PLAY FOR CHANGE

PRIMARY SCHOOL FOR CHILDREN WITH IMPAIRMENTS

BY

Joelle Lim

A 120-point thesis submitted to the Victoria University of Wellington in partial fulfilment of the requirements for the degree of Master of Architecture (Professional)

Victoria University of Wellington
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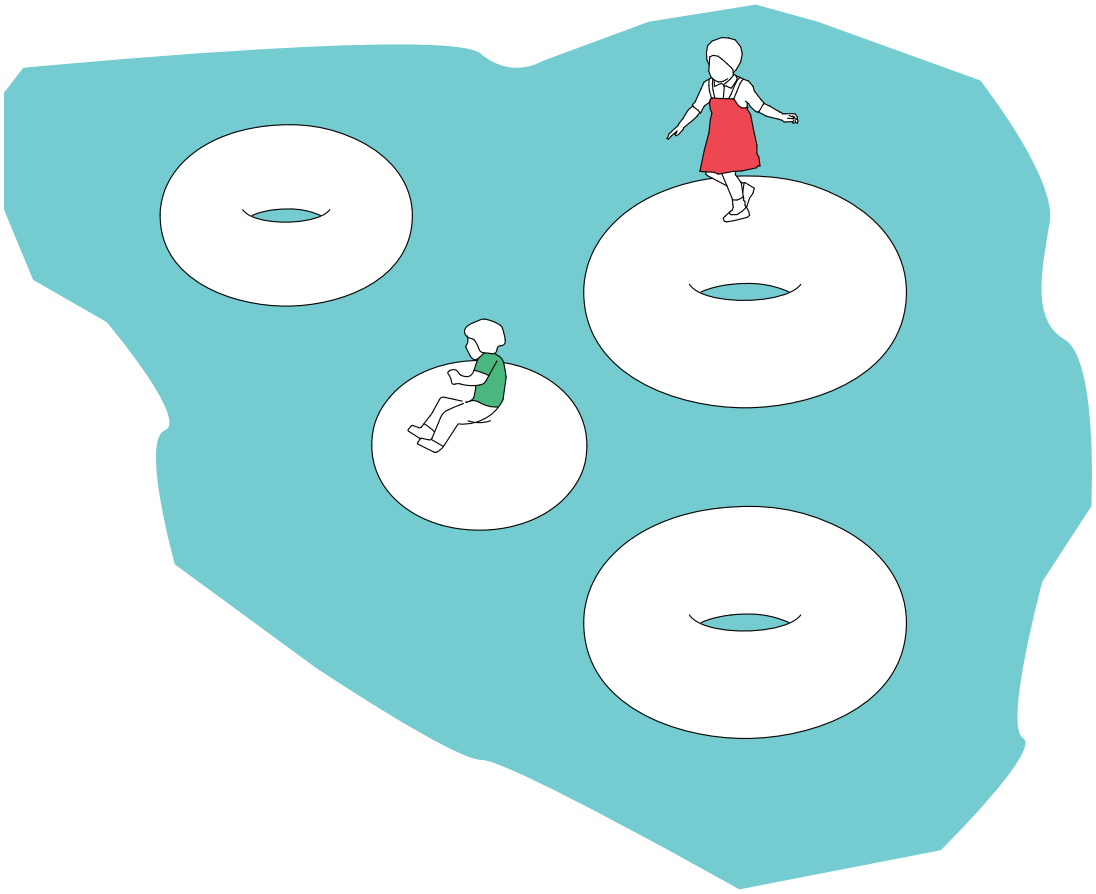

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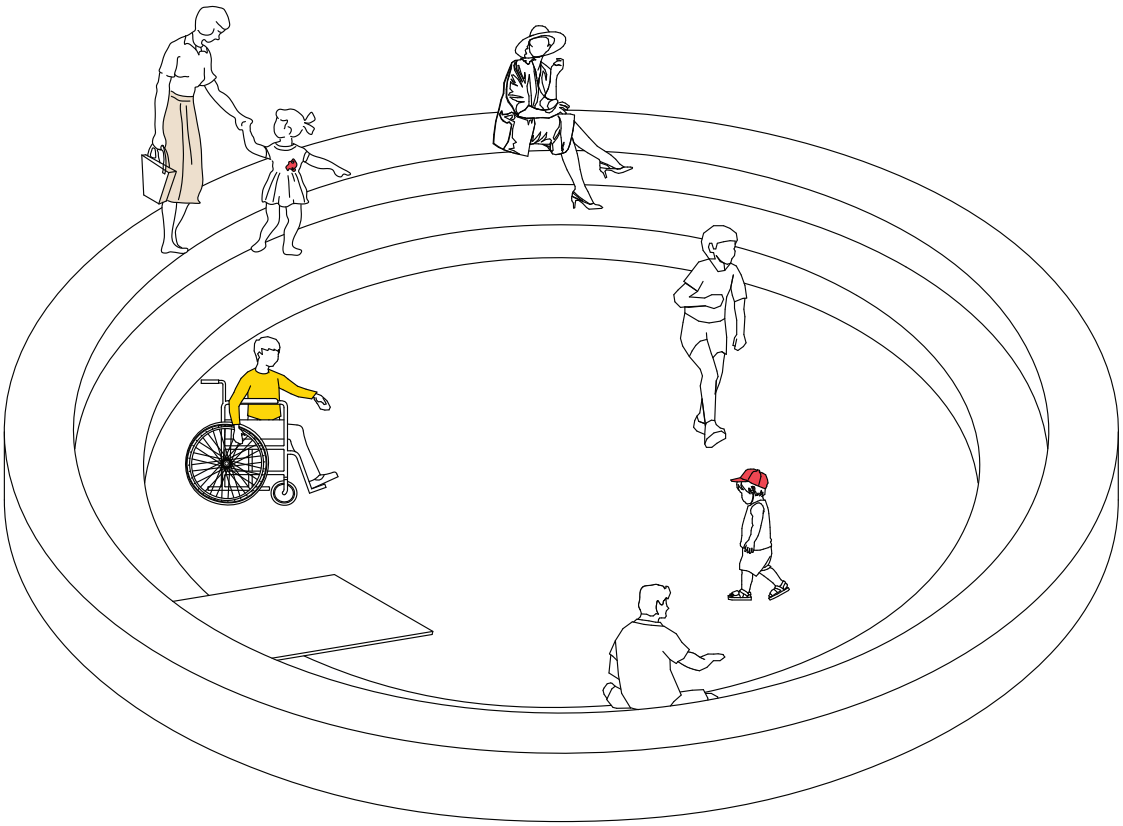
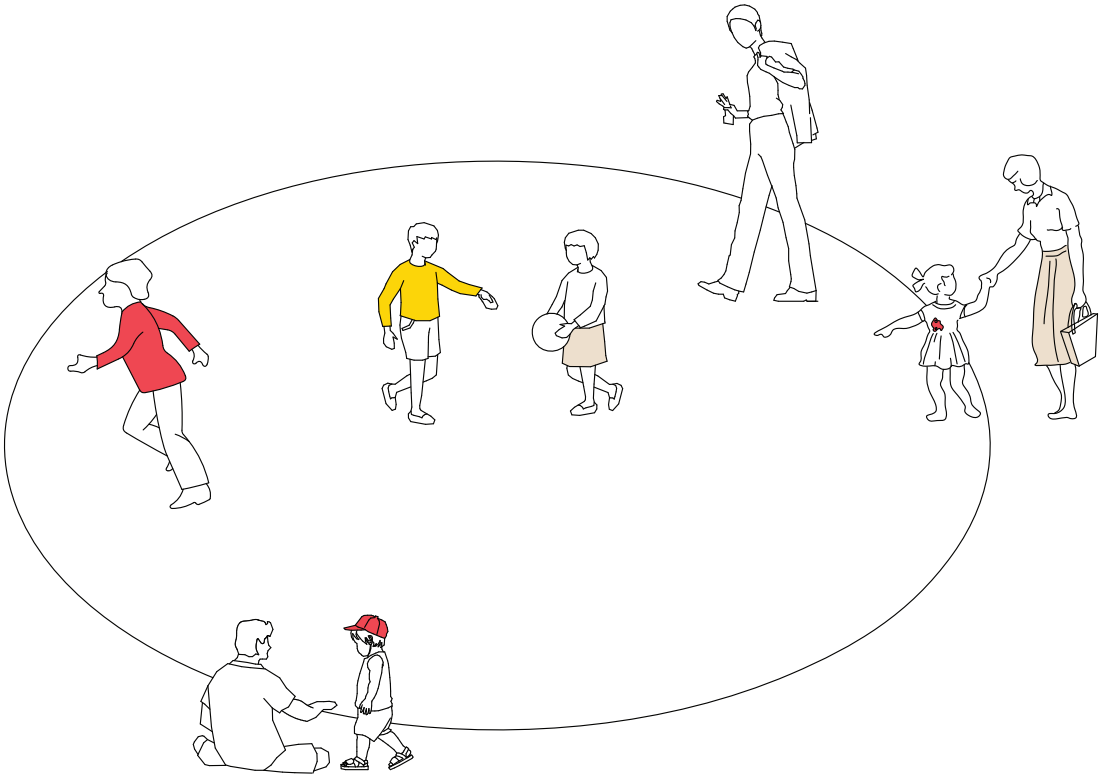
JOELLE LIM



ABSTRACT

Within the architecture of education, there is a lack of attention to the needs of children with disability. Globally, one in every ten children have a disability and there are approximately 90,000 aged 0-14 children living in households who have at least one disability in New Zealand. The cohort is one of the most marginalised and excluded group from the society, resulting in an inability to participate in classes leading to fewer opportunities to develop skills, experience and confidence. School designs are designed for children without disability, and many children with disabilities find that classrooms and outdoor environments are ill-suited for their health needs, resulting in low attendance rates, poor peer engagement and limited educational success.

This thesis explores the role of architecture in facilitating the education of children with disabilities. Working from research-led design through to design-led research, it examines architecture as an educational tool. Examining classroom spaces, outdoor play and outdoor learning environment for children with disabilities, it questions the purpose of education. In addition, the research aims to desensitise the perceived architectural barriers within primary school that restricts participation for children with disabilities. The architectural design knowledge aims to improve design approaches for inclusivity in school, pedagogy and outdoor play environments. By addressing this issue, it could potentially create more positive and optimistic views and from the wider community, greater disability awareness.

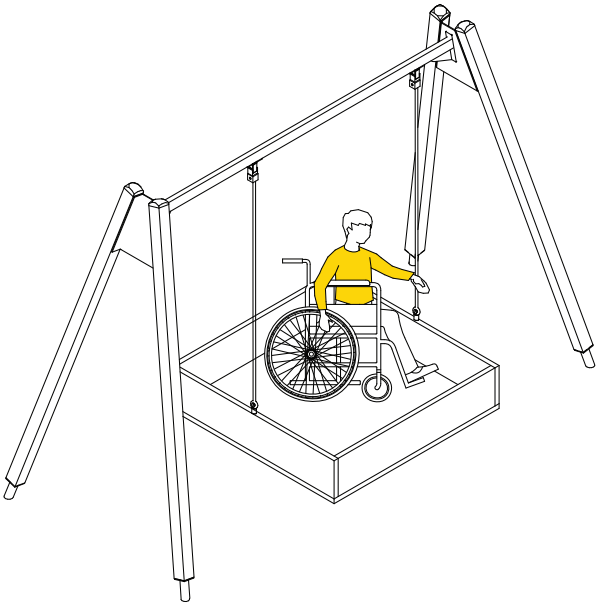


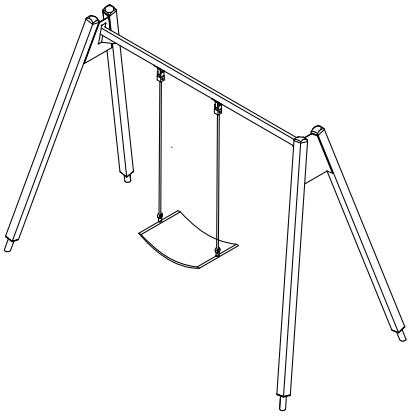
PREFACE

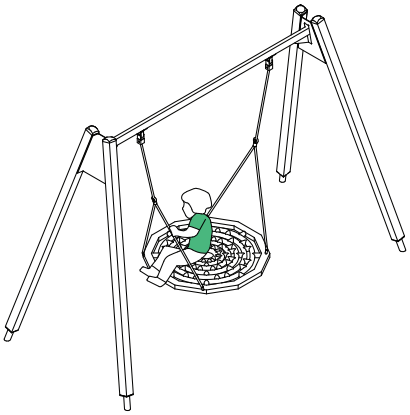
Education is an important foundation of society however children with impairments have limited opportunities for participation in school activities. Growing up around a few relatives with mobility and mental impairments in a middle-income family surrounded by many extended and diverse relatives, I have seen how an impairment affects the individual, their caregivers and their sibling's mental and physical wellbeing. Families often struggle to cope with providing the best opportunities for their impaired child to develop into psychologically healthy and emotionally competent adults.

After hearing stories of children with impairments and undertaking a bit more research I learnt that, there is a lack of participation in school, reduced social communication with their peers and inability to access facilities for rehabilitation. It also became evident that impaired children of low-income families compared to high-income families, experienced greater difficulties and are more at risk of experiencing a lower quality of life. As an architecture student, I was curious to see how school architecture could be orientated more towards children with impairments to achieve their social needs and improve their quality of life.

While the population continues to grow in New Zealand and very few impaired children complete their primary education, these problems and my background have provided the motivation and the foundation for this research.



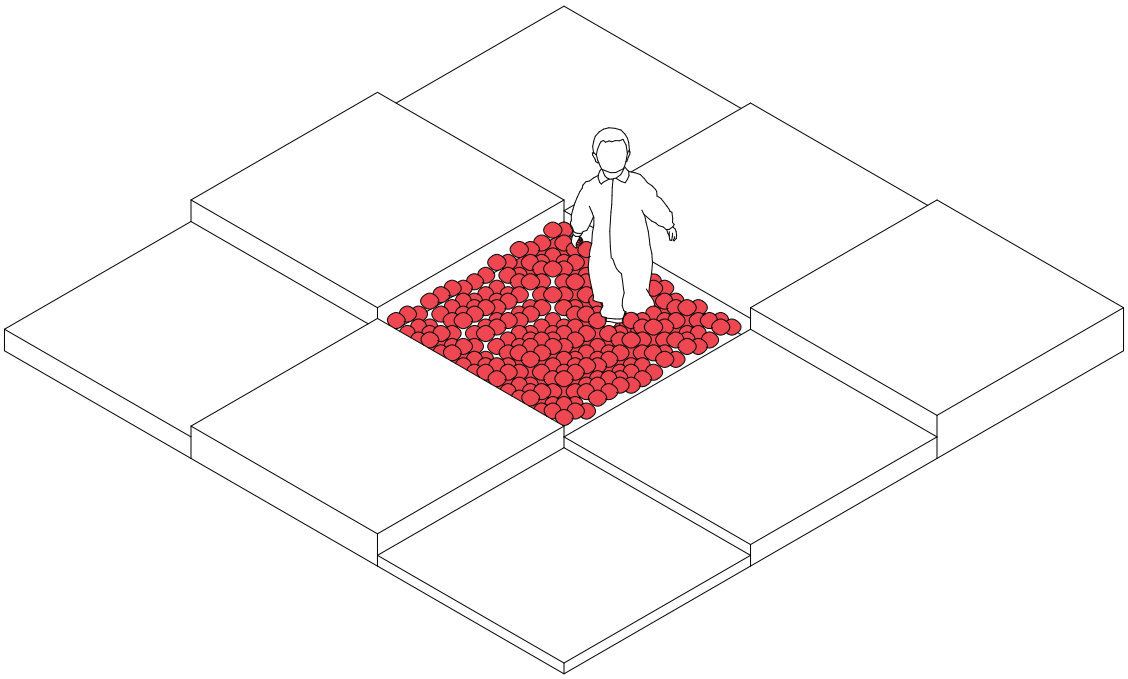




ACKNOWLEDGEMENTS

First, and most of all, I would like to thank my supervisor Jacqueline McIntosh, for her expertise, enthusiasm, assistance and guidance throughout the process of writing this thesis.

I am grateful to my parents for their encouragement and support in me. To my grandma, brother, sister, friends and Atlas, thank you for your support and great company.



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1.0

INTRODUCTION

INTRODUCTION

This chapter explores the current architectural barriers within primary school that restricts participation for children with impairments. The following findings are categorised as:

1. Statistics of children with impairments
2. Lack of accommodation for children with impairments
3. Health of caregivers / quality of care
4. Current classroom design

1.1 STATISTICS OF CHILDREN WITH IMPAIRMENTS

Globally, the population of children with impairments is 93 million and international statistics indicate that one in every ten child has a disability (FIG 1.01) (UNICEF, 2013). Children with impairments are one of the most marginalised and excluded groups of society (UNICEF, 2013). Within the population of primary school age children with impairments, only ten percent are in school, of these, only five percent have completed their primary education (FIG 1.02) (World Health Organisation & Worldbank, 2011). The lack of participation in primary school has been associated with poor health and wellbeing (Law, 2002) for both the child and their family. Within rehabilitation treatment programmes, participation is considered to be one of the more important outcomes for parents and children (Bult, Verschuren, Jongmans, Lindeman, & Ketelaar, 2011). Progressive rehabilitation has been shown to improve the individual's independence, wellbeing, and reduce the progressive nature of some impairments. However, the lack of facilities and services, and lack of participation in schools, reduce "academic opportunities and psychosocial development" (Mah, Thannhauser, Kolski, & Dewey, 2008; Sorani-Villanueva, McMahon, Crouch, & Keys, 2014, p. 61). Studies have found that the most common barriers to participation in primary school education were physical accessibility of the environment and a comprehensive lack of support (Anaby et al., 2013).

FIG 1.01 I INTERNATIONAL STATISTICS OF IMPAIRMENTS

93,000,000

CHILDREN WITH DISABILITIES - MODERATE TO SEVERE DISABILITIES (POTENTIALLY MORE)

10%

ARE IN PRIMARY SCHOOL (WORLDWIDE)

5%

COMPLETED THEIR PRIMARY EDUCATION

FIG 1.02 I WORLDWIDE STATISTICS - COMPLETION OF PRIMARY EDUCATION

1.2 LACK OF ACCOMMODATION FOR CHILDREN WITH IMPAIRMENTS

...where design professionals, such as architects or interior designers, incorporate disabled people's needs into projects, there is the tendency to ***reduce disability to a singular form of mobility impairment, that of the wheelchair user.***
(Imrie & Hall, 2003, p. 10)

Architecture has the capacity to affect our health through the provision of environmental quality and the design can protect the public health, safety and welfare. It has been argued that impairment becomes a disability when the environment prevents the impaired child from doing what an abled-body child would do (Imrie & Kumar, 1998). However, disability is often viewed as "a disease that requires treatment" and in this sense, the disability (as impairment) is "seen as the problem to be overcome rather than a social or environmental barrier" (Imrie & Kumar, 1998, p. 359). Within public buildings, architectural element considerations such as "pavements tend to be littered with obstacles while most public buildings provide few design features to permit disabled people ease of access…colour contrasts and tactile are poorly designed and/or often non-existent" (Imrie & Kumar, 1998, p. 357). Built environments are generally not equipped and suited for people with impairments and that buildings only represent adult able-bodied values, "like steps and restrictions on entry to buildings", which could only serve to "exclude of produce discomfort or nuisance" (Imrie & Kumar, 1998, p. 359). The outcomes hamper access to education, often resulting in children staying at home without proper opportunities to access to education or physical and psychosocial domains (Mah et al., 2008).

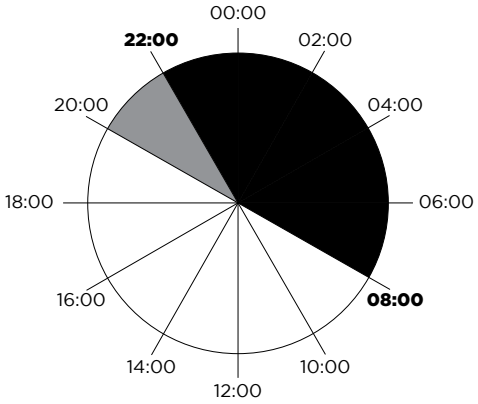
New Zealand statistics found that forty five percent of children with impairment academically were affected as schools were unable to accommodate their impairment (Ministry of Health, 2001). The most common barriers to participation were restriction to the physical accessibility of the environment, lack of support from staff and service providers and the fear of negative attitudes (Anaby et al., 2013). Studies found that while classroom spaces that were designed to promote socialising and collaboration, often "limited attention towards the accessibility of the learning environments, building structure, access to public transportation, and lack of ramps, elevators and parking space for wheelchairs" were neglected (Anaby et al., 2013, p. 1594). The physical built environment and supporting spaces for special equipment must be addressed to increase accessibility for different types of impairments, and to improve participation for children with impairments.

*…**many commercial and public buildings are inaccessible to wheelchair users**, while few buildings provide appropriate design features and navigational aids to enable people with a range of sensory impairments to move around with confidence and ease.* ***Accessible transport is a rarity****…*
(Imrie & Hall, 2001, p. 3)

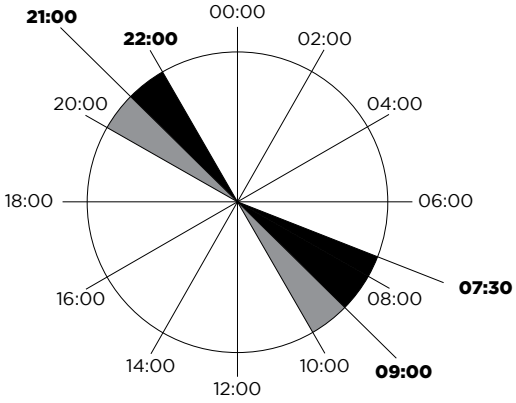
When environmental demands and human resources are not met, stress is often experienced by the user (Evans & McCoy, 1998). The social and emotional characteristics of a child's environment is closely related to the emotional health of a child. School design criteria for children with impairments are limited and studies have found that inadequate facilities, cultural values and environmental barriers can lead to negative social attitudes that can reduce the participation of children with impairments (Anaby et al., 2013). Furthermore, the segregation of children with impairments from their non-disabled peers may reduce participation and affect the individual's emotional health (Anaby et al., 2013, p. 1595). The lack of facilities, services and segregation within class activities, reduces the opportunity for education and "academic opportunities and psychosocial development may be affected" (Sorani-Villanueva et al., 2014).

Inadequate facilities and physical accessibility limits children with impairments ability to play. The psychologist researcher, Peter Gray, discusses that children are "…by natural selection, are designed to play…wherever children are free to play, they do" (Gray, 2011, p. 443). Play promotes the necessary conditions for children to thrive and learn (Bento & Dias, 2017). Over the last half century, there has been a reduced opportunity

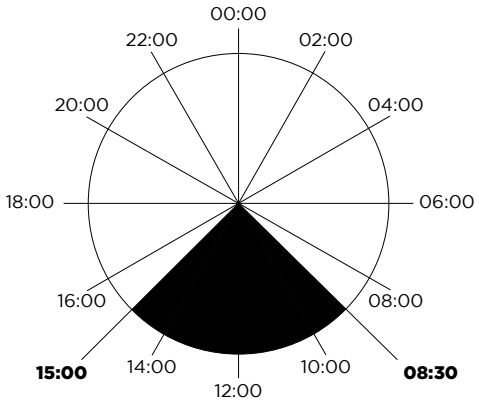
SLEEP



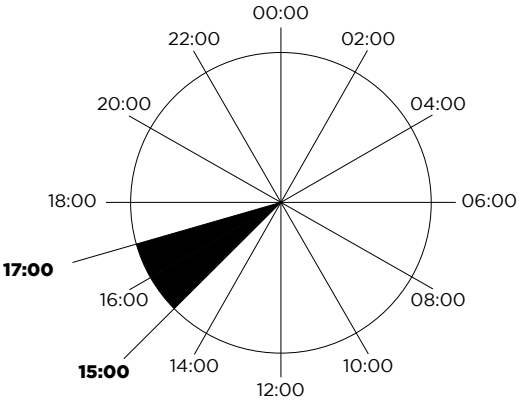
CARE & MAINTENANCE



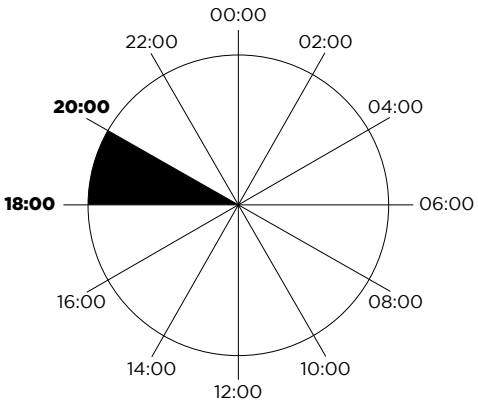
SCHOOL HOURS



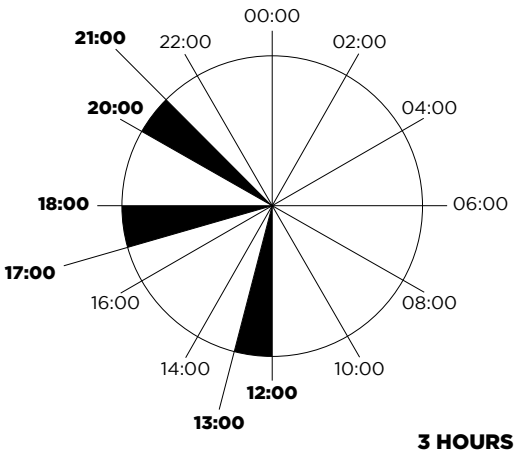
AFTERSCHOLL ACTIVITIES



HOMEWORK



SPARE TIME



3 HOURS

FIG 1.03 I TYPICAL CHILDREN WITHOUT IMPAIRMENT WEEKDAY ROUTINE

for play by “four to eightfold” (Gray, 2011, p. 443). However, due to the concerns of adults for safety, rules restrict child-driven play which ultimately causes the loss of some benefits of play including the development creativity, leadership and group skills (Ginsburg, 2007, p. 183). With the reduced opportunity to play, a study found some correlation that results to the “rising rates of childhood mental disorders, including depression, anxiety, and suicide” (Gray, 2011, p. 443). In FIG 1.03, this shows the weekday routine for children without impairments, it identifies the amount of spare time for child-driven activities.

1.3 HEALTH OF CAREGIVERS / QUALITY OF CARE

Primary caregivers also often experience stress, negative impacts on their health, sharing the burden and worry about the future, a study found that ten percent of marriages had ended in divorce (Abi Daoud, Dooley, & Gordon, 2004; Alschuler et al., 2012; Murphy, Christian, Caplin, & Young, 2007; Pangalila et al., 2015). Studies found that caregivers were more likely to experience emotional stress and lowered self-esteem (Abi Daoud et al., 2004, p. 16) due to “over-commitment, social isolation, family conflict and the demands of caring for their impaired child with medical needs”(Mah et al., 2008, p. 106).

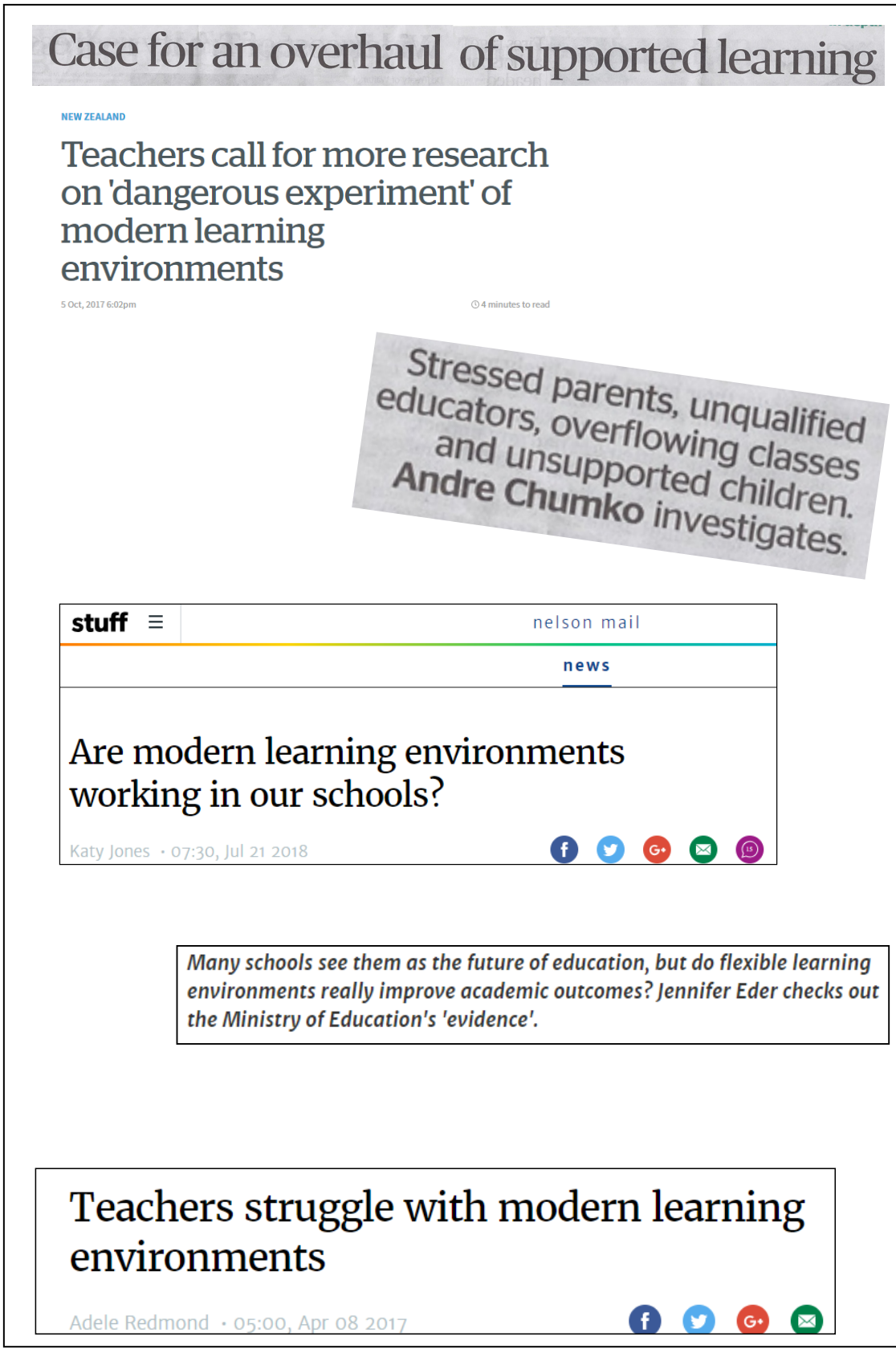
Research found that after the birth of a child with a disability, sixty-seven percent of mothers were unable to enter or maintain paid employment (Curran, Sharples, White, & Knapp, 2001). The cost to raise a child with disability includes ‘out-of-pocket’ healthcare expenses, loss of employment, loss of career development opportunities, and loss of time with spouses and family and in self-care activities (Leonard, Johnson, & Brust, 1993). This suggests that many caregivers, especially those of low-income family, face health, financial and social problems as they spend the majority of their time caring for their disabled child. Cultural orientations and family recreation, this was also found to have a direct correlation to the intensity of leisure participation (Anaby et al., 2013). Hence, the architectural program needs to include community spaces that could promote active engagement and longer-lasting participation for both caregivers and children, which will improve the quality of life, physical and mental wellbeing.

1.4 CURRENT CLASSROOM DESIGN

Innovative learning environments or modern learning environments are becoming increasingly adopted into New Zealand school education. The learning environment models have shifted from a teacher-centred approach to student-centred approach with assistance of e-learning technologies. E-learning is often defined as “technology-based learning in which learning materials are delivered electronically to remote learners via a computer network” (Zhang, Zhao, Zhou, & Nunamaker Jr, 2004). With some assistance of the E-learning technologies, mainstream schools today seek to address inclusion through the provisions of collaborative or workshop-based learning spaces (Dolmans, De Grave, Wolfhagen, & Van Der Vleuten, 2005).

However, these environments still fail to address the needs of children with impairments and accommodate their adolescent developmental needs (Rathunde & Csikszentmihalyi, 2005). E-learning also requires students to be more mature and self-disciplined compared to traditional classroom learning environments (Zhang et al., 2004). The scale of innovative learning environments range from 50 to 300 students within one large open plan classroom taught by 3-5 teachers. Comparing this model to the existing traditional learning environment, when a “student may want to ask questions about the instruction materials… [rather than they] get answer immediately… [they] sequentially go through an instructional video to find an answer” (Zhang et al., 2004, p. 76). To further exacerbate this issue, e-learning systems are text-based learning materials that may lead to “boredom and disengagement in students and prevent them from gaining a good understanding of a topic” (Zhang et al., 2004).

As innovative learning environments are beginning to be implemented in most of New Zealand schools, caregivers and children with impairments are struggling to cope within these environments (FIG 1.04). When children with impairments are inadequately equipped with suitable e-learning systems, a study has also indicated that this results in frustration, confusion, and reduces the learner’s interest (Zhang et al., 2004). Hence, there is a need for schools that are better designed and equipped to be inclusive for children with impairments.



Case for an overhaul of supported learning

NEW ZEALAND

Teachers call for more research on 'dangerous experiment' of modern learning environments

5 Oct, 2017 6:02pm

4 minutes to read

Stressed parents, unqualified educators, overflowing classes and unsupported children. **Andre Chumko** investigates.

stuff ☰ nelson mail

news

Are modern learning environments working in our schools?

Katy Jones · 07:30, Jul 21 2018

Many schools see them as the future of education, but do flexible learning environments really improve academic outcomes? Jennifer Eder checks out the Ministry of Education's 'evidence'.

Teachers struggle with modern learning environments

Adele Redmond · 05:00, Apr 08 2017

FIG 1.04 / PUBLIC CONCERNS ON MODERN LEARNING ENVIRONMENTS

FIG 1.05 I TRADITIONAL CLASSROOM DESIGN - 200 YEARS AGO

DESCRIPTION

The design of classrooms for children with impairments have not changed radically in the past 200 years. FIG 1.05 shows a traditional classroom design that offers a 'traditional face-to-face classroom learning that centres on instructors who have control over class content and learning process' (Zhang et al., 2004). Studies found that these classroom model were more "rigid, with tighter rules, an emphasis on control, and few opportunities to exercise freedom of choice and self-direction" (Rathunde & Csikszentmihalyi, 2005, p. 344).

STRENGTHS

- Immediate feedback
- Can be motivating to students
- Cultivation of social community
- Classroom configuration - Children are required to sit in rows & teacher at the front of the class

WEAKNESSES

- Not inclusive
- Minimal group work
- Children experience low concentration
- Instructor/teacher centred
- Time and location constraints
- More expensive to deliver

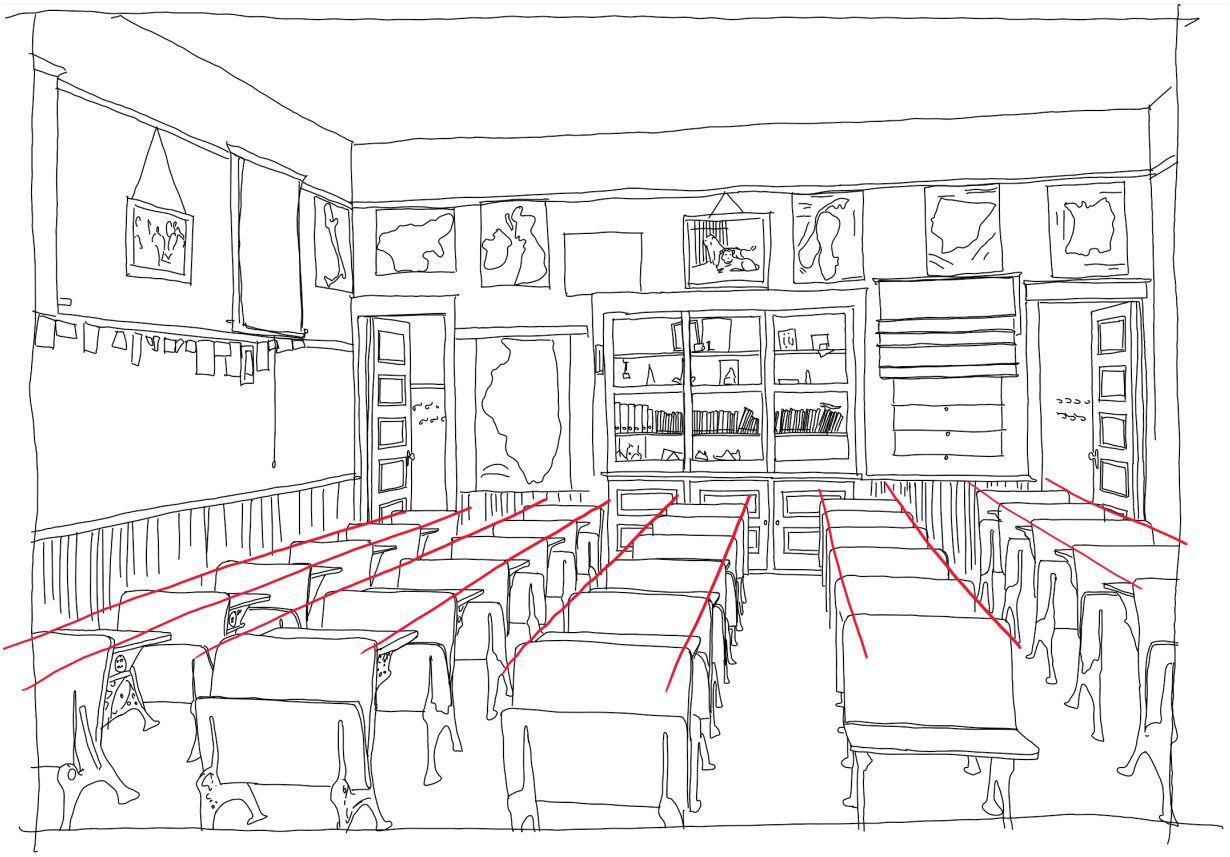


FIG 1.06 I E-LEARNING CLASSROOM DESIGN - 100 YEARS LATER

DESCRIPTION

100 years later, the integration of E-learning offers a 'learner-centred, self-paced learning environment' (Zhang et al., 2004). In FIG 1.06 shows the classroom configuration, it generally relies on technologies and teachers for learning.

STRENGTHS

- Spatial arrangement of classroom still maintained the same
- Slightly learner-centred and self-paced
- Time and location flexibility
- Cost-effective for learners
- Unlimited access to knowledge

WEAKNESSES

- Teacher are still at the front of the classroom
- Technology starts to become a learning tool
- Promoting more sedentary lifestyle in their lifestyle
- Less contact with natural environment
- Lack of immediate feedback
- Potentially more frustration, anxiety and confusion

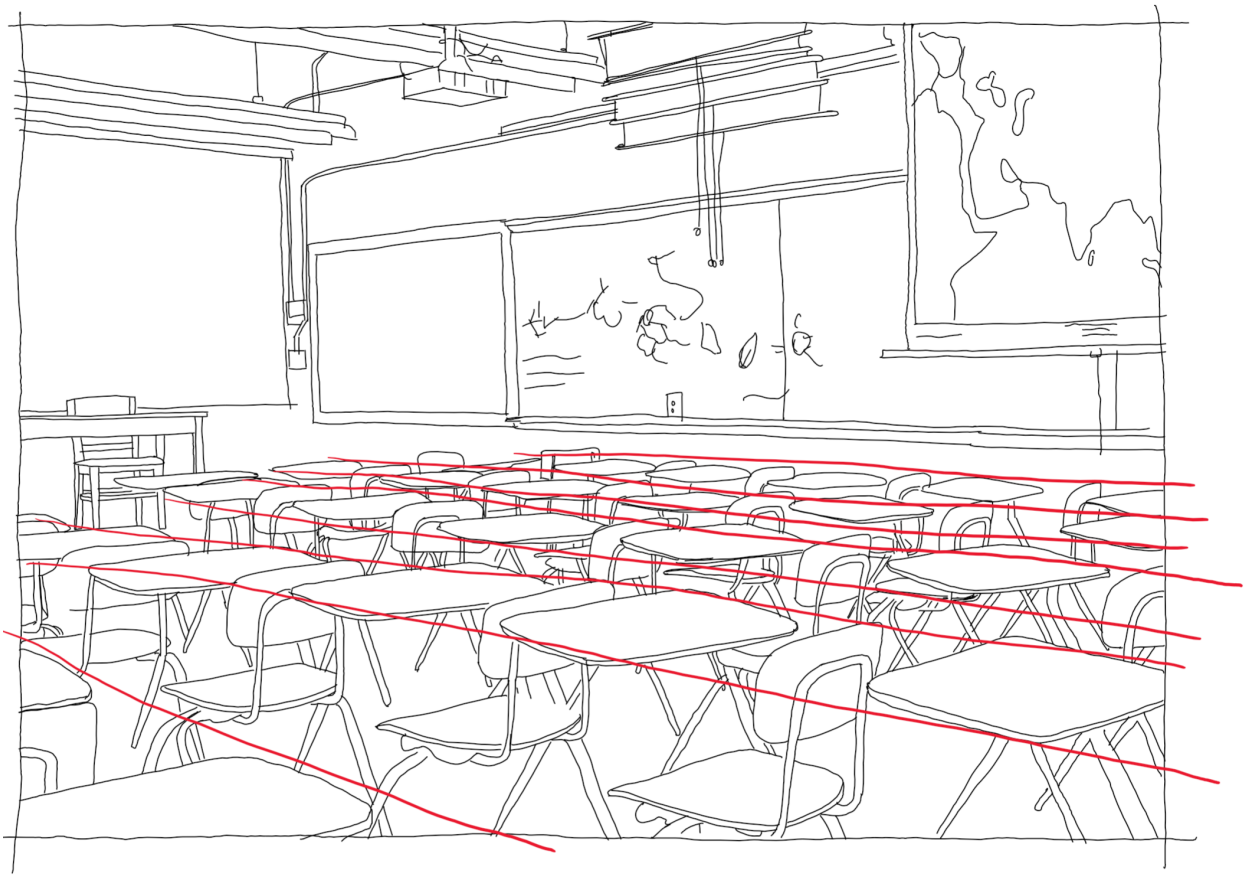


FIG 1.07 I MODERN LEARNING ENVIRONMENT - CURRENT MODEL (BRADBEER, 2011)

DESCRIPTION

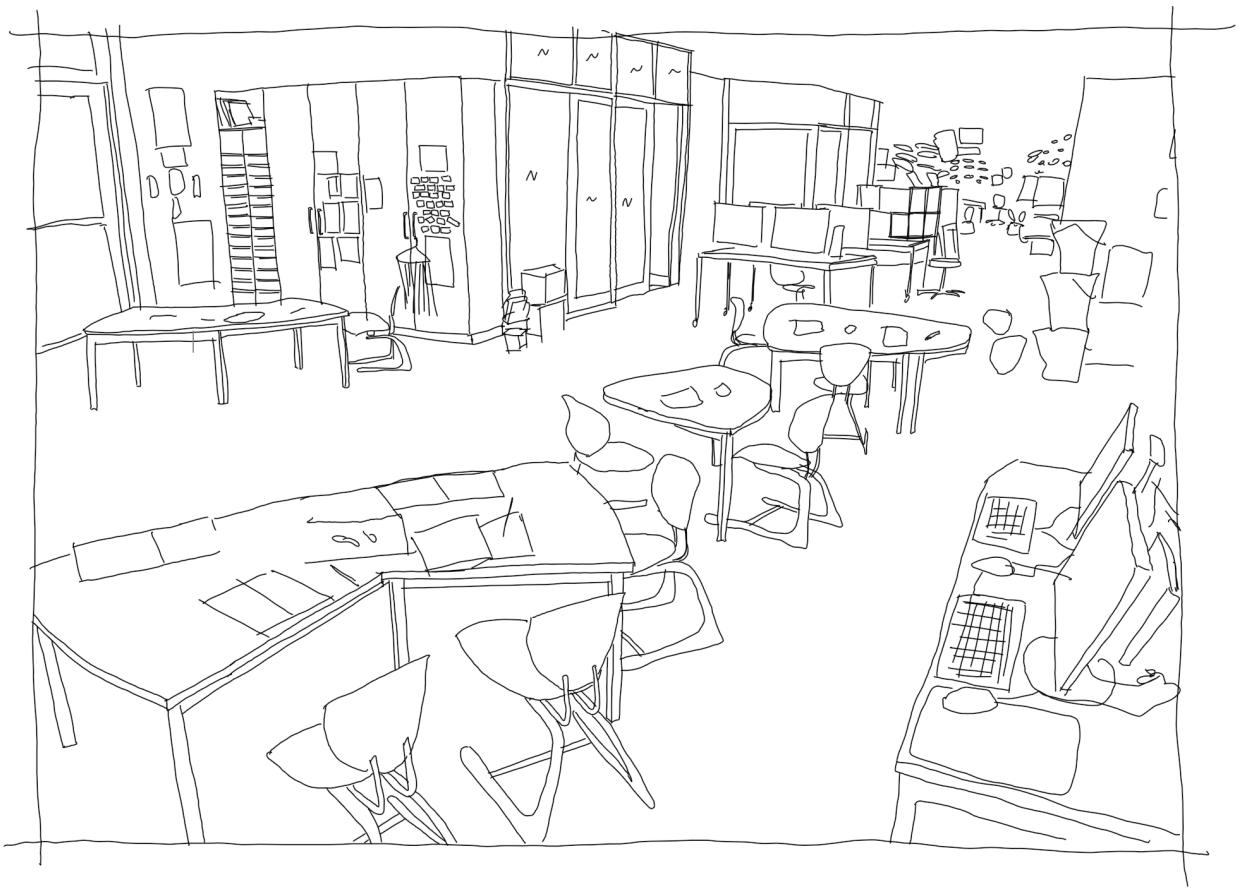
Innovative learning environments primarily focus on collaboration within group activities (FIG 1.07). Design consists of one large open plan classroom with many classroom activities occurring simultaneously.

STRENGTHS

- Promotes collaboration within group activities
- Workshop-based

WEAKNESSES

- Reduced acoustic performance for children – speech intelligibility can be hard to achieve
- 100-300 students with 3-5 teachers



2.0

RESEARCH METHODOLOGY

Research Question:

How can architecture **facilitate participation** for children with impairments and initiate a more **adaptable, inclusive and playful** approach to design?

RESEARCH METHODOLOGY

2.1 RESEARCH AIMS & OBJECTIVES

The research seeks to address the current architectural barriers that prevent children with impairments, such as mobility, visual, hearing, and intellectual impairments, from attending school. It aims to improve the architectural performance criteria within an improved pedagogical environment for children with or without impairments. The research aims to stimulate or potentially restore an individual's skills, improve teacher and learner relationships and promote self-directed or self-chosen play.

The research objective is the design of an alternative primary school which can facilitate participation for children with impairments within an inclusive environment by integrating play, accessibility and support for caregivers and children.

2.2 RESEARCH METHODOLOGY

The methodology of this thesis employs research-led design strategies to develop an initial design, then engages with design-led research to reach a final design. A multidisciplinary literature review was used to develop strategies for designing learning spaces for children with impairments as well as establishing performance criteria, case study analysis and site analysis informed by specific design strategies, then digital modelling in a specific context allowed for the testing of ideas.

Within each design phase, an ongoing analysis and self-evaluated reflection feeds into the next design phase through to the final design (FIG 2.01). The first design phase involved designing a basic mass block consisting of programmes beneficial to children, teachers and caregivers. The second design phase involved developing outdoor learning environments and rehabilitative play-centred activities as well as responding to the site conditions. Both Design Phase One and Two were critiqued by practitioners and architectural academics to help strengthen design concepts. The final design phase involved developing a final detailed design to respond to the research question, aims and objectives, programme and all site conditions.

