYPES OF DOWN SYNDROME:

There are three main types of Down syndrome: Trisomy 21, Mosaic Down syndrome, and Translocation Down syndrome.

- Trisomy 21, accounting for approximately 95% of all cases. It occurs due to a process called nondisjunction, where chromosome 21 fails to separate properly during the formation of the egg or sperm, resulting in an extra chromosome in every cell of the body (Centers for Disease Control and Prevention [CDC], 2024).
- Mosaic Down syndrome is a rarer form, making up about 1–2% of cases. In this type, only some of the individual's cells have an extra chromosome 21, while others have the typical 46 chromosomes.
- Translocation Down syndrome, which occurs in about 3–4% of cases. This type can sometimes be inherited from a parent who carries a balanced translocation, making genetic counseling essential for families with a history of this condition (National Down Syndrome Society, 2021).

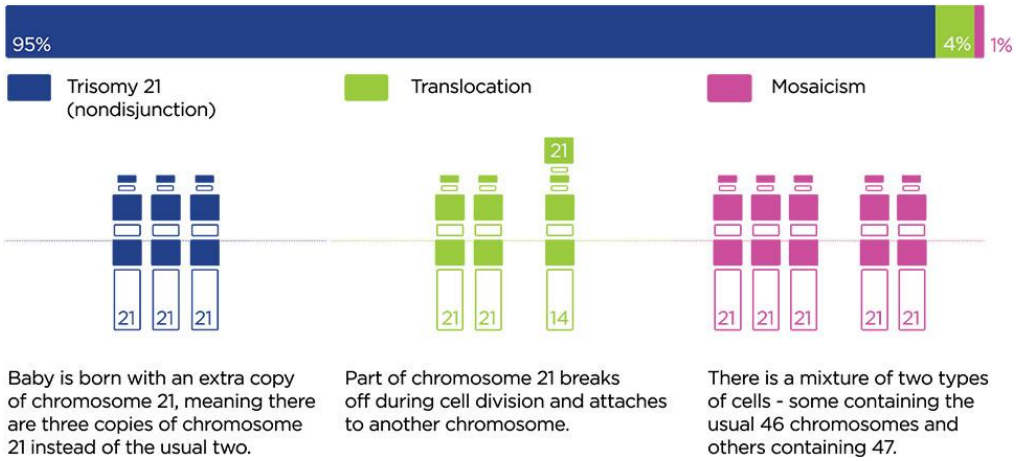

Figure 1.6 :Type Of Chromosomal Abnormality

1.6. SEVERITY LEVEL OF DOWN SYNDROME:

Down syndrome presents a wide spectrum of intellectual and developmental severity, generally categorized into mild, moderate, and severe levels. The degree of severity is most commonly measured by IQ and adaptive behavior, but it also encompasses learning ability, independence, and support requirements.

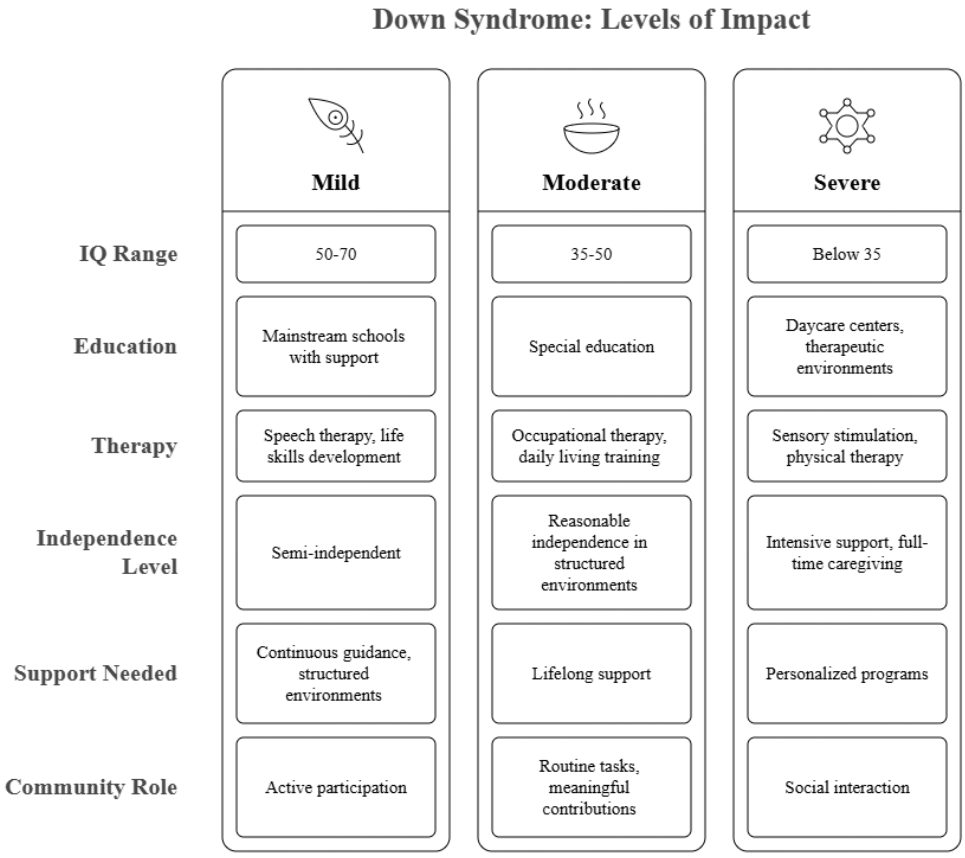

Figure 1.7 : Severity of Down Syndrome

1.7. CAUSE OF DOWN SYNDROME :

Down syndrome is caused by the presence of an extra chromosome. Normally, each human cell contains 46 chromosomes arranged in 23 pairs. However, in individuals with Down syndrome, an error in the division of chromosome 21 leads to an extra copy in some or all of their cells. This additional genetic material affects normal development.

There are three main types of Down syndrome, each with a different genetic cause:

- Trisomy 21 – the most common form, where all cells have an extra chromosome 21.
- Translocation – where part of chromosome 21 attaches to another chromosome.
- Mosaicism – where only some cells carry the extra chromosome.severity of symptoms in mosaic cases often depends on the proportion of affected cells.

Although maternal age is a significant risk factor — with increased chances of having a child with Down syndrome as maternal age rises — the condition can occur at any age, and most children

with Down syndrome are born to mothers under the age of 35, simply because younger women have more babies overall (CDC, 2024).

1.8. SYMPTOM OF DOWN SYNDROME:

Down syndrome can lead to a range of physical, cognitive, and behavioral symptoms, but not everyone with the condition experiences the same set or severity of symptoms.

1.8.1. Physical Characteristics of Down Syndrome

Many physical features are noticeable at birth and become more distinct as the child grows. These may include:

- A flat bridge of the nose
- Upward-slanting eyes
- A short neck
- Small ears, hands, and feet
- Low muscle tone (hypotonia) at birth
- A pinky finger that curves inward
- A single crease across the palm (palmar crease)
- Shorter height than average

As the child continues to develop, other health issues may emerge due to prenatal development differences, such as

- Frequent ear infections or hearing impairment
- Eye conditions or vision difficulties
- Dental issues
- Higher susceptibility to infections
- Sleep disturbances like obstructive sleep apnea
- Congenital heart defects
- Healthcare providers typically monitor these and other conditions throughout the child's life.

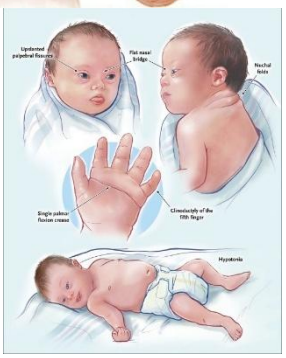

Figure 1.8 : Physical Deformity in Down Syndrome Children

1.8.2. Cognitive Aspects of Down Syndrome

Children with Down syndrome often face developmental and intellectual challenges caused by the extra chromosome. This can impact their ability to meet milestones in areas such as:

- Motor skills (movement and coordination)
- Language and speech development
- Cognitive learning

- Social and emotional development

As a result, they may take longer to:

- Become toilet trained
- Speak their first words
- Begin walking
- Eat independently

1.8.3. Behavioral Traits in Down Syndrome

Some behavioral traits may arise, often due to difficulties in expressing needs or frustrations. These can include:

- Tantrums or stubborn behavior
- Difficulty maintaining attention
- Repetitive or compulsive actions

2. PROJECT DESCRIPTION:

Growth Sanctuary for Down Syndrome Children

"A Journey from Social Exclusion to Inclusion"

The Growth Sanctuary for Down Syndrome Children is a therapeutic and inclusive architectural project envisioned as a retreat-like space for children with Down Syndrome. The project aims to provide a nurturing environment where children are not defined by their disability, but are instead supported, recognized, and celebrated for who they are.It acts as a **daycare center** with selective accommodation, especially for children coming from rural or distant municipalities.

The project adopts a phase-wise developmental approach:

- Phase A: For early intervention and children with severe conditions
- Phase B: For transitional support and moderate cases
- Phase C: For mild cases, vocational learning, and community integration

Each phase is designed as a **milestone in the child's journey**—from dependency to independence and from isolation to inclusion. These spatial transitions break societal stigmas and encourage personal growth.his sanctuary aims to feel more like a home away from home—less like a hospital or institution. It creates a soft, welcoming, and inclusive environment that reflects dignity, empathy, and hope.

The sanctuary doesn't isolate but integrates, offering public interfaces like informal play spaces and communal gardens to encourage interaction with the broader society. It is not just a building—it is a movement towards compassionate urban design, placing differently-abled individuals at the center of community care.

3. PROJECT OBJECTIVE:

- **Promote Early Intervention:**
  Provide specialized spaces and programs for early diagnosis, therapy, and developmental support for children with Down Syndrome, especially those with severe conditions.
- **Support Holistic Growth:**
  Encourage the physical, cognitive, emotional, and social development of children through tailored activities, therapy, and structured routines.
- **Enable Vocational Training:**
  Offer vocational learning opportunities for adolescents and young adults with Down Syndrome to help them build life skills and achieve a level of independence.
- **Empower Parents and Caregivers:**
  Create training spaces and awareness programs that equip parents and caregivers with the knowledge and emotional tools to support their children.
- **Incorporate Nature and Play:**
  Integrate sensory gardens, interactive play zones, and therapeutic landscapes to stimulate learning, joy, and well-being.
- **Provide Accommodation Facilities:**
  Include residential facilities for children from remote areas, as well as stay options for parents and caretakers when needed.
- **Create Public Awareness:**

Use the sanctuary as a model to educate society and reduce stigma about Down Syndrome, promoting empathy, understanding, and respect.

4. PROJECT JUSTIFICATION:

In Nepal, children with Down Syndrome remain one of the most overlooked groups within the disabled community. Despite the existence of organizations advocating for disability rights, there is a severe lack of dedicated infrastructure, early intervention programs, and inclusive environments specifically designed to support individuals with Down Syndrome.

According to the Down Syndrome Society of Nepal, over 600 children were registered in 2011 alone, with numbers continuing to rise. Yet, Nepal's census and public health systems lack accurate data and awareness about this condition. As a result, most children go undiagnosed, untreated, and socially excluded. Access to therapy, education, and developmental support is limited—especially in urban-poor and rural areas—leaving families feeling isolated and helpless.Moreover, societal stigma remains high, and many children with Down Syndrome are kept hidden due to shame or misunderstanding, depriving them of their basic rights to education, health, and emotional growth. Parents and caregivers, too, lack the guidance and psychological support to nurture these children effectively.

Given these challenges, there is a pressing need for a safe, nurturing, and inclusive space where children with Down Syndrome can learn, play, grow, and feel accepted. A Growth Sanctuary in an accessible urban setting like Tokha would serve as a model space for therapeutic intervention, skill development, parent empowerment, and public education—fostering a shift from exclusion to inclusion in Nepalese society.

5. PROJECT SCOPE AND LIMITATION:

5.1. SCOPE

Target Group: Children and young adults with Down Syndrome from Kathmandu District, with limited accommodation for individuals from rural or other urban areas outside the valley.

I. Program **Inclusion**:

- Early intervention and therapy units
- Special education and skill development zones
- Play-based and sensory learning environments
- Parental training and counseling spaces
- Vocational training and social integration programs
- Outdoor therapeutic gardens and recreational spaces

II. Design **Philosophy**:

- A sanctuary, not an institution – fostering inclusion, calmness, and belonging.
- Phase-wise progression (Severe to Mild) reflecting developmental milestones.
- Integration of universal design principles: legibility, spatial awareness, sensory zoning.

III. Community **Interaction**:

- Semi-public and public spaces to promote awareness and reduce stigma.
- Informal gathering spaces and learning gardens open to both users and outsiders.

IV. Sustainability **& Well-being**:

- Use of passive design strategies and local materials.
- Emphasis on nature-integrated healing environments.

5.2. LIMITATION:

- **Geographical Focus**:
  Limited to Kathmandu District due to thesis constraints; data and services for other districts are not comprehensively addressed.

- **User Scope**:
  While Down Syndrome is the primary focus, the sanctuary does not currently extend to individuals with other intellectual disabilities.
- **Budget & Realization**:
  Conceptual architectural proposal; real-world implementation may face funding, policy, and administrative challenges.
- **Medical Facilities**:
  The sanctuary provides therapy and support but is not a full-fledged medical or diagnostic center.
- **Scale & Capacity**:
  Accommodation is limited to a small number of children and parents from outside the valley—it's primarily a day-care and learning center, not a residential institution.

6. METHODOLOGY:

6.1. PROBLEM IDENTIFICATION AND TOPIC SELECTION

- Identified the social and architectural gap in Nepal for children with Down Syndrome.
- Chose the topic to address physical, emotional, educational, and social inclusion through design.

6.2. LITERATURE REVIEW

Reviewed global and local literature on:

- Down Syndrome (symptoms, care needs, behavior patterns).
- Inclusive and therapeutic architecture.
- Special needs education spaces and healing environments.
- Maggie’s Centres and other emotional architecture case studies.

6.3. SITE SELECTION AND ANALYSIS DISTRICT.

Conducted:

- **Physical analysis** (topography, access, orientation, vegetation).
- **Environmental analysis** (sun, wind, noise).
- **Contextual analysis** (surrounding land use, accessibility, services).

6.4. DATA COLLECTION

- **Primary Data**: Site visits, interviews, observations.
- **Secondary Data**: Demographics, health data, case studies, academic resources.

6.5. USER PROFILING AND SPACE PROGRAMMING

- Identified user groups: children with Down Syndrome (age-wise and severity-wise), parents, therapists, caregivers.
- Developed spatial requirements for each group based on developmental needs and therapeutic objectives.
- Introduced phase-wise progression in design:
    - **Phase A**: Early intervention and severe cases.
    - **Phase B**: Transitional learning and socialization.
    - **Phase C**: Skill development and integration.

6.6. CONCEPT DEVELOPMENT

- **Primary Concept**: *"Journey from Social Exclusion to Inclusion."*
- **Secondary Concepts**:
    - Spatial Awareness
    - Prospect and Refuge
    - Legibility and Wayfinding
    - Sensory Design and Routine

6.7. ZONING AND MASTERPLANNING

- Divided the site into soft programmatic zones with a hierarchy of public to private.
- Integrated nature-based therapeutic features: sensory gardens, play zones, community areas.
- Considered noise buffers, shaded walkways, and barrier-free design.

6.8. DESIGN DEVELOPMENT

- Detailed design of core facilities:
    - Classrooms, therapy zones, play areas, dormitories, counseling spaces, parent training rooms.
- Focused on creating a stress-free, “home away from home” atmosphere.
- Applied child-friendly scale, textures, colors, and materials.

6.9. VISUALIZATION AND REPRESENTATION

- Prepared architectural drawings, 3D renders, diagrams, and conceptual illustrations.
- Created phase-wise walkthrough to visualize user experiences and transitions.

6.10. FEEDBACK AND REFINEMENT

- Incorporated feedback from juries and mentors.
- Softened zoning and architectural language to avoid institutional or “zoo-like” feel.
- Improved user flow, sensory transitions, and emotional comfort across spaces.

6.11. FINAL OUTPUT

- Complete architectural presentation including:
    - Research, concept, site analysis, design proposal, and visual representations.
    - Design report and thesis documentation ready for submission.

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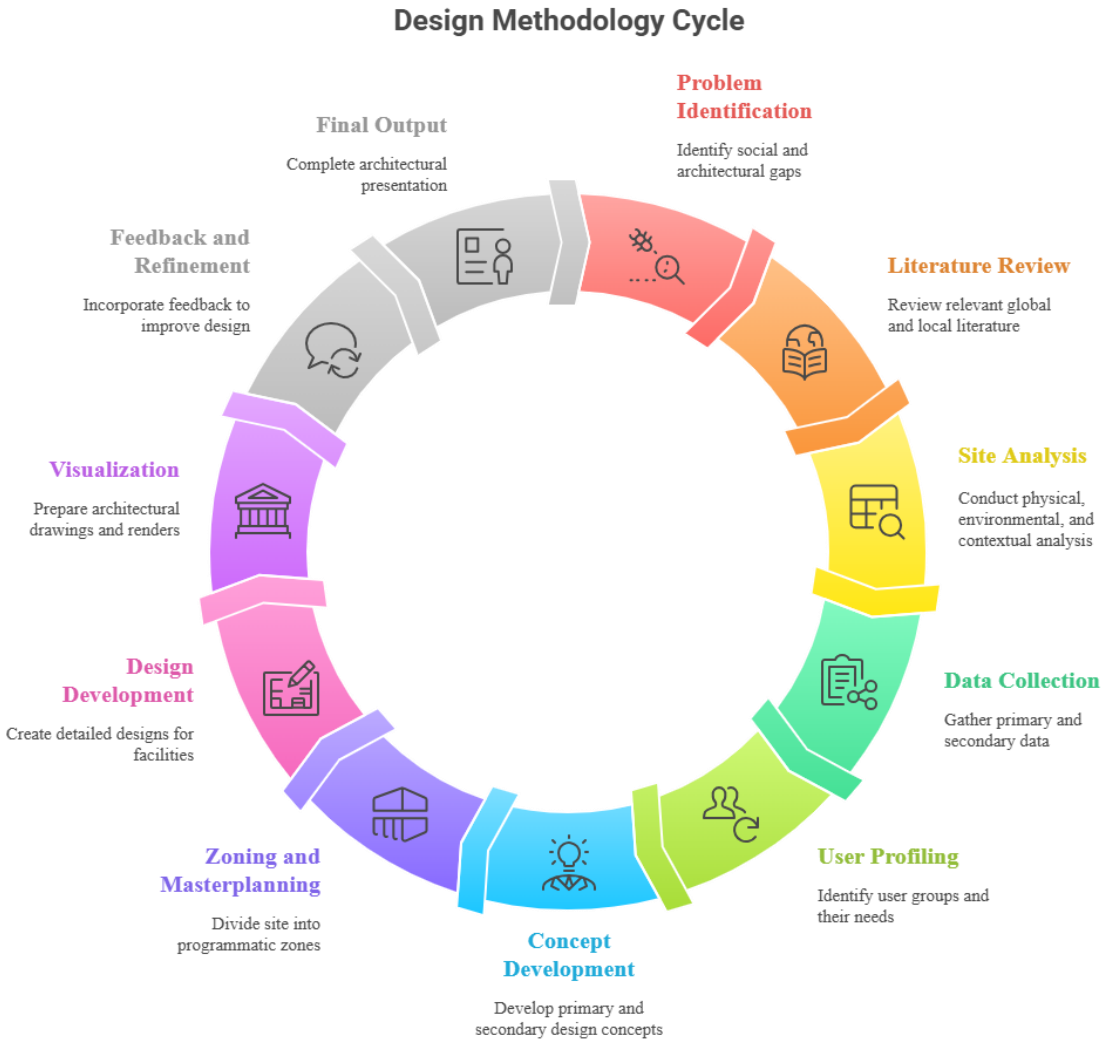


Figure 6.1 : Flow Chart of Methodology

7. LITERATURE REVIEW:

7.1. UNDERSTANDING DOWN SYNDROME AND ITS NEEDS:

Individuals with Down Syndrome often face a wide range of health challenges from birth. While these challenges may be lifelong, early and consistent medical, educational, and social interventions can significantly improve their development and quality of life. For architects, it is essential to understand these needs deeply and translate them into supportive, healing, and inclusive environments.

As discussed in Life Before Birth: The Moral and Legal Status of Embryos and Fetuses, congenital conditions like Down Syndrome present unique ethical, medical, and social considerations from the earliest stages of life. These early health challenges reinforce the importance of early support systems, including thoughtfully designed environments that respond to their physical and developmental conditions.

7.1.1. Physical Health Challenges:

(Evans-Martin, 2009)

- Congenital Heart Defects: About 40–60% are born with heart issues like atrial or ventricular septal defects, requiring lifelong care and regular monitoring.
- Respiratory Issues: Frequent infections and breathing difficulties due to structural differences make good air circulation and clean environments essential.
- Vision Problems: Over 60% experience issues such as nearsightedness, farsightedness, or strabismus. Spaces should offer high-contrast colors and sufficient lighting.
- Hearing Loss: Up to 75% have partial hearing loss, often caused by recurrent ear infections. Acoustic treatment in interiors is crucial.
- Thyroid Dysfunction: Around 4–18% suffer from hypothyroidism, requiring temperature-controlled and stress-reducing environments.

- Musculoskeletal Challenges: Low muscle tone and loose joints impact mobility, demanding ergonomic furniture, grab bars, and soft flooring.
- Skin Conditions: Sensitivity to infections or dryness means materials used in design should be hypoallergenic and non-irritating.

7.1.2. Intellectual & Cognitive Challenges:

Down Syndrome causes mild to moderate intellectual disability, which may affect:

- Motor Development: Delay in crawling, walking, and coordination. Spaces need to be movement-friendly, with ramps and safe open areas.
- Language Development: Slower speech and comprehension development require visual signage, symbols, and communication-friendly environments.
- Memory and Learning: Difficulty in short-term memory and concentration. Repetitive design patterns, organized layouts, and consistent color zoning support this need.

