

# CHOREOGRAPHING SPACE

RESTORING HUMAN MOVEMENT IN WORKPLACE TYPOLOGIES



BY

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B.Arch Sci., Toronto, ON, 2008

A thesis presented to Ryerson University  
and the Yeates School of Graduate Studies  
in partial fulfillment of the requirements for the degree of  
Master of Architecture in the Program of Architectural Science

Toronto, Ontario, Canada, 2014

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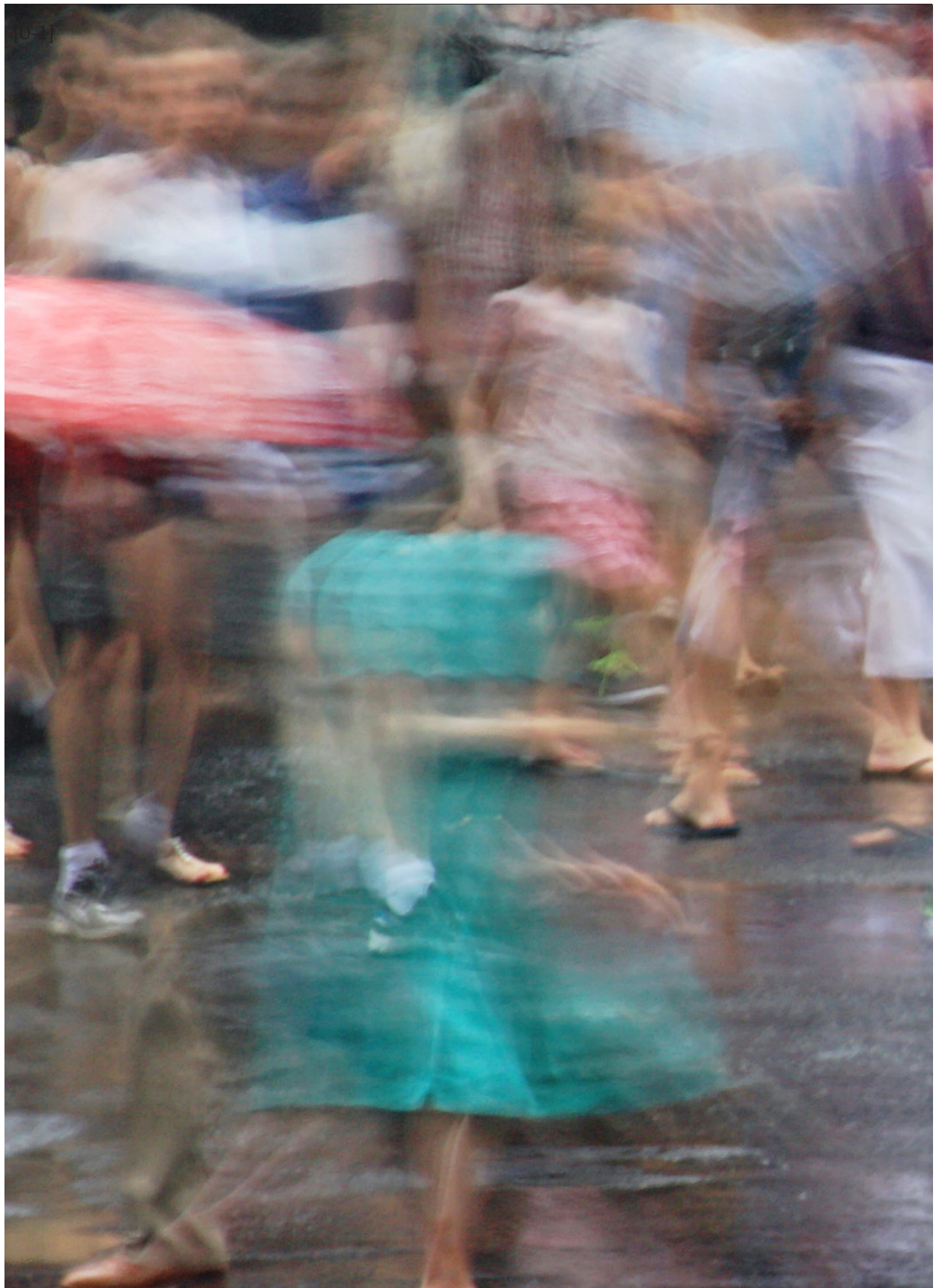
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# ABSTRACT

Choreographing Space:

Restoring Human Movement in Workplace Typologies

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Master of Architecture, Sept 2014

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The mechanics of the human body are becoming increasingly static. In the past, our economic milieu relied on human energy, but in today's workplace, we are predominantly inactive. We have engineered human activity out of our physical environments and created a dependence on mechanisms to move us. Consequently, these rapid changes in the environments we inhabit have resulted in a rapid increase in chronic diseases due to inactivity. Growing evidence suggests that today's chronic illnesses are a product of our modern lifestyle, and our lifestyle is a product of the spatial environments we inhabit. With this in mind, our spatial environment can be the cause and the solution to our sedentary modern condition- by radicalizing its shape it can re-shape the lives of its inhabitants. This thesis examines how human movement can be choreographed into the spatial design of the contemporary workplace environment in order to facilitate healthy lifestyles and sustainable future societies.

[0-2]



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# ACKNOWLEDGMENTS

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# INTRODUCTION

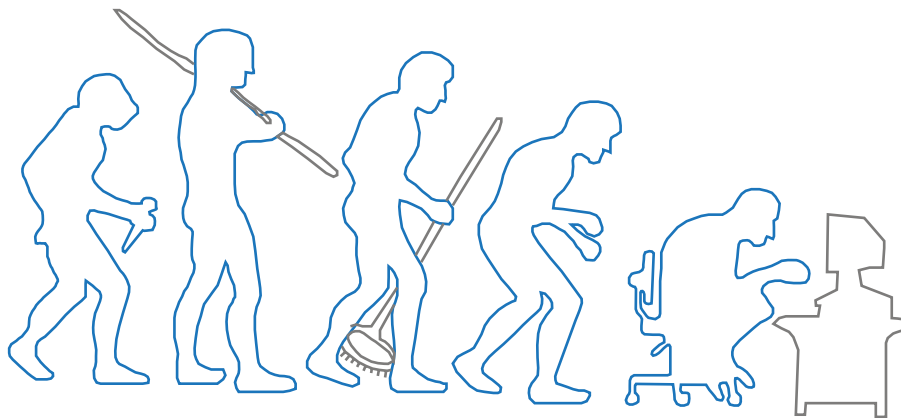
*“To movement, then, everything will be restored, and into movement everything will be resolved”*  
- Henri Bergson<sup>1</sup>

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In today’s contemporary society, mobility is at a record high. Yet, within this context, the human lifestyle is more sedentary, than ever before. Advancement in technology has allowed humans to progress from our origins as nomadic hunter-gatherers, where survival relied on regular movement, to settlers, who spent their days in rigorous physical activity through the maintenance of crops and livestock. In the last hundred years we have progressed from an agricultural society (growing); to a manufacturing society: (making); to today’s information-service society where the majority of people spend their day sitting behind a desk. Within this brief period of time, relative to our existence, our economic environment has radically shifted from one primary based on human energy through activity, to one primary based on human inactivity. Today the average Canadian adult spends 50 to 70 percent of their daily lives sitting, and roughly another 30 percent sleeping. (Picard, 2012)

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[1-1] The evolution of the sedentary man



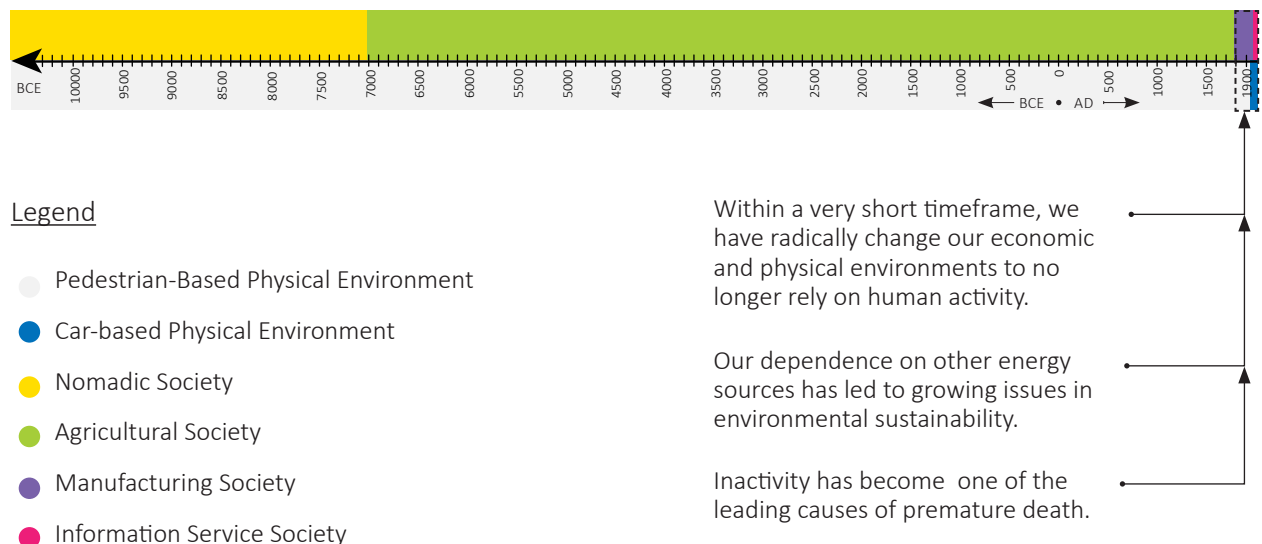
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1      Quote by Henri Bergson found in *Architectures of Time: toward a theory of the event in modernist Culture* by Stanford Kwinter (2001)

Changes within our economic milieu have played a role in removing physical movement from our daily work activities; however, we have also engineered physical activity out of our lives through the design of our physical environment. Coinciding with the changing nature of the modern workplace were the rapidly developing car-dependent, suburban neighbourhoods. With the rise of the suburban model, the choice to walk to school, shops, or services was no longer an option as the car became a reliable and necessary tool to traverse the Canadian post-war landscape. As a result, the streets no longer catered to human activity and interaction – the vibrant streets of the past were replaced with a depopulated modern condition.

Within buildings, the elevator has become the typical mode of transit between floors; so much so that stairs for human movement are only provided as emergency exits and are typically tucked away out of sight. Today we assume that it is common practice for mechanisms to move us; cars, elevators, escalators and motorized chairs, to name a few. In addition, everything we need has been designed so that it is at our fingertips, eliminating the need for even the smallest degree of human movement in

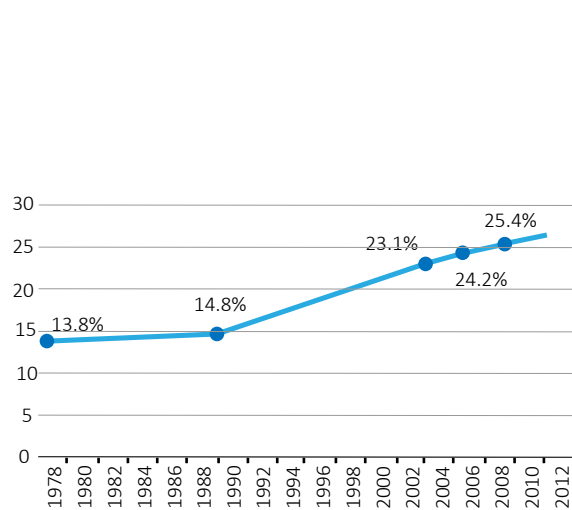
## [1-2] Critical changes in our economic and physical environments



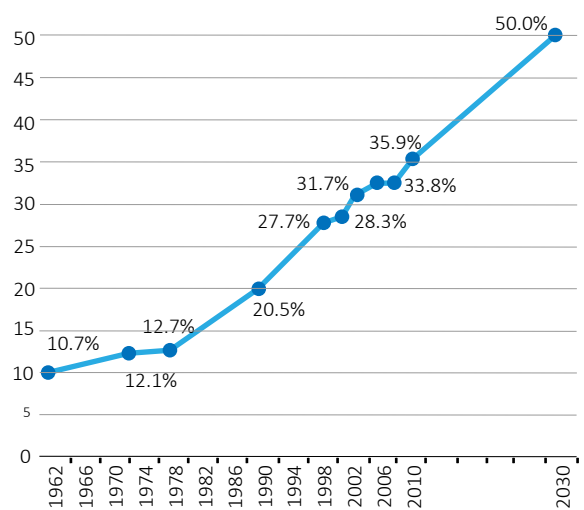
many typical day-to-day spaces. Inactivity and environmental sustainability can also be considered relative. “When you are inactive you are not expending your own physical energy and, as a result, you are utilizing some form of external energy: using cars instead of walking, or cycling... taking elevators and escalators rather than stairs; watching television rather than engaging in physical activity such as dance, or sports, or in the case of children, playing actively during recreation times.” (Lee & Nicoll, 2011) As we become increasingly sedentary, our reliance on other energy sources increases. Our crisis of human inactivity is strongly connected to our crisis in environmental sustainability.

