

**Design Principles of Inclusion
for Public Schools**

by

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CONTENTS

Abstract	iii
Acknowledgments	iv
Chapter 1: Introduction	1
Critique of Inclusion	1
Learning Centres	7
Inclusion by Degrees	10
Successful Inclusion	13
Trained Human Resources	14
Adapted Learning Environments	16
Chapter 2: Adapting an Existing School	27
Site	27
Building	44
Classroom	54
Chapter 3: Design Principles of Inclusion	59
Connectivity	59
Accessibility	63
Flexibility	68
Chapter 4: Conclusion	73
Bibliography	75

ABSTRACT

Including children with disabilities in the public classroom is morally right; yet in the absence of appropriate support, it often results in a learning environment that is morally wrong.

This thesis studies how to appropriately implement inclusive policies within a public school. A new school typology is then proposed, which engages the medical and academic communities to collaborate together within an existing school on behalf of students with disabilities - in assessing them and preparing them individually for successful learning and meaningful inclusion among their peers. This new programme also provides training for teachers as they strive to effectively meet the needs of an increasingly diverse student body.

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To Lynn Hackett, Sherri Macdonald, Jo-Lynn Fenton, and Erin Loney for opening my eyes to the joys and challenges of inclusion in the public education system.

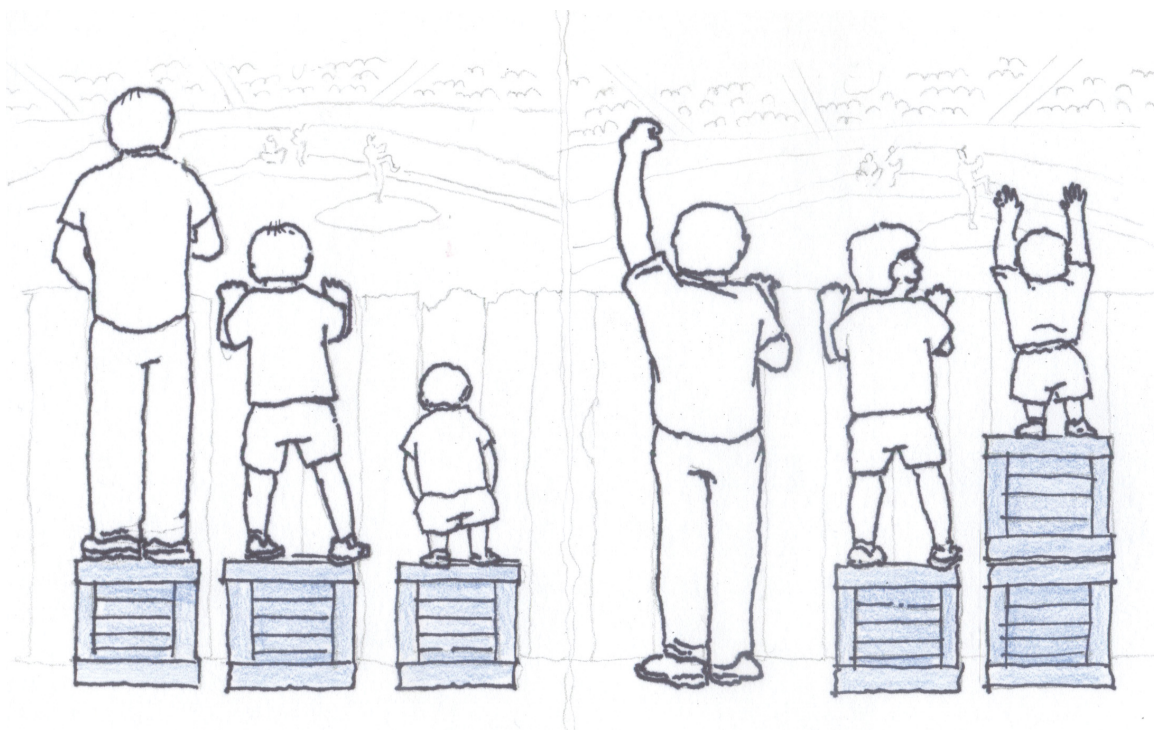
And most importantly to my loving wife Jenny; my daughters, Gwen, Lily, and June; and to my son James who was born in the throes of completing this document.

CHAPTER 1: INTRODUCTION

CRITIQUE OF INCLUSION

Inclusion is both an attitude and a value system that "promotes the basic right of all students to receive appropriate quality educational programming and services in the company of their peers."¹

An inclusive learning environment helps build circles of support and friendship among all students, irrespective of physical and/or mental disability. It is not enough simply to place a student with a neurological disorder, for example, into a regular classroom and expect him or her to work and learn alongside everyone else without the proper support, time and space to work on individual goals and outcomes. This is the challenge facing every school system that embraces policies of inclusion.



It is important to provide the right support for the right person at the right time; image adapted from original by Craig Froehle.

¹ Minister's Panel on Education, *Disrupting the Status Quo: Nova Scotians Demand a Better Future for Every Student* (Halifax: Province of Nova Scotia, 2014), 40.

There is no question that such policies are morally right, but a moral argument can be made when a student with disabilities is placed in a classroom that is ill-equipped to meet his or her physical, social and academic needs. Ironically, this all-or-nothing approach is exclusive only to students capable of learning "the same thing at the same time from the same person in the same way in the same place for several hours each day."² And it is here one of the biggest issues of inclusion in the classroom becomes glaringly clear.

"Disability is an evolving concept"³ susceptible to changes in cultural practices, political structures and medical understanding; as opposed to "the classroom [which] hasn't evolved since the printing press was invented."⁴



For generations, students have been learning in the same kind of classroom; image from www.loc.gov.

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- 2 Prakash Nair, Randall Fielding, and Jeffery A Lackney, *The Language of School Design: Design Patterns for 21st Century Schools* (Rev. ed. Minneapolis: DesignShare, 2009), 25.
 - 3 Helena Towle, *Disability and Inclusion in Canadian Education: Policy, Procedure, and Practice* (Canadian Centre for Policy Alternatives, 2015), 8.
 - 4 Tom Phelan, 'The classroom hasn't evolved since the printing press was invented' says top Angry Bird, Oct 20, 2014, from www.itportal.com.

Stubbornness of pedagogical traditions, inflexibility of space and a lack of assistive learning technologies are common deficiencies of classrooms today, evidences of a by-gone era. Though society today may strive for inclusion in public schools, these lingering deficiencies continue to make it difficult for students with disabilities to participate and learn alongside their abled peers. Meaningful inclusion necessitates adaptation to these environments in order to accommodate students with issues of mobility, sociability and learning.



Mis-alignment of need and support.

Grey line: classroom support

Black line: student need

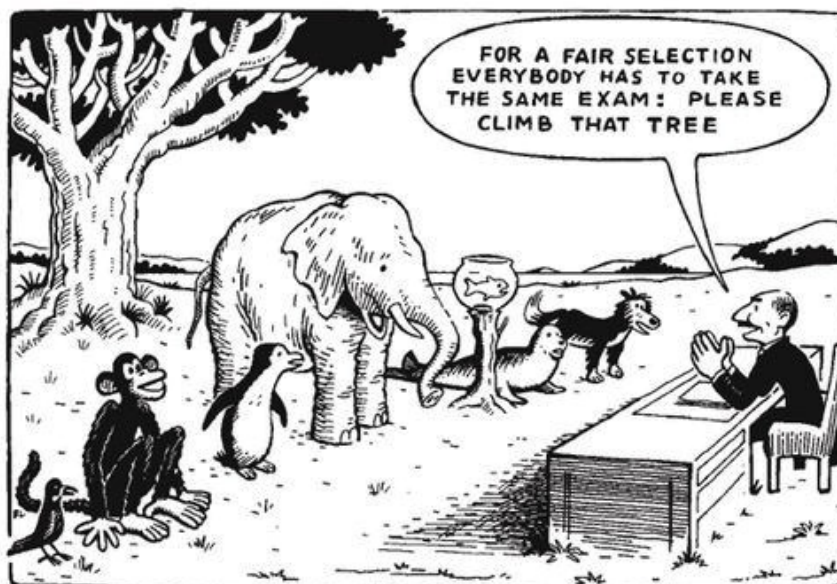
Meaningful inclusion also necessitates individualized support - the right support for the right person at the right time. The goal of public school teachers and administrators, however, is not to replicate a special school, but to build a public school that is "only as special as necessary."⁵ The programmatic challenge of this relatively new pedagogical approach is the fact that teachers are not trained or equipped to support students with disabilities in their classrooms.

To help teachers in this effort, many schools rely on special education and medical

5 Sherri Macdonald (Inglis Street Elementary School), communication with author.

professionals to assess each individual student demonstrating a special need (or needs) and then to provide for them an appropriate set of educational goals and outcomes within their reach. The following three policy schemes outline the framework of this support:

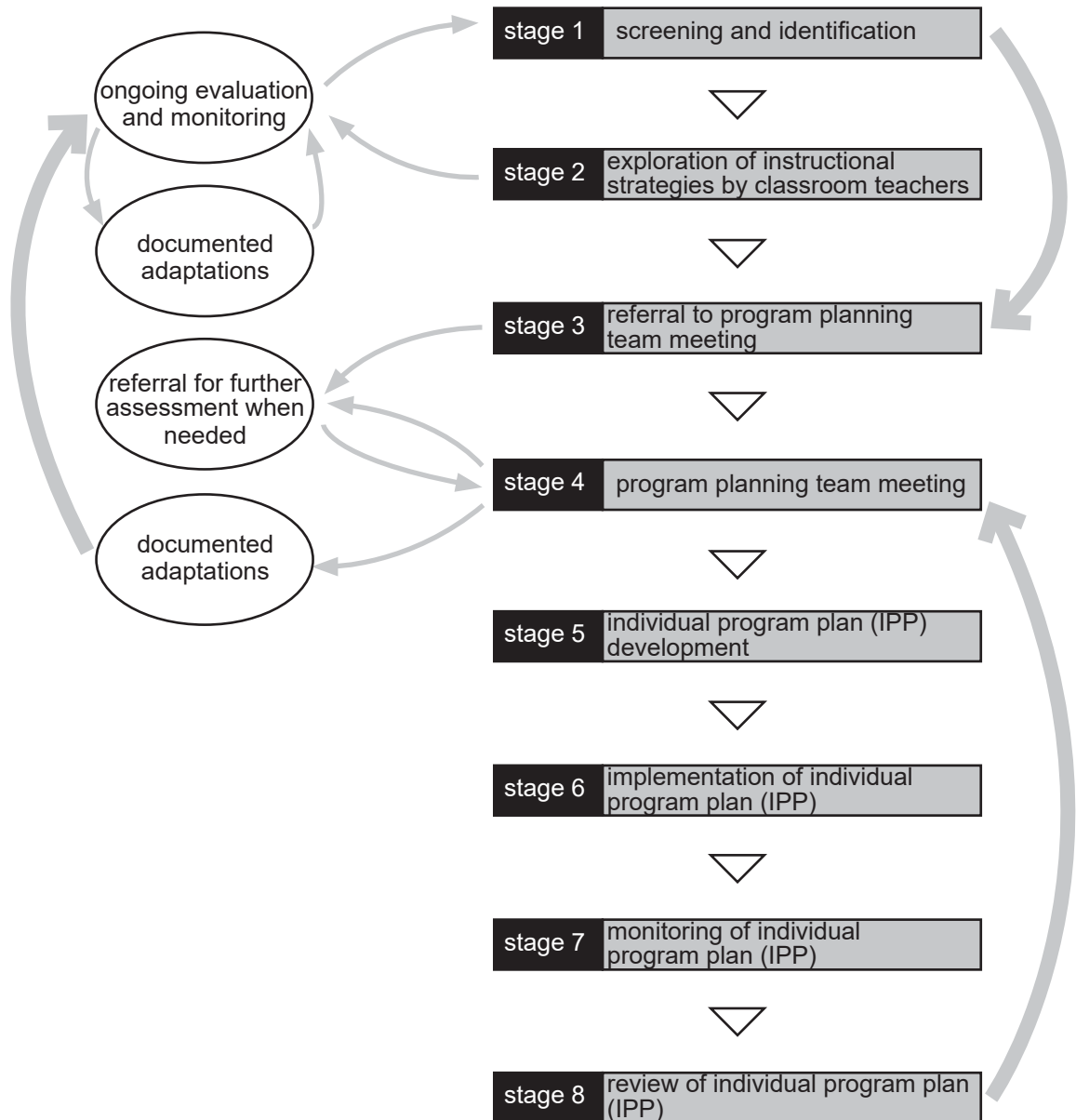
1. An Individual Education Plan (IEP) is provided for each student with a disability in order to determine his or her specific needs and strengths; the purpose of which is to craft a personalized academic program geared towards preparing him or her for a meaningful education and life.
2. Funding is allocated to each school board using a Block Formula Model. This means that "the amount of funds - and therefore the number of staff that should be hired - is based on the number of students"⁶ enrolled in a given region.
3. A Transition Plan is prepared to address the post-school life of a child with disabilities as he or she transitions into adulthood. The two most important aspects of this plan include affordable housing and potential employment opportunities.



Standardized evaluation excludes those who are different in any way; image from ellingtonmontessori.

⁶ Towle, *Disability and Inclusion in Canadian Education*, 14.

These kinds of individual support frameworks build capacity for inclusion in public schools, but require an enormous amount of human resources. Educational program assistants, medical professionals and other paraprofessionals form a support team that is assigned to each individual student; ideally, but as these services are often too expensive or simply out of reach for some schools, it is common to have one support team assigned to multiple students.



Identification, Assessment and Program Planning Diagram; data from Department of Education: Nova Scotia, *Special Education Policy: Nova Scotia* (Province of Nova Scotia, 2008), 28.

According to a 2006 Canadian survey entitled: *A Profile of Education for Children with Disabilities in Canada*, "nearly [1 in 5] children did not have the educational aids that they needed and [nearly 1 in 4] children with unmet needs for special education had similar unmet needs regarding educational aids." The parents of these children cited a "lack of funding in the school system"⁷ as the reason for this failure.

Funding to support individual need in the public school is notoriously difficult. Need does not stand still. It is not always predictable. It can be drastically different from one person to the another; and for these reasons, among many, school boards assign a certain percentage of total funding within their jurisdiction to go towards special education. This is done using a quantitative formula based on total student enrollment. Financially, this makes sense; but realistically, when it comes to students with a variety of special needs, "one size does not fit all"⁸ (see image on page 1).

When funding is inadequate to provide appropriate human resources to these students, the responsibility of supporting and educating them is laid more heavily upon the shoulders of undertrained public school teachers "struggling to effectively meet the needs of all [their] students."⁹ In diverse classrooms, the teacher is stretched thin by the expectation that he or she must be all things to all students; whether it be a counselor, therapist, psychiatrist, special education expert, administrator, nurse, parent, friend, disciplinarian, and so forth. It is no surprise that inclusion, implemented poorly, is considered as "one of the biggest frustrations"¹⁰ that teachers face today.

In places like Nova Scotia, Canada, the teachers union have instituted *work-to-rule action[s]*¹¹ in order to reduce the overall work load of teachers - a load born, in part,

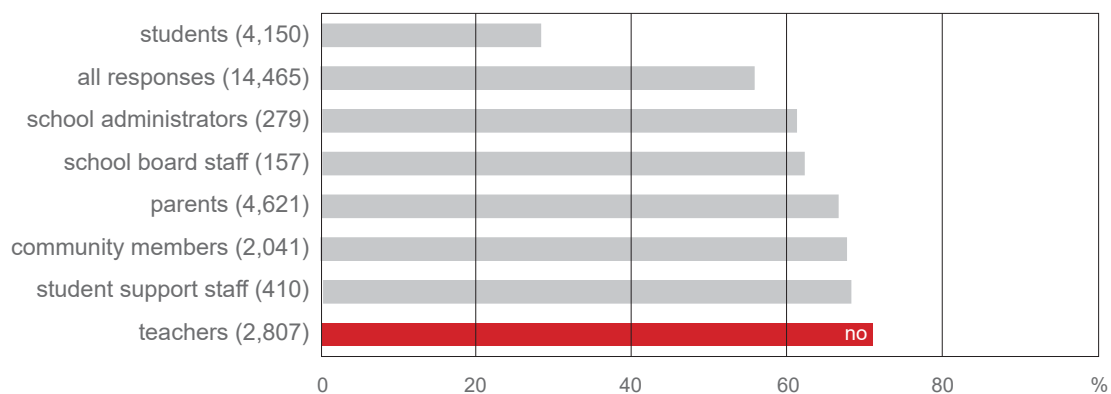
7 Statistics Canada, *Participation and Activity Limitation Survey of 2006: A Profile of Education for Children with Disabilities in Canada*, from www.statcan.gc.ca.

8 Macdonald (Inglis Street Elementary School.)

9 Minister's Panel on Education, *Disrupting the Status Quo*, 42.

10 Holly Conners, *Inclusion is the classroom challenge teachers are too afraid to talk about, educator says*, CBC News Nova Scotia, 2016, from www.cbc.ca.

11 Cassie Williams, *Teachers in Nova Scotia to start work-to-rule job action Dec. 5*, CBC



76 percent of elementary school teachers in Nova Scotia do not agree that current inclusion practices are working; data from Minister's Panel on Education, *Disrupting the Status Quo: Nova Scotians Demand a Better Future for Every Student*, 41.

of inadequate funding and support for inclusion. It took a long time for this ruling to come about because inclusion was the "challenge teachers [were] too afraid to talk about [...]; no one want[ed] to raise the issue for fear of looking like they [didn't] want children with special needs in their classes."¹² Unbridled inclusion eventually took its toll, however, as many teachers felt as though they were not making a difference; not doing a good enough job getting through to students in classrooms where the "ability levels range[d] from pre-primary to grade 9."¹³ This sentiment is echoed in the words of a concerned parent:¹⁴

With so much attention on so many different special needs, the focus on basic academics is being watered down. This is not fair to kids who don't have special needs.

Learning Centres

One way schools are addressing this problem is by adopting what is called a Learning Centre into the fabric of the school. A Learning Centre is usually a regular classroom retrofitted to serve as a home room for students with disabilities. It has many functions: it is a reward for children with behavioral issues; a retreat for

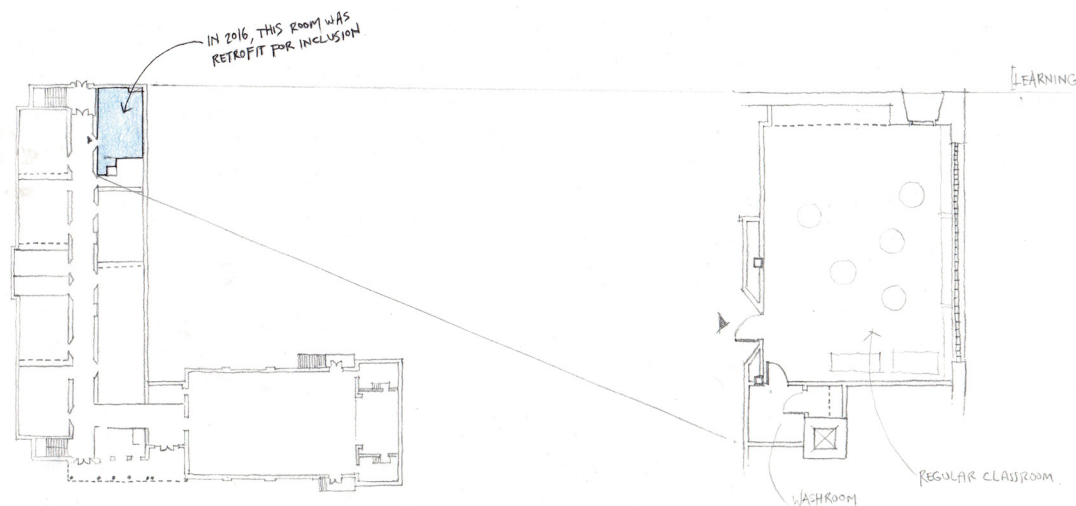
News, from www.cbc.ca.