7.1.3. Emotional & Behavioral Challenges:

- Individuals may struggle with frustration, attention, or obsessive behaviors. Quiet zones, sensory rooms, and personalized routines can reduce stress and support well-being.
- Behavior is often linked to difficulty in expressing needs, which underscores the importance of intuitive, legible spaces that aid non-verbal communication.

7.1.4. Treatment Needs:

I. Medical Care:

Regular health monitoring is essential due to common associated health issues such as congenital heart defects, respiratory problems, thyroid disorders, and hearing or vision impairments. Early diagnosis and treatment of these conditions can significantly improve outcomes.

II. Therapeutic Interventions:

Physical therapy, occupational therapy, and speech therapy are crucial for improving motor skills, coordination, communication, and daily living activities. These therapies support functional independence and social interaction.

III. Educational Support:

Specialized education tailored to cognitive abilities helps children with Down Syndrome develop language, social skills, and academic knowledge in an inclusive or specialized setting.

IV. Psychosocial Support:

Emotional and behavioral support for individuals and families addresses challenges such as social stigma, anxiety, and building self-esteem.

V. Environmental Adaptations:

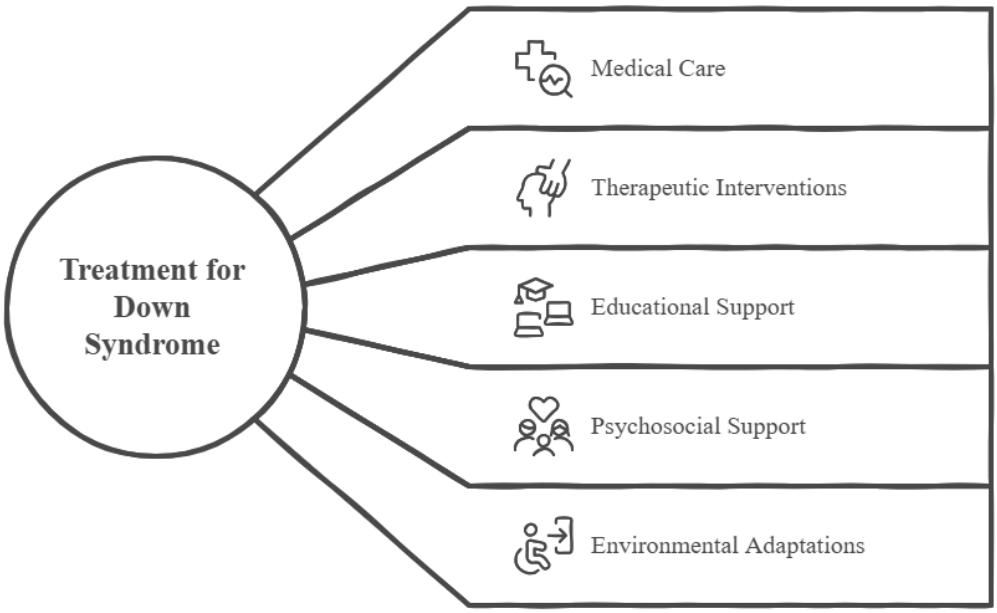


Figure 7.1 : Treatment for down syndrome

7.2. INDOOR SPATIAL REQUIREMENTS:

7.2.1. Learning Spaces:

7.2.1.1. Primary Learning Spaces:

1. Class may open onto a shared area allowing flexibility
2. Easy access to quiet small-group rooms
3. Links to a variety of outdoor spaces -peaceful quite places as well as noisy active places.

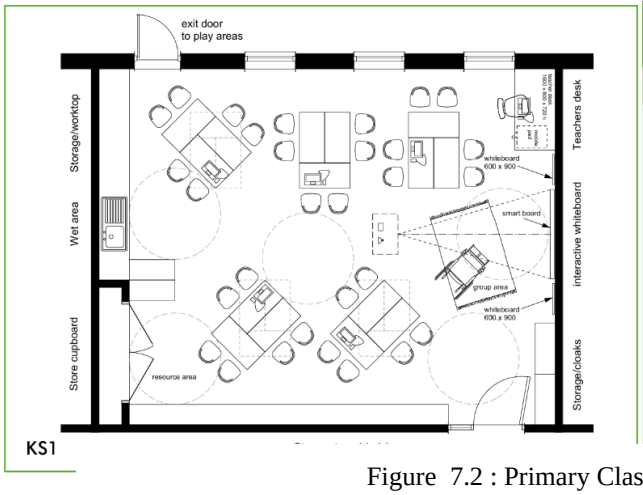


Table 4: Area guidelines[5] – primary mainstream

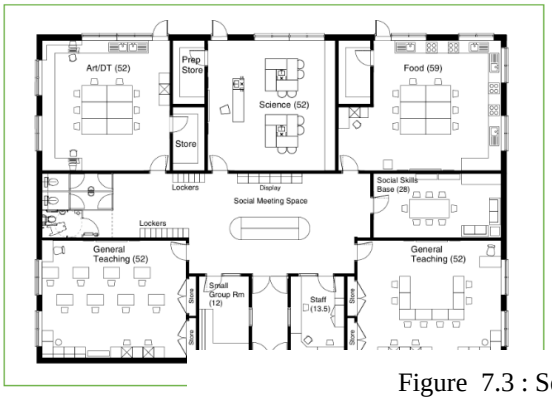
	Area m²
Small classrooms (30)	Up to 56
Standard classrooms (30)	56 – 63
Large classrooms (30)	63 – 70
Small group rooms (<6)	9 – 12
Library resource (depends on school size)	19 – 54
Food bay/room (15)	35 – 39
Science/design & technology room (15)	35 – 39
ICT room (15)	35 – 39
Music/drama studio (30)	50 – 80
Main hall (depends on school size)	140–200

Figure 7.2 : Primary Class Layout

Source: Department for Children, Schools and Families (2008).

7.2.1.2. Secondary Learning Space:

1. General teaching room sizes allow for variation in layout, including space between individual tables.
2. Each pupil can have their own workspace in the practical rooms.
3. The small group rooms can be used for counselling or learning support.
4. Direct access to the outside from practical spaces broadens the learning opportunities.



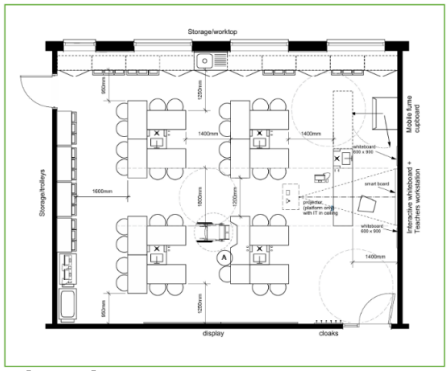


Figure 7.3 : Secondary Class Layout

Source: Department for Children, Schools and Families (2008).

7.2.2. ICT space:

Children with SEN and disabilities use a wide range of equipment, such as interactive whiteboards and/or plasma screens, computers, touch screens, adapted keyboards and access technology, or switching equipment, along with associated software. If there is a dedicated ICT space (15–20m2) for small groups or one to one.

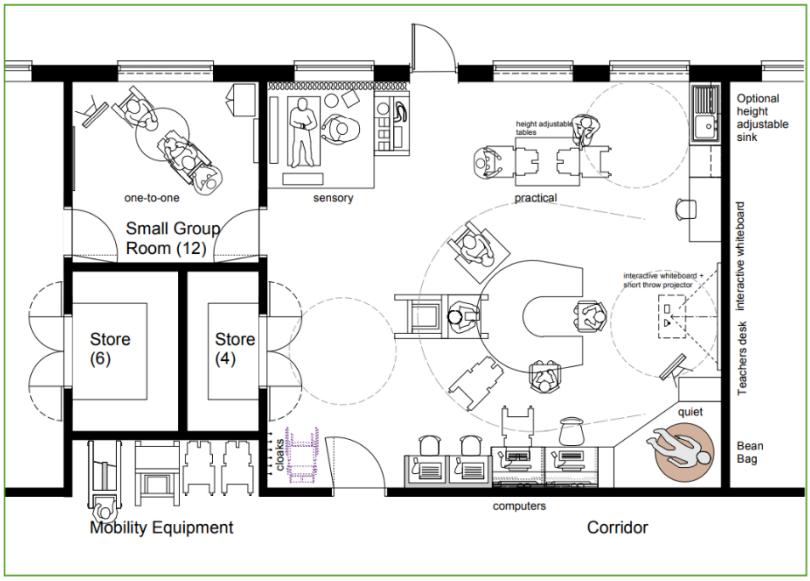


Figure 7.4 : Classroom Layout

Source: Department for Children, Schools and Families (2008).

7.2.3. Medical Spaces:

There are three main types of provision:

1. Medical facilities (e.g. medical inspection room required by School Premises Regulations, first aid room)
2. Therapy rooms to support healthcare and children's access to education (e.g. physiotherapy, hydrotherapy)
3. Admin spaces for multi-agency professionals (e.g. offices, case conference and meeting roo

7.2.4. Therapy Spaces:

(Designing for Disabled Children, n.d.)

7.2.4.1. Physiotherapy:

In a school setting, a physiotherapist carries out assessments and devises treatment plans, working with teaching and support assistants to instruct them on how to deliver programmes to meet the needs of children individually or in small groups.

Some physiotherapy can be carried out in the corner of a teaching space or SEN resource base, set out with matting and mirrors (which should be protected). Alternatively, it may take place in one of the following:

a. Requirements:

- a multi-purpose support space (25– 30m2) (if suitably fitted out, e.g. with a couch, a clinical wash hand basin, and a curtained or screened changing space)
- a large medical room (18–25m2) with an adjustable height couch and equipped with a ceiling-mounted hoist (If portable hoists are used, 25–30m2 may be needed.)
- a fully equipped physiotherapy room (25–30m2 is recommended) – where there is a higher level of need it may also be used by other therapists, as appropriate, on a timetabled basis
- Storage space (4–10 m2) will be needed to support any of these spaces, for inflatables, physical aids and equipment. It should be directly accessible from the space, with outward-opening doors.

b. Interior Elements:

- Therapy Mats / Soft Flooring
- Parallel Bars
- Balance Beams / Walkways.
- Therapy Balls / Exercise Balls
- Foam Rollers / Cushions
- Climbing Structures / Ramps / Stairs with Handrails
- Resistance Bands / Weights.
- Fine Motor Tools.

Figure 7.5 : Interior of Physiotherapy

7.2.4.2. Occupational Therapy:

OTs work with individuals across the lifespan to increase their independence in these activities. These everyday activities are a person's "occupations" and include sleep, hygiene, dressing, cooking, self-feeding, employment, transportation, attending school, and toileting. Some individuals will be learning a skill for the first time (called habilitation).

Occupational therapy helps children with Down Syndrome develop independence in daily activities, improve fine motor skills, and enhance cognitive and sensory processing. The therapy is customized based on the child's abilities and needs.

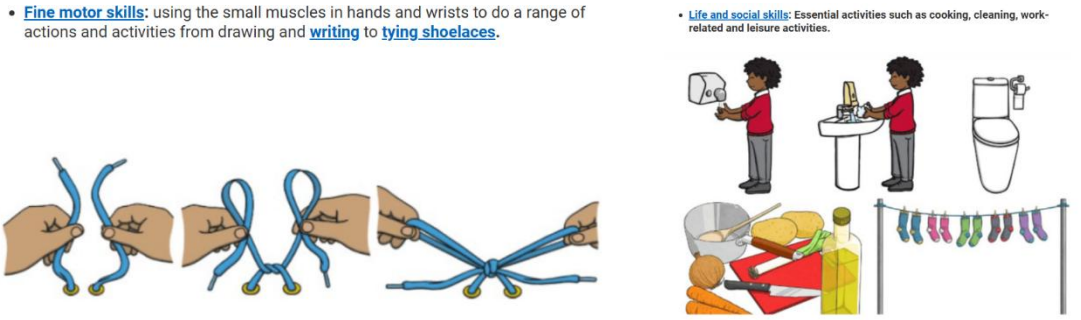


Figure 7.6 :Basic Life Skills

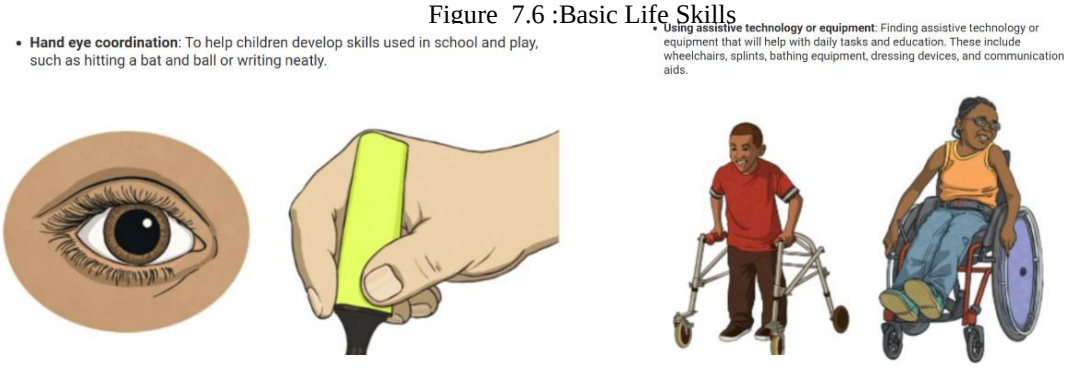


Figure 7.7 :Movement of Physical Body

7.2.4.3. Hydrotherapy:

Hydrotherapy is included in some special schools, principally for treatment and exercise for students with physical and/or sensory disabilities. Warm water provides an effective medium for muscle relaxation and is a pleasurable, therapeutic experience that may encourage the development of communication and interaction skills.

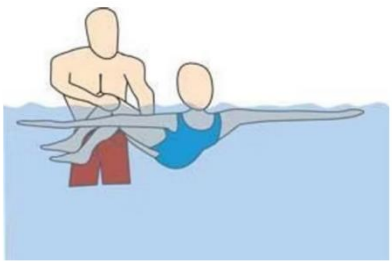


Figure 7.8 : Hydrotherapy

Requirements:

- A typical hydrotherapy pool needs an overall space of 85m2, with:
- a pool of 24m2
- a surround of 2–2.5m wide (ensuring safe movement)
- staff changing of 4m2 to 6m2 each for males and females separately

7.2.4.4. Language and Speech therapy:

(Designing for Disabled Children, n.d.)

The speech and language therapist (SLT) works with children in the classroom or a separate quiet room. Sometimes a dedicated speech and language therapy base is provided34. A room of 12–15m2 will support individual or small group work. For larger groups of between six and eight, a space of 39–65m2 may be needed.

Figure 7.9 : Speech Therapy

7.2.4.5. Music Therapy:

Music therapy uses rhythm, melody, and harmony to support physical, emotional, cognitive, and social development. For children with Down syndrome, it improves communication, motor skills, emotional expression, social interaction, and cognitive abilities. Techniques include singing, instrument playing, listening, and movement. Therapy rooms need good soundproofing, enough space for activities, comfortable seating, a calming environment, and accessibility for mobility aids.

Figure 7.10 : Music Therapy

7.2.4.6. Color and light Therapy:

Color and light therapy use specific colors and light wavelengths to influence mood, behavior, and physiological responses. These therapies can help reduce anxiety, improve focus, and stimulate sensory development, making them beneficial for children with special needs, including those with Down syndrome.

Therapy rooms should have adjustable lighting systems with options for different colors and intensities, soft and neutral wall colors to complement light therapy, controlled natural light to avoid glare, and a calming, clutter-free environment to enhance relaxation and focus

7.2.4.7. Behavioural Therapy:

Behavioral therapy focuses on modifying negative behaviors and reinforcing positive ones through structured interventions. It helps children with special needs develop social skills, communication, and self-control, improving their overall functioning and independence.

Figure 7.11 : Communication through picture
Source: Jammi Scans. (n.d.).

Therapy spaces should be quiet, safe, and free of distractions, with flexible areas for individual or group activities. Visual aids, calming colors, and organized layouts support focus and positive behavior.

7.2.4.8. Art Therapy:

Art therapy involves the use of creative activities such as painting, drawing, and sculpting to support emotional expression, cognitive development, and motor skills. For children with Down Syndrome, it serves as a non-verbal outlet for communication and helps build confidence and fine motor control. The space should be bright, calming, and well-ventilated, with washable surfaces, accessible storage for materials, and flexible seating arrangements. Flooring should be easy to clean, and the layout should accommodate children with mobility aids.

Figure 7.12 : Art therapy
Source: Education Cambodia

7.2.4.9. Dance Therapy:

Dance therapy uses movement to support physical coordination, emotional release, and social engagement. It helps children with Down Syndrome improve balance, rhythm, and body awareness while encouraging joyful expression and group interaction. The therapy space should be open and spacious with shock-absorbent or sprung flooring, full-length mirrors, and a sound

Figure 7.13 :Dance Therapy
Source: istock

system for music. It should also have visual cues for orientation, accessible entrances, and space for group movement activities.

7.2.4.10. Play Therapy:

Play therapy is a therapeutic approach that uses play to help children express emotions, develop social skills, and improve cognitive abilities. It provides a safe and engaging environment where children can explore feelings and resolve psychological challenges through guided play activities.

Figure 7.14 :Play Therapy
Source: Pentagon Play (2024)

A play therapy room should have ample open space for movement, a variety of toys and play materials, comfortable seating, and a calming, child-friendly atmosphere. It should be safe, accessible, and designed to encourage creativity and interaction.

7.2.5. SENSORY ROOM:

People with down syndrome have been shown to prefer lively and animated presentation, often because their memory skills are superior to their verbal skills. l. The sensory rooms in a school can provide a place for an individual with special needs to go when a meltdown occurs. a sensory room also can provide a low-stress, fun environment for a private to work out their feelings and responses to various situations.

Elements in Sensory Room

- **Sensory Stimulation:** textured surfaces, bubble tubes, calming sounds, aromatherapy, weighted items, manipulatives, and mirrors.
- **Comfort & Safety:** soft adjustable lighting, swings, quiet seating, and safe, calming environment.

Figure 7.15 : Sensory Room
Source: Fun and Function (2024)

Children with Down Syndrome want to learn things through games.They prefer to sit and study in places where they can enjoy the colours. These children can not sit in a place like normal children learn and listen to what the teacher is saying They want to see what is around them, enjoy it and immerse themselves in it

When designing a space you should try to design it as an open space without making it narrow. These children do not want to sit on a bench and study. They prefer to sit in their places and study accordingly. An educational environment that offers appropriate cognitive stimulation, engaging learning activities, positive expectations of children's learning and other environmental factors may have the potential to increase levels of engagement for children with Down syndrome.

7.2.6. CALM ROOM/QUIET ROOM:

A calm room is a quiet, safe space designed to help children relax, reduce stress, and self-regulate emotions. It provides a soothing environment with soft lighting, comfortable seating, minimal distractions, and calming sensory elements like gentle sounds or tactile objects to promote emotional well-being and focus.

Figure 7.16 : Quiet Room

7.3. DESIGN GUIDELINE APPROACH:

(Bulatova, 2023) (Department for Education, 2015)

7.3.1. Legibility and Wayfinding:

Legibility refers to how easily users can understand and navigate a space, while wayfinding is the process of using environmental cues to find one's way. For children with Down Syndrome and other cognitive disabilities, designing clear, intuitive paths with visual landmarks, color-coded zones, and simplified signage greatly enhances independence and confidence in movement.

Figure 7.17 : Landmark inside the building through color,smell,sculpture,scale

Key Design Considerations:

- Use of distinct colors and textures to define different areas
- Consistent, simple signage with pictograms or visuals
- Clear line of sight and minimized visual clutter

- Repetition of familiar symbols or icons to guide transitions
- Logical layout that avoids confusion or dead-ends

7.3.2. Prospect and Refuge

Figure 7.18 :Opportunity to escape linear route to acloves

The theory of prospect and refuge in design refers to creating spaces where individuals feel both a sense of openness (prospect) and safety or shelter (refuge). For children with Down Syndrome, this balance helps reduce anxiety and supports emotional well-being by allowing them to observe their environment from a secure, comforting place.

Key Design Considerations:

- Prospect: Open spaces with views to activity zones, natural light, and visibility that allow children to feel aware and included
- Refuge: Cozy nooks, alcoves, window seats, or small rooms with soft furnishings where children can retreat when overstimulated or in need of calm

This balance supports both exploration and emotional regulation in therapeutic and learning environments.

7.3.3. Territoriality and Control:

Figure 7.19 : Providing choices for stimuli and light

Territoriality refers to the human need to claim and control a defined space, while control relates to the ability to influence one's environment. For children with Down Syndrome, providing clear boundaries and a sense of ownership over certain spaces helps foster independence, predictability, and comfort.

Key Design Considerations:

- Defined Personal Spaces: Individual cubbies, lockers, or desks to instill a sense of ownership
- Controlled Environments: Choice-based spaces where children can decide where to sit, what activity to engage in, or when to take a break

- Visual Cues and Boundaries: Use of color, flooring changes, or low partitions to indicate zones while maintaining inclusivity and supervision.

7.3.4. Privacy and Choice

Children with Down Syndrome benefit from spaces that balance interaction and retreat. Designing areas that allow children to choose whether to participate or observe helps them feel secure and respected.

Figure 7.20 : Use of Quiet room by choice

Design Considerations:

- Quiet nooks or alcoves for retreat
- Flexible furniture to allow rearrangement
- Visual or symbolic barriers instead of complete separation

7.3.5. Design for Sense

Sensory-friendly design supports children's perception and interaction with their environment through controlled stimuli tailored to their needs.