What we have failed to realize is that like our nomadic ancestors, we also rely on movement for survival; “physical inactivity and unhealthy diet are second only to tobacco as the main causes of premature death.” (Active Design Guidelines, 2010, pg. 6) The systems within our body rely on regular movement to function properly and without it, parts of the system begin to slow, or shutdown. Researchers have found that “those who sit all day, had a: 147 percent increased risk of heart attack or stroke; 112

[1-3] Prevalence of obesity, Ages 18 years and older, Canadian and the United States



Obesity in Canada  
(Public Health Agency of Canada, 2011)



Obesity in The United States  
(Ogden, & Carroll, 2011)

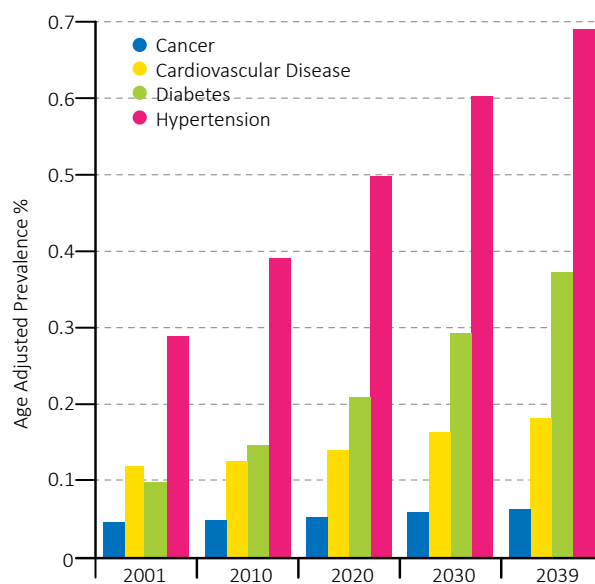
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percent increase in the risk of developing diabetes; 90 percent greater risk of dying from a cardiac event; and a 49 percent greater risk of premature mortality.” (Picard, 2010)

As the result of the critical shifts in our contemporary contexts, Canadians have become increasingly inactive with only 15 percent of the adult population meeting the current guidelines in physical activity. (Statistics Canada, 2011) As a result of inactivity – obesity is on the rise and in 2008, 37% of Canadian adults were measured as overweight, and 25% as obese. (Public Health Agency of Canada, n.d) U.S Statistics clearly show a correlation between the rapid increase in obesity and the radical changes made to our economic and physical environments in the mid-twentieth century (refer to table 1-3). Obesity, initiates a whole series of potential chronic health problems which are preventable if you are physically active, and by association, not overweight. The most significant chronic diseases which obesity is an agent for are cardiovascular disease- which is the leading cause of death globally- as well as adult-onset diabetes (also known as type two); a condition that was rarely seen in adults, is now on the

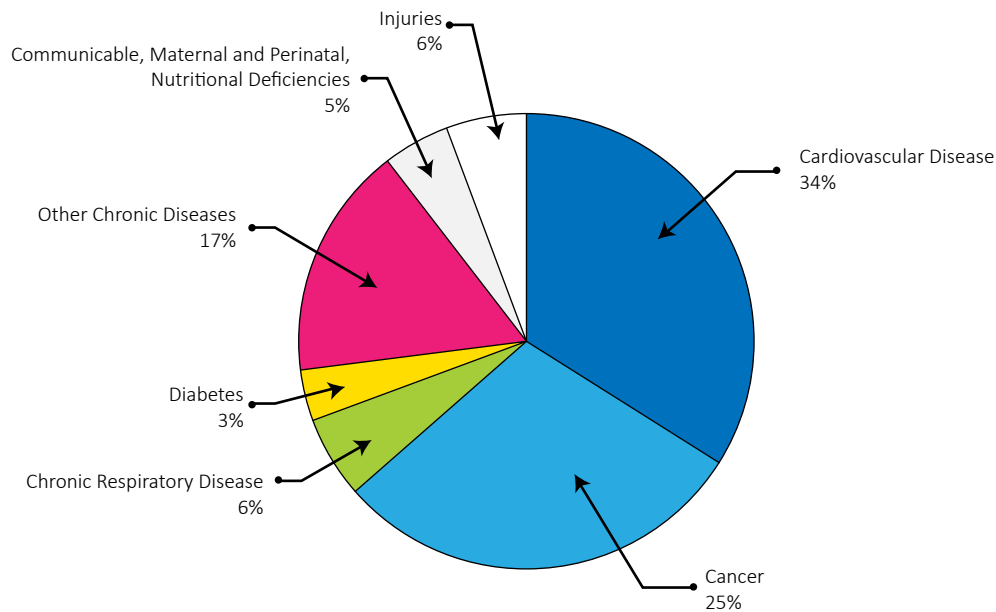
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[1-4] Chronic disease rates in Canada (Elmslie, n.d, pg 5)



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[1-5] Deaths in Canada, all ages, 2005 (World Health Organization, n.d)



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rise and being diagnosed in young adults, teenagers and children. Within Canada, chronic diseases have been increasing by 14% per year (Elmslie, n.d, pg 5) and account for 89% of all deaths. (World Health Organization, n.d)

Obesity does not only affect the individual but the greater society as a whole. Our economy is strained due to rising health care costs, disability costs and declining productivity and workforce availability. The estimated direct, indirect, and total health care costs of physical inactivity in Canada in 2009, were \$2.4 billion, \$4.3 billion, and \$6.8 billion, respectively. (Janssen, 2012). It is estimated that obesity cost the Canadian economy approximately \$4.6 billion in 2008, up \$735 million or about 19 percent from \$3.9 billion in 2000. (Public Health Agency of Canada, 2011). If these trends continue not only will individuals suffer, but so will the sustainability of our socio-economic system.

Unlike infectious diseases of the past, the chronic diseases that plague society today are a product of the modern lifestyle. According to the World Health Organization, the four major risk



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factors are tobacco use, alcohol misuse, unhealthy diets and physical inactivity; (Lee & Nicoll, 2011) all of which are lifestyle choices. Comparing lifestyles, “if our average hunter/gatherer forebears had the conditioning of today’s Olympic athlete; then the flip side is that the conditioning of the mean contemporary human being is that of a dead – or soon to be dead – hunter/gatherer.” (Lee & Nicoll, 2011)

Strong evidence supports the fact that the frequency and severity of many chronic diseases we face today are related to our modern lifestyle. In addition, strong evidence supports that our modern lifestyle is a product of the spatial environment we inhabit. When comparing the statistical data, the radical changes in the health of our society began to take shape after radical changes were made to our physical environments. “The environment in which we live and the environments that we design are key determinants of the health conditions and the health epidemics that [affect us].” (Lee & Nicoll, 2011)

Our current physical environment has played a critical role in fostering the current human condition by engineering human movement and activity out of urban planning and building design. That being said, it is also the built environment that can provide the solution, and radicalize its shape to reform the lives of its inhabitants. With this in mind;

- What is the architect’s role in the fight against chronic disease?
- Can architecture become the medium to choreograph human movement and activity back into our spatial environments, to shape our lifestyles, and to foster a healthy and sustainable future society?

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The ability of architecture to actively engage in social decision making and lifestyle behaviour is an emerging paradigm in architectural discourse. The growing concern for the inactive conditions of contemporary society is resulting in new initiatives in urban planning strategies. Today, making people more active at the urban scale has resulted in planning strategies that promote walkability and bike use as well as providing more public spaces for recreation. Unlike the car-dependent planning strategies of the previous generation, most major cities now have guidelines in place to create walkable, pedestrian friendly street frontages. “When, for example, you create a more walkable and enticing public realm – sidewalks in areas where people feel safe from crime and traffic-related issues, nice landscaping – these types of interventions produce increased physical activity through walking behaviors by 35-160 percent.” (Lee & Nicoll, 2011)

Despite the progress in creating healthy places within the city, the design community has spent little time investigating strategies to activate the human body with the scale of the building. With 90 percent of our time spent indoors (Health Canada, 2011), methods to keep people moving inside need to be initiated in order to make a significant impact in supporting healthy lifestyles. The New York City Departments of Design and Construction (DDC), Health and Mental Hygiene, Transportation (DOT), and City Planning, have been the first to tackle strategies that can engage the human body into activity through building design. Through the collaboration of many research professionals and agencies- The Active Design Guidelines (2010) were produced as the first publication to provide designers with spatial strategies rooted in evidence-based research that promotes human activity.

With the modern workplace being where we spend the greatest amount of time inactive, it has become a critical medium to investigate the possibilities of design to influence human movement. This thesis attempts to radicalize the traditional office

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typology and the associated spatial conditions which keep people static and sedentary, and instead facilitate a new spatial condition, where the human body can once again be nomadic. This thesis continues along the line of thought initiated by the emerging paradigm of active design and expands on these ideas to develop strategies for choreographing the human body in space.

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# SPATIAL AGENCY

*The interrelationships amongst things in space, as well as the effects that are produced through such dynamic interactions, are becoming of greater significance for intervening in urban landscapes than the solely compositional arrangement of objects and surfaces.*

– James Corner (1999)

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Throughout history, science has progressed towards an increasingly accurate definition of space. Likewise, the discipline of architecture, has evolved based on the changing definition and characteristics of our spatial milieu. In turn, our understanding of the spatial context we inhabit manifests itself into the forms of its architectural paradigm. Siegfried Gideon (1941) describes this condition as *space conception*. For example, the invention of the perspective drawing provided a technique to accurately mimic how space appears based on the optics of the human eye. This invention allowed a new paradigm to emerge, which no longer worked with flat surfaces but allowed architects to penetrate space in three dimensions, creating visual connections or vistas through exterior and interior space. Architecture found a means to work more closely with its spatial milieu.

The foundation of architectural theory and practice is connected to a strong history in understanding space relative to the classical definition by Isaac Newton. In Newton's terms, space was considered as a backdrop or an independent object with an absolute, fixed reference point within which other objects or phenomena existed. Space was considered as a static object, a stage set on which life's drama played out; space, body and time were independent of each other. Emerging from this understanding of space, architecture engaged with space through the production of static architectural objects; prioritizing the visual, through form, representation, and signification.

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In the early 20th century, Albert Einstein's theories of relativity made the Newtonian definition of static space obsolete and facilitated a line of flight towards a new *space conception* for our modern context. Einstein's theory illustrated that space and time are not separate elements, but are relative and indivisible; *Space-Time*. "Space in modern physics is conceived of as relative to a moving point of reference, not as an absolute and static entity of the baroque system of Newton." (Gideon, 1941, pg. 436) As a result, our understanding of space has evolved from two dimensions, to three dimensions, and now a new dimension has been added: time. Through its association with time, space can no longer be defined as static; instead, space is in a continuous state of movement.

In his book, *Space, Time and Architecture*, Gideon (1941) tries to describe how Einstein's new theory of relativity, and the introduction of space-time is changing the discipline of architecture. Rather than truly bringing the dimension of time into architectural practice, the examples Gideon provides, simply objectify time and movement by representing them through static, signifying forms. The combination of space and time into one entity resulted in the introduction of movement into architecture. However, the introduction of movement into a discipline that has conceived space as static and rigid for so many centuries led to the objectification of movement into frozen immobilized forms. Space, the medium for architecture, became broader in its variables, but the discipline of architecture chose to engage only with space in ways which were tangible, ignoring an entirely new realm of potentials. Despite the significant changes in spatial form throughout the history of architecture, our discipline is still deeply rooted in spatial techniques from the enlightenment and the classical definition of space that is static as proposed by Newton.