¹² Holly Conners, 'Inclusion.'

¹³ Ibid.

¹⁴ Minister's Panel on Education, *Disrupting the Status Quo*, 40.

those with sensory integration disorders; and a place where Educational Program Assistants and medical professionals come to provide specialized training and/or therapy for specific students. This support that can be a full-time commitment or a supplementary tutelage on top of educational programming already provided in the regular classroom.



Plan of Inglis Street Elementary School in Halifax, Nova Scotia. A regular classroom (highlighted in blue) started serving as a Learning Centre in 2016.

The following is a critique of the Learning Centre. It is based on the experience of Erin Loney and Jo-Lynn Fenton, members of a school advisory council in Halifax, Nova Scotia:

1. Overcongestion

There is insufficient space for students, educational program assistants, adaptive living aids, teachers and parents, who should all be able to come and go comfortably.

2. Inflexibility

The physical space is not capable of adapting to daily fluctuations of support and personnel. This space should be capable of controlling aspects of the environment such as: lighting, acoustics, temperature, furniture, workspace configuration and so forth.

3. Circulation

Wheelchairs, walkers, crutches - along with other equipment - must always be able to navigate between tables, chairs, storage units and workspaces.

4. Too Open

An open concept does not allow for different activities to occur at the same time. This space should be flexible enough to become completely open, if necessary, or be arranged into smaller, semi-private and private work zones.

5. No individual instructional space

Individualized learning requires individual learning spaces with visual and acoustic privacy. These are spaces for one-on-one instruction.

6. Not home-like

The Learning Centre must be the most comfortable space in the school, not be like any other classroom. Materials and colors should not be institutional or dull. It is important to have views of nature - if possible - or even interior spaces.

7. Not located in prominent place within the school

The Learning Centre should be the heart of the school, located in an area that allows for frequent, positive interaction between all students, regardless of age or ability.

8. Little Storage

This is a significant issue. Some students receive adaptive skills training that require large and cumbersome equipment and materials. Mobility equipment is such as wheelchairs and walkers must have adequate-sized storage rooms, closets or nooks. It is important to keep most of these items organized, out of sight and secure.

9. No small workspaces (with sinks)

There are too few, or no spaces that accommodate different types of hands-on learning and life skills training. Kitchens, arts and crafts tables, and laundry rooms are just a few examples.

10. Inadequate washrooms

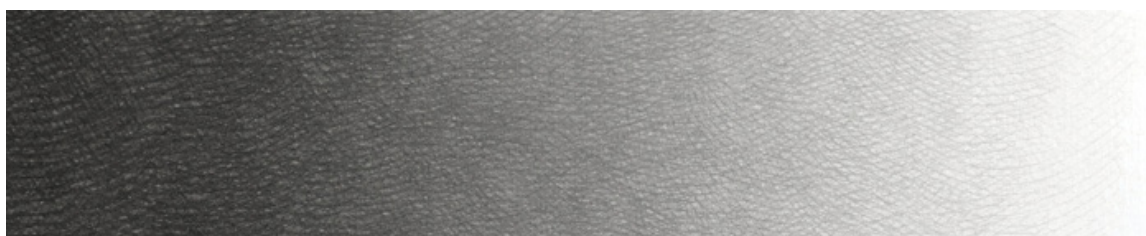
Accessible washrooms are not always designed correctly; for example, there should be a lift permanently mounted to the ceiling that can serve three areas: the change table, the toilet and the shower. Proper dimensioning and spacing should also reflect local building code standards.

Rectifying these ten spatial issues would transform this list into the beginnings of a very useful set of inclusive design principles that could be applied in any part of a school. The correct design of a Learning Centre is only the beginning.

INCLUSION BY DEGREES

There is no singular method of inclusion. Every student is different, requiring different support at different times; and it is for this reason that the Learning Centre has been developed, because it facilitates different levels or degrees of inclusion:¹⁵

1. inclusion in which students with disabilities participate in the class;
2. inclusion in which students with disabilities participate in a classroom but are pulled out at certain times; and
3. inclusion in which students with disabilities are together in their own separate classroom.



A continuum of need requires a continuum of support; image from drawingacademy.

These three degrees of inclusion illustrate a simple fact: disability is not a binary condition. Disability and ability are two ends of a continuum of need in requirement of a continuum of support. For some, the support they require is as simple as

¹⁵ Towle, *Disability and Inclusion in Canadian Education*, 22.

pair of glasses; but for others, it might be a guide dog. The point is: differentiated support is a good thing. It is not equal, but it is equitable (see image on page 1).

Some disagree with differentiated inclusion, espousing to a "true inclusion philosophy"¹⁶ that is about a complete sharing of space and experience among all people. This philosophy asserts that students with disabilities should never have to be relegated to a separate room within a school; in fact, the trend of inclusion is going in the opposite direction. The essence of pure inclusion is distilled from the words of philosopher Jorge Luis Borge in his description of poetry:¹⁷

Poetry lies in the meeting of poem and reader, not in the lines of symbols printed on the pages of a book.

It turns out that inclusion is much like poetry. It lies in the meeting of people, not in inclusive policies printed on the pages of a manifesto. Its essence is found in interaction. For example, a person with disabilities gains a greater understanding his or her strengths and limitations when interacting with other people; conversely, a person seemingly without disability receives a greater understanding of self when interacting with a person who displays human frailties beyond his or her own.



Charles Foster seeks to live as a badger, an otter, a fox, stag and swift, in order to better understand their lives as well as his own; image from theguardian.

¹⁶ Towle, *Disability and Inclusion in Canadian Education*, 22.

¹⁷ Juhani Pallasmaa, *The Eyes of the Skin: Architecture and the Senses* (Chichester: John Wiley & Sons, 2005), 20

The following excerpt is from the book entitled 'Being A Beast,' by author and naturalist, Charles Foster. It serves to illustrate the full breadth of inclusion; where at one end there is complete segregation and isolation; and at the other, there is Charles Foster, whose ridiculous, yet stupendous feat of living like a badger - as well as other animals - for days at a time gave him an appreciation for the exotic sensory capabilities of these creatures; and as a result, a greater comprehension of his own:¹⁸

[...] we had not been in the wood long, but already it was ours. I'd thought that it would seem an absurd pretension to go on hands and knees through the wood. Now it would have seemed an insufferable arrogance to do otherwise. Our heads swayed from side to side – exactly the questing swing of a badger, but forced by our clumsy anatomy. I was handling the badger's world with thick mittens. But even so, this world was more interesting than my own. A lot more happens at six inches and below than at six feet and above.

[...] there were some high physiological fences keeping us out of the badger's world. The main one was scent. My landscape is a visual one. The badger's territories are marked by defecation, and the faeces of each badger carry a unique scent. But noses don't just map perimeters: they sneeze form, colour and personality into the badger's life. For a badger, with its relatively poor eyesight, wood sorrel is mainly the scent of wood sorrel; a dead hedgehog is the shape of hedgehog.

After immersing himself in the environment of a pretentious badger for a time:

[The] feeling and experience [of being a badger] went away immediately when standing up [and] re-establishing my eye sight.

Charles Foster's experience is an unorthodox interpretation of inclusion, but it does demonstrate a simple idea: difference is a wonderful thing because it teaches us things about ourselves that we otherwise could not know. It broadens our perspective. It promotes pride in our strengths and understanding in our weaknesses. Inclusion is a conversation between the two ends of human ability, a continuum rich in all of the qualities of humanity, equity and justice.

¹⁸ Patrick Barkham, *Being a Beast by Charles Foster review – the man who ate worms like a badger*, February 3, 2016, from www.theguardian.com.

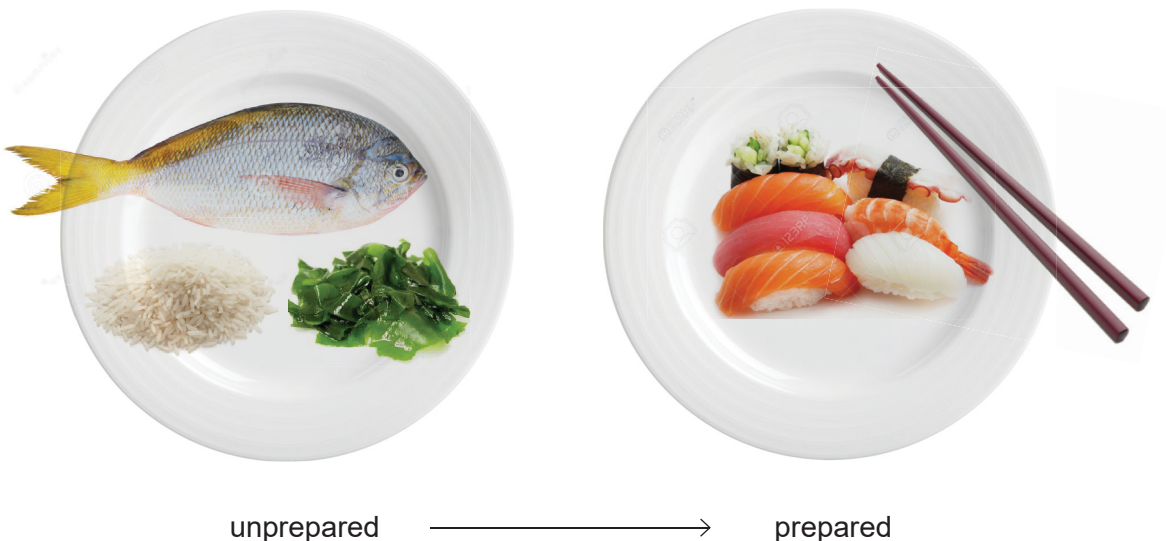
SUCCESSFUL INCLUSION

Successful inclusion is like a good meal. When care is taken to ensure that all of the ingredients are properly prepared and complimentary to each other, the meal is good. When little or no thought is put into preparing the ingredients, the meal is likely to be disappointing even if the ingredients are good on their own.

Any busy university student can throw together a meal haphazardly to satisfy a need quickly; but a person who is competent in food preparation will invest the appropriate amount of time and energy required to prepare a meal that is worth eating.

In the illustration below, an undressed fish, uncooked rice and raw seaweed (left plate) represent a classroom carelessly combining a diverse group of students in the same space. The carefully prepared sushi (right plate) represents a classroom that has taken care to ensure that all of these same ingredients are prepared to be complimentary to each other.

Successful inclusion should follow the same pattern; only in this case, competent medical and academic professionals take on the role of chef and an adapted learning environment his kitchen.



Trained Human Resources

Jan Keddy is a competent special education advisor in Nova Scotia, Canada, and she had this idea: instead of retroactively trying to fix the problems associated with inclusion, we should come up with a long term plan to "support inclusion in a more proactive way."¹⁹ This proactive approach would ensure two things:

1. That teachers are trained how to meet the needs of students with a variety of disabilities because "when teachers learn, students learn"²⁰ too.
2. Students with disabilities are pre-taught what to expect in the public classroom and how to learn effectively in restrictive environments so that, when ready, they can meaningfully participate.

Meaningful inclusion is the ultimate goal. Unnecessary inclusion, much like unnecessary segregation, "is neither good for a child with disabilities nor for those with whom they must associate."²¹ There are times when inclusion is just not helpful; while at other times it is very helpful, so the key to successful inclusion is in figuring out when and where and how it should take place. This is why it is important to have special education experts - Educational Program Assistants, for example - integrated into the school system as much as possible. Their role of influence as it relates to inclusion needs to be larger.

This thesis proposes a new school typology that more purposely engages these medical and academic professionals in collaborating together within an existing school on behalf of students with disabilities - in assessing and preparing them individually for successful learning and meaningful inclusion among their peers.

And furthermore, within this bolstered framework of support, provide routine

19 Jo-Lynn Fenton, School Advisory Council

20 Halifax Regional School Board Website, accessed March 22, 2017, <http://www.hrsb.ca/about-hrsb/learning/professional-learning-communities-plcs>.

21 Kenneth Bayes, and Sandra Francklin. *Designing for the Handicapped : The Mentally Retarded, the Mentally Ill, the Maladjusted, the Blind, the Deaf, Those with Learning Difficulties, the Gifted or Exceptional Child* (London: George Godwin Limited, 1971),6.

training for public school teachers as they strive to effectively meet the needs of all students.

The following diagram is a description of the proposed new school typology. The purpose of this new typology is to (1) connect each student with disabilities to the medical / academic community, (2) integrate this community into an existing public school - shaded in grey, (3) create a collaborative training space within this existing school where teachers are trained to meet the needs of their students and students are prepared to participate the public classroom and (4) effectively transition students from school to adult life:



A visual description of Jan Keddys school within a school model.

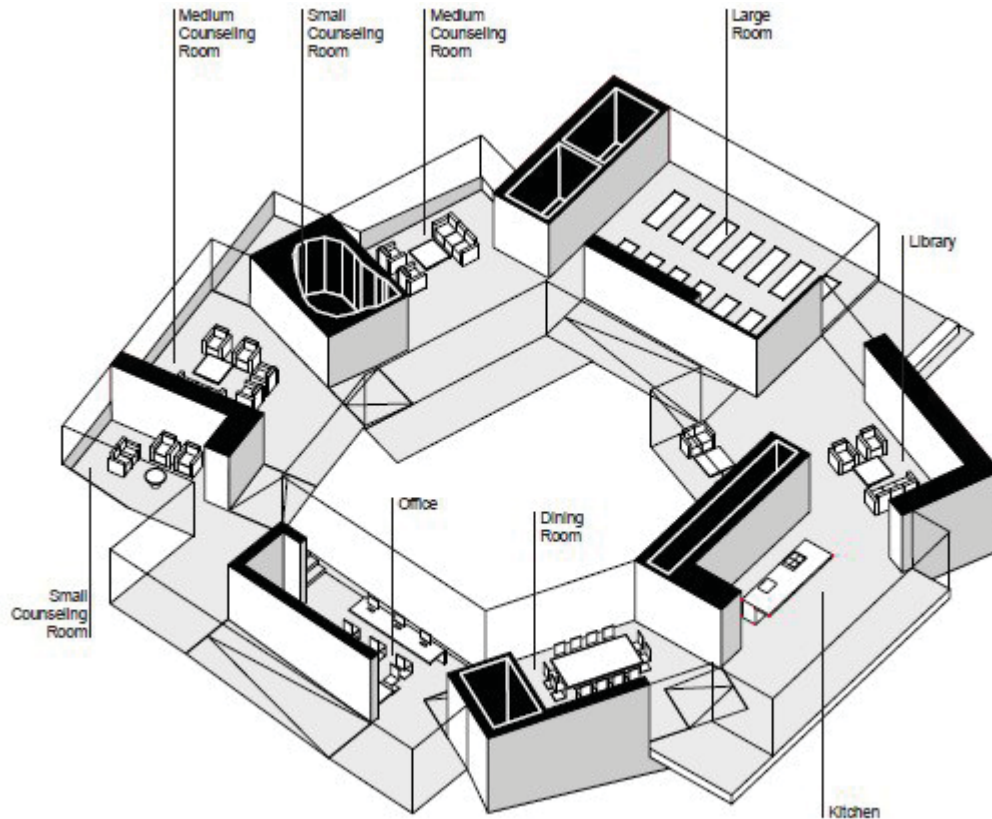
Adapted Learning Environments

An environment adapted to meet the needs of its patrons is exemplified in Maggie's Centres built throughout the United Kingdom. These buildings are specially designed to serve those who have been diagnosed with cancer and require practical, emotional and social support from medical professionals, family members and friends. "Great architecture is vital to the care Maggie's [Centres] offer"²² because it is specifically tailored to promote a calmness and warmth that uplifts those looking to find peace under difficult circumstances.



A consulting room dubbed "the womb" provides a soothing, calm environment in the Gartnavel Maggie's Centre in Glasgow, Scotland; image from dezeen.

22 "Warm and Welcoming Spaces Within Our Centres"; from Maggie's Centre Website



Perspective view of spaces within the Gartnavel Maggie's Centre, a single level building in the form of a ring of interconnected L shaped figures; image from www10.aeccafe.

The Gartnavel Maggie's Centre, part of a community hospital in Glasgow, Scotland, was designed by OMA Architects and opened in 2011 as a single-level building in the form of a ring of interconnected L shaped figures intended to make "one feel at ease and at home; part of an empathetic community of people"²³

As a case study, the Gartnavel Maggie's Centre is an excellent example of how programme and architecture can work symbiotically for the benefit of the user. The difference between designing a Maggie's Centre and an inclusive school, however, is that instead of designing for a single medical condition such as cancer, an inclusive school must design for a myriad of medical conditions.

The following is a list of medical conditions that theoretically could exist among the

²³ Rose Etherington, *Maggie's Gartnavel by OMA*, October 5, 2011, from www.dezeen.com.

student body of a single school:²⁴

Hearing Impairment: Difficulty hearing.

Visual Impairment: Difficulty seeing.

Speech Impediment: Difficulty speaking and/or being understood.

Lack of Mobility: Difficulty walking. This means walking on a flat firm surface, such as a sidewalk or floor.

Issues of Dexterity: Difficulty using hands or fingers to grasp or hold small objects, such as a pencil or scissors.

Learning Disability: Difficulty learning due to the presence of a condition, such as attention problems, hyperactivity or dyslexia, whether or not the condition was diagnosed by a teacher, doctor or other health professional.

Developmental Delay: Child has a delay in his/her development, either a physical, intellectual or another type of delay.

Developmental Disability or Disorder: Cognitive limitations due to the presence of a developmental disability or disorder, such as Down syndrome, autism or mental impairment caused by a lack of oxygen at birth.

Psychological Disorder: Limited in the amount or kind of activities that one can do due to the presence of an emotional, psychological or behavioural condition.

To design a space in which all these forms of disability are fully addressed is a nearly impossible task. Even variations within each of these conditions make things difficult; for example, degrees of visual impairment could translate daylight into a painful glare for some and a useful light / shadow contrast for others.

Furthermore, accessible design often has an indirect effect of labeling those with

24 Statistics Canada, *Profile of Disability Among Children*, from www.statcan.gc.ca.

disabilities, as they are often the only ones who use them. For example, a clumsily designed ramp in a public space or a slow moving lift on a set of stairs have stigmas associated with them. Of course these designs are not intended to be malicious by any means, but inclusive design strategies are ideally inconspicuous. When they are properly integrated into the fabric of a building, no one really associates them with accessibility - except perhaps those who really need them - because they are enjoyed by everyone.

The Guggenheim museum in New York City, designed by Frank Lloyd Wright, is a good example of inconspicuous inclusive design. The primary design element is a ramp - normally an obtrusive design element - but it does not read as something designed for a specific group of people. The architect simply made a decision to connect multiple levels of art galleries with a gently sloped floor, rather than a series of stairs because (1) it facilitates a procession of people ideal for viewing artwork; (2) it continuously provides reference as to where you are within the gallery as the ramp revolves around an open atrium; and lastly, yes, (3) it is accessible to



The ramp is a architectural device used to do multiple things: it connects spaces vertically and horizontally, it gives access to wheelchairs and it creates a flow ideal for a museum; image by Robert Mars.



wheelchairs. The ramp has many functions and serves everyone. It was not designed as an alternative.

Further success to the design is demonstrated in the way that a singular design element - the ramp - can define an entire building. The interior forms carved out by the ramp also define the exterior of the building, providing a unique opportunity to install a continuous skylight along the entirety of the gallery (at the location of the colored lights on the bottom image).



The interior ramp shapes the exterior form, infecting the entire building with this inclusive design element; top image by James Taylor Foster., bottom image by Kaitie Garvin.

The ramp is just one design element that can promote an inclusive building environment. There a number of other different environmental adaptations that can serve as effectual 'ramps' for other types of disabilities as well.