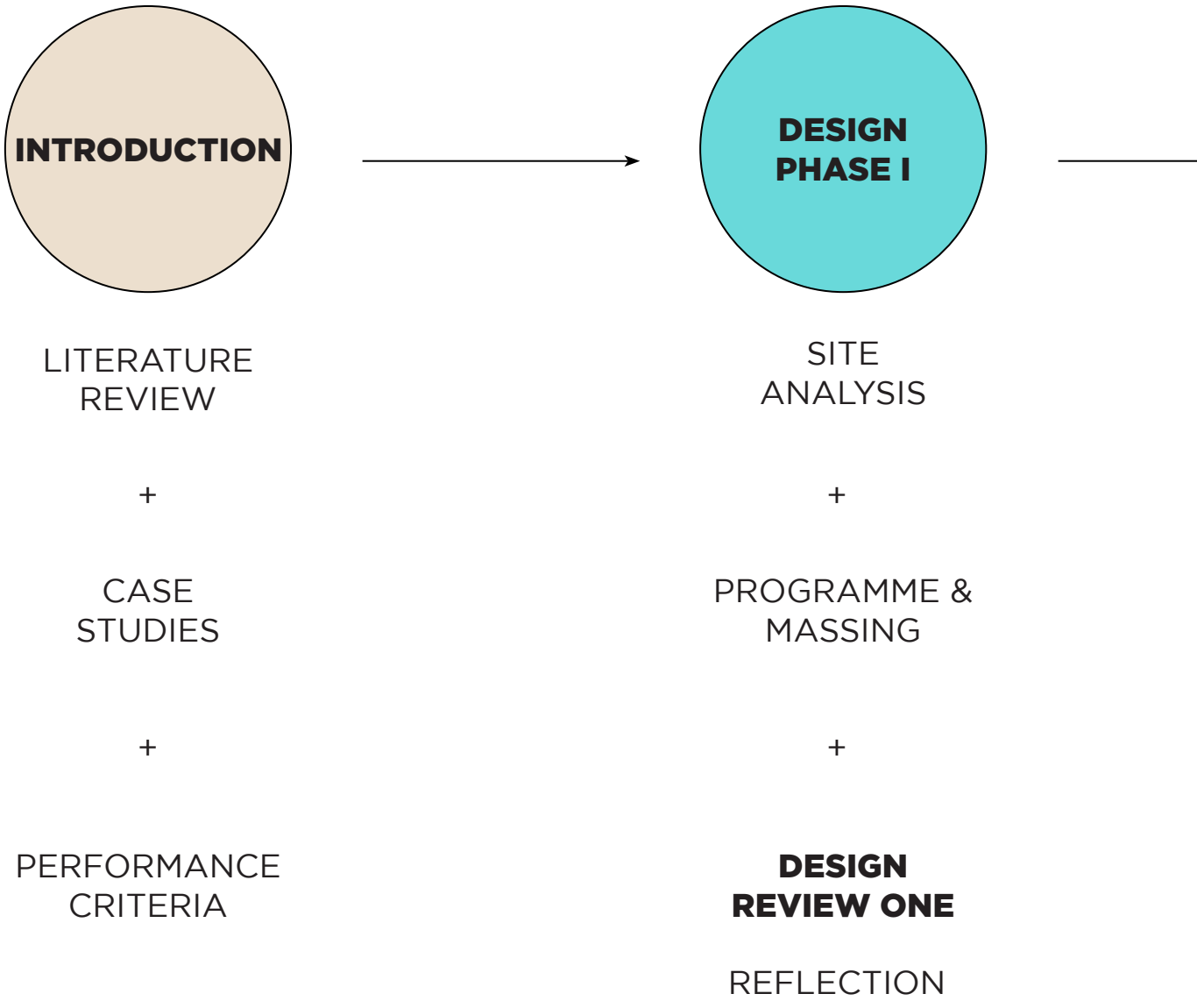
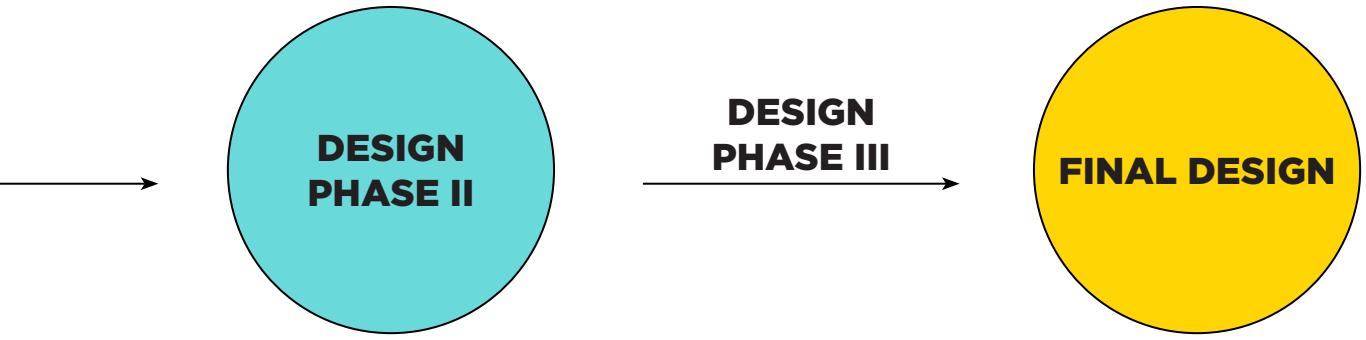


FIG 2.01 I RESEARCH PROCESS SUMMARY



IMPAIRMENT
NEEDS

+

PLAY
INTEGRATION

+

**DESIGN
REVIEW TWO**

REFLECTION

SITE
CIRCULATION

+

COMMUNITY
ENGAGEMENT

+

REFINEMENT
OF DESIGN

CONCLUSIONS

+

REFLECTION

FIG 2.02 I NORTH ISLAND OF NEW ZEALAND

AUCKLAND

11 **SPECIALIST SCHOOLS** **+** **1,419,000** **PEOPLE**

- Arohanui Special School
- Carlson School
- Mt Richmond School
- Oaklynn Special School
- Parkside School
- Rosehill School
- Sir Keith Park School
- Sommerville School
- Sunnydene Special School
- Wairau Valley School
- Wilson School

RATIO **1:2700**

CANTERBURY

3 **SPECIALIST SCHOOLS** **+** **575,000** **PEOPLE**

- Allenvale Special School and Resource Centre
- Ferndale School
- Waitaha Learning Centre

RATIO **1:3400**

WELLINGTON

2 **SPECIALIST SCHOOLS** **+** **514,000** **PEOPLE**

- Kimi Ora School
- Mahinawa Specialist School

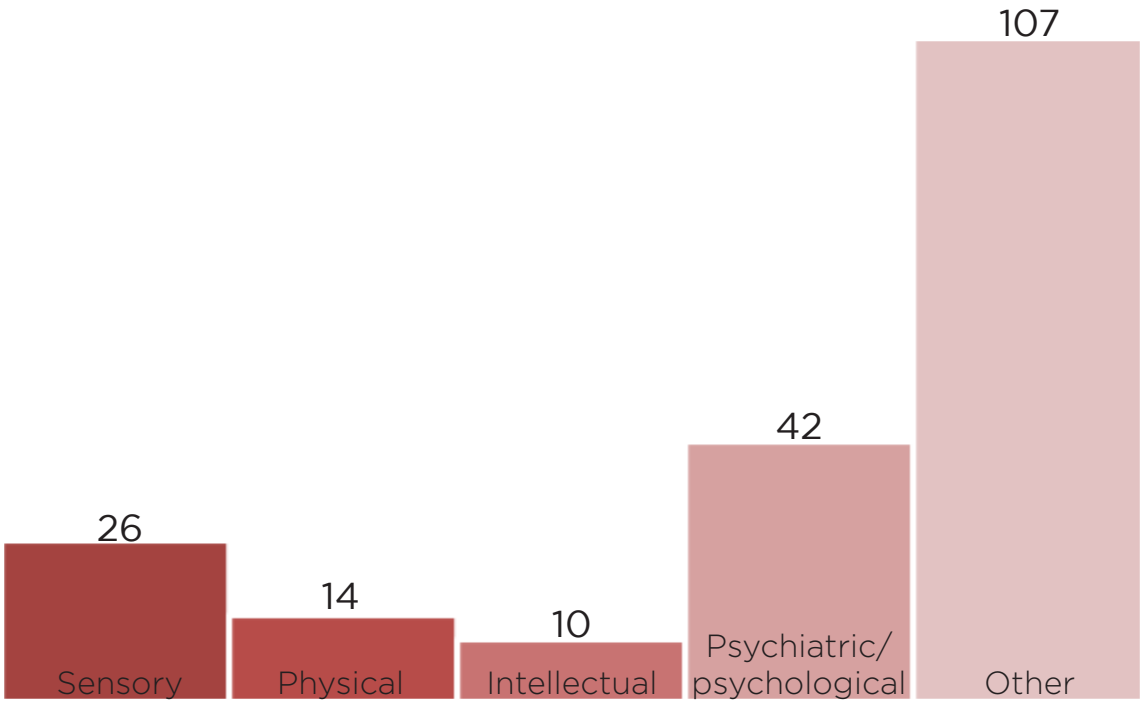
RATIO **1:4600**

FIG 2.03 I DISABILITY SURVEY OF THREE REGIONS (MACPHERSONS, 2013; EDUCATION, 2017)

2.2 POTENTIAL SITES

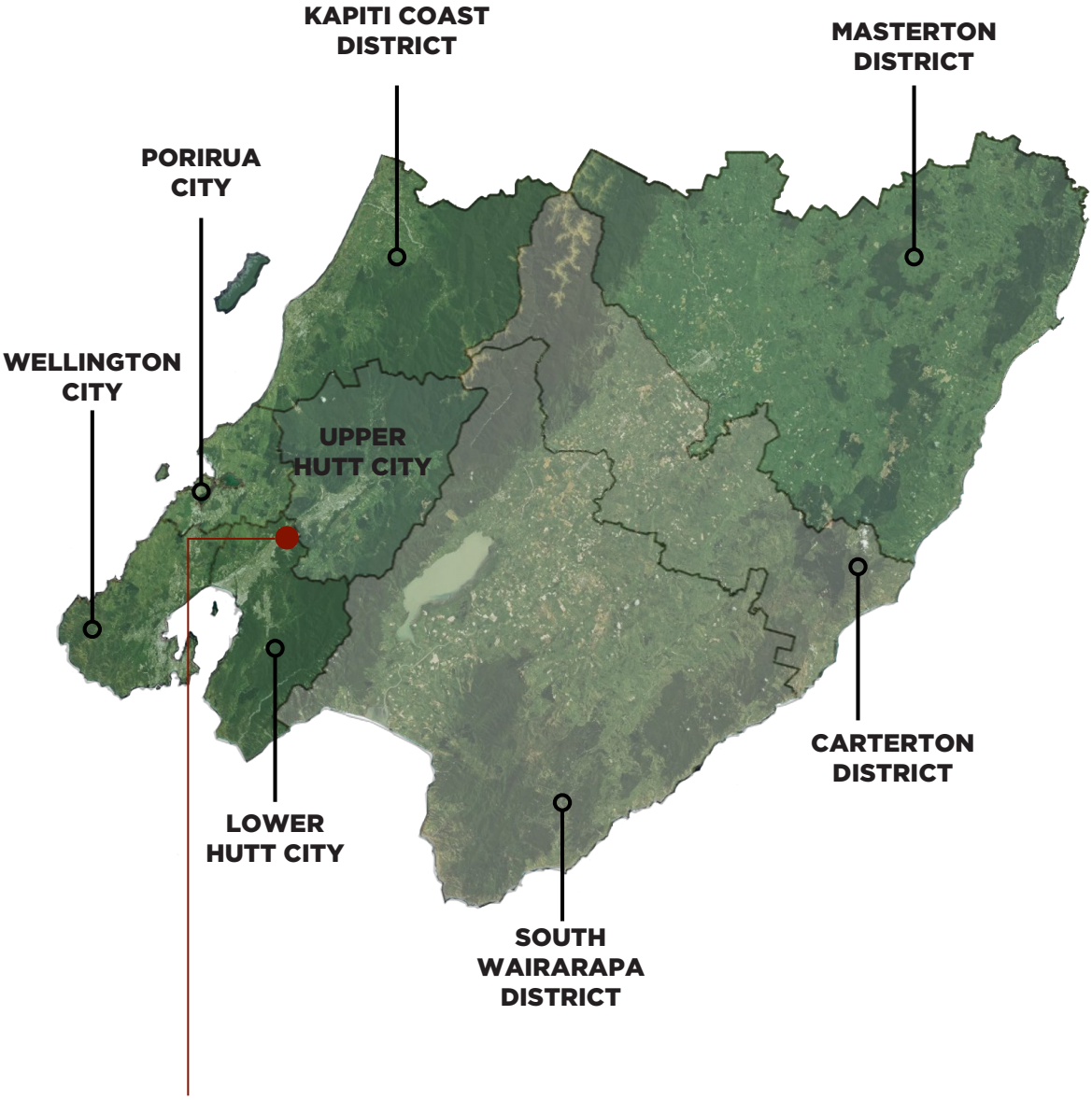
Initial preliminary site selection began with selecting the highest population areas living in a region in New Zealand, it was found that the top three regions were Auckland, Canterbury and Wellington, in respective order (FIG 2.02). In the absence of statistics indicating the number of children with impairments within each region, the ratio from the 'Disability Report', one in every ten children have a disability (World Health Organisation & Worldbank, 2011) and the New Zealand general disability statistics have been applied (FIG 2.04, FIG 2.05) (Statistics New Zealand, 2014). FIG 2.03 indicates the ratio comparing children aged 0-14 to the number of specialist schools that are available to them. Statistics found that Wellington has the highest ratio of children with impairments to available specialist schools, and shows that the ratio in Wellington is almost double compared to Auckland.

Identifying the potential suburb within Wellington that could heavily benefit an alternative primary school was further undertaken. These selections were based on the resident populations, median income and children to adult ratio. These factors are important as family income have a direct impact on the child's education and a child is more at risk of not participating in school when these factors are considered. The selected suburb was Naenae, as the child to adult population ratio was significantly higher compared to other suburbs, as well as having the lowest median income (Statistics New Zealand, 2014). Through a series of site analysis, it was indicated that Naenae town centre was increasingly underutilised, and many commercial shops have been relocated, resulting in facilities being neglected. Based from earlier problem findings for this research, with close proximity of amenities, transportation links and close to the intermediate and college schools, this could address the current issues relating to participation for children with impairments.



'Other' includes impaired speaking, learning, and developmental delay for children aged 0–14 yearst

FIG 2.04 I ESTIMATED TYPE OF DISABILITIES FOR CHILDREN AGED 0-14 IN NAENAE



24% → **1,980** = **200** = **~ 10**

CHILDREN IN NAENAE

CHILDREN AGED 0-14 LIVING IN NAENAE

PROJECTED POPULATION OF CHILDREN WITH DISABILITIES IN NAENAE

CHILDREN COMPLETED THEIR PRIMARY EDUCATION

"ONE OF THE LOWEST PERSONAL INCOME MEDIAN IN WELLINGTON"
(STATISTICS NEW ZEALAND, 2014)

FIG 2.05 I ESTIMATED POPULATION OF CHILDREN WITH IMPAIRMENTS IN NAENAE

3.0

LITERATURE REVIEW

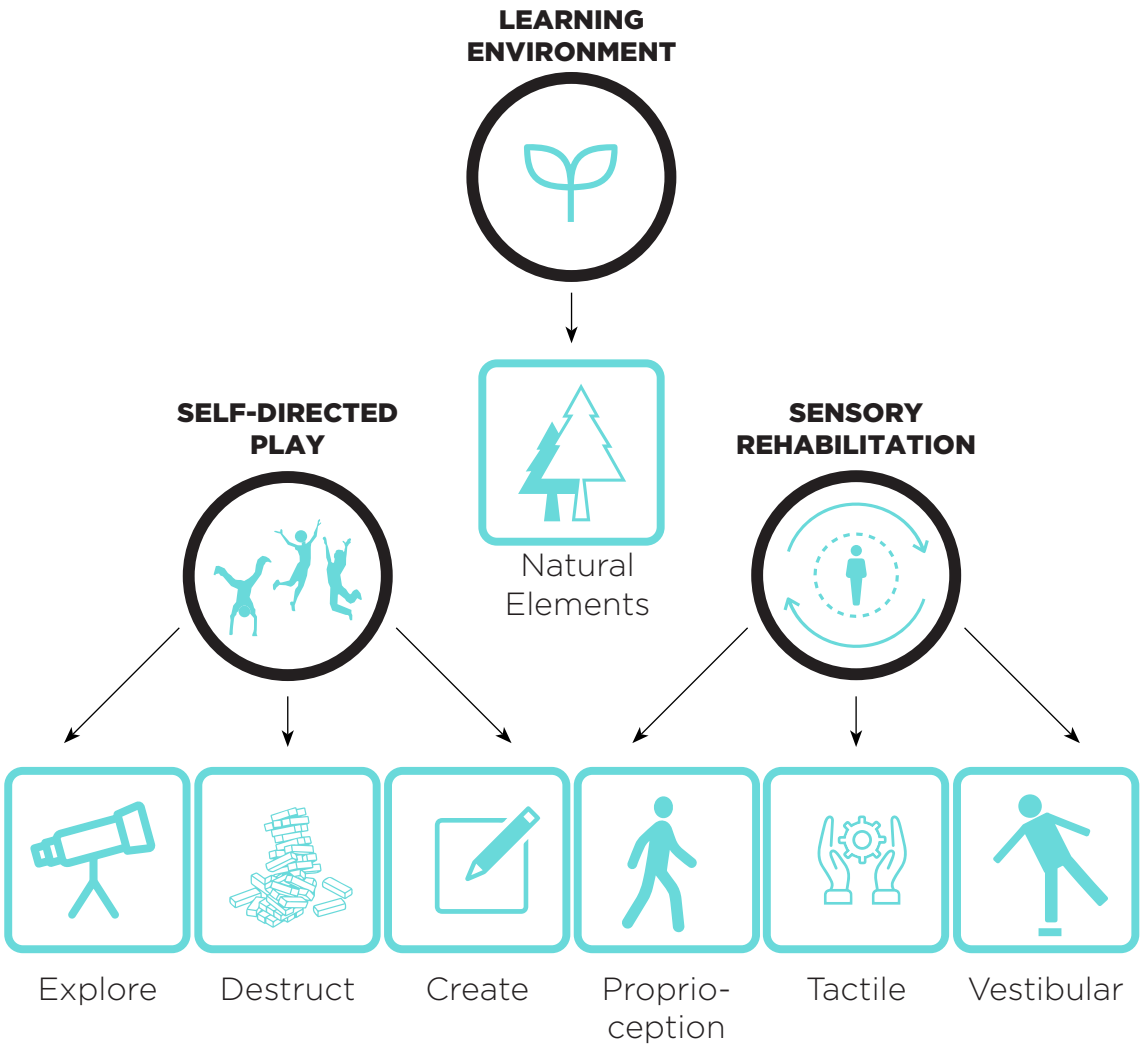


FIG 3.01 I ARCHITECTURE FOR PLAY PERFORMANCE CRITERIA

LITERATURE REVIEW

The multidisciplinary literature review focused on understanding the key barriers to effective school design for impaired children, it was found that play, accessibility and support were important to improving participation for children. The following literature review is categorised as architecture for play, architecture for accessibility and architecture for support.

3.1 ARCHITECTURE FOR PLAY

In this section, the summarised performance criteria are illustrated in FIG 3.01. The literature review indicated that architecture for play should consider the following criteria:

1. Learning Environment
    - Natural elements
2. Sensory Rehabilitation
    - Proprioception
    - Tactile
    - Vestibular
3. Self-directed play
    - Explore
    - Destruct
    - Create

3.1.1. LEARNING ENVIRONMENT

*"Outdoors can be described as an **open and constantly changing environment**, where it is possible to **experience freedom, gross and boisterous movements, and contact with natural elements**. While playing outside, children **benefit from being exposed to sunlight, natural elements, and open air, which contributes to bone development, stronger immune system and physical activity.**"*
(Bento & Dias, 2017, p. 157)

Outdoor learning environment offers restorative qualities that can facilitate therapeutically and reduce stress levels to improve cognitive fatigue. Research found that children within outdoor learning environment display more physical activity behaviours in free play on the playground than in physical education class (Barbour, 1999). The "…equipment, materials and spatial delineation in outdoor learning environments influence children's physical and social skill development", which "promotes or constrains the physical involvement and peer interactions of children with varying levels of physical competence" (Barbour, 1999, p. 94). A study also found that the physical layout of the outdoor learning environment and design elements such as spatial density, clear circuits for movement and a high lookout tower increases play activities for children with autism (Anaby et al., 2013, p. 1594). There is a correlation between the spatial arrangement within outdoor learning environment to physical activity, these criteria need to be considered to provide a more effective and productive learning experience for children with impairments.

Design elements within outdoor environment must include views of natural elements or direct contact with natural elements to allow occupants to feel a sense of retreat and fascination (Hartig & Evans, 1993; Kaplan & Kaplan, 1989). Direct contact with natural elements, such as "sticks, rocks, flowers, soil, water, etc., are explored with curiosity and drive to learn, as they offer countless possibilities to play" (Anaby et al., 2013, p. 1594). Access to animals and plants was found to be therapeutic for children with physical impairments (Bento & Dias, 2017) and could "uplift the human spirit and promote healing" (Evans & McCoy, 1998, p. 91). Hence, when children are in contact with natural elements, they can experience a sense of 'retreat or fascination' that enables them to rehabilitate, play and explore their skills, passions and interests.

3.1.2. SENSORY REHABILITATION

*"Sensory integration is the **organisation of sensations for use**. Our **senses give us information about the physical conditions of our body and the environment around us**. Sensations flow into the brain like streams flowing into a lake. Countless bits of sensory information enter our brain at every moment, not only from our eyes and ears but from every place in our body. We have a **special sense that detects the pull of gravity and the movements of our body in relation to the earth.**"*
(Ayres & Robbins, 2005, p. 5)

Over eighty percent of the nervous system involves processing or organising sensory input and allows the brain to produce useful body responses and useful perceptions, emotions, and thoughts (Ayres & Robbins, 2005). When impairments compromise this ability, they restrict the sorting, ordering, and eventual combining of all sensory inputs together into a whole brain function (Ayres & Robbins, 2005). The lack of sensory integration has been correlated with sensory integrative dysfunction problems which includes "hyperactivity or distractibility, behavioural problems, speech and language delays, muscle tone and coordination problems, learning difficulties at school and adolescence" (Ayres and Robbins 2005, 51-53). As such, sensory integrated activities are found beneficial to foster children with impairments.

Sensory integration therapy involves proprioception, tactile and vestibular therapy to address the specific impairments of the child (FIG 3.02, FIG 3.03, FIG 3.04). Although, these therapies cannot fully restore an impaired child, they can enable them to become more aware and acclimatize themselves to their own impairments. By implementing sensory integrated activities within school environment, increased confidence and self-awareness can be developed which promotes mental wellbeing.

PROPRIOCEPTION SYSTEM

Sensory information from our joints and muscles. This tells us about the position, movement, force, and direction needed for activities (Ayres & Robbins, 2005).

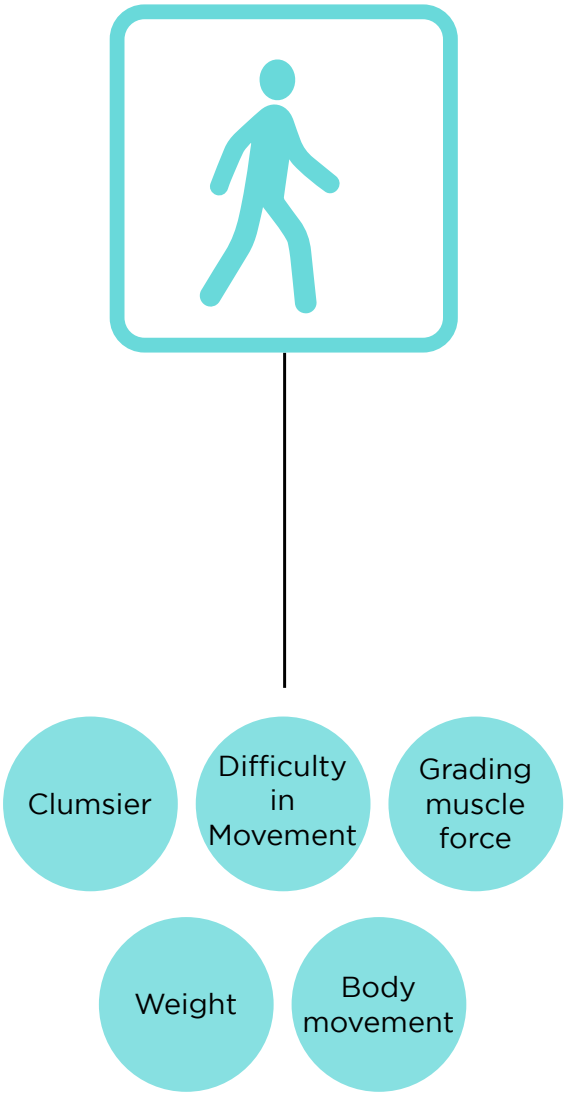


FIG 3.02 I PROPRIOCEPTION DISORDER (RICKETTS, 2008)

TACTILE SYSTEM

Largest sensory system that allows touch sensations flow into the brain to tell us that something is touching us and informs us of body awareness and movement (Ayres & Robbins, 2005).

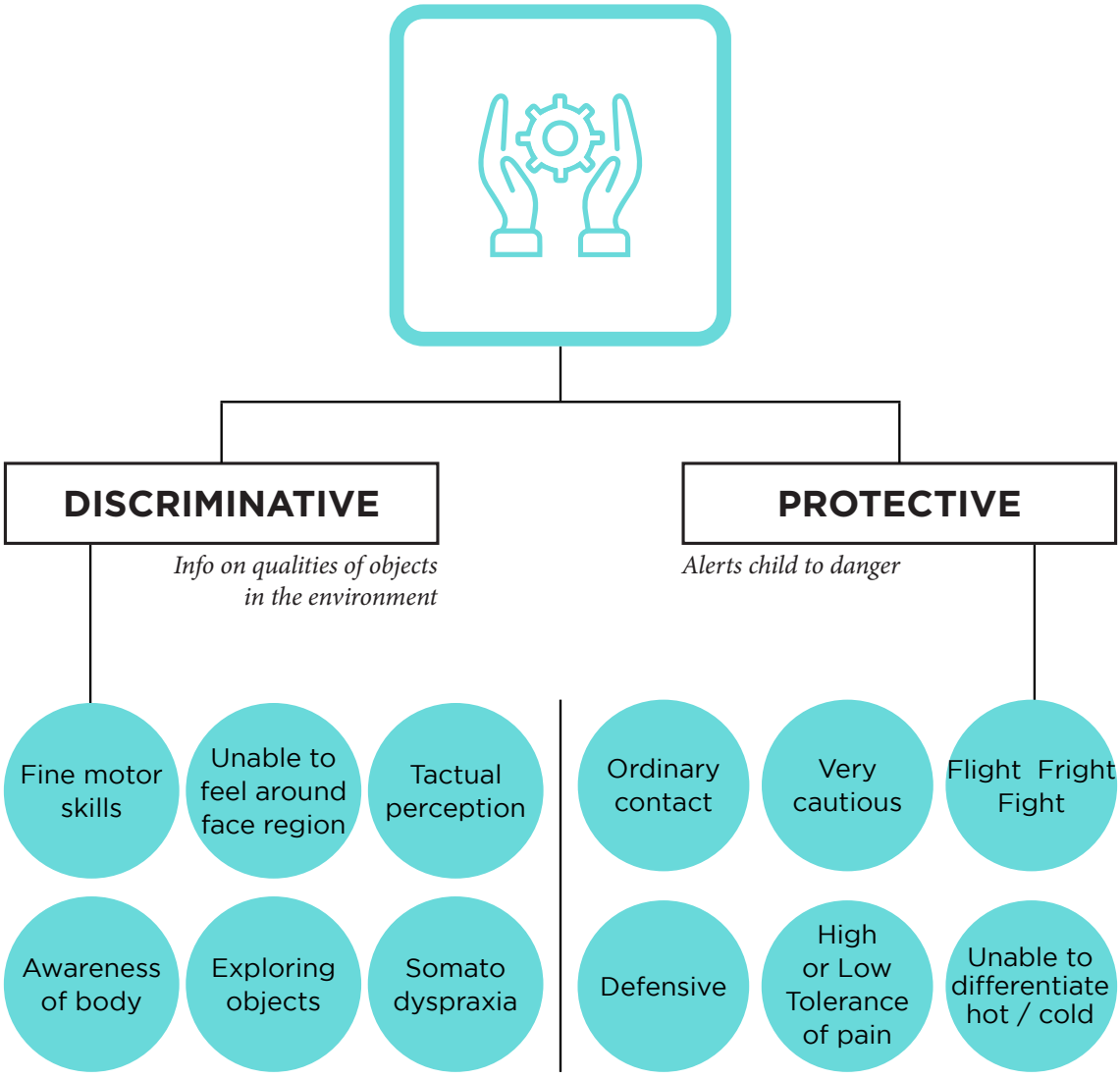


FIG 3.03 I TACTILE DISORDER (RICKETTS, 2008)

VESTIBULAR SYSTEM

Located in inner ear and tells us where we are in relation to gravity; whether we are moving or standing still, and how fast or slow we are going (Ayres & Robbins, 2005).

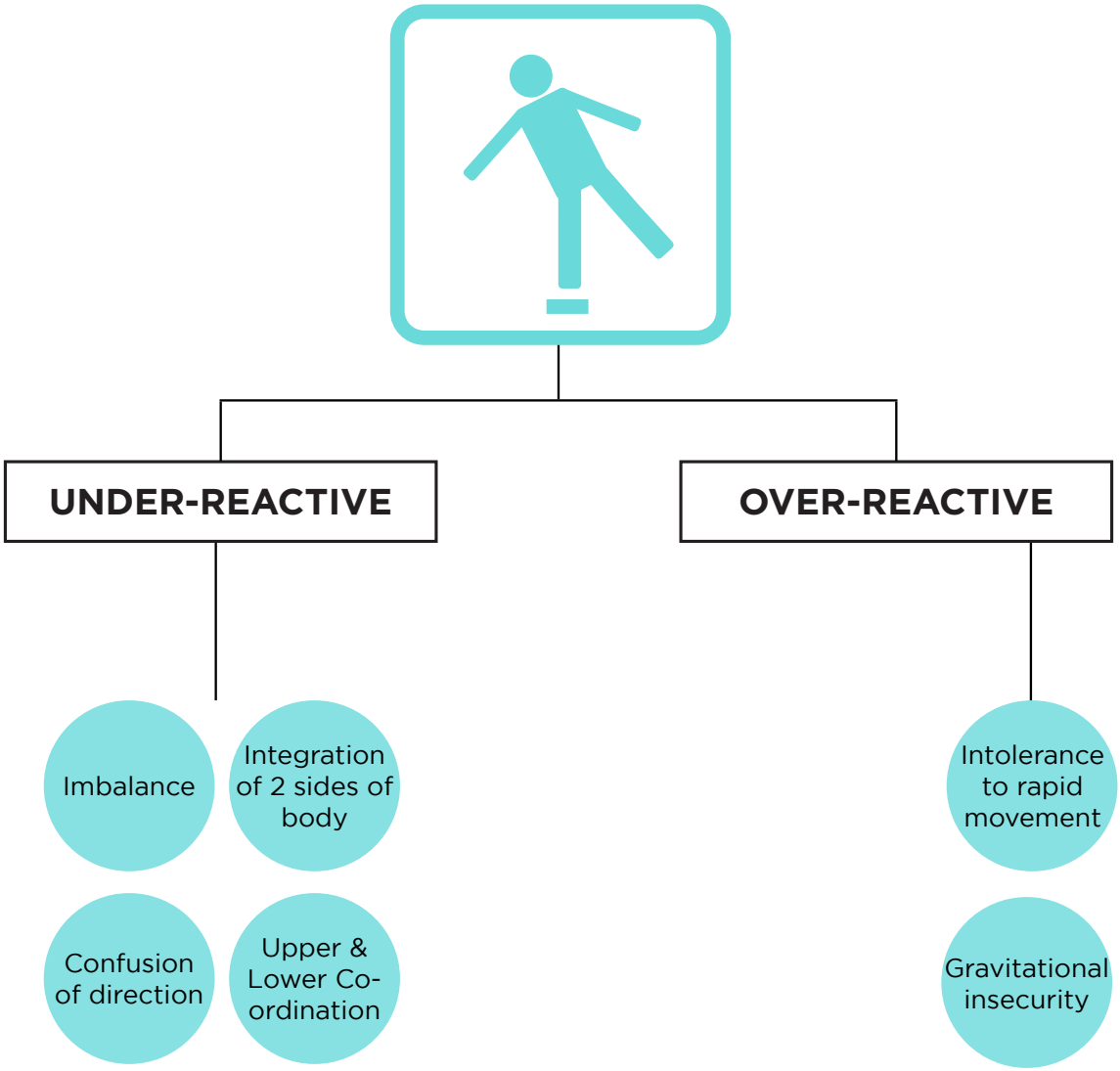


FIG 3.04 I VESTIBULAR DISORDER (RICKETTS, 2008)

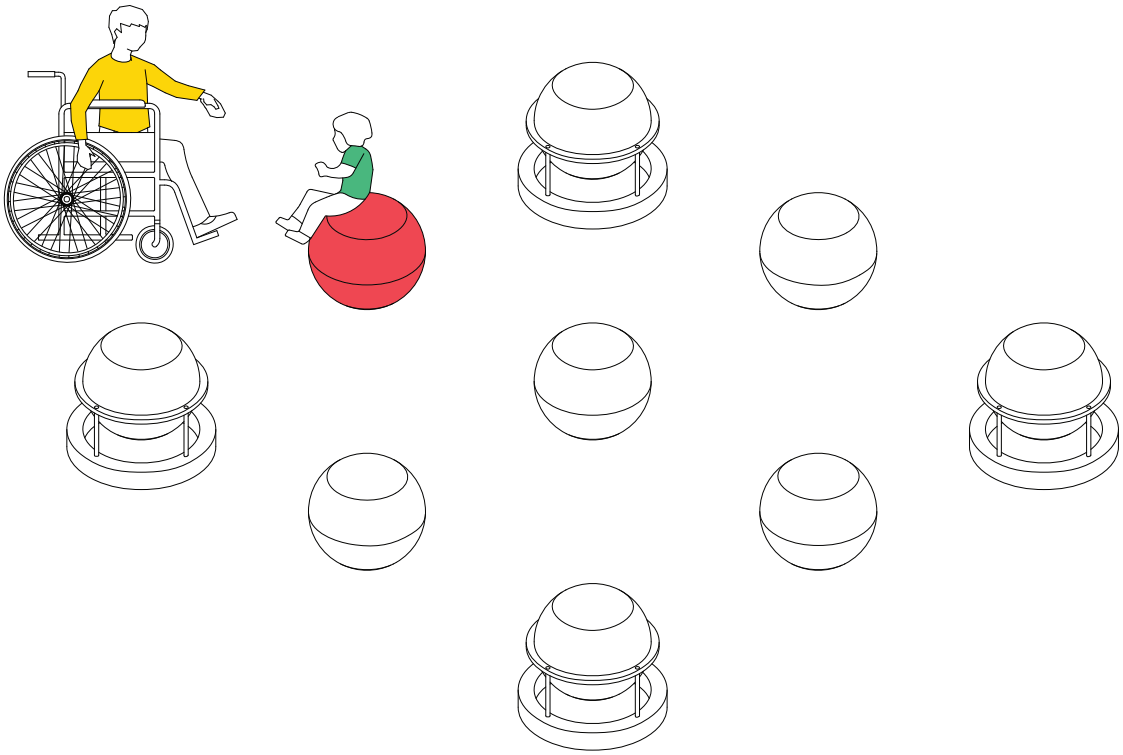
3.1.3. SELF-DIRECTED PLAY

> *"Play allows children to **create and explore a world they can master**, **conquering their fears while practicing adult roles**, sometimes in conjunction with other children or adult caregivers. As they master their world, **play helps children develop new competencies that lead to enhanced confidence and the resiliency they will need to face future challenges.** Undirected play allows children to **learn how to work in groups, to share, to negotiate, to resolve conflicts, and to learn self-advocacy skills.**"*
> *(Ginsburg, 2007, p. 183)*

The importance of play was a key theme in the readings and has been widely recognized as a right of every child. "Play is important as it develops cognitive, physical, social and emotional well-being in children" (National Scientific Council on Developing Children, 2011, p. 4) and is cherished part of childhood (Ginsburg, 2007). However, many parents and teachers disregard play as important for young children (Rothlein & Brett, 1987). With their "hurried lifestyle, changes in family structure, and increased attention to academic and enrichment activities", 'recess or free child-centred play' has diminished (Ginsburg, 2007, p. 182; Gray, 2011).

Through play, children were also about to "use their creativity while developing their imagination, dexterity, and physical, cognitive, and emotional strength" (Ginsburg, 2007, p. 183). Studies found that undirected play also allowed children to learn how participate and work with groups, sharing, negotiate, resolves conflict and to learn self-advocacy skills. As play becomes child-driven, evidence shown that the child begins to practice their own decision-making skills; confidence within themselves which includes them moving at their own pace; discover their own areas of interest and competencies; problem-solving; exert self-control; follow rules; learn to regulate emotions; make friends; and learn to get along with others as equals and experience joy (Ginsburg, 2007; Gray, 2011). Because of play, the child can "ultimately engage fully in the passions they wish to pursue" (Ginsburg, 2007, p. 183; Gray, 2011). Furthermore, play also allow less verbal children to be "…able to express their views, experiences, and even frustration through play, allowing their parents an opportunity to gain a fuller understanding of their perspective" (Ginsburg, 2007, p. 183).

Physical activity also offers children to have a physical release after a change in academic instruction, and "even a formal structured physical education class may not offer the same benefit as free-play recess" (Ginsburg, 2007, p. 184). Although some children thrive in highly scheduled environments, often these environments are accompanied with a reduced time for physical activity and a reduction in the amount of playtime. As such, schools have been held responsible for supporting sedentary lifestyles that can be ill-suited to unearthing the learning potential and academic abilities in children with impairments. Passive surveillance can improve safety and reassurance for the children to access to outdoor play learning environment and address parents' over-protectiveness over children play activity.



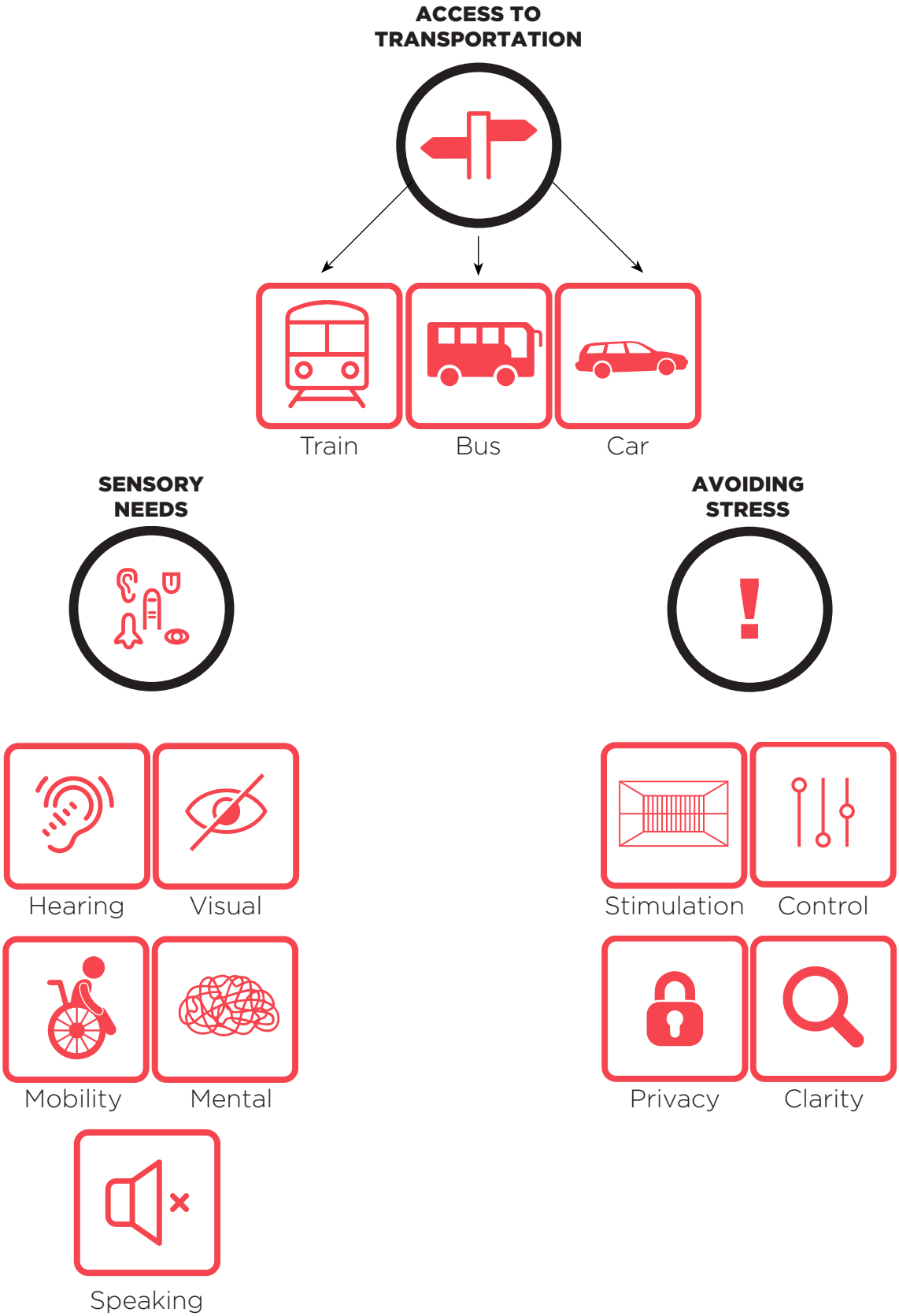


FIG 3.05 I ARCHITECTURE FOR ACCESSIBILITY PERFORMANCE CRITERIA

3.2 ARCHITECTURE FOR ACCESSIBILITY

In this section, the summarised performance criteria are illustrated in FIG 3.05. The literature review indicated that architecture for accessibility should consider the following criteria:

1. Access to transportation
    - Train
    - Bus
    - Car
2. Sensory Needs
    - Hearing
    - Visual
    - Mobility
    - Mental
    - Speaking
3. Avoiding Stress
    - Stimulation
    - Control
    - Privacy
    - Clarity

3.2.1. ACCESS TO TRANSPORTATION

When buildings are inaccessible, participation is lost. Research found that when facilities failed to accommodate the ease of transportation, impaired child (or user) generally stayed at home (Imrie, 2000). Participation enables children to develop their social, intellectual, emotional, communicative and physical potential which is vital for their development, and provide opportunities to develop their skills, interests and abilities (Law et al., 2004). Within public buildings, the architectural elements relating to accommodating transport were found to be designed poorly. Pavements were often obstructed and design for visual impairments were also poorly executed with the poor choice of colour contrasts and tactile indicators (Imrie & Kumar, 1998). Furthermore, while new classroom spaces were designed to promote socialising and collaboration, studies found that "limited attention [was] made towards the accessibility of the learning environments… [the] building structure, access to public transportation, and lack of ramps, elevators and parking space for wheelchairs" (Anaby et al., 2013, p. 1594). This often led users to experience a sense of hopelessness, anger and humiliation to confrontation (Imrie & Kumar, 1998). To create an inclusive school environment, there is a need to consider the access into the building, and to link external journey circulations, such as, the journey between local amenities, transportation areas (eg: bus, train and car) to the entrances of the school building. The design consideration for access to transportation must also include the impaired child's sensory needs to create an inclusive designed environment.

3.2.2. SENSORY NEEDS

A lack of adequate supported areas to store special equipment and access were identified as barriers of children with impairments. Architectural researcher, Rob Imrie discusses that "architects' conceptions of the body have tended to see it as pre-formed, fixed and known, leading some to refer to the ideas and practices of architects as necessarily producing 'standard-fit' design, that is, decontextualized, one-dimensional architecture" (Imrie, 2003, p. 101). Built environments are not equipped and suited for people with impairments and that buildings only represent adult able-bodied values, "like steps and restrictions on entry to buildings", which could only serve to "exclude of produce discomfort or nuisance" (Imrie & Kumar, 1998, p. 359). Studies found that to enhance student's achievement and motivation, school environments need to provide more 'appropriate developmental fit', such as more relevant task, student-directed learning, less of an emphases on grades and competition, more collaboration (Rathunde & Csikszentmihalyi, 2005). Children with impairments require additional learning support; behaviour support; learning aids, ICT, and specialist furniture, fittings and equipment; therapy; multi-sensory stimulation; and personal support and care (Gill et al., 2008). School design that includes the needs of children with hearing, visual, mobility, mental and speaking impairments in school environment can improve participation and reassurance for children to access the learning environment independently.

3.2.3. AVOIDING STRESS

When environmental demands and human resources are not met, stress is often experienced by the user (Evans & McCoy, 1998). A study found that architectural strategies such as stimulation, control, privacy and clarity reduce stress within the built environment (Evans & McCoy, 1998). Evans and McCoy focus on how the building element and form influences the occupant's

stress levels within a space. They emphasize the importance of design consideration when dealing with circulation and internal spaces. Four architectural strategies were recommended, such as stimulation, control, privacy and clarity.

Stimulation is the amount of information within a setting that affects the user negatively and positively (Evans & McCoy, 1998). It was found that overstimulation can cause distraction and interfere cognitive processes which affects concentration, as well as leading user to experience boredom or sensory deprivation when they are under stimulated. These stimulations are often influenced by spatial configuration, circulation systems and the activity of the space (Evans & McCoy, 1998).

A sense of control within an environment can provide users with a sense of control of their activity or self-directed play. "Control is defined herein as mastery or the ability to either alter the physical environment or regulate the exposure to one's surroundings" (Evans & McCoy, 1998, p. 88). It was found that when the sense of control is loss, this "threatened individual needs to effectively interact with interior space", which could lead to reduced participation in the activity (Evans & McCoy, 1998, p. 88). For participation within school to be meaningful, there must be "a feeling of choice or control over the activity, a supportive environment to facilitate easy attention to the activity, a focus on the task and not on the long-term consequences, a sense of challenge from the activity, and sense of mastery" (Law, 2002; Meyer, 1922). Architectural spaces need to include appropriate physical constraints, flexible spatial arrangement and climatic and lighting control.

Privacy is the "ability to regulate social interaction", it provides user the sense of solitude and intimacy to "buffer some of the negative impacts of crowding and noise" (Evans & McCoy, 1998, p. 89). The ability to control during social interaction is an important facilitator towards a sense of control within interior settings (Evans & McCoy, 1998). Spatial hierarchy through "provision of spaces ranging from places that provide solitude and intimacy, through small group meetings" can also provide a sense of power and control as the desires of the individual desires has been met (Evans & McCoy, 1998, p. 89). Architectural spaces need to include spatial resources, lighting control, spatial hierarchy and furnishings.

Clarity or comprehensiveness of building elements and form within the built environment provides ease of movement and wayfinding within a space (Evans & McCoy, 1998). It was found that user experienced frustration, annoyance, hostility and helplessness when there are disruptions in physical surroundings, ambiguity and misinformation that could make prediction difficult (Evans & McCoy, 1998). Architectural spaces must consider signage, pathway configuration, building element, form and geometry and predictability.