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[2-1] The objectification of time into static representations of movement



(Top Left: Alvar Aalto, MIT Baker House Dormitory, 1946; Right: Burka Architects, The Marilyn Monroe Towers, 2012; Bottom Left: Frank Gehry, Walt Disney concert Hall, 2003)

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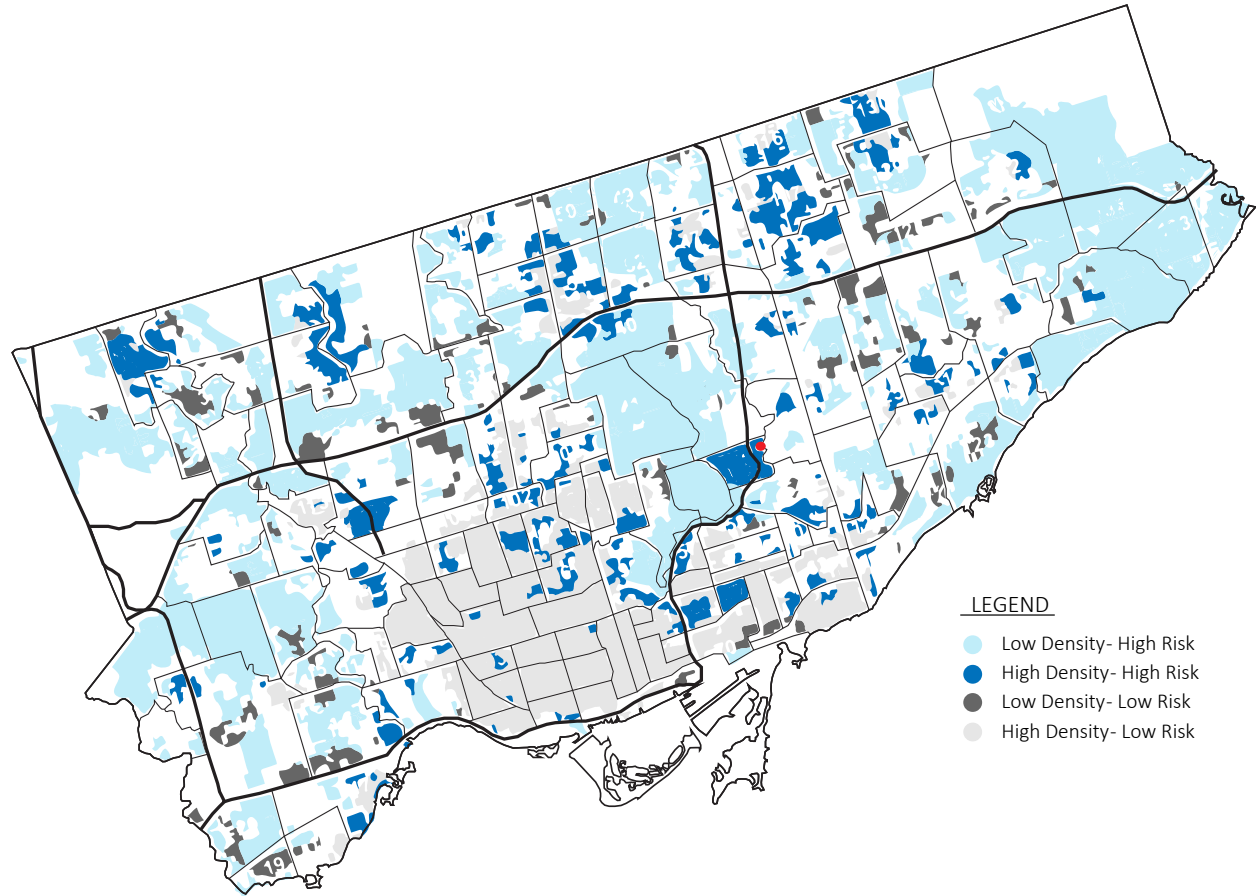
Contradictory to the foundation of architectural practice, space is not a backdrop for the events that occur within it, space is an actor and has an effect on the many networks that flow through it. Although it took time to materialize into architectural thought, the introduction of time into space, resulted in a paradigm shift from the objectification of (static) space to the performance of (temporal) space.

Before the twentieth century, new developments happened slower and incrementally, and therefore our physical environment did not undergo radical change to the same extent it did after the Second World War. The invention of the car and the rapid development associated with the industrial revolution resulted in the rapid growth of car-oriented suburban cities that grew so quickly we could not comprehend their effects on society.



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[2-2] The relationship between health and neighbourhood design in Toronto communities



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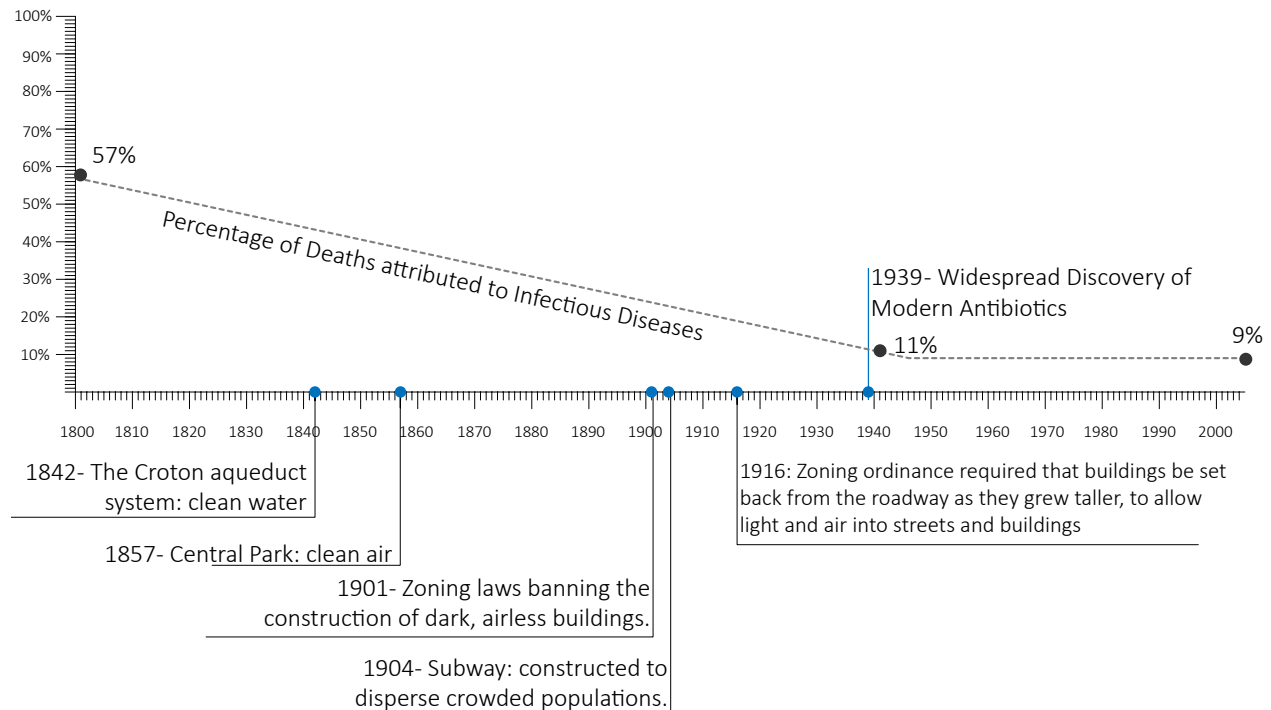
*“The environment in which we live and the environments that we design are key determinants of the health conditions and the health epidemics that [affect us].”*  
(Lee & Nicoll, 2011)

However, today we have growing evidence that our modern lifestyle, and the chronic diseases affecting us, are both the product of our physical environments. A study by St. Michael’s Hospital focuses on how Toronto’s neighbourhoods are determinants of health. (CBC News, 2014) The study found that there was a relationship between the quality of health among inhabitants and the design of the physical environment they inhabit. In illustration 2-2, the neighbourhoods in blue are considered areas where inhabitants are at a greater risk due to the physical design of their environment.

Although the physical environment is considered the cause of our bleak modern lifestyle and associated chronic health problems, it can also be the solution- by radicalizing its shape it

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### [2-3] Urban design interventions for controlling infectious disease



can reshape the lives of its inhabitants. Historical precedents show that changes in our physical environment can have a positive effect on the health of society's inhabitants. For example, in the late 19th, and early 20th century, environmental design strategies were used to combat the infectious diseases affecting society at that time. In 1940, infectious diseases only counted for 11% of mortality rates as oppose to 60% in 1880. (Active Design Guidelines, 2010, pg. 13) Since the discovery of almost all modern antibiotics were not widespread until 1939, (Lee & Nicoll, 2011) this fact supports the idea that the design interventions, within the environment, played the greatest role in the control of these infectious epidemics.

Due to our changing space conception, a new architectural paradigm has emerged, one that no longer focuses on the static elements of architecture- such as signification, representation and form, but instead, the consequences of architecture, and how it contributes to the systems and processes of human formation and occupancy. Unlike the architectural paradigm before us, that

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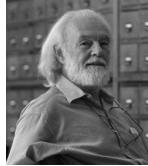
saw space as a backdrop to the events that occur within it, space today is considered to possess agency and is part of a complex field of relations with other human and non-human, visible and invisible phenomena. Using design to engage within the social and environmental process of our contemporary context has been coined by Jeremy Till as *Spatial Agency* (Awan, Schneider, & Till, 2011). Unlike mainstream practices, Spatial Agency is a new paradigm for which architects can operate but this does not mean we need to abandon the theoretical foundation from which the discipline has evolved. Instead, we can radically expand our scope and use the skills that are unique to our profession to “make a difference to a pre-existing state of affairs or course of events.” (Awan, Schneider, & Till, 2011)

Bruno Latour, James Corner, Jeremy Till, David Harvey and Stanford Kwinter have all been influential sources who share a greater interest in what architecture can do as oppose to only evaluating it for what it looks like. Motivated by these ideas, I approached all decisions relating to my thesis project by first asking the question of how this design decision could be an agent for transformation to promote human movement at all scales of the project. As a result, strategies were developed in both the site selection, and the site planning process, in order to prioritize the performative goals of fostering human movement, over decisions solely based on visual form and aesthetics.