This thesis identifies five accessible design elements - including the ramp - as being crucial to the creation of inclusive space:

1. Ramp
2. Tactility
3. Gross motor pathways
4. Sensory retreat alcoves
5. Tranparency

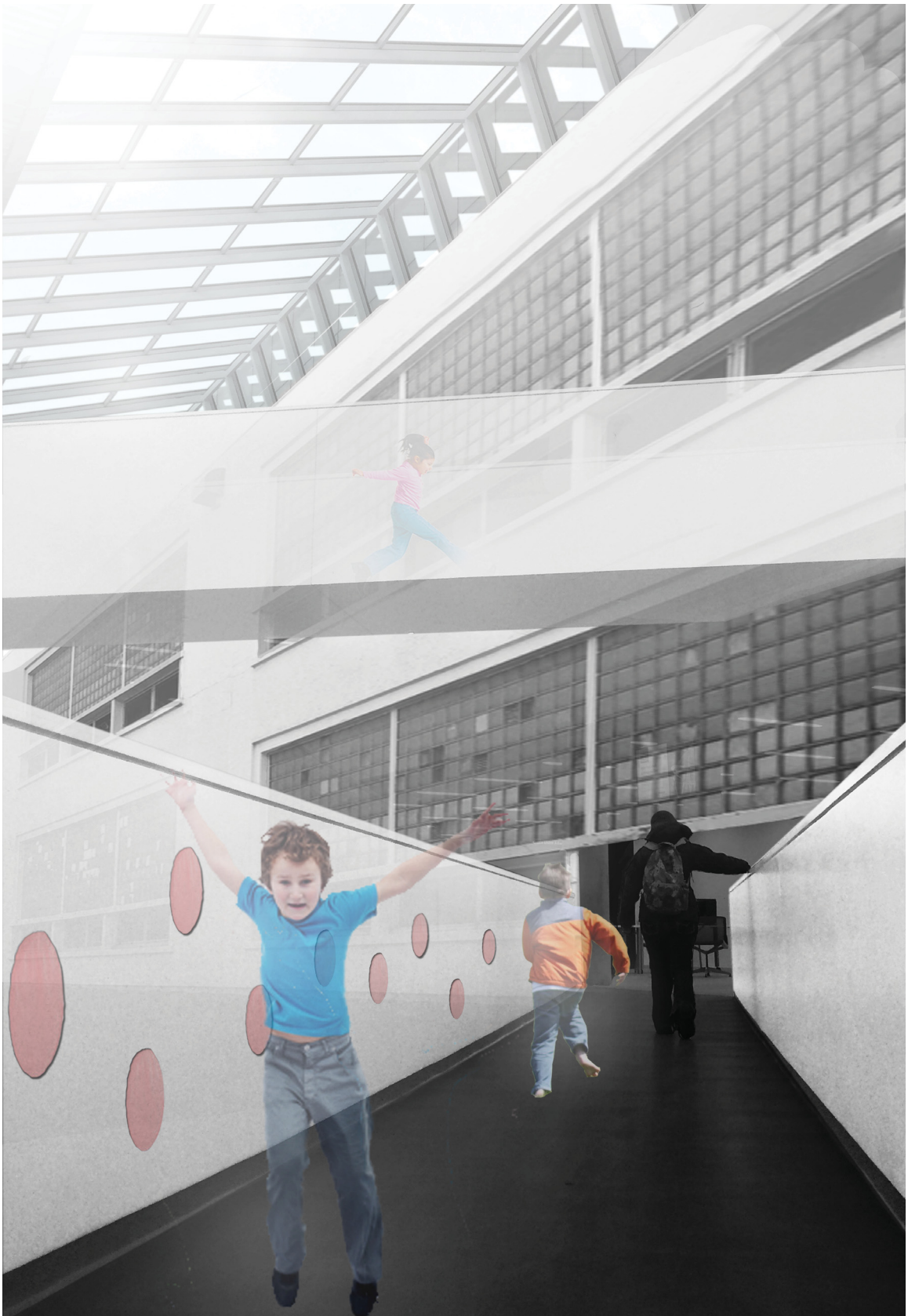
These are represented by collages on the next five pages:



The ramp as egress



Tactility as a wayfinding tool



Gross motor pathways give opportunity to regulate emotions



Sensory retreat alcoves allow for a connection to open space



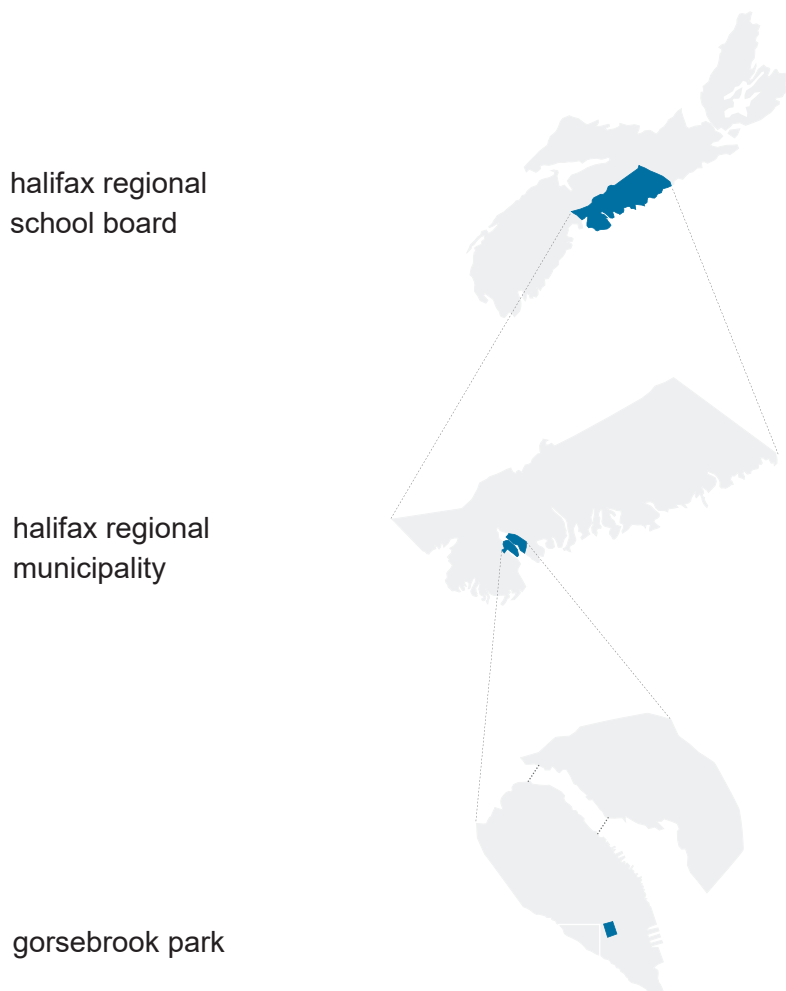
Transparency increases the imageability of space

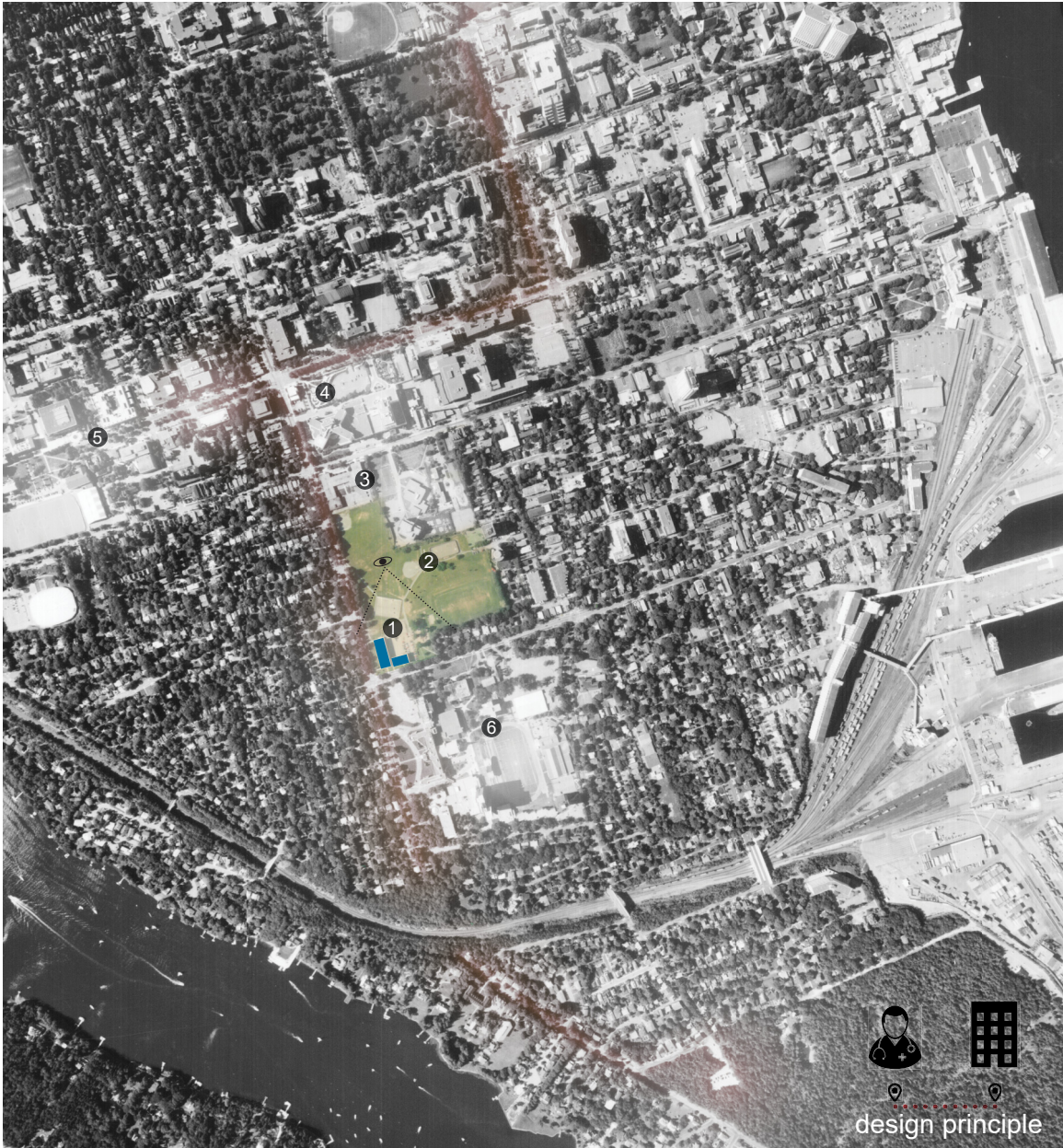
CHAPTER 2: ADAPTING AN EXISTING SCHOOL

SITE

In selecting a site to test Jan Keddy's school within a school model (see page 15), it was important to find an area in which inclusion was considered to be an issue. In Nova Scotia, Canada, inclusion has been a major issue ever since a work-to-rule action (as described on page 6) was instituted by the teachers union in 2016.

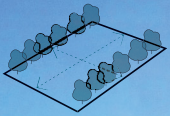
I chose to work with an existing school rather than design a new building for two reasons: (1) many schools across the province are responding to sudden congestions of special need with very few resources at their disposal; and (2) a new programme such as this could potentially revitalize an underused school - and there are many of these in Nova Scotia.





Aerial view of Gorsebrook Park in Halifax. (1) [inglis elementary school](#), (2) gorsebrook park, (3) atlantic provinces special education authority, (4) children's hospital, (5) dalhousie university, (6) st mary's university; aerial image from Nova Scotia Government.

Inglis Street Elementary School is located in Gorsebrook Park on the Halifax peninsula. It is underused, but its urban location is ideal for a school because of its adjacency to a park and residential community. It is also ideal for a collaborative training centre because of its proximity to medical and academic resources. [Note: diagrams of inclusive design principles will be displayed whenever employed as part of the design. For a complete compilation of the 24 principles, see chapter 3.]

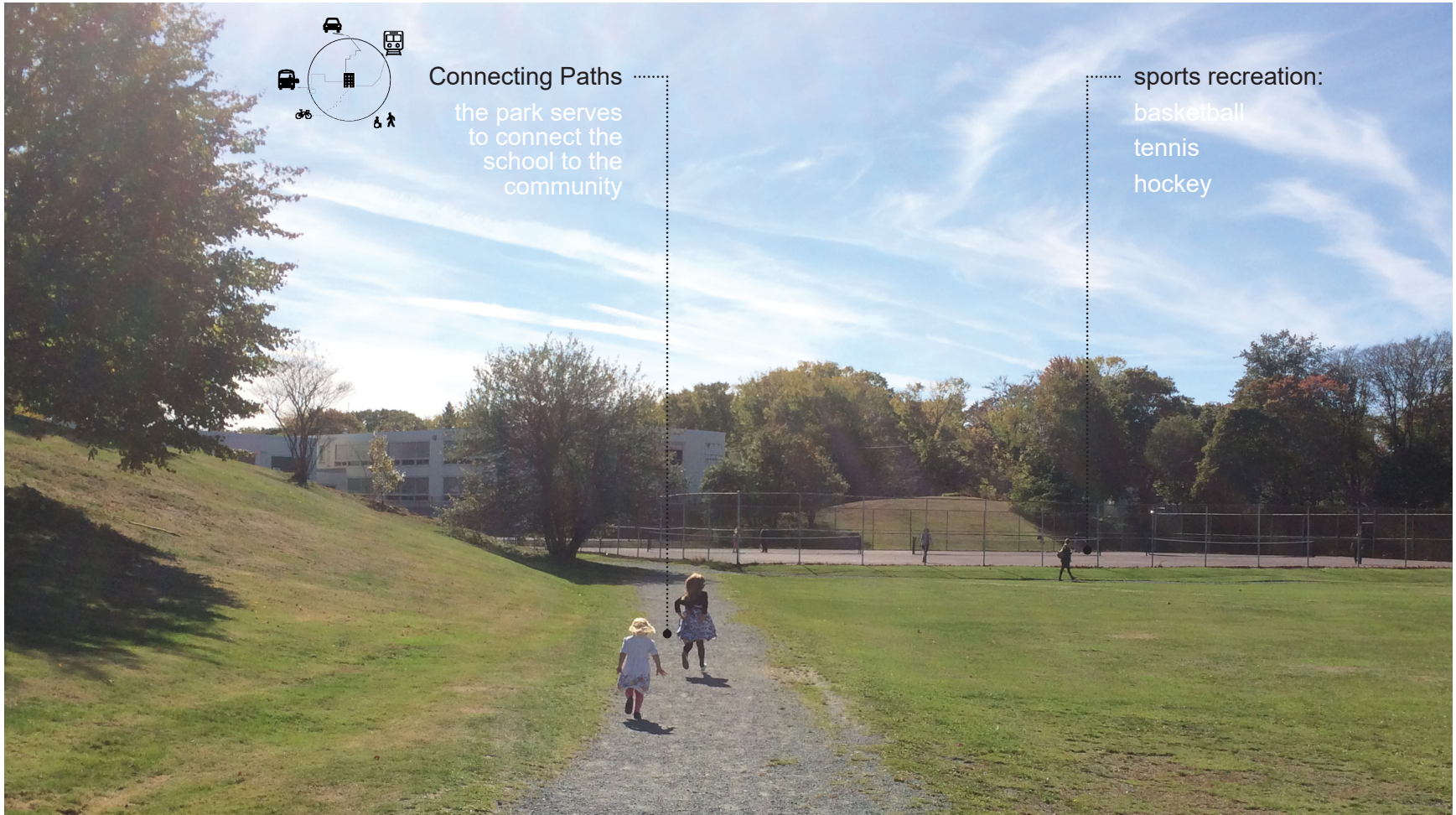


Ondulating Landscape
open and unstructured green space is the most notable characteristic of the park

Site:
Inglis Street Elementary School



View of Gorsebrook Park.



View of school from interior path.

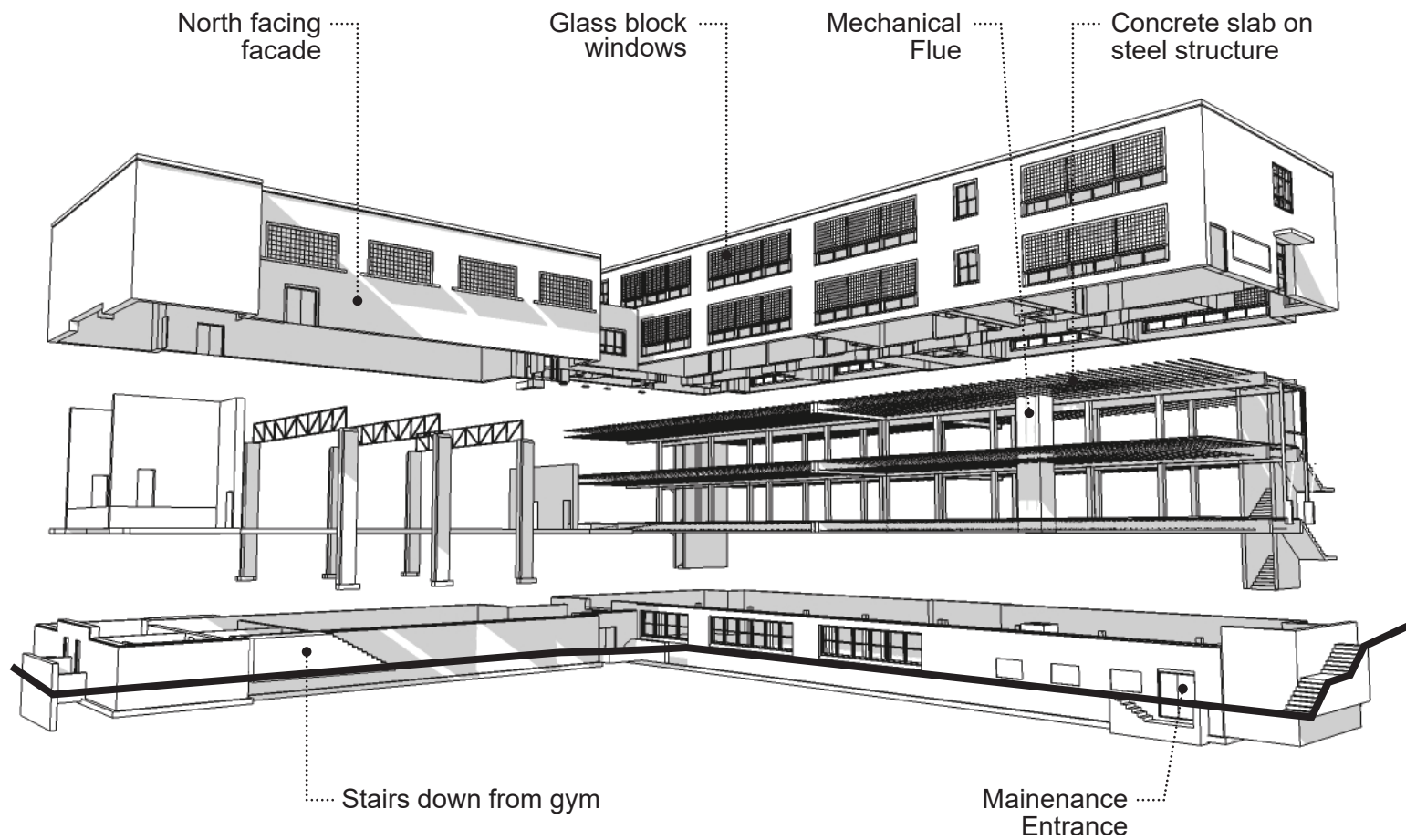


Morning Gathering:
the defacto entrance to
the school

Public Playground:
separated from school by
asphalt courtyard



View of school from Park.