Figure 7.21 : Nature to increase productivity

Design Considerations:

- Use of natural textures, soft lighting, and calming colors
- Minimizing harsh sounds or flickering lights
- Incorporating sensory zones with tactile, auditory, and visual stimuli

7.3.6. Design for Routine

Predictable layouts help children anticipate activities, which supports learning and reduces anxiety.

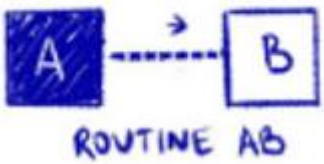


Figure 7.22 : Clarity of Spatial Organization

Design Considerations:

- Clear, sequential zoning of daily functions (e.g., arrival → activity → rest → exit
- Visual schedules and pictorial signs
- Repetition in spatial arrangement to build familiarity

7.4. DESIGN KEYS :VISUAL ENVIRONMENT ASPECT:

Visual memory in Down syndrome is better than auditory memory in receiving information. Babies with Down syndrome tend to be "visual learners," they can learn to communicate with sign language months or years before they master speech. People affected by Down syndrome present a remarkable hypersensitivity and a particular spatial perception.

The **visual environment** serves as a critical medium for enhancing cognition, memory, and motor skills in wayfinding orientation, particularly for individuals with Down Syndrome, who are predominantly visual learners (Chalim, Hayati, & Defiana, 2023). These environmental elements support users in understanding and interacting with their surroundings more effectively. According to Buyanov (2006), aspects of the visual environment—such as color, pattern, material, and light—not only define the physical space but also act as stimuli to help children interpret and respond to sensory information.

Additionally, Kopec (2018) emphasizes that these elements, when deliberately designed, can positively influence user behavior. By strategically integrating visual cues, the built environment can foster improved orientation and wayfinding through sensory engagement and behavioral reinforcement.

7.4.1. Color of the architectural element:

Colour is a fundamental element of visual perception, intrinsically linked to light and constantly influencing how individuals experience and interpret space. Through sensory engagement, colour visuals stimulate memory and recognition, serving as essential tools in spatial orientation and cognitive mapping. In the context of wayfinding, colour is one of the most intuitive and distinguishable visual aspects, especially when applied to spatial and formal elements. However, its effectiveness depends on the cognitive and perceptual characteristics of the user. For individuals with Down Syndrome, middle-range colour palettes are recommended to enhance focus and support productivity (Meerwein, 2007). According to Luis and Moncayo (2018), using non-contrast, middle-range colour combinations is more effective than stark contrasts, as it reduces overstimulation and improves visual comfort.

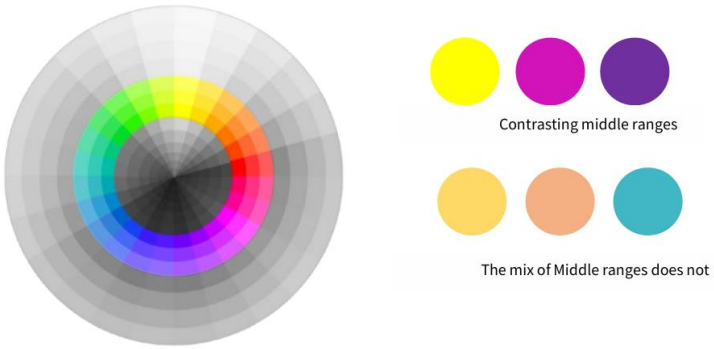


Figure 7.23 : Color Palette

Source: Chalim, T. A., Hayati, A., & Defiana, I. (2023). Visual environment aspect of public building design for persons with Down Syndrome. International Journal of Disability Studies, 10(2), 167–177.

The application of colour like this will make it easier for users to navigate and help them remember the function of a space based on its colour

Figure 7.24 : Color application for wayfinding

Source: Chalim, T. A., Hayati, A., & Defiana, I. (2023). Visual environment aspect of public building design for persons with Down Syndrome. International Journal of Disability Studies, 10(2), 167–177.

7.4.2. Pattern:

Individuals with Down Syndrome often face challenges in recognizing spatial cues and maintaining orientation within built environments. In this context, patterns serve as essential visual sensory tools that help mark changes in function and building levels, supporting spatial understanding and navigation (Meerwein, Rodeck, & Mahnke, 2007).

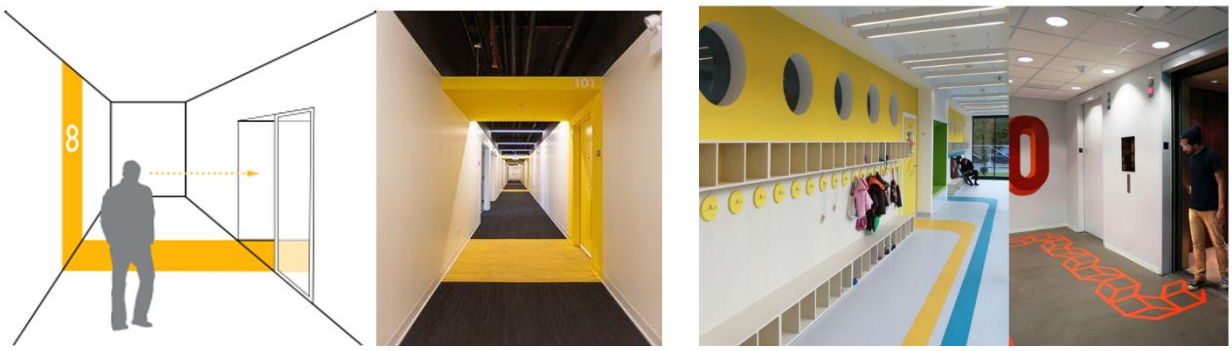


Figure 7.25 : Pattern application for wayfinding

Source: Chalim, T. A., Hayati, A., & Defiana, I. (2023). Visual environment aspect of public building design for persons with Down Syndrome. International Journal of Disability Studies, 10(2), 167–177.

These patterns act as visual signals or markers that facilitate wayfinding by enhancing cognitive and memory skills, while also helping users form spatial perceptions. Geometric patterns—especially simple and repetitive forms—are preferable over complex designs, which may confuse or overwhelm users with Down Syndrome. When integrated into floors, walls, or ceilings, such patterns act as navigational guides that stimulate motor activity and clarify spatial direction. Moreover, when combined with appropriate color schemes, these patterned elements become focal points that unconsciously reinforce motor responses and improve orientation, ultimately promoting independent movement through space.

7.4.3. Material:

Materials in architecture act as sensory landmarks that assist users in navigating and engaging with their environment on a daily basis. For individuals with Down Syndrome, who often experience impairments in cognition, memory, and motor skills, materials become essential in facilitating sensory engagement—particularly through sight and touch. Natural materials, being familiar and

Figure 7.26 : Ceiling pattern for wayfinding

Source: Chalim, T. A., Hayati, A., & Defiana, I. (2023). Visual environment aspect of public building design for persons with Down Syndrome. International Journal of Disability Studies, 10(2), 167–177.

recognizable, provide tactile textures and visual warmth that stimulate memory and emotional connection. Their organic qualities also contribute positively to users' behavior by fostering comfort, calmness, and a sense of safety. Textures found in wood, stone, and other natural elements stimulate the tactile motor system, while their subtle scents can evoke memory and aid in environmental recognition. The emotional quality of natural materials makes them ideal for creating nurturing spaces.

In environments tailored to individuals with Down Syndrome, the selection of safe materials is crucial. Surfaces should avoid sharp edges and abrasive finishes to prevent injury during movement or interaction. Where synthetic materials are used, smooth and non-intrusive textures are recommended to preserve safety and sensory comfort. By integrating such sensory-conscious materials, the built environment can enhance adaptation, emotional well-being, and independent exploration.

Figure 7.27 : Use of natural materials

Source: Chalim, T. A., Hayati, A., & Defiana, I. (2023). Visual environment aspect of public building design for persons with Down Syndrome. International Journal of Disability Studies, 10(2), 167–177.

7.4.4. Light:

People with Down Syndrome often respond positively to natural light, particularly when it enters through windows or reflects gently off surfaces. Sunlight filtered through windows or openings creates a comforting and familiar atmosphere, making these spots naturally preferred locations. However, lighting must be carefully controlled, as overly intense illumination can lead to glare, reducing comfort and causing visual strain due to high contrast.

Incorporating patterned or colored transparent roof materials can introduce playful shadows that stimulate curiosity and help support memory formation. These shifting shadows become visual cues that enhance spatial awareness and wayfinding. Light filtered through such elements not only encourages sensory engagement but also supports motor function and emotional expression.

Figure 7.28 : Use of natural and artificial light

Source: Chalim, T. A., Hayati, A., & Defiana, I. (2023). Visual environment aspect of public building design for persons with Down Syndrome. International Journal of Disability Studies, 10(2), 167–177.

Additionally, introducing open gardens and green spaces within or adjacent to buildings enriches the sensory environment. These spaces allow both light and air to circulate naturally, contributing to a healthier and more engaging atmosphere. Thoughtfully designed voids and openings not only serve as passive ventilation systems but also enhance mood and encourage movement through visual and environmental stimulation.

7.5. WAYFINDING PRINCIPLES:

KEVIN LYNCH

Figure 7.29 : Kevin Lynch Image of the City

Source: Riou, M. (n.d.). *The Urban Mycelium*.

7.5.1. DESIGN PRINCIPLE

7.5.1.1. Emphasis

Creating focal points within the space – be it an architectural element or graphics – can aid in wayfinding and mapping of the space making them easier to navigate.

7.5.1.2. Rhythm

Designing the space with common elements, either from floor-to-floor or within one's view point, can aid in orientation and provide a reassuring sense of order within an environment.

7.5.1.3. Proportion

Proportion ensures the relative size and scale of the various elements in a design. If the proportions are off a space can feel unbalanced or not in sync with human scale. Ceiling heights and room proportion are critical to ensure the feel of the space is appropriate.

7.5.1.4. Balance

Balance creates visual equilibrium and often reconciles opposing forces in a composition to create visual stability. Most successful compositions achieve balance by either symmetry or asymmetry.

7.6. CIRCULATION

7.6.1. Circulation Type :

Configuration of the path

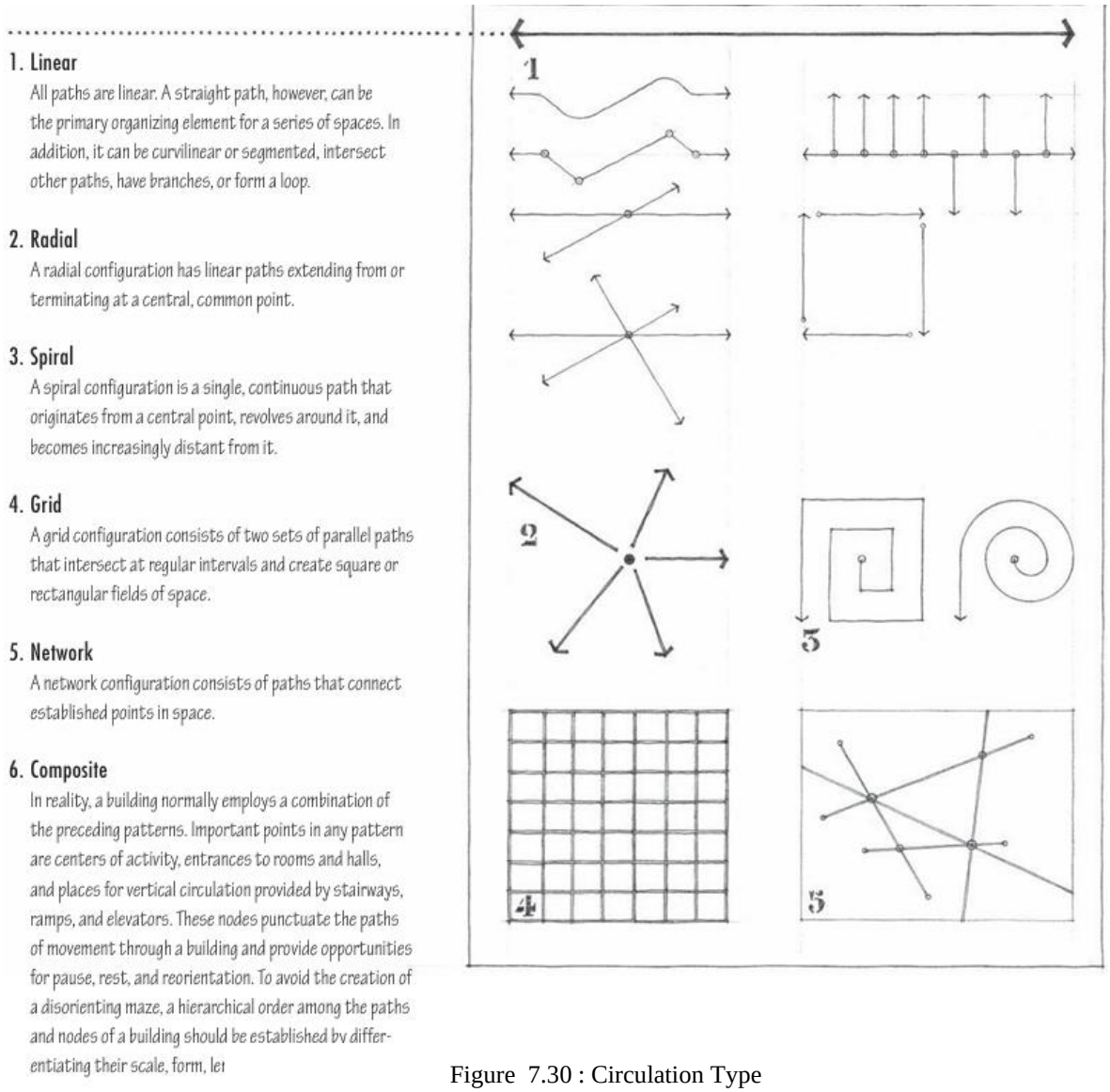


Figure 7.30 : Circulation Type

Source: Ching, F. D. K. (2014). *Architecture: Form, Space, & Order*.

7.6.2. Path – space Relationship:

The relationship between paths and spaces shapes how users experience architecture. Paths can pass through, terminate in, or pass by spaces, each creating different emotional and spatial effects. These relationships help organize movement, emphasize destinations, or encourage visual interaction. Ching also highlights transitions—such as flush, defined, or filtered entries—that influence how users enter and perceive spaces. This concept is especially useful in therapeutic or inclusive environments, where thoughtful circulation can support sensory comfort and emotional well-being.

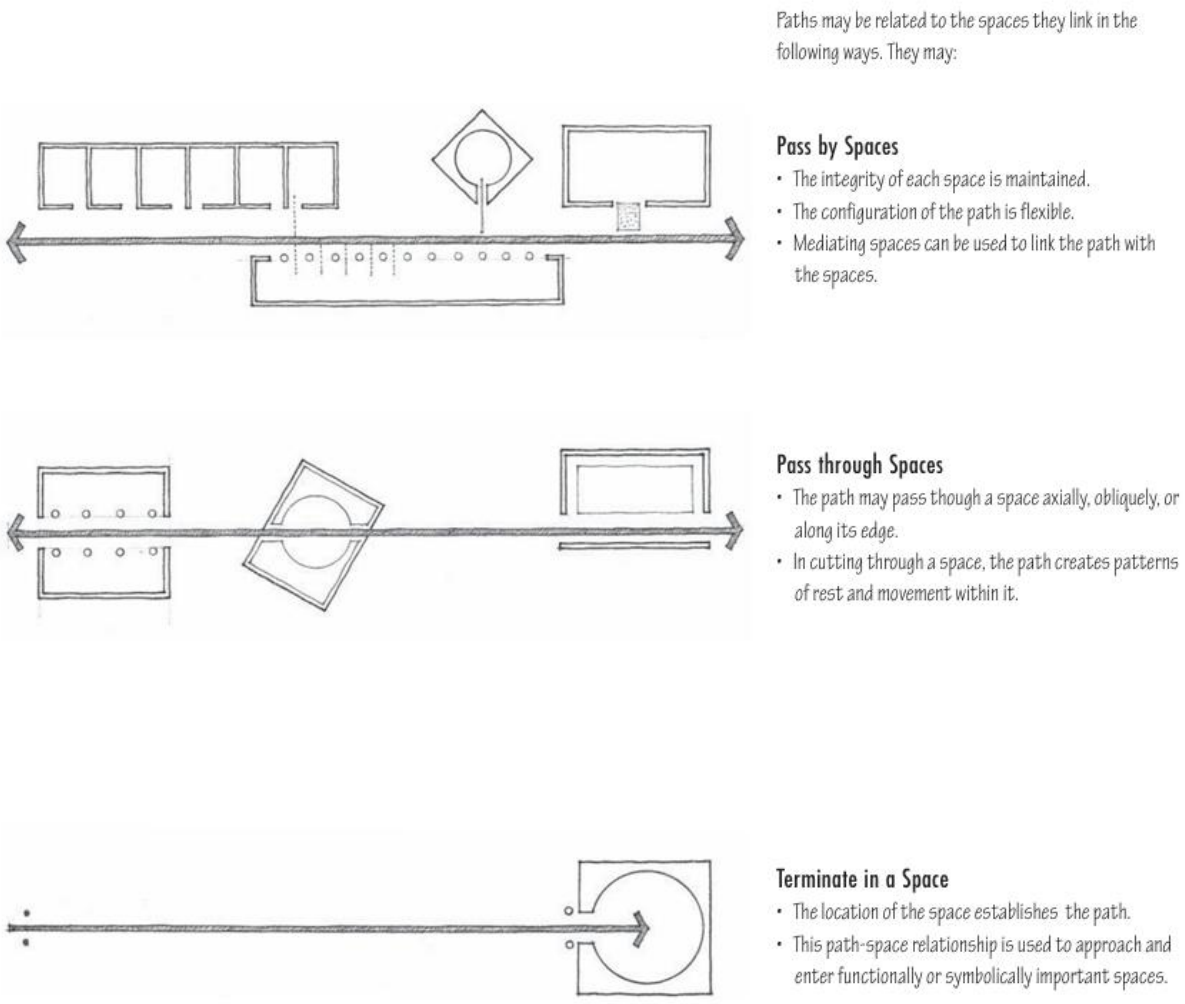


Figure 7.31 :Path-Space relationship

Source: Ching, F. D. K. (2014). *Architecture: Form, Space, & Order*.

7.6.3. Form of the Circulation space:

Different circulation forms—linear, radial, spiral, grid, network, and composite—each influencing how users move through and perceive space. Linear paths create clear direction, radial forms emphasize a central space, and spiral paths suggest dynamic movement. These forms help structure experiences and emotional flow, especially important in therapeutic settings where clarity, comfort, and gentle transitions are key.

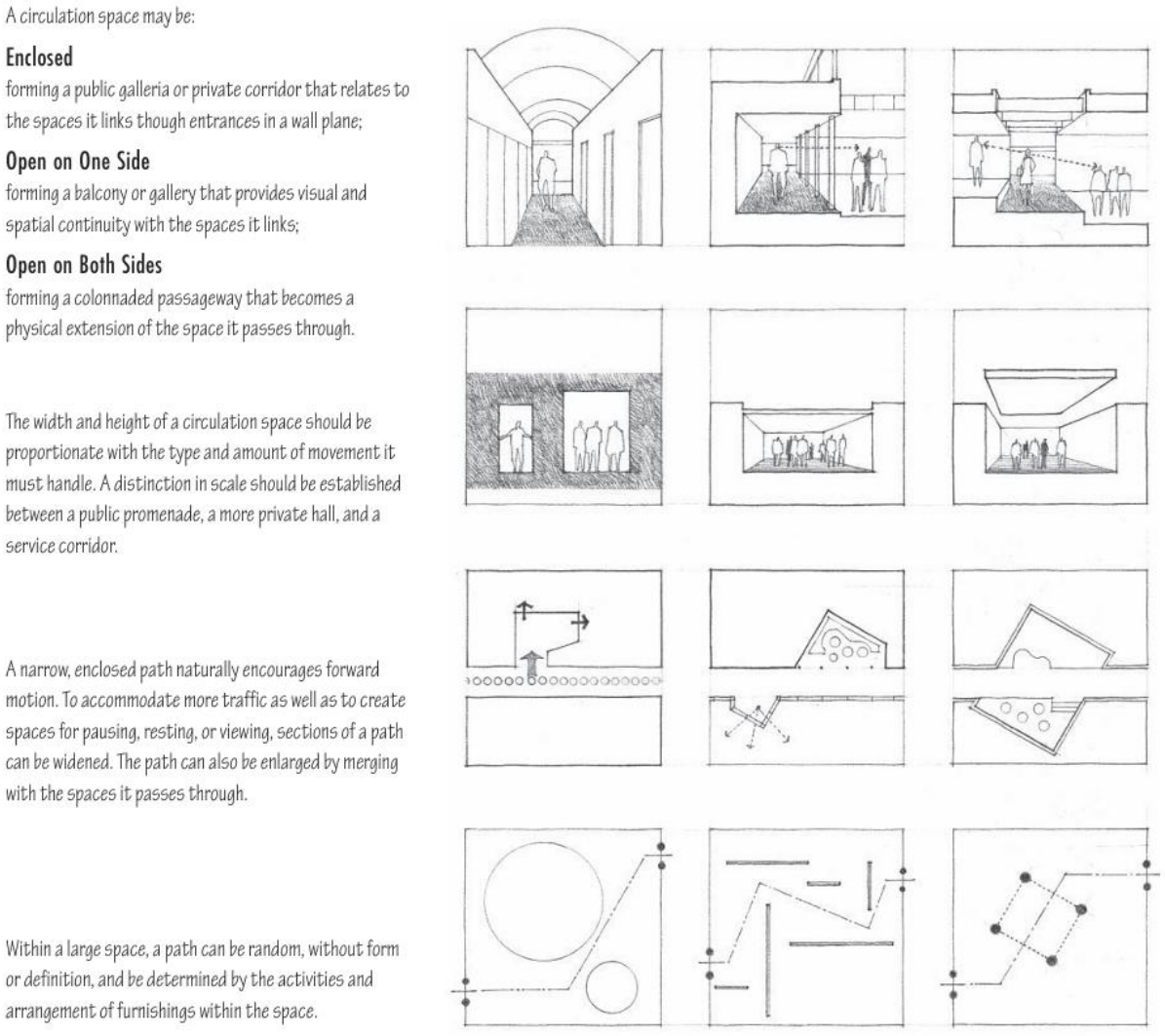


Figure 7.32 : Form of Circulation type

Source: Ching, F. D. K. (2014). *Architecture: Form, Space, & Order*.