*"My viewpoint privileges actions and effects over representation and meaning; the concern is for how things work and what they do."*

-James Corner (1999)



*"Projecting new urban and regional futures must derive less from utopia of form and more from a utopia of process – how things work, interact and inter-relate in space and time. Thus the emphasis shifts from the static object-space to the space-time of relational systems"*

-David Harvey (1996) paraphrased (Corner, 1999)



*Architecture would then be seen in its full proximity and intimacy with the systems of forces that give shape and rhythm to the everyday life of the body. Thus the object-be it a building, a site, or an entire urban matrix...would be defined now not by how it appears, but rather by practices: those it partakes of and those that take place within it."*

-Stanford Kwinter (2001)



*Attention is shifted from architecture as a matter of fact, to architecture as a matter of concern. As matters of fact, buildings can be subject to rules and methods, and they can be treated as things on their own terms. As matters of concern, they enter into socially embedded networks, in which the consequences of architecture are much more significant than the objects of architecture.*

-Bruno Latour (2005) paraphrased (Awan, Schneider, & Till, 2011)



*"If one accepts that the social relations are embedded in the spatial relations, than the architect has an important role to play in this reconfiguration."*

– Jeremy Till (2009)

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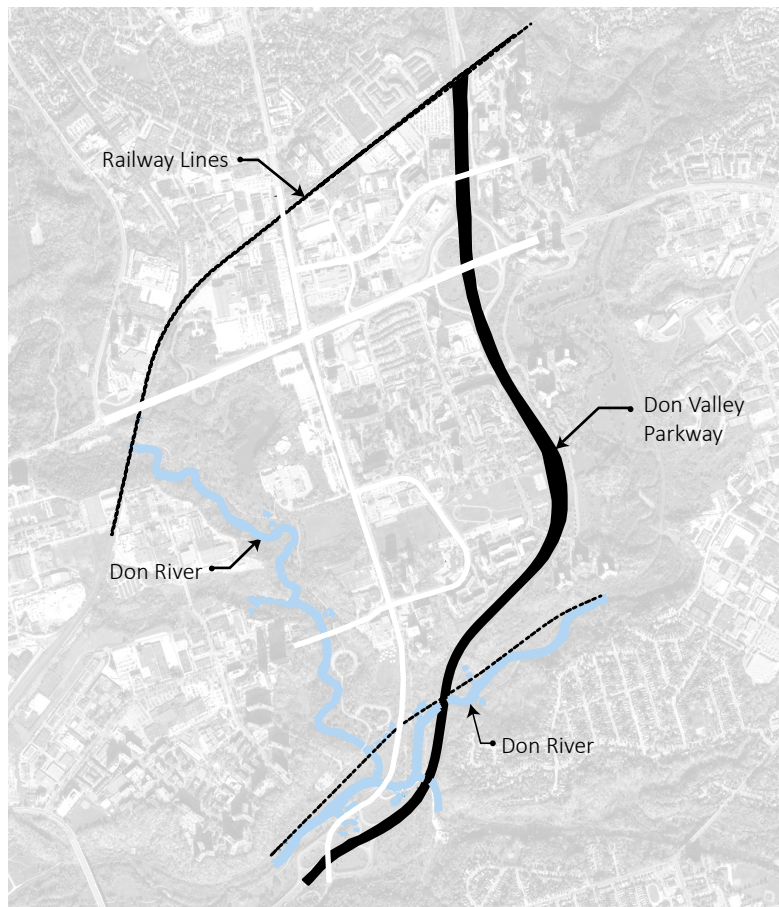
## SITE SELECTION STRATEGIES

### 1. Locate the project in a community in need of transformation

If this project is to become an agent for change, where it is sited becomes an important characteristic in order to foster a transformation within a neighbourhood in need. Flemington Park was selected as the project site because it was one of the Toronto neighbourhoods where residents are at a greater risk of being inactive, and, have a higher risk of chronic disease due to the design of the physical environment. Looking at the site in its current condition, it is completely isolated and disconnected from surrounding networks. The Don Valley Parkway is a barrier dividing it from the east; the Don River and Ravine creates a barrier to the west and the south, and the rail lines are the barrier to the north.

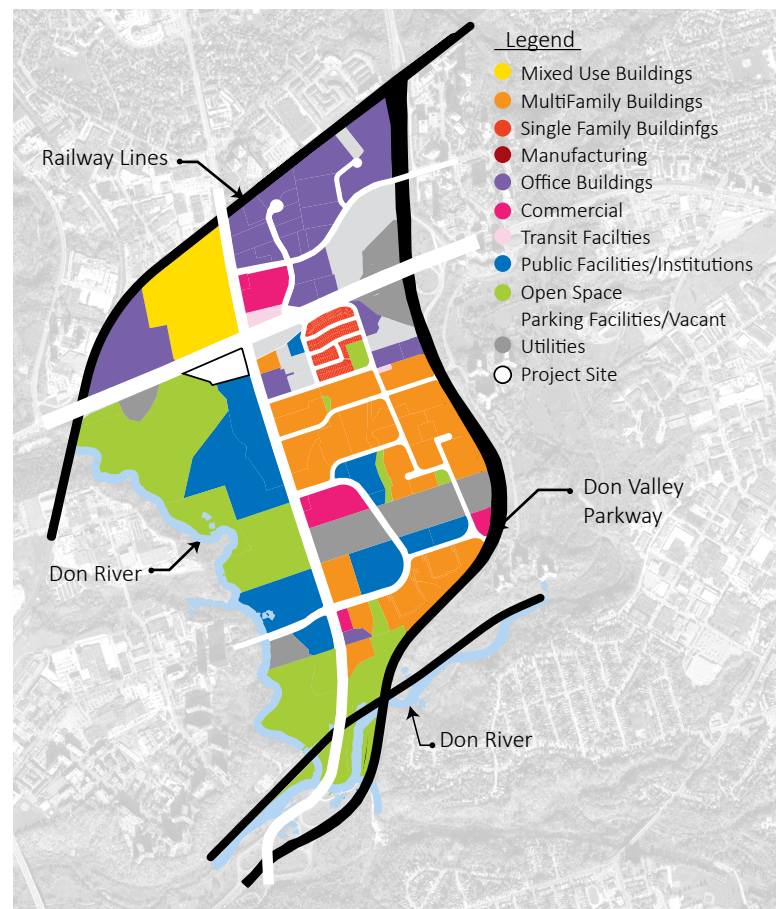
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[2-5] Disconnected:  
Context Diagram



In turn, this neighbourhood becomes an isolated island, with very few connections in and out. Making conditions even worse, the diversity of use within the neighbourhood is very low, rendering many daily amenities only accessible by car. Referring to illustration 2-6, the north part of the neighbourhood is a business center, comprising of suburban office park typologies; the south is mostly residential. The only retail amenities include two gas stations, a superstore, a daycare, two fast food restaurants and a strip mall. Lastly, the street condition does not support walkability. Buildings are set back from the street, with parking lots lining the sidewalks, weakening the pedestrian experience (refer to illustration 2-7). As a result of these environmental conditions, the neighbourhood struggles economically as the streets are void of human movement and activity- populated primarily by the steady flow of cars that move through it.

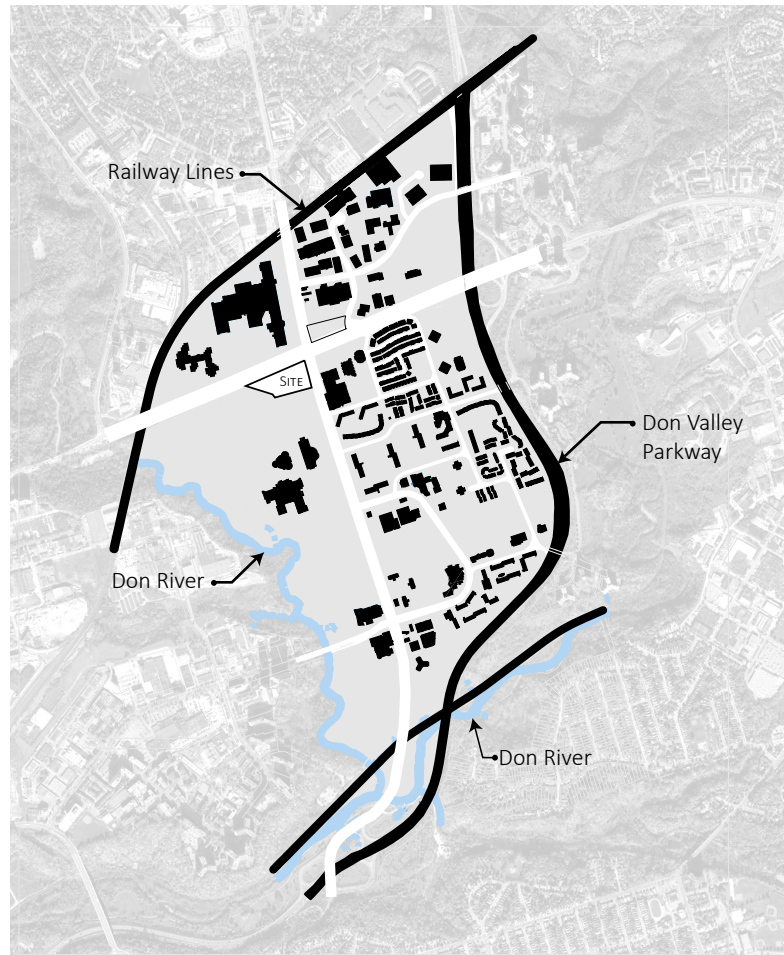
[2-6] Limited Amenities:  
Context Diagram





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[2-7] Unfriendly Pedestrian  
Experience: Context Diagram



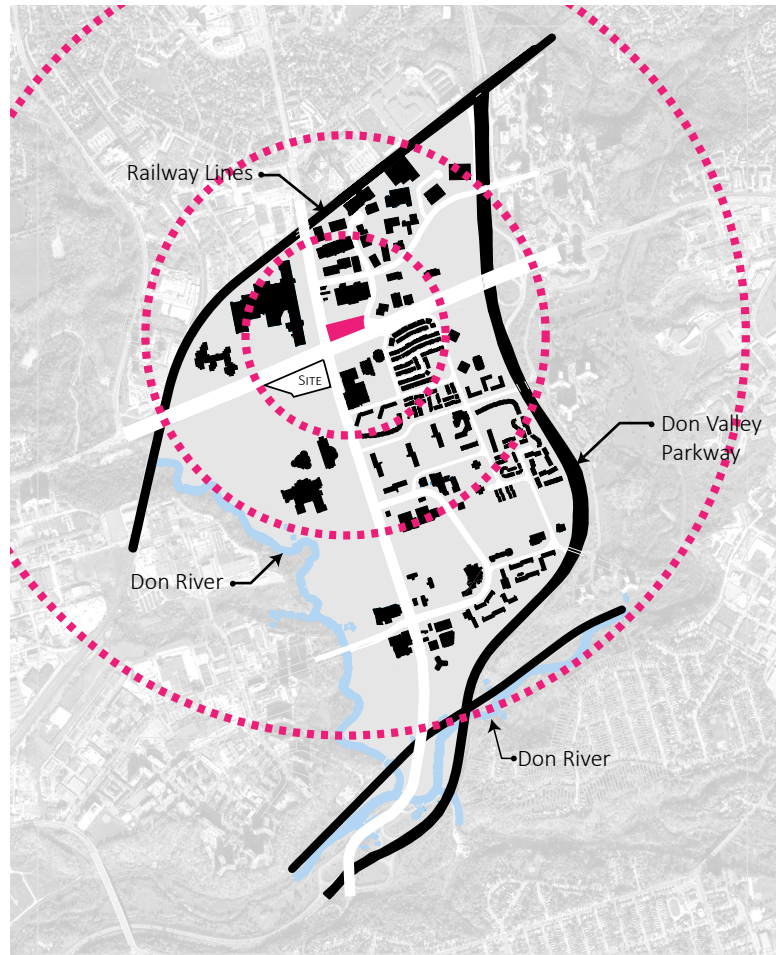
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2. Locate the project close to transit nodes

Currently, this site lacks a connection to the Toronto transit system, but with the introduction of the Eglinton Light-Rail Transit (LRT) line, this site has the potential to become an emerging densified hub. Rather than locating offices in suburban settings where they can only be accessed by car, offices located adjacent to transit hubs increase human activity as transit use typically involves walking to, or from, a bus or subway stop. The addition of the transit node will also promote activity among the local communities, giving residents the option to leave their cars at home. Most of Flemington Park is within a 5 to 15 minute walk to the proposed LRT transit station. Refer to illustration 2-8.