3.3 ARCHITECTURE FOR SUPPORT

In this section, the summarised performance criteria are illustrated in FIG 3.06. The literature review indicated that architecture for support should consider the following criteria:

1. Teacher – Student Relationship
    - Facilitate learning
    - Community assistance
2. Peer Support
    - Collaboration
    - Leadership
3. Caregivers Support
    - Support group
    - Counselling

3.3.1. TEACHER - STUDENT RELATIONSHIP

To make education more appealing and effective, appropriate pedagogical methods need to be integrated to enhance systems interactivity and personalisation and engage the learners effectively (Zhang et al., 2004). To improve the teacher and children relationship, the architectural implications indicates that there is a need for secluded area within each learning environment to allow teachers to communicate with students. Design guides often suggests that children with impairments should work in a small group and one-to-one work with support staff and specialist teachers (Gill et al., 2008). It was found that the group sizes taught by one teacher should range between eight to fifteen children with moderate needs; or six to eight children with severe needs; or four to six children with profound needs (Gill et al., 2008). To provide a longer lasting and meaningful participation, self-directed learning was found to be effective

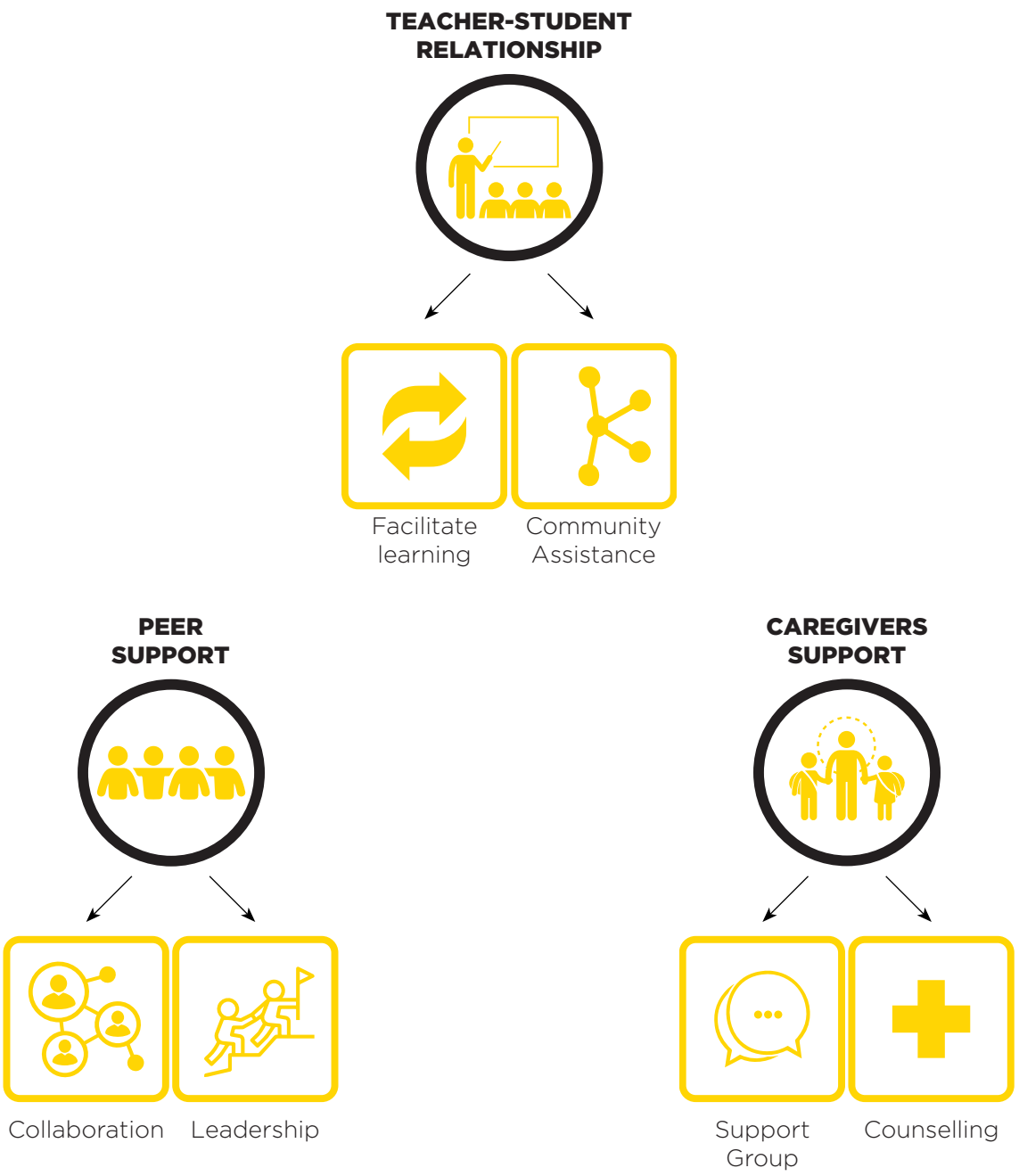


FIG 3.06 I ARCHITECTURE FOR SUPPORT PERFORMANCE CRITERIA

among children with impairments (Law et al., 2004). Hence, this suggests that the learning spaces should be activity-based programme, monitored by teaching assistants and support staff working alongside teacher to teach children individually or in groups.

3.3.2.PEER SUPPORT

The presence of peers in a playground plays an important role in the development of the child's perceptions and their impressions of classmates aiding in the development of their peer relationships (Barbour 1999). Social spaces that allow peer engagement could offer collaboration among younger impaired children. Furthermore, it was found that peers in a playground also played an important role in the development of the child's perceptions and impressions of their classmates and in the development of their peer relationships (Barbour, 1999). Hence, not only children without impairments benefit from playing with children with impairments, they are able to develop leadership and learn to be more collaborative (King, Petrenchik, Law, & Hurley, 2009). The design for the impaired child and everyone can be beneficial for them to develop into psychologically healthy and emotionally competent adults.

3.3.3.CAREGIVERS SUPPORT

Parental and caregiver support can also foster social participation and friendship development (Anaby et al., 2013, p. 1594). Research found that informal caregiving for children with impairments, was reported that it has beneficial spiritual impact for caregivers(Marshall et al., 2003). Studies suggests that community can support and promote a caregiver's health (Murphy et al., 2007). Participation in community-based leisure activities can thereby develop the quality of life within the community and promote health for children (Anaby et al., 2013, p. 1589). The ability for children with impairments to participate actively in the community is also one of the most important contributors to their own health and wellbeing (Law et al., 2004). Cultural orientations and family recreational, this was found to also have a direct correlation to the intensity of leisure participation (Anaby et al., 2013, p. 1595). Hence, the architectural program needs to include community spaces that could promoting active engagement and longer-lasting participation for both caregivers and children. This could also improve the quality of life and improve the physical and mental well-being.

Lower family income and parental education level also have a direct impact towards lower participation levels in children (Bult et al., 2011). The level of stress is higher within lower income family, through fostering stress recovery, could be highly beneficial for children with impairments. Hence, potential intervention may be needed such as support groups, activities for parents outside the family, and ensuring access to mental health professionals could be ideal to foster stress recovery in order to reduce the progressiveness nature of some of the impairments for children with impairments. Through these activities, higher caregiver education program could increase participation in children (Bult et al., 2011).

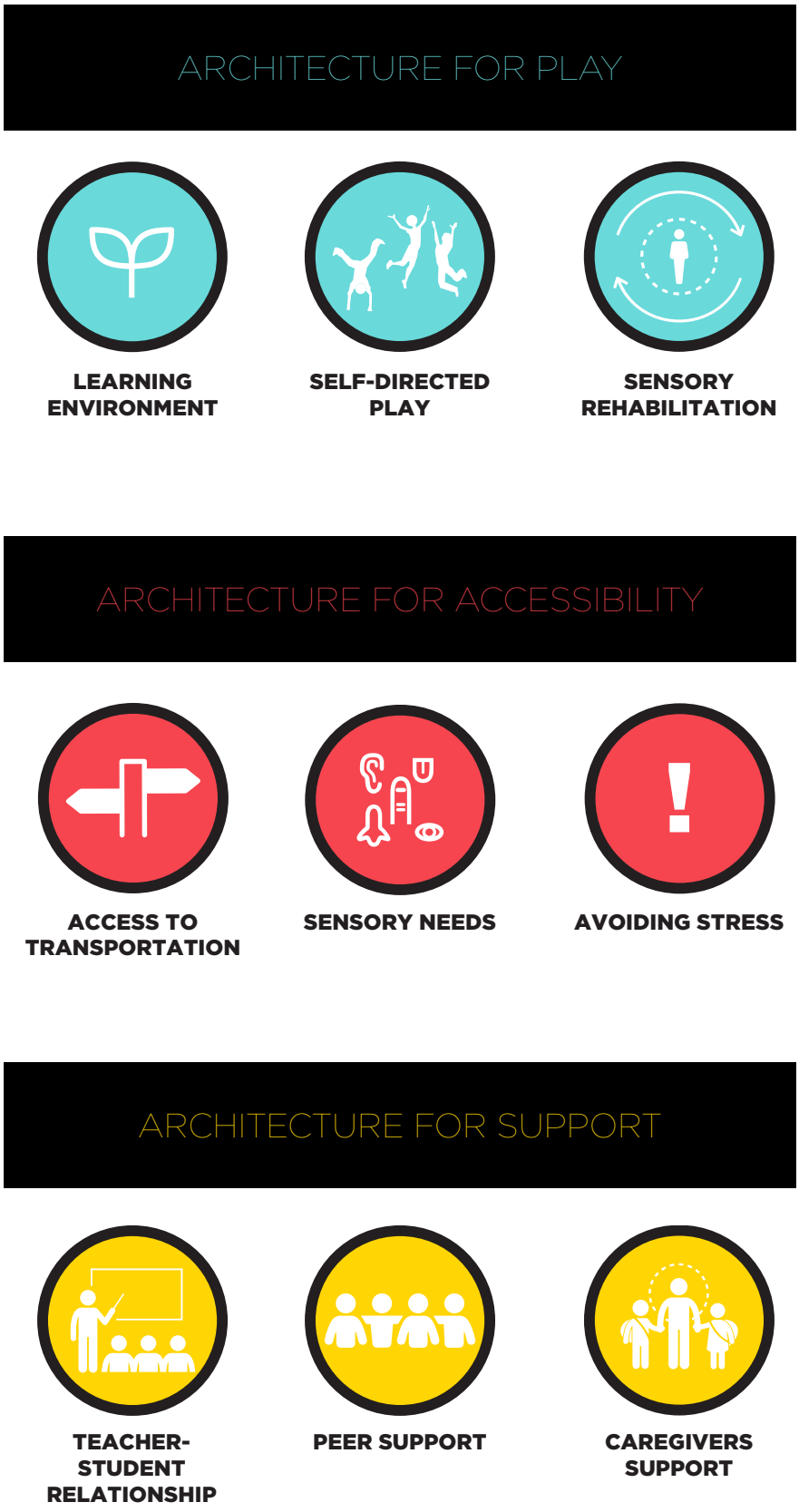


FIG 3.07 I PERFORMANCE CRITERIA SUMMARY

LITERATURE REVIEW

3.4 CONCLUSION & REFLECTIONS

The literature review revealed many different architectural and therapeutic strategies towards improving participation for children with impairments. The project identifies design strategies within learning environment that facilitate participation for primary school to be more adaptable, inclusive and playful. Appropriate design parameters for the development of a learning environment of the green world that can be adequately equipped to facilitate children with impairments' education have been developed. Studies found that to successfully implement workshop-based or problem-based learning, the design of the learning environment must stimulate students towards "…constructive, self-directed, collaborative and contextual learning and in consistency in or alignment between all aspects of the curriculum" (Dolmans et al., 2005, p. 736).

As explored in this literature review, this research portfolio aims to:

1. Design an alternative primary school which can facilitate participation for children with impairments within an inclusive environment by integrating play, accessibility and support for caregivers and children.
2. Address the current architectural barriers that prevent children with impairments, such as mobility, visual, hearing, and intellectual and speaking impairments, from attending school.
3. Demonstrate and improve the architectural performance criteria within an improved pedagogical environment for children with or without impairments.
4. Stimulate or potentially restore an individual's skills
5. Improve teacher and learner relationships
6. Promote self-directed or self-chosen play and group activities.
7. Provide caregiver and community support

Studies highlighted the significance of outdoor learning spaces and the importance of play that could promote physical activity. The architectural theory has given insight into how participation could be improved and towards creating architecture that is inclusive, adaptable and playful. Through this literature review, the design outcome needs to achieve the following performance criteria that will be used for design experimentation (FIG 3.07). This includes:

- Architecture for Play
    1. Outdoor Environment
    2. Self-Directed Play
    3. Sensory Rehabilitation
- Architecture for Accessibility
    1. Access to Transportation
    2. Sensory Needs
    3. Avoiding Stress
- Architecture for Support
    1. Teacher-Student Relationship
    2. Peer Support
    3. Caregivers Support

The literature review has addressed the current issues relating to children with impairments and caregivers. It was found that participation in community-based leisure activities can develop the quality of life within the community and promotes health for everyone (Anaby et al., 2013, p. 1589). With cultural orientations and family recreational, this was found to also have a direct correlation to the intensity of leisure participation (Anaby et al., 2013, p. 1595). Hence, the architectural program of the school has shifted towards more community-engagement spaces which can promote further active engagement and longer-lasting participation for both caregivers and children. This could improve the quality of life, improve physical and mental well-being for children with impairment, caregivers and the community.

4.0

CASE STUDIES

PROJECT	**FUJI KINDERGARTEN SCHOOL**
ARCHITECT	**TEZUKA ARCHITECTS**
LOCATION	**TACHIKAWA, TOKYO, JAPAN**
YEAR OF COMPLETION	**2017**

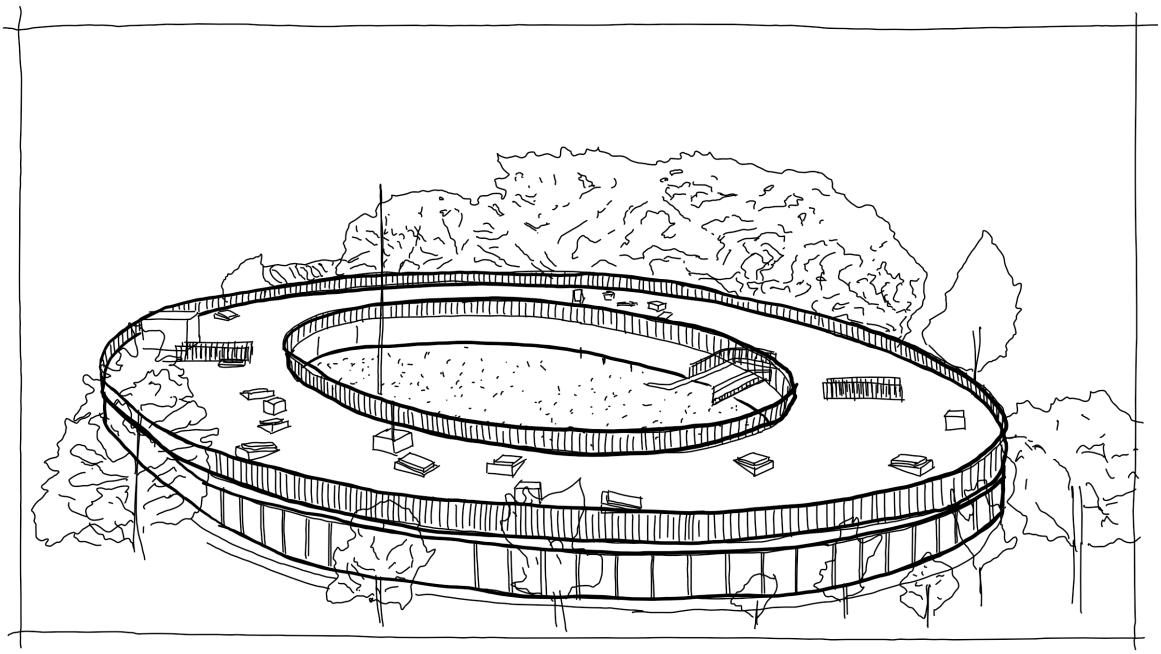


FIG 4.01 I FUJI KINDERGARTEN SCHOOL

In this chapter, to understand how these principles have been addressed in practice, five case studies were analysed:

1. Fuji Kindergarten School by Tezuka Architects
2. LEGO House by Bjarke Ingels Group
3. Hazelwood School by Alan Dunlop
4. Blur Building by Diller Scofido and Renfro
5. Montessori School by Herman Hertzberger

The Fuji Kindergarten school design by Tezuka Architects in Tokyo is a leading school promoting self-directed play. This school features an accessible oval roof with a circular open plan space in the centre of the building, that allows play activities on the roof as well as views into internal activities (FIG 4.01). The physical boundaries combined with continuous space provides endless opportunities for play. The building caters for 640 children every year and operates during normal school hours. Architecturally, the building demonstrates "green building practice in forms that are legible for children, and [shows] how environmental sustainability can be incorporated in buildings in a way that has a positive impact on the children" (Scott, 2010, p. 91). Sustainable practices were used as a part of the education program. The children "use pumps to get drinking water, a novelty that also leads to an understanding of its source" (Scott, 2010, p. 91).

A study found that children who went to Fuji Kindergarten School on average walked four thousand meters during school hours, and had much higher athletic abilities compared to other school (Tezuka, 2015). Furthermore, the roof is accessible to both children and teachers, passive surveillance by adults can provide safety and security. Throughout the architecture, the building uses natural elements to be part of play activities, this offers restorative qualities to foster stress recovery and enhance learning in the individual. Studies found that direct contact with natural elements and views of nature could provide restoration (Hartig & Evans, 1993; Kaplan & Kaplan, 1989).

STRENGTHS

- Promotes self-directed play
- Activities utilise natural elements that provides endless opportunities for play
- Student-centred learning

WEAKNESSES

- Building permeability within internal spaces could have bad acoustic performance
- Internal spaces might be overstimulating to some impaired child

PROJECT	**LEGO HOUSE**
ARCHITECT	**BIG (BJARKE INGELS GROUPS)**
LOCATION	**7190 BILLUND, DENMARK**
YEAR OF COMPLETION	**2017**

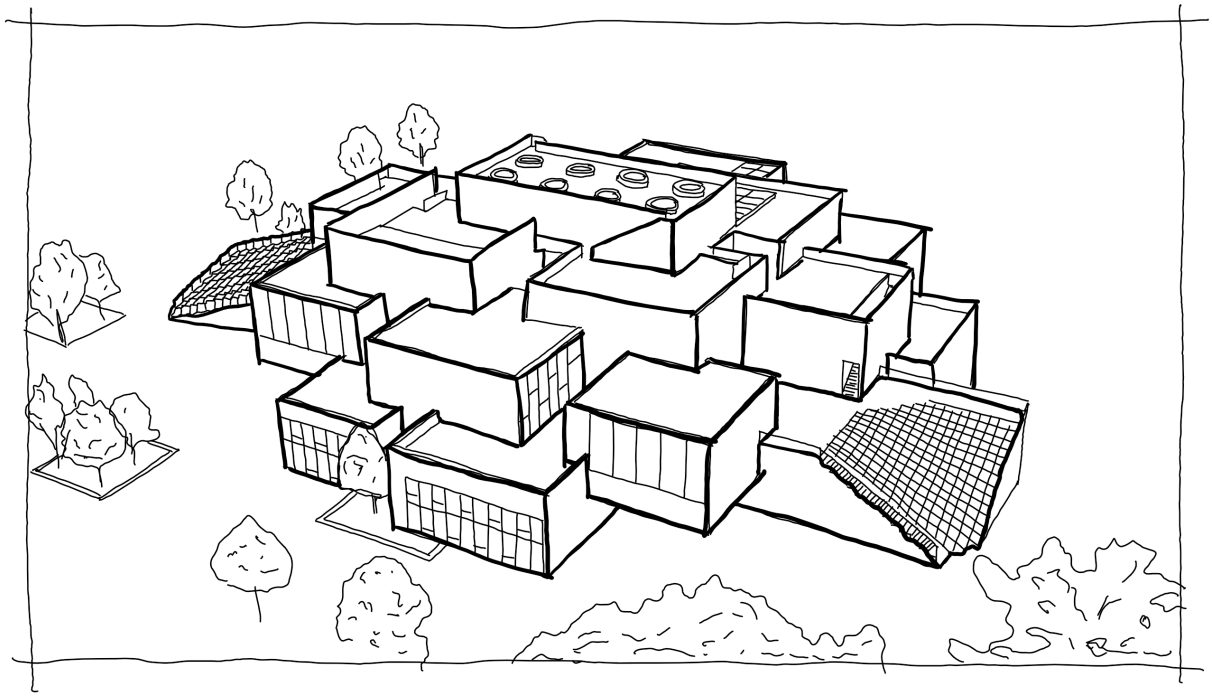


FIG 4.02 I LEGO HOUSE

DESCRIPTION

The Lego House designed by Bjarke Ingels Group, includes paid attractions and free areas that are open to the public. This building contains “21 white bricks stacked on top of other, crowned by an oversized 2x4 Lego block named the ‘keystone’ (FIG 4.02) (Stevens, 2017). And each year there are approximately 250,000 guests, with 2,500 visitors on peak days (Stevens, 2017). Furthermore, the aesthetics of the large white bricks “creates space for indoor activities, while simultaneously providing shelter public space, filled with 25 million LEGO bricks, the 12,000 square meter building contains a series of ‘experiences zones’, comprising two exhibition areas and four colour-coded play areas that each symbolise a special aspect of play and learning” (Stevens, 2017). Red was used to encourage creativity, blue to encourage cognitive skills, green to encourage socialising and yellow for emotional skill development. Ground floor consists of general stores, restaurants, conference facilities and 2,000m2 of public square. The aim of this building is to “celebrate creativity and the strength of learning through play” (Stevens, 2017).

STRENGTHS

- Engage children to be more playful and creative
- Passive surveillance
- Colour zoning was used to successfully separate the type of programmes.
- Engages wider selection of people

WEAKNESSES

- All play programmes seem relatively similar
- Lack of exposure to natural elements; the building seems a bit sterile for younger children.

IMPLICATIONS FOR DESIGN

- Multigenerational - Programmes are open to all ages
- Zoned areas for different types of play to incorporate different programme to offer different types of learning

PERFORMANCE CRITERIA MET

ARCHITECTURE FOR PLAY

ARCHITECTURE FOR ACCESSIBILITY

ARCHITECTURE FOR SUPPORT

PROJECT	**HAZELWOOD SCHOOL**
ARCHITECT	**ALAN DUNLOP ARCHITECTS**
LOCATION	**GLASGLOW, SCOTLAND, UK**
YEAR OF COMPLETION	**2007**

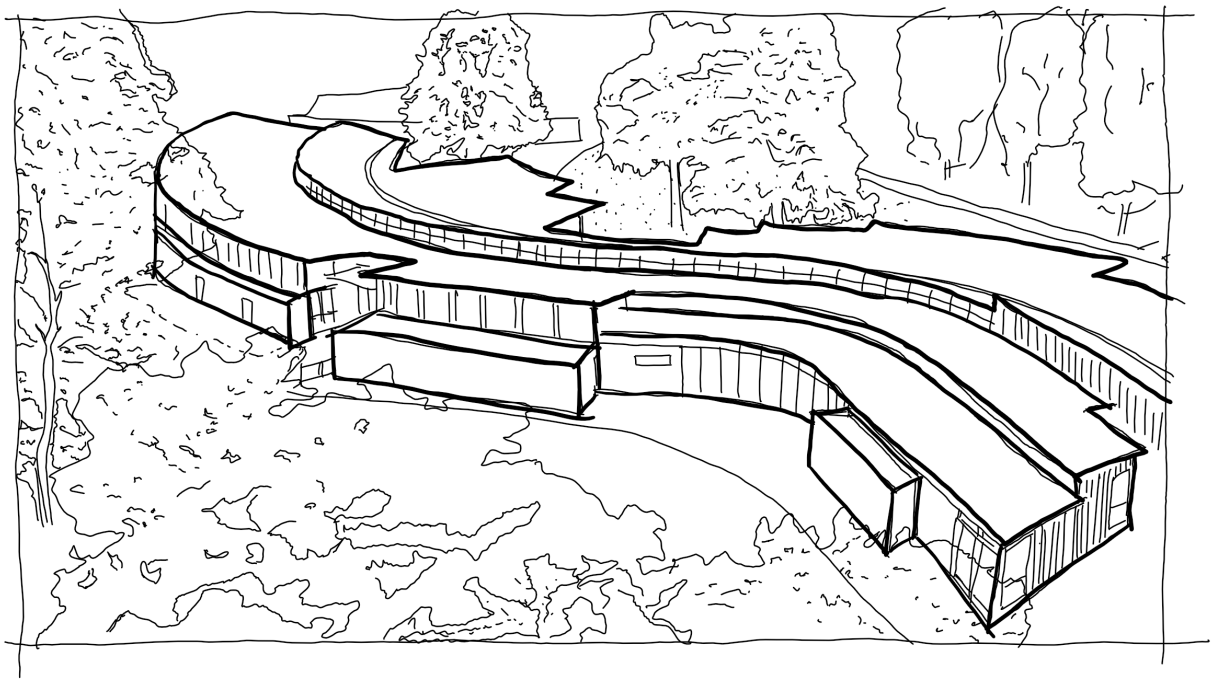


FIG 4.03 I HAZELWOOD SCHOOL

DESCRIPTION

"A school to delight the senses, where taste, touch, smell and an awareness of surroundings could help promote a sense of independence and could act as sensory cues."
(Dunlop, 2011, p. 2)

The Hazelwood School by Alan Dunlop Architects was designed for children with visual and hearing impairments, aged 2 to 18. The architect was determined to create "a school which would support the needs of the children and he aspirations of their parents, a place of safety and ambition that would free the teacher and inspire the child" (Dunlop, 2011, p. 2). Through careful planning and consideration, the architecture allows those children to navigate easily through tactile system on the wall and liner circulation throughout the building (FIG 4.03). As children with visual and hearing impairment are unable to see or hear, the architecture appeals to their other sense to orientate and encourage independence for the children.

STRENGTHS

- Children with visual and hearing impairment can be independent.
- Easy access - Linear circulation
- Structural elements are made up of natural resources – Some contact of natural element

WEAKNESSES

- Limited opportunities to play
- Segregation from children without impairments

IMPLICATIONS FOR DESIGN

- Tactile system for impaired children to navigate through the building
- Linear Circulation
- Contrasting colour were used to assist children with partial visual impairments

PERFORMANCE CRITERIA MET

ARCHITECTURE FOR PLAY

ARCHITECTURE FOR ACCESSIBILITY

ARCHITECTURE FOR SUPPORT

PROJECT	**BLUR BUILDING**
ARCHITECT	**DILLER SCOFIDIO & RENFRO**
LOCATION	**YVERDON-LES-BAINS, SWITZERLAND**
YEAR OF COMPLETION	**2001-2002**

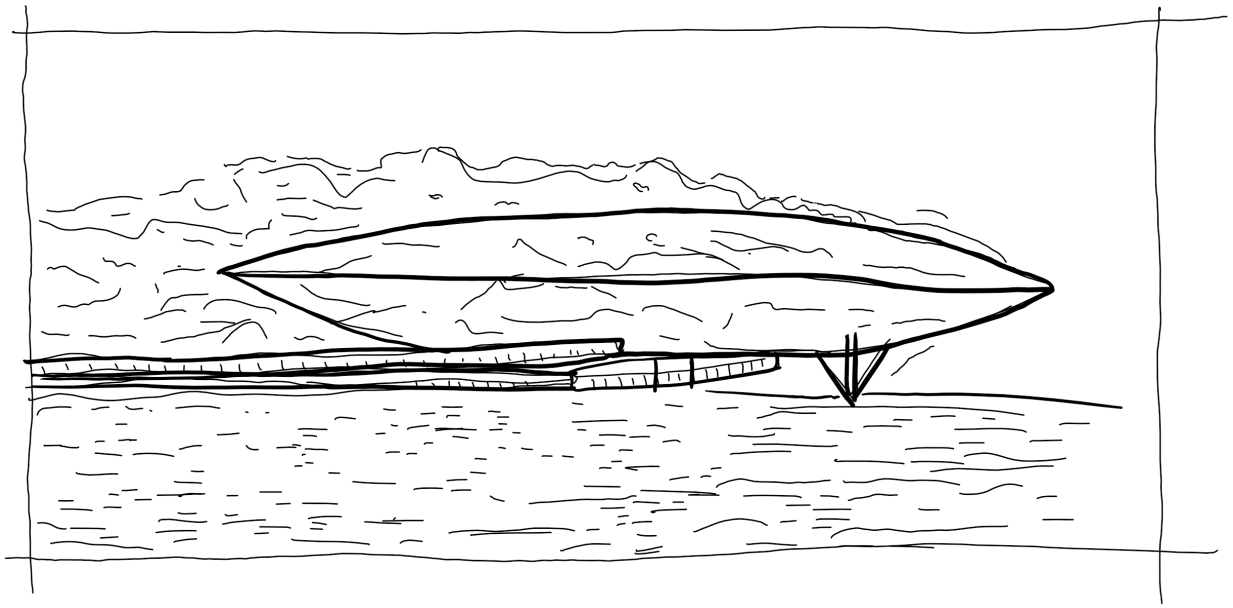


FIG 4.04 I BLUR BUILDING

DESCRIPTION

The Blur building is a large open-air platform where the movement is not defined (FIG 4.04). The visual and acoustic senses are removed from the space, while heightening the physical senses, this precedent was interesting as the visual and hearing senses were erased, the occupants became more aware and cautious of the surroundings.

STRENGTHS

- Mystery or under-predictability leads to exploring type of play
- Exercises user's tactile senses
- Interesting concept – architecture plays with our other senses

WEAKNESSES

- Under stimulation after a long period of time, boredom could occur.

IMPLICATIONS FOR DESIGN

- Creating mystery, can lead to user to explore their surroundings.

PERFORMANCE CRITERIA MET

ARCHITECTURE FOR PLAY

ARCHITECTURE FOR ACCESSIBILITY

ARCHITECTURE FOR SUPPORT

PROJECT	**MONTESSORI SCHOOL DELFT**
ARCHITECT	**HERMAN HERTZBERGER**
LOCATION	**DELFT, NETHERLANDS**
YEAR OF COMPLETION	**1960-1966**

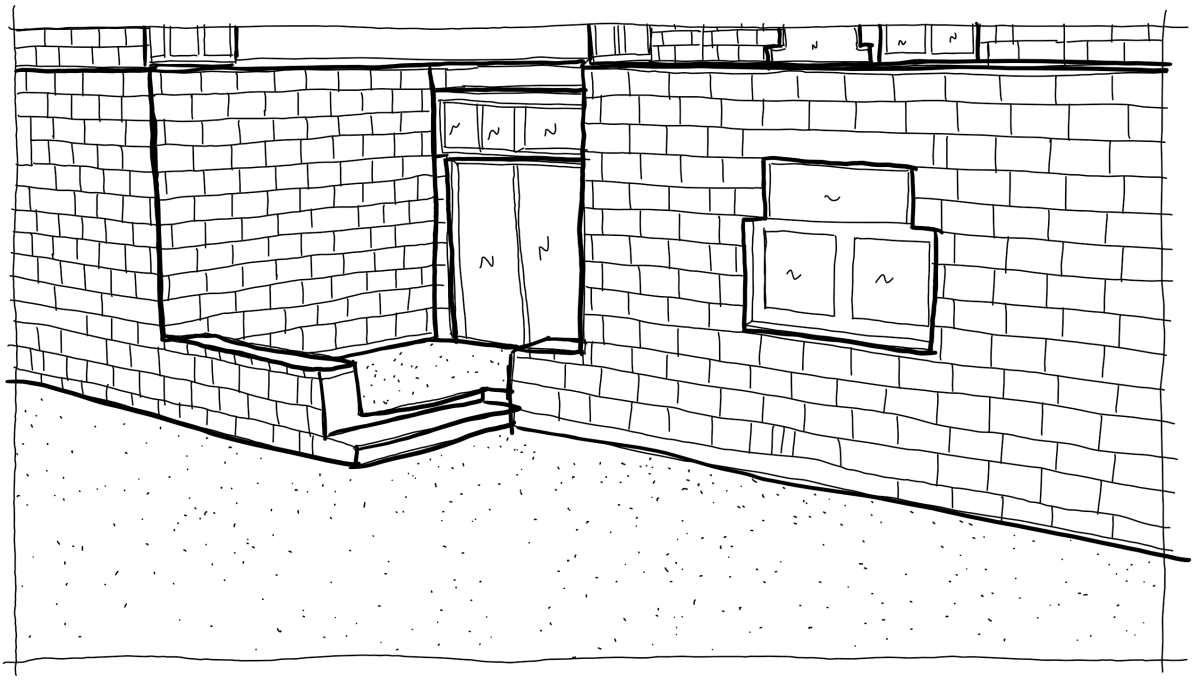


FIG 4.05 I MONTESSORI SCHOOL DELFT

DESCRIPTION

The Montessori school designed by Herman Hertzberger, has a spatial arrangement that allows the building to be extended over the years (FIG 4.05). Furthermore, the spatial articulation between classroom "permits activities to take place simultaneously without one disturbing the other" (Hertzberger, 2016). The L-shaped classrooms provides different zones of concentration and together they provide extended corridor space that allows children to use for learning, group work, social activity, etc. Furthermore, children are able to access the playground after school hours to maximise more time for self-directed play. This Montessori method focusses on creating "a school environment that fostered deep engagement and concentration", that triggers their 'intrinsic motivation' (Rathunde & Csikszentmihalyi, 2005, p. 347).

Hertzberger discuss how the architecture of education is about learning "how to live together, relationships with other people, knowing how to negotiate, how to help people with difficulties, to have a creative approach to everything, so all sorts of things are part of education" (Hertzberger, 2016, p. 8). His ideas essentially explore design strategies for open learning environments that evoke a sense of curiosity and encourages self-directed learning. This offers a more engaging type of learning tool as opposed to teacher feeding information to children. Hertzberger emphasises that architecture for the education must oriented towards physical and mental accommodation and this is important as it is about improvement of conditions and human dignity (Hertzberger, 2008).

STRENGTHS

- Easy surveillance for teachers with openness and transparency
- Flexibility
- Acoustic performance is easier to achieve
- Breakout spaces for introverted child
- Shared and collaborative spaces available
- Student-centred focussed

WEAKNESSES

- Student-centred approach needs feedback
- Concrete design might seem sterile – lack natural elements

IMPLICATIONS FOR DESIGN

- Student-centred learning environments
- Small group work type of programme within learning environment

PERFORMANCE CRITERIA MET

ARCHITECTURE FOR PLAY

ARCHITECTURE FOR ACCESSIBILITY

ARCHITECTURE FOR SUPPORT

CASE STUDIES

4.6 CONCLUSION & REFLECTIONS

The performance criteria generated from the literature review was used to identify some architectural design strategies that could be integrated into the alternative school design. The methodology of evaluation for these case studies were identifying the strengths and weaknesses and implication for design. Those case studies were:

1. Fuji Kindergarten School by Tezuka Architects
2. Lego House by Bjarke Ingles Group
3. Blur Building by Diller Scofido and Renfro
4. Hazelwood School by Alan Dunlop Architects
5. Island Bay Primary School by Don Jamieson Architecture

Overall, these case studies have indicated some design strategies that needs to be incorporated or avoided:

Incorporate:
- Student-centred learning environments and small group activity spatial arrangement
- Flexible and adaptable spaces
- Multigenerational activities - Programmes are open to all ages
- Incorporate programme into zones to facilitate self-motivated play and learning
- Direct connection with nature
- Rehabilitative activities/therapy for children with impairments
- Tactile system for sensory impaired child to navigate through the building – Floor, colour contrast, walls, etc.
- Create 'mystery' to lead user to explore their surroundings

Avoid:
- Teacher-centred learning environment
- Limited opportunities to play
- Segregation from children without impairments and community activities

In conclusion, through evaluation of these case studies, this has established a series of reasonable design strategies to inform the design-led process for the design phases for this research.

5.0

SITE ANALYSIS

FIG 5.01 | AERIAL VIEW OF PROPOSED SITE


CLINIC &
PHARMACY
NAENAE BOXING
ACADEMY
NAENAE TRAIN
STATION
COMMUNITY HALL
OLYMPIC POOL
POST OFFICE
(RELOCATED)

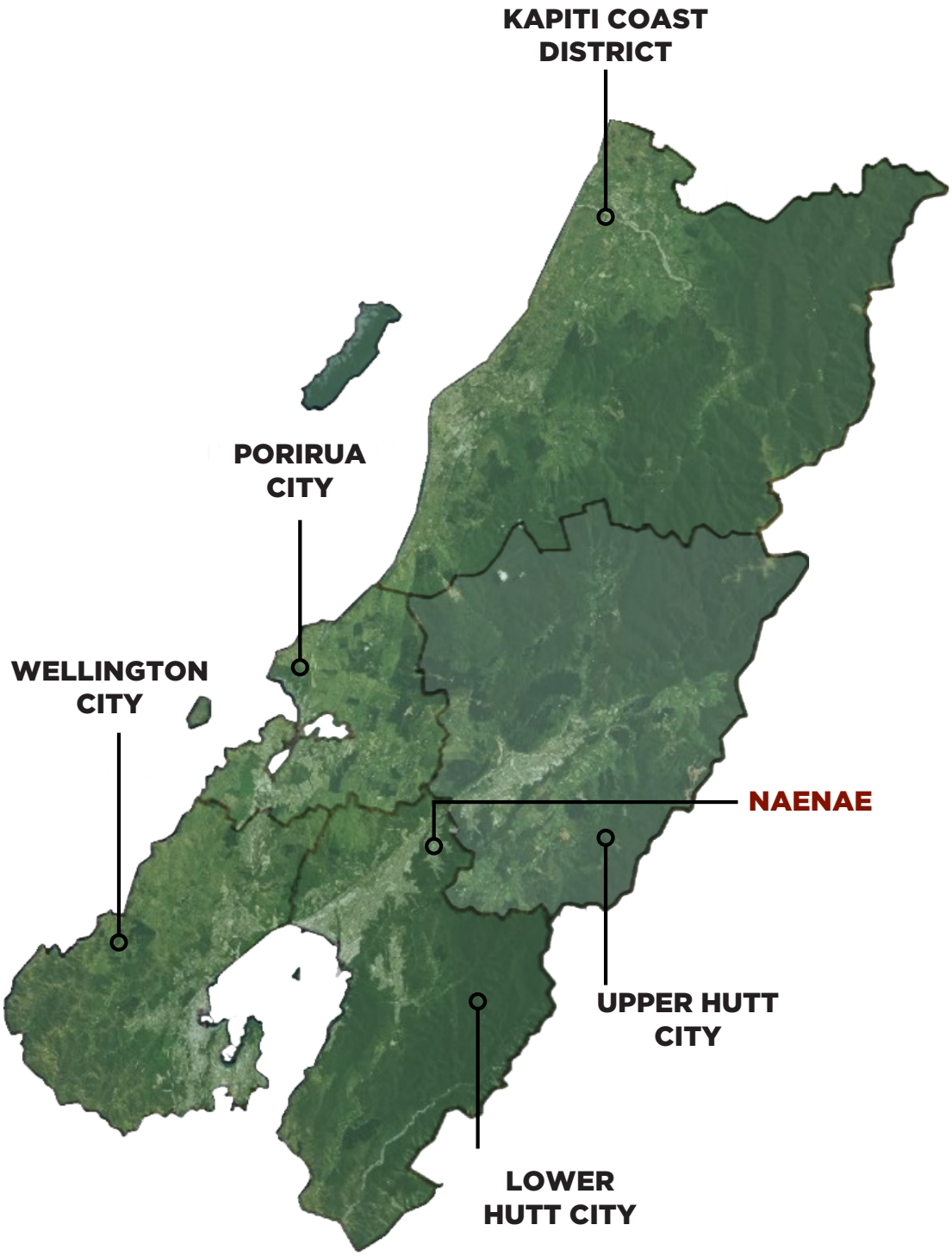


FIG 5.02 I WELLINGTON REGION

SITE (CONTEXT) ANALYSIS

5.1 HISTORY OF NAENAE

"Naenae [was] offered the opportunity to build 'an ideal garden' city in the Hutt Valley…reserves would cover at least 15% of the total area and green corridor would be provided to ensure children could play and walk to school away from motorized traffic." (Schrader, 1996, pp. 69-70).

Ernst Plischke, and Austrian immigrant after the World War II and the 'architect of world repute', was the chief designer of Naenae. Plischke's design concept for Naenae aims to make the community centre the focal point of his design, the complex combines commercial, social and cultural activities and "was aimed at facilitating the development of a community spirit in the suburb" (Schrader, 1996, p. 71). Plischke challenged "the predominantly individualistic and familial focus of the rest of Naenae by creating an environment design to bring about face-to-face contact and chance meetings between residents…the realization of this vision became the goal of Naenae's social planners" (Schrader, 1996, p. 71). Research also found that Plischke's plan was heavily influenced by 'cities of medieval Europe', he found San Marco Square in Venice, have "all [of] the necessary attributes of a modern community centre" (Schrader, 1996, p. 71). Some similarities can be made from San Marco to Naenae Town Centre, Plischke's arrangement was primarily targeted for pedestrian users.

With the rise of popular interests in developing the community centres, the vision for Naenae was an 'active and sociable community' (Schrader, 1996). However, with upcoming election, a change in the government party has forced the project to be abandoned. Lack of government and community support towards the scheme, have forced Naenae to be fully under developed. The public concerns for development of Naenae Town Centre was the lack of child care facilities and the design outcome needed to be less formal (Schrader, 1996). With the absence of community support, the lack of attention on the town centre has ultimately caused the centre to be underutilised and forced the community to stay at home (Schrader, 1996).

Billy Graham was a former New Zealand and Australasian light welterweight boxing champion. His troubled youth growing up in Naenae inspired him to create the Naenae Boxing Academy (Billy Graham Youth Foundation, 2018). The Naenae Boxing Academy was established by Graham and is currently funded by the Naenae Youth Charitable Trust. The Boxing Academy was founded with "strong desire to give back to his local community and make a difference in the lives of its young people" (Billy Graham Youth Foundation, 2018). This gym is currently located on the corner of Treadwell and Sladden Street, opposite to the eastern site of the town centre. The aim of this boxing academy is to teach "youth life-skills through participation in the discipline of boxing and physical fitness" (Billy Graham Youth Foundation, 2018). The Boxing Academy is open to all youth from the age of nine through to eighteen years.

5.2 PRESENT DAY IN NAENAE

Naenae has one of the lowest personal income median and one of the highest ratio of children living in household (Statistics New Zealand, 2014). There are currently 1,980 children aged 0-14 which makes up 24% of the Naenae community, one of the highest in the Wellington region. The estimated population of children with impairments living in Naenae is approximately two hundred children. If only five percent of the population have completed their primary education, this means that only ten children would have completed their primary education. Furthermore, the population of Naenae consists mainly of European ethnic groups at 47%, with the total of 4,230 European population. While, Maori and Pacific people make up 42% of the Naenae population with the total of 3,717 people (Statistics New Zealand, 2014).

Based on the site analysis in the following pages, Naenae has a good transportation connection, local amenities, school connections and a relatively flat site. However, the development of the town centre has caused underutilisation by the community, high crime rates, state housing development, inaccessibility to train station and industrial background (FIG 5.01). Some

weaknesses were the lack of green spaces for the community to socialise, the following pages illustrates the dullness and sterile environment of Naenae town centre (FIG 5.04 – FIG 5.12). These provide the opportunity to address the topic issues and revitalise the town centre that could improve the quality of life and the physical and mental wellbeing for children, caregivers and the community.

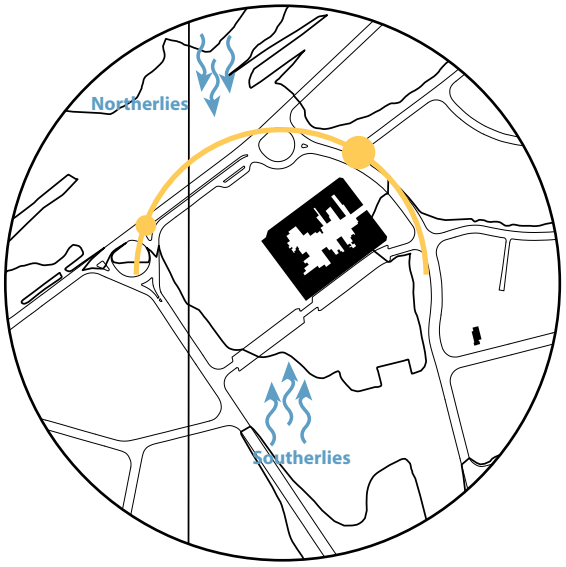
Kimi Ora specialist school is located North of the Naenae town centre, across the train station. It is located between the Naenae College and Naenae Intermediate school. The Kimi Ora school caters for children aged 5 – 21 years with only high or very high complex special needs. Through multiple site visits, it was found that the play areas were limited and sterile, as there is minimal connection with natural elements (FIG 5.13).

In FIG 5.03, the site analysis has identified the circulation, sun, wind, transportation links and the local amenities. The primary road is located on the Northern side of the Naenae town centre, this road separates the train station from the centre, the only access is through the underground tunnel (FIG 5.14). The town centre is exposed to northerlies wind with all-day sun. Some key local amenities that are commonly used were:

- Train station and Bus stops– Northern side of the town centre
- Olympic Pool – Southern side of the town centre
- Naenae Medical centre and pharmacy – Eastern side of the town centre
- Naenae Boxing Academy – Eastern side of the town centre.

CIRCULATION

SUN & WIND



LOCAL AMENITIES + BUS STOPS

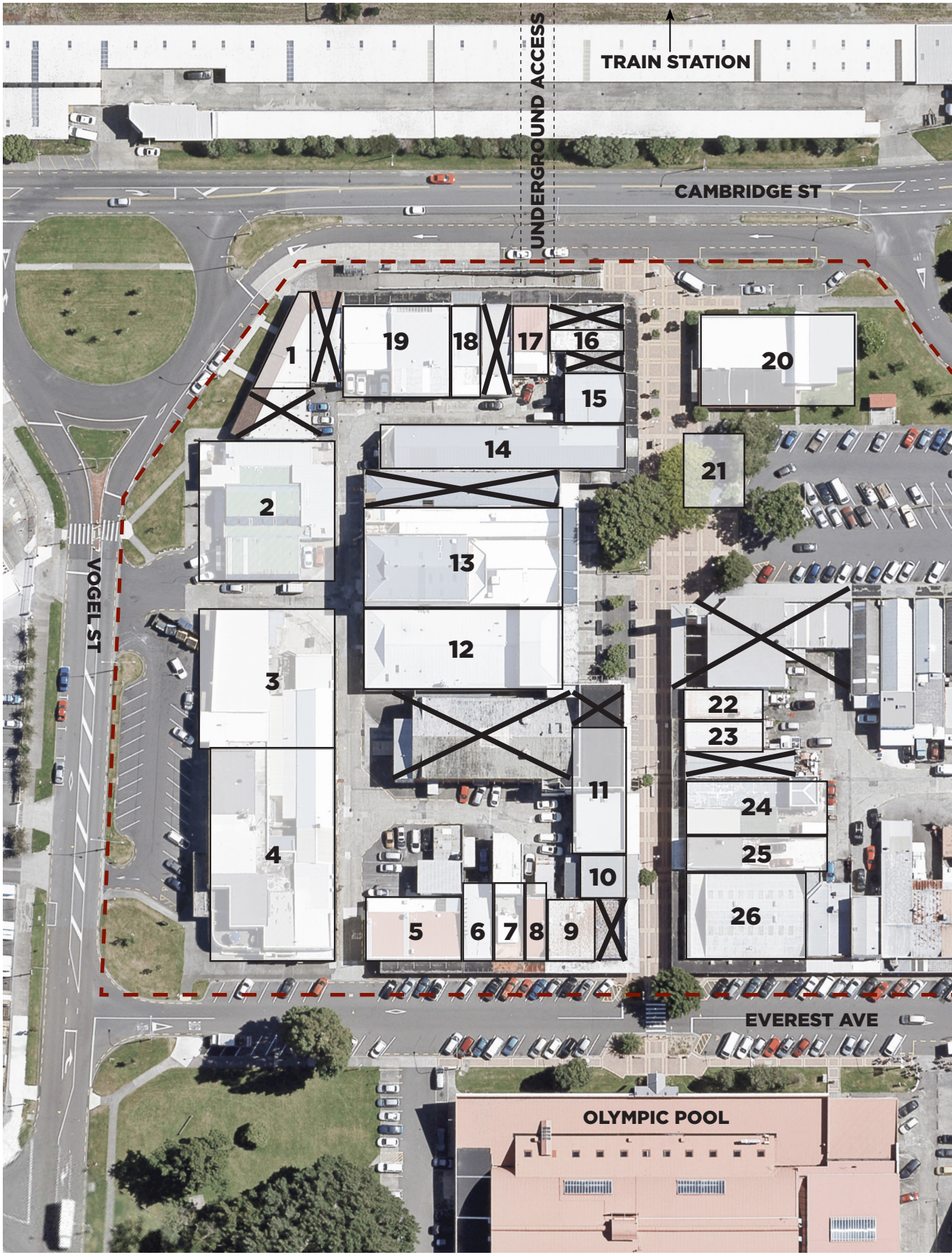
FIG 5.03 I SITE ANALYSIS FOR CIRCULATION, SUN, WIND, LOCAL AMENITIES AND TRANSPORTATION LINKS

FIG 5.04 I MAIN CENTRAL TOWN VIEW WITH ABANDONED SHOP LOTS

FIG 5.05 I COMMUNITY HALL (LEFT)
FIG 5.06 I UNDERUTILISED SHOP LOTS (RIGHT)
FIG 5.07 I NAENAE MEDICAL CENTRE (BOTTOM)

FIG 5.08 I VIEW NAENAE MEDICAL CENTRE
FIG 5.09 I TOWN CENTRE VIEW TO WEST END
FIG 5.10 I VIEW OF ABANDONED POST OFFICE
FIG 5.11 I LARGE ROUNDABOUT AT NORTH-WEST SIDE OF CENTRE

FIG 5.12 I VIEW OF NAENAE HOTEL (TOP)
FIG 5.13 I KIMI ORA SPECIALIST SCHOOL PLAY SPACES FOR IMPAIRED CHILDREN (LEFT)
FIG 5.14 I TUNNEL TO NAENAE TRAIN STATION (RIGHT)


TRAIN STATION
UNDERGROUND ACCESS
CAMBRIDGE ST
VOGEL ST
EVEREST AVE
OLYMPIC POOL
1
19
18
17
16
15
20
14
21
2
13
12
3
22
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11
24
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26
5
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7
8
9

X. Empty

1. Salon
2. Super saver
3. Hutt Accomodation
4. Hotel/ TAB / Bar
5. Country Roast
6. Laundromat
7. Electrician
8. Salon
9. A1 roast
10. Cafe
11. Pasifika Food
12. Dental
13. Church
14. Coinsaver
15. Da-deals
16. Salon
17. Liquor Store
18. Mini-mart
19. CCS Disability Actions
20. Community Library
21. Playground
22. Cafe
23. Butcher
24. Pawn Shop
25. Finance Office
26. Price Busters

Proposed Site Location

SITE PLAN

SCALE BAR

0 15 30 60M

SITE (CONTEXT) ANALYSIS

5.3 SUMMARY AND REFLECTION

The site analysis has identified a combination of shops, community centre, medical centre and an Olympic pool. With these current local amenities, it has the potential for the proposed design to address some of the architectural barriers that children with impairments are currently experiencing. The proposed location of the site gives Naenae an opportunity for revitalisation, good connection to services and local amenities, integration with community, connection to pool, good public transportation and a healthy connection to the intermediate and college schools.