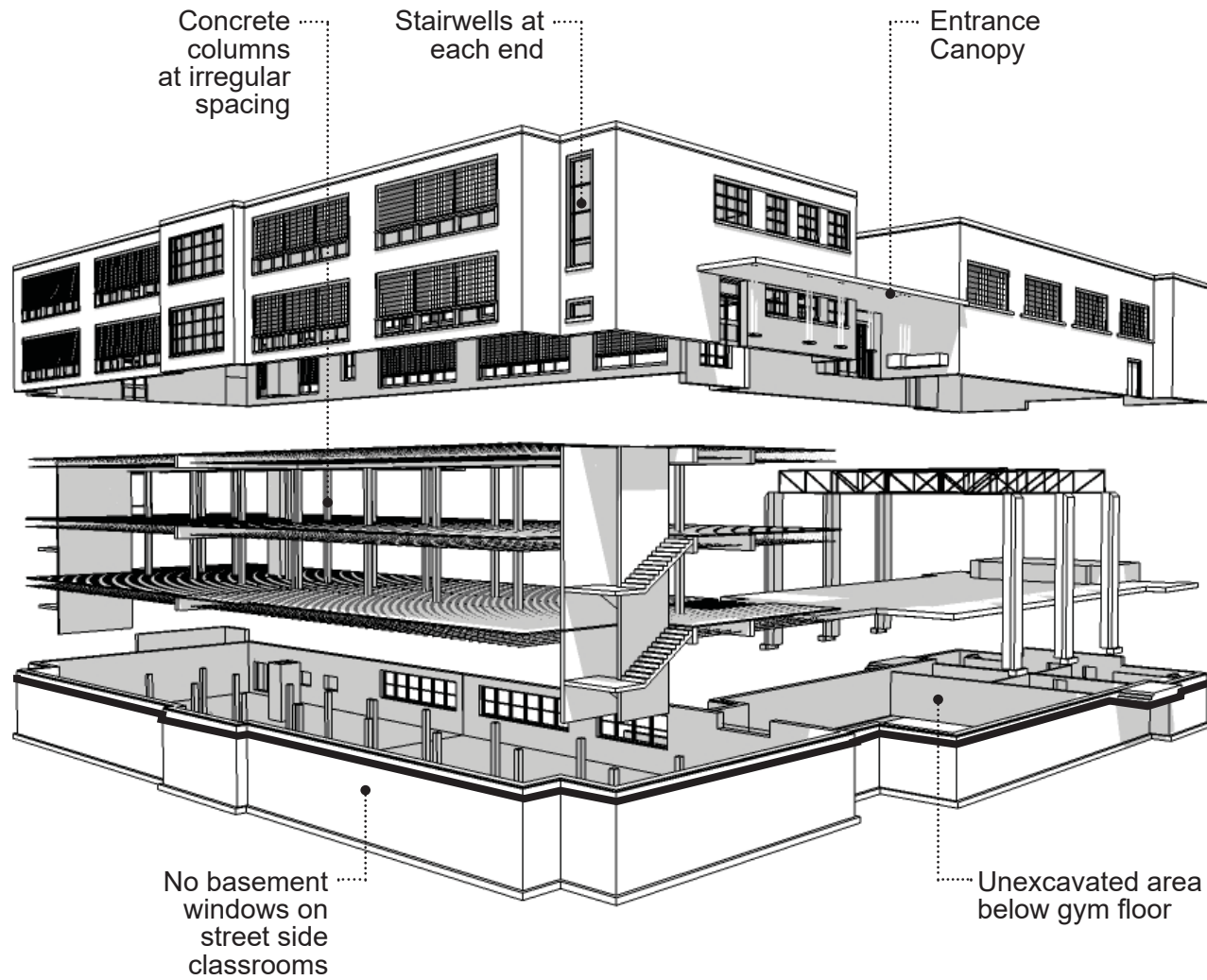
Exploded axonometric study of Inglis Street Elementary School (from park side).



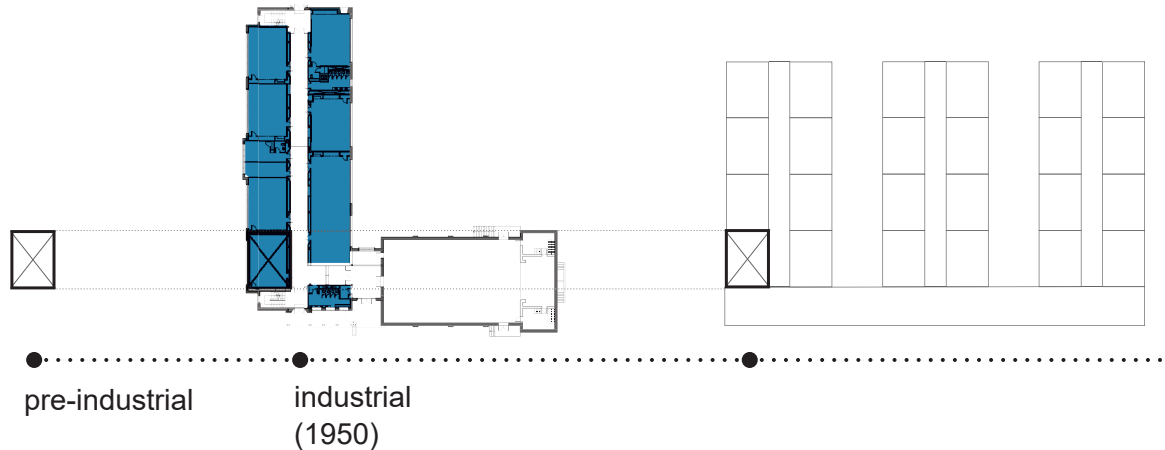
School garden
on Robie Street

Main Entrance:
in between gym and
rest of school

View of school from Inglis Street.

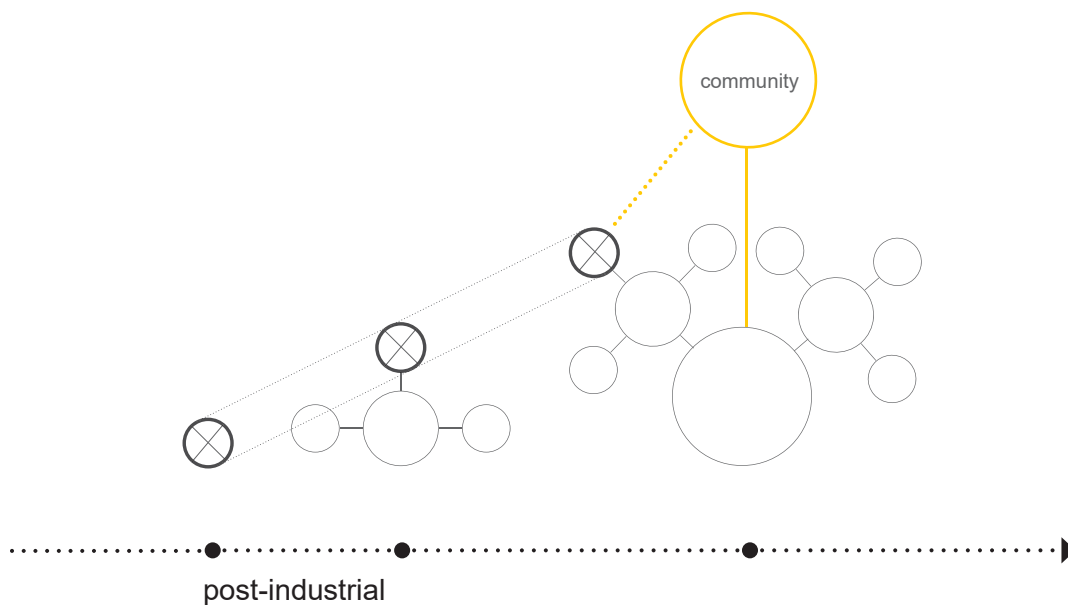


Exploded axonometric study of Inglis Street Elementary School (from street side).



Inglis Street Elementary School was built in an era of industrialization. The effect of industrialization on school design resonates today in the form of the ubiquitous double loaded corridor, which could be seen as an aggregation of the one room school house. The goal of this architecture was productivity of space.

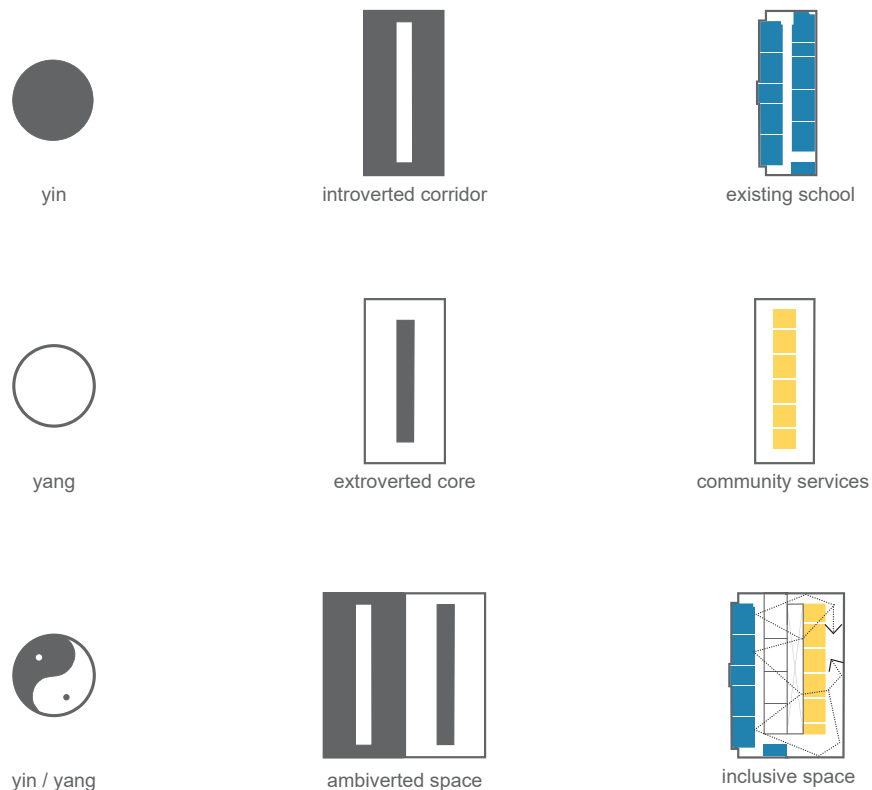
The goal of contemporary school design is flexibility of space as well as creating synergies between communities and schools through partnered programming. The goal of this thesis is to do the same; to create synergies between medical/academic communities and Inglis Street Elementary School through the introduction of collaborative training space. The question is: how can an industrial-era school be adapted to meet these contemporary goals?



This diagram situates the building (blue) within in the historical context of school design.

The answer is: by ascribing to the theory of yin and yang - as cliché as this sounds. Disability and ability are two extremes of the human condition and are connected by a continuum of need (as described on page 10); it is in this connection where we find the heart of inclusive design. The study of yin and yang is useful to inclusive design because they are "opposite, yet complimentary energies" that "blend into one seamless whole."²⁵ They are separate, but interpenetrating.

If we treat this design project as an exercise in harmoniously combining two extremes; one being Inglis Street Elementary School; and the other a space for community services (ie. Jan Keddy's Collaborative Training Space), then the result would look like the diagram below. The existing school provides a good reference point to start with - the double loaded corridor. This is an introverted scheme that has a clear opposite found in an extroverted core design. Combining the two naturally creates an ambiverted scheme.

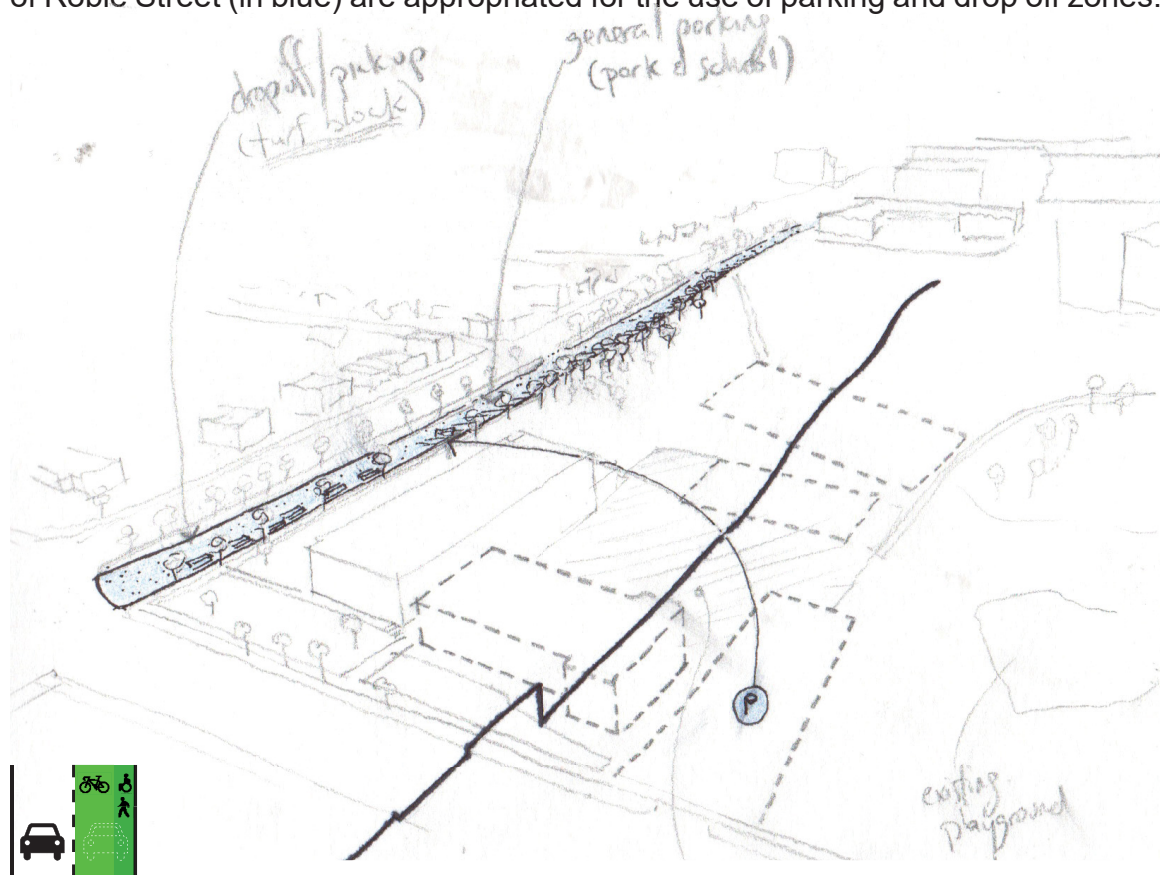


An ambiverted design inspired by the Yin Yang theory.

²⁵ TCM World Website, *What is TCM? / Yin Yang Theory*, <https://www.tcmworld.org/what-is-tcm/yin-yang-theory>.

Before applying this scheme to the school, an audit of the surrounding site reveals the zeitgeist, or spirit of Gorsebrook Park to be its unstructured and open green space. The basketball and tennis courts are removed and relocated as they are obstructive to this spirit. The school gym is also removed - to be relocated - as it defines a north-facing courtyard of asphalt, disconnecting the street from the park. The parking lot is removed and relocated as it pushes into potential park space, creating a single entry point that acts as a bottle neck for cars getting in and out.

To address inclusive design at this scale of the project, the words of architect Prakash Nair remind us that "we can't view each part of our urban landscape as being useful for one particular function."²⁶ For example, streets do not just have to be used by cars just like schools do not just have to be used by students. Multifunctional spaces are key to inclusion. With this in mind, two of the four lanes of Robie Street (in blue) are appropriated for the use of parking and drop off zones.

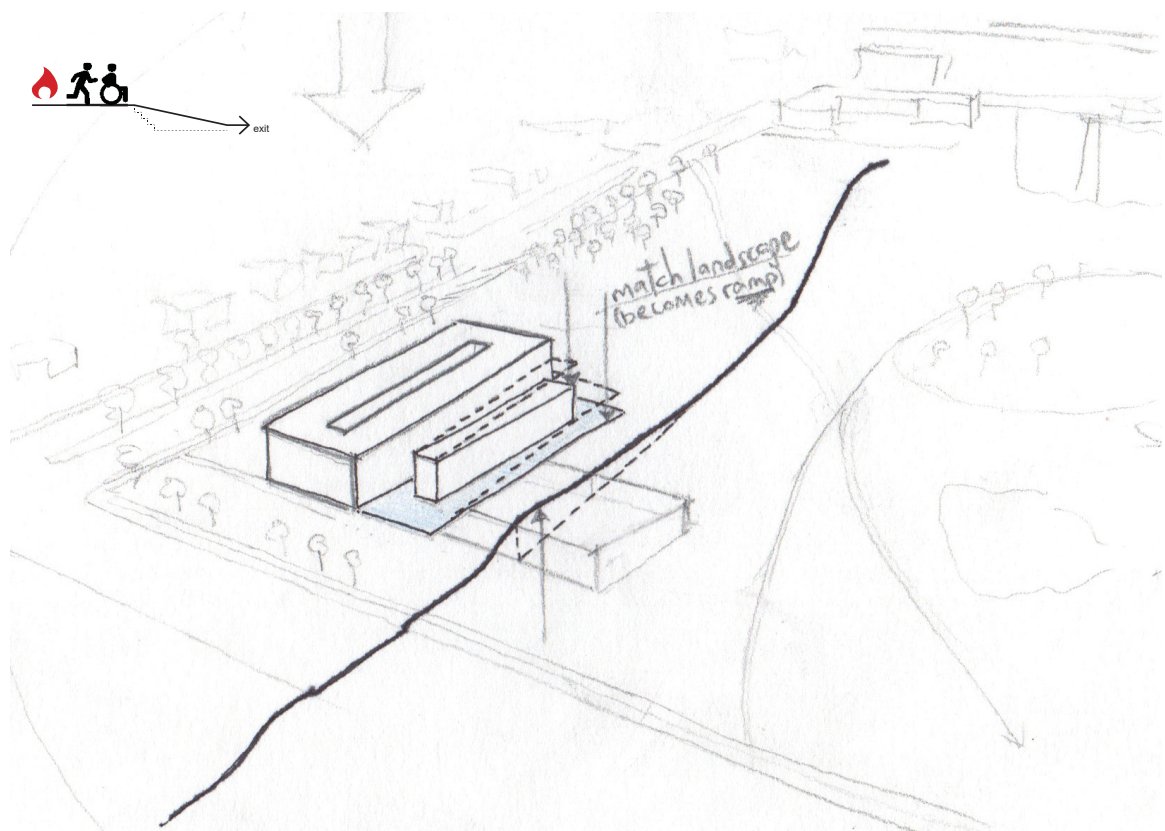


Site audit. Remove things that are destructive to the spirit of Gorsebrook Park.

²⁶ Prakash Nair, Randall Fielding, and Jeffery A Lackney, *The Language of School Design*, 25.