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[2-8] Transit Nodes:  
Context Diagram



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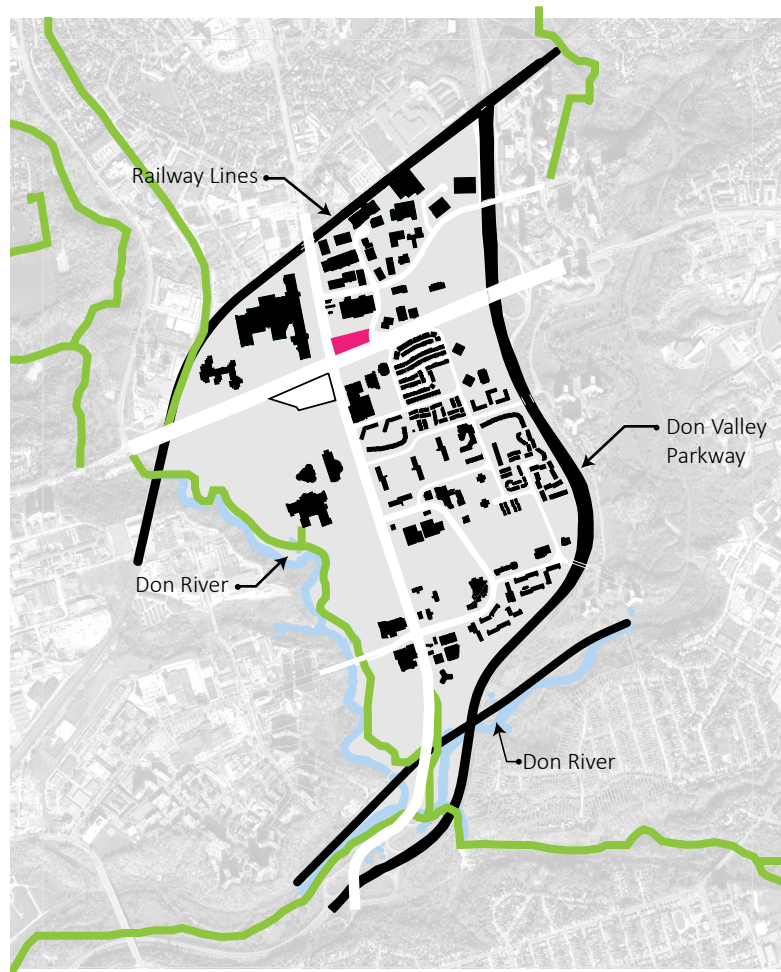
3. Locate the project close to designated bike trails

By locating office buildings along existing (or proposed) cycling networks, it offers the possibility to the building users to ride their bikes to work. “Cycling even just 15 minutes or 2.5 miles-less than the average commuting distance- twice a day is enough to burn the equivalent of more than 10 pounds annually”. (Active Design Guidelines, 2010, pg. 17) Flemington Park is surrounded by an existing network of designated bikes paths. In addition, the very wide, multi-lane streets could easily be converted into lanes that segregate cars from cyclists in the future as the local dependency on cars decreases.



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[2-9] Bike Trails: Context  
Diagram



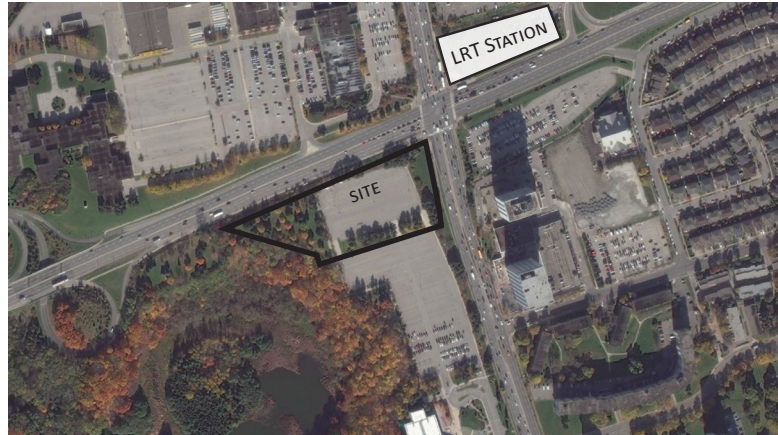
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## SITE PLANNING STRATEGIES.

The project site is the north parking lot of the Ontario science center, at the corner of Eglinton and Don Mills. The project footprint is within the footprint of the existing parking lot in order to preserve the trees to the west and south of the site. Although the focus is creating movement within the workplace, the site has the potential to be an agent for lifestyle transformation within the local community. “The neighbourhoods that are marginalized in our city...have been victimized of civic neglect...where people have stopped or minimized moving around. As you get people moving around, the opportunity to increase economic activity of all kinds goes up.” (Zardini, 2012). The following strategies in site planning aim to promote and provide opportunities for human movement at the local urban scale.

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[2-10] Existing Site  
Aerial Photo



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1. Increase the Diversity of land use in local neighbourhoods

Flemington Park lacks diversity in its land use and amenities. To the north, most of the sites are occupied by stand-alone office-park buildings. To the south, it is predominantly residential with the exception of a few retail strip malls and fast food restaurants. As a result, residents who live within this neighbourhood rely on the car to travel to important amenities and destinations. In a research study on land use planning, it was found that each quartile increase of land-use mix was associated with a 12 percent reduction in the likelihood of obesity. (Frank, 2004). In order to provide amenities on the project site, the office component of the building has been elevated to allow for retail

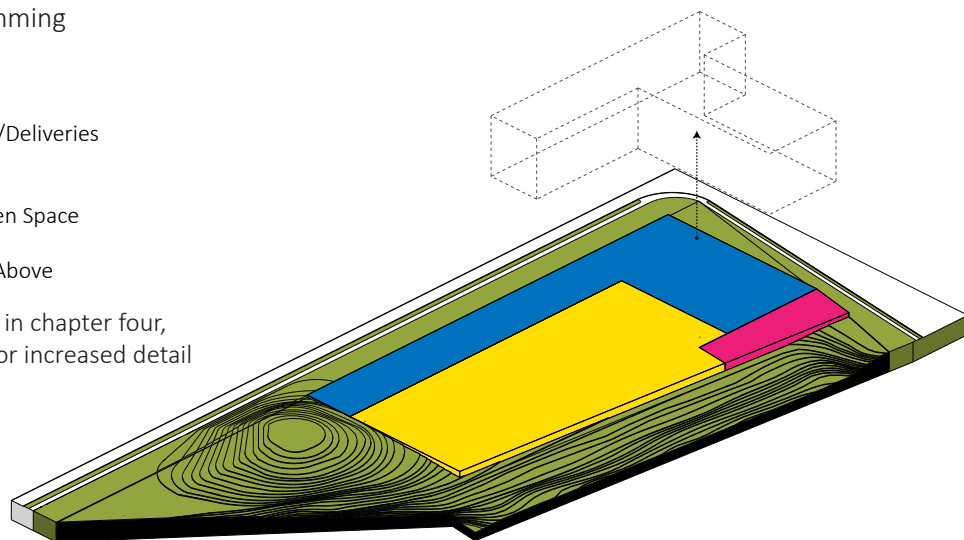
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[2-11] Site Programming

Legend

- Parking Garage
- Building Services/Deliveries
- Office Lobby
- Retail
- Recreation / Green Space
- Movement Paths
- Office Structure Above

\* refer to floor plans in chapter four,  
*Movement Agents*, for increased detail  
and clarity



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amenities below. With the introduction of the Eglington LRT stop, it is the assumption that the neighbourhood will intensify in density and the vacant space surrounding the site would in time be populated with a higher density of land uses.

## 2. Provide recreation spaces for both employees and the public to enjoy

Numerous studies have linked the proximity of parks and other recreational facilities to higher levels of physical activity among both youth and adults. (Potwarka, Kaczynski, & Flack, 2008) With this in mind, a recreational green is provided above the parking in order to create an active space which can accommodate all kinds of recreational activities. Utilizing the existing topography, the natural landscape to the west becomes malleable and wraps over two stacked levels of parking. This space provides the community with a social and recreational landmark which can take on many uses. For example, it could be a place to play sports, exercise with friends, shop at an outdoor farmers market, ice skate throughout the winter or even a space for festivals and special events.

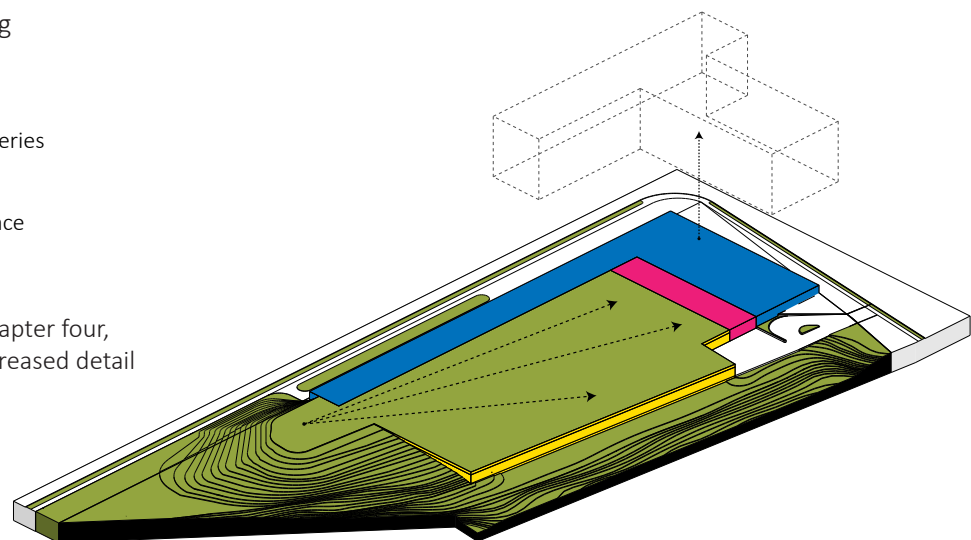
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### [2-12] Site Programming

#### Legend

- Parking Garage
- Building Services/Deliveries
- Office Lobby
- Retail
- Recreation / Green Space
- Movement Paths
- Office Structure Above

\* refer to floor plans in chapter four,  
*Movement Agents*, for increased detail  
and clarity



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### 3. Creating inviting, pedestrian friendly streetscapes and pathways

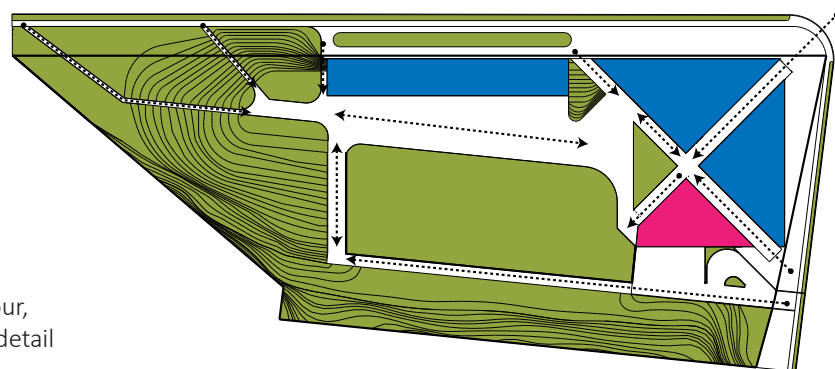
In recent studies, higher street connectivity—as measured by small block sizes, has been associated with increased pedestrianism. (Hess, Moudon, Snyder, & Stanilov, 1999). As a result, the building massing was cut into smaller block sizes based on where pedestrians enter the site. These main pedestrian entry points provide viewpoints into the public green. By creating attractive views from these paths, it encourages occupants to move through them to investigate what lies further ahead on the path. This tactic is used to bring guests to the site through the podium of the building and into the active green space above. These paths also provide shortcuts through the site, and allow pedestrians, both building users and those passing by, to choose their own path. Similar to the building elevations which face the street, the faces of the building that address the internal pedestrian pathways also provide store frontage to foster interest and activity. Within the central intersection of the internal walkways is an elevator vestibule to access the office lobby above. However, the intent of this thesis is to promote human movement, and the absence of a path for human travel eliminates the possibility of increased physical activity. As a result, the urban green space stretches over these internal pedestrian pathways to provide a human path of travel to meet the office lobby above. The podium of the building becomes a hybrid of program, landscape, and circulation.