A key aim of this research is to integrate more child-centred activities into the community as well as providing programmes that can benefit the physical and emotional wellbeing of the caregivers and the Naenae community. The design outcomes will be tested onto the proposed site to ensure that the external circulation of the school does not cause any obstruction any activities within the community. Some key site criteria are:

1. Respond to the site conditions, such as sunlight, wind, noise, etc.
2. Improve the external circulation of the centre
3. Communal activities that appeal to different age-group at the town centre
4. Integration of outdoor spaces as social spaces

Though the ethnicity population data has indicated that Naenae is a multi-cultural, however with the scope of this research, it was not possible to address cultural groups due to time restriction. Nevertheless, it is worth noting that the cultural group and practices will influence the designed environment.

6.0

PRELIMINARY DESIGN

PRELIMINARY DESIGN

This chapter, this explores the process of the design development in three different phases. The conceptual design of Phase I focussed on designing school with supported activities. While the Phase II focussed on integrating sensory play to stimulate learning and recovery/rehabilitation. Both of these design phases were completed and critiqued by architectural practitioners and academics. The combination of critiques from guest critics and personal reflection were used in Phase III leading up to the final design examination. Within each design phase, there is an ongoing performance criteria analysis and self-evaluated reflection that feeds into the next design phase through to a refined final design. The design outcome need to accommodate for approximately 300 children with impairments, 300 children without impairments, parents, support staff and teachers.

6.1 PHASE I: DESIGNING SCHOOL WITH SUPPORTED ACTIVITIES

The progression of the first phase involved programme research, understanding critical training for children with impairments and designing through the development of architectural strategies that specifically target children with impairments. The outcome of phase one of the design, was a rectilinear mass building that aimed to impairment needs by providing a range of facilities that would provide multiple opportunities for children to explore their interests. In FIG 6.01, the ideal learning environment was adopted from design guide, to begin experimenting the scale (Gill et al., 2008). This model was used to accommodate approximately 18-25 students. Using this learning environment model, three design concepts were generated to respond to the site conditions (FIG 6.03, FIG 6.04, FIG 6.05).

The design takes into account the higher end of spectrum when dealing with the severity of each impairments. Designing through the perspective of higher severity makes the design more aware and user-friendly within the space. Some assumptions made in this stage were:

- Mobility impairments: Wheelchair or crutches bound
- Visual impairments: Requires cane training
- Hearing impairments: Requires sign language
- Intellectual impairments (ADHD & Autism): Requires sensory deprivation. The choice of the following intellectual impairments was found to be the most common intellectual impairment among younger children.

In FIG 6.03, FIG 6.04, FIG 6.05, these design concepts explore different circulation options in relation to the site conditions. In design phase I, design concept two ‘Mixed’ in FIG 6.04, was chosen to be developed further. Evaluation of this concept has indicated that there are opportunities to address the traffic noise on the northern side of the boundary and surround the town centre. This provides an opportunity for internal school programme to connect with community centre, Olympic pool, medical centre and the boxing academy.

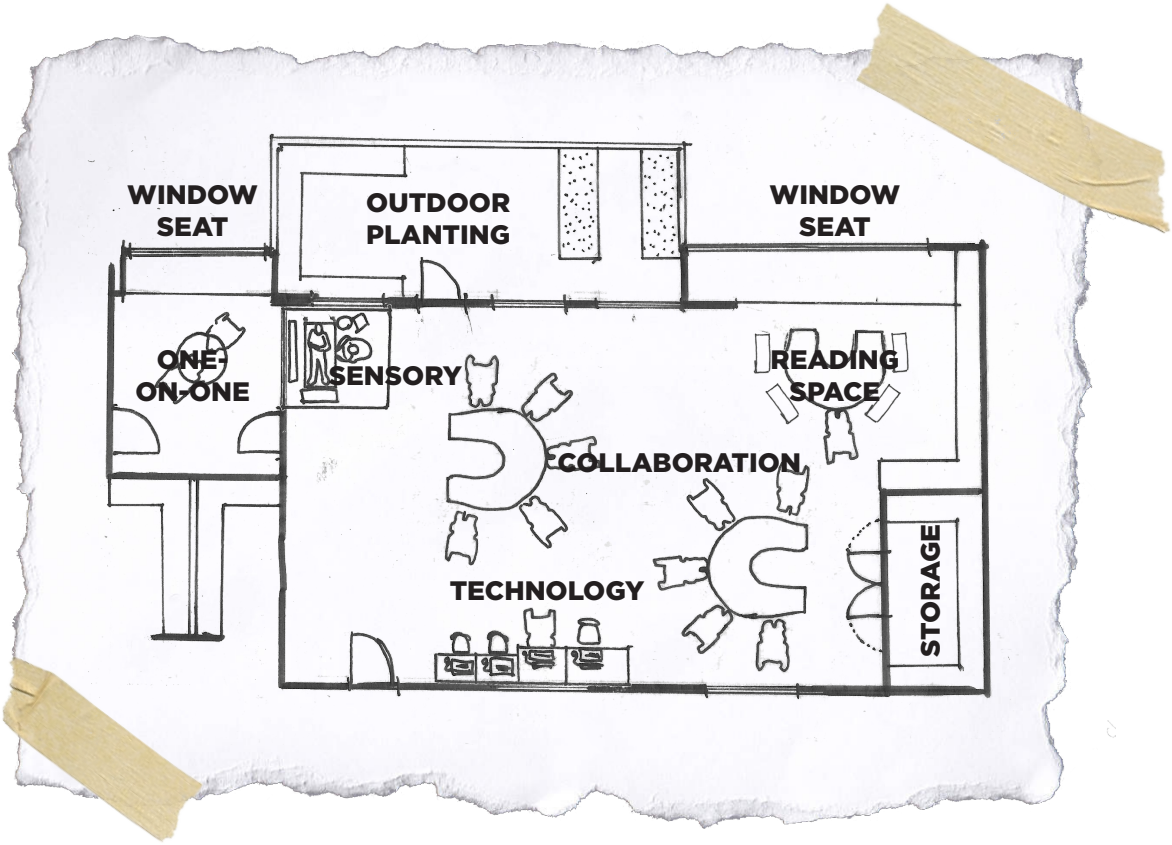


FIG 6.01 I SUGGESTED TYPICAL LEARNING ENVIRONMENT FOR IMPAIRED CHILDREN

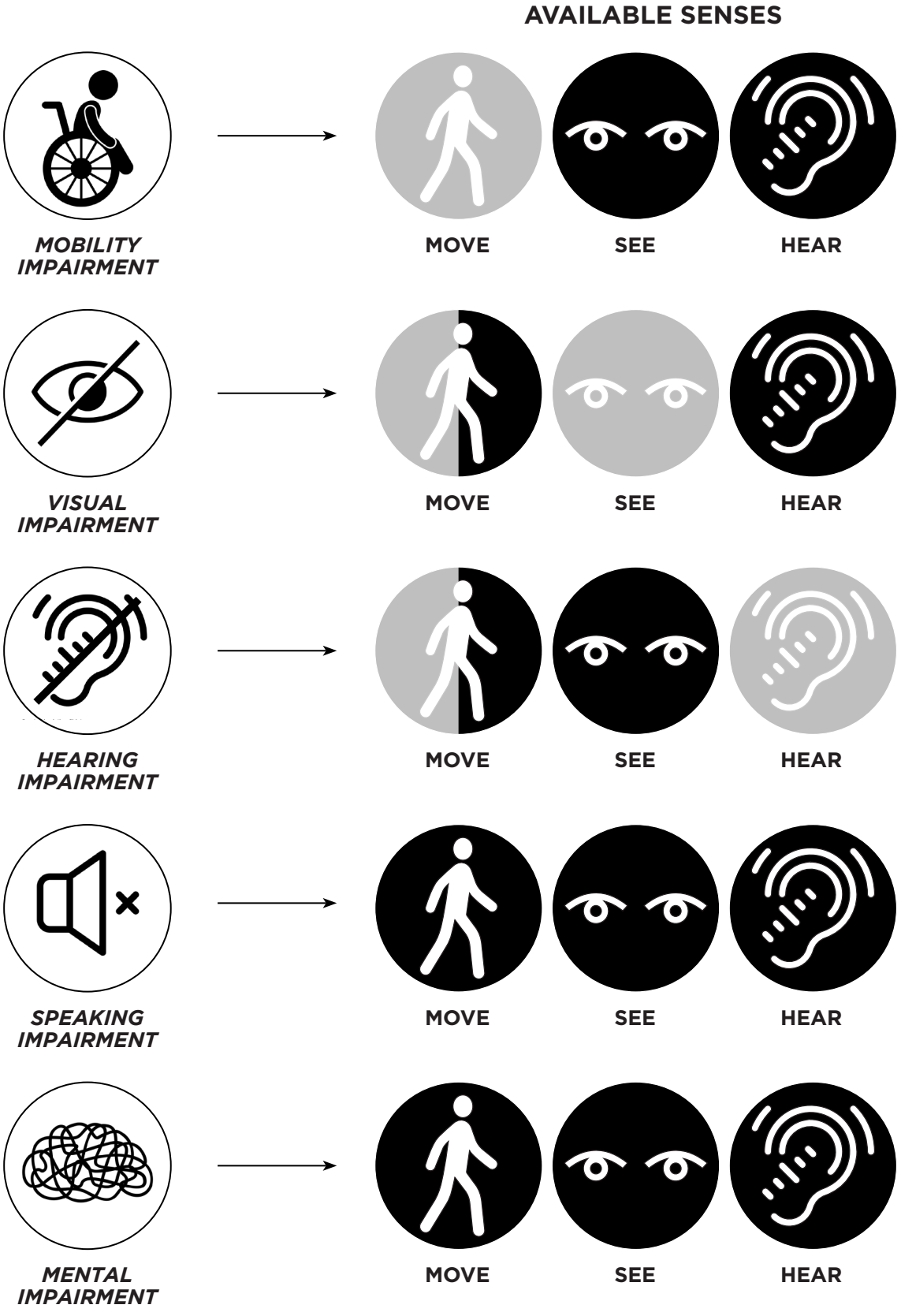


FIG 6.02 I CRITICAL TRAINING FOR CHILDREN WITH IMPAIRMENTS

AVAILABLE SENSES		CRITICAL TRAINING
 TOUCH	FOCUS	UPPER BODY STRENGTH TRAINING LOWER BODY STRENGTH TRAINING
 TOUCH	FOCUS	MOBILITY (CANE) TRAINING BRAILLE TRAINING
 TOUCH	FOCUS	SIGN LANGUAGE / EYE COORDINATION BALANCE TRAINING
 TOUCH	FOCUS	SIGN LANGUAGE / EYE COORDINATION
 TOUCH	FOCUS	CONCENTRATION / REDUCE STRESS

FIG 6.03 I DESIGN CONCEPT ONE - SPRAWLING

DESCRIPTION

Using the typical floor plan of a specialist school, a simple mass was developed to establish building coverage to understand the relation of the building to the site condition. In the earliest concept, the idea was to create individual classrooms with their own outdoor spaces. This allows outdoor learning environment to be accessible from every classroom.

STRENGTHS

- Reasonable sized outdoor learning environment for each class
- Facilitate any external circulation and site condition
- All classrooms have all-day sun

WEAKNESSES

- Requires the whole site to accommodate for 400 children
- Need to remove the heritage clock tower
- The scale of the learning environments does not facilitate any communal activities
- Cambridge Road could cause high levels of traffic noise

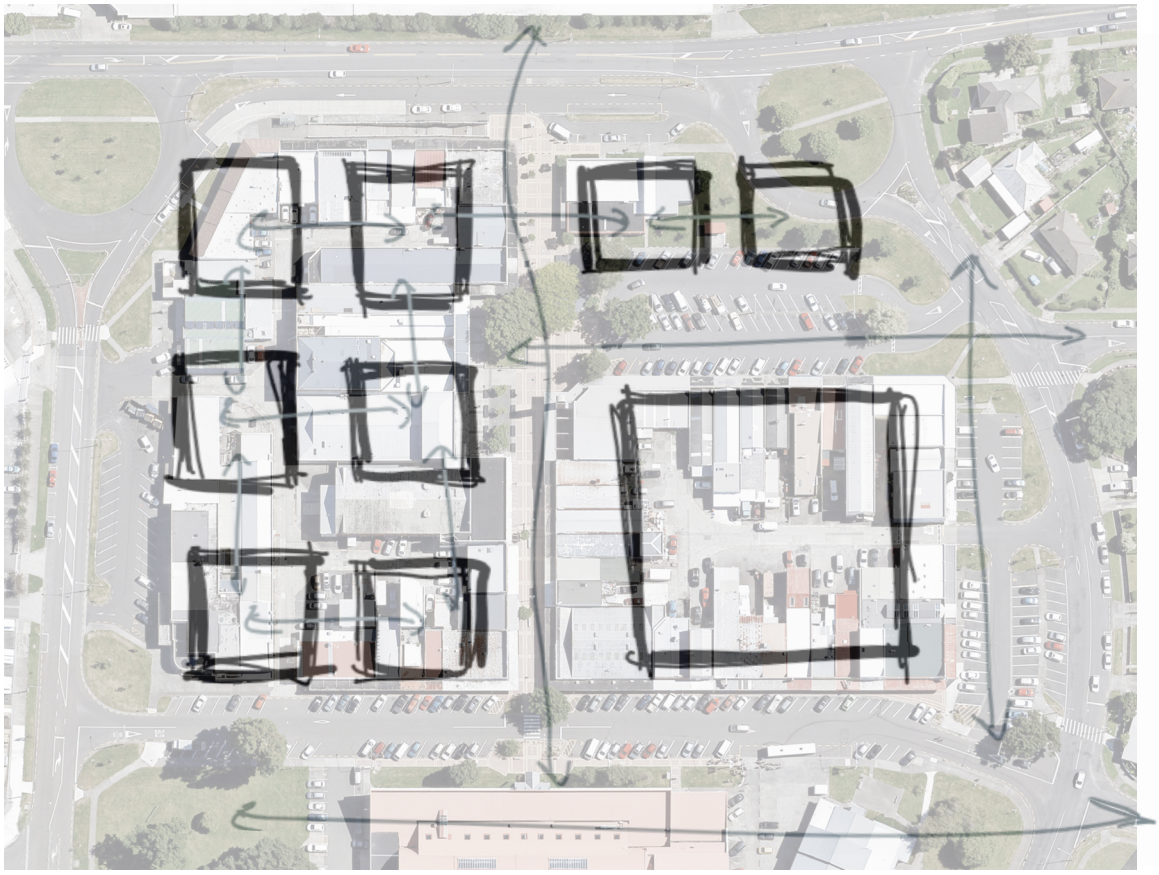


FIG 6.04 I DESIGN CONCEPT TWO - MIXED

DESCRIPTION

In this concept, a basic block was used to protect internal classroom from high traffic noise at the North-Eastern boundary of the site. The block surrounds the community and healthcare centre which offers opportunity to provide a stronger link from the school to the community and the pool.

STRENGTHS

- Surround the community – more centralised
- Acoustic barrier to reduce high noise levels
- Integration with the centre
- All facilities and services could be integrated into the block
- Sheltered internal spaces from rain and wind
- Potential to develop Naenae community at the space between the centre and the school

WEAKNESSES

- Prevents access to public transportation – need to integrate transportation access through the building
- Limited access throughout the entire site

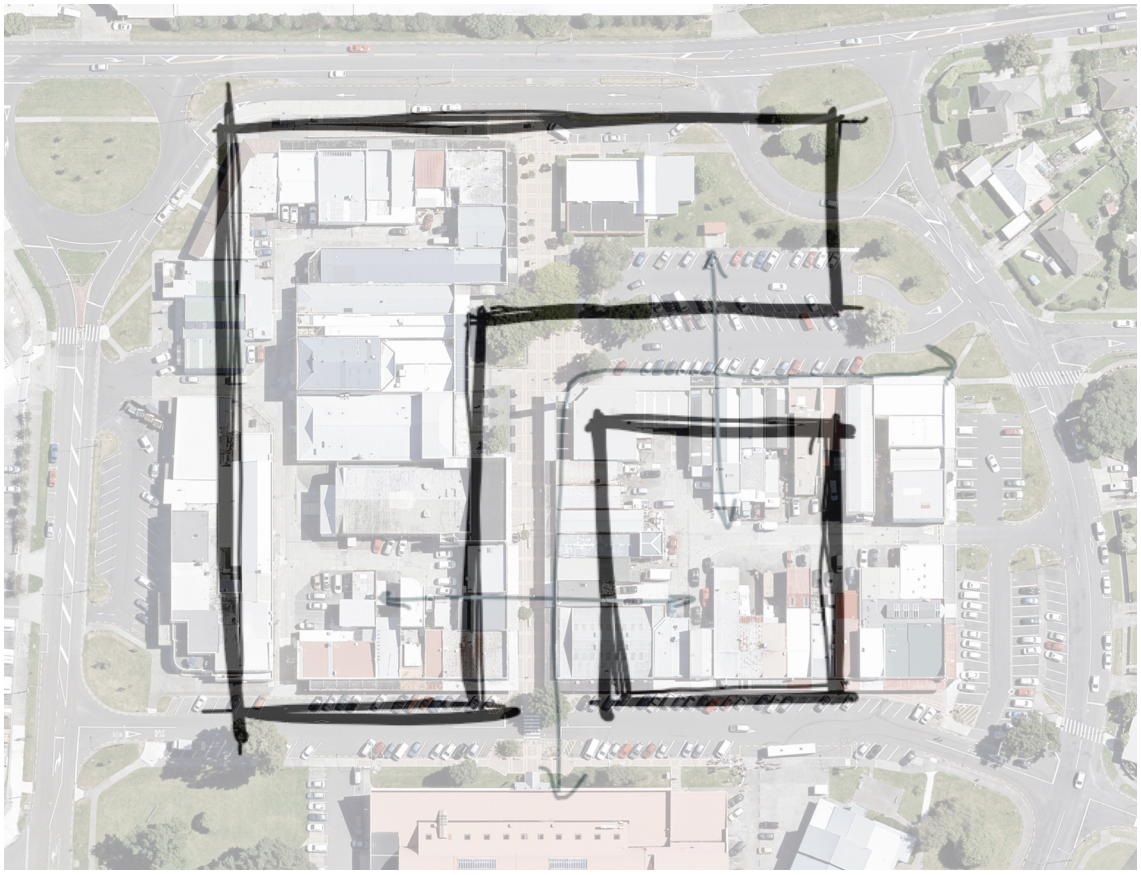


FIG 6.05 I DESIGN CONCEPT THREE - CLUSTERED

DESCRIPTION

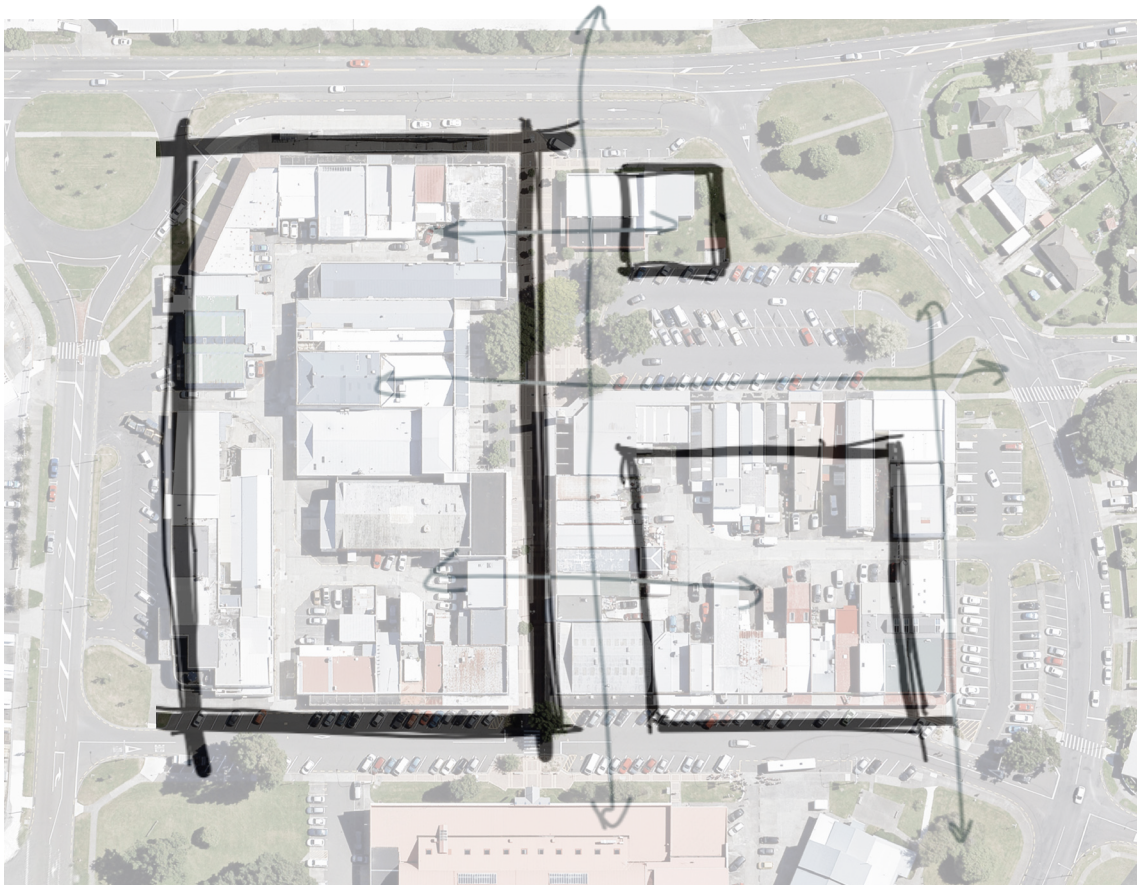
This concept focusses on responding to the external site circulation. The design keeps the 'better-half' of Naenae, while still providing necessary learning environments. This concept also prevents high level of noise activities from all around the site.

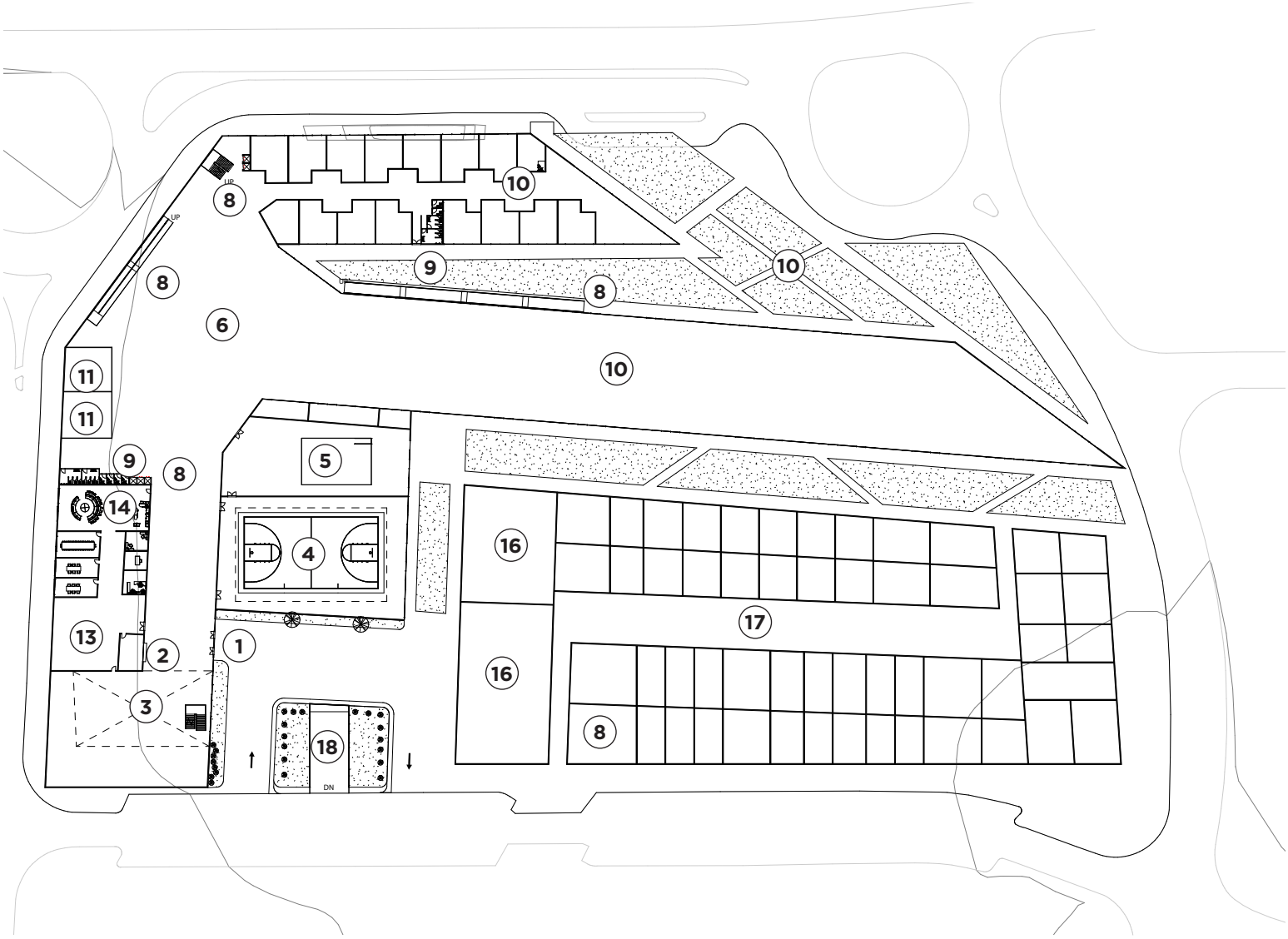
STRENGTHS

- Good macro-circulation, eg: linkage to train and bus station
- Good relationship with the town centre

WEAKNESSES

- Scale may be large – a few storeys may be required to meet all spatial requirements
- Some internal space might lack sunlight





1	ENTRANCE	7	LIBRARY	13	OFFICES
2	RECEPTION	8	STAIRS / LIFTS / RAMPS	14	STAFF ROOM
3	CAFE / WAITING AREA	9	TOILETS	15	COMMUNITY HALL
4	MULTIPURPOSE GYM	10	LEARNING ENVIRONMENT	16	CLINIC / PHARMACY
5	HYDROTHERAPY POOL	11	SPECIALIST ROOM	17	SHOPS
6	CAFETERIA	12	THERAPIST ROOM	18	UNDERGROUND CARPARK

FIG 6.06 I GROUND FLOOR PLAN

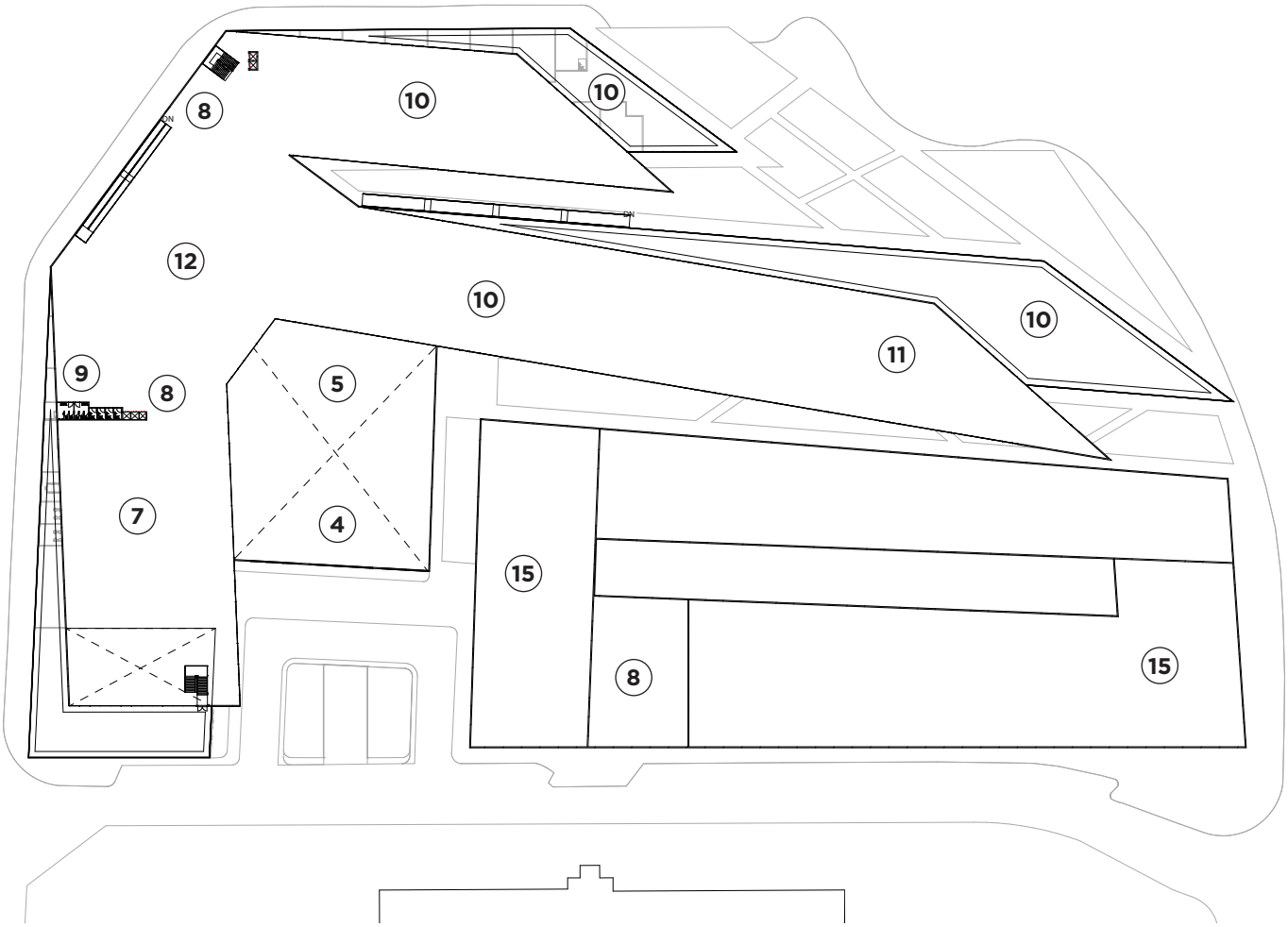


FIG 6.07 I FIRST FLOOR PLAN

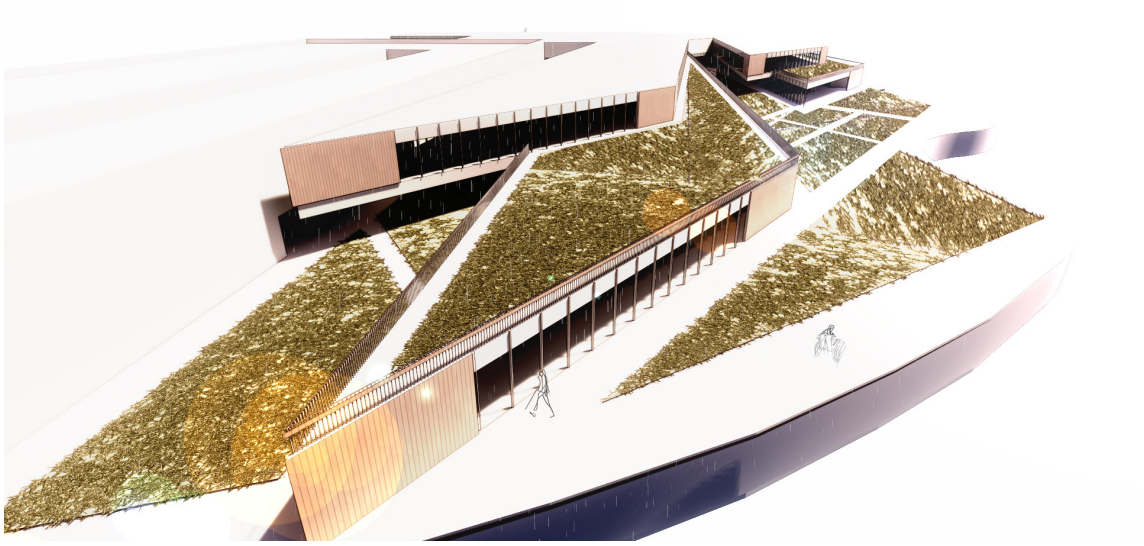


FIG 6.08 I SCHOOL ENTRANCE FROM BLOCK STUDY
FIG 6.09 I OUTDOOR LEARNING ENVIRONMENT
FIG 6.10 I SENSORY LEARNING ENVIRONMENT

6.2 CONCLUSION & REFLECTTION OF DESIGN PHASE I

The design focus of this phase aims to provide a range of facilities that would provide multiple opportunities for children to explore their interests. The performance criteria of the design outcome of Design Phase I shows that self-directed play, sensory (tactile) rehabilitation, sensory needs and avoiding stress were lacking. The spatial arrangement of programme facilitates primarily caregiver support, peer support and some sensory rehabilitation. Some strengths of the design were integrating healthcare and social interaction spaces within the school for children, teachers and caregivers. This has provided an opportunity to improve the mental wellbeing of the caregivers. The school building was orientated to create a more centralised town centre, where the block faces the community centre, Olympic pool, medical centre and the boxing academy.

Some positives were:

- The critics agreed that learning environment should be more workshop-based for deeper and more effective learning engagement
- The critics were in favour of the choice of site and the location of the building
- The critics also commented that background research identified full understanding of the type of impairments.

At the end of this design phase, a few questions were raised relating to the Design Phase I outcome. Questions:

1. Scale of the building was too large
2. Need for integrated activities
3. Need for outdoor learning environment
4. Research play (and play equipment) for engaging children with impairments with longer participation

Personal Reflection

The strengths of this design outcome were the understanding of the difficulties of each impairment, relevant training to rehabilitate, and development of the range of programme. Some weaknesses of this review are the scale of the building and development of outdoor learning environment.

The design helped incorporate all facilities that are required within a school. With this as a starting point, this sets up for next design phase where further refinement could take place. However, the design does not promote self-direct or self-chosen play, which make learning engagement difficult. This question has raised whether the general facilities could provide self-directed play for younger children. The indoor learning environments adopted from design guide were also found to be ineffective because it creates more structured learning environment. Hence, there was a need to move away from this design model and start to develop activity-based programme.

In summary of the findings at the end of Phase I, there is need to address the following issues:

1. Need for interactive outdoor learning environment
2. Integration with the community and available for public use after school hours
3. Scale of the building is too large and scale adjustment is needed for children
4. Building mass prevents access to the transportation
5. More playful
6. Need less structured learning environment

PERFORMANCE CRITERIA MET

ARCHITECTURE FOR PLAY

ARCHITECTURE FOR ACCESSIBILITY

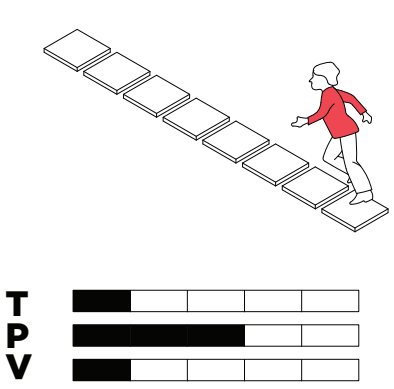
ARCHITECTURE FOR SUPPORT

6.3 PHASE II: INTEGRATING SENSORY PLAY TO STIMULATE LEARNING AND RECOVERY/ REHABILITATION

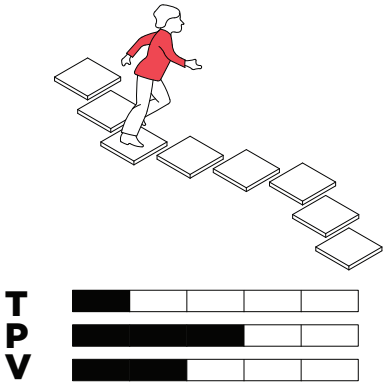
Through research-led design, the progression of the second phase involves redefining the programme, addressing circulation issues, scale-check and playful learning environments. The programme is mainly an exploration of the effectiveness of sensory integration therapy and facilitate communal activities for caregivers and Naenae community. After this stage, master planning was undertaken to develop the best spatial arrangement that meets the performance criteria of 'Architecture for Accessibility'. Following this, an in-depth analysis was undertaken to analyse each sensory integration system. Concluding Design Phase II with, 3D experimentations of the play spaces based from the architectural implication of sensory integration therapy analysis.

Multiple sensory integration therapy was used to evaluate the type of rehabilitation a child could practice when they are playing. The following pages illustrate on many different types of play activities:

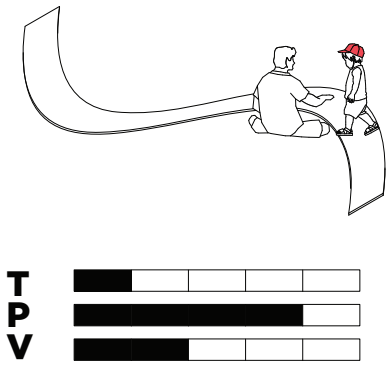
1. Linear Movement



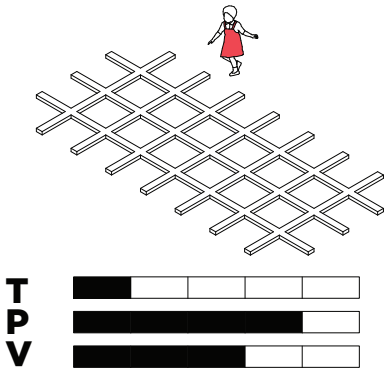
2. Non-linear Movement



3. Organic Movement



4. Inverted Path



5. Offset with boundary

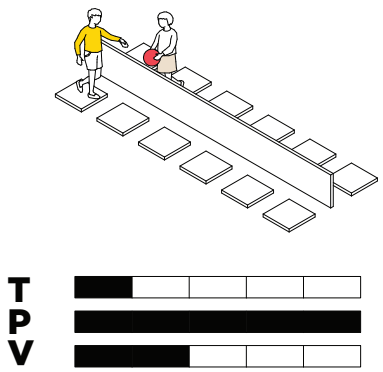
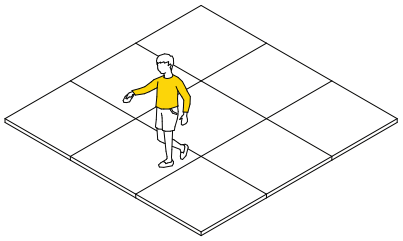
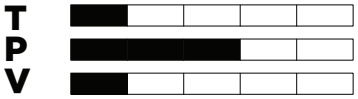


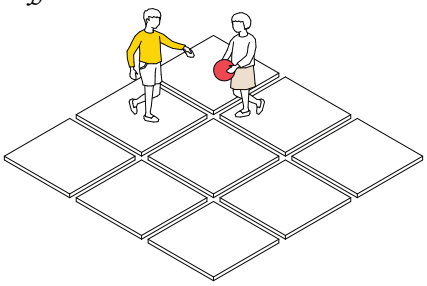
FIG 6.11 I CIRCULATION

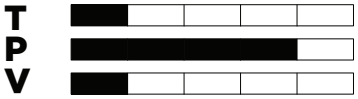
6. Tiled Square



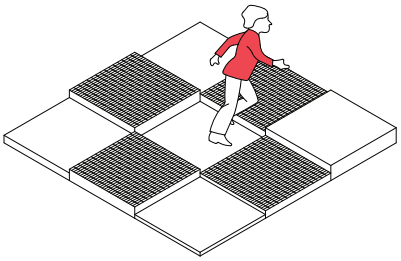


7. Offset Tiles

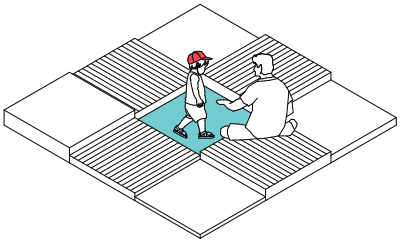




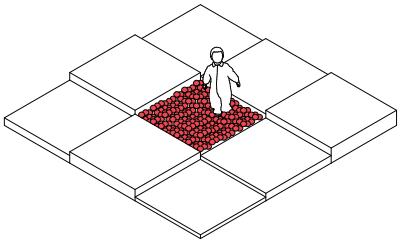
8. Vertical Offset



9. Shallow water



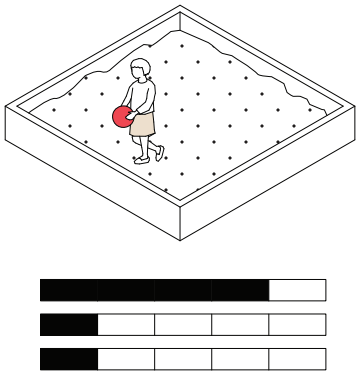
10. Ball/block pit



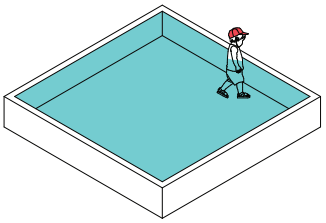
T - *TACTILE*
P - *PROPRIOCEPTION*
V - *VESTIBULAR*

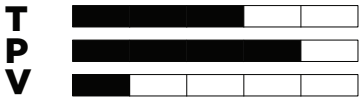
FIG 6.12 I SURFACE TREATMENT

11. Sand Box

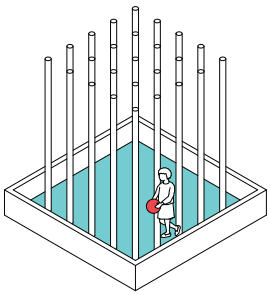


12. Rehabilitative Pool

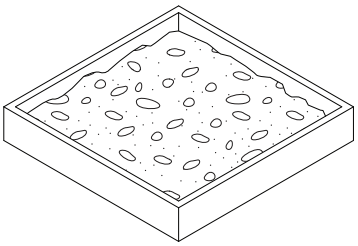


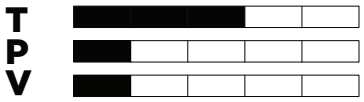


13. Vertical Element Obstruction

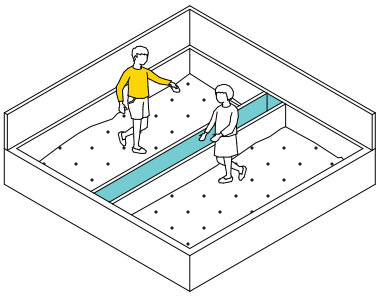


14. Mud Box





15. Mudkit



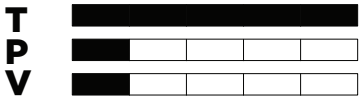
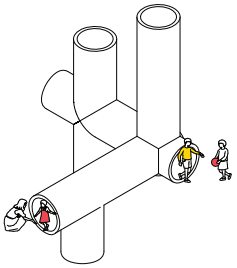
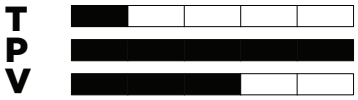


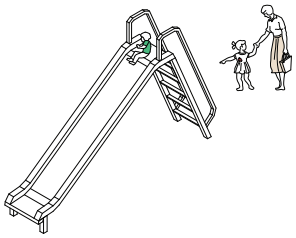
FIG 6.13 I ENCLOSED

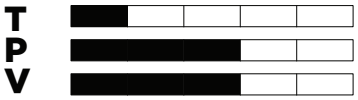
16. Tube Game



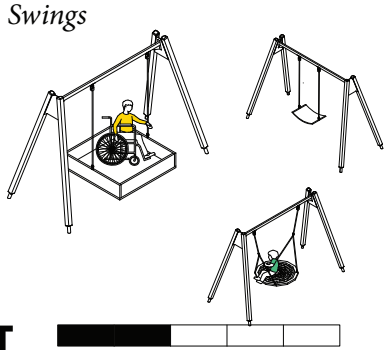


17. Slide

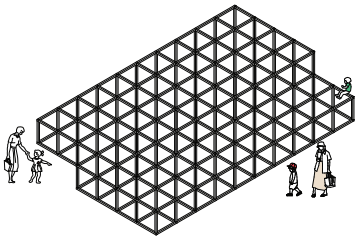


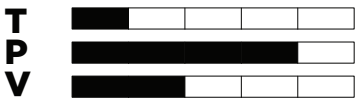


18. Swings

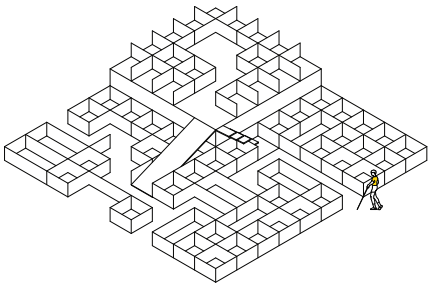


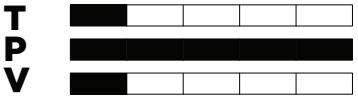
19. Monkey Bars





20. Maze

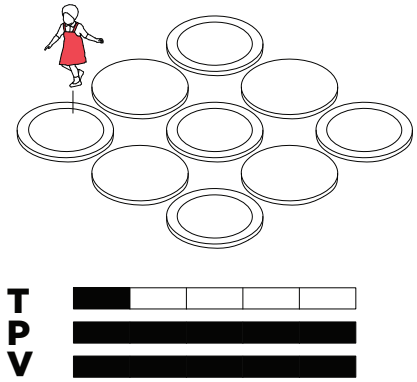




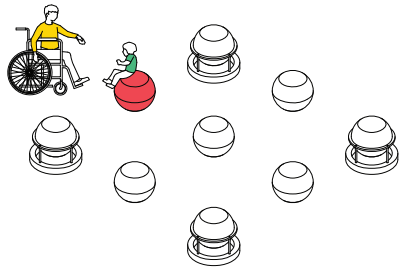
T *- TACTILE*
P *- PROPRIOCEPTION*
V *- VESTIBULAR*

FIG 6.14 I LEVELS

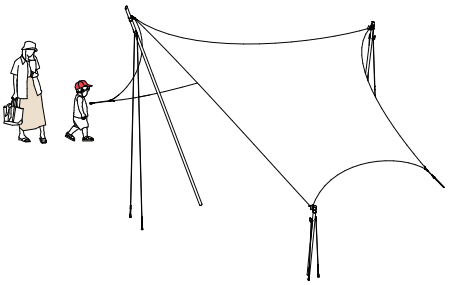
21. Trampoline



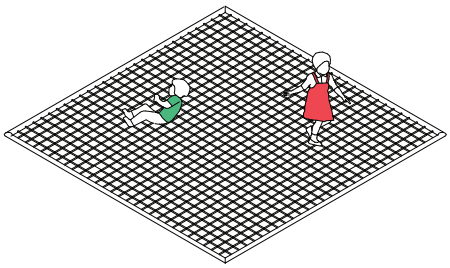
22. Yoga balls



23. Tent fabric



24. Net



25. Donut - Space invader

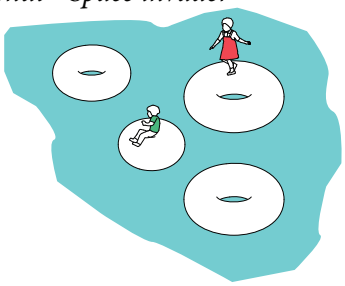
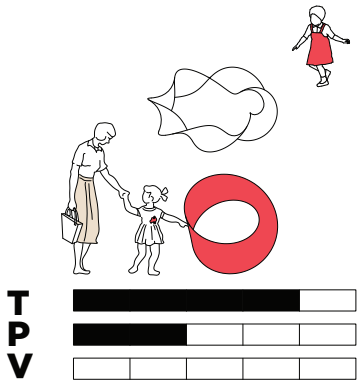
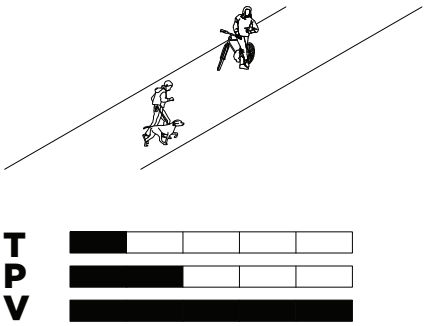