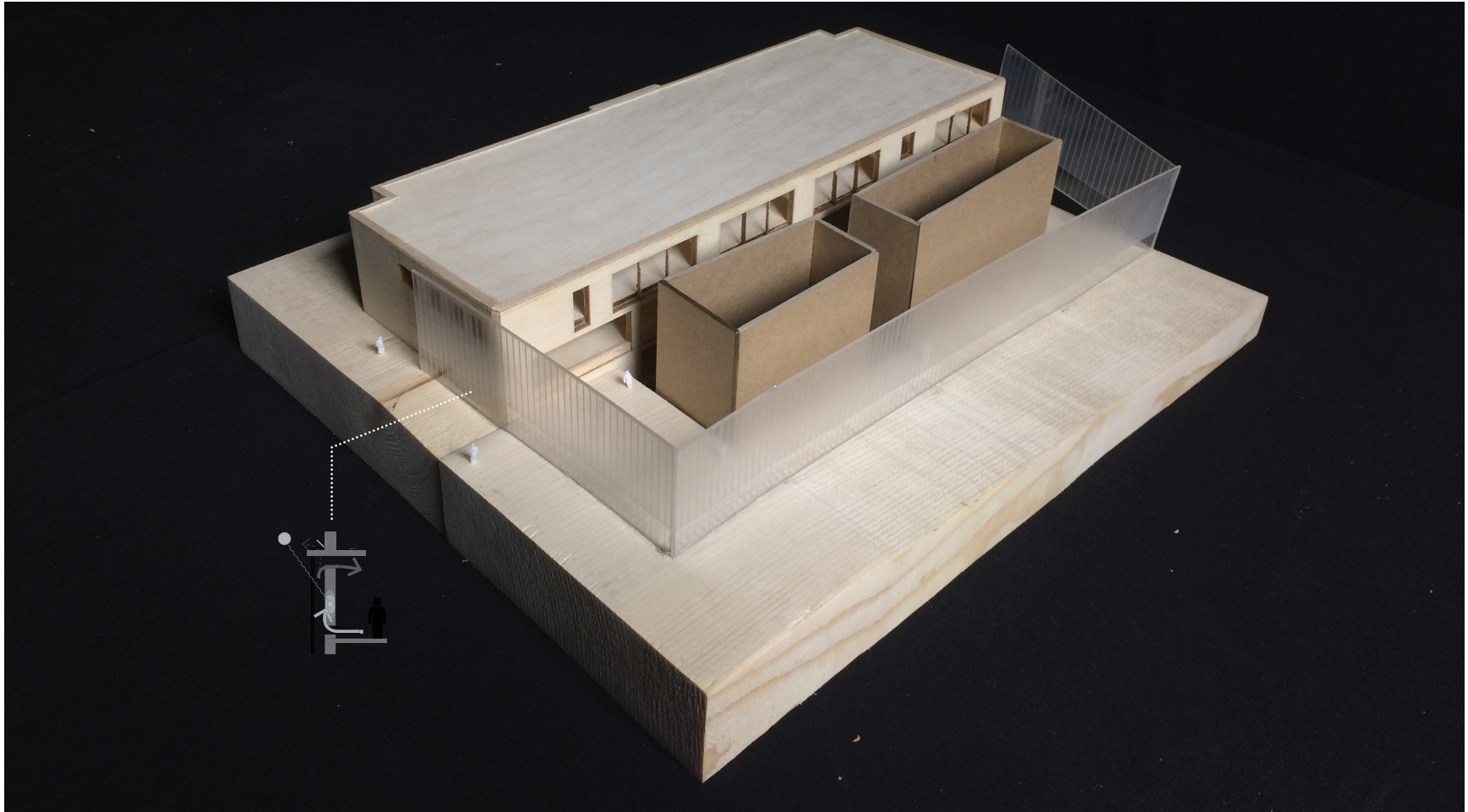
Upon removal of the gym, a sizeable grade change is revealed between the street and the asphalt courtyard (denoted by a dashed line in the diagram below). Infilling the courtyard with earth allows for the lower landscape to re-connect with the higher street by a gentle slope of 4.5% (1:24). The gym can then be pushed beneath this natural-looking feature, connecting to the school's lower level on one side and the park on the other.

An ambiverted floor plan concept (see page 36) is then applied to the site by adapting its floor plates (in blue) to match the sloping landscape, creating a series of ramps connecting each floor. The National Building Code of Canada recommends a 1:20 slope for most ramps since it is "safer and less strenuous"²⁷ for those with reduced mobility. The floor plates match the landscape perfectly, blurring the line between indoor and outdoor space, and still in keeping with building code regulations.



Programme insertion. Apply ambiverted space concept derived from yin yang theory.

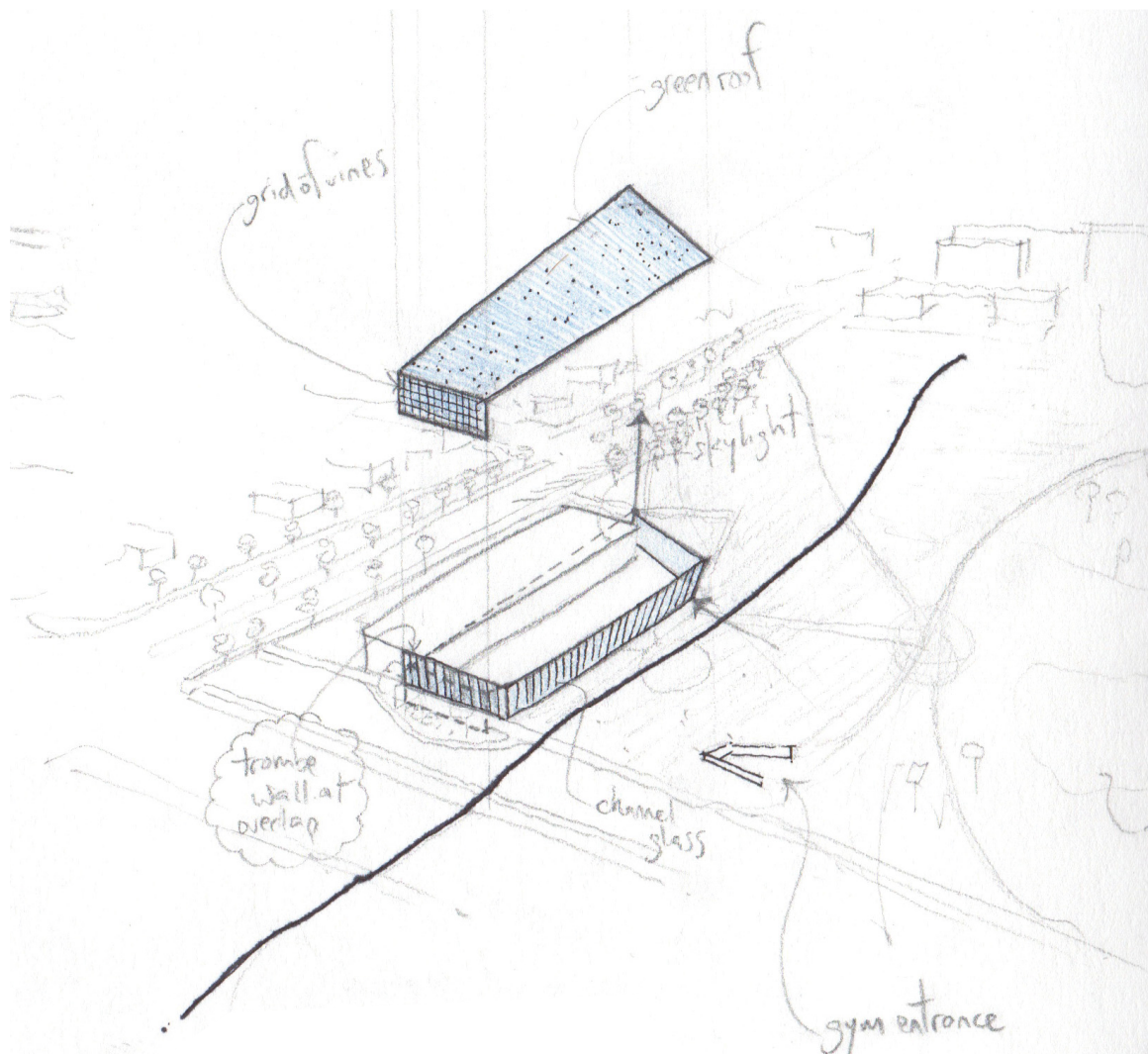
²⁷ National Research Council of Canada, *National Building Code of Canada, 1995, 11th edition, Appendix A*. (Ottawa: Canadian Commission on Building and Fire Codes, National Research Council of Canada), 1995.



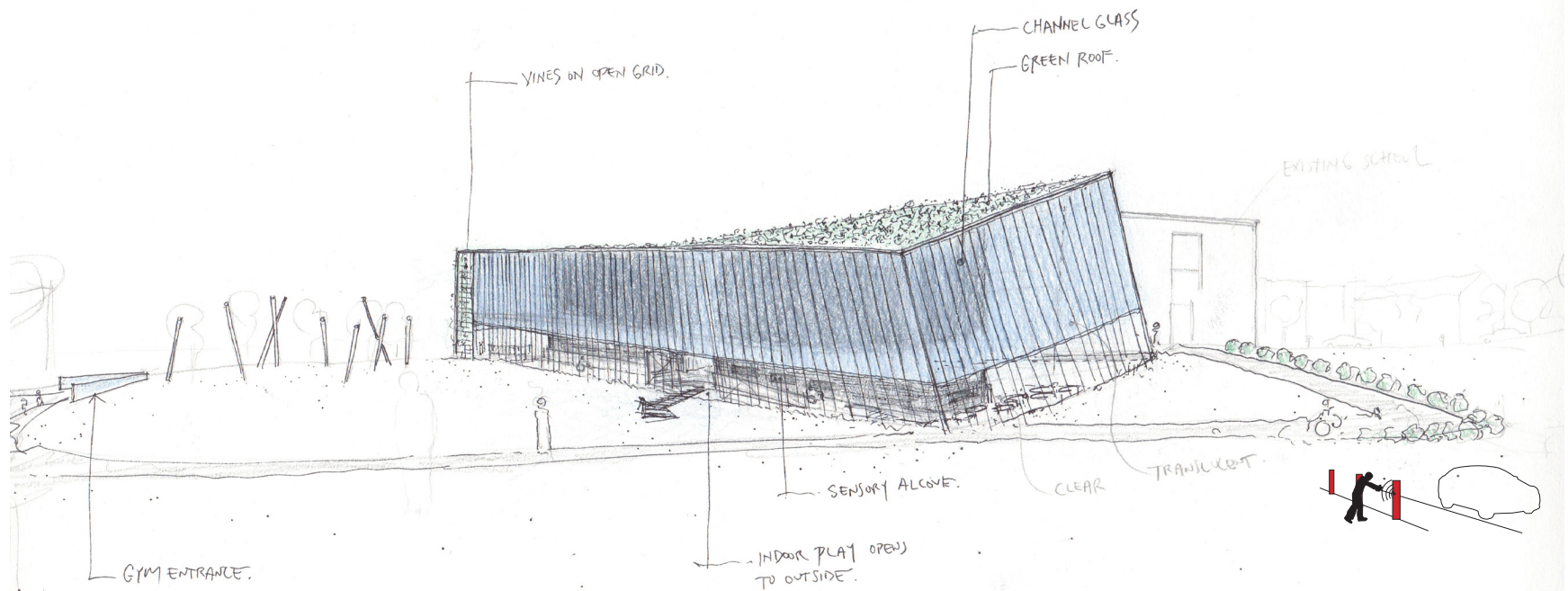
Model describing relationship of existing building (in wood) and new architecture (in card and glass).

The shell of the building is composed of two distinct pieces; one, a glass wall with vision glass on the bottom third and frosted glass on the upper two thirds; and second, a roof element that dips down to match the slope of the floor plates, which in turn match the slope of the landscape.

The new glass addition barely slides past the facade of the old structure by eight inches on the south end to create a trombe wall - taking advantage of the thermal mass of the existing concrete structure on the south facade. This same glass element runs past the facade of the old structure by 10 feet on the north end in order to create a point of entry between the general parking lot and the drop off zone.



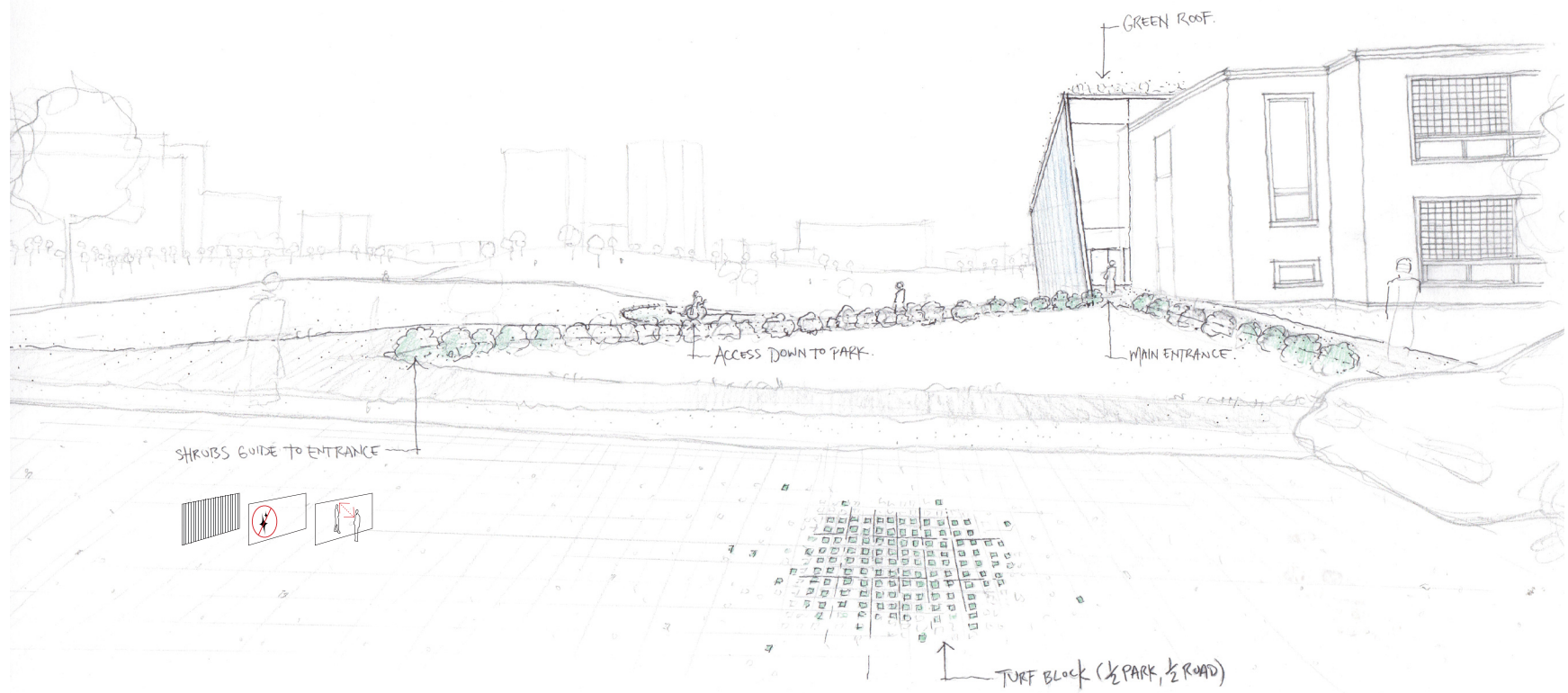
Building envelope. Match the slope of the landscape, floor plates and roof.