---

#### [2-13] Site Circulation

##### Legend

- Parking Garage
- Building Services/Deliveries
- Office Lobby
- Retail
- Recreation / Green Space
- Movement Paths
- Office Structure Above



\* refer to floor plans in chapter four, *Movement Agents*, for increased detail and clarity

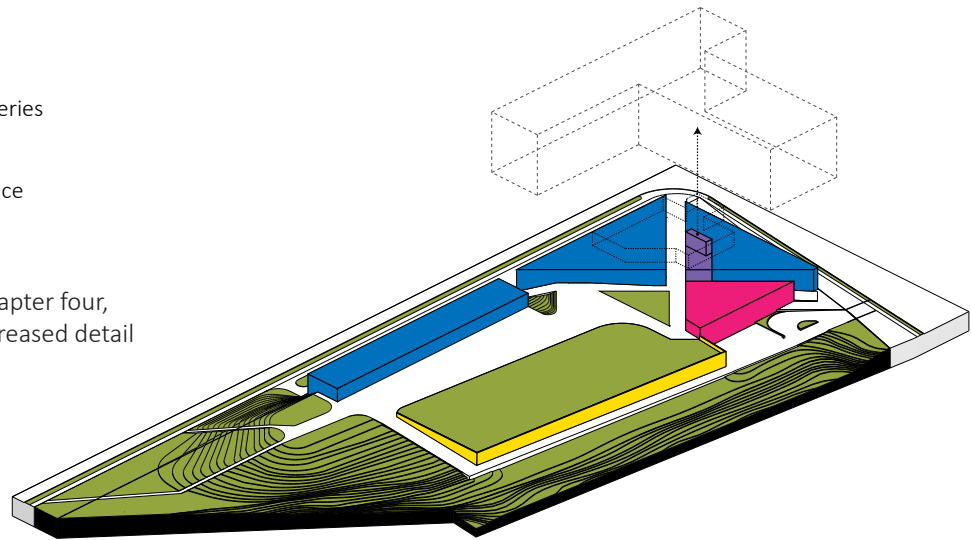
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## [2-14] Site Circulation

### Legend

- Parking Garage
- Building Services/Deliveries
- Office Lobby
- Retail
- Recreation / Green Space
- Movement Paths
- Office Structure Above

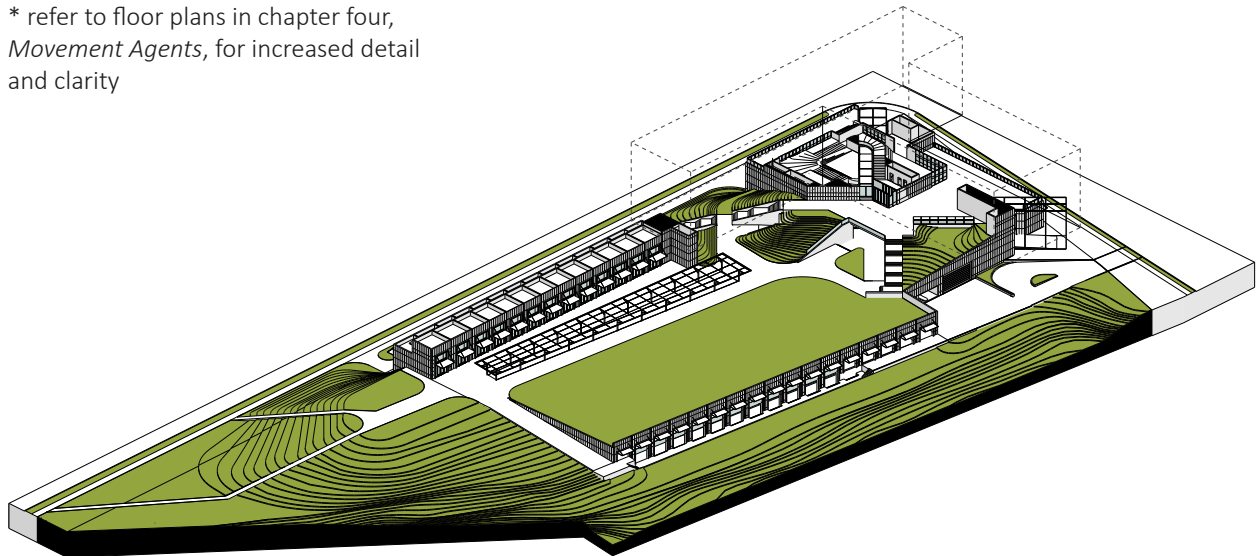
\* refer to floor plans in chapter four,  
*Movement Agents*, for increased detail  
and clarity



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## [2-15] Site and Podium design

\* refer to floor plans in chapter four,  
*Movement Agents*, for increased detail  
and clarity



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There are many detailed studies and guidelines now available to make the pedestrian realm more inviting. A pedestrian's experience is more enjoyable when they have things to look at and activity taking place around them. By framing the sidewalks with retail frontage, it provides transparency to look at the activity happening inside while also facilitating a greater degree of activity on the exterior. Creating facades that reflect human scale also promotes walkability. As a result, the building steps back in height after the second storey to limit the vertical height and massing of the building. The building mass reflects human scale horizontally by breaking up the retail storefront into smaller bays.

#### 4. Provide Public amenities to support recreation and walking.

In order to make this space enjoyable for the broader community, seating, drinking fountains and restrooms are important amenities for visitors or for those people who might be walking by. Research suggests that these amenities' support increased frequency and duration of walking. (Active Design Guidelines, 2010, pg. 40) People will be more inclined to walk longer distance if they know they have washroom facilities and drinking fountains available for use along the way.



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[2-16] Rendering: Site entry path from street intersection (Don Mills & Eglington)



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[2-17] Rendering: site entry path from Eglington Avenue



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# SOCIAL-SPATIAL TRANSFORMATIONS

*“If one accepts that the social relations are embedded in the spatial relations, than the architect has an important role to play in this reconfiguration.” – Jeremy Till (2009)*

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The human body and its spatial environment share an intensive relationship with one another. In his essay *Violence and Architecture*, Bernhard Tschumi (1994) describes this relationship using the metaphor of violence; bodies violate space and space violates bodies. In the context of movement, all space is violated by the flows of human movement that shape the forms of architectural objects. Space also violates bodies. The shape of space facilitates the behaviour of how we move and act, consciously or subconsciously. To summarize Tschumi’s argument, architecture shapes the way we move and the way we move shapes architecture. Architecture as a discipline works within this intense relationship between body and space.

Looking at the relationship on a broader scale, social relationships affect spatial relationships, and spatial relationships affect social relationships. It has become clear that the spatial conditions of the traditional office environment have played a

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[3-1] Architecture shapes the way we move, and the way we move shapes architecture



*Bodies violate space:* Human movement acts as a vehicle to influence architectural form



*Space violates bodies:* Architectural form is a vehicle to influence human movement

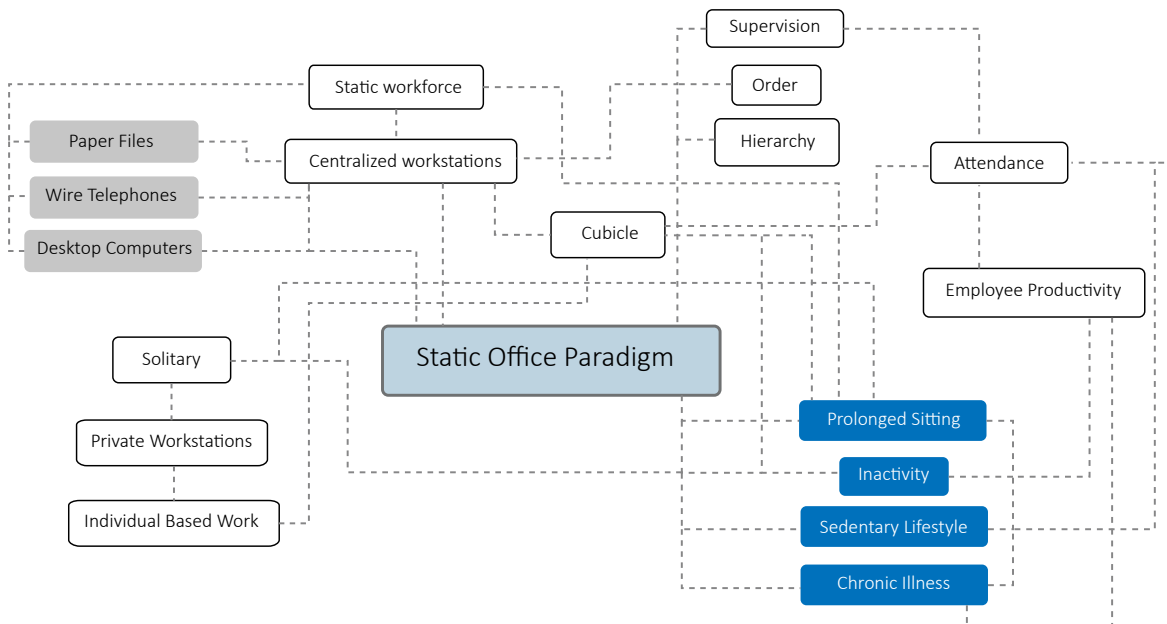


significant role in shaping the sedentary lifestyles of contemporary society. That being said; social conditions within the workplace have also shaped the spatial conditions within the traditional office typology. There are synergies between our social environment and our spatial environment.

Bruno Latour's, *Actor-Network Theory* (abbreviated ANT) also theorizes that objects, human and non-human, are also agents for social and spatial transformations. (Latour, 2005) For instance, the car is an object that had a significant role in the transformation of our post-war landscape by means of a new suburban planning model. Through the spatial transformation in which the car was an agent, new social conditions emerged; such as an inactive modern society. Indirectly, the car has been an agent in the increasingly levels of chronic disease affecting modern society.

Objects within the work environment have also been agents for the spatial and social stratifications within the traditional office building. The wire telephone and the desktop computer were agents for a spatial condition that required people to stay

[3-2] Static Actor Network diagram

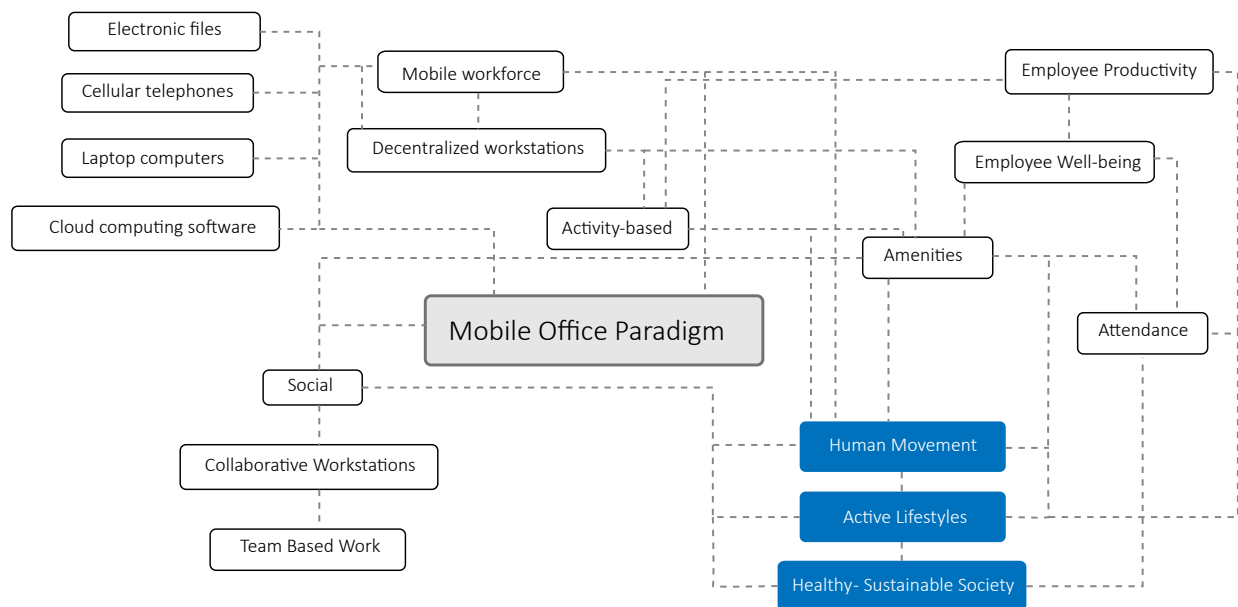


sedentary at their desks. In order to access files and be available for incoming calls, occupants had to be located at their assigned, fixed workspace. As a result, the measure of productivity within the workplace was often relative to the number of hours spent sitting at your desk.

Pressure from the effects of sedentary behaviour in the office (and at home) are creating a need for new typologies that will get people more active and physically mobile. However, the social relations within the office are already undergoing change due to various agents within our contemporary milieu, and these changes are allowing for a new spatial condition to emerge.