FIG 6.15 / TENSILE

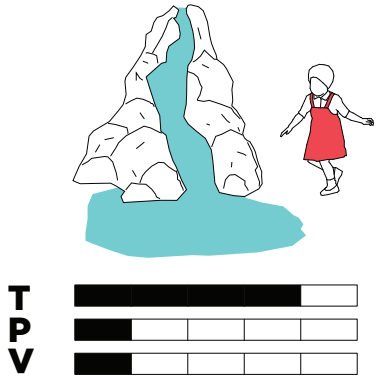
26. Interactive art sculpture



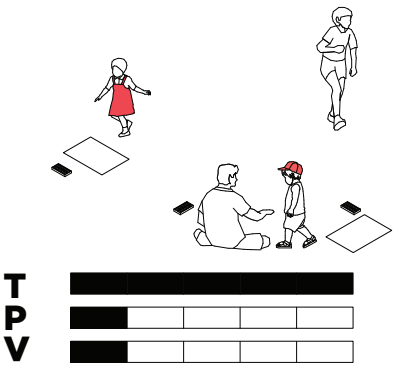
27. Bikes & Scooters



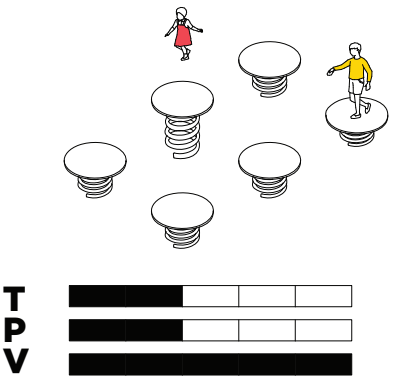
28. Waterfall



29. Finger Painting



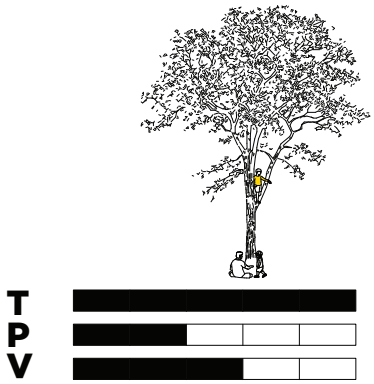
30. Vibration



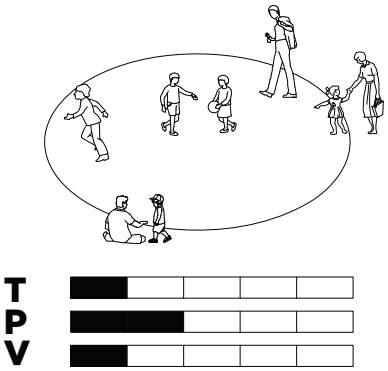
T - *TACTILE*
P - *PROPRIOCEPTION*
V - *VESTIBULAR*

FIG 6.16 I ACTIVITIES

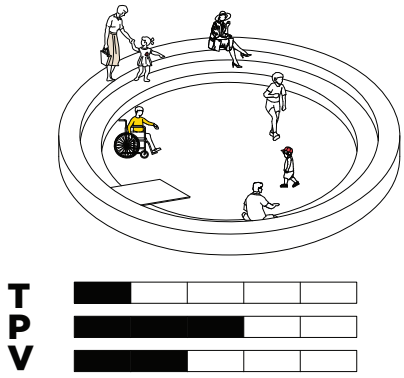
31. Climbing Trees



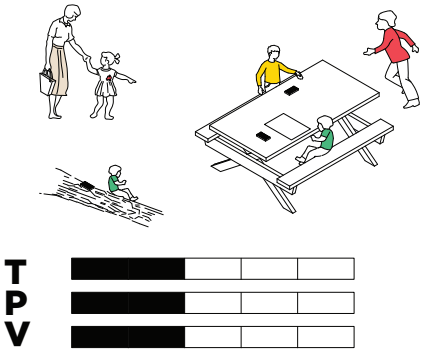
32. Central Courtyard



33. Submerged Space



34. Cafeteria



35. Gaming

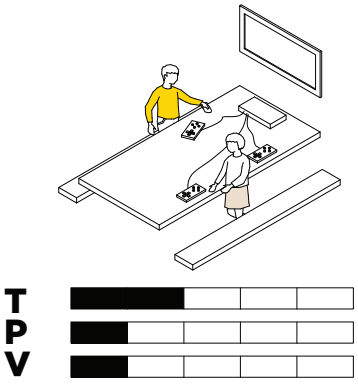
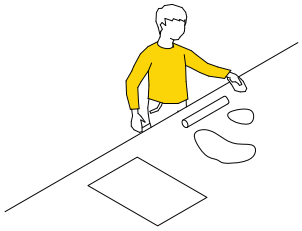
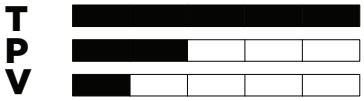


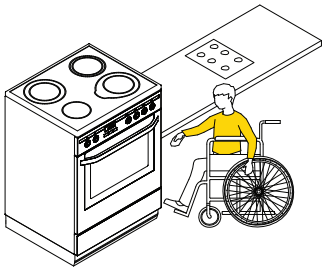
FIG 6.17 I SOCIAL

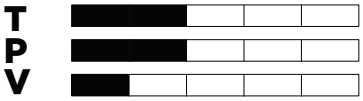
36. Play Dough



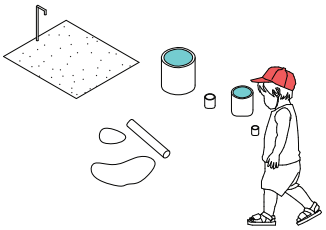


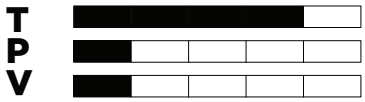
37. Baking



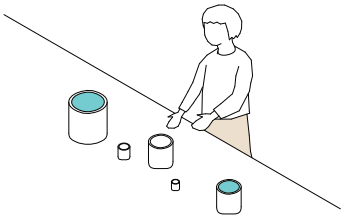


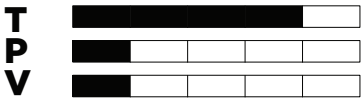
38. Measuring



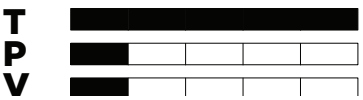


39. Pouring





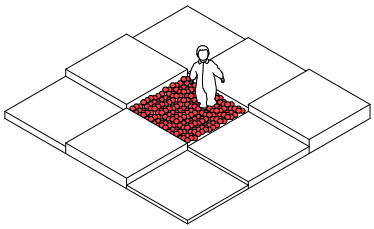
40. Harvesting



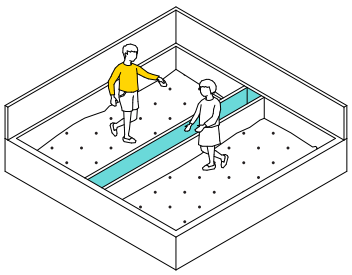
T - *TACTILE*
P - *PROPRIOCEPTION*
V - *VESTIBULAR*

FIG 6.18 I COOKING

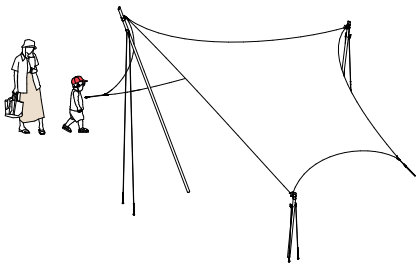
Ball / Block pit



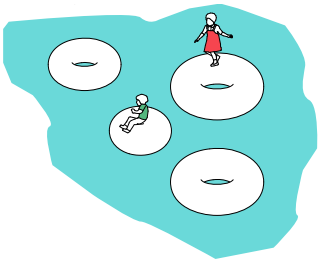
Mud box



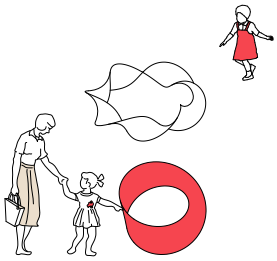
Tent



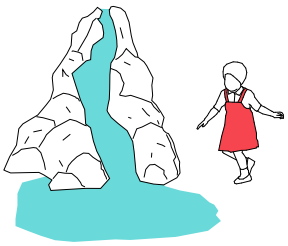
Donut - Space invader



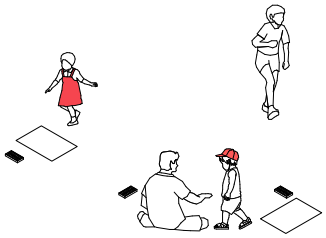
Interactive art sculpture



Waterfall

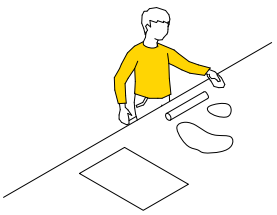


Finger Painting



Climbing Trees

Play Dough



Harvesting

ELEMENTS FOR TACTILE

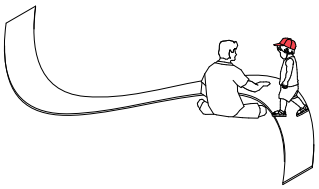
- Water
- Balls (Various Sizes)
- Art Activities
- Cooking Activities
- Climbing

ARCHITECTURAL IMPLICATIONS ON SPACES

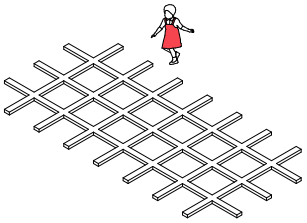
1. Enclosed area for mass of objects
2. Surface Treatment
3. Supporting areas for tables - chairs

FIG 6.19 I TACTILE SYSTEM - ARCHITECTURAL IMPLICATIONS

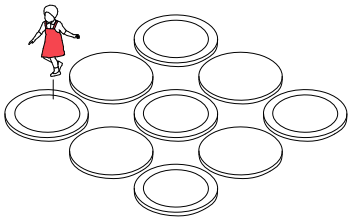
Organic Movement



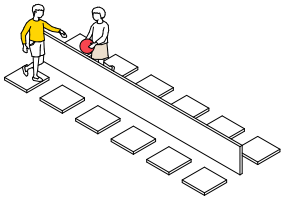
Inverted Path



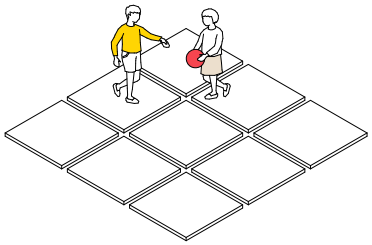
Trampoline



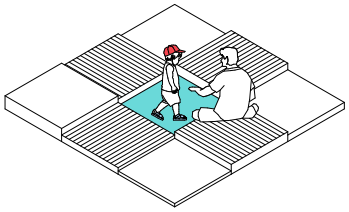
Offset with boundary



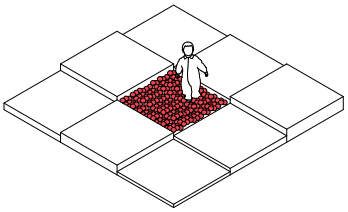
Offset Tiles



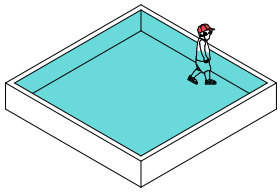
Shallow water



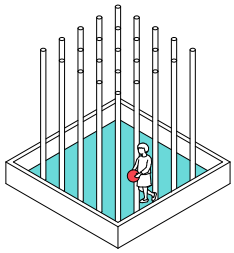
Ball / block pit



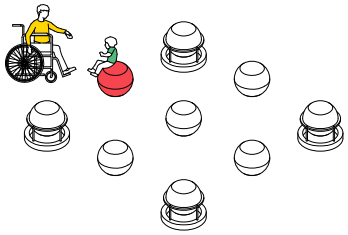
Rehabilitative Pool



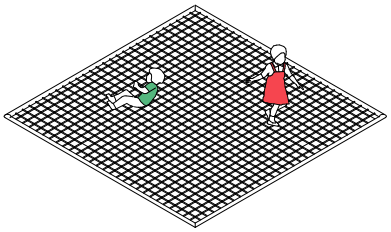
Vertical Elements Obstruction



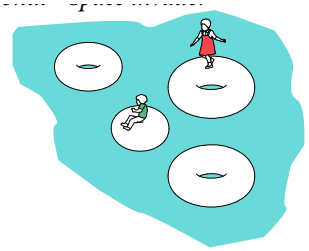
Yoga balls



Net



Donut - Space invader



ELEMENTS FOR PROPRIOCEPTION

- Floor geometry
- Surface treatment
- Elastic materials (Trampoline)
- Water rehabilitation

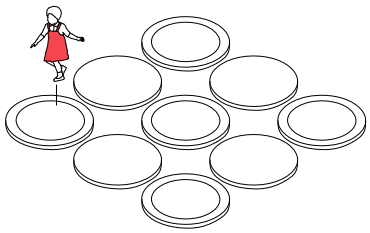
ARCHITECTURAL IMPLICATIONS ON SPACES

1. Surface treatment on pathways
2. Levels
3. Submerged Space

FIG 6.20 I PROPRIOCEPTION SYSTEM - ARCHITECTURAL IMPLICATIONS

Swings

Trampoline



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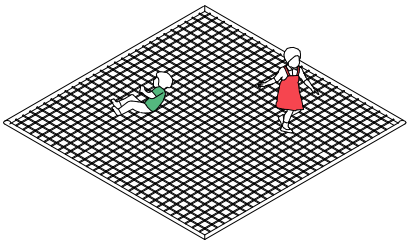
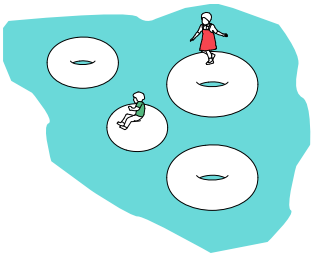
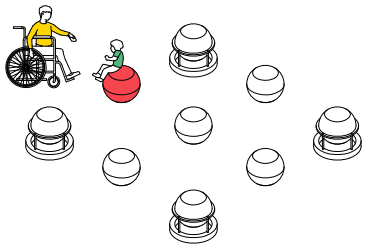


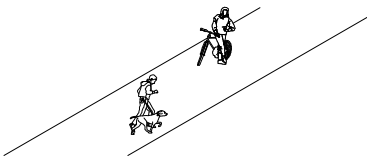
Donut - Space invader



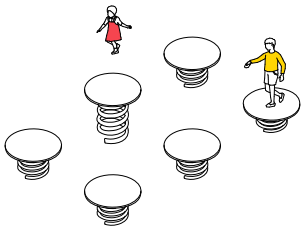
Yoga balls



Bikes & Scooters



Vibration



ELEMENTS FOR VESTIBULAR

- Elastic materials (Trampoline, yoga balls)
- Water rehabilitation
- Springs structured floors
- Bikes
- Swings

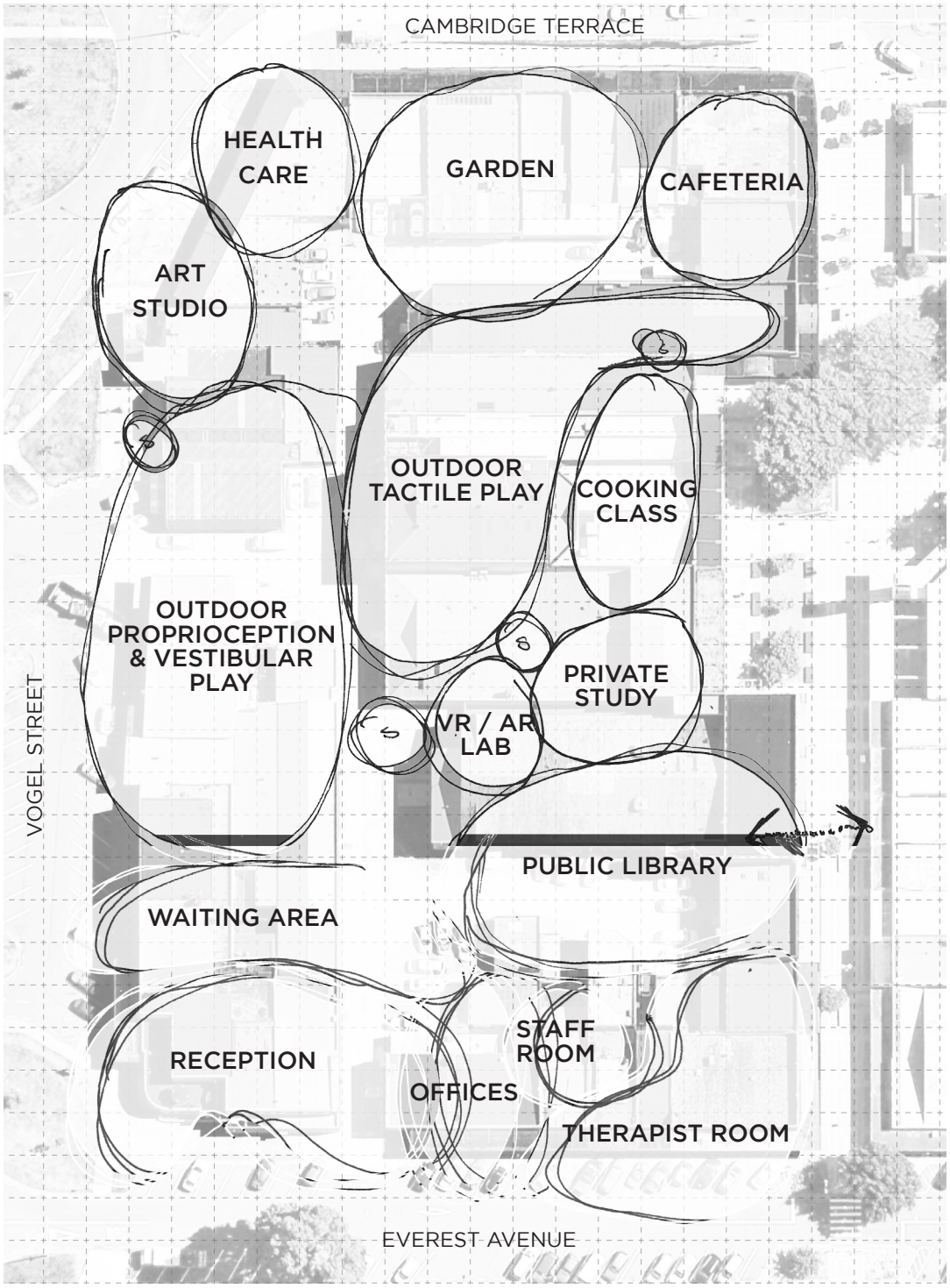
ARCHITECTURAL IMPLICATIONS ON SPACES

1. Surface treatment on pathways
2. Levels
3. Submerged Space
4. Elasticity of surfaces

FIG 6.21 I VESTIBULAR SYSTEM - ARCHITECTURAL IMPLICATIONS

"...PLAY ISN'T DOING WHAT WE WANT, BUT DOING WHAT WE CAN WITH THE MATERIALS WE FIND ALONG THE WAY. AND FUN ISN'T THE EXPERIENCE OF PLEASURE, BUT THE OUTCOME OF TINKERING WITH A SMALL PART OF THE WORLD IN A SURPRISING WAY..."

- IAN BOGOST

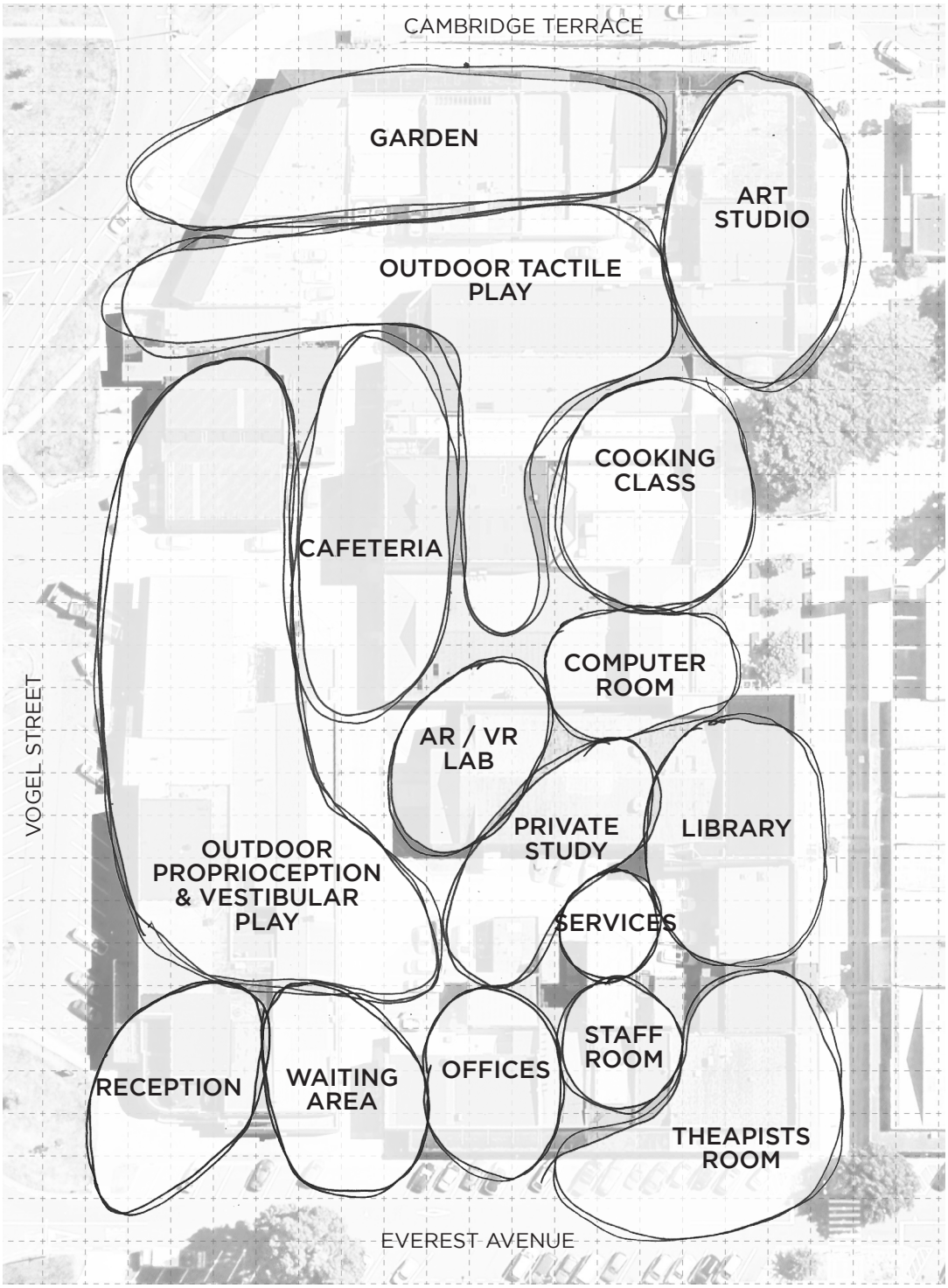


SUPPORTIVE ENVIRONMENT

- ***CHILDREN*** X
- ***PUBLIC*** ✓
- ***STAFF*** ✓

- Safety for children is not achieved (too open to public)
- Disconnect with health care to staff offices
- Community integration

FIG 6.22 I DESIGN ITERATION 1



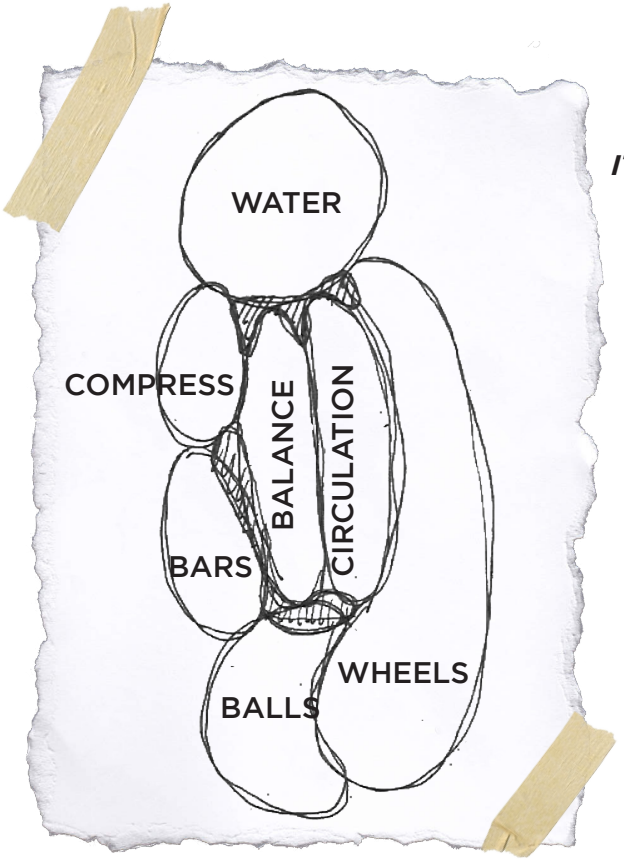
SUPPORTIVE ENVIRONMENT

- ***CHILDREN*** ✓
- ***PUBLIC*** ✓
- ***STAFF*** ✓

- Scale still a bit large
- Staffroom could be isolated (no natural lighting for retreat)

- Fine gross movement
- Social skills

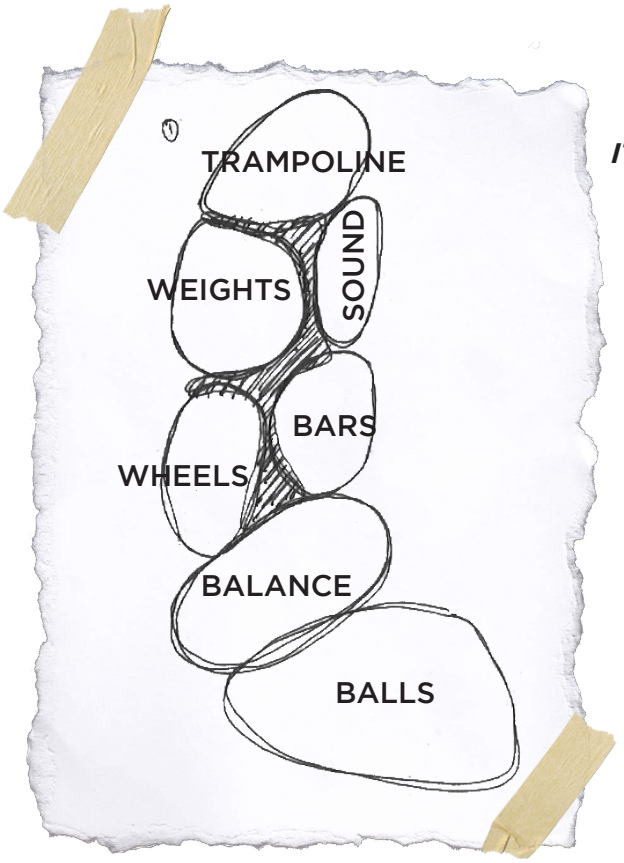
FIG 6.23 I DESIGN ITERATION 2



ITERATION 1

+ **Water is close to Tactile Play**

- **Circulation is unnecessary program, could be integrated into the space**

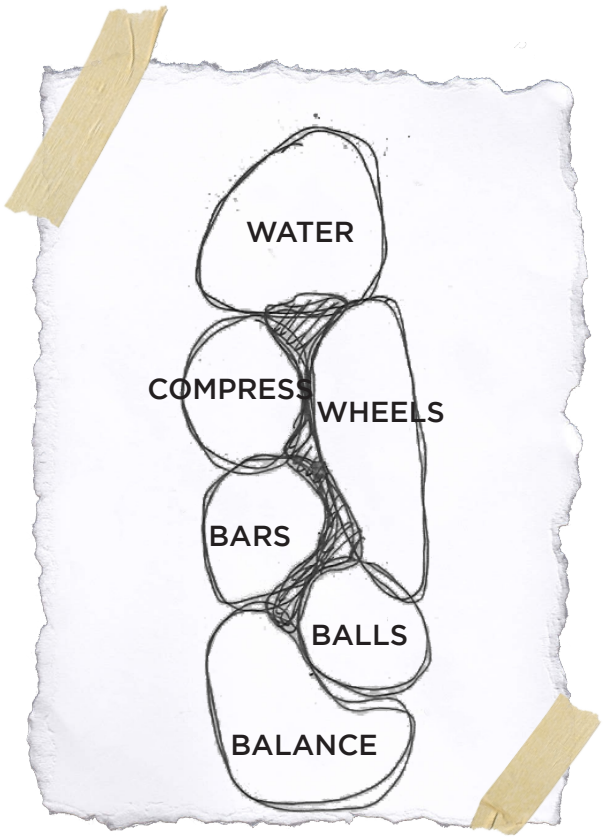


ITERATION 3

+ **Good range of proprioception and vestibular play**

- **No central space to understand the whole site activities**

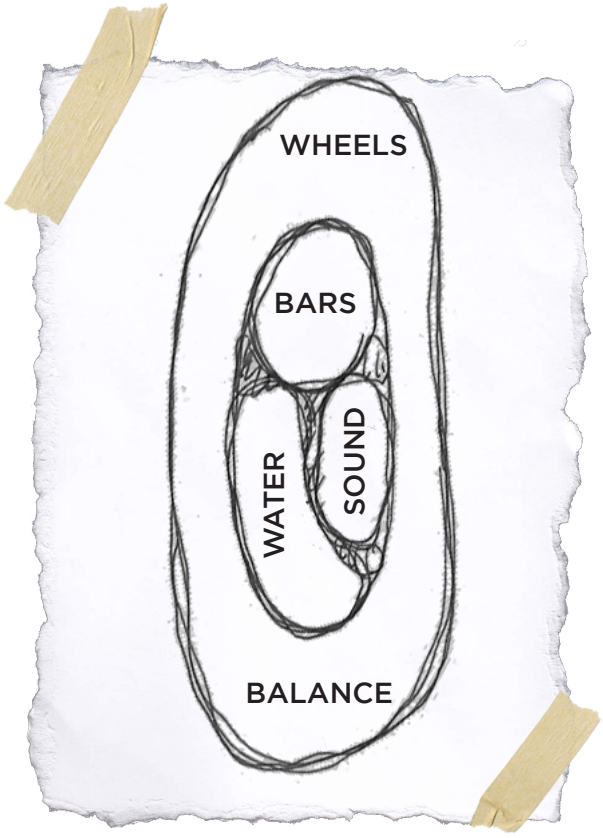
FIG 6.24 I EXPERIMENTING RELATIONSHIP PROPRIOCEPTION / VESTIBULAR



ITERATION 2

+ **Central crush space to view all activities available**

- **Balance may not need to be a space as this could be integrated into surface treatment within any programme**

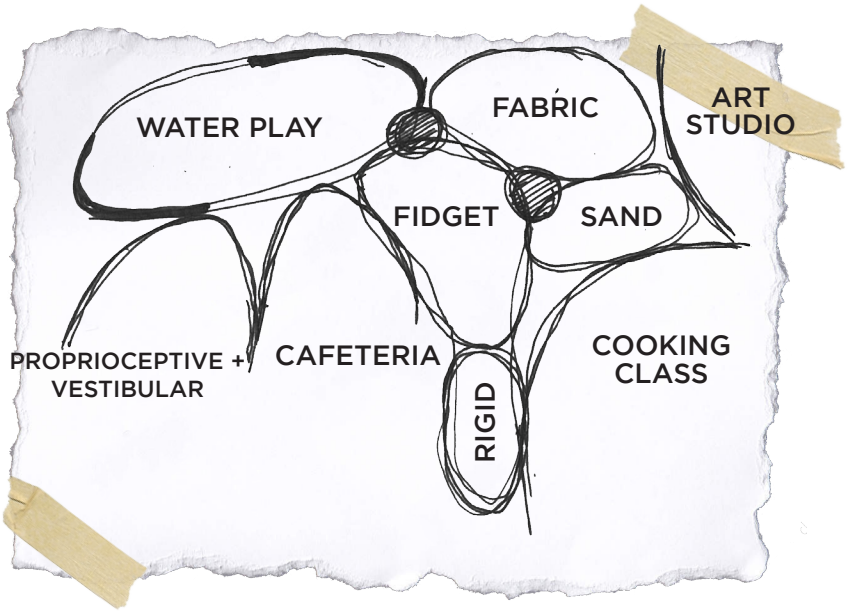


ITERATION 4

+ **Good integration with circulation and wheels activities**

- **Boundary treatment is required for clarity**

*This was selected for the design outcome of design phase II.

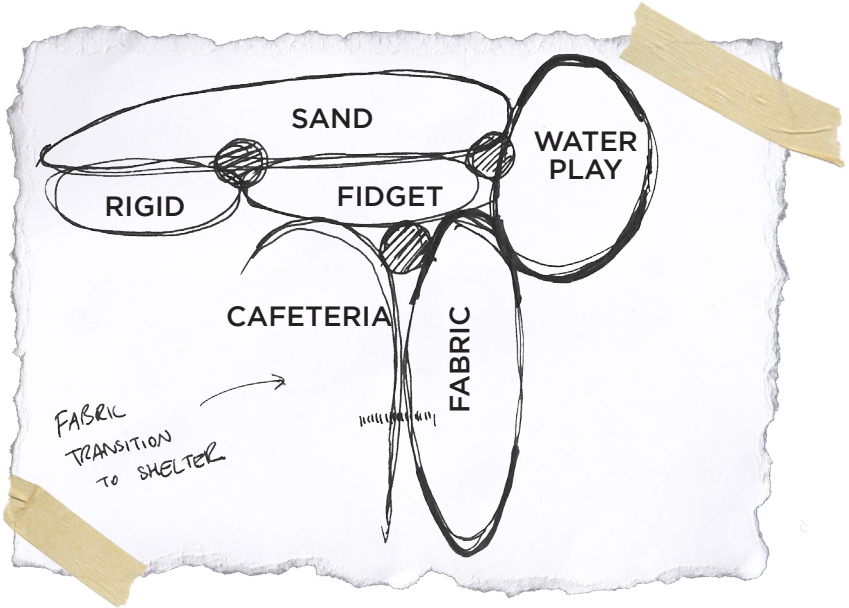


ITERATION 1

\+ **Water and sand protected from wind**

\- **Movement flow from water to sand disallow students to mix component**

*This was selected for the design outcome of design phase II.

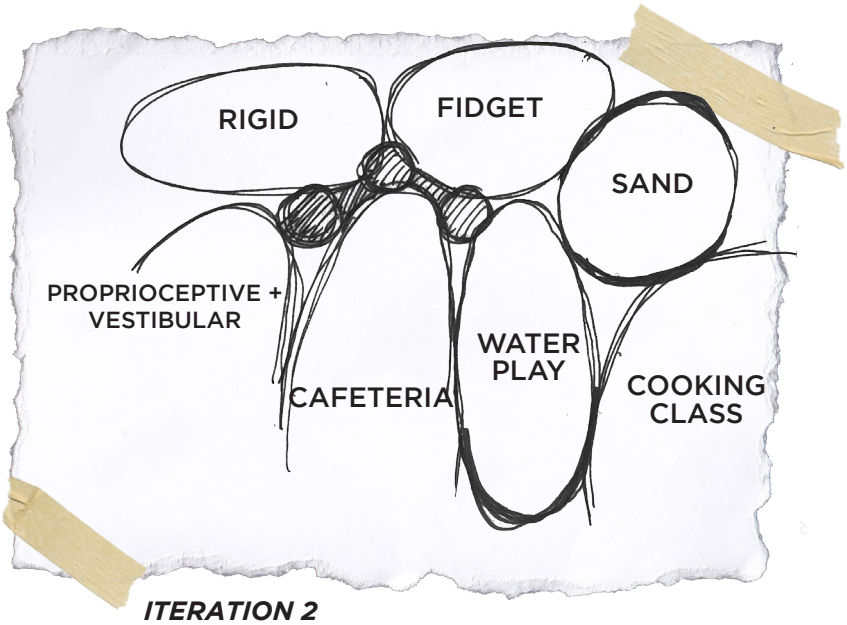


ITERATION 3

\+ **Fabric play area offers new tactile range - colour, more texture opportunities for exploration**

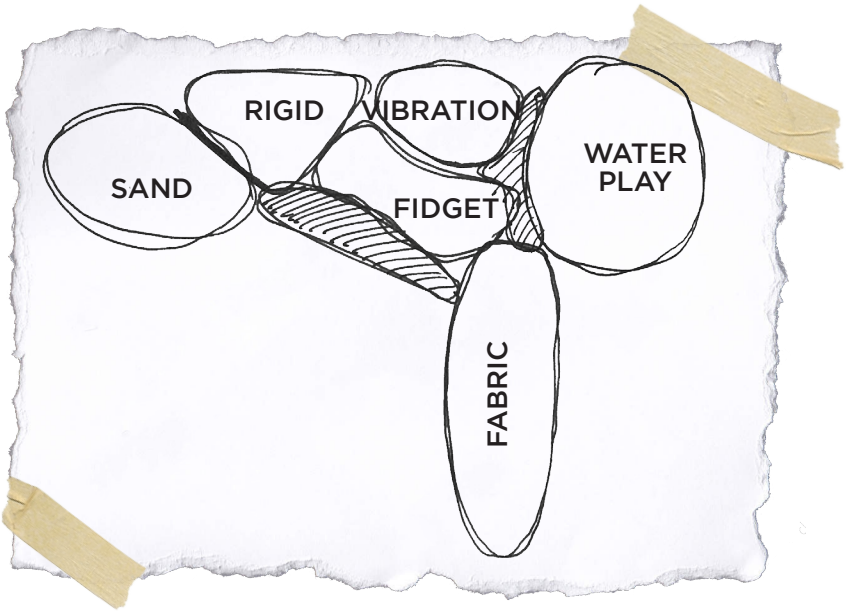
\- **Northerly wind could move sand into the cafeteria area - NOT IDEAL**

FIG 6.25 I EXPERIMENTING RELATIONSHIP TACTILE



ITERATION 2

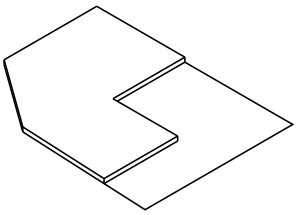
+ **Water and sand is adjacent**
+ **Therapeutic aesthetic environment from cafeteria to cooking class**
- **Another water play is required for proprioceptive play - (more space)**



ITERATION 4

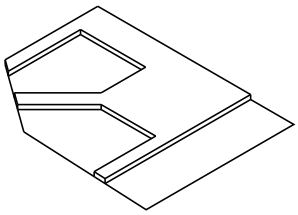
+ **Water and sand is adjacent**
- **Water is opposite sand play = reduced options**

1.



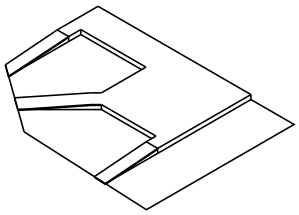
Massing of building geometry

2.



Removing parts that are outdoor

3.



Accessible ramps

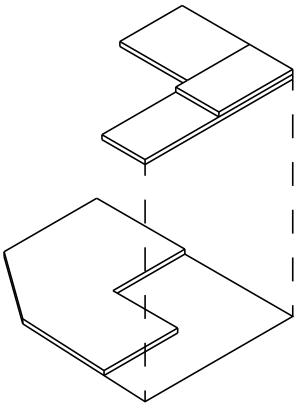
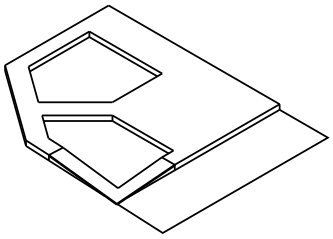


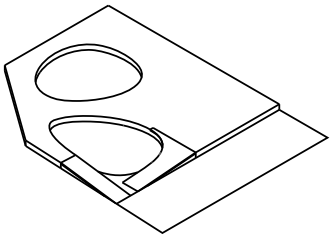
FIG 6.26 I BUILDING GEOMETRY - FACILITATING OUTDOOR LEARNING ENVIRONMENT

4.



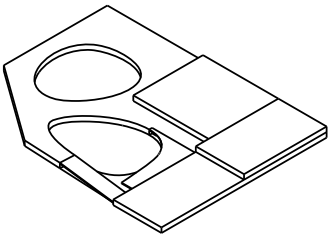
Reduced ramps

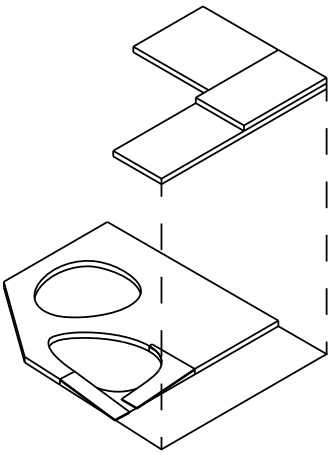
5.



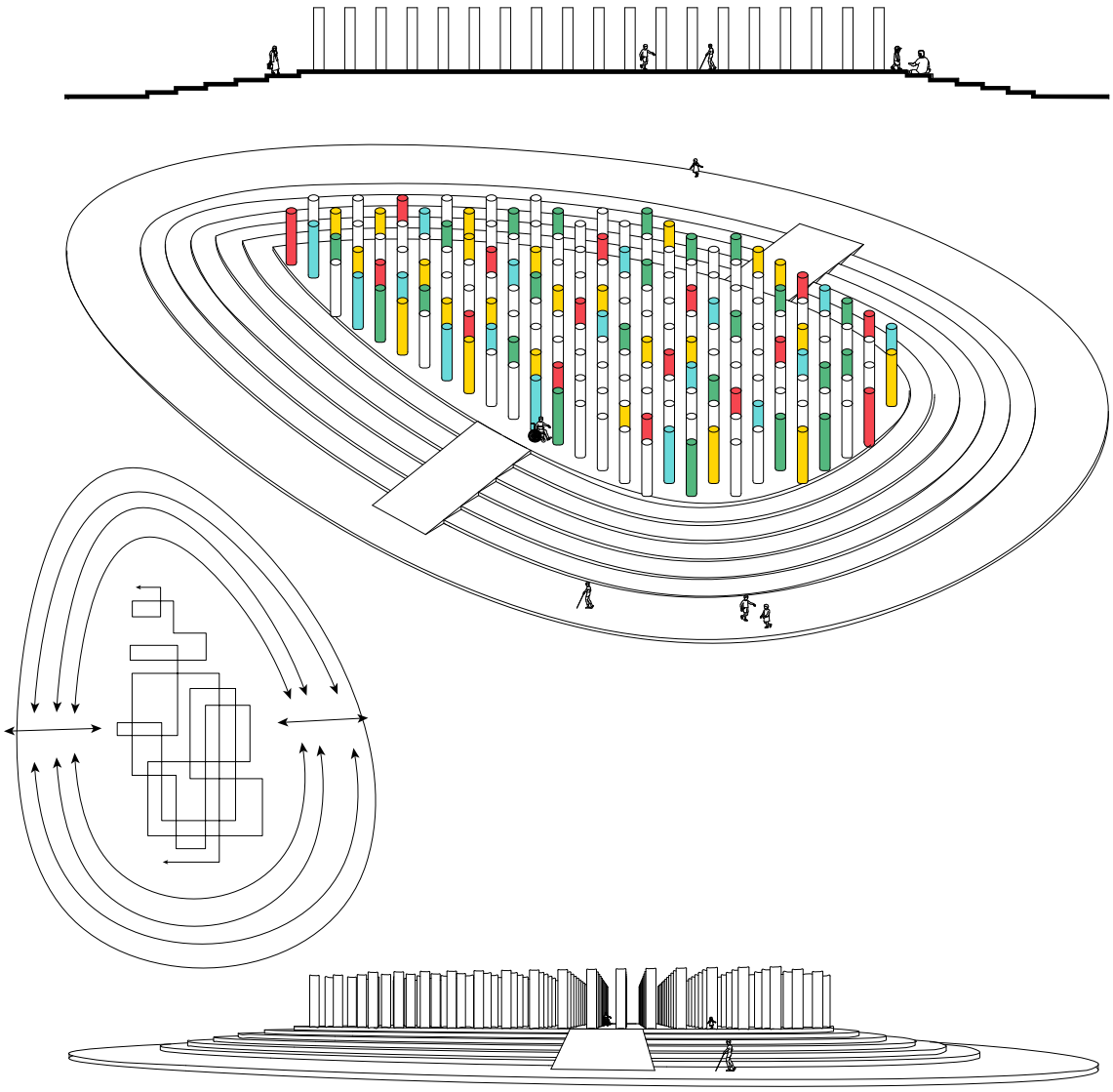
Exterior reflects to context - interior is organic to bring everyone together

6.





Upper library floors



Stimulation

- Edge Friction concept to indicate the speed of the mobility training
- Under stimulation - Can be boring

Control

- No control on the environment - except the direction

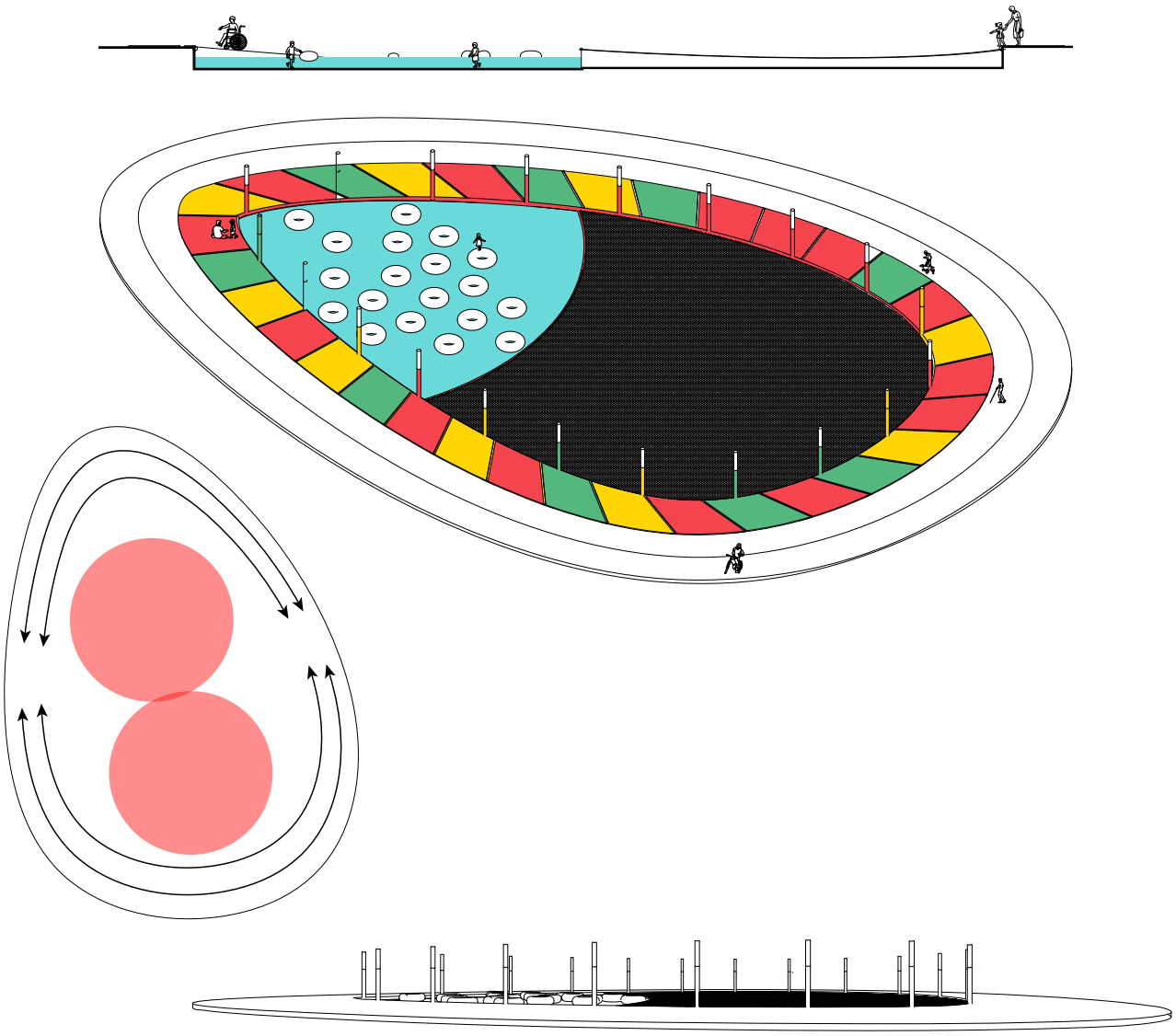
Privacy

- No nature views to provide retreat, fascination and exposure to nature

Clarity

- Clear indication of the type of activity.