View of School from Gorsebrook Park



🕒 Site Plan



View of entrance from parking

BUILDING



upper level

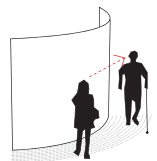
main level

lower level

Floor Plans



Main Level Plan

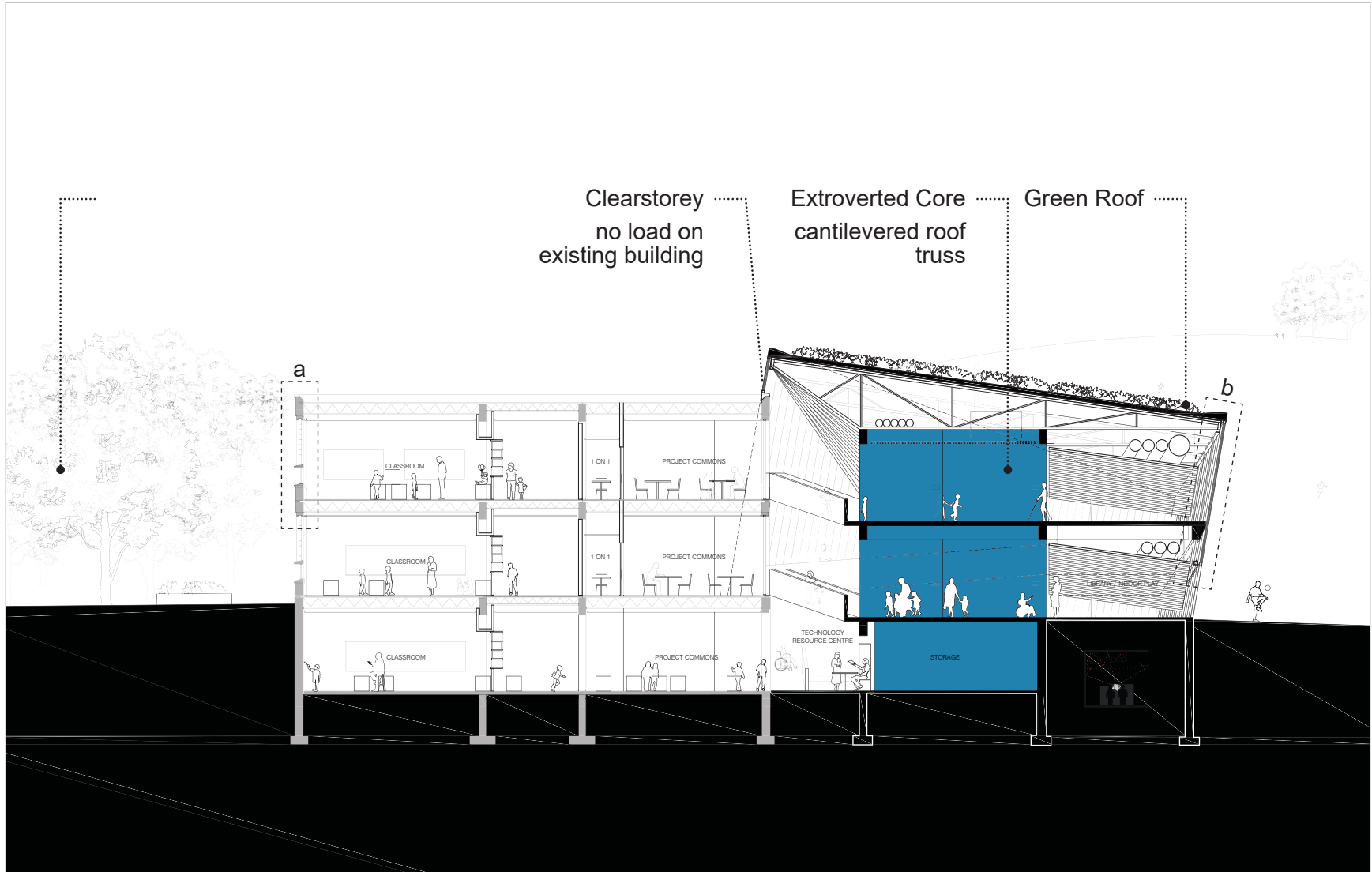




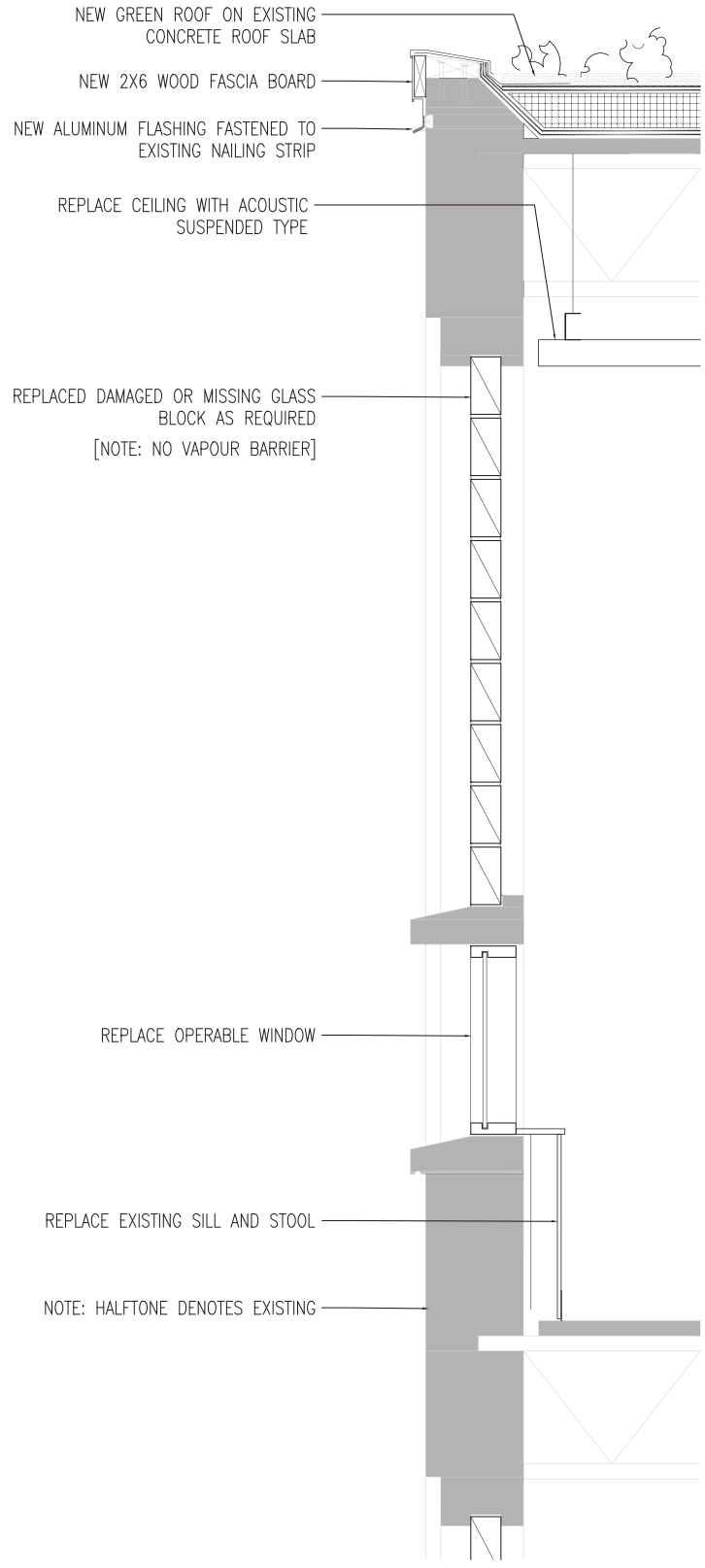
Upper Level Plan



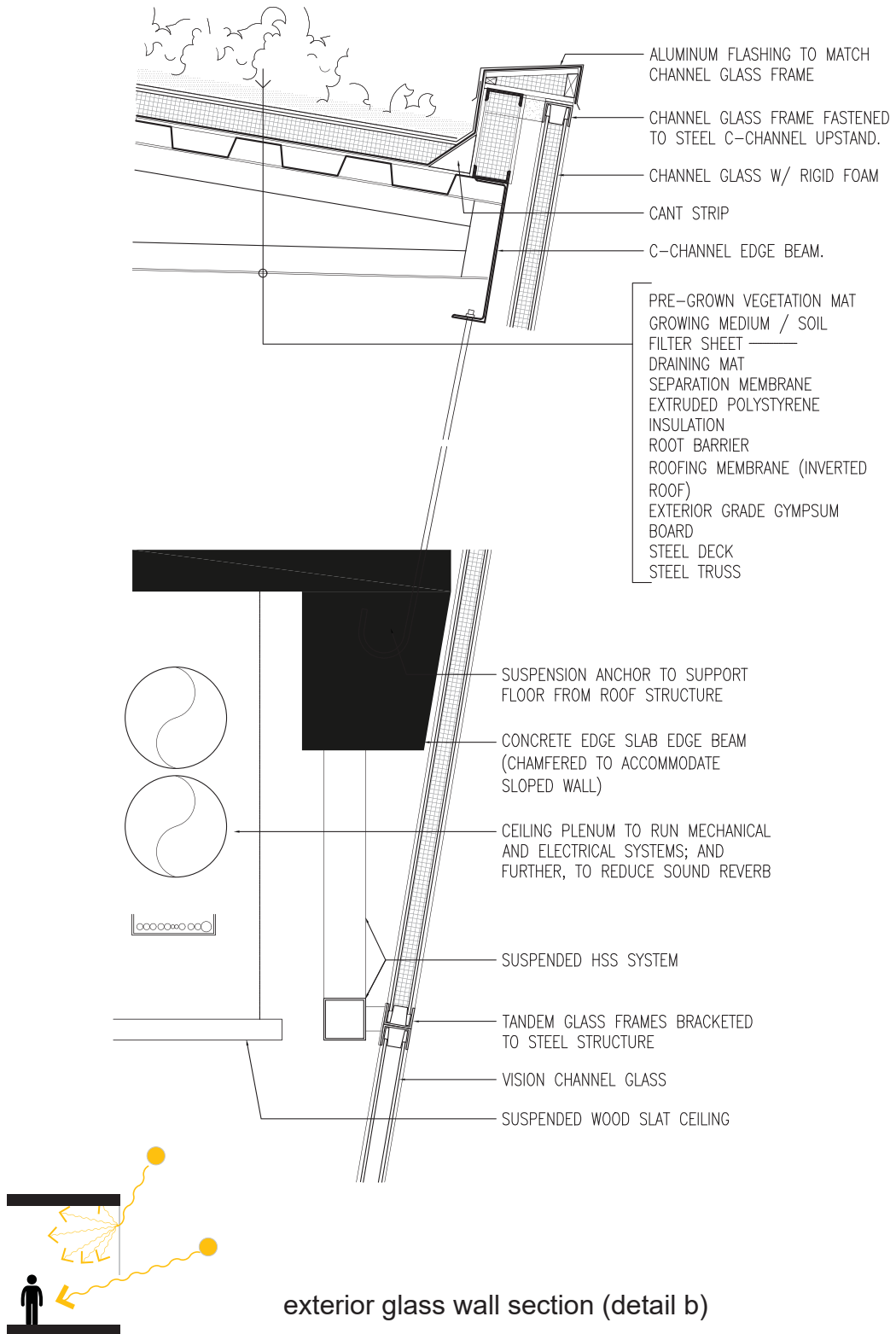
Lower Level Plan

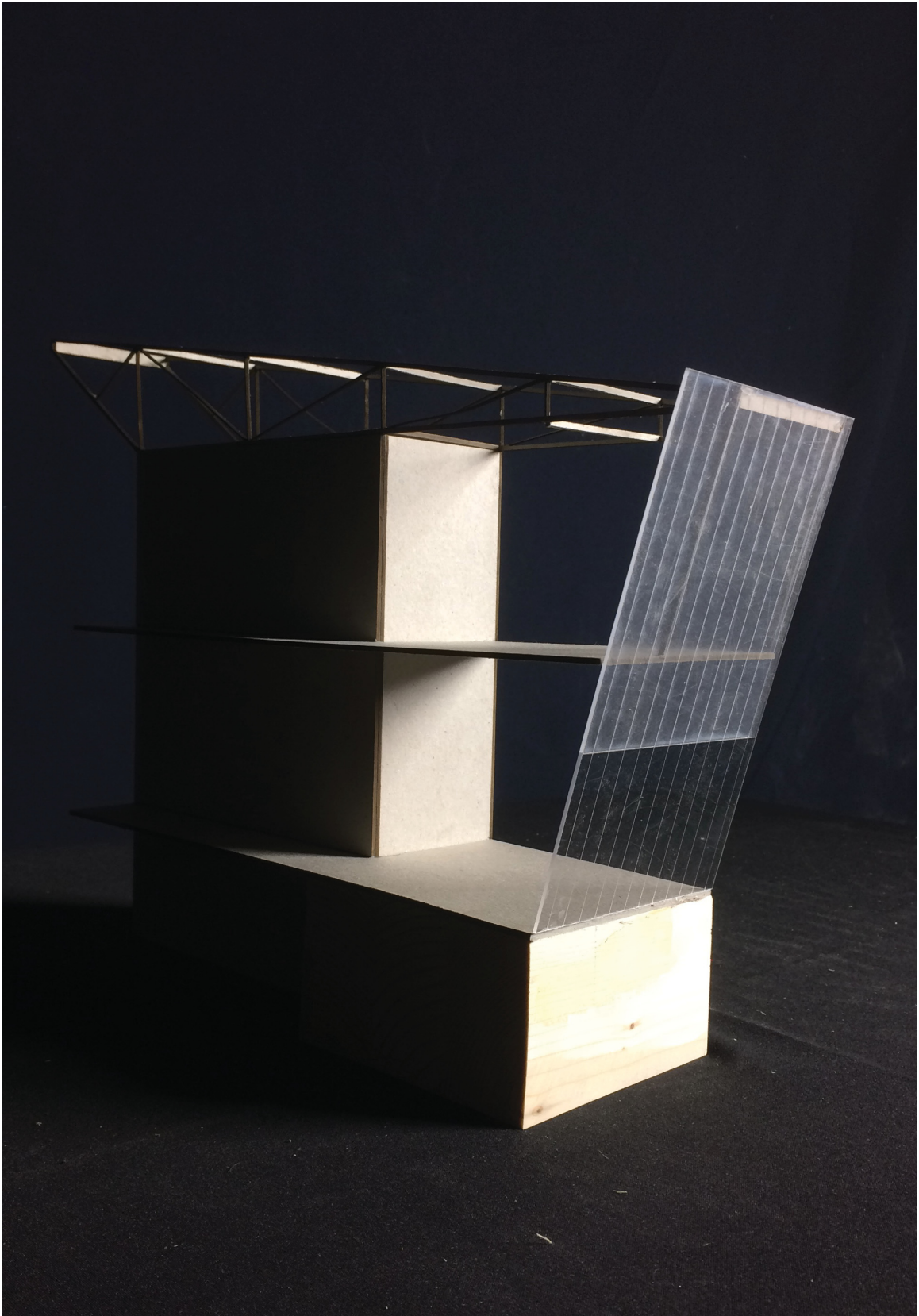


Building Section

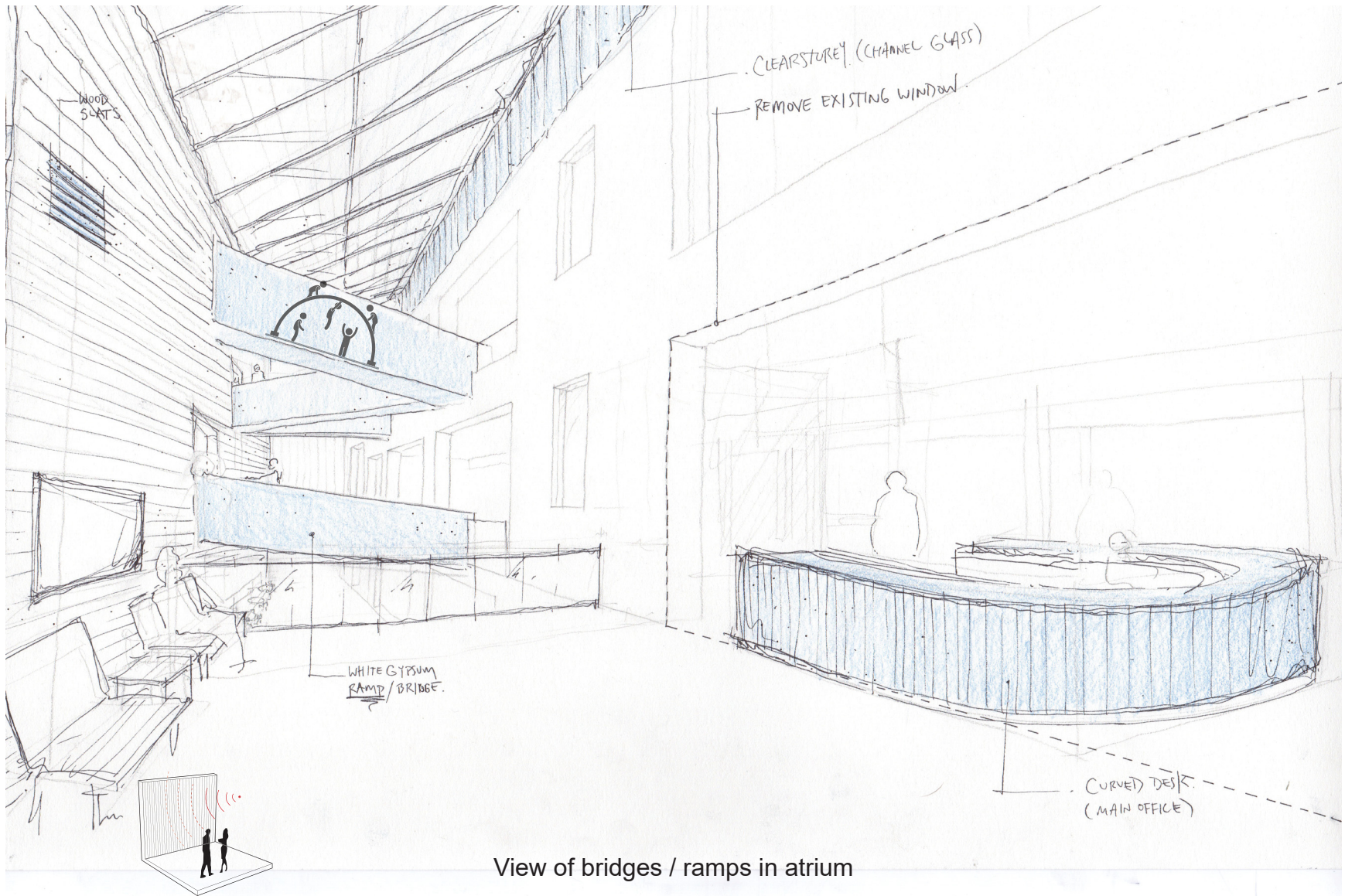


existing glass block window (detail a)

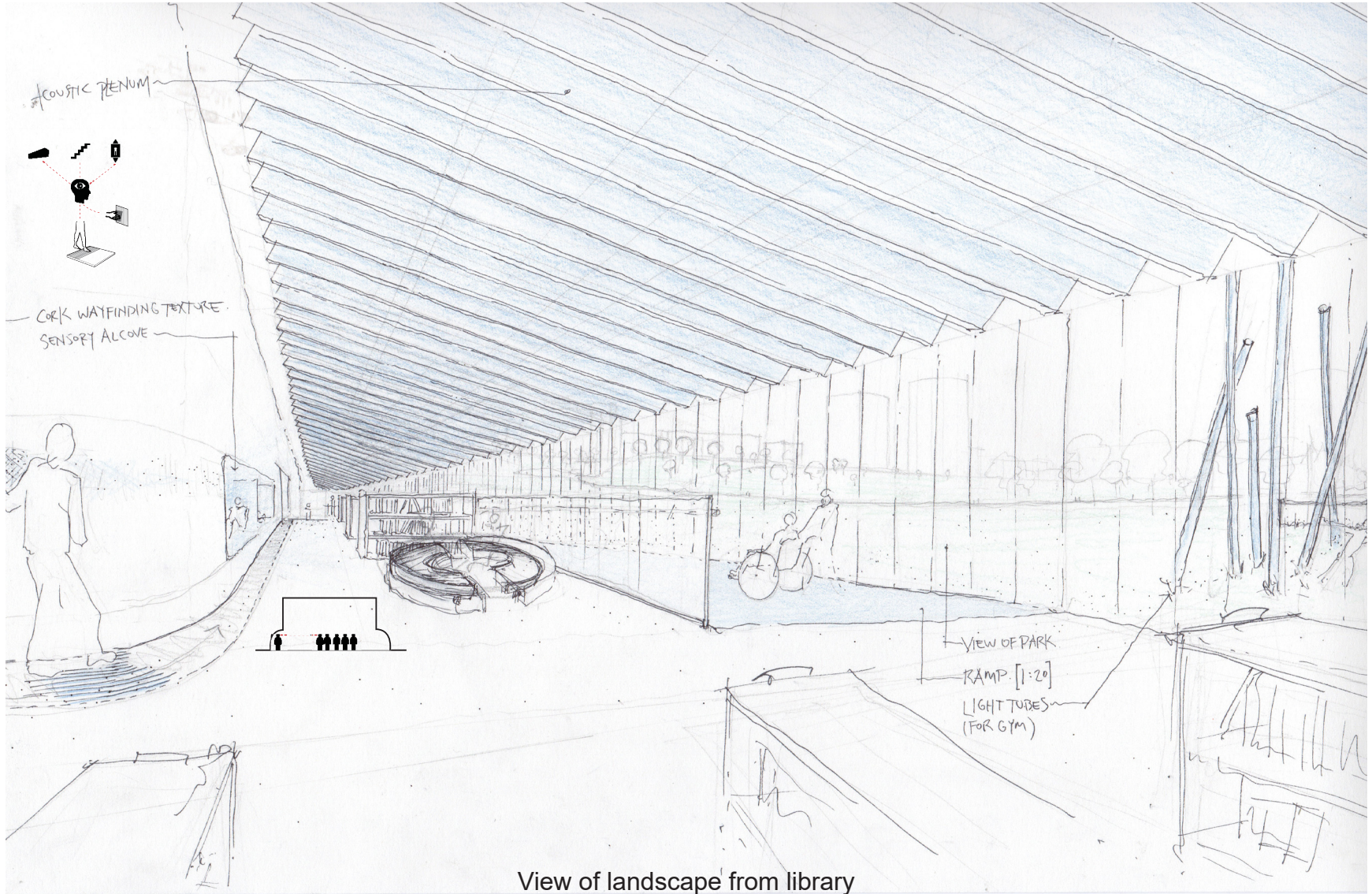




Model describing structural scheme of new addition



View of bridges / ramps in atrium



View of landscape from library

CLASSROOM

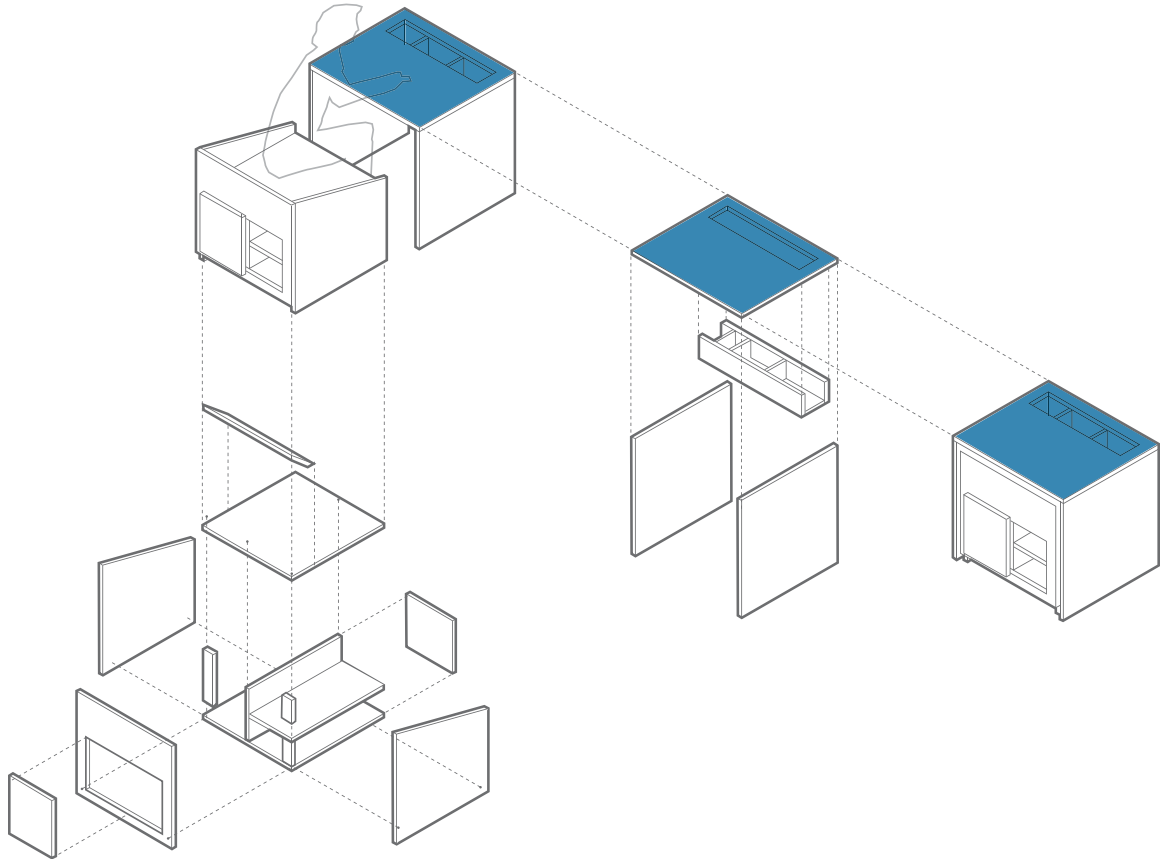


The English for Fun Flagship School in Madrid; image from archdaily.