7.7. CIRCULATION

7.7.1. Horizontal Circulation:

Accessible design standards require a minimum 36-inch-wide route for wheelchair users (U.S. Department of Justice, 2010).

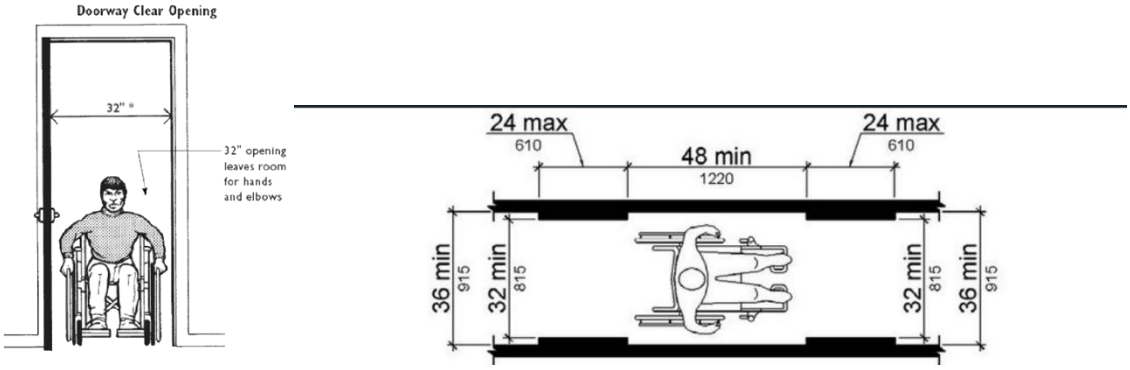


Figure 7.33 :Minimum corridor width

Source: U.S. Department of Justice (2010)

7.7.2. Vertical Circulation: Stairs

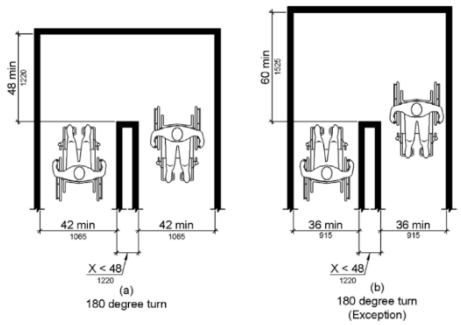


Figure 7.35 : Turn width

Source: U.S. Department of Justice (2010)

Rise
150mm–170mm (150mm preferred for schools)
Going
250mm minimum (280mm preferred for schools)
Clear width between handrails
1200mm minimum (1600mm preferred)

Figure 7.34 :Dimension for staircase

Source: Department for Children, Schools and Families (2008).

7.7.3. Ramp

The maximum allowable slope in any new construction is 1:12 with a maximum rise of 30” (76.2 cm) without a landing. A ramp with a slope between 1:12 and 1:16 can have a maximum horizontal length of 30’ (9.14 m) without a landing. A ramp with a slope between 1:16 and 1:20 can have a horizontal run up to 40’ (12.19 m) before requiring a landing

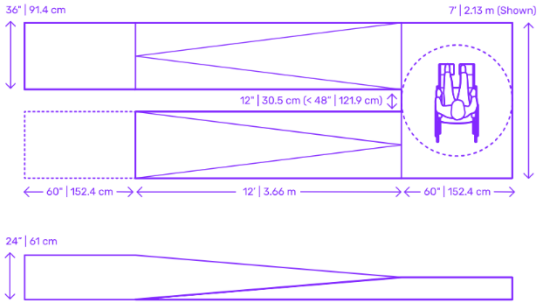


Figure 7.36 : Ramp Diagram

Source: Dimensions.com (n.d.)

.Ramp Widths

ADA accessible ramps must maintain a minimum clear width of 36” (91.4 cm) at all times. The cross slope along the width of any ramp must be less than 1:50 or <2%. The 36” (91.4 cm) clear width must be maintained between all including handrails.

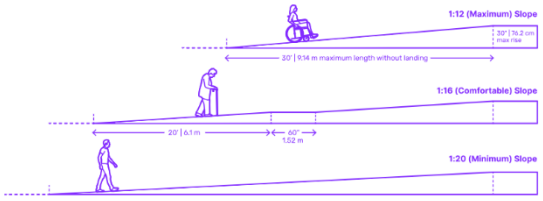


Figure 7.37 : Ramp Slopes

Source: Dimensions.com (n.d.)

7.8. DOORSAND WINDOWS:

Door openings shall provide a clear width of 32 inches (815 mm) minimum.

Clear openings of doorways with swinging doors shall be measured between the face of the doorand the stop, with the door open 90 degrees.

Windows with low level sills and windows with seating space or niches are provided,

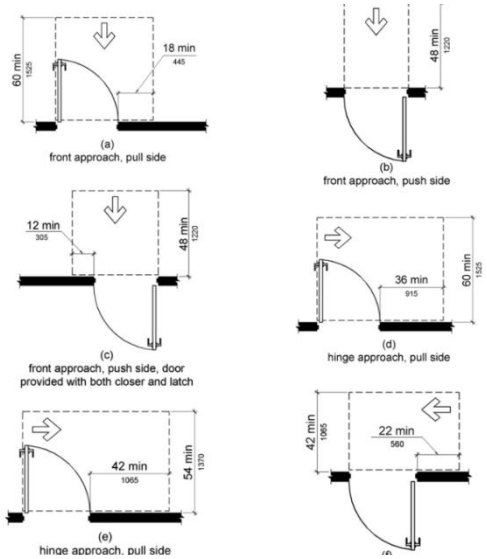


Figure 7.38 :Door dimension

Source: U.S. Department of Justice (2010)

7.9. SANITARY SPACES:

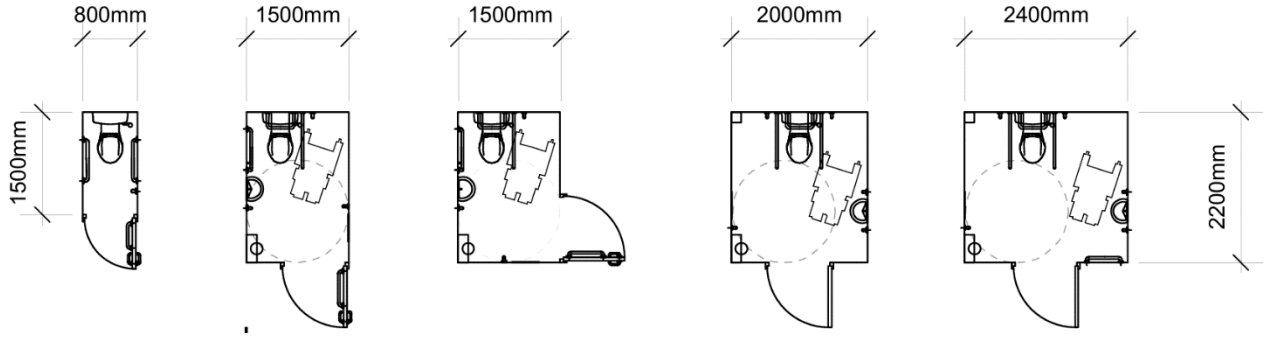


Figure 7.39 : Variation in size of toilet

Source: U.S. Department of Justice (2010)

- Clear floor space: Minimum of 60 inches diameter turning space inside the restroom.
- Toilet height: 17–19 inches (measured from floor to top of seat).
- Grab bars:Behind toilet: 36 inches min. in length
- Side wall: 42 inches min., positioned 33–36 inches above the floor
- Door clearance: Should swing outward with 32 inches min. clear width
- Sink: Mounted no higher than 34 inches from the floor, with knee clearance of at least 27 inches

- Flush controls: Must be hand-operated or automatic, positioned on the open side of the toilet
- Mirror and accessories: Should be placed no higher than 40 inches above the floor

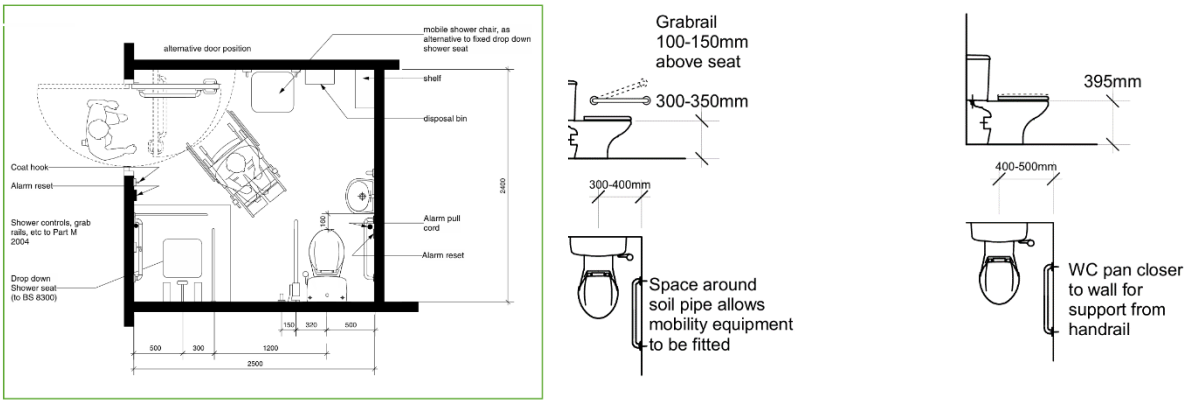


Figure 7.40 : Wheelchair accessible toilet

Source: U.S. Department of Justice (2010)

7.10. PARKING DIMENSION:

Car parking spaces shall be 96 inches (2440 mm) wide minimum and van parking spaces shall be 132 inches (3350 mm) wide minimumVan parking spaces shall be permitted to be 96 inches (2440 mm) wide minimumand the access aisle is 96 inches (2440 mm) wide minimum.

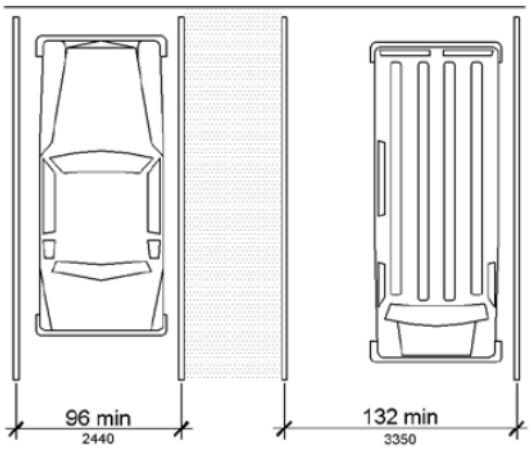


Figure 7.41 : Parking Dimension

Source: U.S. Department of Justice (2010)

7.11. Compressed Earth Block:

(Standards New Zealand, 2024)

Compressed earth blocks (CEBs) are a durable, low-cost way of building a home, office, or community. The blocks are environmentally friendly, long lasting, and able to withstand the harshest weather conditions. They also have a lower embodied energy than traditional concrete and brick. Compressed earth blocks (CEBs) are a green, environmentally friendly construction material that can be built with local resources and provide a durable, sustainable, and affordable building solution. CEBs are made from soil, aggregate, and water which is compressed to produce blocks. These blocks can be used as a replacement for traditional materials such as cement, wood, brick or block.

SOIL CONTENT :

	Sand	Silt	Clay
Ideal Soil	80%	10%	10%
Good Soil	65-80%	0-20%	10-20%

Figure 7.42 :Soil Content for earth block

Source: ICIMOD (n.d.)

7.11.1. Why Earth Block Works for This Project:

1. Environmental Benefits

- Lower embodied energy: Earth blocks don’t require high-temperature kilns like fired bricks. CSEBs are sun-dried or pressed, not fired, saving huge amounts of energy.
- Locally sourced: Made from local soil, which reduces the carbon footprint from transportation.
- No deforestation: Brick kilns often use firewood, contributing to deforestation and air pollution.

2. Thermal and Humidity Regulation

- Natural insulation: Earth blocks have better thermal mass, keeping interiors cooler in summer and warmer in winter.
- Humidity regulation: Earth blocks "breathe" — they can absorb and release moisture, helping maintain a stable interior humidity level. This is especially beneficial for:
- Children with Down Syndrome who may have heart or respiratory sensitivities.
- Creating a calm, healing environment.

3. Cost and Accessibility

- Lower cost (when local soil is used): Making earth blocks on-site or nearby can cut down transportation and production costs.
- Labor-friendly: Block-making can be labor-intensive but also creates local jobs and skill-building opportunities.

4. Construction Performance

- Good compressive strength (if stabilized well): CSEBs, when properly stabilized (usually with cement or lime), can perform as well as or even better than normal bricks.
- Modular and flexible: Earth blocks can be made in various sizes and interlocking forms to reduce mortar use.

5. Health and Comfort

- Non-toxic and breathable: Earth blocks don’t emit VOCs or toxins like some industrial bricks or concrete blocks might.
- Calm visual quality: The earthy tones, texture, and acoustics of earth walls contribute to a soothing sensory experience — ideal for therapeutic or educational spaces.

7.11.2. Earth Block Module Types:

The standard thickness of rammed earth walls is generally 300mm. In instances where niches and recesses are required for fireplaces, heater boxes etc. walls can be constructed to alternative thickness as required by the project.

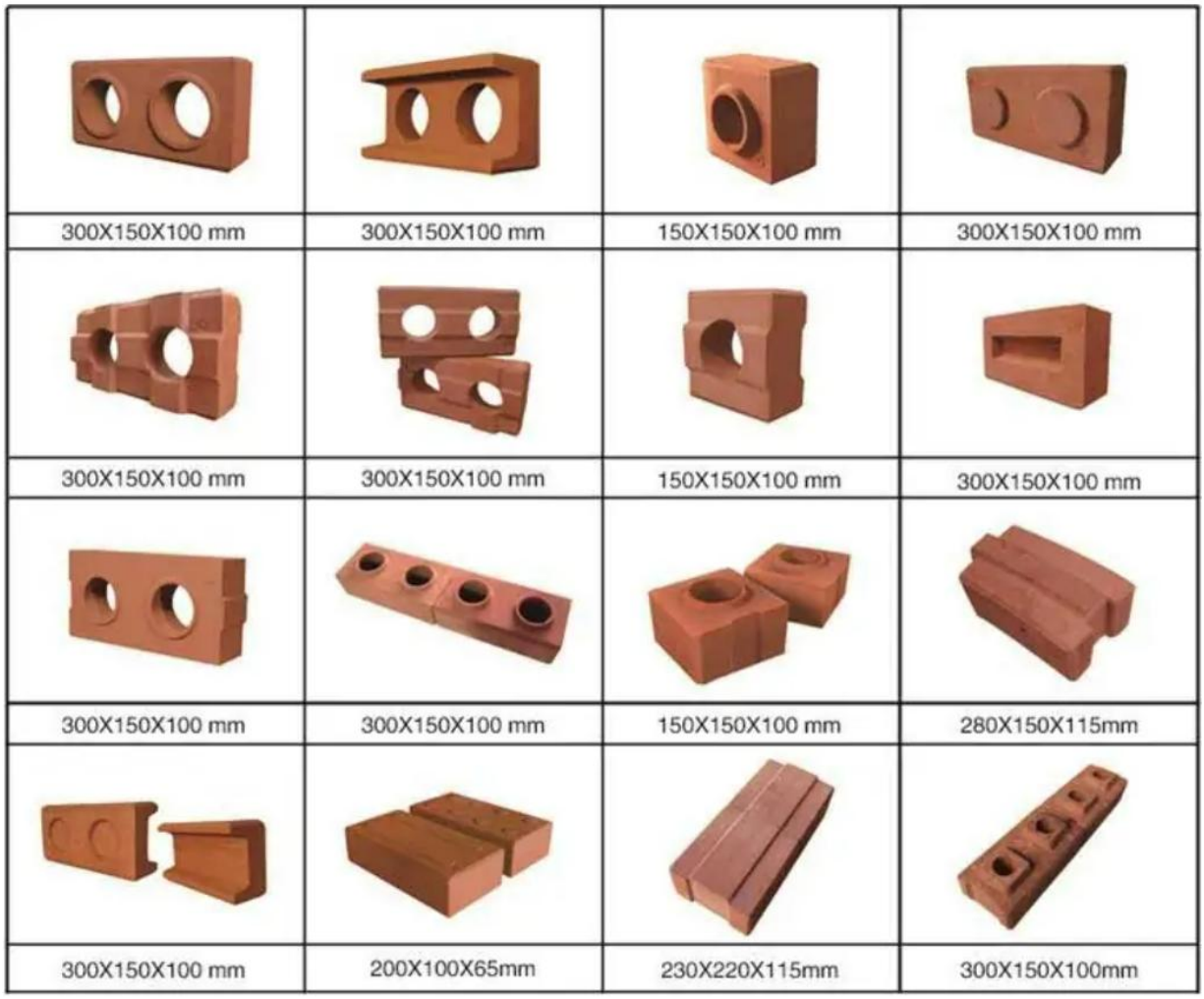


Figure 7.43 : Earth block Module

Source: **Source**: Zhang, C. (n.d.). *Block-Machine*.

8. CASE STUDIES:

8.1. NATIONAL CASE STUDY:

8.1.1. NAVAJYOTI KENDRA:

8.1.1.1. Introduction:

Nava Jyoti Kendra is a day care center of training, support and guidance for the intellectually disabled children and the guardians and the parents of such children's which was opened by an American social worker in 1978 with three boys and two girls. The center is now run by the Sisters of Charity of Nazareth with the mission to educate mentally handicapped children in Nepal so they can be independent and happy.

Time of pickup:

1 school bus

8-10 a.m. around the ring road periphery

Care Centre time: 10am-3pm

Age Range:

5-25 years

Age limit upto 25 years of age

8.1.1.2. Target Group:

- Special needs children – DS, Autism, Cerebral Palsy, Behavioral Problem, Mentally retarded
- No wheelchair accessible

8.1.1.3. User Group:

- 72 students (Around 26 students with DS)
- 8-9 teachers
- 2-Occupational Therapist
- 1-Physiotherapist
- 1-caretakers

- 2-4 Sisters

8.1.1.4. Location/Accessibility:

The centre is located in Baluwatar, Kathmandu.Thecentre is located in the residential area of lazimpat area and is placed at very quiet place. The centre has ease access to hospitals nearby.

Figure 8.1 : Location Map

8.1.1.5. Design Analysis:

LEGEND :

Children quarter

Sister quarter

Training Hall /Parking

Softscape

Figure 8.2 : Master Plan

8.1.1.6. Circulation:

The circulation is linear simple and easy.

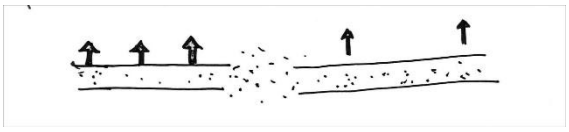


Figure 8.3 : Circulation Pattern

8.1.1.7. Zoning:

The zoning is done by segregating the children quarter and sister's residence quarter and sister's training hall.

The landscape design is mostly hardscape with paved block. It contains small play area with swings,slides and softscapes.

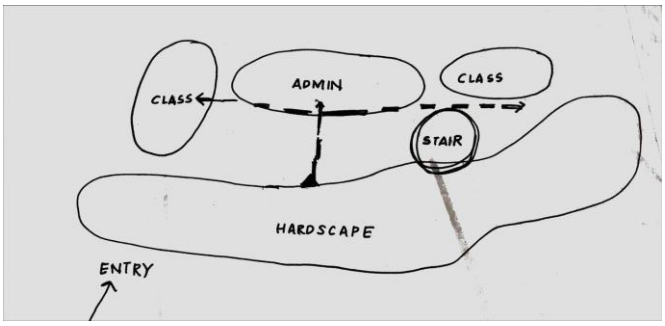


Figure 8.4 : Zoning Diagram

LEGEND :

Class

Therapy spaces

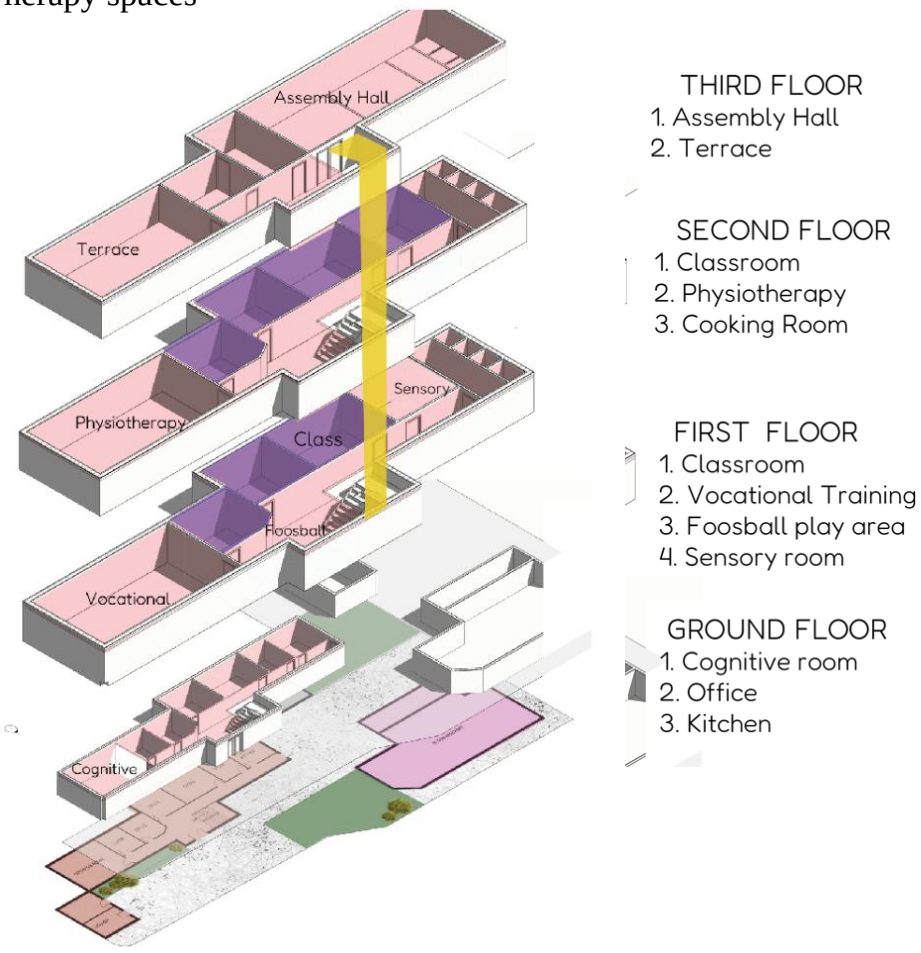


Figure 8.5 :Axo-diagram

8.1.1.8. Interior Gallery:

The interior space does not have soft flooring. The classrooms however have colorful furniture layout.The interior space contains of hard and sharp edges.