FIG 6.27 I DESIGN PROPRIOCEPTION & VESTIBULAR EXPLORATION 1



Stimulation

- Edge Friction concept to indicate the speed of the mobility training
- Under stimulation - Can be boring

Control

- Water and trampoline play is available for play

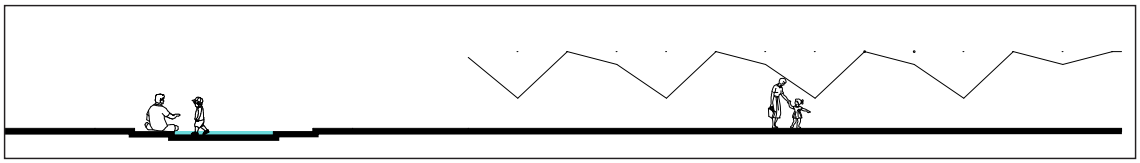
Privacy

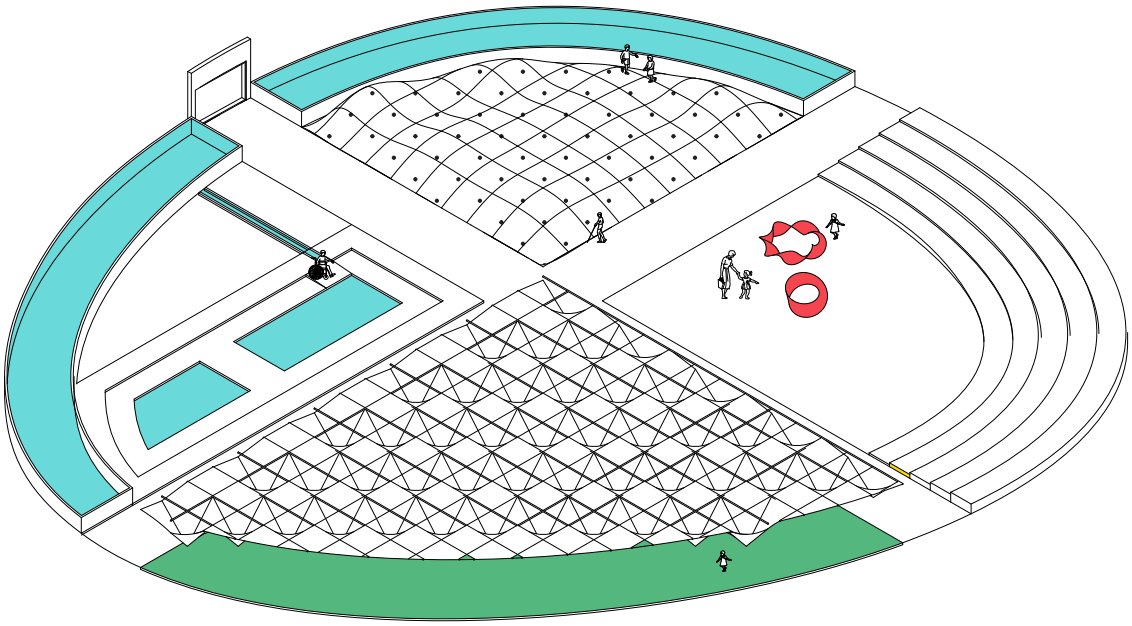
- No nature views to provide retreat, fascination and exposure to nature

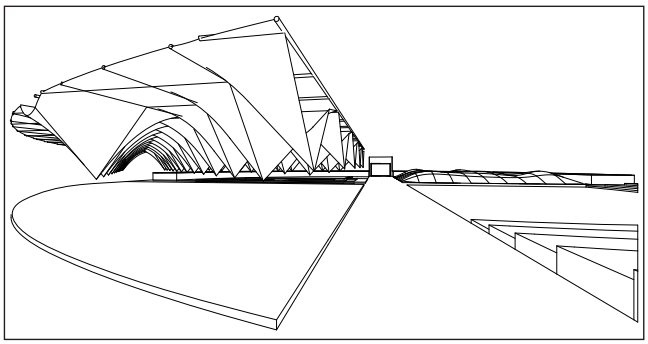
Clarity

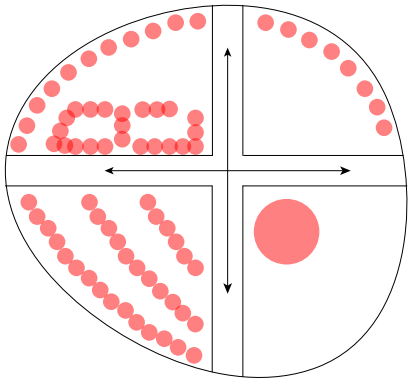
- Clear indication of the type of activity.

FIG 6.28 I DESIGN PROPRIOCEPTION & VESTIBULAR EXPLORATION 2









Stimulation

- Edge Friction concept to indicate the speed of the mobility training
- Under stimulation - Can be boring

Control

- No control on the environment - except the direction

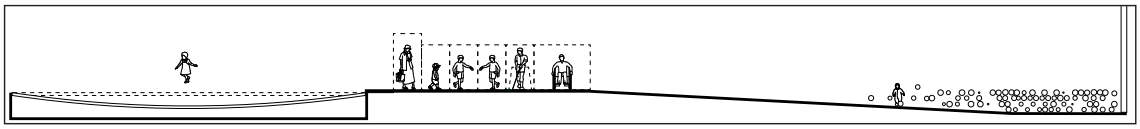
Privacy

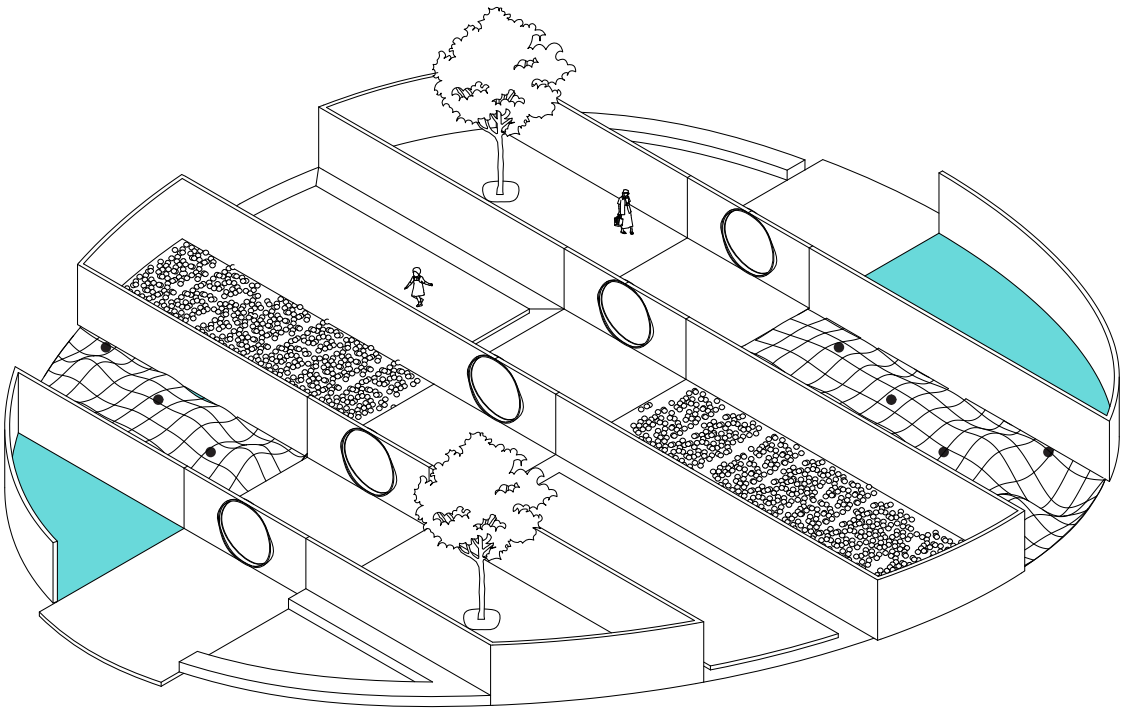
- No nature views to provide retreat, fascination and exposure to nature

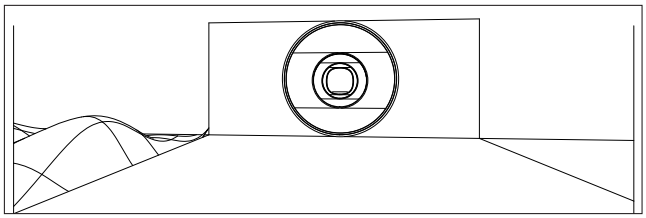
Clarity

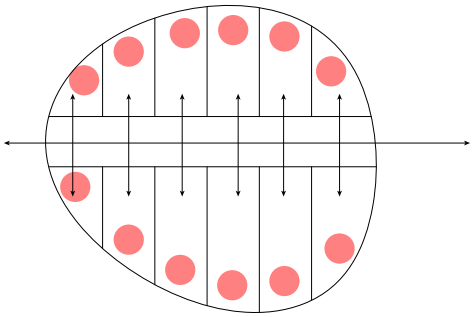
- Clear indication of the type of activity.

FIG 6.29 I DESIGN TACTILE EXPLORATION 1









Stimulation

- Enclosed space removes distraction between activity

Control

- Semi-structured space - each area is enclosed between activity

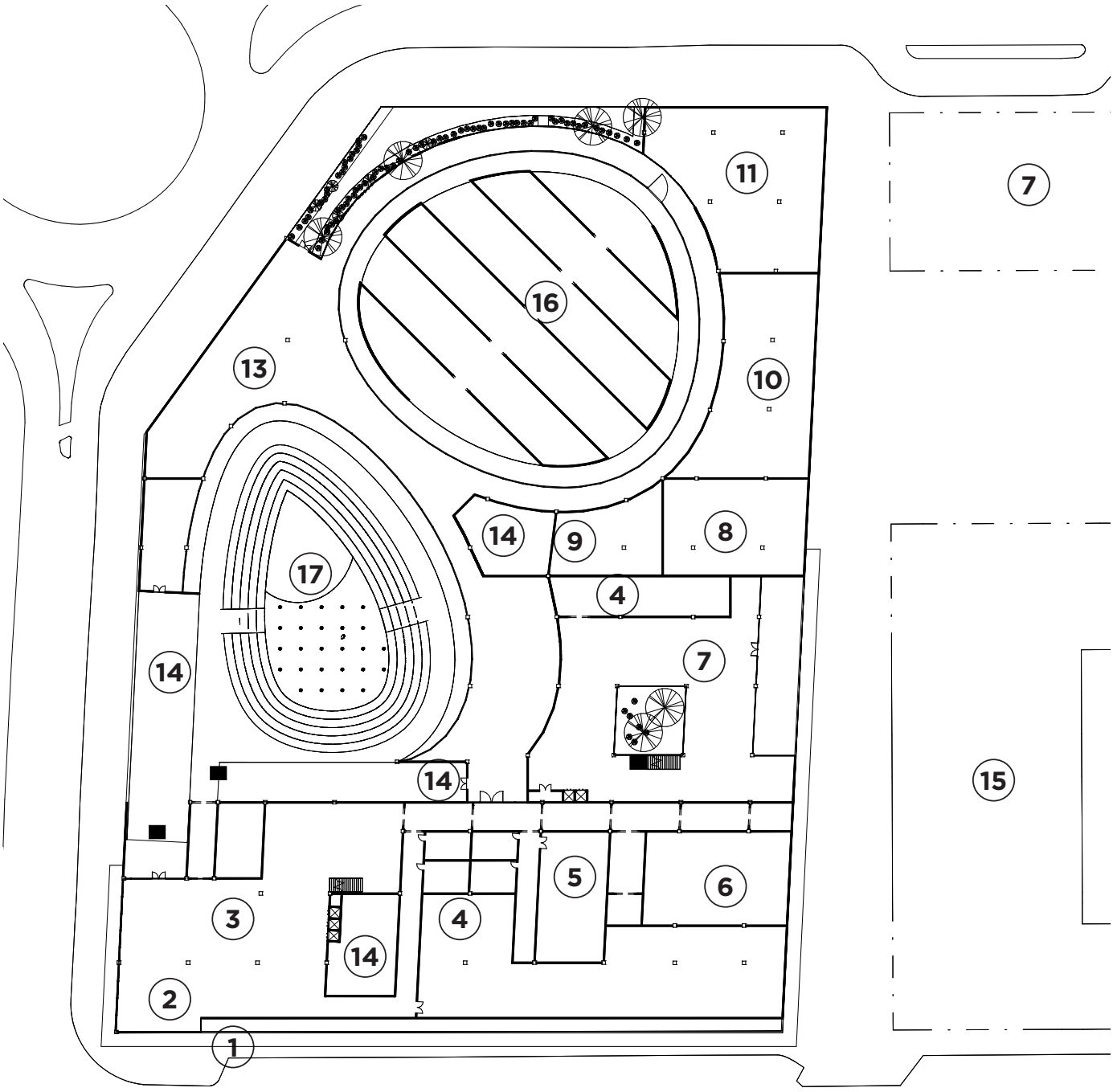
Privacy

- Garden beyond view - Organic frame offers partial view which offers some mystery

Clarity

- Rectilinear shape of the spaces provides clarity

FIG 6.30 I DESIGN TACTILE EXPLORATION 2



1	ENTRANCE	7	LIBRARY	13	CAFETERIA
2	RECEPTION	8	PRIVATE STUDY	14	STAIRS / LIFT / RAMP / TOILETS
3	WAITING AREA	9	AR / VR LAB	15	SHOPS
4	OFFICES	10	COOKING CLASS	16	TACTILE AREA
5	STAFFROOM	11	ART CLASS	17	PROPRIOCEPTION + VESTIBULAR PLAY AREA
6	THERAPIST ROOMS	12	GARDEN		

FIG 6.31 I GROUND FLOOR PLAN

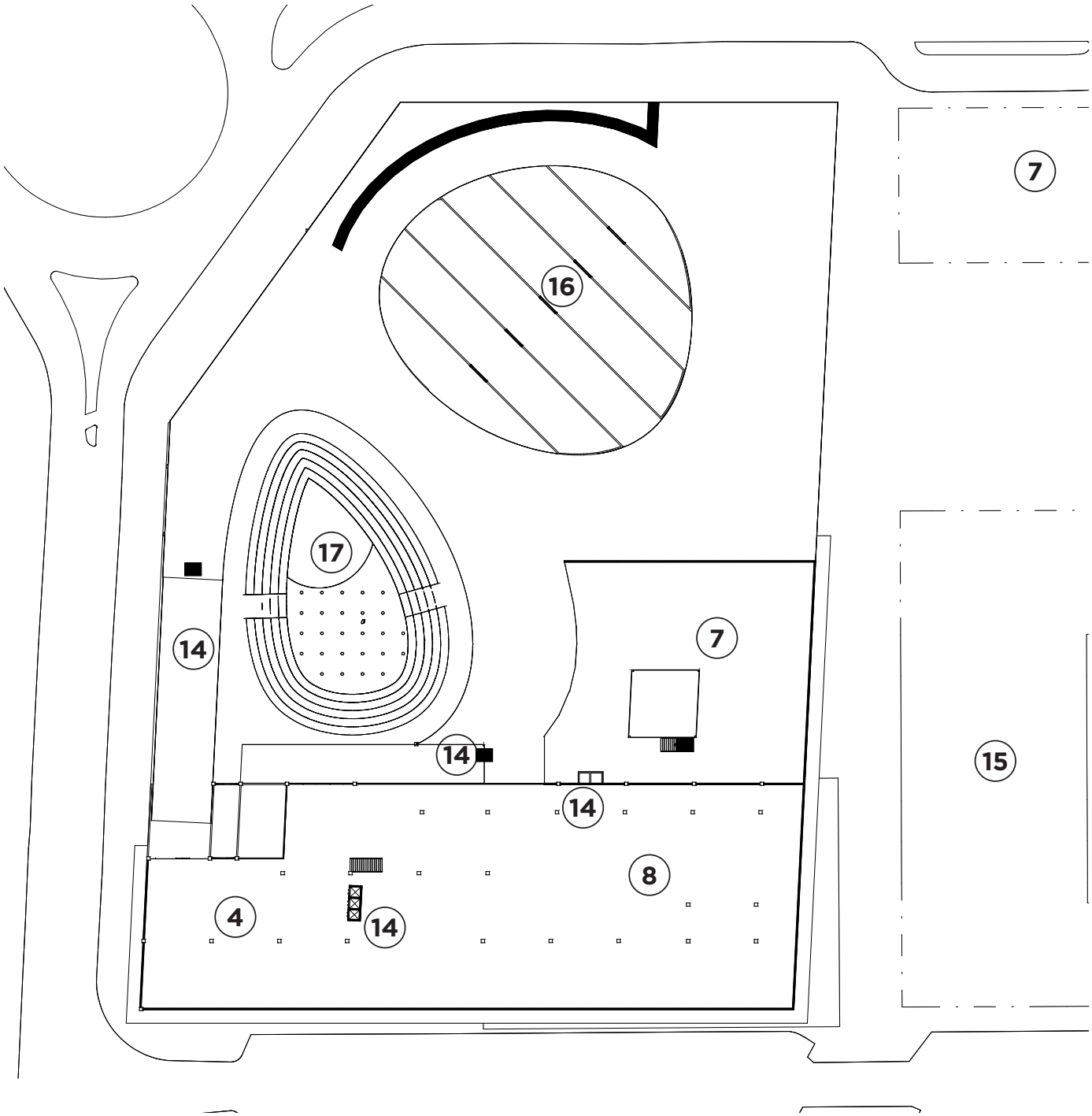


FIG 6.32 I UPPER FLOOR PLAN

FIG 6.33 I PRELIMINARY INTERIOR PLAY SPACES (TOP)
FIG 6.34 I PRELIMINARY TACTILE PLAY SPACES (BOTTOM)

6.4 CONCLUSION & REFLECTTION OF DESIGN PHASE II

At the end of Design Phase II, more criteria were addressed. Sensory rehabilitation, self-directed play, impairment needs, reduced stress within interior and architecture for support were achieved. However, the play areas do not have sufficient natural elements. Train and bus transportation have not been addressed and support spaces for children with and without impairments are yet to be considered.

Some positives critiques were:

- The critic commended that the sensory integration iterations were effective when determining the type of sensory integration therapy.
- The process of developing play activities for children with impairments was thorough and presented nicely

At the end of this design phase, further design considerations were raised from critics:

1. Sensory-deprivated areas for children with autism were lacking
2. Façade Treatment was under developed and need to respond to the site
3. Development of community integration activities needed strengthening
4. Play areas needed to be more fluid
5. The journey of the impaired child within the whole building needed testing

Personal Reflection

The strengths of this design phase II outcome were engaging children with a playful approach through sensory integrated therapy. However, these activities may have been over analysed and technical which resulted in the rigidity of the play areas. There is still room for improvements such as circulation within internal spaces and how it's used during different times of the day, especially when the school is accessible to when caregivers and community can access

A few weaknesses within this design outcome were the linkage between school and public transportation, addressing the needs of the individual's impairments within the learning environment and support spaces to facilitate children with impairments' needs. Though the layout and the sensory integrated activities aims to improve either tactile, proprioception and vestibular system, it was found that it was rigid, and element of play aesthetics within these areas were lacking.

In summary of the findings at the end of Phase II, the next step needs to address the following problems:

- 'Loosening-up' sensory play areas
- Address micro and macro-circulation – internal and external circulation
- Façade treatment development
- More natural element – too rigid that limit opportunities
- Too much enclosure
- Site Conditions – Rain, wind
- Occupant journeys
- Addition of second floor to improve accessibility for after school hours

6.5 PHASE III - DESIGN REFINEMENT

The next stage of the design primarily focused on the macro and micro scale aspect of the design to ensure that all performance criteria were achieved.

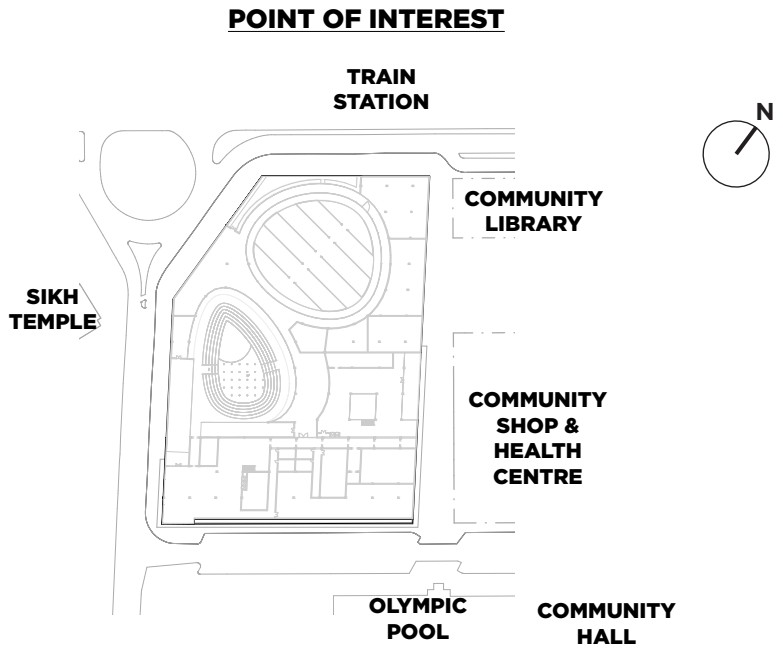
The following pages are a series of development drawings that led to the final outcome of the design.

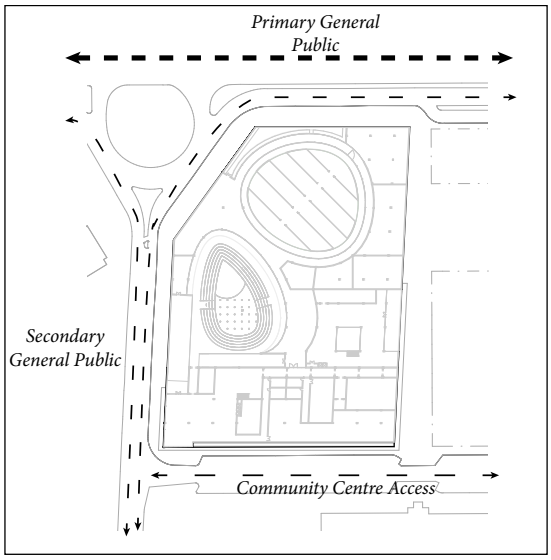
PERFORMANCE CRITERIA MET

ARCHITECTURE FOR PLAY

ARCHITECTURE FOR ACCESSIBILITY

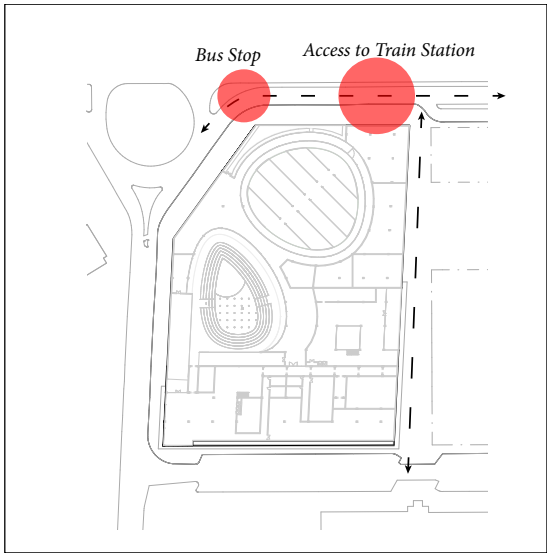
ARCHITECTURE FOR SUPPORT





1. VEHICULAR TRAFFIC CIRCULATION

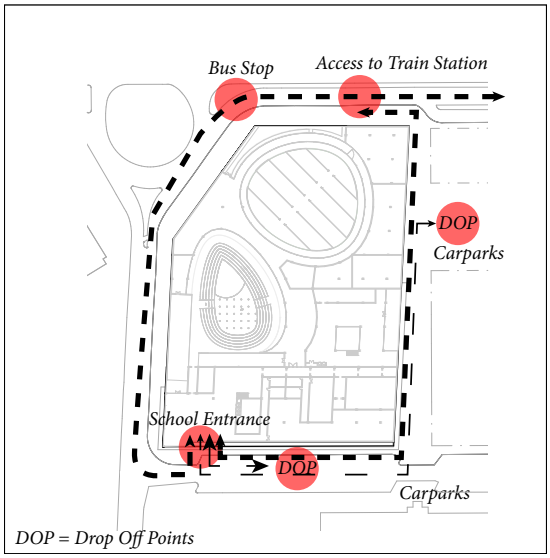
+ *Medium heavy traffic on northern end of the building.*
- *Slow traffic on South-Eastern boundary*



2. TRAIN + COMMUTERS

+ *Access to train station and bus station.*
- *Northern and eastern sides have medium-high traffic flow*

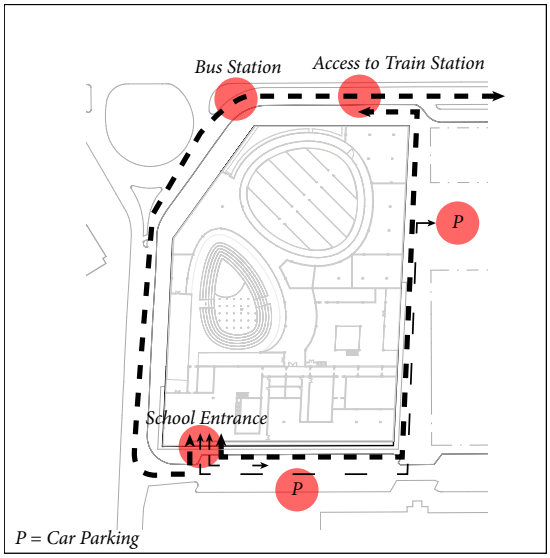
FIG 6.35 I MACRO CIRCULATION - MOVEMENT AROUND THE SITE



3. STUDENTS / CAREGIVERS

\+ *One entrance provides a meeting point for everyone.*
\- *May be long distance to get to entrance point*

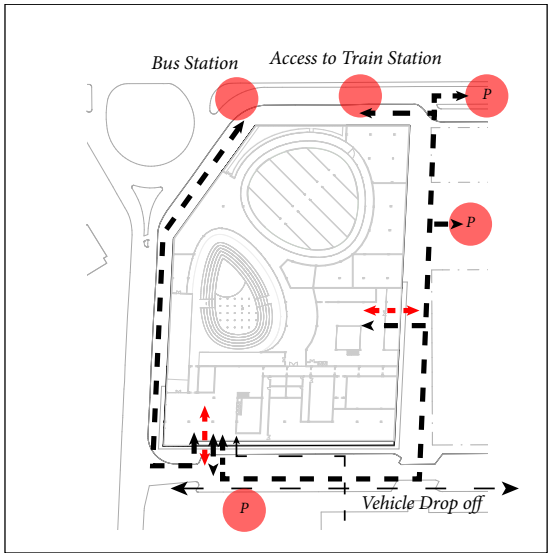
? ***Should there be only one entrance?***



4. TEACHERS / STAFFS

\+ *Healthy connection to public transport.*
\- *Parking area in front of the building could bring down the quality of space*

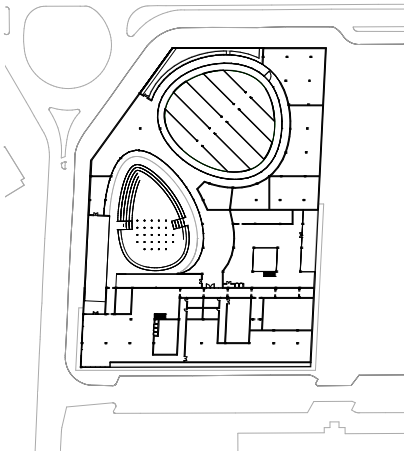
? ***Should parking be underground?***



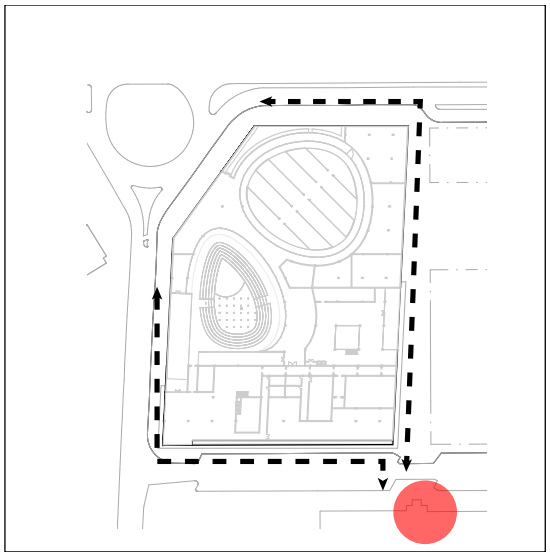
6. GENERAL PUBLIC AFTER SCHOOL)

\+ *Closed to public during school hours provide safety for children*
\+ *Two access into school for community activities*

? ***Should there be an access in Northern end of the building?***



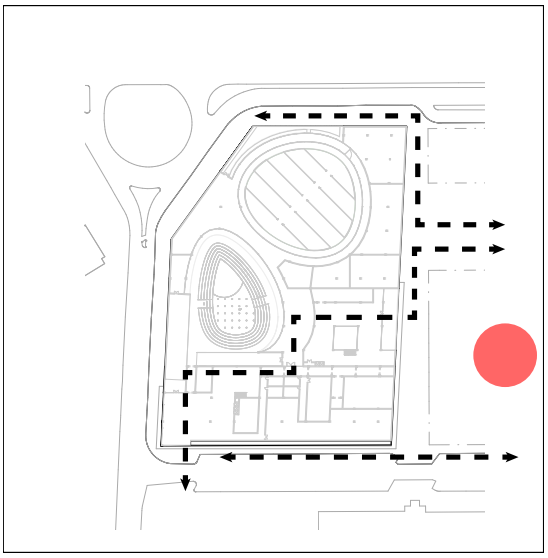
1. ACCESS TO PUBLIC TRANSPORTATION



3. ACCESS TO POOL

± *Does not require access through building to get to Naenae Pool*

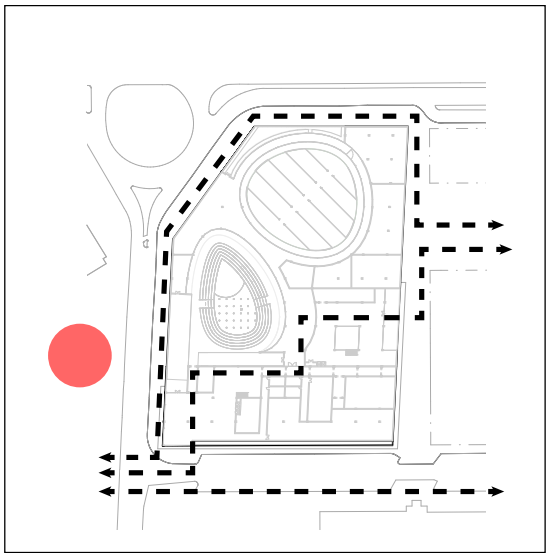
? ***Should there be access for shelter from rain?***



4. ACCESS TO HEALTH CENTRE

\+ *Sheltered and shortcut through building.*
\- *Nothing to showcase the building*

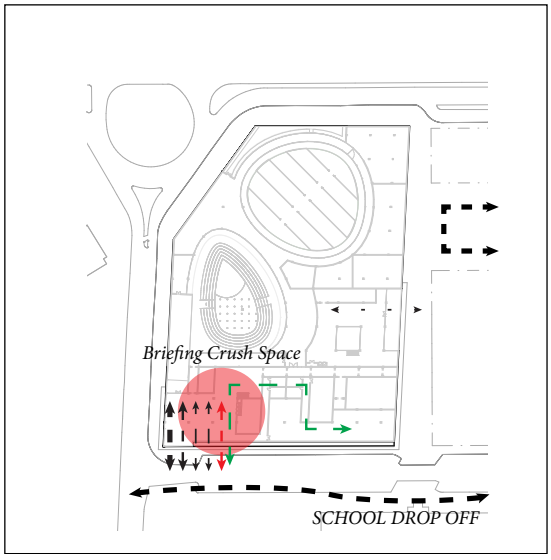
? ***Should there be more natural landscape within the journey?***



5. ACCESS TO WESTERN SIDE

\+ *Encourage people to use part of outdoor area*
\+ *Partial view of internal school training activities*

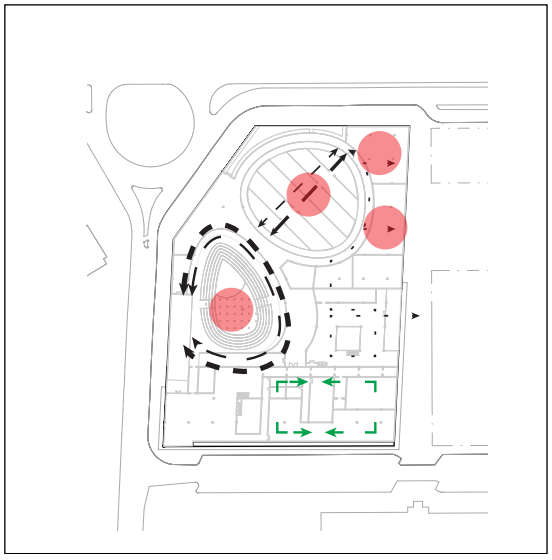
? ***Should they be able to see what the whole school offer (facilities-wise)?***



1. 08:00 - MEETING & BRIEFING

+ *Everyone meet up at one point*
- *Under-designed reception/waiting area*

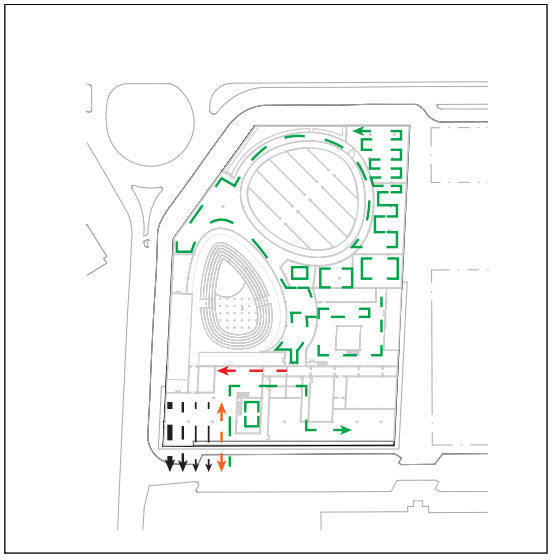
? ***Moment of architectural design - Crush Space for debriefing***



2. 10:00 - SPECIFIC TRAINING

+ *Allows improvement to child's disability*
- *More activities for abled-children*

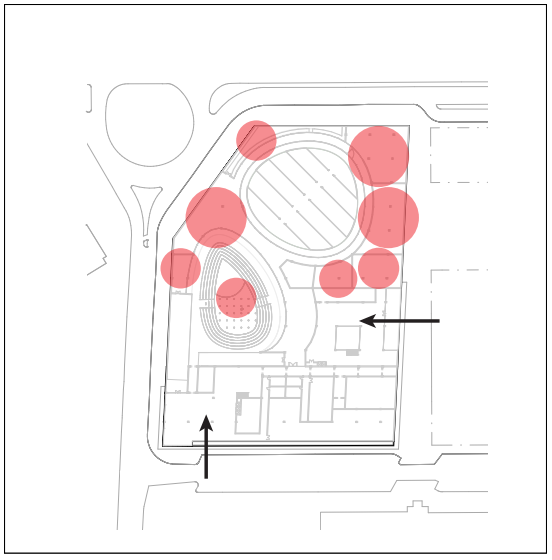
? ***Needs shelter for outdoor rehabilitative spaces***



5. 16:00 - HOMETIME & COMMUNITY SETU

+ *Option to stay behind for community activities*
+ *Needs after-school space for chilldren waiting for parent*

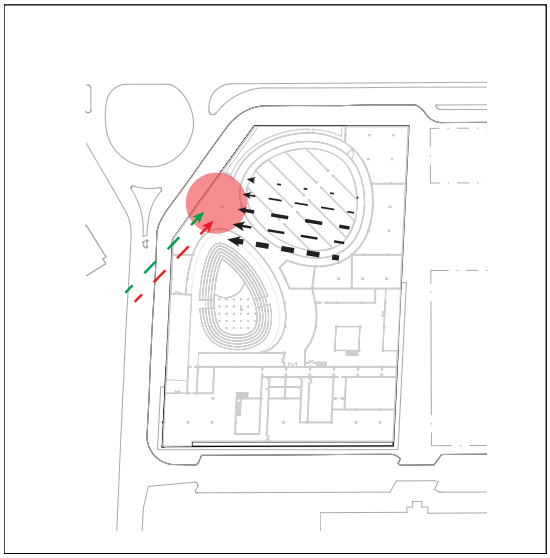
? ***Should there be a washroom?***



6. COMMUNITY ACTIVITIES

+ *Art and cooking classes are open to community to use*
+ *Proprioception & Vestibular becomes a gym*
- *Needs a hall and additional meeting/practice rooms*
? ***More rooms to provide more range of community activities?***

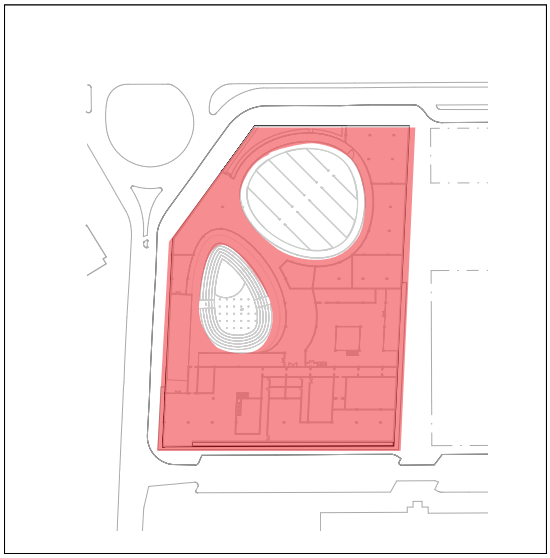
FIG 6.37 I MICRO CIRCULATION - OCCUPANTS JOURNEY - TIMES OF THE DAY



3. 12:00 - LUNCHTIME

+ *Cafeteria is central, accessible to everyone*
- *Not a lot of spaces to sit*

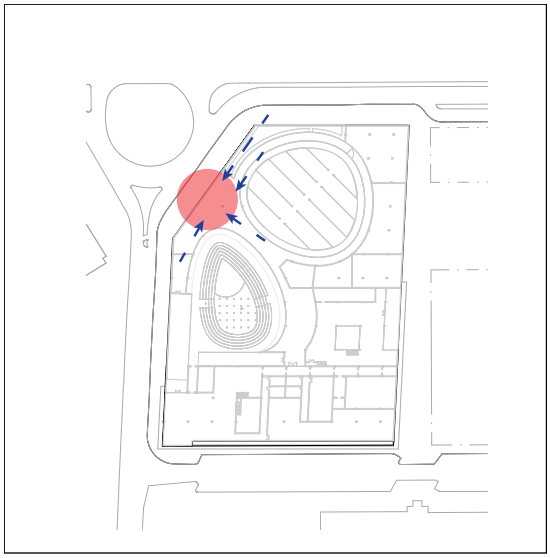
? ***Should the cafeteria be larger for socialising?***



4. 14:00 - FREEPLAY

+ *Art + Cooking classes are open for children to use*
- *Outdoor places need natural elements*
- *Area for sensory deprivation*

? ***Should there be courtyard spaces of play to provide semi-sheltering?***



7. EVENING TEA BREAK

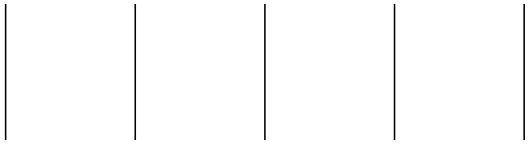
+ *Central cafeteria for tea break*
- *Needs larger space and defined space*

? ***Should cafeteria be placed next to cooking studio - make children or community to prepare lunch for everyone?***

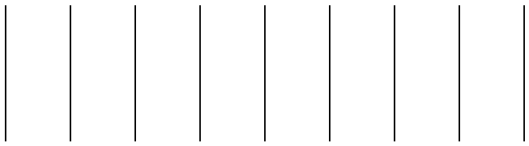
8. CLOSE DOWN & CLEANUP

+ *Community cleans up and prepare for school tomorrow*

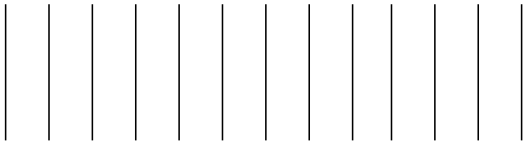
Mobility
Blind
Deaf
Autistic
Abled
Teachers
Support Staff
Parents
Community



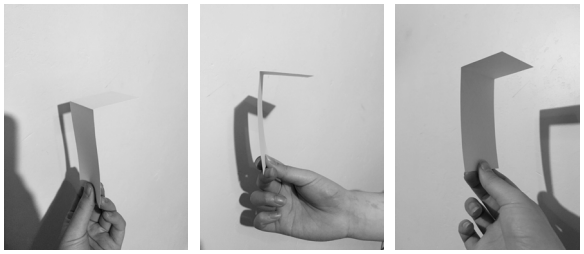
Slowing Speed



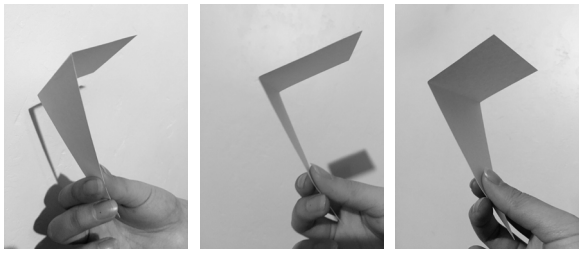
Constant Speed



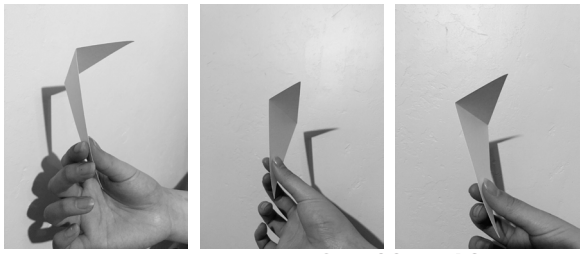
Speeding



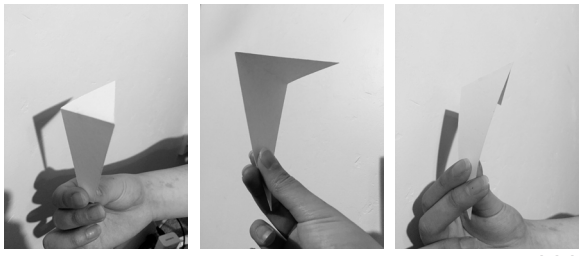
SUN COVERAGE ●●●●○



SUN COVERAGE ●●●○○



SUN COVERAGE ●●●○○



SUN COVERAGE ●●○○○

Facade model exploration. Semi-sheltered vertical grid facade design provides privacy and edge friction. Edge friction through vertical elements within the driver's line of vision, could slow down oncoming vehicle to create a safer environment.

FIG 6.38 I DRIVERS LINE OF VISION - FACADE DEVELOPMENT

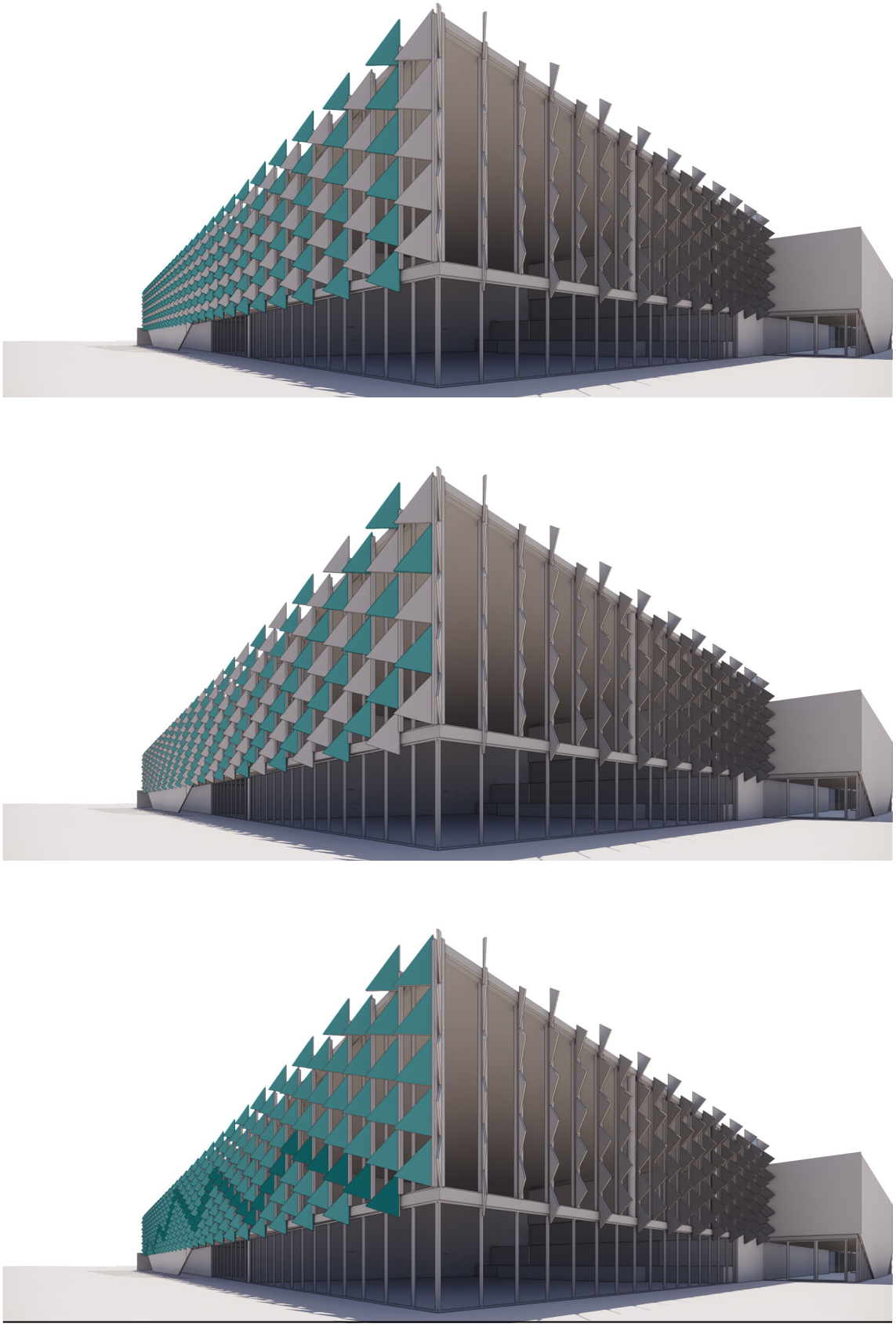


FIG 6.39 I FACADE DEVELOPMENT WITH STRUCTURES AND CONTRASTING COLOURS

7.0

DEVELOPED DESIGN

DEVELOPED DESIGN

The finalised school design is an alternative community-centred school design that allows children with and without impairments, teachers, parents and community to use the facilities throughout the day, the week and the year. The design components consist of three key areas, play areas, specialist areas and communal activities areas. These areas are designed to be flexible to accommodate both teaching and learning but also accommodate public use. The following pages are sectioned into these three parts focussing on how the design has addressed the performance criteria.

The school use for the school programmes are in FIG 7.01, FIG 7.02 and FIG 7.03. The timetable maximises the daylight hours during the winter and summer season in relation to the programme for different types of occupants within each space. The school is open to children, teachers, caregivers and the community all-day, however, during 10am to 4pm in winter and 12pm to 6pm in summer, caregivers and the community are unable to access the school unless supervised by teachers. This provides a safety space for children to explore and learn during school hours without any unwelcome guests. At the start of their school hours, children are required to meet up with their assigned teachers at the reception area for progress update and to check their emotional and physical healthy, before they attend to their rehabilitation and other activities.

Within the school hours, there are no scheduled classes. This provides children with an opportunity to self-direct their own learning, since research found that children have longer participation and have a deeper and more effective learning engagement through this method as opposed to scheduled activities. Architecturally this means that formal classrooms are not required and replaces these with specialist rooms. The specialist rooms are used by teachers and they guide students to learn and develop their skills, passions and interests individually or in groups.

The ground floor consists of activity areas to provide ease of movement for children with mobility impairments. The north-eastern part of the building are specialist rooms, such as textiles/woodwork, art, dance, drama, science lab, computer lab, music room and recording studio; theatre/hall; library; and gallery. These programmes are placed there as the northern part of the building have all-day sun and facing the centre of the town centre to facilitate evening or weekend activities for the public. The kitchen and community garden are on the north-western part of the building. This facilitates deliveries behind the community kitchen on Vogel St. The kitchen and the garden were placed close to each other to provide an educational opportunity for the community to grow their own food and children can learn about the relationships between preparation foods and where they came from, etc. The play areas are designed for children with impairments and they are placed at the centre of the building to encourage play but have need designed to attract and challenge able bodied children as well. The proprioception and vestibular play system are outdoors, while the tactile play system is enclosed with a skylight above the area.

The second floor consists of more outdoor learning environments for children to play, explore and learn in, a children library, seminar rooms, therapist rooms and staffrooms. The therapist rooms can accommodate caregivers experiencing depression. The inclusion of therapist rooms within the school provides a healthcare access opportunity for children and caregivers to resolve any problems relating their physical and mental health. Furthermore, as the school provides a range of interactions, such as social interaction spaces and community activities/classes, this could be beneficial for caregivers experiencing depression.