Similar to how the wire telephone and desktop computer created a fixed workspace condition, the internet, laptops, cellphones and cloud networks are allowing the workforce to become mobile. These objects of agency have created a line of flight towards an emerging workforce, which is no longer static and fixed but capable of movement and change. A transformation

[3-3] Mobile Actor Network diagram



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is happening; everything that was once static is now mobile, and we must harness these changes into a new spatial typology which supports such mobility by facilitating human movement and activity.

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## REINVENTING TYPOLOGY

*“You never change things by fighting the existing reality. To change something, build a new model the make the existing model obsolete.”*

*- Buckminster Fuller*

Today’s office workforce is undergoing change, and as a result, the existing office typology is no longer a successful or productive solution for the modern worker. In addition, traditional workplace typologies are designed to keep us static, and we now realize we need to keep moving, even during the nine-to-five. How can we get people moving? The first step is to develop a new spatial framework for the contemporary workplace typology. The following sections analyze the changes emerging in the future workforce in order to develop an emergent office typology which allows us to be productive, while also being active.

### 1. The emergent workforce is mobile

Today the office can be anywhere, and the modern worker can be nomadic. The introduction of wireless technology enables workers to be productive almost anywhere; on the road, in a coffee shop or at home. Today, the majority of workers are internally and externally mobile, moving from meeting to meeting, working in breakout spaces with colleagues or traveling to meetings in other offices with other consultants and clients. The office is everywhere, and statistically only 39 percent of office workers constantly work at the same desk. (Vitra, n.d) As a result of this mobility, there are very large inefficiencies in the use of office space today. Private offices are unoccupied more than 75 percent

of the time and workstations are unoccupied 60 percent of the time. (Herman Miller, 2012) Traditional office layouts provide a 70/30 ratio of individual space versus shared space. (Hendy, 2013) With so many people being away from their workstation for a large chunk of the day it is not only uneconomical for employers, but it is also unsustainable. “Having huge buildings running lighting and air conditioning and not having many people in them makes no sense.” (Oliver, 2014)

#### [3-4] The emergent workforce is mobile



#### 2. The emergent workforce is compact

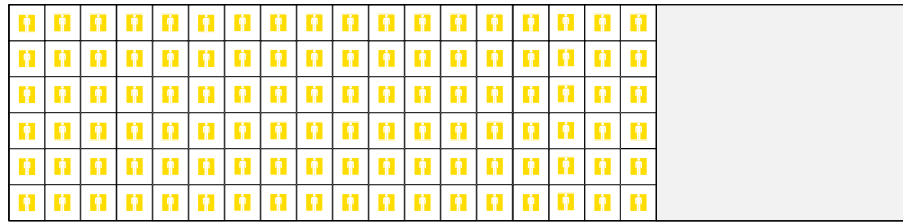
With the significant changes in technology, as well as the underutilized private workstations, individual space allocation no longer needs to be as large. Most files are being transferred to digital storage and many employees that work in a wide variety of industries can be fully functional with just a laptop computer. “A typical workstation in the 1970s measured 12’ x 12.’ By 1995, it had shrunk to 10’ x 10.’ Today, workstations have been reduced to an average size of 6’ x 8’ and space planners believe that future workspaces can be cut by an additional 21% without reducing productivity.” (Langhoff, 2007)

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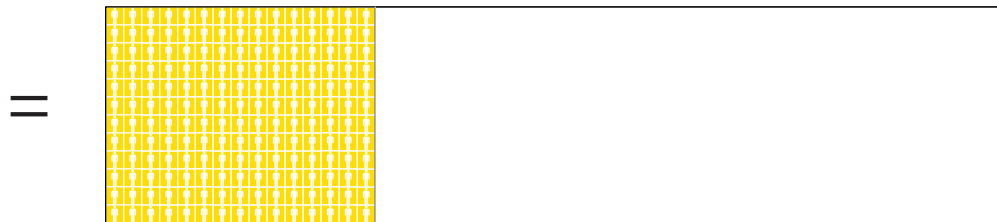
### [3-5] The emergent workforce is compact

#### Legend

- Private Workspace-Occupied
- Collaborative Workspace/Shared Amenities Space



Due to changes in technology, the spatial requirements of private workstations are 50% smaller



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### 3. The emergent workforce is collaborative

Despite the workforce being able to work from anywhere, workers are still choosing to come to the office as opposed to working from home. In fact, although mobile technology initially created the shift towards working from home, the desire or need to collaborative face to face with colleagues has encouraged the workforce to come into the office each day. “In a 2010 survey, respondents reported spending an average of 45 percent of their work time ‘in the office,’ up from 18 percent in 2007 while percentages of time working from home decreased compared to 2007 levels. There is no evidence that employers influenced or requested this shift in behavior; workers are increasingly choosing to use the corporate office as a place to meet, interact, and collaborate.” (Herman Miller, n.d.)

The way in which we carry out our work is changing; few employees produce value in isolation. Specialization and knowledge-based work are breaking down office hierarchies and promoting collaboration and teamwork. Rather than working individually, we are required to collaborative within the local office

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structure and with external consultants much more frequently. Research reveals a continuing shift towards collaboration in the workplace. Back in 1985, just 30 percent of an individual's output depended on working within a group; by 2010, that figure was up to 80 percent. (Herman Miller, 2012) "Buildings are no longer the containers for work; they now function as places for people to gather and collaborate. These connections are quickly becoming the main justification for the physical workplace." (Herman Miller, 2012, pg. 2)

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#### [3-6] The emergent workforce is collaborative



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#### 4. The emergent workforce is cooperative and social

With collaborative work outweighing individual work, the future office typology must respond by offering locations for informal, spontaneous and decentralized ways of working, which are not available in most traditional office settings. Unlike the 70/30 rule of individual to shared space, today we require an office layout that flips the ratio and provides 70 percent social and collaborative space and 30 percent individual space. (Hendy, 2013). This significant change in the way we work has led to some companies incorporating collaboration hubs for employees to break from a solitary environment to one where employee can become motivated through the exchange of ideas with colleagues. These alternative spaces are different from traditional boardrooms; they are more informal, and offer additional social and recreational amenities.

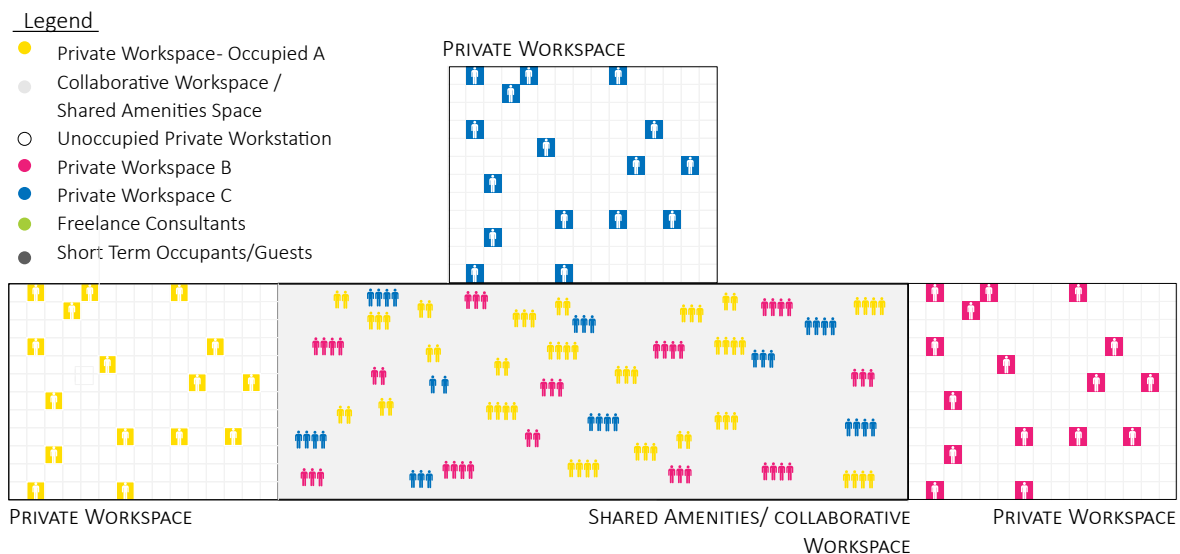
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The introduction of collaborative amenities in the workplace, is not only making work more social, but it is also making the workplace more livable. As a result, the spatial condition emerging from the social changes between generations is providing spaces within the workplace which don't just serve the function of work, but also a social and experiential function as well. "The emerging generation of workers- Generation Y- rates 'having a workplace that provides an engaging experience with the organization' as its most important feature—while Baby Boomers rate it lowest. Because of the importance of social connection to Generation Y, typical office workers of the future will expect an engaging workspace (and work culture) that makes them feel good and keeps them coupled to people they value at work and in the organization at large " (O'Neill, 2010)

The workplace for emerging generations will be charged with activity, with the buzz of an active village street. Such environments offer the chance for people to take a break from work and be stimulated by the people passing by, or the chance interactions that this type of social space will foster. In order to create a social and active streetscape there needs to be a higher level of density of individuals within the space. Mobility has resulted in a workforce that is both internally and externally mobile and 83 percent of the workforce works remotely for at least part of the day. (Wrike, 2012) Similar to private workstations, these collaborative and social spaces are underutilized at times, due to the changing density of occupants within the workplace throughout the day. Studies in office efficiency suggest that sharing desks at a three-to-one (3:1) ratio achieves a utilization rate of 80-95 percent. (Heschmeyer, 2013) That being said, in another survey, 89 percent of employees stated that they prefer having their own private space (Oxford Properties, n.d). In order to make space efficient while still providing occupants with individual workstations, the collaborative and social space, can become a shared space, among networks of employers. This ensures that

the collaborative hub is an active and social space throughout the day and that employees still have a personal and private desk or ‘touchdown spot’ to go back to when they want to shut out distractions, or require some privacy. “Rather than thinking of the office as a place primarily for solitary activity, from which one occasionally breaks out in time and space to settings intended for social activity, the office is designed primarily as a social setting, from which one occasionally seeks out more private places for contemplation, concentration and confidentiality.” (Becker, & Sims, 2001, p52)

[3-7] The emergent workforce is cooperative and social



## 5. The emergent workforce is contingent

It is estimated that worldwide mobile worker population will increase from just over 1 billion in 2010 to more than 1.3 billion by 2015. (International Data Corporation, 2012) With many companies operating across the globe, there are times when a specific project deadline may require employees from other offices, or from other locations worldwide, to be pulled together to complete the task at hand. Although technology allows us to communicate easily regardless of where we call home, evidence



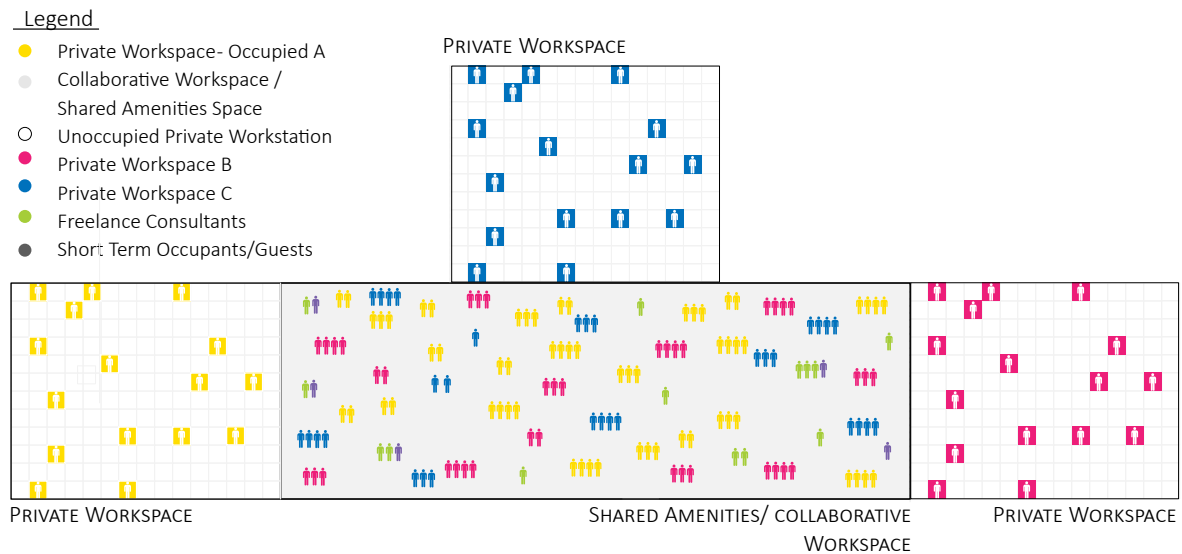
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shows that we are more productive when we work face to face which is why the increase of mobile workers are on the rise. It is estimated that by 2020, 40% of the workforce will be comprised of independent freelance consultants. (Intuit, 2012) With so much complexity and unknowns regarding the size of your workforce at any given time, you need to have enough space to allow for the overflow of people, short term. Whether it be mobile workers, freelance workers or external consultants from other offices, there needs to be space to accommodate for contingency. In addition, with a growing number freelance workers, where do these people work? Often freelance workers, work from home, but if a more standard typology that has a shared and cooperative component existed, there could be a space for them to work (for a monthly fee), and benefit from greater opportunities for social interaction, collaboration, and networking. It also provides the amenities to meet with clients and hold presentations, in the shared conference spaces with essential audio-video equipment. These spaces, although shared by many, can be reserved through a central booking system, often referred to as 'hoteling'. The space allows for "independent professionals from a variety of backgrounds and areas of expertise to participate in the community, connections, and happy accidents that come from physical co-location." (Herman Miller, n.d.)