Figure 8.6 : Classroom

Figure 8.8 : Cognitive Room

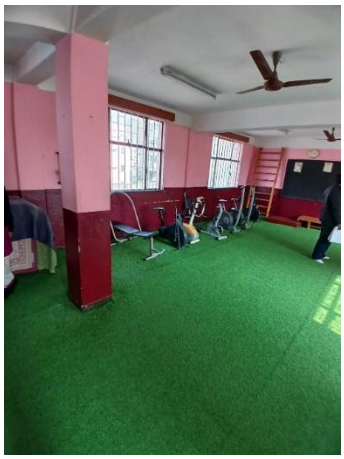


Figure 8.7 : Physiotherapy room

Figure 8.11 : Vocational Room

Figure 8.10 : Assembly Room

Figure 8.9 : Corridor used as playspace

8.1.1.9. Exterior Gallery:

Figure 8.13 : Exterior View of School Block

Figure 8.12 : Exterior of Caretakers Block

8.1.1.10. Positive Aspect:

- Physiotherapy and Cognitive Therapy Spaces are provided
- Simple and Linear Circulation
- Dedicated zone for caretaker and children block

8.1.1.11. Negative Aspect

- No wheel chair accessible
- No use of colors ,material and textures
- No provision of calm room

8.1.1.12. Inferences

- Use of simple and linear circulation
- Therapy spaces are to be provided
- Calm rooms are to be provided for every classroom.

8.1.2. DOWN SYNDROME SOCIETY NEPAL (DSSN):

8.1.2.1. Introduction:

Satyam Day care centre (DSSN) is a progressive center with a lot of activity goal oriented practices which resulted in performances.

- Care Centre time : 10am -3pm
- Age Range : 5yrs – 28yrs

8.1.2.2. Target Group:

- Down Syndrome Children

8.1.2.3. Users Category:

- 28 children with Down syndrome
- 6-8 caretakers

Figure 8.14 : Location Map

8.1.2.4. Location / Accessibility:

The site is located in KapurdharMarg,Lazimpat. It is located in the mixed use building area and is quite and peaceful.

8.1.2.5. Design Analysis:

The centre has no separate circulation for the wheelchair users. The child classroom is placed at the less noise prone zones. The playspace is provided at the very well lit area.

Figure 8.15 : Master Plan

8.1.2.6. Circulation:

The circulation pattern is confusing and complex.

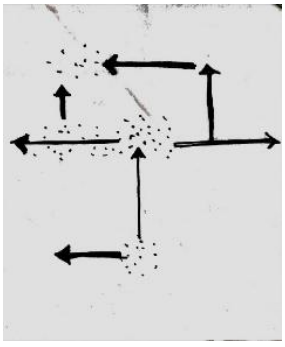


Figure 8.16 : Circulation diagram

8.1.2.7. Zoning:

The zoning of this care centre is done to segregate the Admin and classroom. Dance studio is directly connected to the playscapes.

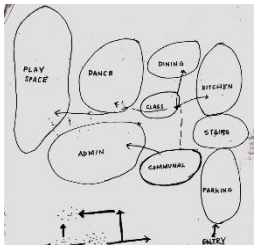


Figure 8.17 : Zoning Diagram

8.1.2.8. Interior Gallery:

- Dance Room:

  The dance room is covered with soft flooring and the largest room in the center. The particular room function as story telling, music, communication room for the down syndrome children. The room is well lighted.

- Dark Room:

Figure 8.18 : Dance Room

Figure 8.20 : Dark Room

Figure 8.19 : Classroom

- Classroom:

  The centre consists of only one classroom.The classroom is connected to the dark room.

- Dining Room:

  The dining room consists of different dining chair consisting of bar chair. This is intentionally done to give them the hospitality training.

- Activity Room:

Figure 8.22 : Activity Room

Figure 8.21 : Dining Room

8.1.2.9. Exterior Gallery:

- **Playspace:**

Figure 8.23 : Playspace

- **Parking and Accessibility:**

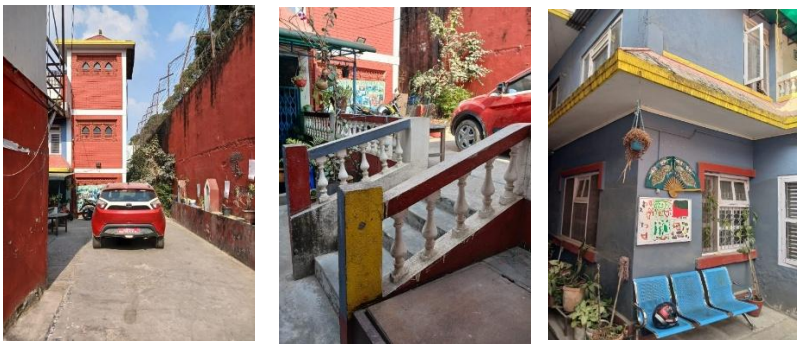


Figure 8.24 : : Exterior Accessibility

8.1.2.10. Positive Aspects:

- Focused majorly on down syndrome children
- Direct connection of clasrrom to quiet room
- Has soft playspace

8.1.2.11. Negative Aspect:

- No proper facility of classroom
- No wheelchair accessibility
- No therapy zones

8.1.2.12. Inferences:

- Spatial connection from classroom to quiet room

8.1.3. CCID NEPAL:

8.1.3.1. Introduction:

Centre for Intellectually disabled Nepal is a small organization that uses local and international resources to safeguard the health and well-being of physically and mentally underprivileged disabled children and offers them education, shelter, food, and vocational tools to enable them to run their lives smoothly in Nepali society.

- Time of pickup: No institution vehicle
- Care centretime : 10am -3pm
- Age Range:2-25yrs: No age limit

8.1.3.2. Target Group:

- Special needs children – DS, Autism, Cerebral Palsy, Behavioral Problem, Mentally retarded
- No wheelchair accessible

8.1.3.3. Users Category:

- 22 students (Around 15 students with DS)
- 4-Teachers/Caretakers

8.1.3.4. Location /Accessibility:

The centre is located in Baneshwor,Kathmandu.

Figure 8.25 : Location Map-CCID Nepal

8.1.3.5. Design Analysis:

The building ground floor is the rental space taken by the CCID Nepal for the intellectually disabled children. The institution has only one class and one dining space for the children

It has a separate dance room and Tv room for the children for entertainment but not frequently used due to the tin-roof structure.

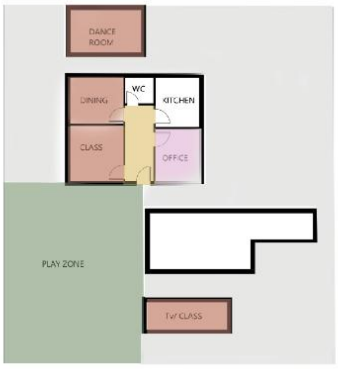


Figure 8.26 : : Master Plan

8.1.3.6. Circulation:

The circulation pattern around the space is simple and linear.

8.1.3.7. Interior Gallery:

Figure 8.27 : : Classroom/Therapy Space

Figure 8.29 : Dining Room

Figure 8.28 : : Kitchen

8.1.3.8. Exterior Gallery:

Figure 8.30 : Outdoor Playspace

8.1.3.9. Positive Aspects:

- Simple Circulation

8.1.3.10. Negative Space:

- No therapy spaces
- No dedicated classroom
- No facility or provisions provided

8.1.3.11. Inferences:

- Therapy space and amenities are to be provided.

8.2. INTERNATIONAL CASE STUDY:

8.2.1. CAIRNSFOOT SPECIAL NEEDS SCHOOL:

8.2.1.1. Introduction:

The vision for the project was to create an environment that both shelters and challenges students. Shelter being at the heart of human need for safety and challenge being key to a child's development. By integrating these ideas into play, over time students develop the confidence and skills to reach their full potential. Creating environments with a human focus is core value of the NBRS team.

Target Group – Special needs children – Severe- Moderate Intellectually challenged students

No. of users –

8.2.1.2. Location / Accessibility:

Cairnsfoot School is in Brighton-Le-Sands, Australia, and it is considered to be in a great position because it is close to the sea and to some beneficial and functional areas such as gardens, as well as being in a residential area.

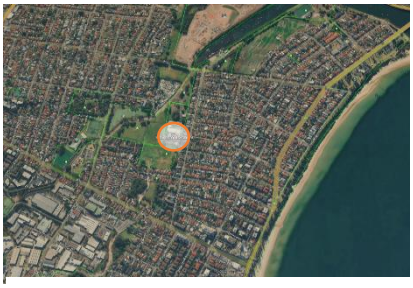


Figure 8.32 :Availability of hospitals around school periphery

Figure 8.31 :Residential area around the school periphery

8.2.1.3. Climate :

Brighton-Le-Sands, Australia experiences a Mediterranean climate with warm, dry summers and mild, wet winters, characterized by mostly sunny skies, moderate temperatures, and occasional rain throughout the year; perfect for beach activities with average summer highs around 26°C (79°F) and winter lows around 10°C (50°F).

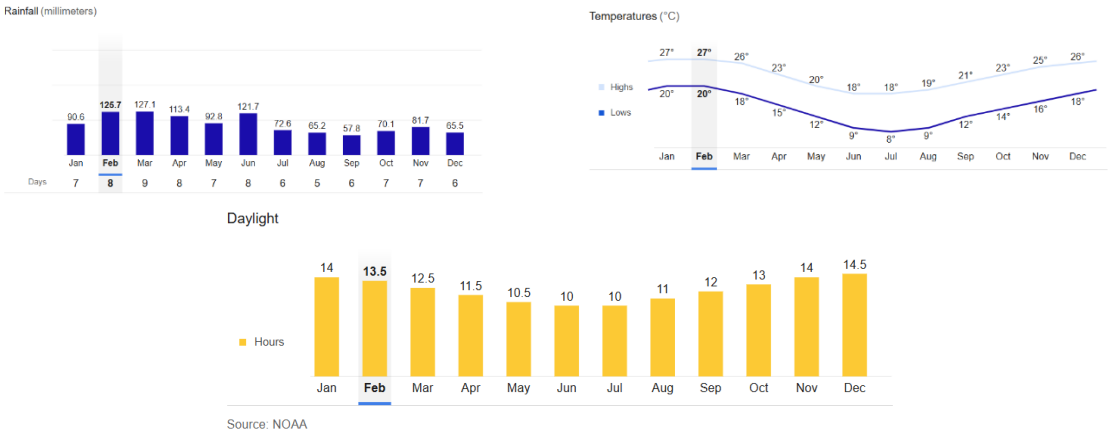


Figure 8.33 : Climate Analysis of the area

8.2.1.4. Design Analysis:

Concept:

The design concept for the school, particularly in the landscaping of the playground, was to create an environment that intersects the ideas of shelter & challenge. Shelter is at the heart of the human need for safety, while challenge is key to a child's development. By integrating these ideas into play, over time students develop confidence and skills to reach their full potential.

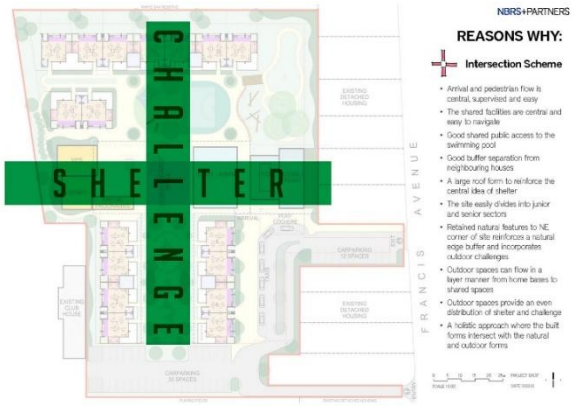


Figure 8.34 :Design Conceptualization

Planning:

Planning of the site allowed arrival and pedestrian flow to be centralised and supervised with easily accessible shared facilities. A large roof forms to reinforce the central idea of shelter and creates an all-weather outdoor learning environment.

The **canopy** represents the comforting safe definition of shelter. The central canopy is large enough to contain the whole school community and provides a new heart of the school where children of all ages can meet and play.

The **idea of shelter** in a physical sense provides protection through the built form, which gently shapes outdoor courtyard spaces. Learning spaces create a sense of reassurance, allowing for 'escape spaces', where children who feel overwhelmed can find a sensory haven, yet always maintaining sight lines for teachers.

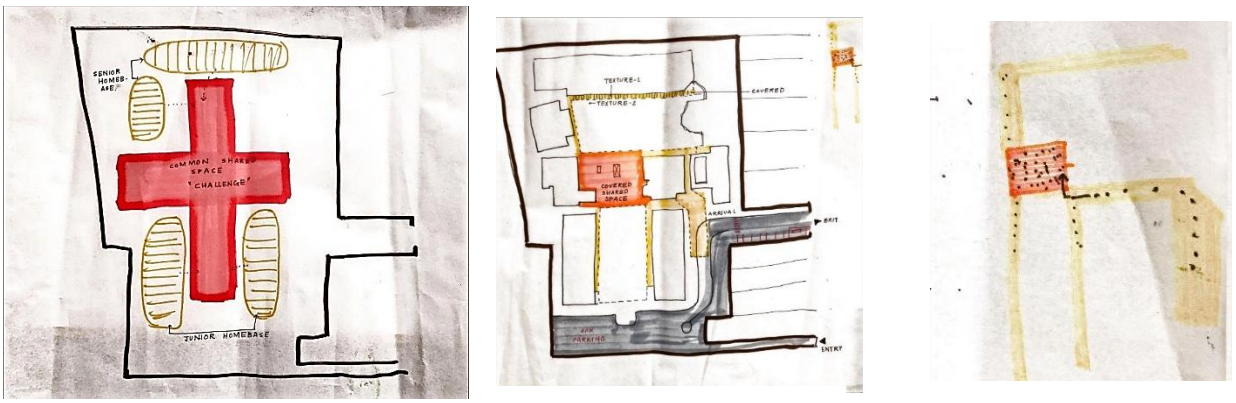


Figure 8.35 : Planning Analysis

8.2.1.5. Zoning:

The zoning is done by segregating the function from the neighbourhood by the use of buffer spaces that include parking and the landscape forms.The program was then divided into junior and the senior home base having the central space in between those spaces.

Figure 8.36 : Zoning Analysis

The junior homebase is provided a courtyard of its own and the senior homebase has a courtyard of its own, These individual courtyard of the homebases act as the challenging ground for the children.

The homebased are provided with the hierarchy of the spaces such as withdrawal zone, private zone, transition zone, public zone and green zones.

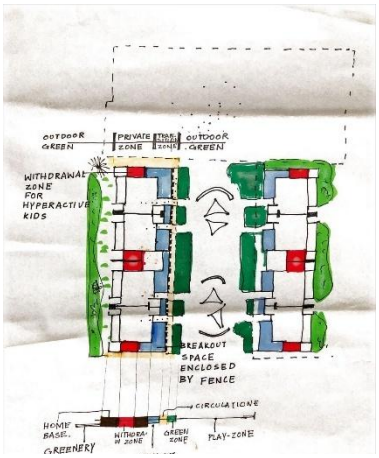


Figure 8.37 : Hierarchy analysis of the space

8.2.1.6. Interior Gallery:

Figure 8.38 : Interior of the classroom

The interior spaces has its own distinct identity characterized by the colors. The flooring provided is of soft matting. The layout of the classroom is flexible.

8.2.1.7. Exterior Gallery:

Outdoor features include water play, climbing hills with tunnel through, achievable balance beams, a bike track, ball court, in ground trampoline and climbing frames. These play features are augmented with socializing and outdoor learning spaces including a herb and vegetable garden, orchard plantings, as well as a sensory garden incorporating stimulating ground textures, and a range of asthma and allergy friendly plant species. These experiences teach children how to extend beyond their perceived limits and provide the opportunity to interact with nature.

Figure 8.39 : Outdoor Play area

Landscape:

- A vibrant play structure with slides, climbing elements, and tunnels offers engaging physical activities, promoting motor skill development.
- The pathways incorporate a mix of textures—wood, stone, and mulch—enhancing tactile experiences for children walking or using mobility aids.
- Canopies provide sun protection, making the space more comfortable and accessible throughout the day.
- A wooden curved structure creates a defined sensory zone, possibly for quiet interaction, storytelling, or auditory play.
- Smooth paved walkways ensure easy movement for wheelchair users, while green spaces and trees create a calming atmosphere.

Figure 8.40 : Play area with natural textures

Figure 8.41 :Non-confrontational communication for the children

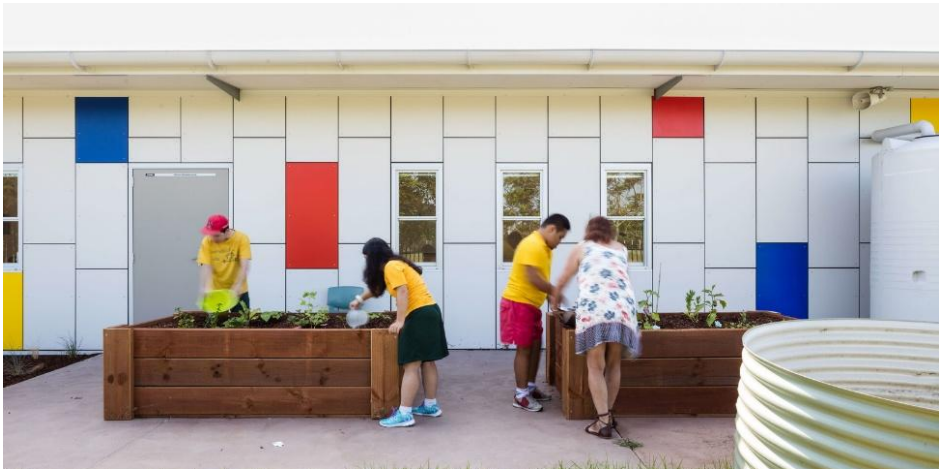


Figure 8.42 : Vegetable farming

Façade Design:

In the background, the school's building features a modern design with a white panel façade accented by bold geometric patches of yellow and blue, reinforcing a playful and stimulating environment. There are also outdoor water stations, suggesting accessibility features for students.

Figure 8.43 : Facade with white panels and colors

Finishing materials :

A range of finishes and textures such as steppingstones, timber balancing logs and textured concrete with stone inlays appeal to students' senses. The inclusion of pedestrian crossings and signage creates a strong connection to the real world.

Navigation and Way-finding:

The design has been carefully crafted to create clarity of navigation, to stimulate and challenge. Wide circulation paths with clearly defined edges have been included to assist sight impaired students. Paths are continuous without dead-ends and coloured pavements have low glare qualities. The inclusion of pedestrian crossings and signage creates a strong connection to the real world.

8.2.1.8. Positive Aspects:

- Simple and rectilinear circulation
- Dedicated primary and secondary block
- Use of Textures and colors
- Playful landscaping elements

- Provision of withdrawal and transitional zone

8.2.1.9. Inferences:

- The hierarchy of zone is a must
- Playful landscaping elements
- Simple circulation is preferred

8.2.1.10. AREA CALCULATIONS :

No. of children accommodated – 107 students enrolled in 17 classes around 6-7 children in one class.

Total site area : 17332 sq.m

Total built up area: 4570 sq.m : 26.36%

Total non-built up area :12762 sq.m

Total parking area : 1310 sq.m : 7.6%

Total landscaping area : 11452 sq.m for shared zone and landscaping : 66%

Table 1: Area Calculation

S.N	Type of Spaces	No. of rooms	Area in terms of sq.m	Percentage area
	Junior Homebase	8	188 sq.m per class including withdrawal zone, toilet, storage and transition zone. Classroom area only – 102 sq.m Total: 1508 sq.m	8.7%
	Senior Homebase	9	1701 sq.m i.e. 189 per class	9.8%
	Admin	1	431 sq.m	2.48%
	Multipurpose Space	1	461 sq.m	2.65%
	Swimming pool	1	212 sq.m	1.22%
	Plant storage	1	256 sq.m	1.47%
TOTAL BUILT UP AREA			4570 SQ.M	26.36%
	Landscaping area		11452 sq.m	66%

8.2.2. ST.COLETTA SCHOOL

8.2.2.1. Introduction:

St. Coletta was founded in 1959 by a couple with a child diagnosed with Down Syndrome. As they had history dealing with the struggle of finding an educational system that worked for their child, they decided to establish the school as a special education charter which serviced and educated children with severe or multiple disabilities.