The green roof on the rooftop provides opportunities for proprioception and vestibular play and the skylight above the specialist room on the floor below, allows children to look down on the type of activities that are happening. This appeals to the exploratory type of play. The architecture can allow children to be curious and explore different type of activities. Through this, there is a potential that to enable activities to be more engaging and meaningful. The children library also explores this design concept, this library was placed on the top floor to allow children to visualise play/rehabilitative activities for children with impairments. With the line of vision directed into these spaces, it aims to encourage students to exercise or practice their proprioception, vestibular and tactile senses.

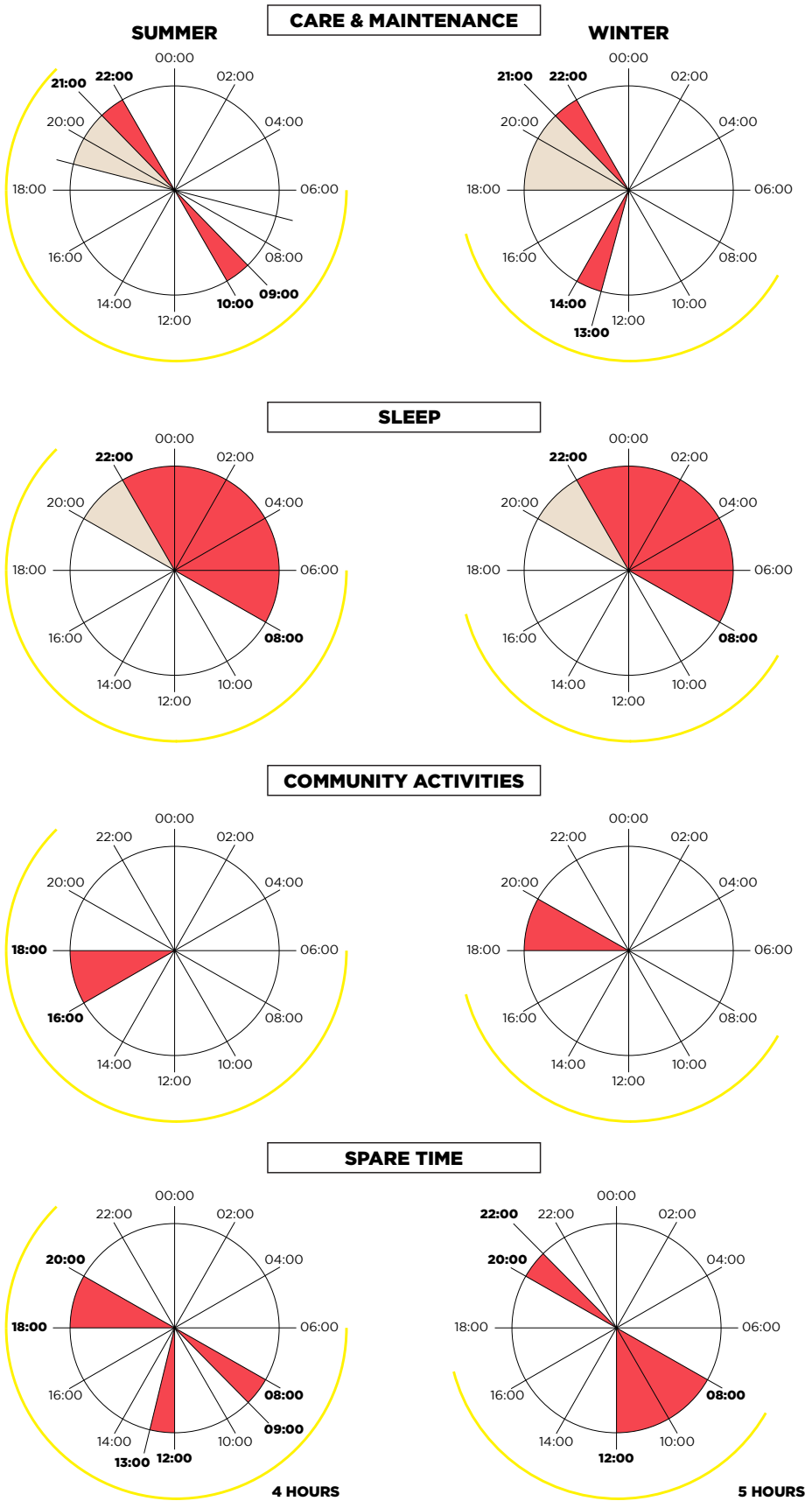
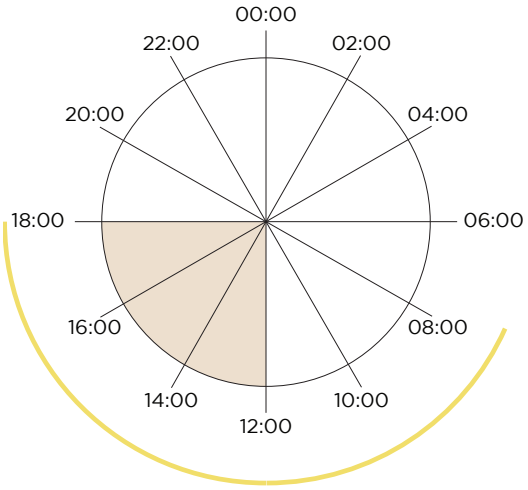
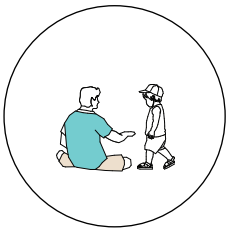


FIG 7.01 I PROPOSED TIME ROUTINE DURING THE SEASON FOR CHILDREN

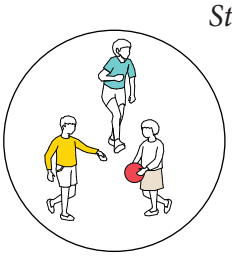
SUMMER



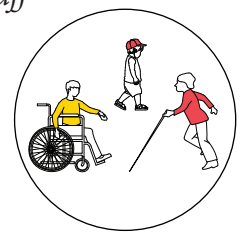
SCHOOL HOURS



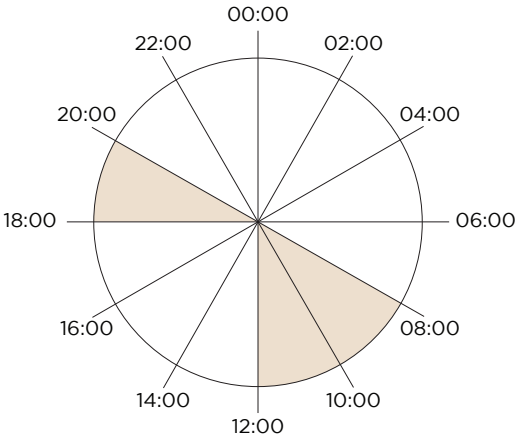
Teachers/ Staff



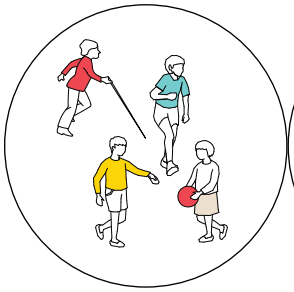
Children without impairments



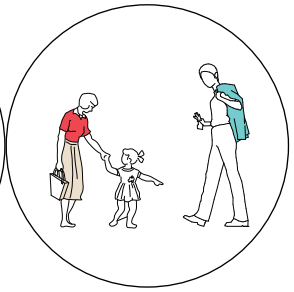
Children with impairments



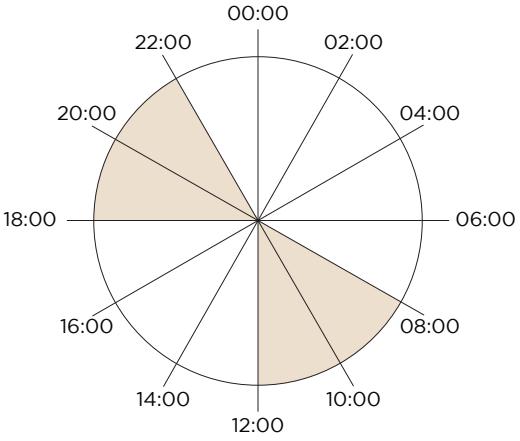
AFTER/BEFORE SCHOOL ACTIVITIES (OPTIONAL)



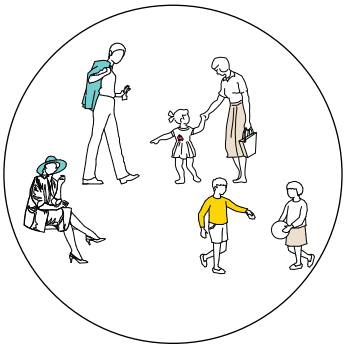
All Children



Caregivers



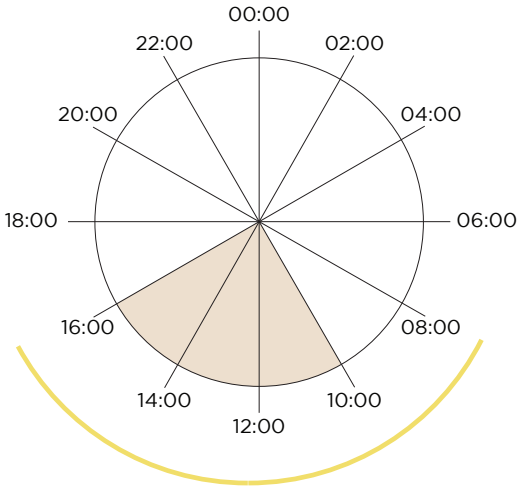
COMMUNITY ACTIVITIES



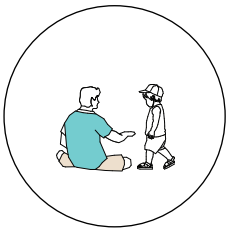
Community

FIG 7.02 I PROPOSED USE OF SCHOOL DURING SUMMER DAY

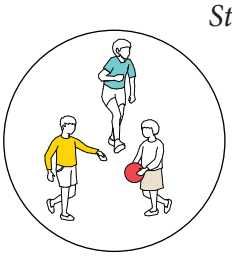
WINTER



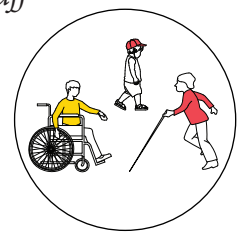
SCHOOL HOURS



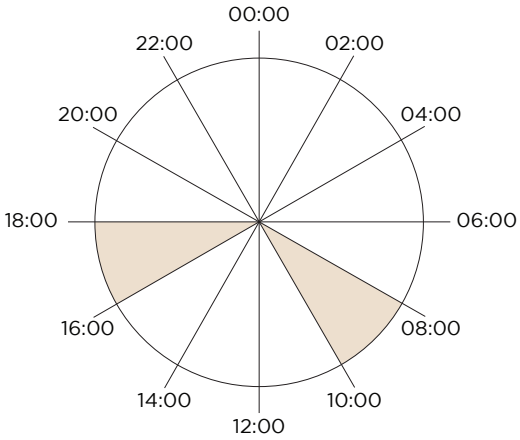
Teachers/ Staff



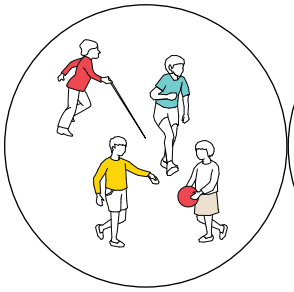
Children without impairments



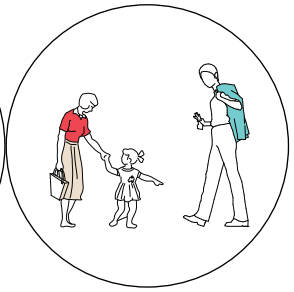
Children with impairments



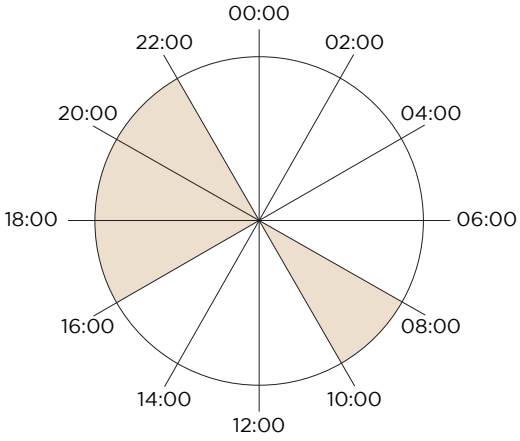
AFTER/BEFORE SCHOOL ACTIVITIES (OPTIONAL)



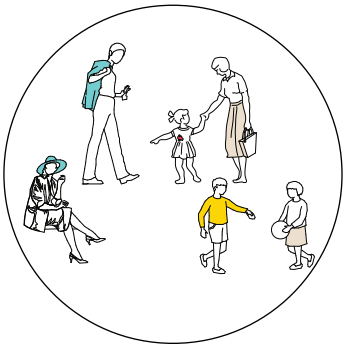
All Children



Caregivers

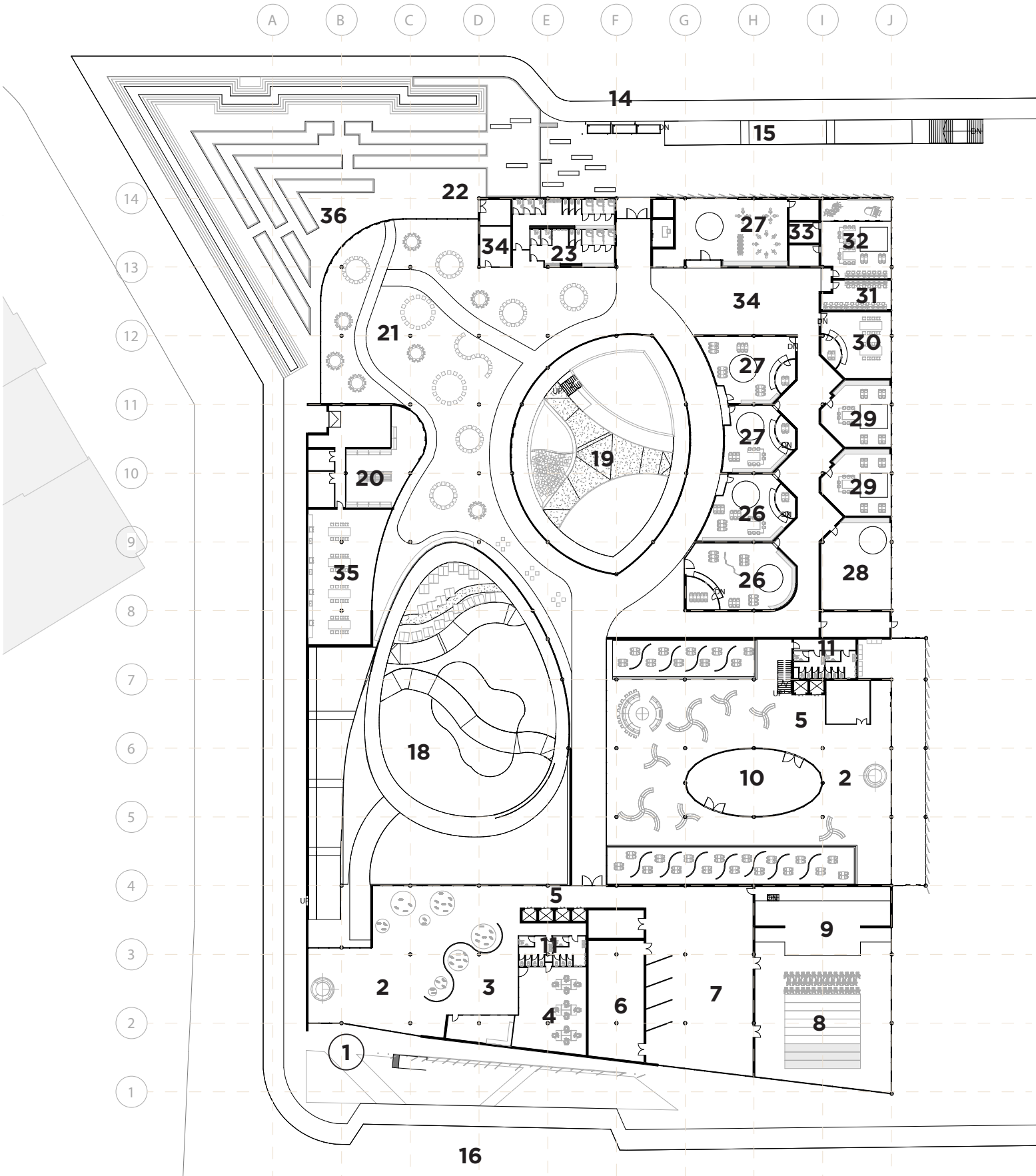


COMMUNITY ACTIVITIES



Community

FIG 7.03 I PROPOSED USE OF SCHOOL DURING WINTER DAY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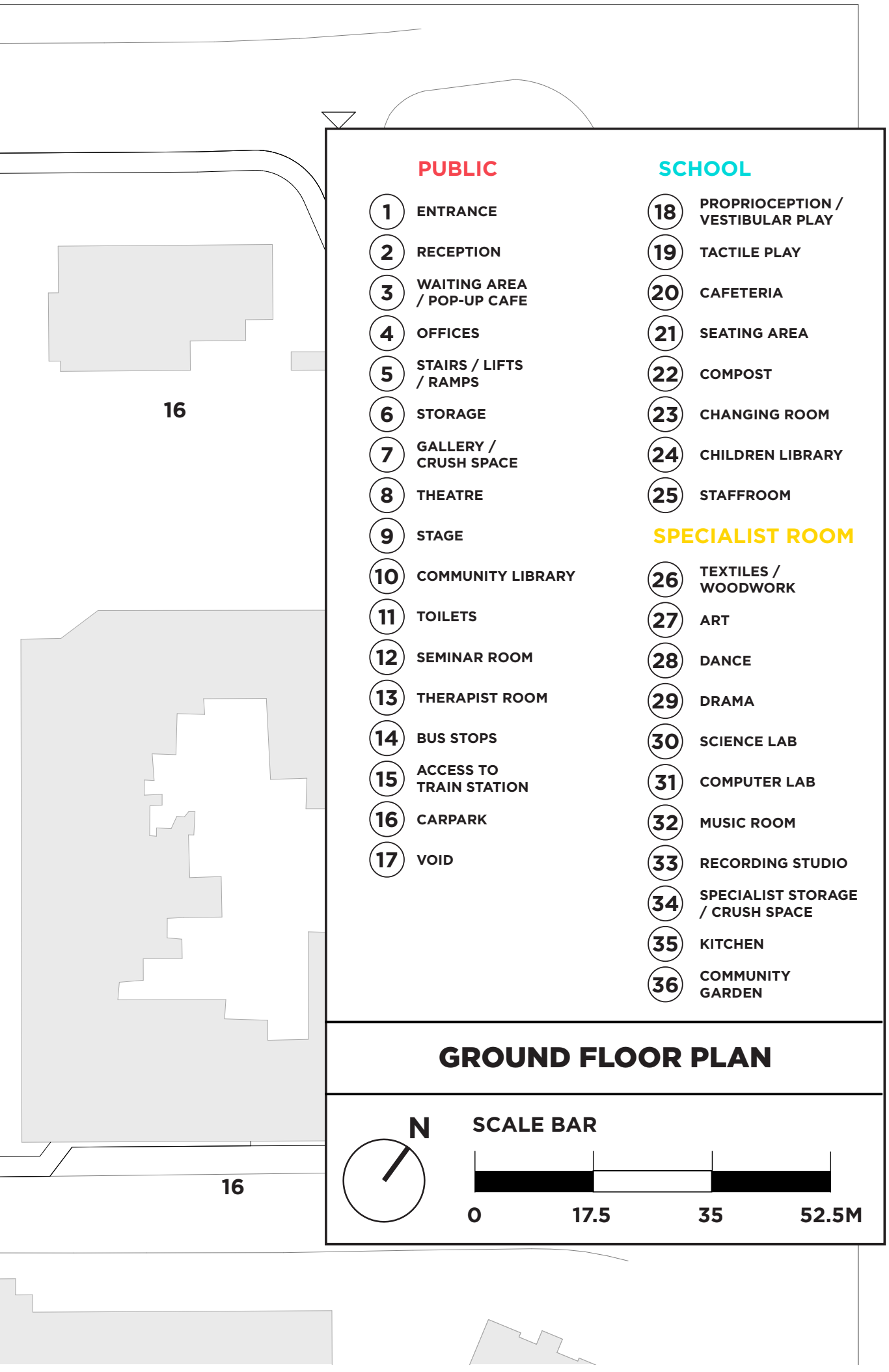

PUBLIC

1. ENTRANCE
2. RECEPTION
3. WAITING AREA / POP-UP CAFE
4. OFFICES
5. STAIRS / LIFTS / RAMPS
6. STORAGE
7. GALLERY / CRUSH SPACE
8. THEATRE
9. STAGE
10. COMMUNITY LIBRARY
11. TOILETS
12. SEMINAR ROOM
13. THERAPIST ROOM
14. BUS STOPS
15. ACCESS TO TRAIN STATION
16. CARPARK
17. VOID

SCHOOL

18. PROPRIOCEPTION / VESTIBULAR PLAY
19. TACTILE PLAY
20. CAFETERIA
21. SEATING AREA
22. COMPOST
23. CHANGING ROOM
24. CHILDREN LIBRARY
25. STAFFROOM

SPECIALIST ROOM

26. TEXTILES / WOODWORK
27. ART
28. DANCE
29. DRAMA
30. SCIENCE LAB
31. COMPUTER LAB
32. MUSIC ROOM
33. RECORDING STUDIO
34. SPECIALIST STORAGE / CRUSH SPACE
35. KITCHEN
36. COMMUNITY GARDEN

GROUND FLOOR PLAN

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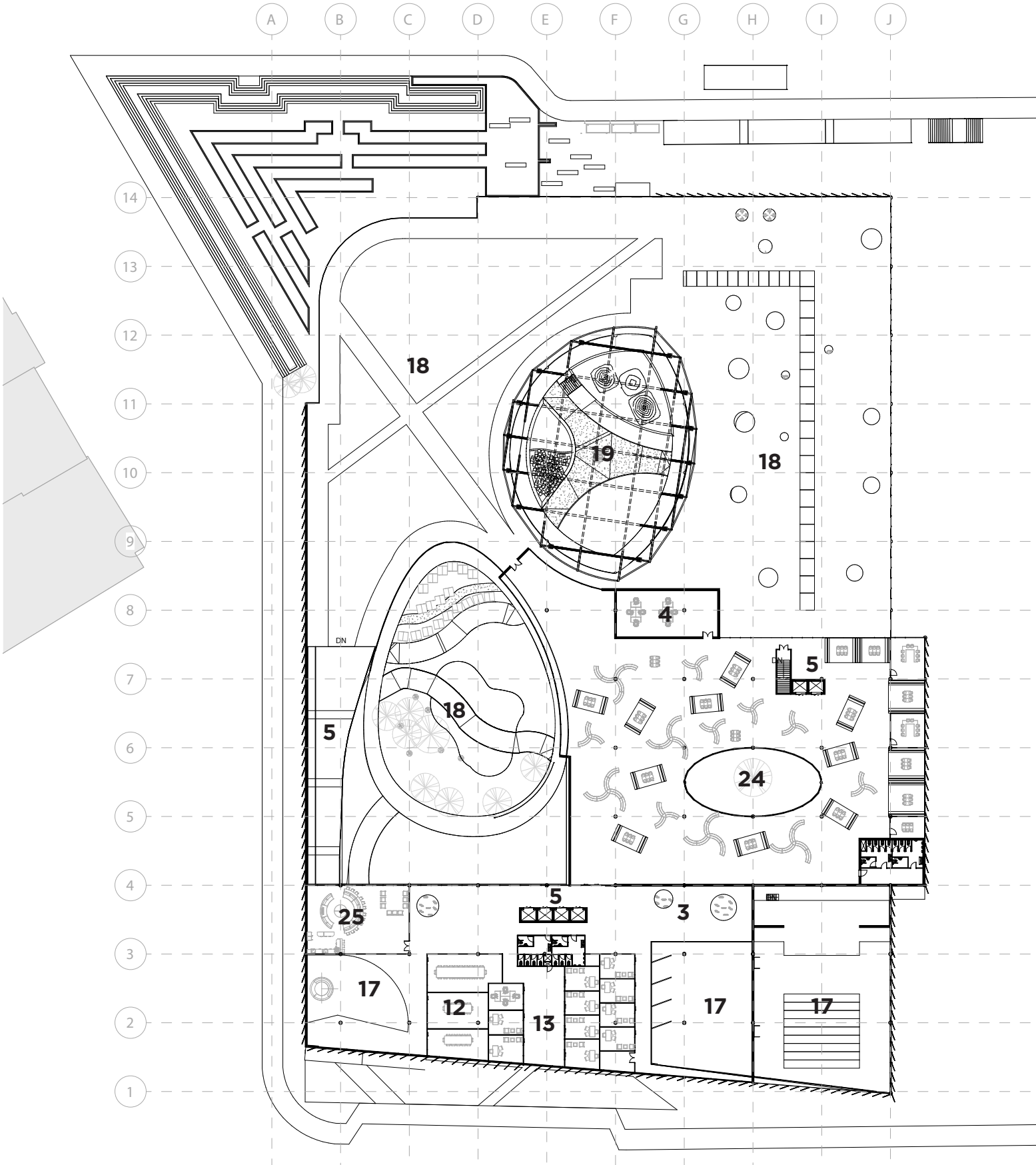
SCALE BAR

0 17.5 35 52.5M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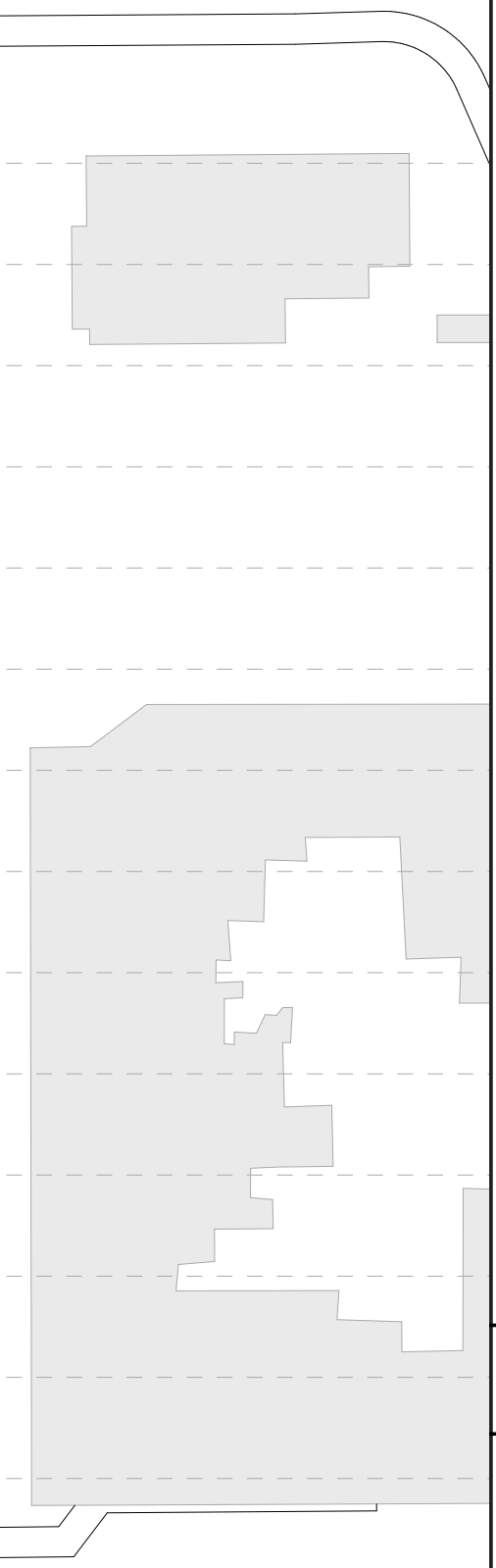

PUBLIC

1. ENTRANCE
2. RECEPTION
3. WAITING AREA / POP-UP CAFE
4. OFFICES
5. STAIRS / LIFTS / RAMPS
6. STORAGE
7. GALLERY / CRUSH SPACE
8. THEATRE
9. STAGE
10. COMMUNITY LIBRARY
11. TOILETS
12. SEMINAR ROOM
13. THERAPIST ROOM
14. BUS STOPS
15. ACCESS TO TRAIN STATION
16. CARPARK
17. VOID

SCHOOL

18. PROPRIOCEPTION / VESTIBULAR PLAY
19. TACTILE PLAY
20. CAFETERIA
21. SEATING AREA
22. COMPOST
23. CHANGING ROOM
24. CHILDREN LIBRARY
25. STAFFROOM

SPECIALIST ROOM

26. TEXTILES / WOODWORK
27. ART
28. DANCE
29. DRAMA
30. SCIENCE LAB
31. COMPUTER LAB
32. MUSIC ROOM
33. RECORDING STUDIO
34. SPECIALIST STORAGE / CRUSH SPACE
35. KITCHEN
36. COMMUNITY GARDEN

UPPER FLOOR PLAN

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SCALE BAR

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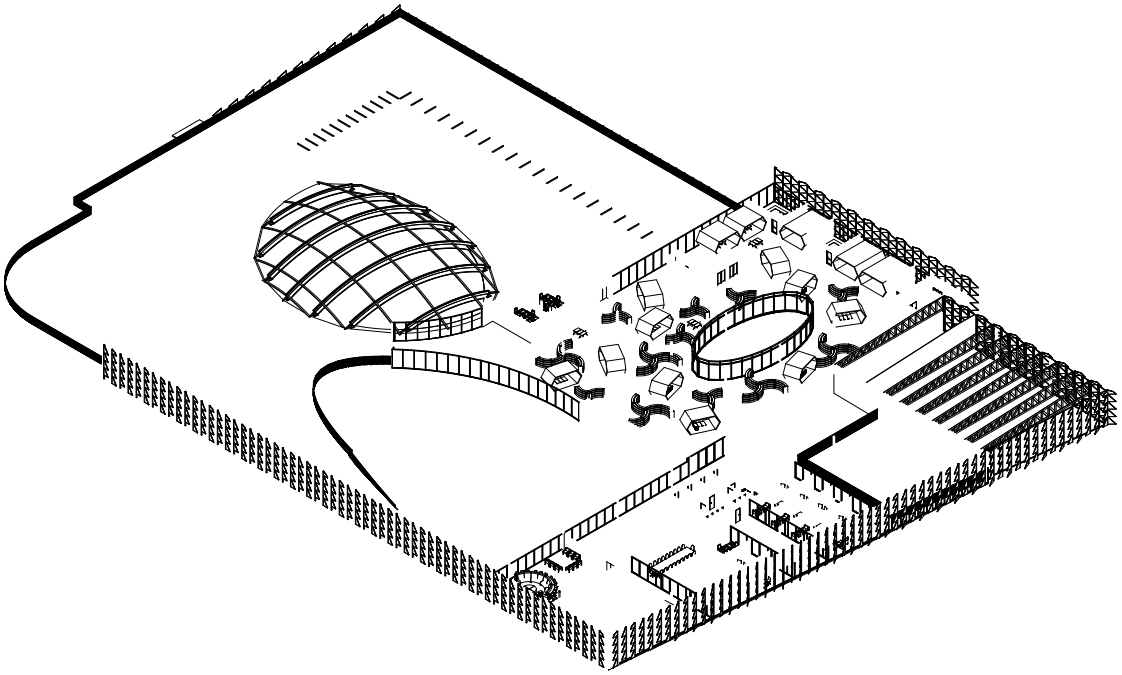

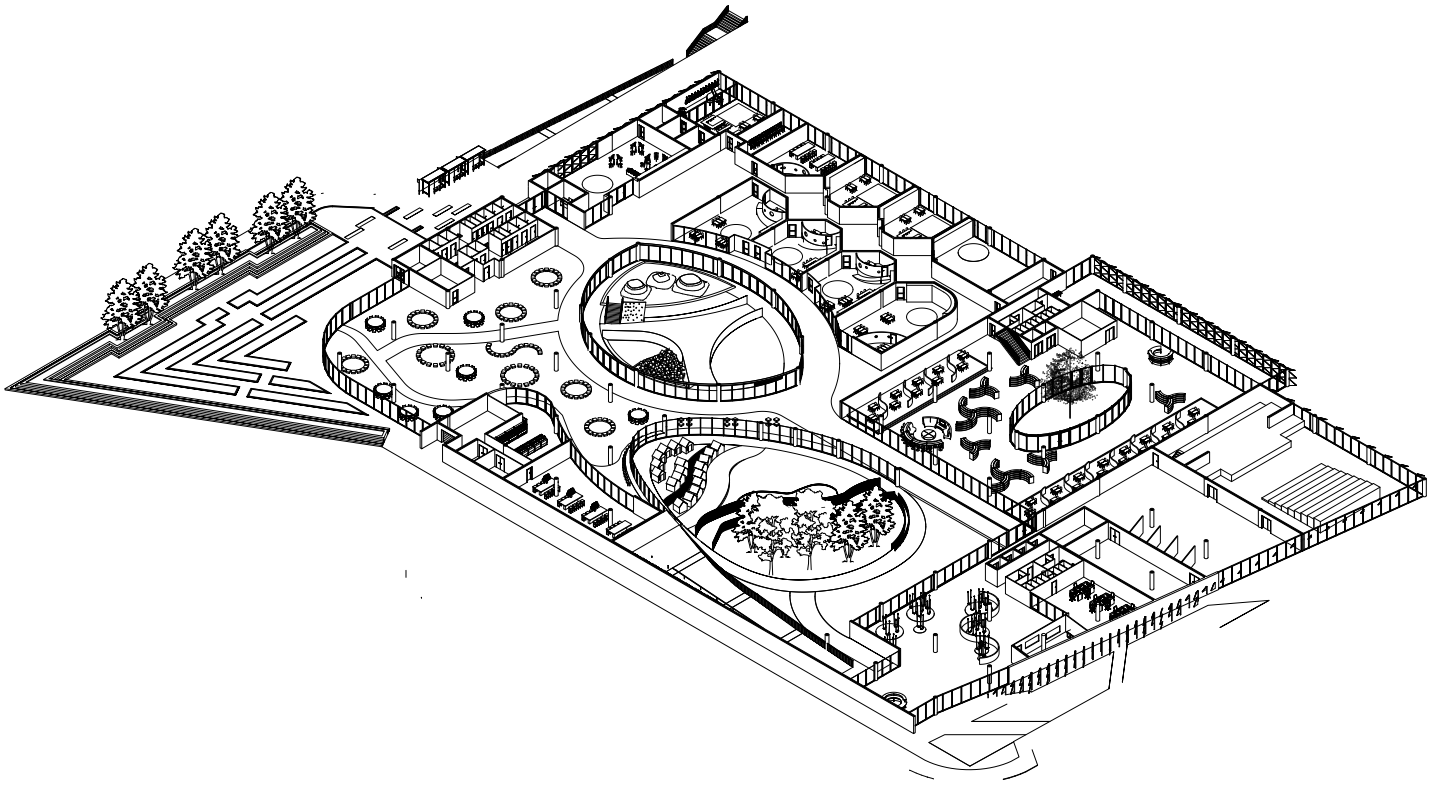

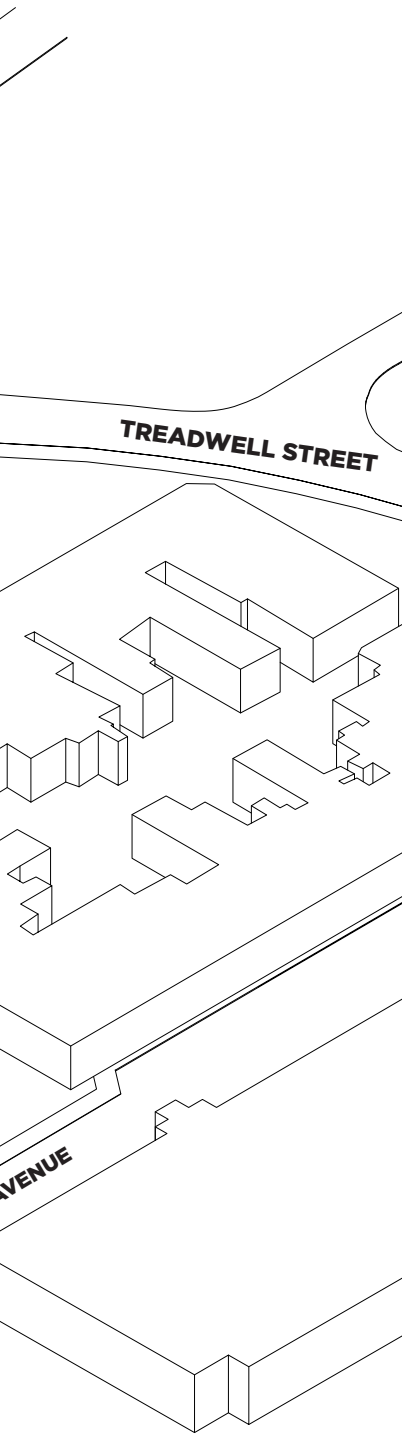

1. ENTRANCE
2. RECEPTION / CAFE
3. GALLERY
4. HALL / THEATRE
5. COMMUNITY LIBRARY
6. PROPRIOCEPTION / VESTIBULAR PLAY
7. TACTILE PLAY
8. CAFETERIA / ADJUSTABLE SEATING AREA
9. SPECIALIST ROOMS
10. COMMUNITY GARDEN
11. TRAIN STATION / BUS STOPS
12. OUTDOOR PLAY AREA
13. CHILDREN'S LIBRARY
14. THERAPIST ROOMS
15. SKYLIGHTS

EXPLODED AXONOMETRIC

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SCALE BAR

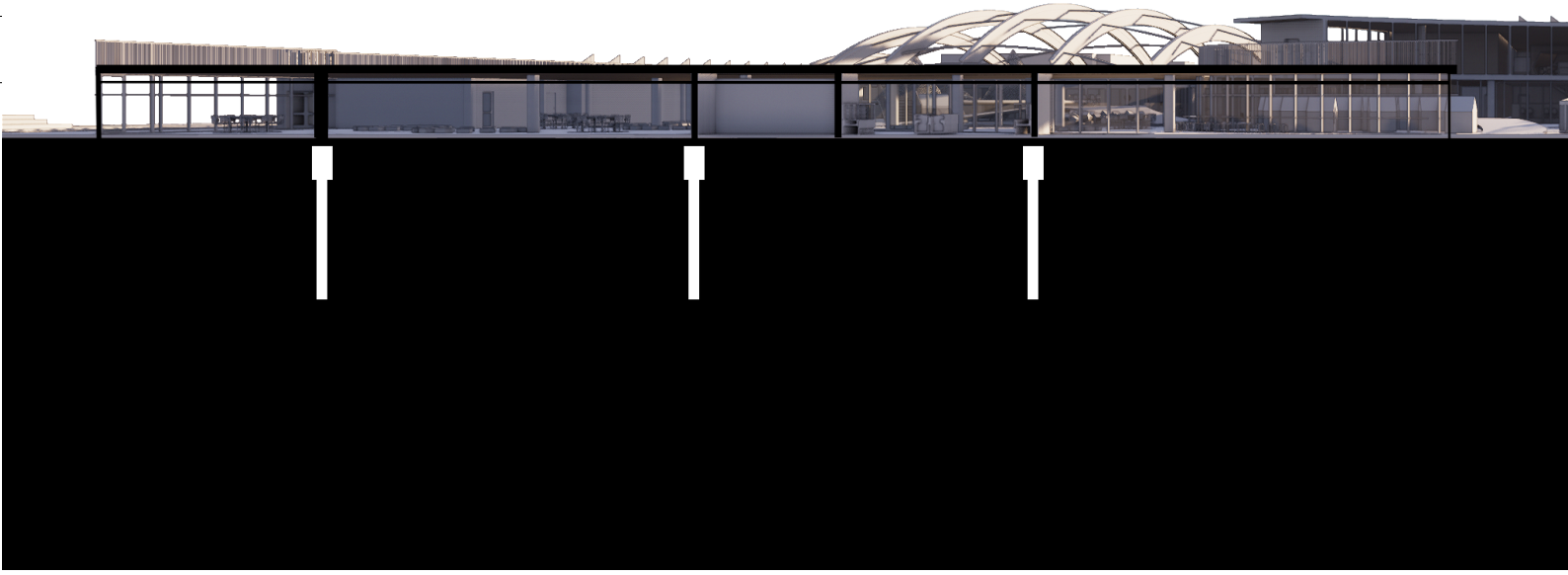
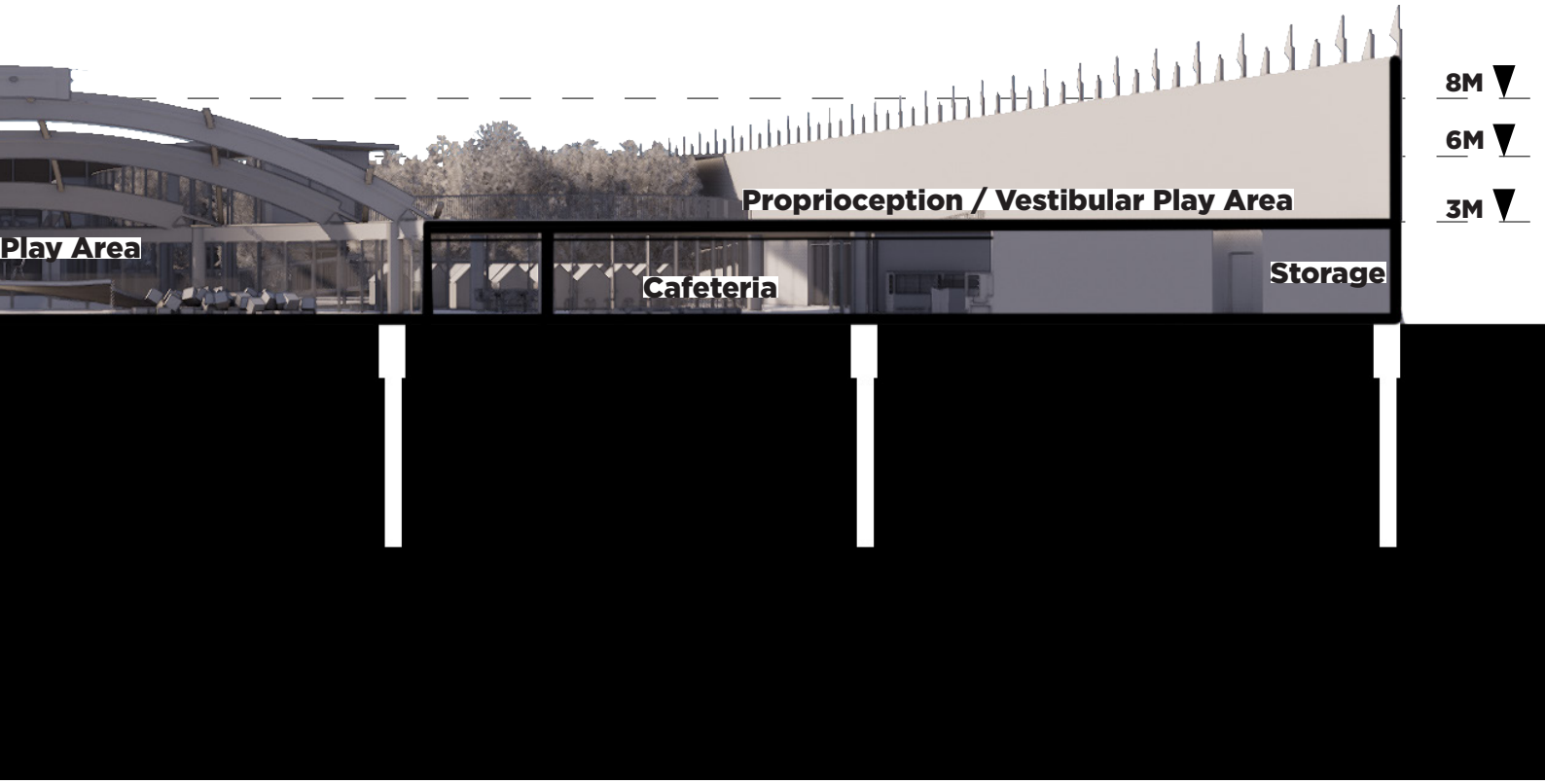


FIG 7.04 I SHORT SECTION FROM EAST TO WEST (TOP)
FIG 7.05 I LONG SECTION FROM NORTH TO SOUTH (BOTTOM)


8M
6M
3M
Proprioception / Vestibular Play Area
Play Area
Cafeteria
Storage


8M
6M
3M
Staffroom
Proprioception / Vestibular Play Area
Waiting Area
Reception

ARCHITECTURE FOR PLAY

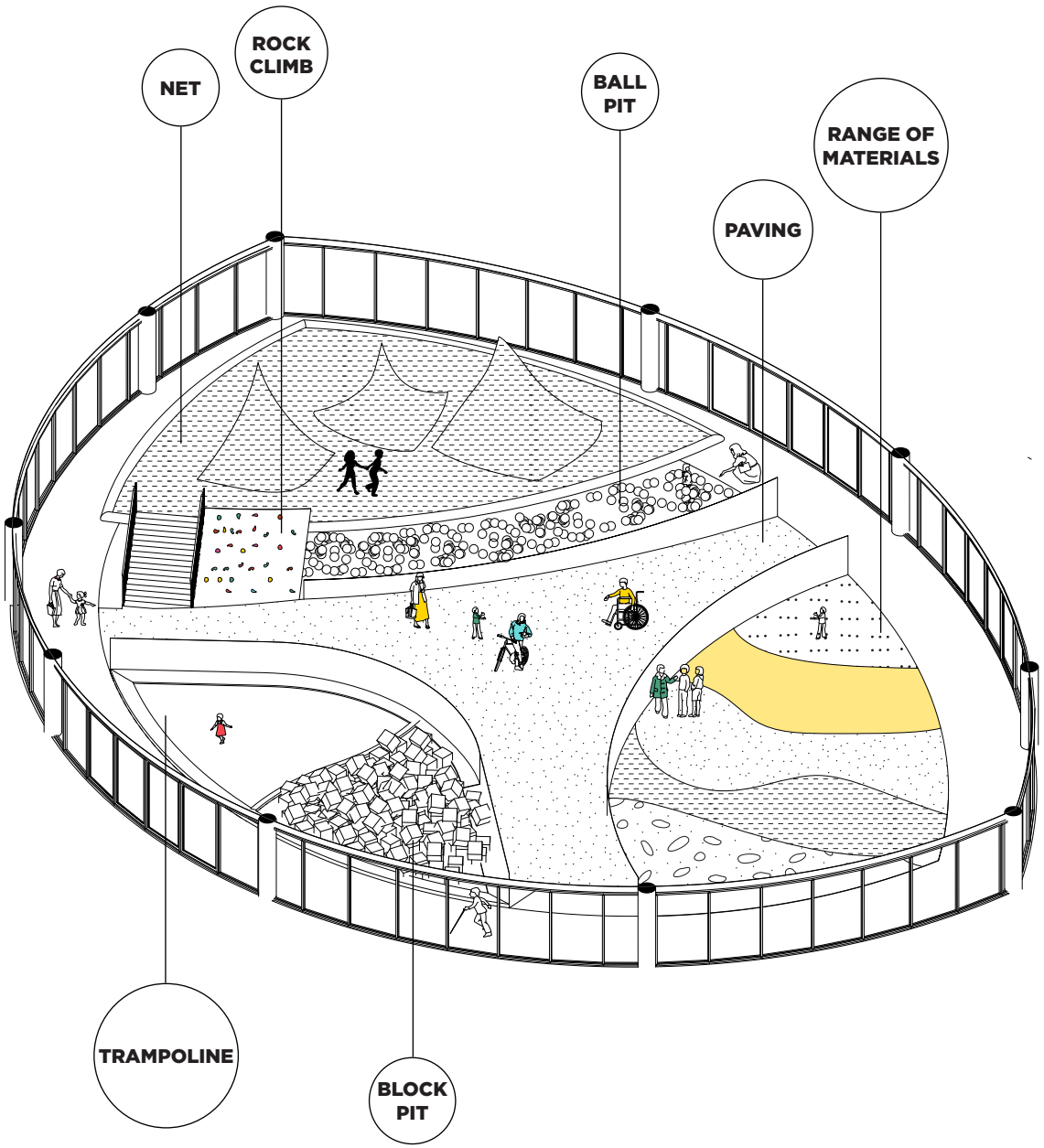


FIG 7.06 I TACTILE PLAY SYSTEM

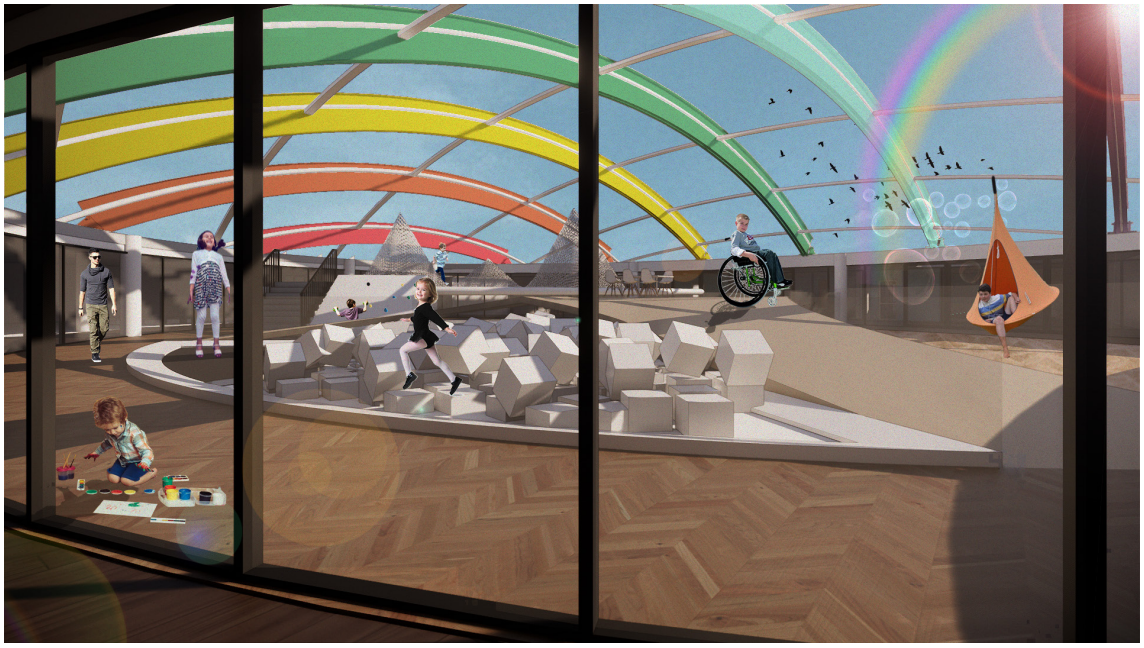
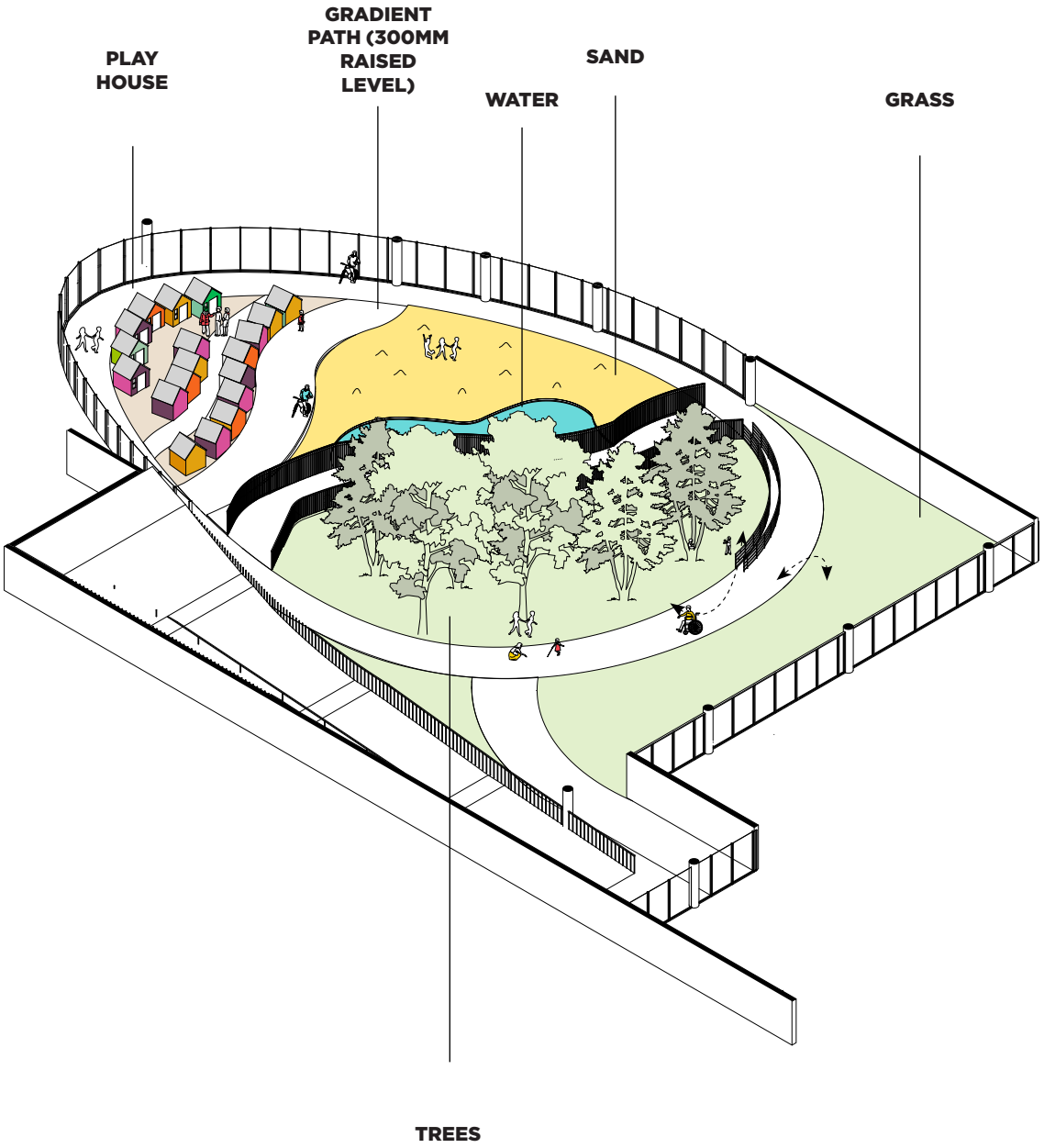


FIG 7.07 I VIEW FROM CAFETERIA
FIG 7.08 I VIEW FROM OUTDOOR PLAY AREA FROM ABOVE



PLAYHOUSE

Playhouse - to hide, explore, create, imagine, climb, social gathering...