The classroom is "moving away from [the traditional] model of single-purpose spaces to multifunctional areas."²⁸ The English for Fun Flagship School in Madrid exemplifies a learning environment capable of maximizing open space, configuring a host of different learning situations and embracing a high level of transparency. Through the use of stackable wooden boxes used as storage, seating and working surface, the design accomplishes a sense of fun.

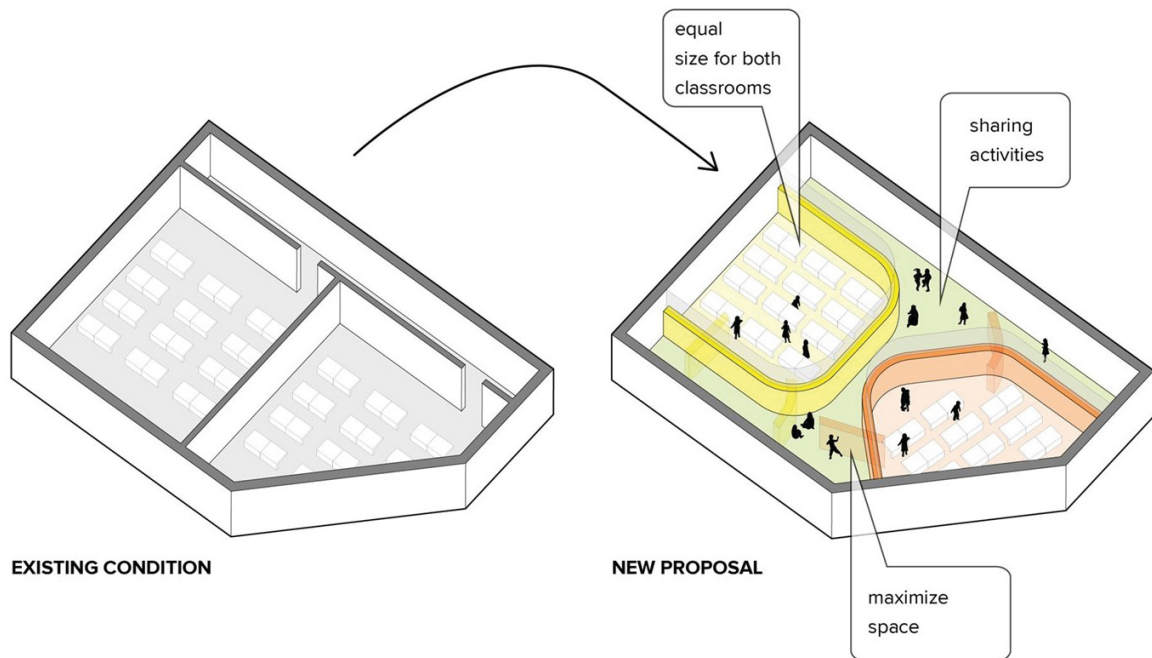
The strength of this design is its intentional flexibility broken down into three categories: (1) long term adjustments, (2) instantaneous need = instantaneous adjustment and (3), a variety of options. A variety of differently sized wooden boxes is gives students power to learn whenever or wherever he or she chooses, under the direction of the teacher of course.

²⁸ Prakash Nair, Fielding, Randall, and Lackney, Jeffery A. *The Language of School Design*, 123.

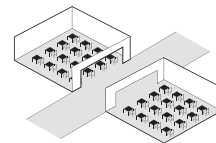


Individual workstation: compressed storage / desk / chair

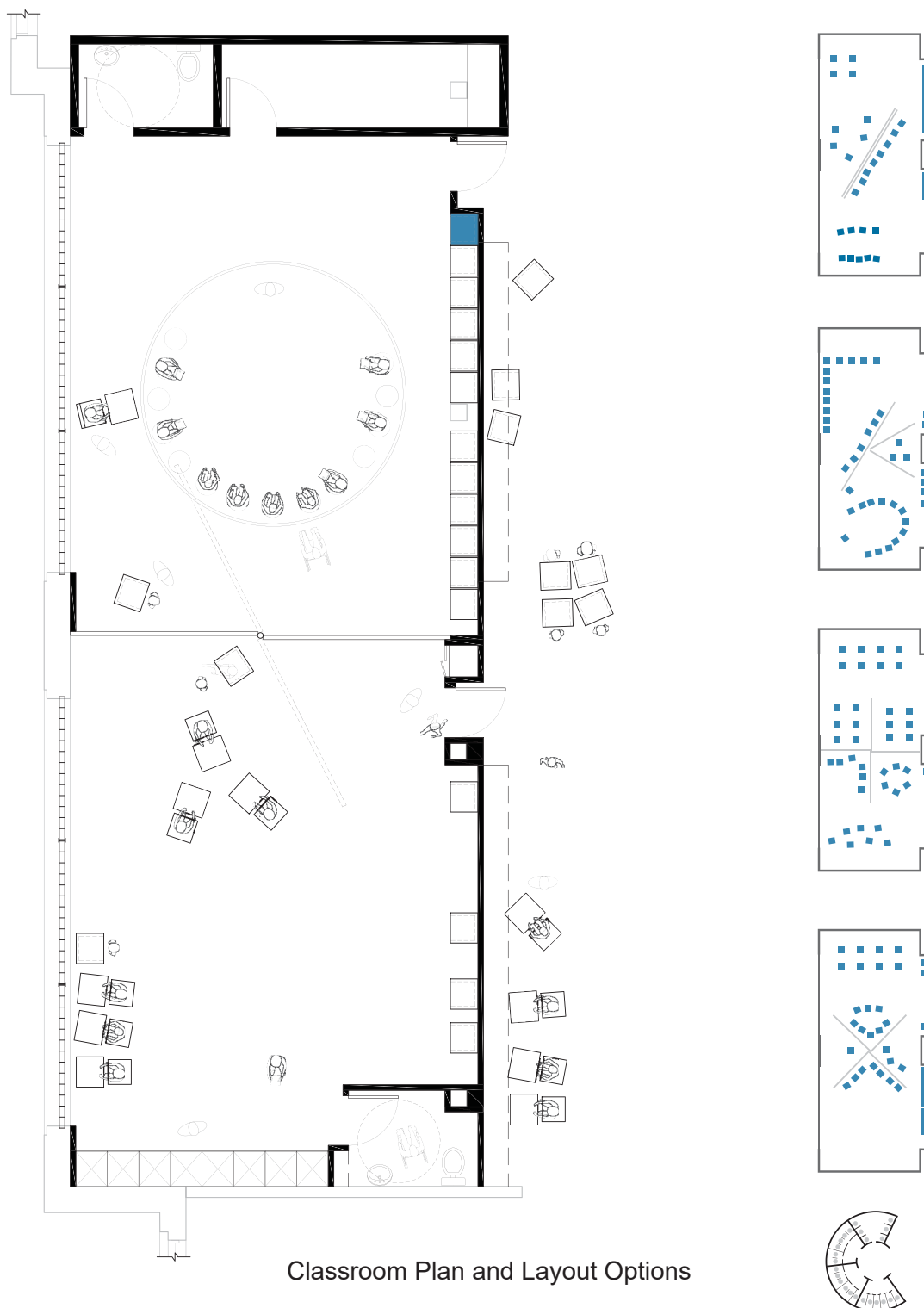
This individual workstation - inspired by the English for Fun Flagship School - is a compressed storage unit, desk and chair that has the ability to open up an existing classroom, without requiring extensive renovations. A typical classroom is composed of large group tables or individual desks with chairs strewn about them. This project proposes that these be replaced by a number of individual workstations - as seen in the diagram above - that can be pushed by the student or teacher as needed. Storage is built into the chair and desktop in order to minimize storage shelving within the classroom. The chair fits nicely inside the desk so as to allow for efficient use of space.



Even the most rigid existing conditions can be transformed into a dynamic learning environment - DSSI Elementary School in Seoul, South Korea; image from archdaily.



Working to make an existing space flexible is difficult, but it can be done. In Seoul, South Korea, architect Daniel Valle designed a renovation to the DSSI elementary school as described in the diagrams above. The two existing classrooms were static, uninspired spaces similar to the classrooms in Inglis Street Elementary School. The design strategies employed at DSSI that were applied to this thesis include: removing partitions, creating openings in walls and utilizing circulation space as learning or prep space. The architect also made it a much more pleasant experience transitioning from one area to another as a visual connection between adjacent spaces was achieved using glazing at certain height.



The goal of this classroom design was to provide a way for teacher to create a variety of spaces within the classroom. Also, the ten deficiencies of Learning Centre were consulted in designing a classroom that would cater to inclusion.

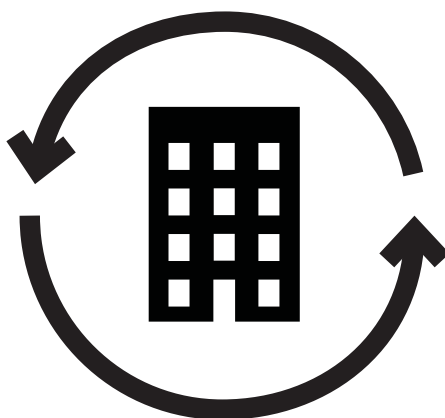


Model describing renovated classroom

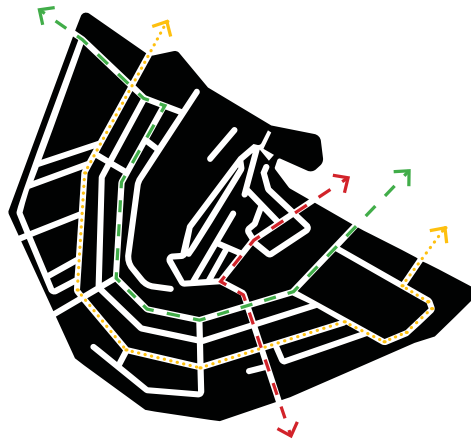
CHAPTER 3: DESIGN PRINCIPLES OF INCLUSION

CONNECTIVITY

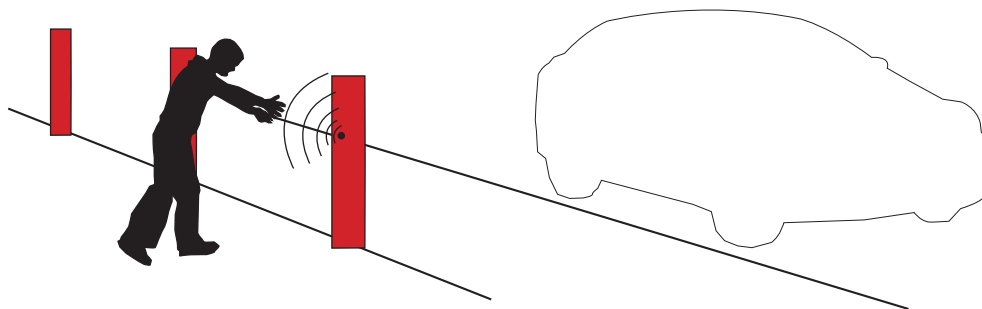
Transitioning from one environment to another must be conducive to physical, mental and emotional regulation. Without a stable connection to the environment, it is difficult for many children with disabilities to focus and learn effectively. Connectivity can be visual, auditory, tactile, olfactory or even taste.



In the Community: **Connected to History.** The reuse or recycling of an existing school, by way of renovation or addition, is a good way to connect to an existing community. Urban communities, in particular, are often dotted with underused schools that are slated for closure; but because of their ideal location near urban parks, businesses, recreational amenities and most importantly, health services, urban schools are good candidates to have added to them a community service such as a Collaborative Training Centre, which prepares kids and teachers for inclusion.



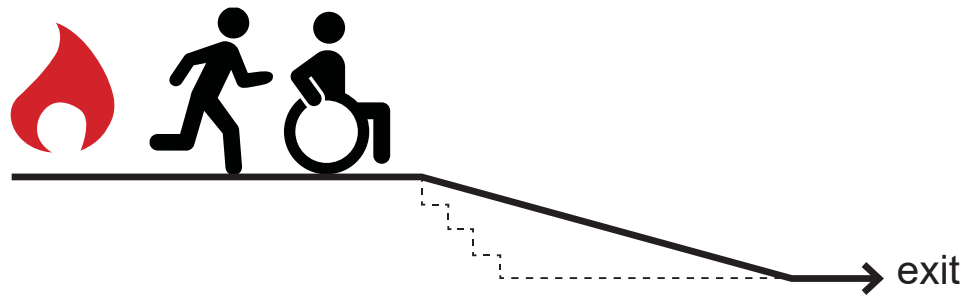
In the Street: Network of Accessible Paths. Developing a network of accessible paths within a city brings freedom of movement to those who would otherwise feel isolated and overly dependent on others. Connecting places of living, shopping, recreation, education, business and industry would allow for many people with physical and/or mental disabilities to enjoy a level of urban independence.



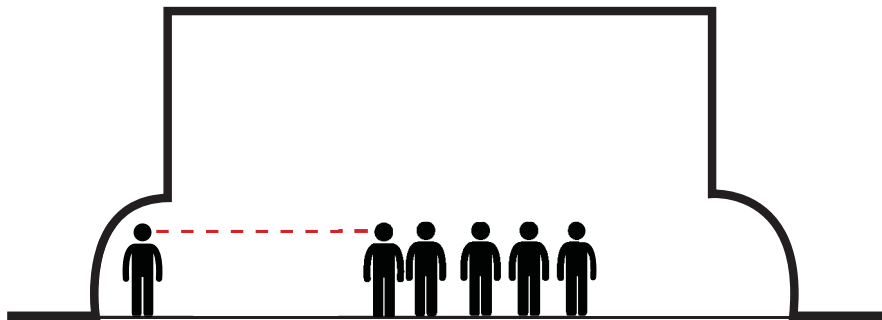
In the Park: Invisible Boundaries. 'Connecting to' and 'differentiating from' are two terms describing an invisible boundary. It connect can you to the confines of an open park or clarify the location of adjacent street and private properties. Using the technology of "theremin bollards,"²⁹ one can rid the landscape of chain link fences by using our neglected senses; such as hearing, in order to "carve a volume"³⁰ of safe space using just the ear.

²⁹ Dom Smith. *Tech Spotlight: Theremin Bollards*. April 1, 2014, from www.soundspheremag.com.

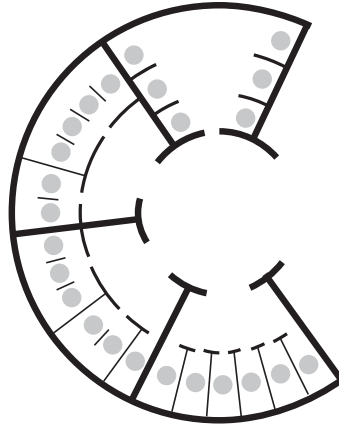
³⁰ Juhani Pallasmaa, *The Eyes of the Skin*, 50.



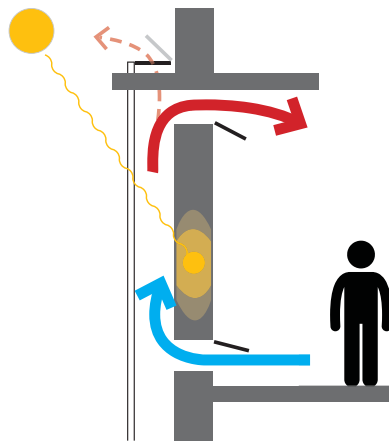
Circulation Space: Connecting Upper Levels to Exit. It is disrespectful to individuals in wheelchairs when they are forced to wait in a stairwell for emergency personnel to come in evacuate them. Alternative exits or even ramps connecting levels should be included in the design of inclusive buildings.



Open Space: Sensory Alcove. An alcove cut out of an open space can serve as a retreat for individuals with sensory integration disorders, who suffer from overstimulation of the senses when navigating open space. Such anxiety is often treated by finding a dark, quiet space - called a sensory room - in order to de-escalate feelings of anxiety. A sensory alcove is an alternative to a sensory room, allowing a person with a sensory disorder to stay connected to an open space. And while not in use for this purpose, anyone can use it.

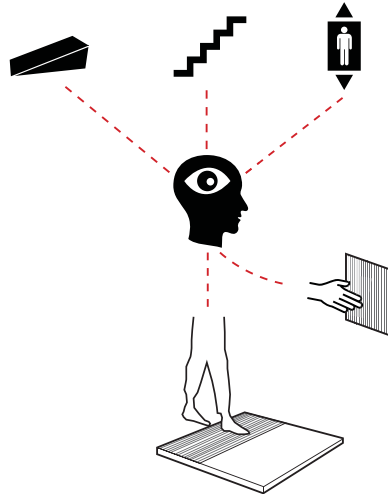


Learning Space: Seamless Transition from Individual to Group Space. This diagram depicts a sociopetal plan which, "by its arrangement and shape of rooms, encourages the development of stable human relationships. The growth of interpersonal relationships depends on being able to slip unobstrusively from one to another of three separate zones of sociability - complete privacy, the intimate group [and] the larger group."³¹



Technology: Connection Between Old and New Buildings Using a Trombe Wall. There is a lot of dormant thermal mass in old schools structures. Take advantage of the opportunity to slide an new glass wall just past the face of the old facade in order to (1) connect the old with the new and (2) capture the energy of the sun in order to provide passive heating and ventilation.

³¹ Kenneth Bayes, and Sandra Francklin, *Designing for the Handicapped*, 22.



Material: Imageability of Architectural Elements. The ordering of materials can help to define hierarchies of space that are legible to the touch. This legibility contributes to the ultimate "imageability" of circulatory paths if the design of these paths is "meaningful, distinct and not confusing."³²

ACCESSIBILITY

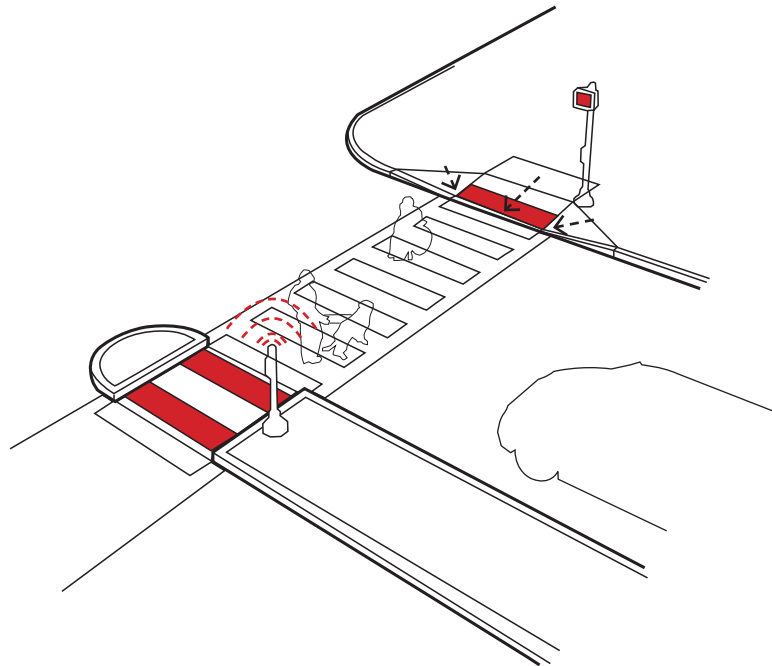
An inclusive environment is adapted to cater to the physical, mental and emotional needs of everyone who uses it, making it accessible to all.