- Target Group : Children with down syndrome and other intellectual disability
- No. of users :285 no. of children aged 3-22
- Location: Washington,US
- Architects: Michael Graves
- Year: 2006
- Area: 30000 sq.m

8.2.2.2. Location/Accessibility :

St. Coletta School for Exceptional Children is located on a multi-block site in an area between an institutional zone, the Armory, and a residential community.

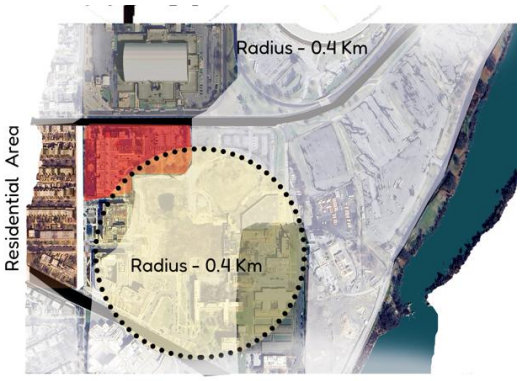


Figure 8.44 :Location Map

8.2.2.3. Design Analysis:

Embracing Postmodernism in the 1980s allowed Graves to introduce classical elements into his designs while also privileging playfulness and a sense of humor through colorful and highly geometric facades. it is one large, two-storied building with two different facade treatments. This is because the building responds to two different architectural contexts, echoing the elemental forms of the rowhouses on 19th Street and the larger geometric pavillions on Independence Avenue clad in Ludowici-glazed tile. The former exhibit dark red and cream color faux bricks while the latter feature large volumes in bright colors: blue, orange, yellow, red, and green.

All fittings are also accessible to students who use wheelchairs as well as those who stand. On the exterior, the “houses” also feature private gardens and play spaces, where students produce and stage outdoor performances.

Way – finding :

Internally, the houses front onto a double-height common space called the "village green." The interior of each house is painted a different color, which becomes a way-finding device and also helps the students identify with their "community," a vital part of the school's teaching philosophy.

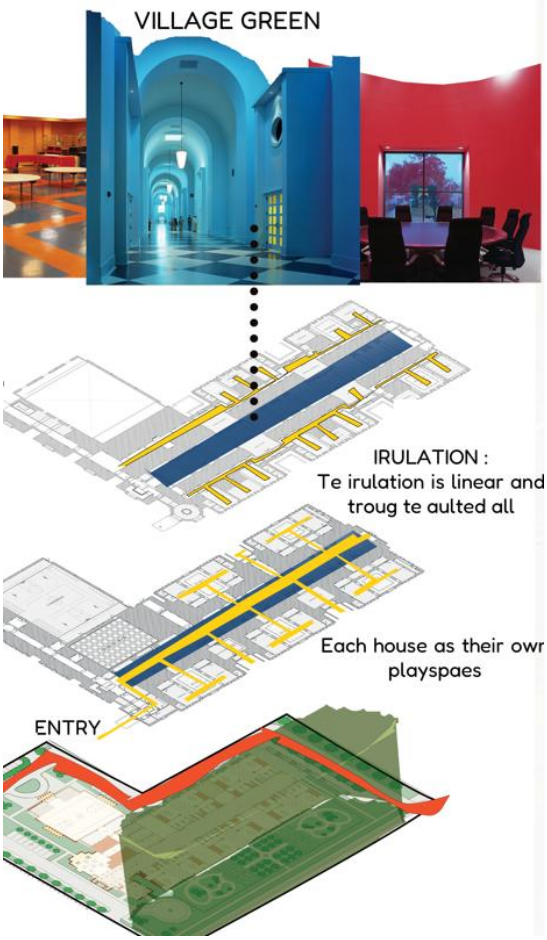


Figure 8.45 : Axo-diagram

8.2.2.4. Circulation:

The circulation is easy. The circulation is done through the central passage and through which different communal halls can be reached.

8.2.2.5. Zoning:

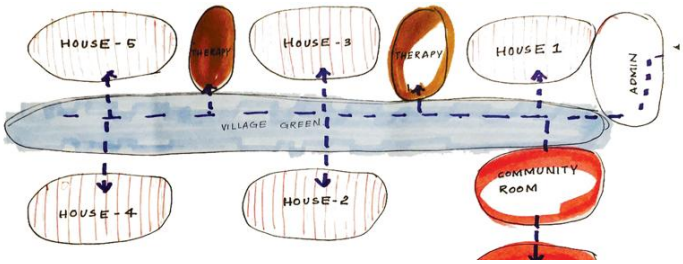


Figure 8.46 : Zoning diagram

8.2.2.6. Interior Gallery:

Figure 8.47 : Color character of the room

8.2.2.7. Exterior Gallery:

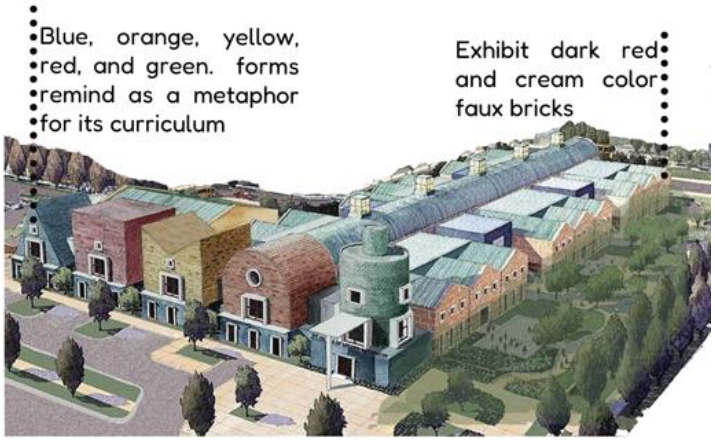


Figure 8.48 : Geometrical shapes on facade

8.2.2.8. Positive Aspects:

- Focused majorly for the down syndrome children
- Simple and linear circulation
- Provision of therapy nad sports spaces
- Use of geometric shape

8.2.2.9. Inferences:

- Using simple geometry in the façade
- The concept of village green that is of central linear space.
- Provision of therapy spaces

8.2.3. AL MUHAIDIB DOWN SYNDROME CENTER: HIBA

8.2.3.1. Introduction:

An integrated and specialized government center has been established to provide educational and rehabilitation programs for children with Down syndrome. This center has been built in accordance with the highest international standards that focus on creating exemplary facilities for individuals with disabilities.

- Target Group – Down Syndrome Students.
- No. of users –
- Location: Al Khobar, Saudi Arabia
- Architects: Omran Architect
- Year: 2014
- Area: 15000 sq.m

Figure 8.49 : Location Map

8.2.3.2. Location / Accessibility:

The centre has close proximity to the residential area and close to the hospital.

8.2.3.3. Design Analysis:

Facilities within the "Hiba" Center include classrooms equipped with state-of-the-art interactive technology, clinics, and medical devices. These facilities provide rehabilitation and educational services, such as sensory, physical, and occupational therapy, aimed at enhancing the physical abilities and overall care of the students. Moreover, the center features a specialized library to support reading skills and features various play areas.

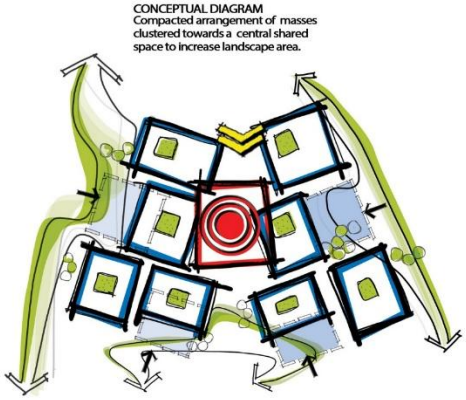


Figure 8.50 : Conceptual Diagram

Designed to provide a sustainable and health-wise Environment for children with Down syndrome. The masses are clustered around a positive central shared space, with negative space forming landscape areas. A modern approach is used in the design style of the building whilst preserving the traditional use of materials The use of louvers, inner courtyards and green spaces all enhance the quality of space and learning .the playful use of color in the building interior creates a fun and joyful learning experience.

The Center Comprises Three Main Sections:

- The Early Intervention Department - Kindergarten (KG 1 - KG 2 – Preparatory / Nursery)
- The Boys Section - Elementary Stage (First Grade - Second Grade - Third Grade)
- The Girls Section - Elementary Stage (First Grade - Second Grade - Third Grade - Fourth Grade)

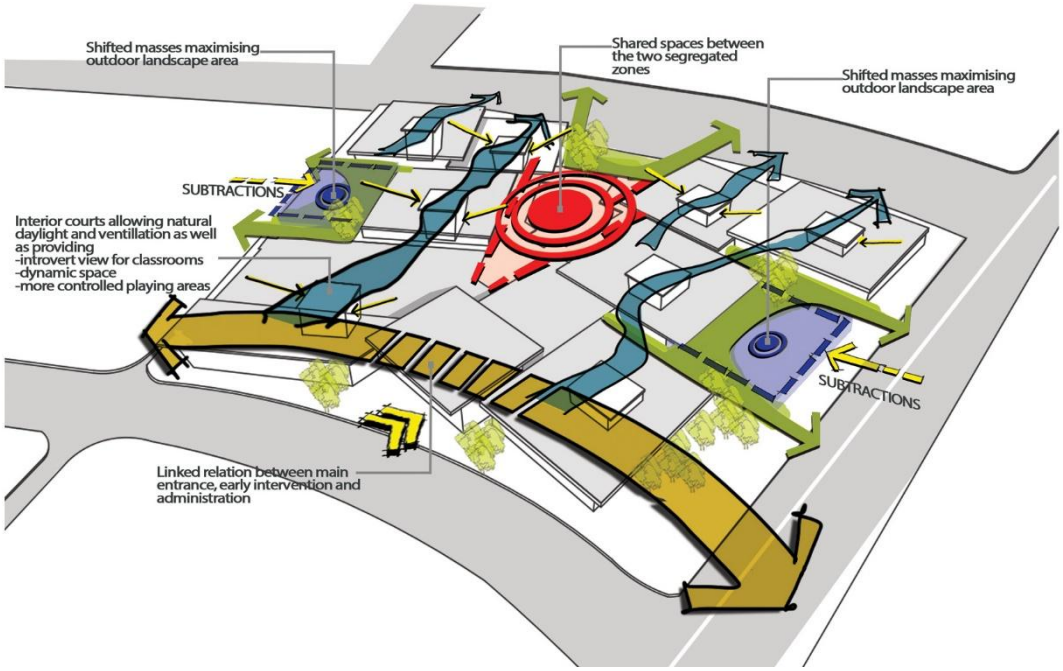


Figure 8.51 : Mass distribution

8.2.3.4. Circulation:

The circulation is simple and rectilinear.

Figure 8.52 : Circulation flow

8.2.3.5. Zoning:

The zoning is done by segregating the boys and the girls section that is combined by the shared spaces. The individual section is provided the small courtyard spaces in between.

8.2.3.6. Exterior Gallery:

Figure 8.53 : Use of louvres in exterior

8.2.3.7. Area Calculation:

- No. of children accommodated – 34 classes so around 200-250 childrens
- Total site area : 15,000 sq.m
- Total built up area: 6200 sq.m : 41.33%
- Total non-built up area : 8800 sq.m for landscaping areas :58.67%

8.2.3.8. Positive Aspects:

- Small pocket spaces are provided for green space.
- Provision of therapy spaces in the centre
- Use of louvres,colors,textures.

8.2.3.9. Inferences:

- The green pocket spaces facilitate for playful kid space.
- Common facility placed at the centre of the design.

8.2.4. DAMIN SPECIAL SCHOOL:

Figure 8.56 : Site plan of Damin School

8.2.4.1. Introduction:

- Location: Ning Bo Shi,China
- Architects: Real Architects
- Year: 2023
- Area: 1500 sq.m

8.2.4.2. Landscape Analysis:

Figure 8.55 : The natural Garden

Figure 8.54 : The challenge Ground

8.2.4.3. Inferences:

- Use of garden to stimulate the senses
- Use of natural elements to calm and relax
- Use f challenging landscapes to challenge the children.
- Use of textured walls

8.3. COMPARATIVE TABLE:

Table 2: Comparative table of international case study

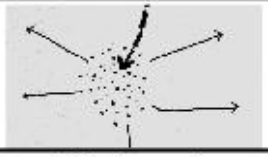
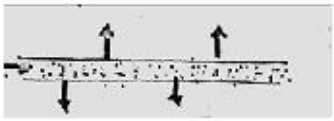
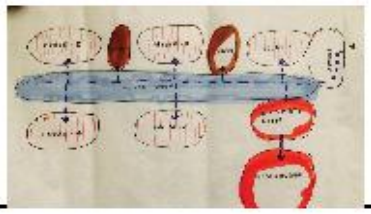
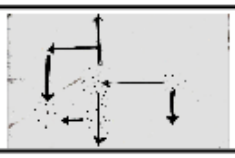
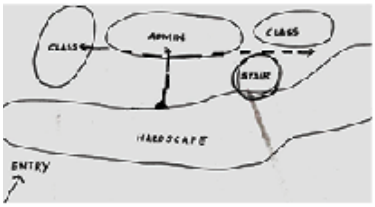
	INTERNATIONAL CASE STUDY	
CRITERIA	CAIRNSFOOT SPECIAL SCHOOL	ST. COLETTEA SCHOOL
1. INFO :	Location : Australia Total Area : Use : Special needs child Storey: 1 storey Topography : Flat	Location : USA Total Area : Use : Down Syndrome Children Storey: 3 storey Topography : Flat
2. SITE :	Close proximity to residence and hospital premises	Close proximity to residence and hospital premises
3. CIRCULATION PATTERN		
3. DESIGN CON-	Concept of Shelter and Challenge	Concept of Village Green
5. ZONING		
6. PROGRAM - AREA ANALYSIS	No. of Children - 107 Total Site Area - 17332 sq.m 	No. of Children - 285
7. GALLERY		

Table 3:Comparative table of national case study

NATIONAL CASE STUDY		
CRITERIA	NAAJYOTI KENDRA	DSSN NEPAL
1. INFO :	Location : Baluwatar Total Area : Use : Special Needs Children Storey: 4 storey Topography : Flat	Location : Lazimpat Total Area : Use : Down Syndrome Children Storey: 2 storey Topography : Flat
2. SITE :	Close proximity to residence and hospital premises	Close proximity to residence and hospital premises
3. CIRCULATION PATTERN		
3. DESIGN CON-		
5. ZONING		
6. PROGRAM - AREA ANALYSIS	o. of Children -72 : 26-DS	No. of Children : 28-DS
7. GALLERY	HBA DOWN SYNDROME CENTER o. of Children - 200-250 Children otal Site Area - 15000sq.m	

9. SITE ANALYSIS:

9.1. SITE SELECTION CRITERIA:

The project main purpose is to provide the children with the holistic and healing environment for the children to grow learn and strive them to be better.

The criteria for the site selection was derived from the precedent studies done previously. In overall, the appropriate selection for the site seems to be more around peaceful places with connection to nature rather than the hustling and bustling noise and vibrant places of the city, The site had to have close proximity to the hospitals area nearby and must be in connection with the residential neighbourhood. Several sites were considered and studied and finally the site was finalized based upon above mentioned criteria.

Major Site Requirements:

- Close proximity to hospitals.
- Close proximity to residential areas away from the hustling and bustling of the city
- Peaceful environment
- Accessible from the ring road areas

9.2. LOCATION:

The proposed site for the Growth Sanctuary for Down Syndrome Children is located in Tokha, a municipality in the northern part of Kathmandu District, Nepal. Positioned between Bhutkhel Park to the south and Tokha old settlement to the northeast, the site lies in a semi-urban context that offers both natural serenity and access to community infrastructure.

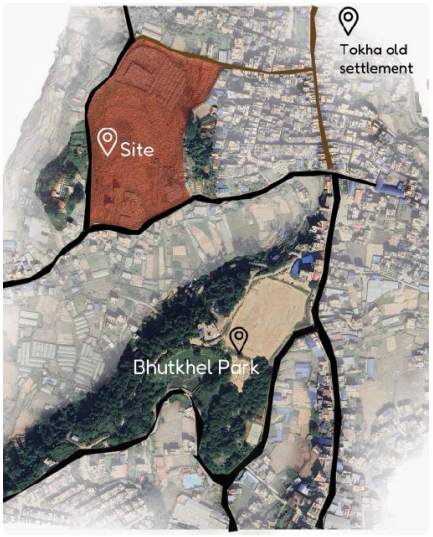


Figure 9.1 : Location Map of Site

The area surrounding the site consists of a mix of agricultural land, low-rise residential settlements, and public open spaces, providing a balanced interface between built and natural environments.

- Site Area: 22039 sq.m
- Topography :Countour having the highest level of 6m

- Orientation: South Facing Plot
- Longitude: 27°46'00.2"N
- Latitude :85°19'39.1"E
- Altitude: 1,350 meters (4,429 feet) above sea level.

9.3. SITE JUSTIFICATION:

The selected site in **Tokha, Kathmandu**, meets the essential criteria for the Growth Sanctuary for Down Syndrome Children**,** focusing on creating a peaceful, healing, and inclusive environment.

- It lies close to major **hospitals** for accessible healthcare.
- Surrounded by **residential neighborhoods**, it promotes community integration.
- The site offers a **calm, nature-connected setting**, ideal for therapy and learning, away from city noise.
- Proximity to **Bhutkhel Park** enhances the potential for outdoor healing spaces.
- Well-connected to the **Ring Road**, it ensures easy access from across the valley.

This blend of tranquility, accessibility, and contextual relevance makes Tokha an ideal location for the project.

9.4. SITE PROXIMITY ANALYSIS:

9.4.1. Hospital Proximity:

The site has easy accessible to the major hospitals like Grande International hospital and government hospital like Teaching hospital at the radius about 2-5 km.

9.4.2. Surrounding Proximity:

The site is near to the old settlement of Tokha and around the newly built modern residential colonies. The architectural character arounf the surrounding is mixed from traditional to contemporary architecture.

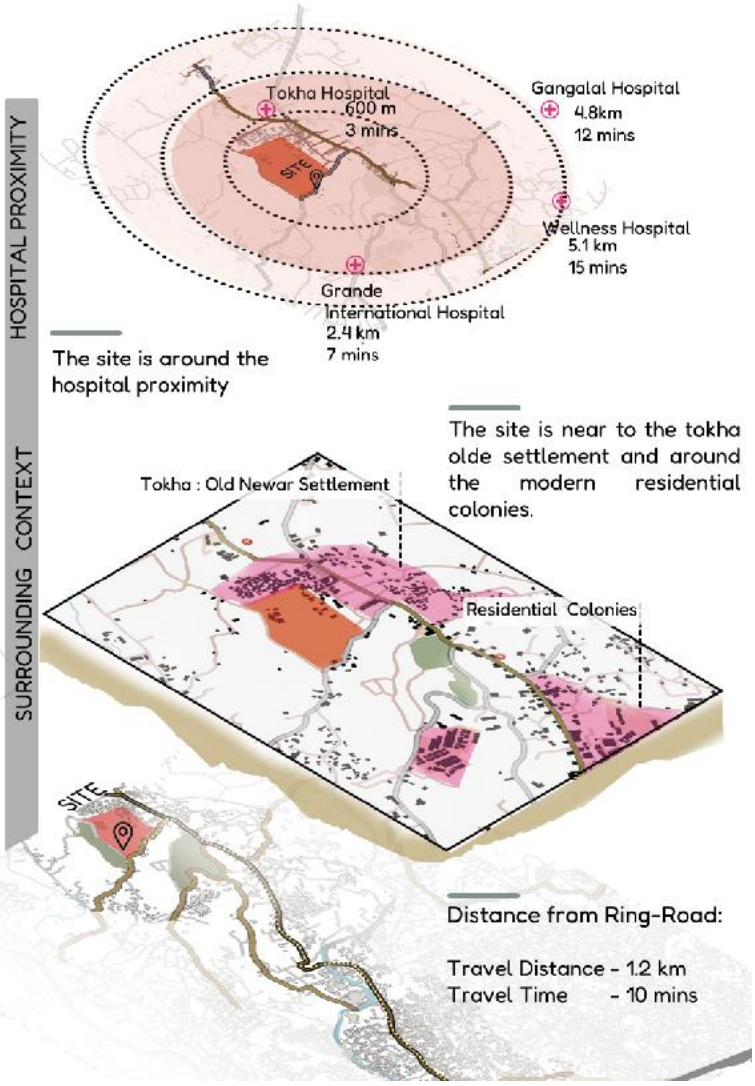


Figure 9.2 : Site Proximity Analysis

9.5. ACCESSIBILITY:

Thse site is about 1.2 km from the ring road area. The site can be reached through the public vehicle with only 2-4 walking distance from the bus stop.

The site is surrounded by 3 roads the primary road of 8m width in south and west direction and secondary road of width 6m in north **direction.**

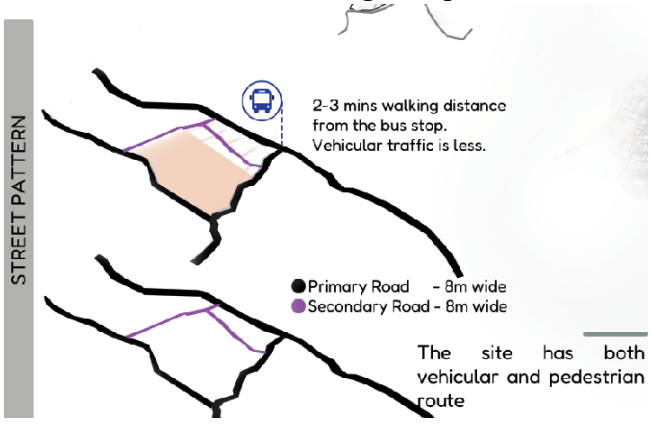


Figure 9.3 :Street Pattern of site

9.6. CLIMATE:

Tokha experiences a temperate climate with four distinct seasons, making it suitable for a healing and learning environment. Summers (May to August) are warm and humid, with temperatures ranging from 25°C to 32°C and frequent monsoon rains.