SAND

Sand - to shape, play, dug, moved...

WATER

Water spray feature - to cool down, collect, mix...

TREES

Trees - to hide, climb, collect leaves, run around...

CIRCULAR WALKWAY

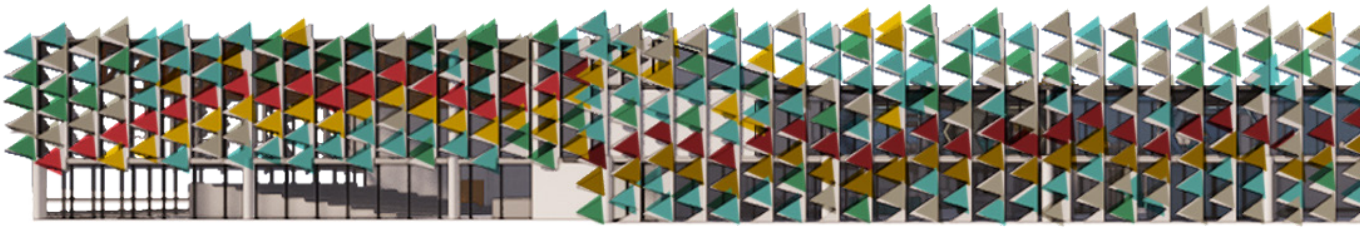
Circular walkway - to run, walk, cycle, crawl, practice...

FIG 7.09 I PROPRIOCEPTION AND VESTIBULAR PLAY SYSTEM

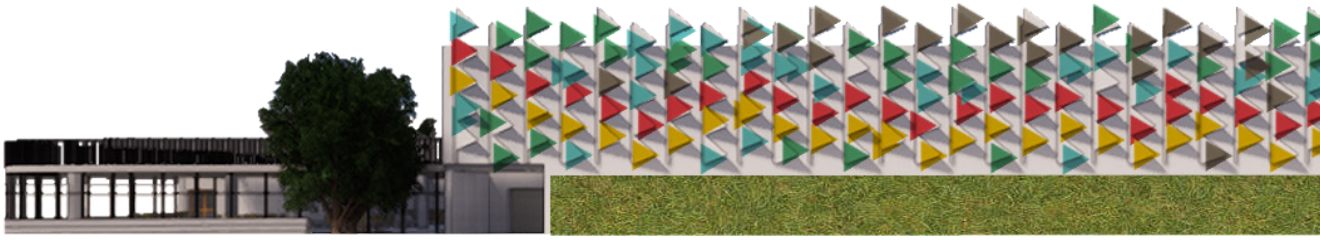
FIG 7.10 I VIEW FROM LIBRARY TO PROPRIOCEPTION & VESTIBULAR PLAY
FIG 7.11 I VIEW FROM OUTDOOR RAMP TO PROPRIOCEPTION & VESTIBULAR PLAY

ARCHITECTURE FOR ACCESSIBILITY

South-East Elevation (Entrance)



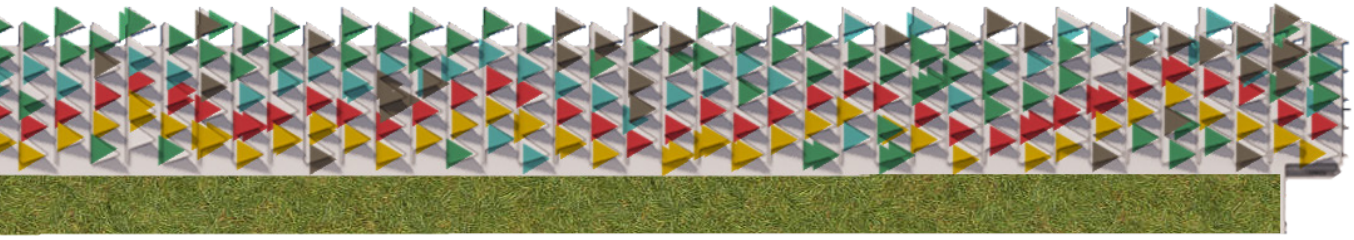
North-East Elevation (Community Library)



South-West Elevation (Green Wall)

North-West Elevation

FIG 7.12 I BUILDING ELEVATIONS - COLOUR FACADE GUIDES USER TO THE ENTRANCES



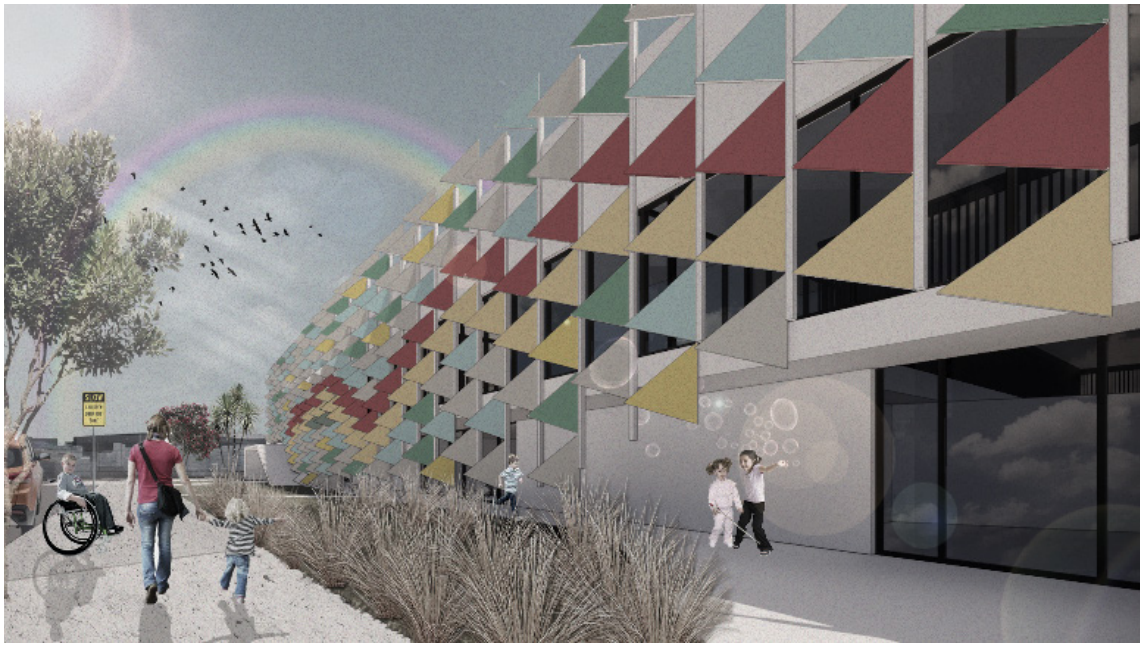


FIG 7.13 I MONOCHROMATIC VIEW - MONOCHROMACY / ACHROMATOPSIA (TOP)
FIG 7.14 I MONOCHROMATIC VIEW - BLUE CONE / MONOCHROMACY (BOTTOM)

FIG 7.15 I ANOMALOUS TRICHROMACY - RED-WEAK / PROTANOMALY (TOP)
FIG 7.16 I MONOMALOUS TRICHROMACY - GREEN-WEAK / DEUTERANOMALY (BOTTOM)

FIG 7.17 I ANOMALOUS TRICHROMACY - BLUE-WEAK / TRITANOMALY (TOP)
FIG 7.18 I DICHROMATIC VIEW - RED-BLIND / PROTANOPIA (BOTTOM)

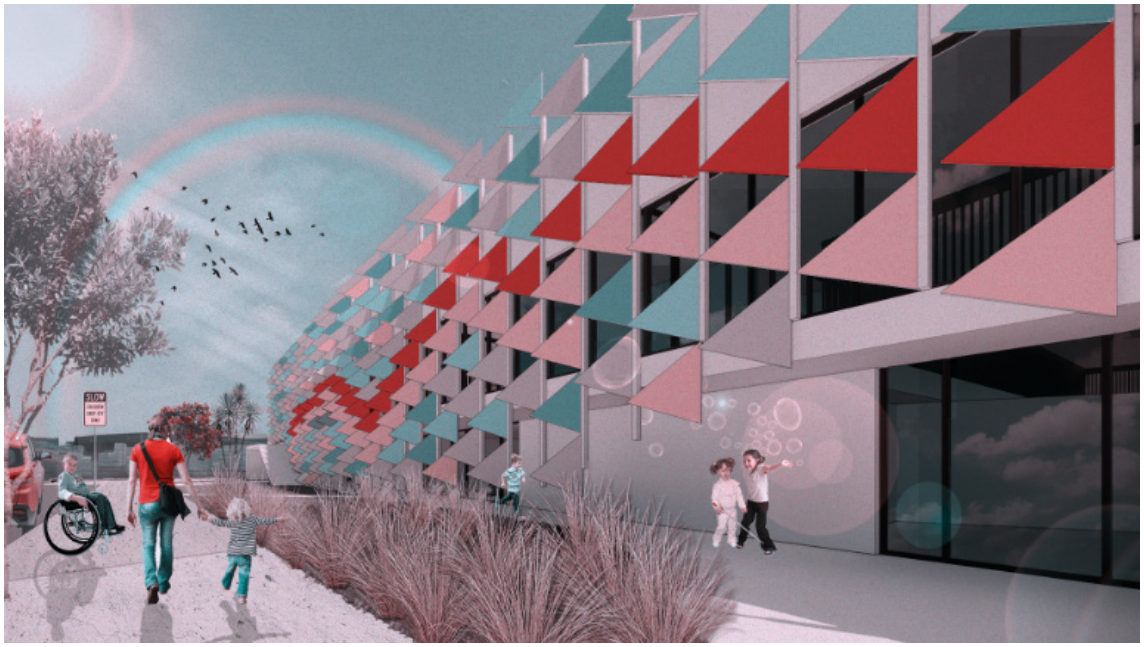


FIG 7.19 I DICHROMATIC VIEW - GREEN-BLIND / DEUTERANOPIA (TOP)
FIG 7.20 I DICHROMATIC VIEW - BLUE-BLIND / TRITANOPIA (BOTTOM)

FIG 7.21 I TYPICAL INDOOR LEARNING SPACES (TOP)
FIG 7.22 I SENSORY-DEPRIVATION AREAS FOR CHILDREN WITH MENTAL IMPAIRMENTS (BOTTOM)

Through a series of colour experimentation, it was found that blue and green colour undertones were the best colours to contrast with all type of skin colour. Children with hearing impairments are constantly signing to each other and over time, studies show that this can cause eye strain.

Through research-led design, contrasting colours from skin can reduce eye strains for children with hearing impairments. And these were integrated within all internal learning environments to assist children in reading sign language and reduce eye strain.

FIG 7.23 I SKIN CONTRAST FOR CHILDREN WITH HEARING IMPAIRMENTS

ARCHITECTURE FOR SUPPORT

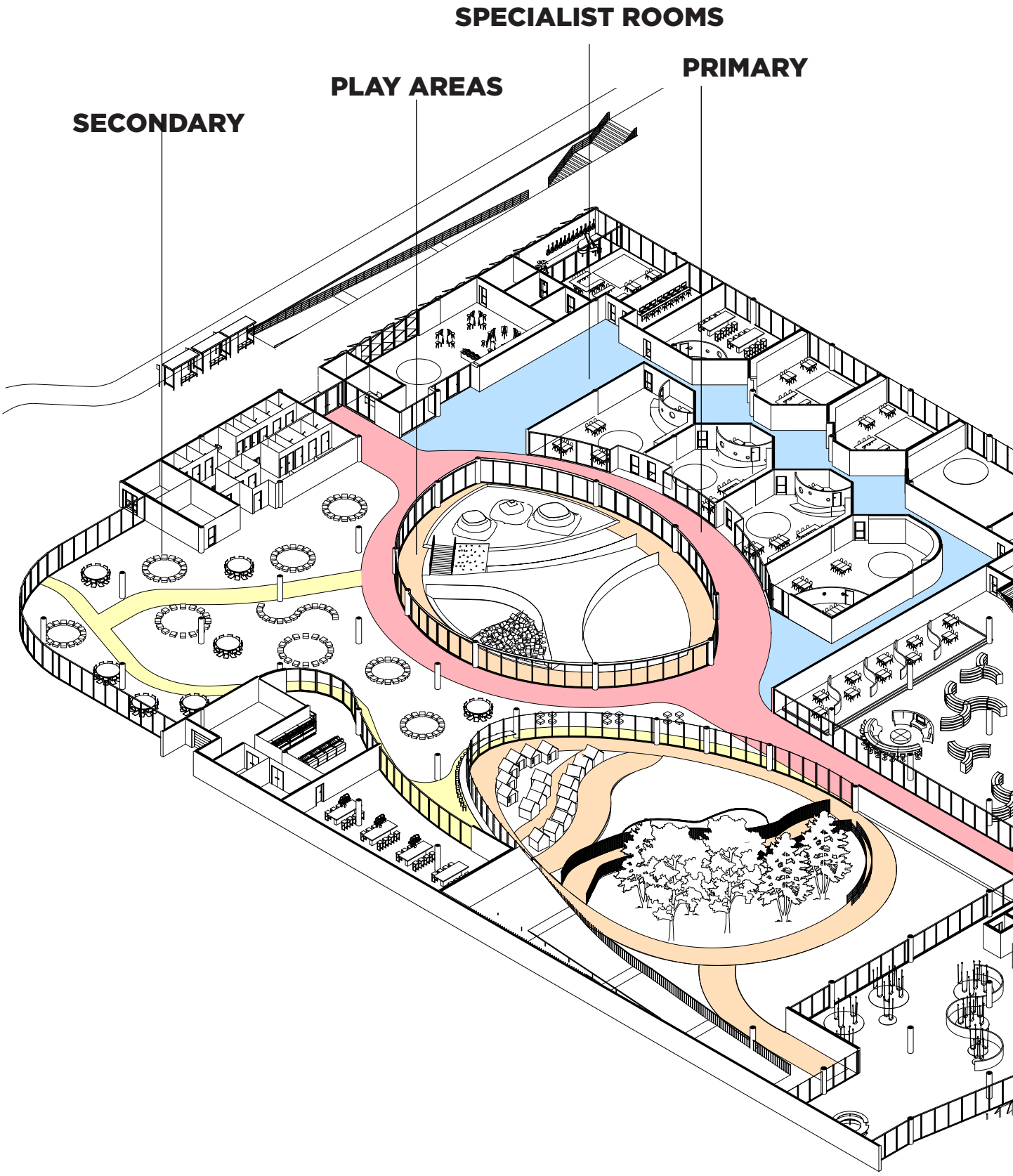
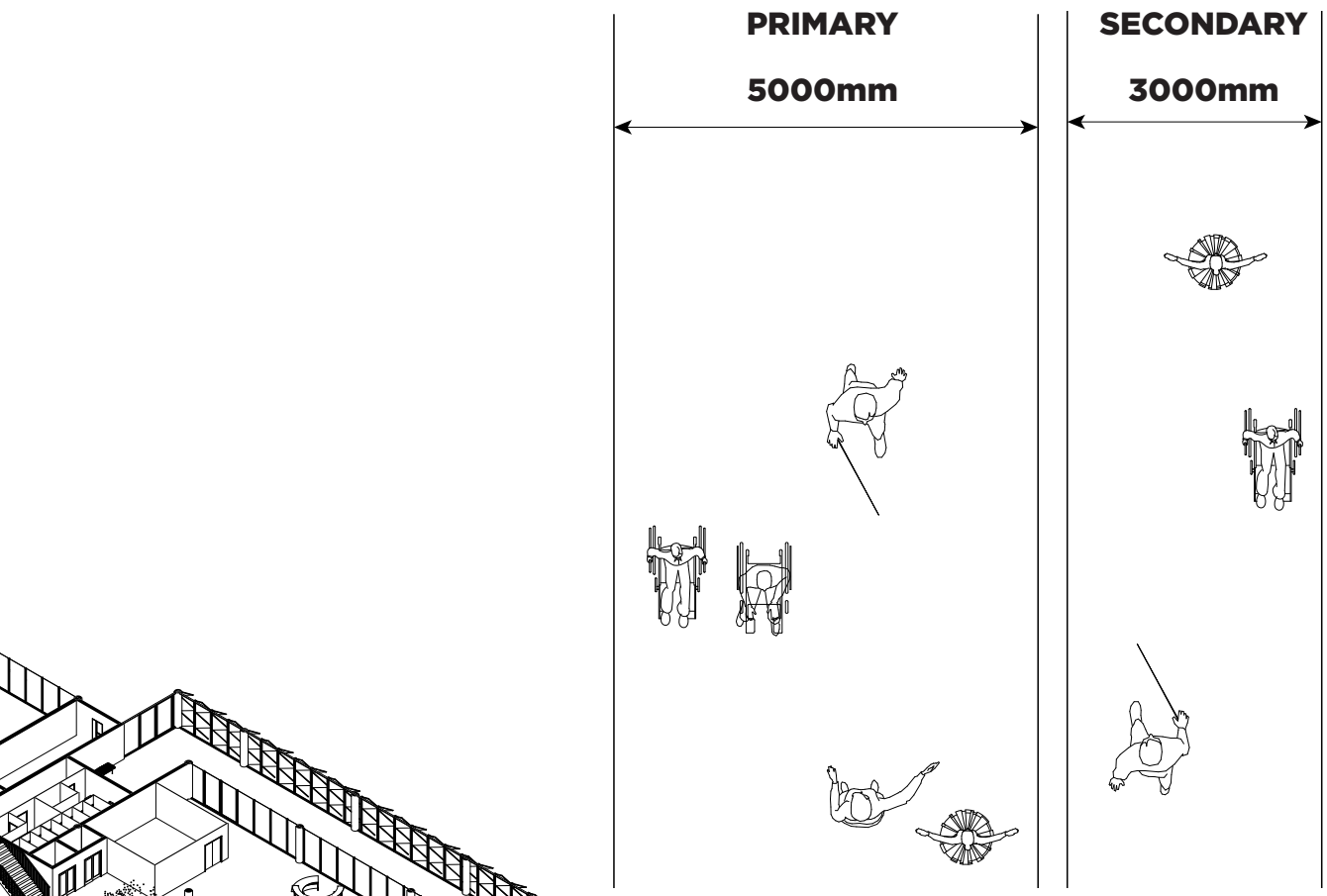


FIG 7.24 I PRIMARY AND SECONDARY DIFFERENT TYPES OF CIRCULATION


PRIMARY
5000mm
SECONDARY
3000mm

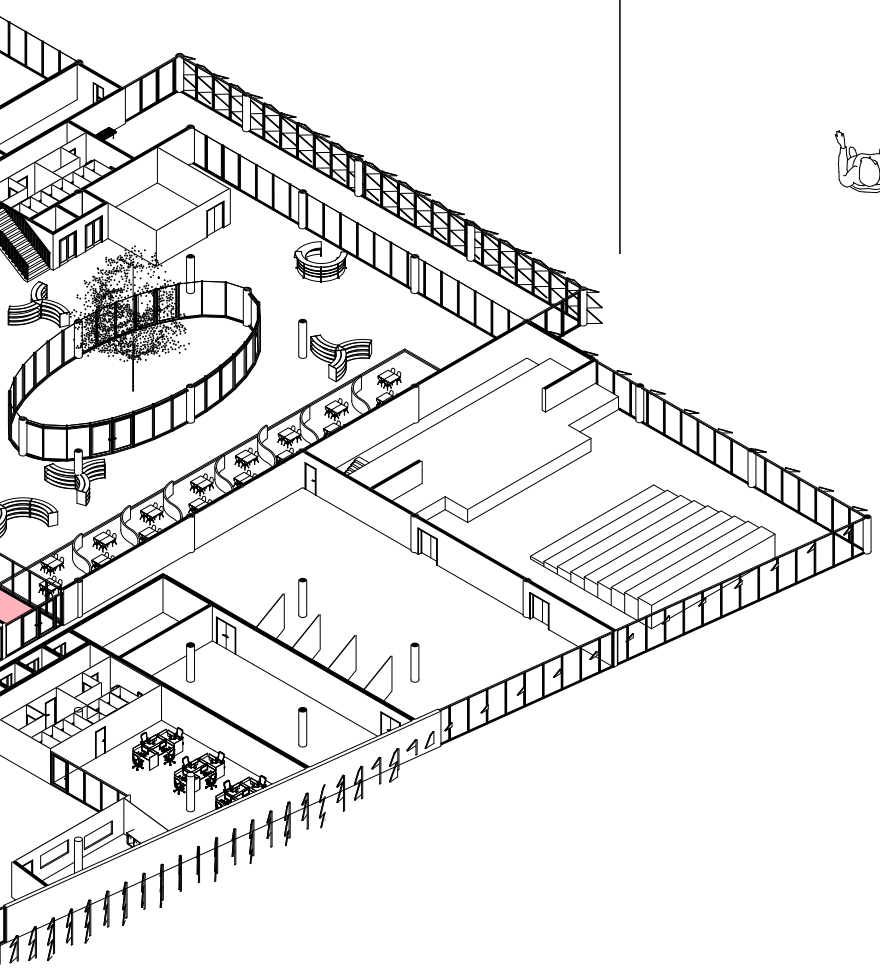
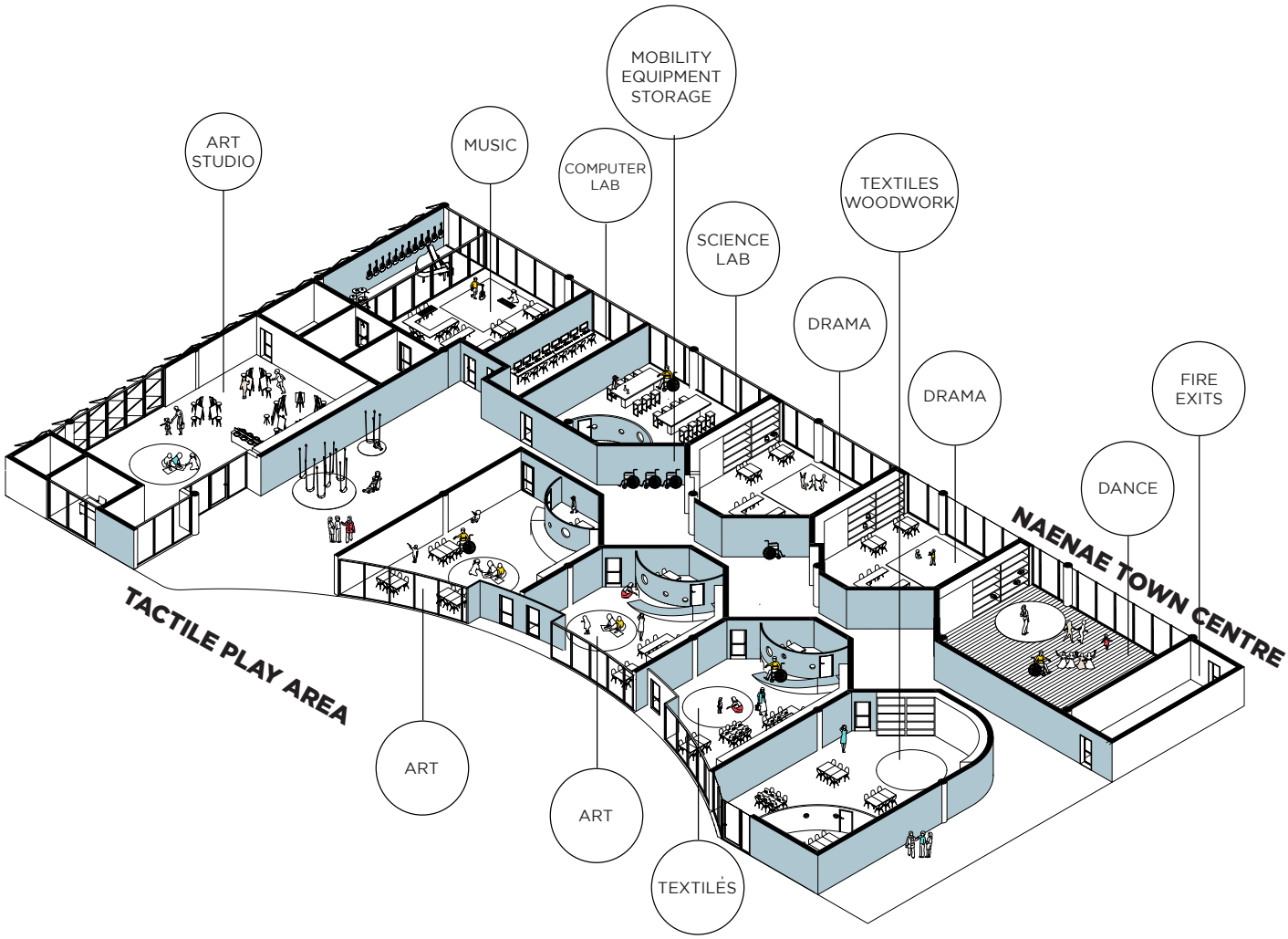
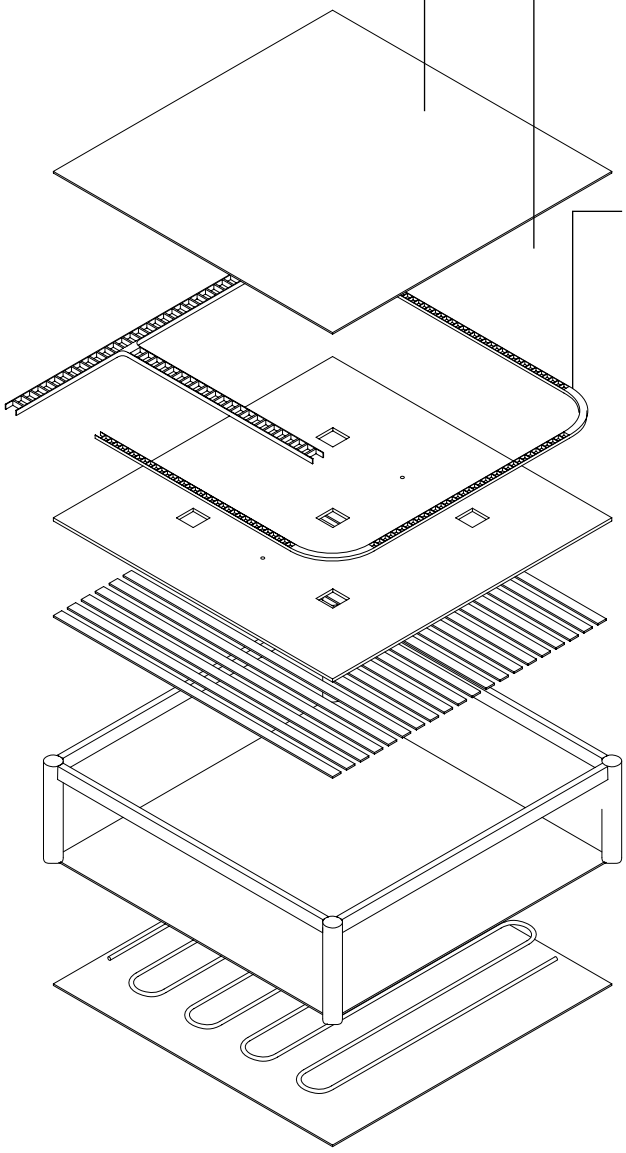


FIG 7.25 I SCHOOL - SPECIALIST ROOM (MUSIC) / DURING THE DAY (TOP)
FIG 7.26 I COMMUNITY - SPECIALIST ROOM (MUSIC) / DURING THE EVENING (BOTTOM)



The spatial arrangement for the specialist rooms provide opportunities for social interaction and storage for mobility equipment. The linear corridor with glass doors allows ease of movement and occupants are able to explore and see the type of activity within each room. Furthermore, the placement of these specialist rooms are located along the eastern side of the building, this creates a healthy connection to the Naenae Town Centre. During community activities, the curtain wall can accommodate public access to those specialist room. While in the morning and afternoon, the curtain wall will remain closed to ensure the safety of the child from any unwelcome guests. While on the other side, the art and textiles rooms overlook at tactile play area. This also provide an opportunity for occupants from those areas to explore and see the type of activities available.

FIG 7.27 I SPECIALIST ROOMS



SLAB

DUCTS

1200 x 1200mm	*Ducts at riser HVAC Primary*
800 x 450mm	*Oval Ducts HVAC Secondary*
300mm dia.	*Round Ducts*
150mm dia.	*HVAC Tertiary Round Ducts & Flexi Ducts*

ELECTRIC & DATA

50mm	Main Pipe Sprinklers
25mm	Secondary Pipe Sprinklers
400mm	Electrical Cable Tray above ceiling to all rooms
200mm	Data Cable Tray above ceiling @ perimeter of building and column to colun back to core.

CEILING FINISH

Non-structural timber to conceal services

COLUMNS & BEAMS

UNDERFLOOR HEATING

FIG 7.28 I SERVICES FOR COMFORTABLE LEARNING ENVIRONMENTS

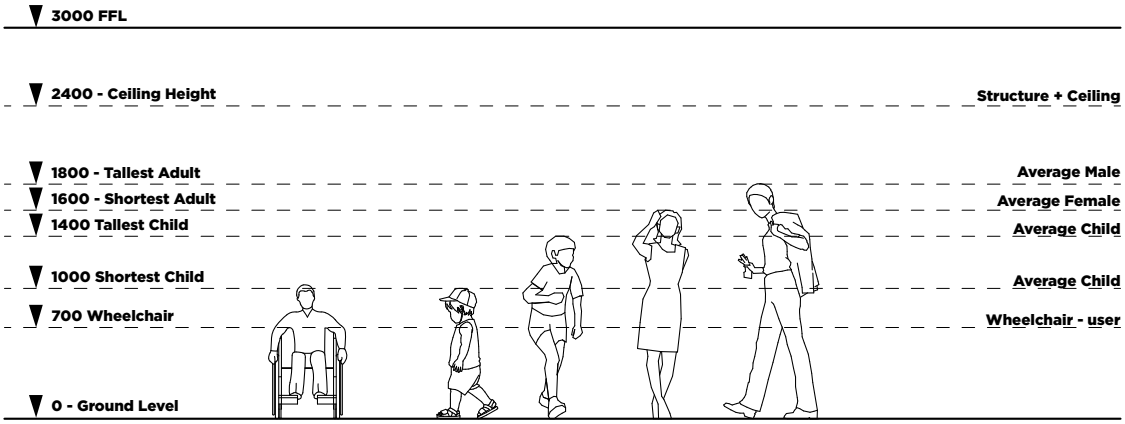


FIG 7.29 I TYPICAL ROOM SECTION - SERVICES VS OCCUPANCY
FIG 7.30 I CHILDREN LIBRARY ON UPPER FLOOR WITH NATURAL LIGHTING

8.0

CONCLUSION

CONCLUSION & REFLECTIONS

This research portfolio has addressed the question of: ***How can architecture facilitate participation for children with impairments in primary school and initiate a more adaptable, inclusive playful approach to design?***

The aims of this research portfolio were to "design an alternative primary school which can facilitate participation for children with impairments within an inclusive environment by integrating play, accessibility and support for caregivers, children", and the community. Children with impairments are encouraged to self-direct their own learning and be encouraged or taught by their teachers, families and the community. A school that involves the community and active parent engagement could extend the quality of their learning experience and an increased activity for participation. The end result has fully addressed the criteria:

Architecture for Play
The school design focusses on facilitating play seeking to engage children in exploratory, creative and destructive types of play. The architecture consists of outdoor learning environments where children can play, learn, rehabilitate and socialise. It was found that self-directed play for children could create a positive impact towards the psychological development of the child and make learning more engaging as it nominated by the child, allowing them to develop their skills, interests and aspirations. Hence, there was need to prioritise play activities as this was currently lacking in many schools. Furthermore, the integration sensory integrated therapy within these play areas allows children with impairments to be able to rehabilitate and become acclimatised to their impairments. Through this, it allows children with impairments to become more independent.

Architecture for Accessibility
The accessibility part of the design was addressed through the programming side of the design, façade treatment and macro and micro circulation of the spaces. Façade treatment guides children with visual impairments towards the entrance of the building or to the public transportation areas. And the circulation throughout the whole building is somewhat linear that allows ease of movement.

Through a series of colour experiments, it was found that blue and green colour undertones were the best colours to contrast with all type of skin colour. Children with hearing impairments are constantly signing to each other and over time, studies show that this can cause eye strain. Through research-led design, contrasting colours from skin can reduce eye strains for children with hearing impairments. And these were integrated within all internal learning environments to assist children in reading sign language and reduce eye strain.

Architecture for Support
The research aim was to design a school that rehabilitates children with impairments and improve their quality of life. Through a community-centred approach design, this allows caregivers to participate in community activities and the community to aid in school activities. An intergenerational school that caters for all ages, could improve the caregiver's mental and physical wellbeing which is likely to impact the quality of care of an impaired child.

Reflections
Through the multidisciplinary literature review and case studies, performance criteria for architecture for play, architecture for accessibility and architecture for support were identified. This was generated to ensure that the overall design outcome was beneficial and has addressed the research question. The case studies of relevant architecture were used to strategize and evaluated to see what are the form of architecture facilitate children with impairments.

The design seeks to implement more play-learning spaces to encourage more self-directed and self-chosen play for children and to unify play-approach school and community centre together to create a broader spectrum of inclusiveness and address negative views associated with school designs and outdoor learning environments. The architectural design knowledge will likely impact children, parents/caregivers and teachers, as well as design professionals which can be used to approach universal design for inclusivity and learning environments. The significance of

addressing this issue could create positive and optimistic views from the wider community on impairment and perceived limitation of their impairments.

The architecture design outcome has created a platform for sensory integration therapy that allows children to be more acclimatised to their impairments. And it has also created a platform for self-directed play and learning to make learning more engaging and allow children to develop their interest, skills and competencies to become successful in homes, communities and in life. It was found that through inclusive architecture, opportunities for participation were enhanced, increased, and more attainable. Community-centred integration, can improve the caregiver's physical and emotional wellbeing and provide a support framework.

A challenge was to deal with the relationship of each programme within a space and understand how the space could be adaptable and flexible to facilitate three different types of users, caregivers, teacher, child and community members. Through planning, scheduled time for children was found to be effective and could safeguard the safety of the child. Furthermore, parents and teachers did not find play as important as young children (Rothlein & Brett, 1987). The fear associated with the safety and security of play today in parents hinders the child's freedom of play. The final design outcome has addressed this issue, through passive surveillance across the key areas, allowing views into the play and learning environment to ensure the safety of the child while allowing children to explore different types of activity.

Another challenge faced involved establishing the severity or some impairments. Advice on the design of environments specifically for a variation on the severity of each impairment needs and a combination of impairments is lacking in architectural literature. Many mainstream school designs were unable to facilitate severity or the variation of impairments needs. For example, macular degeneration gets partial vision and they would experience different architectural elements that causes stress, when comparing to a hearing or mobility impaired child. This suggests that involving health professionals during the design process and do further design experimentation across a range of impairment to understand the relationship and highlight the importance of the architectural elements has on the child for a specific impairment. That being said, if this alternative school model was to be implemented in other areas of Wellington or anywhere in the world, the demographic of the type of disability may be different from Naenae. Perhaps this could suggest a more specific impairments for the design to be tested.

The 'Developed Design' chapter has shown how the final design has responded to each performance criteria and tested onto a site. Based on Statistics of New Zealand, Naenae has one of the lowest personal income median in Wellington. The Naenae suburb was chosen with the intention to provide better facilities for lower income families. The development of the design was able to respond to the site conditions and able to provide a programme that are beneficial for the community and the children.

However, in future, there are still room for improvements. In practice, designing a school usually requires community specialists and educational specialist to be involved in the process of the design. Especially, when designing for a multicultural community, cultural practices will need to be considered and addressed so that cultural perspective point of view are included. In terms of designing for children with impairments, lighting was not considered thoroughly. The light temperature and the intensity of light can affect how an occupant uses a space. Architectural lighting and spatial configuration can be crucial towards the environmental qualities.

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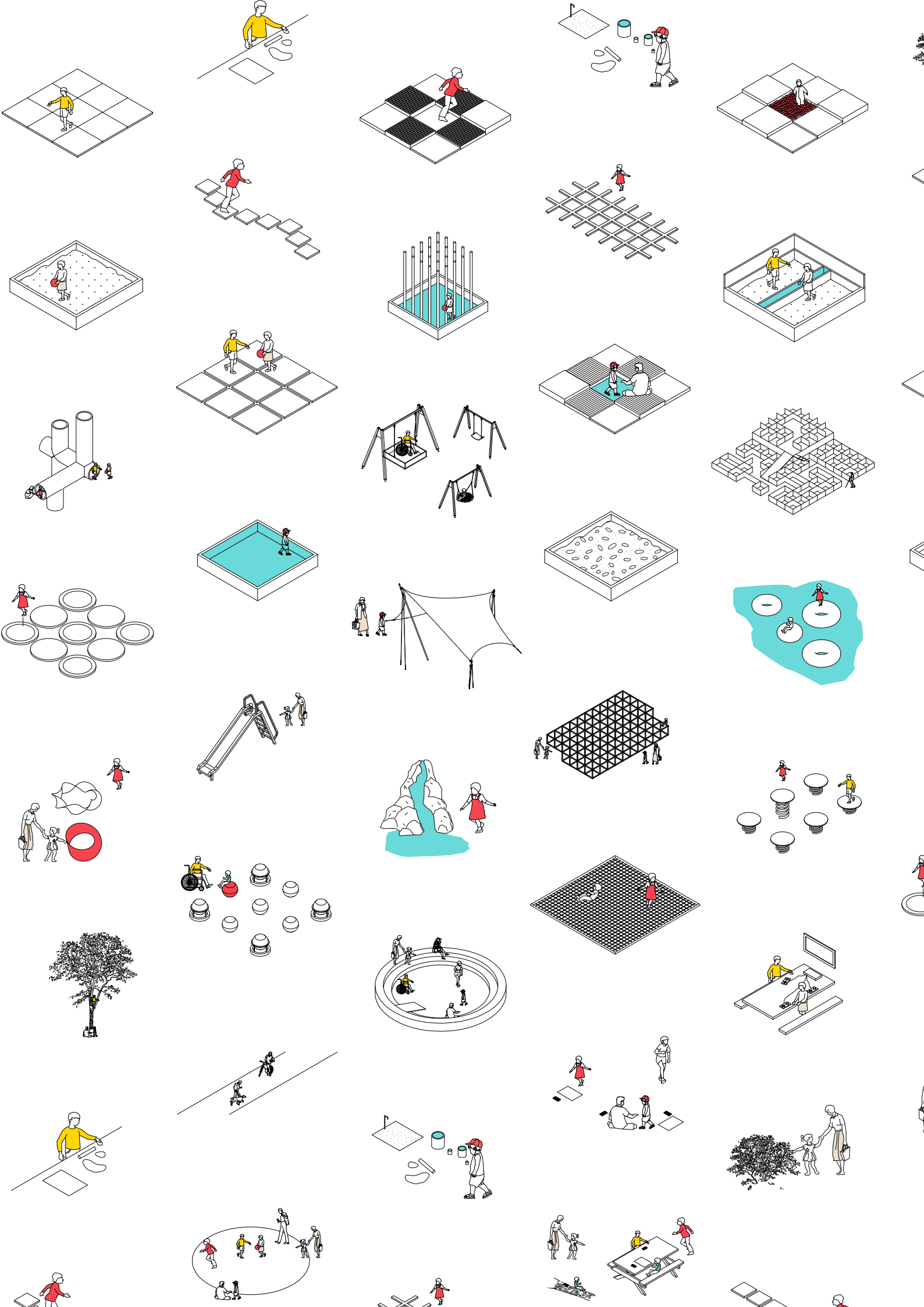

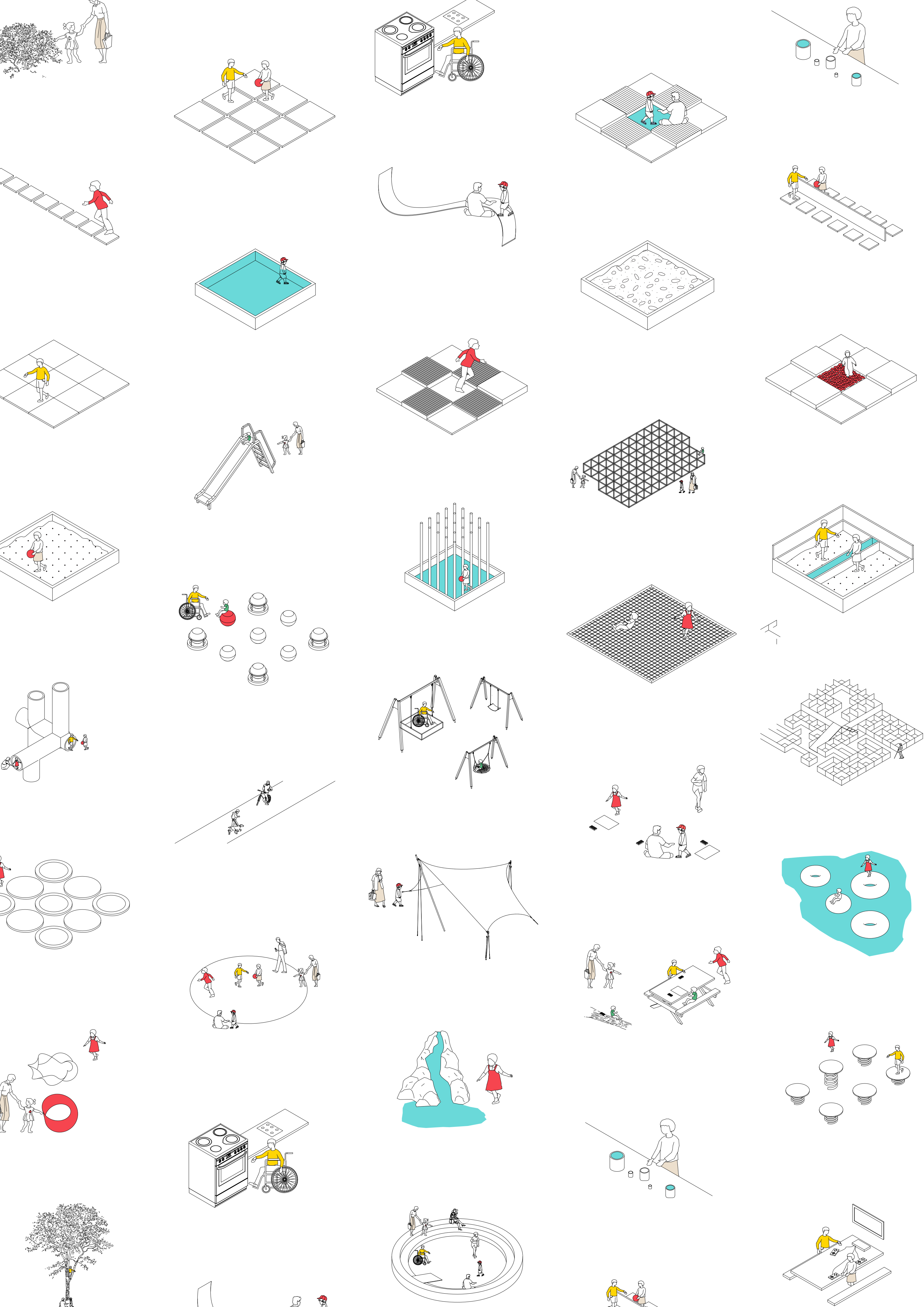

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