With the understanding that disability is not simply black or white (see page 7), the point of inclusive design is to ensure that the appropriate support is available to the appropriate person at the appropriate time. In addition, it is important to remember not to indirectly label those with disabilities through accessible design. Everyone should be made to feel comfortable in the same space. This can be accomplished by allowing everyone to use the same space in the same way; for example, designing a ramp as part of the primary building circulation so that no one is singled out for using an accessible design element (see page 19,20).

³² Kevin Michael Reid, and Dalhousie University. School of Architecture, *Navigating with Memory : Visual Impairment and Haptic Sensibility in Architectural Design*. (Halifax, N.S.: Dalhousie University, 2005), 5, 6.

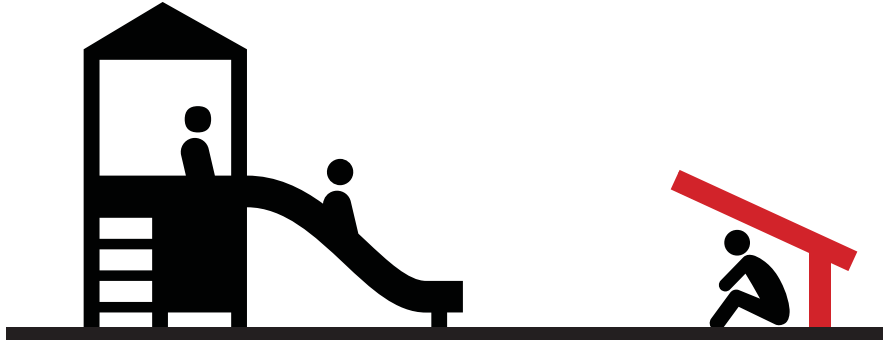


In the Community: Proximity to Community Health Services. When designing a school in which medical expertise is required, it is important to plan for therapists, psychologists, doctors, nurses and other paraprofessionals to travel back and forth between school and hospital, preferably by foot. Pedestrian travel has the potential to activate spaces between buildings and "promotes a healthy lifestyle."³³

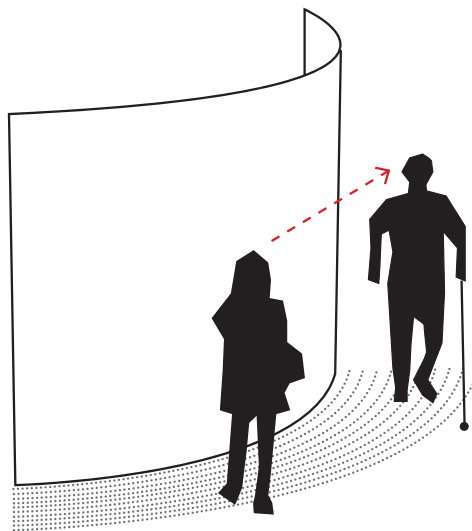


On the Street: Adapted Sidewalks. As one of the primary transition spaces between home, car / bus, and the school, the sidewalk must be adapted to meet the needs of those in wheelchairs, the hard of hearing, the visually impaired, as well as the autistic who benefit by the clarity and simplicity of accessible paths.

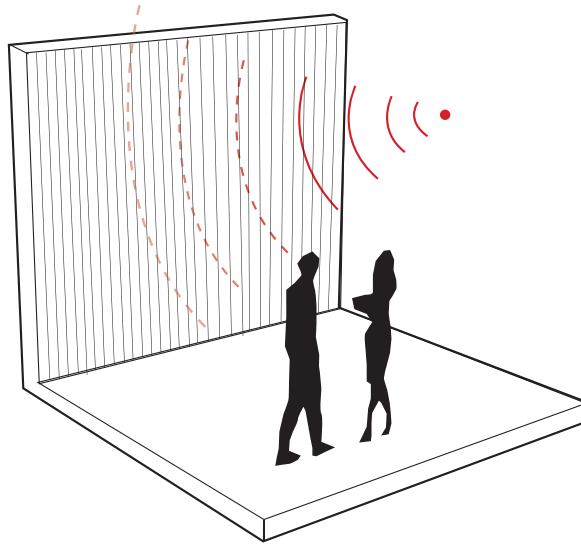
³³ Dalhousie University, *Campus Master Plan: Framework Plan, 2010*, from www.dal.ca, 13.



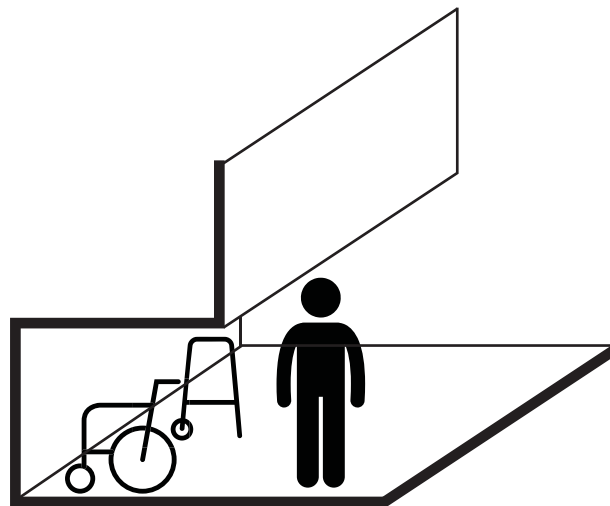
At the Park: Semi-Private Refuge. Some children with disabilities find recess to be over-stimulating and stressful. A grouping of large boulders, a small shelter or a few strategically planted bushes are simple design features that could provide a child with enough protection against visual and auditory distractions and make it enjoyable to be outside again.



Circulation Space: Transparent Corners. A curved wall at corner conditions is a simple way to increase transparency, allowing people to see, hear or feel people coming around the bend. Transparency is a visual concept to the sighted, but it can also be recognized as vibrations in the floor, clarity of the sound in the air or the ordering of texture and materials on the wall.

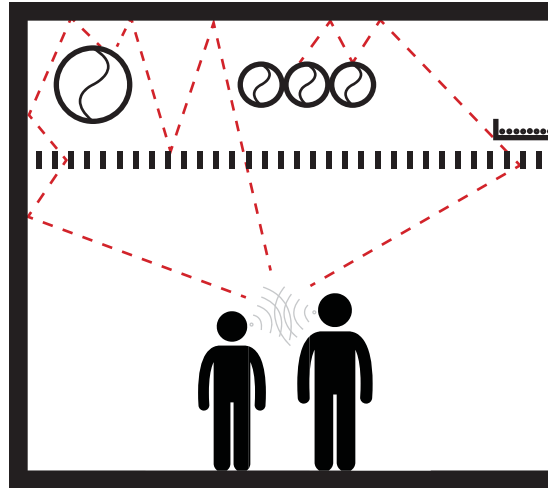


Open Space: Control Sound Reverberations. Silence is clarity for the visually impaired, so in order to design comfortable and informative spaces for them it is important to choose materials and systems that absorb excessive sound; while at the same time, allowing for certain sounds (an elevator for example) to "create high points of sensory awareness along [a] continuum of movement and transition."³⁴

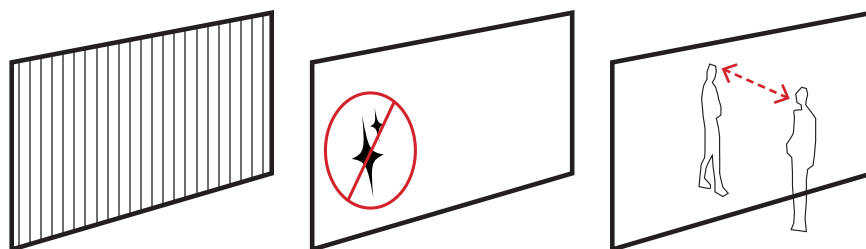


Learning Space: Storage for Special Equipment. Assistive Technology takes up a lot of space. Finding storage solutions that are efficient and out-of-sight allows for spaces to be more open, functional and visually calm.

³⁴ Kevin Michael Reid, and Dalhousie University. School of Architecture. *Navigating with Memory*, 30.



Technology: Acoustic Ceiling Plenum. Noise reverberation within in an open-ceiling room is not conducive to the emotional regulation of people with sensory integration disorders, nor is it to those trying to have a conversation. A simple solution to this, is to cover all the mechanical and electrical work with a slat ceiling. This does two things; first, it protects the mechanical and electrical work from view; and second, it creates a pocket of space (a plenum) that absorbs much of the noise emanating from below, making "very substantial improvements in speech intelligibility."³⁵



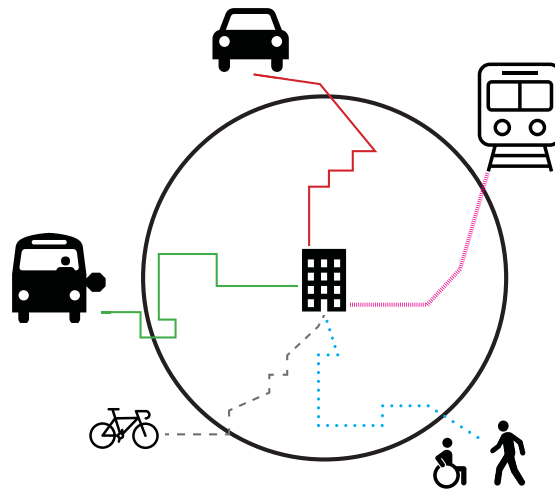
Material: Textured, Non-Reflective and Transparent. Textured materials are useful in designing architectural elements used in wayfinding. Non-Reflective or matte surfaces should be used and not reflective surfaces as these tend to be bothersome to those with certain sensory disorders.

³⁵ William J. Cavanaugh, Gregory C. Tocci, and Joseph A. Wilkes. *Architectural Acoustics: Principles and Practice*. (2nd ed. Hoboken, N.J.: John Wiley & Sons, 2010), 87.

FLEXIBILITY

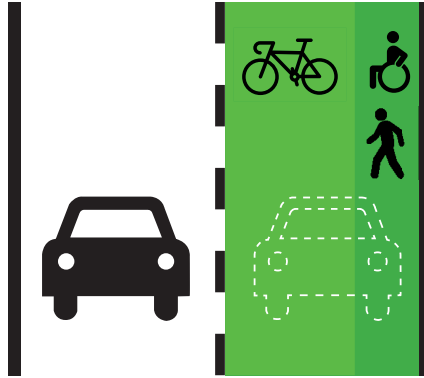
The ability to control one's environment in order to accommodate a timely need, whether that need occurs once a year or sporadically throughout each day is the crux of flexibility.

Flexibility is especially needed in the classroom, where students spend the majority of their time. Contemporary research on the subject reveals that the classroom is on the brink of becoming a "flexible stage,"³⁶ a clear departure from the stagnant array of desks and chairs in a box that most people are familiar with.

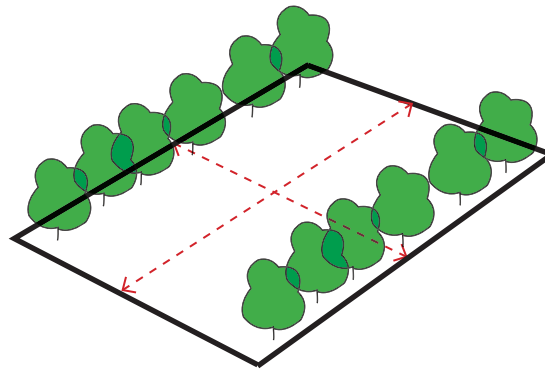


In the Community: Variety of Transportation Options. An important aspect of flexibility is variety; the more options, the better - particularly as it relates to movement within the community. A parent of a child with disabilities, for example, feels empowered with a sense of control when they know that if something goes awry, there is a plan B, a plan C and a plan D if necessary.

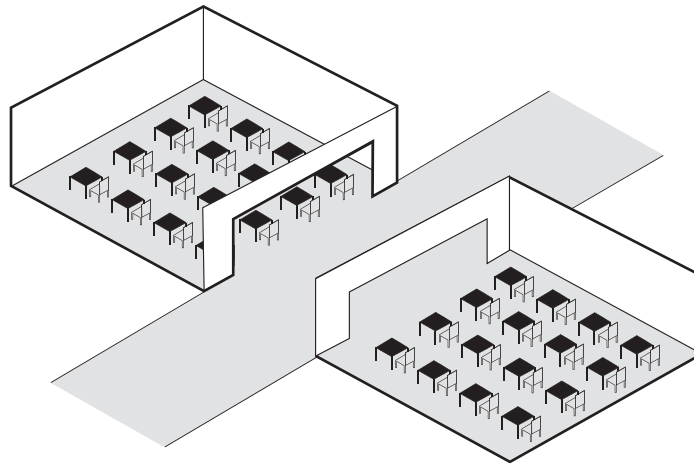
³⁶ Patrick Brosnan, *The Classroom: Stagnant Space or Flexible Stage*, August 16, 2013, from www.legat.com.



On the Street: Reclaimed Roads. Space is an important resource in the city. If there is ever opportunity to reclaim space from the automobile and give it to bikes and pedestrians, it should be considered. And through the use of materials such as turf block (half concrete, half turf), a reclaimed road can serve both vehicles and pedestrians depending on the circumstances. This re-allocation of resources mirrors that of the comic found on page 1 of this document.



At the Park: Unobstructed and Open. One of the reasons why Gorsebrook Park could be considered to be an inclusive space is because of its unprescriptive quality of space. While it is still important to have specific park elements like playgrounds, paths and recreation venues, it is equally important to have space that can become anything at any time, whether it be a picnic, a track meet, a soccer game, sun bathing, ... etc.



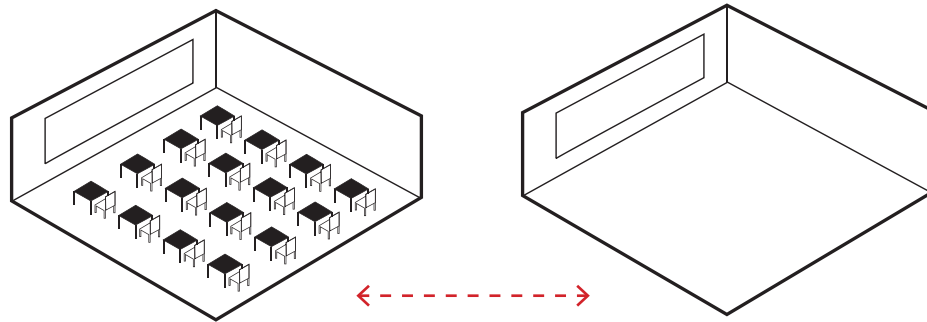
Circulation Space: Extension of Learning Space. The classroom is considered an the "old standard building block of a school" because learning is taking place everywhere within schools nowadays. In fact, classrooms, or circulation space for that matter, are no longer "owned by any particular teacher or function."³⁷



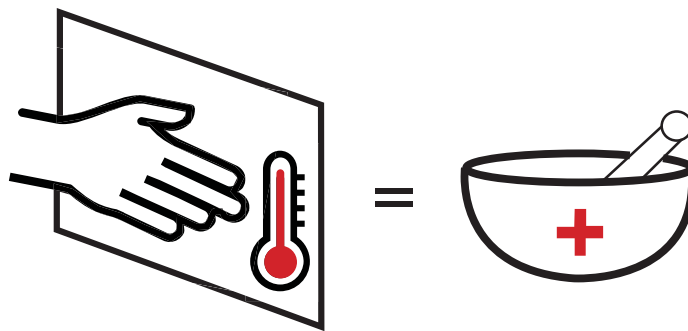
Open Space: Gross Motor Skills Development. It is well documented that "movement opens up learning pathways and communication skills in children with special needs."³⁸ Before venturing out into an open space, children with autism are often taught to exercise their gross motor skills in order to expel any tension in their bodies so that they will be able to bear with the bombardment of the senses while in open space.

37 Prakash Nair, Randall Fielding and Jeffery A Lackney, *The Language of School Design: Design Patterns for 21st Century Schools*. (Rev. ed. Minneapolis, Minn.: DesignShare, 2009), 33.

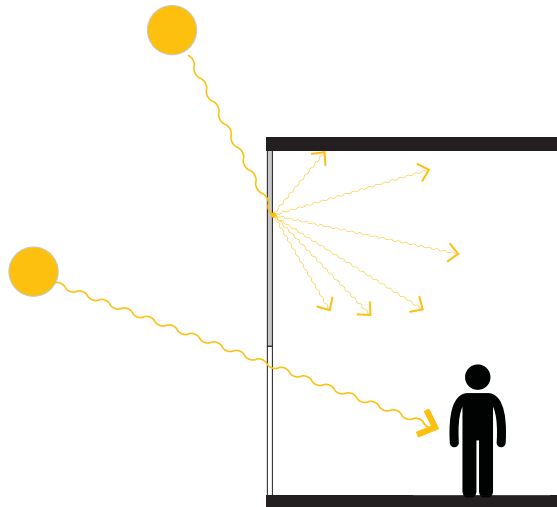
38 Keddy, (Special Education Advisor.)



Learning Space: Impermanent Furniture. Flexibility in the classroom is defined by an ability to configure the class according to the pedagogical needs of the teacher(s) and student(s). It is also important that a classroom be able to remove obstructions when a student in a wheelchair is part of the class. Adaptive, transformative, and flexible furniture is a good way of accomplishing flexibility in the classroom.



Technology: Thermally active surfaces as therapy. Different materials react to heat differently; some are thermally conductive while others are thermally benign. The juxtaposition of materials like concrete and steel - in terms of their ability to store heat - can be useful in sensory rooms or alcoves, perhaps even in circulation and wayfinding.



Material: Light diffusion above / transmission below. This principle is about harnessing natural light, which is "becoming a luxury"³⁹ in most learning environments. It was inspired by the window at Inglis Street Elementary School, featuring 8 inch glass blocks on the upper two thirds and vision glass on the bottom third. The primary purpose of the window was to let diffuse light enter the classroom and the secondary purpose was to allow for views.

³⁹ Derek Philips, *Daylighting: Natural Light in Architecture* (Amsterdam: Elsevier, Architectural Press, 2004), 5.

CHAPTER 4: CONCLUSION

Inclusion is only meaningful to a student with disabilities when he or she is ready to be included; and this takes preparation. Preparation can be divided into two broad categories: (1) appropriately trained human resources and (2) appropriately adapted learning environments.

Appropriately trained human resources are required to first assess where a student is developmentally in order to design an individualized education plan that will drive his or her learning. Second, human resources are used to teach and train students with disabilities in developing basic skills and understanding sufficient for meaningful inclusion in the public classroom - the goal ultimately being full inclusion if possible. And third, human resources provide physical, mental and social therapies for students as required throughout the day. When funding is not sufficient to maintain these human resources, inclusion does not work well. When the medical and academic communities are integrated into the very fabric of a school, there is greater chance for success.

Appropriately adapted learning environments augment the capabilities of students with disabilities by providing five general services. First, making each level accessible through the creative use of ramps, lifts and elevators. Second, providing moments of sensory retreat in the form sensory rooms, alcoves and corners. Third, ensuring transparency between spaces, around corners and between levels so as to increase the imageability of space. Fourth, designing long, narrow spaces meant to help autistic children regulate their emotions through pacing and walking. And fifth, wayfinding measures include tactile material patterns in the floors and walls in main circulation spaces.

The design of the collaborative training centre within Inglis Elementary School is the result of combining an introverted double loaded corridor with an extroverted core with circulation space surrounding. This idea stems from the theory of yin and yang, which is a representation of a whole spectrum - suitable metaphor for the bringing together of students across a whole spectrum, or continuum, of disability.

The programmatic and aesthetic goal was to create an interpenetrating harmony between two opposite, yet complimentary spatial ideas - open and closed space.

Working with the undulating landscape was crucial in developing the ramp that connected all three levels of the building.

The design principles of connectivity, accessibility and flexibility are the fruit of this thesis. They are woven in and out of every aspect of the design and are intended to be developed and built upon in future projects in the pursuit of inclusive space.

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