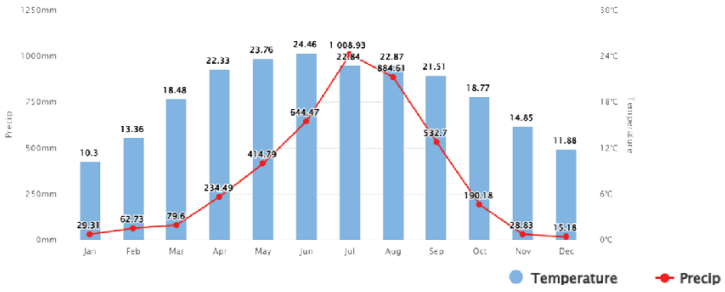


Figure 9.4 : Temperature and precipitation chart of Tokha

Autumn (September to November) brings pleasant, dry weather with clear skies and temperatures between 18°C and 27°C, ideal for outdoor activities. Winters (December to February) are cool and dry, with temperatures dropping as low as 2°C, though daytime sunshine maintains comfort. Spring (March to April) offers mild temperatures. Overall, the moderate climate supports year-round use of outdoor and semi-open spaces, with monsoon precautions and passive solar design considered in planning.

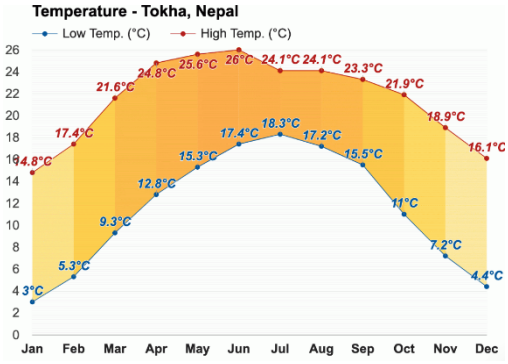


Figure 9.5 : Temperature Chart of Tokha

Though the climate are not extreme, The slight variation of climate has adverse effect on the children so the humidity levels of the building relation with sunspace and wind factors are to be considered.

9.7. SITE HISTORY:

The site has been used as an agricultural land. The site close proximity has changes undergoing housing development and new residences.

9.8. NATURAL FEATURES:

The site is surrounded by parks and natural greeneries - Peaceful environment

The site in Tokha is characterized by its gentle terrain with minor contour variations, offering opportunities for layered

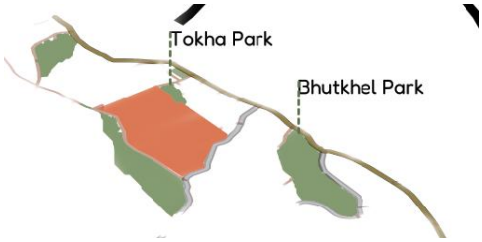


Figure 9.6 : Greeneries around the site

landscaping and sensory pathways. It is surrounded by natural greenery and open agricultural fields, which help create a calm and refreshing environment ideal for therapeutic purposes.

9.9. MAN-MADE FEATURES:

The frontal section of the site, facing the road, is currently occupied by a block manufacturing shelter, indicating semi-industrial use. This existing structure reflects limited development on the site and suggests a potential for reuse or clearance depending on the design strategy. The presence of this activity also ensures that the site is already accessible and has some level of infrastructural connectivity.

9.10. UTILITIES:

9.10.1. Electric Poles:

The site consists of electrical poles in the roads oriented in the south. Telecommunication and internet accessible.

Figure 9.7 : Block manufacturing Shelter

9.10.2. Drainage:

No facility of drainage in the site area

9.10.3. Roads:

Although the site is accessible from nearby roads, the existing road infrastructure is in poor condition, with uneven surfaces and inadequate maintenance

Figure 9.8 : Presence of Electric Poles

9.11. SUN PATH DIAGRAM:

The site is south-facing, allowing for maximum exposure to natural sunlight throughout the day. With no major obstructions in the southern direction, the site benefits from excellent solar access—ideal for creating well-lit, warm interior spaces and incorporating passive solar design strategies that enhance comfort and reduce energy consumption.

Figure 9.9 : Site Analysis Diagram

9.12. SENSORY:

9.12.1. Noise:

The site is accessible from 3 roads so the vehicular noise from the road might be intense for the site.

9.12.2. Views:

Figure 9.10 : View toward south

Figure 9.12 : View toward West

Figure 9.11 : View toward North-East

9.13. BUILDING BYE LAWS

- Zone: Urban Expansion Zone
  Ground coverage : 50%
  Setback :3m from site boundary
  FAR:3

9.14. SWOT ANALYSIS

9.14.1. Strengths (S)

- Peaceful environment – appropriate distance from residential settlements and hospitals
- Natural greenery surrounds the site, promoting a healing atmosphere
- Good vehicular accessibility from multiple directions
- Low pollution and traffic congestion
- Unobstructed access to sunlight from the south-facing orientation

9.14.2. Weaknesses (W)

- Roads around the site are still under construction
- Lack of proper drainage infrastructure
- Noise pollution from nearby roads
- Irregular site shape creates challenges in planning and increases negative/unused spaces

9.14.3. Opportunities (O)

- Potential to create buffer zones and green belts to reduce noise and enhance tranquility
- Scope for integrating sustainable drainage and passive design solutions
- Site has minimal contour variations – easier for construction and accessibility
- Unobstructed views can be used to create visually open and welcoming spaces

9.14.4. Threats (T)

- Ongoing transformation from agricultural to semi-industrial land
- Risk of losing green and open spaces due to urban sprawl
- Potential for dense and haphazard settlements developing around the site
- Risk of compromising natural character and environmental quality if not planned sensitivel

9.15. SITE DRAWINGS

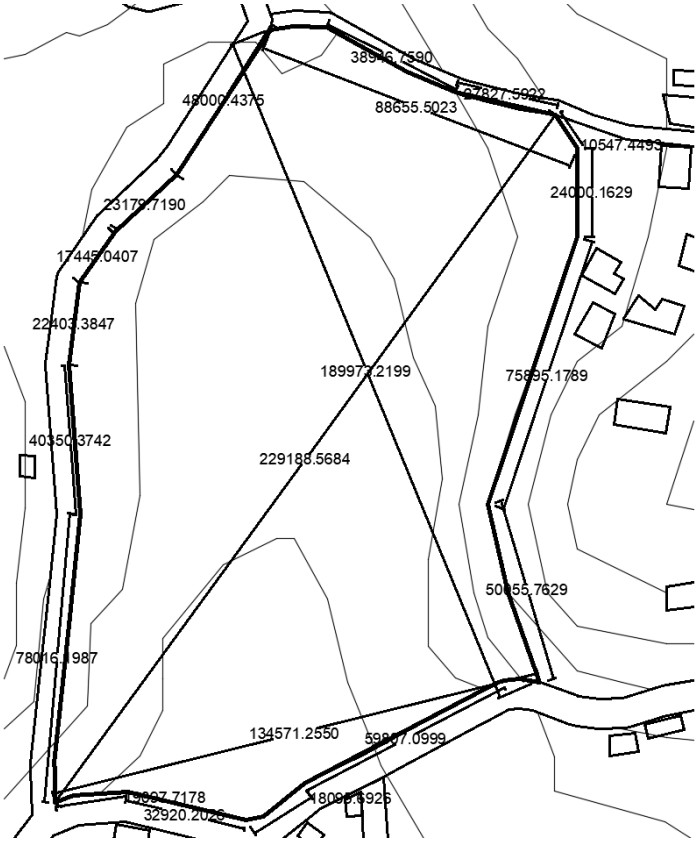


Figure 9.14 : Site drawing

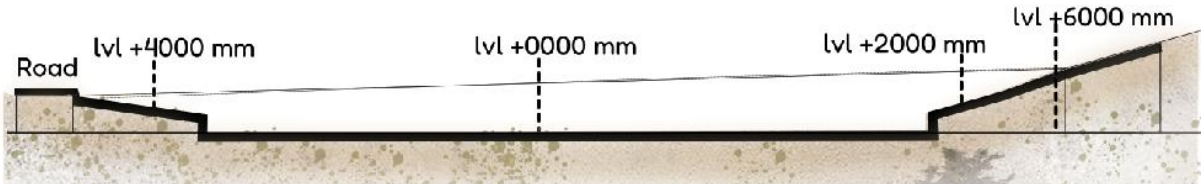


Figure 9.13 : Site Section X-X

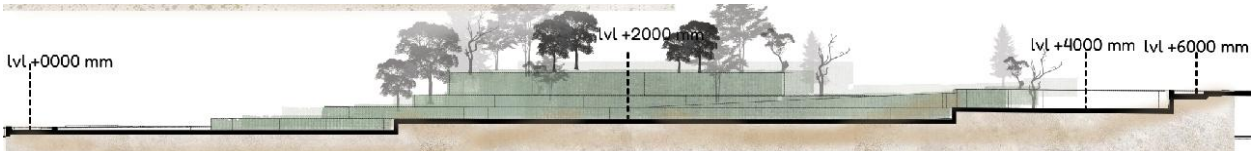


Figure 9.15 : Site Section Y-Y

10. PROGRAM FORMULATION:

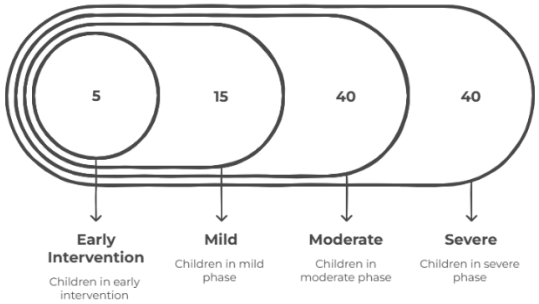


Figure 10.10.1 : Number formulation

10.1. CHILDRENS:

Table 4: Calculation of Children

Municipality	Intellectual Disabilities	Down Syndrome Estimate (15%)	Adjusted for Distance (15% for Kathmandu, 10% for others)
Tokha (Kathmandu)	28	4	4
Kathmandu Metropolitan City	335	50	50
Budhanilkantha (Kathmandu)	46	7	7
Tarakeshwar (Kathmandu)	41	6	6
Kageshwori (outside Kathmandu)	24	4	2 (10% reduction)
Kirtipur (outside Kathmandu)	37	6	3 (10% reduction)
Gokarneshwor (Kathmandu)	44	7	7
Chandragiri (outside Kathmandu)	60	9	5 (10% reduction)
Dakshinkali (outside Kathmandu)	12	2	1 (10% reduction)
Nagarjun (outside Kathmandu)	34	5	3 (10% reduction)
Shankharapur (outside Kathmandu)	22	3	2 (10% reduction)
Total			**90**

No. of children at day care : 90 childrens

No. of children : 10 childrens to be accommodated

TOTAL NO. OF CHILDREN = 100 childrens

Assuming Since more amount of children is seen in severe and moderate phases considering that

- Severe - 40
- Moderate - 40
- Mild – 20

10.2. STAFFS :

- No. of teaching staffs : 18 Staffs = 20 staffs
- 1 per 5 childrens
- No. of helpers : 18 helpers (1:5)
- No. of other staffs : 5-10 staffs
- TOTAL NO. OF STAFFS : 48 Staffs
- TOTAL NO, OF STAFFS TO BE ACCOMODATED : 5-10 Staffs (1:2)

Table 6 : Admin Block Program

S.N.	PROGRAMS	AREA PER UNIT	NO. OF UNITS	TOTAL SQ.M
1.	Reception	131	1	131
2.	Consultation Room	30	2	60
3.	Management Office	49	1	49
4.	Admin Office	20	1	20
5.	Store	10	2	20
6.	Observation Deck	34	1	34
7.	W/C	18	2	36
8.	Lobby	37	1	37
9.	Executive Office	29	1	29
10.	Director Office	18	1	18
11.	Working Cubicle	29	1	29
12.	Director Office	12	1	12
13.	Meeting Room	29	1	29
14.	Terrace	23	1	23
TOTAL AREA (including circulation and wall area)		621 sq.m		

Table 5 : Parents Block Program

S.N.	PROGRAMS	AREA PER UNIT	NO. OF UNITS	TOTAL SQ.M
1.	Lobby	116	1	116
2.	Meeting Room	40	1	40
3.	Training Hall	62	1	62
4.	Workshop	65	1	65
5.	W/C	15	1	15
TOTAL AREA (including circulation and wall area)		356 sq.m		

Table 7 : Therapy Block Program

GROUND FLOOR

S.N.	PROGRAMS	AREA PER UNIT	NO. OF UNITS	TOTAL SQ.M
1.	Calming Entrance	113	1	113
2.	Communal Hall 1	41	1	41
3.	Class	25	2	60
4.	Quiet Room	4	2	8
5.	Sanitary	21	4	55
6.	Physiotherapy	50	1	50
7.	Therapist Room	20	1	20
8.	Staff Room	47	1	47
9.	One On One Therapy	12	1	12
10.	Cafeteria	87	1	87
11.	Occupational Therapy	198	1	198
12.	Infant Simulation Area	46	1	46
13.	Music Therapy	84	1	84
14.	Speech Therapy	58	1	58
15.	Hydro Therapy	100	1	100
16.	Changing Room	27	1	27
17.	Womb Space	181	1	181
TOTAL AREA (Including Circulation And Wall Area)		1565 Sq.M		

FIRST FLOOR

S.N.	PROGRAMS	AREA PER UNIT	NO. OF UNITS	TOTAL SQ.M
1.	COMMUNAL HALL 2	58	1	58
2.	CLASS	35	2	70
3.	QUIET ROOM	4	2	8
4.	SANITARY	18	1	18
5.	STORE	50	1	50
6.	THERAPIST ROOM	20	1	20
7.	STAFF ROOM	22	2	44
8.	INFANT SIMULATION AREA	12	2	24
9.	THERAPIST ROOM	87	1	87
10.	STAFF ROOM	198	1	198
11.	MEETING ROOM	46	2	92
TOTAL AREA (including circulation and wall area)		991 sq.m		

Table 8 : Learn Block Program

GROUND FLOOR

S.N.	PROGRAMS	AREA PER UNIT	NO. OF UNITS	TOTAL SQ.M
1.	Playful Entrance	128.54	1	128.54
2.	Painting-Art Therapy	68.1	1	68.1
3.	Spill Out Area	74.5	2	74.5
4.	Class Room	40.28	7	282.57
5.	Cave Spaces	22.5	7	158.6
6.	Sensory Room	55	3	170
7.	Staff Room	54	2	108
8.	Store	34	1	34
9.	Observation Room	10.3	1	10.3
10.	Observation Deck	59.5	1	59.5
11.	Audio-Visual Room	20	1	20
12.	Sanitary	28	4	56.7
13.	Medical Room	47.5	1	47.5
14.	Play Corner	41.9	1	41.9
15.	Staircase	8	2	17.9
TOTAL AREA (including circulation and wall area)		2198.4 sq.m		

FIRST FLOOR

S.N.	PROGRAMS	AREA PER UNIT	NO. OF UNITS	TOTAL SQ.M
1.	Office	58	2	116
2.	Sanitary	21	2	42
3.	Meeting Room	60	2	121
4.	Store	15	2	37
Total Area		767 Sq.M		

Table 9 : Learn Block Program

GROUND FLOOR

S.N.	PROGRAMS	AREA PER UNIT	NO. OF UNITS	TOTAL SQ.M
1.	Playful Entrance	88	1	88
2.	Pottery	48	1	48
3.	Craft Garden	84	1	84
4.	Staff Room	54	1	54
5.	Store	88	1	88
6.	Sanitary		3	44.4
7.	Janitor's Room	16.65	2	33.3
8.	Domestic Science	56	1	56
9.	Hospitality Training /Cafe	146.9	1	146.9
10.	Cafeteria	97	1	97
11.	Lobby	108	1	108
12.	Kitchen -Dining	100	1	100
13.	Clean Staff	29	1	29
TOTAL AREA (including circulation and wall area)		1471.1 sq.m		

FIRST FLOOR

S.N.	PROGRAMS	AREA PER UNIT	NO. OF UNITS	TOTAL SQ.M
1.	Office	58	2	116
2.	Sanitary	21	2	42
3.	Meeting Room	60	2	121
4.	Store	15	2	37
TOTAL AREA		767 sq.m		

Table 10 : Vocational block Program

GROUND FLOOR

S.N.	PROGRAMS	AREA PER UNIT	NO. OF UNITS	TOTAL SQ.M
1.	Playful Entrance	88	1	88
2.	Pottery	48	1	48
3.	Craft Garden	84	1	84
4.	Staff Room	54	1	54
5.	Store	88	1	88
6.	Sanitary		3	44.4
7.	Janitor's Room	16.65	2	33.3
8.	Domestic Science	56	1	56
9.	Hospitality Training /Cafe	146.9	1	146.9
10.	Cafeteria	97	1	97
11.	Lobby	108	1	108
12.	Kitchen -Dining	100	1	100
13.	Clean Staff	29	1	29
TOTAL AREA (including circulation and wall area)		1471.1 sq.m		

FIRST FLOOR

S.N.	PROGRAMS	AREA PER UNIT	NO. OF UNITS	TOTAL SQ.M
1.	Staff Room	46.15	2	92.3
2.	Meeting Room	36.5	2	73.3
3.	Store	9.9	2	19.8
4.	Lobby	60	1	60
5.	Lift	6.9	1	6.9
6.	Living Room	21.9	4	87.8
7.	Bed Room	20	9	180
8.	Wash Room	7.88	5	39.4
9.	Workshop	48	1	48
10.	Janitor Room	32.4	1	32.4
TOTAL AREA (Including Circulation And Wall Area)		1471.1 Sq.		

SECOND FLOOR

S.N.	PROGRAMS	AREA PE UNIT	NO. OF UNITS	TOTAL SQ.M
1.	Store	60.2	1	60.2
2.	Lift	6.9	1	6.9
3.	Living Room	18.267	3	54.8
4.	Bed Room	16	5	78.9
5.	Wash Room	6	2	12.7
6.	Balcony	13.35	4	53.4

7.	Gym	76	1	76
TOTAL AREA			763.67 Sq.M	

Table 11 : Parking Program

S.N.	PROGRAMS	NO. OF USERS	AREA PER PERSON	NO.	TOTAL AREA
1.	Vans 1 Per 15 Children	90	21	6	126
2.	Cars	5,3	18	8	144
3.	Motorbikes	25 ,5	2	30	60
4.	Ambulance	1	1	21	21
	TOTAL AREA	351 sq. M			

11. DESIGN CONCEPT:

11.1. Conceptual Framework: - Fragmented Puzzle

The central concept is a metaphorical journey—from societal exclusion and stigma to inclusion, acceptance, and empowerment. The architecture becomes a medium through which children, their families, and society slowly dismantle prejudices and reconstruct possibilities. This metaphorical journey is perceived in the idea of unsolved puzzle — fragmented, confusing, and filled with barriers.The idea of puzzle explore the idea odf solid and void and how these helps in wayfinding and navigation . Here, architecture becomes the missing pieces that bridge those gaps.

Figure 11.2 : Puzzle Metaphor

Figure 11.1 : Identity in void

The design unfolds in three interwoven acts:

Pause – At the heart of the therapy block, spaces are scaled to the child's comfort, textured to stimulate gentle sensory engagement, and open to pockets of light and nature. These are moments of stillness, where healing begins.

Play – The learning block expands the child's world through discovery and interaction. Classrooms spill into landscaped courtyards, playful facades guide wayfinding, and safe gradients invite movement. This is where curiosity is nurtured, friendships form, and confidence grows.

Purpose – The vocational block stands at the threshold to the community, connecting to Tokha's Saturday market. Here, the skills learned are transformed into crafts, produce, and performances — tangible contributions that dissolve the lines between the sanctuary and the society outside.

The master plan is shaped as a puzzle — solids and voids interlocking, each block a distinct piece with its own function, yet inseparable from the whole. Curved landscapes weave these pieces together, acting as both connectors and sensory landmarks.

In its architecture, the sanctuary becomes a storyteller: barrel vaults signal thresholds, textures define identities, and each pathway is a narrative thread guiding the child forward. The goal is not only to support the individual journey but to reshape societal perception — to replace stigma with acceptance, and pity with pride.

The site is divided into **three progressive** phases representing developmental levels. Each zone encourages interaction, therapy, and independence, guiding the child through stages of growth. Each phase is a distinct zone on the journey, connected by paths.

The design reflects a spatial and psychological journey through three primary phases:

- Phase A: Early Intervention
- Phase B: Transitional Learning
- Phase C: Vocational Integration

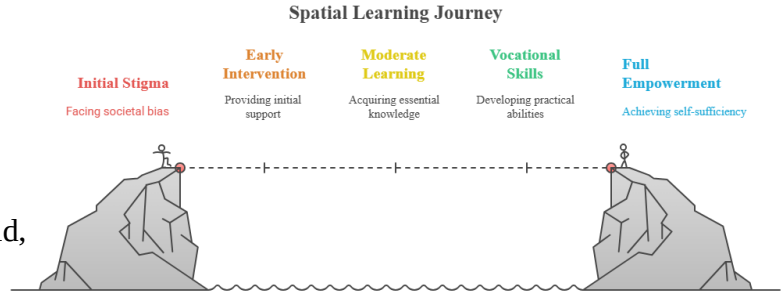


Figure 11.3 :Spatial Journey

This sequence of spaces is not rigid but fluid, allowing children to move at their own pace. Each zone is integrated with nature, therapy, and learning, fostering physical, emotional, and social development.

11.2. Phase-wise Zoning Strategy:

The masterplan is organized into three phases, each catering to different developmental needs. These zones are not only spatially distinct but are also emotionally calibrated, providing comfort and stimulation appropriate to each stage of growth.

11.2.1. Phase A: Early Intervention Zone

This phase is designed primarily for infants and toddlers, especially those recently diagnosed with Down Syndrome. It is also a key phase for parents, who often face confusion, fear, and a lack of guidance upon diagnosis.

Key features include:

- Infant Stimulation Rooms: Spaces equipped with sensory materials, soft lighting, textures, and sounds to support early brain development.
- Parent Counseling & Orientation Spaces: Quiet and private areas where professionals can educate and empower parents with information about Down Syndrome, expected developmental pathways, and therapeutic practices.
- Parent–Infant Interaction Zones: Gentle, homely environments that foster bonding through guided play, therapy, and observation.

This phase aims to rebuild trust and hope, equipping parents to become active, confident participants in their child's developmental journey.

11.2.2. Phase B: Transitional Learning Zone

This area supports young children who are gaining basic motor, social, and communication skills. It includes:

- Group classrooms and therapy halls
- Interactive indoor–outdoor spaces
- Challenge gardens that promote cognitive and motor development

The goal here is to foster peer interaction, routine learning, and communication through structured and playful environments.

11.2.3. Phase C: Vocational and Social Integration Zone

Designed for older children and young adults, this phase offers:

- Vocational workshops
- Creative labs (art, music, cooking, crafts)
- Nature trails and performance spaces

It promotes independence, creativity, and societal contribution—key elements in dismantling societal stigma and affirming identity.

11.3. Supportive Design Principles

The design incorporates inclusive strategies grounded in cognitive and psychological research. The following four principles guide every spatial decision:

11.3.1. Spatial Awareness:

Clear spatial layouts, predictable room sequences, tactile guides, and boundary definitions help children understand and navigate the space intuitively.

11.3.2. Prospect and Refuge:

Open spaces (prospect) are balanced with safe, cozy corners (refuge) to accommodate children with varied sensory sensitivities.

11.3.3. Legibility and Wayfinding:

Use of colors, textures, icons, and natural lighting cues ensures the space is navigable for all.

11.3.4. Design for Sense and Routine:

Repetitive spatial patterns, visual anchors, and consistent lighting and material palettes help children develop stable routines and a sense of familiarity.

Figure 11.4 : Design Principles

11.4. Nature-Based Therapeutic Landscape

Nature plays a central therapeutic role across the sanctuary. Gardens are not treated as decorative features but as developmental and therapeutic tools.

11.4.1. Sensory Gardens (Phase A):

Offer calming and controlled stimuli—scents, textures, sound, and color—to soothe and stimulate infants and toddlers.

11.4.2. Challenge Gardens (Phase B):

Encourage exploration and resilience with low-level obstacles, stepping stones, tactile paths, and interactive installations.

11.4.3. Nature Trails (Phase C):

Promote independence, creativity, and emotional reflection. These paths are designed for safe, unsupervised or semi-supervised use by older children.Each landscape component evolves in complexity and interaction, synchronized with the phase it supports.

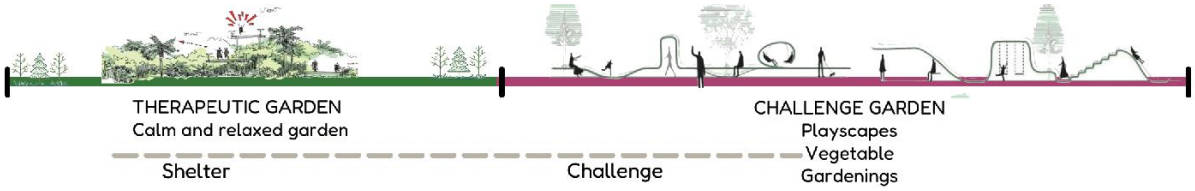


Figure 11.6 :Landscaping Concept

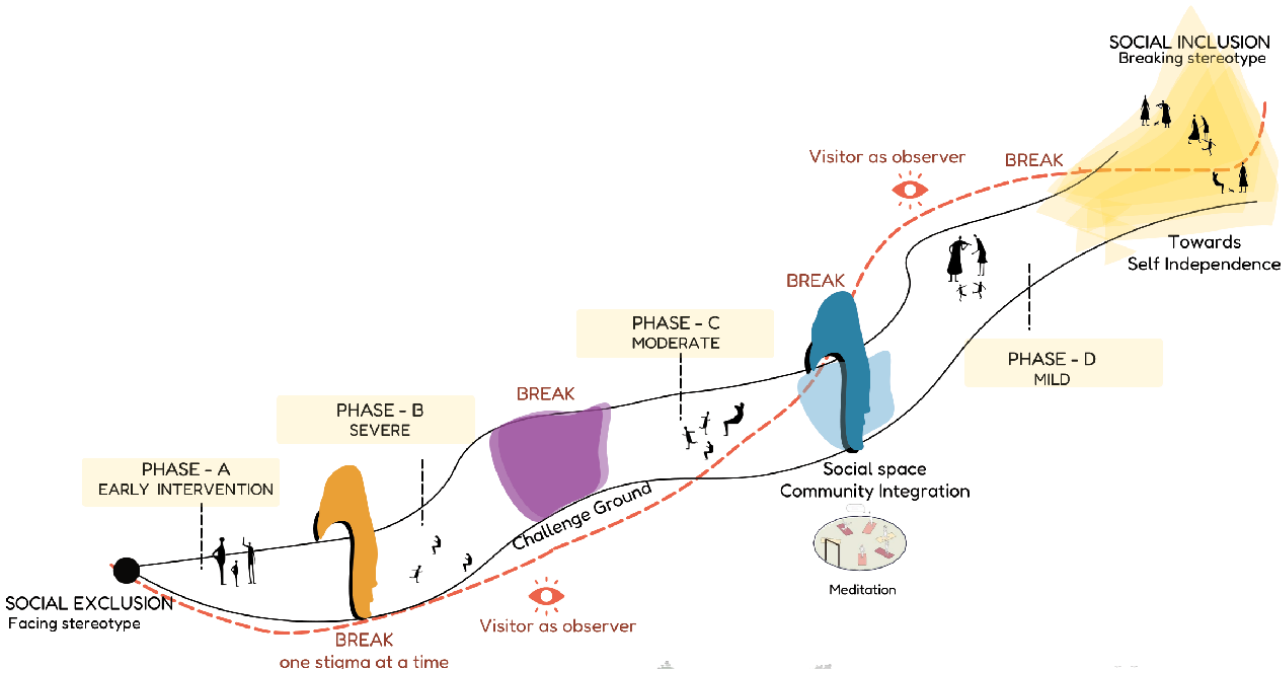


Figure 11.5 : Conceptual Journey Sketch

11.5. PLAN DEVELOPMENT:

The planning is done on the basis of zoning on the site. The zoning was done by the site constraints and opportunities. The zoning and overall plan development of the Growth Sanctuary for Down Syndrome Children is deeply rooted in both the physical characteristics of the site and the conceptual framework of a phased journey from social exclusion to inclusion. Situated in Tokha, the site presents distinct constraints and opportunities—bounded by roads on three sides and defined by a 6-meter contour variation. These conditions were utilized to establish a buffer space like parking and landscaping materials.

A strong diagonal axis was introduced as the main organizing spine of the design, symbolizing the journey of growth and self-realization for the children. This axis begins from the inward, more secluded zone where infants and parents receive early therapeutic support, and moves diagonally

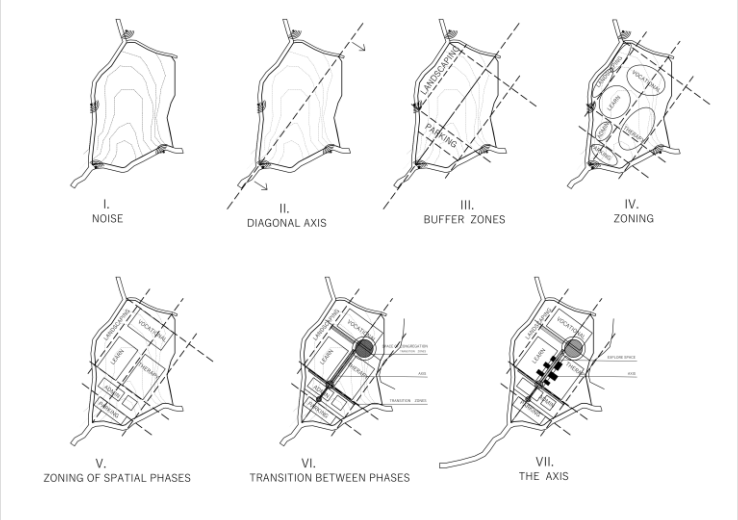


Figure 11.7 : Plan development sketch

across the site towards vocational and socially integrative spaces. Along this path, the site unfolds gradually—each zone opening more to public interaction as children progress in confidence and ability. Secondary axes and nodes intersect the main diagonal, guiding movement and enhancing wayfinding through visual cues such as sensory gardens, rest nodes, shaded pavilions, and varied textures. These not only serve as orientation tools but also create meaningful pause points that reflect moments of reflection, learning, or celebration. The zoning thus responds not only to functional requirements and site constraints but also to the emotional and psychological journey of its users—crafting a sanctuary that is intuitive, inclusive, and purposefully navigable.

12. DESIGN DEVELOPMENT

The master plan of the Growth Sanctuary is envisioned as a spatial metaphor for the journey of a child with Down Syndrome—from protection and therapy to learning and eventual integration into society. This journey is expressed through a gently curved landscape path that serves not only as a circulation spine, but also as an exploratory, sensory-rich experience. The form and zoning of the buildings respond to the topography, ensuring both accessibility and emotional progression. The design celebrates movement, discovery, and transformation by guiding children across multiple spatial phases, marked by distinct architectural blocks that align with their developmental needs.

The entire sanctuary is held together by a continuous, curved landscape spine that represents the exploratory journey of the child. This path meanders organically from the entrance pavilion past the therapy block, through sensory gardens, activity courts, and classroom terraces, and finally reaches the vocational stage and market. Along the way, the landscape offers spaces for barefoot walks, textured balancing bridges, playful ramps, bamboo sound walls, and restful nodes with seating and shading trees. The landscape is not decorative—it is pedagogical and healing, helping children develop balance, sensory grounding, and spatial memory.

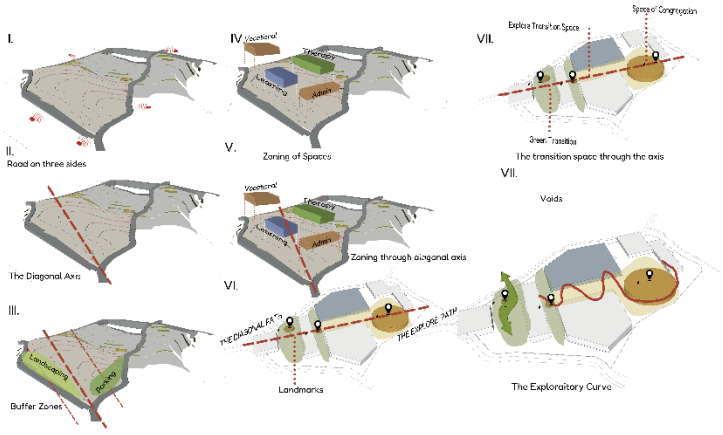


Figure 12.1 : Form development

12.1. THE PATH :ADMIN BLOCK:

Located at the front of the site, the administrative block acts as the formal and symbolic threshold between the external world and the sanctuary. This is where visitors, parents, and staff are first received, offering a sense of order, safety, and clarity. Architecturally, it is designed with a grounded, structured form that sets a calm and professional tone while remaining welcoming. The admin block also plays a dual role as a subtle observational and orientation point, visually connecting to the curved landscape path and nearby therapy spaces, while buffering the public interface from the more sensitive child-focused zones deeper in the site.

Figure 12.3 : Information board infront of Admin

Figure 12.2 : Waiting Pavilion

Figure 12.4 : Courtyard in Admin Block

12.2. THE PATH : PARENTS BLOCK

The Parents' Block acts as a bridge between the sanctuary and the families. It is a space where parents are not only passive observers but active participants in their children's journey. Instead of being treated like clients in an institution, they are welcomed as part of a community

supported, trained, and gently guided.The layout is kept very informal rather than the formal institutionalized offices.

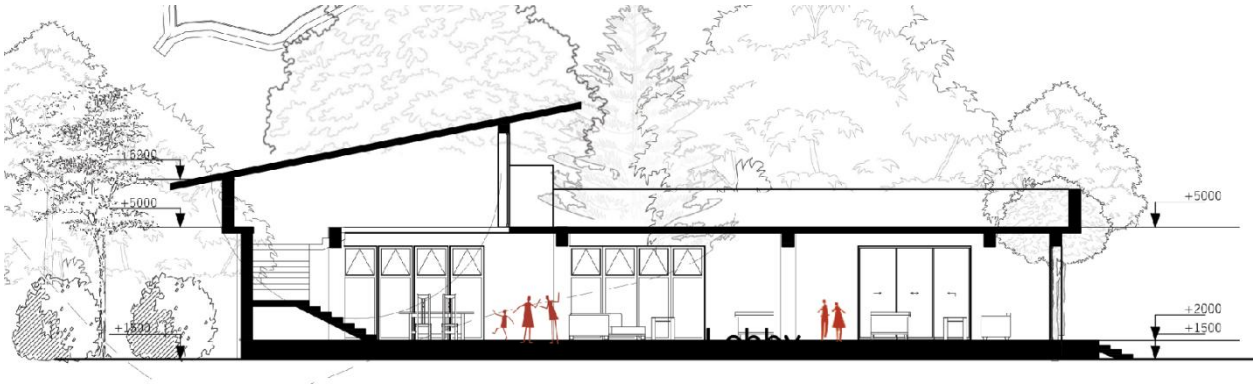


Figure 12.5 : Informal Open layout in Parents block

12.3. THE PAUSE : THERAPY BLOCK:

To the quieter right side of the site lies the therapy block, representing the beginning of a child's journey—where care, healing, and observation take place. This zone includes sensory therapy rooms, womb-like escape spaces, hydrotherapy, music therapy, and occupational spaces designed at a child-friendly scale. The architectural language here is softer and more enclosed, with curved forms, sunken courts, and textured paths that prioritize comfort, safety, and sensory awareness. Parent observation pods are integrated in the landscape, while one-way glass inside allows silent observation from corridors without disrupting therapy sessions, maintaining both emotional distance and care.

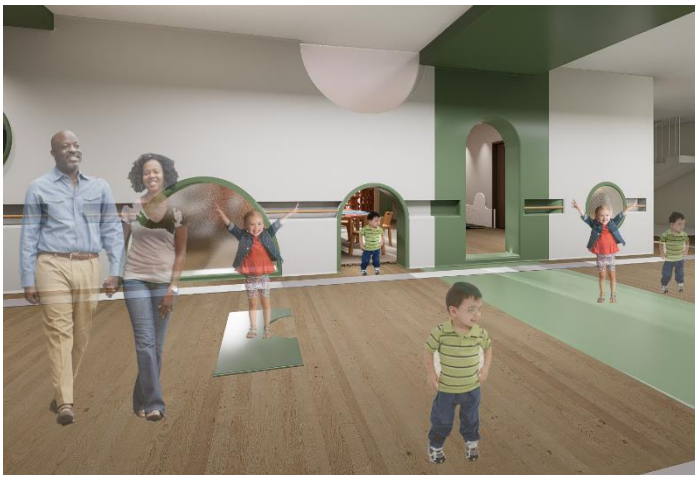


Figure 12.6 : Color Application for way-finding

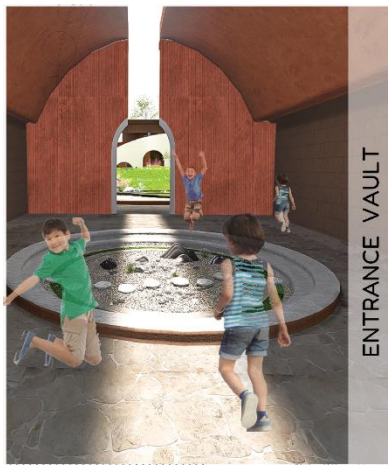


Figure 12.7 : Therapy entrance Vault

12.3.1. LANDSCAPE ANALYSIS

The landscape of the therapy block is designed as an active healing environment that responds to the site's natural contours (0–6 m), climate, and the diverse needs of children with Down Syndrome. The sloping terrain allows for terraced gardens, gentle ramps, and interactive physiotherapy paths that integrate movement with nature. To buffer road noise and pollution, dense vegetation, earth mounds, and water features are strategically placed, creating a calm, restorative setting.

The landscape is zoned into high-activity areas with climbing ropes, timber beam crossings, and challenge trails to develop gross motor skills, while quieter sensory gardens with fragrant herbs (lavender, tulsi, mint, lemongrass), colorful flower beds (marigold, salvia, cosmos), and textured surfaces support fine motor skills, emotional regulation, and sensory stimulation. Shaded nooks and small withdrawal pods offer refuge for moments of calm, while central garden spines link therapy spaces, encouraging social interaction and inclusion. Wayfinding is supported through puzzle-inspired paving, color-coded paths, and sensory landmarks. Together, the therapy landscape becomes more than a functional outdoor space, it is a sanctuary where movement, play, and nature combine to foster growth, reduce stress, and build dignity for children, parents, and caregivers alike.

Figure 12.8 : Therapy landcape in therapy block

12.4. THE PLAY :EDUCATIONAL BLOCK:

Placed on the opposite side, the learning block forms the intermediary space in the child's journey. This block introduces more openness, higher ceilings, and a variety of sensory stimuli. Here, the children begin to engage with structured education and socialization. The architecture reflects this transition through layered forms, open corridors, playful voids, and partially sunken or elevated zones that respond to the site's topography. Elements like skylights, tactile walls, and color-coded learning zones allow children to recognize and interact with space, supporting cognitive and emotional development through spatial memory and routine.

Figure 12.10 : Color application in corridor as wayfinding

Figure 12.9 : Play Entrance Vault

Figure 12.11 : Play corner

Figure 12.12 : Sensory room

12.4.1. LANDSCAPE ANALYSIS :

The play landscape is conceived as a “challenge ground” where learning and play merge into a continuous journey. Instead of conventional playgrounds, the design uses nature-integrated play features to stimulate both gross and fine motor skills while fostering curiosity and confidence. Dynamic elements such as slides, seesaws, climbing ropes, hopscotch trails, trampolines, swings, and sand pits are interwoven with sensory play components like textured walls, tunnels, and sound-based installations.

A wavy maze, hanging bridges encourage movement, balance, and coordination, while mini-stages, periscopes, and chatting stools support social play and self-expression. Pathways are color-coded and puzzle-patterned to guide children through a sequence of challenges that begin with simpler tasks and gradually lead to more complex explorations, symbolizing growth and resilience. The play landscape is therefore not only recreational but therapeutic, helping children build independence, adaptability, and joy in a safe, inclusive outdoor setting.

Figure 12.13 : Learning landscape

12.5. THE PURPOSE : VOCATIONAL BLOCK:

At the culmination of the site's contour, on a 4-meter elevated platform, sits the vocational block—both physically and symbolically elevated. This block is the final phase in the sanctuary's internal journey and becomes the most outward-facing in terms of community engagement. Designed with terraced gardens and open courtyards, the vocational block provides children with opportunities to develop and showcase life skills such as pottery, gardening, hospitality, and crafts. On Saturdays, this block transforms into a public market, directly connected to the upper-level road and the traditional Tokha pedestrian route. This allows visitors to access the space as a vibrant, inclusive community hub—normalizing and celebrating the abilities of Down Syndrome children through direct interaction and exchange.

Figure 12.15 : The learn stairs in vocational block

Figure 12.14 : Vegetable farming in vocational block

12.6. THE CENTRAL AMPHITHEATRE:

At the intersection of the sanctuary's experiential path lies the central amphitheatre—a space conceived not just as a performance zone, but as a democratic, inclusive heart of the campus. It sits gently nestled between the therapy, learning, and vocational blocks, acting as a spatial and emotional pause point where all user groups—children, staff, parents, and visitors—can gather informally or during planned events. Architecturally, the amphitheatre steps flow organically with the site's contours, blurring the boundary between built form and landscape. The levels are kept intentionally low and accessible, allowing children to sit, crawl, play, or observe without intimidation. Integrated into the curved circulation spine, it becomes a natural meeting point—

visible from multiple blocks, yet partially enclosed by surrounding greenery and interactive landscape features like small rock walls, sensory planting beds, and child-scaled slides or climbable edges. During special occasions, this space transforms into a stage for exhibitions, performances, and collaborative programs that reinforce social confidence among the children. Psychologically, it offers a sense of being part of a larger whole, without being placed in the spotlight—encouraging collective engagement, self-expression, and belonging. The amphitheatre is therefore not a standalone event space, but a **symbol of inclusion**, bringing together all the fragmented journeys of the sanctuary into a shared, celebratory moment.

Figure 12.16 : The central Amphitheatre

Figure 12.17 : The green ramp leading to vocational block

13. CONCLUSION:

The **Growth Sanctuary for Down Syndrome Children** is envisioned as a nurturing and inclusive environment that transcends the conventional boundaries of institutional care. Through a design approach rooted in empathy, spatial psychology, and phased development, the sanctuary addresses the multifaceted needs of children with Down Syndrome—supporting them from early intervention to social integration. By integrating site-responsive zoning, therapeutic landscapes, sensory-driven environments, and intuitive wayfinding, the project establishes a framework where architecture becomes a medium of healing, growth, and empowerment. This thesis not only proposes a physical space but advocates for a shift in societal attitudes—breaking stigma and embracing diversity.

The sanctuary is thus a response to a long-standing gap in the urban care infrastructure of Nepal, aiming to serve as a replicable model that brings hope, dignity, and opportunity to individuals with Down Syndrome and their family.

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