These trans-formative social conditions have been explored by diagramming. I have used this technique to develop a massing and typology to accommodate the emergent workforce, and their desire to be internally and externally mobile. This typology harnesses this desire to be mobile and provides a spatial structure to accommodate it. "The emergent diagrammatic technique has been proven as a means of reinventing and breaking free from the existing, standardized building types as "such typologies no longer provide adequate solutions to contemporary demands and situations." (Van Berkel, & Bos, 2006)

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[3-8] The emergent workforce is contingent

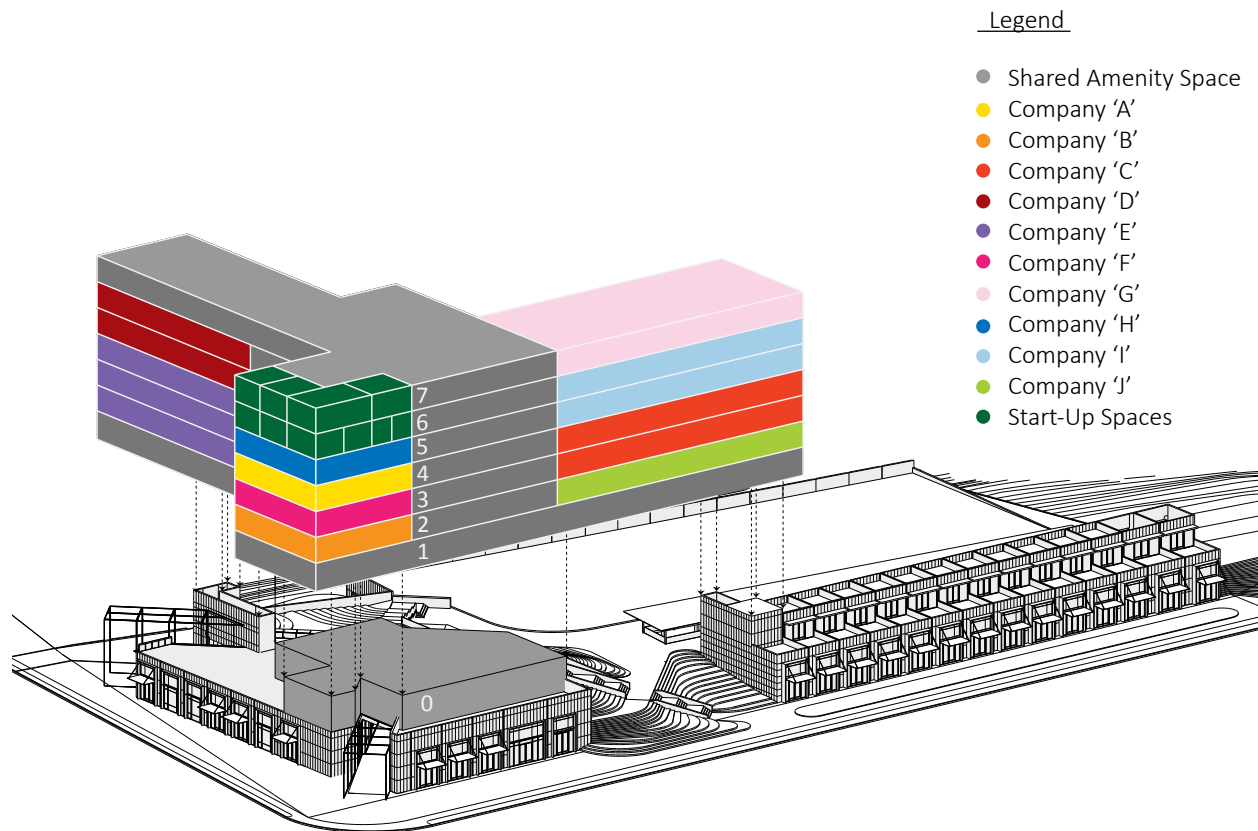


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What has been developed, is a new interstitial social hub which connects privately lease office space. Within this interstitial space, shared amenities are provided for the employees to be social and collaborative with each other, outside their private company organizations. Due to economies of scale, the diversity of amenities provided can increase, because they are shared among a greater number of people and companies. In turn, these spaces have the ability to enhance and improve occupant well-being. Outside of this social and collaborative space, is a private space, leasable to companies of varying size. Small companies could take up smaller footprints while bigger companies may lease out multiple floors. This space is also appealing for start-ups, as very little space is required since most of the amenities required for a small business are provided within the shared amenity space. This emergent typology has created a condition where about 50% of the building floor area is an interstitial social hub connecting private companies through a vertical community. The future chapters focus on how this interstitial space can be designed in order to promote human movement within.

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[3-9] Parti Diagram for the emergent workplace



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# MOVEMENT AGENTS

*“It is recognized that multiple processes of urbanization must be engaged and artfully, yet indeterminately, choreographed in relation to evolving and open ended spatial formations.”*  
– James Corner (1999)

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The concept of Spatial Agency requires designers to take an essential role in re-shaping our environment to promote healthier lifestyle choices. The discipline of architecture in the 21st century has a much larger role to play than simply working with the visual, the aesthetic, and the formal. As designers, we can shape space in order to shape the lives of those that inhabit it - space can be used as an agent for change. This chapter outlines a collection of spatial strategies that can encourage us to live healthy lives by promoting physical activity through environmental cues. This emerging practice is called ‘Active Design.’

After an era of car-driven development, cities have initiated new strategies to repopulate the streets to promote human activity. Most cities have prepared guidelines for their urban streetscapes to promote walkability which is perhaps the first step in curbing sedentary behavior and the associated chronic illnesses. That said, urban design strategies cannot solve the issue independently. In order to keep the human being active throughout the day, we must look beyond the urban scale of the city and develop strategies that engage the human body within building interiors. 90 percent of our time is spent indoors (Health Canada, 2011) which makes building design a critical agent in shaping the health and lifestyle of its occupants.

New York City has commissioned the first set of design guidelines to be used by architects and planners to promote *Active Design* at both the urban and building scales. The Active Design Guidelines (2010) are strategies that were developed from

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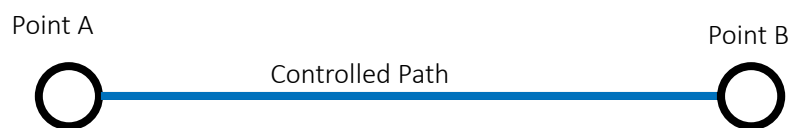
evidence-based research to promote stair climbing, walking, bicycling, transit use, active recreation, and healthy eating. These guidelines were an influential reference – the publication is the only of its kind to tackle spatial strategies to aid the fight against inactivity. This thesis expands of this body of research to include both evidence-based strategies, as well as strategies rooted in architectural theory. The checklist of strategies included within the Active Design Guidelines is also included within the appendix of this thesis.

This thesis emerged through the exploration of the intensive relationship between the body (in motion) and space. From this research, three categories of movement in which designers can propel the body into movement were developed; *Motivated Movement*, *Controlled Movement*, and *Contingent Movement*.

*Controlled Movement* is our ability to precisely control the path of a moving body through the design of a movement path which is the only path serving two points. To get from point A to point B, the body must follow a set trajectory where no other routes are available. As a result, using this type of movement strategy allows us to manipulate the amount of movement an occupant undergoes in their day-to-day activities that it can be calculated in order to reach certain targets of movement. This movement strategy could also be called a ‘push’ tactic as it forces occupants into certain actions.

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#### [4-1] Controlled Movement

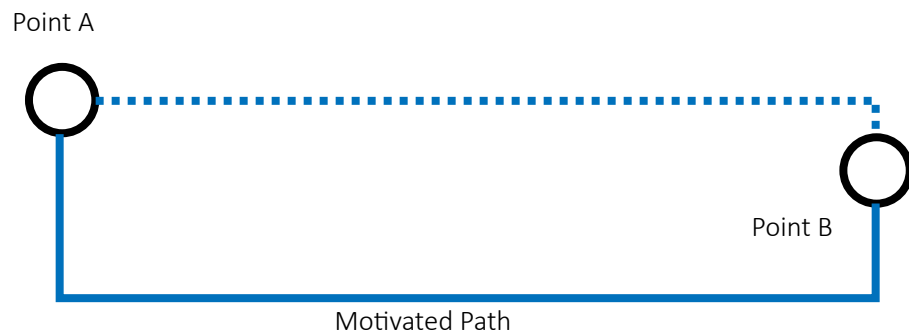


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*Motivated Movement* focuses on behaviour and perception of the human body in order to emphasize and subconsciously promote one movement path over the other. Although different options are provided, the design of space can have a strong effect on the decisions we make, and this type of movement attempts to encourage you along a certain path. A simple example would be how the design of a stair could encourage occupants to use that route of vertical travel instead of using the elevator. This type of movement strategy is a 'pull' tactic: it does not force occupants into certain options, but encourages and promotes certain movement patterns over others.

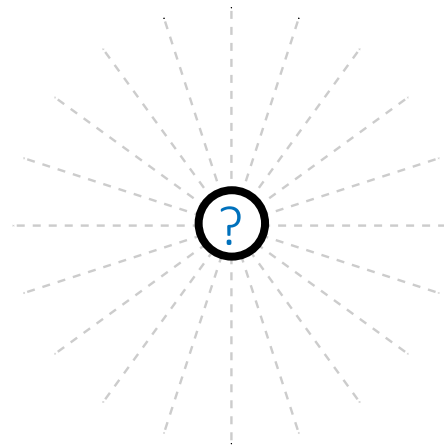
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[4-2] Motivated Movement



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*Contingent Movement*, involves movement paths that we cannot predict or anticipate, but can be encouraged through an open-ended framework. Rather than prescribing, ordering or fixing, *Contingent Movement* attempts to provide a template for unlimited possibilities and potentials by keeping things open-ended and capable of change.



Contingent Paths      - - - - -

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Architecture can engage with the human body using these three movement strategies, and a series of potential spatial relationships can emerge when you start thinking of ways to instrument them in different building types and sites. The following chapters outline the various ways *Contingent Movement*, *Controlled Movement*, and *Motivated Movement* could be used in an office setting, and on the project site. Keep in mind that this is not to be considered a complete list. Instead it should be read as a set of examples, as each project and building type will likely engage with these three movement types in new and original ways. New strategies to choreograph the human body can emerge when you approach it with an open mind.

It is important to note that the following chapter focuses on interstitial space which connects private workstations with shared amenities rather than on the movement that can be achieved within these privately leased spaces. Like most office buildings, the project would be designed and potentially built, before knowing what tenants will occupy the various floors of the building; making the mechanisms of private space harder to control. In addition, these spaces are meant to be places primary for solitary private work behaviour and therefore they were not

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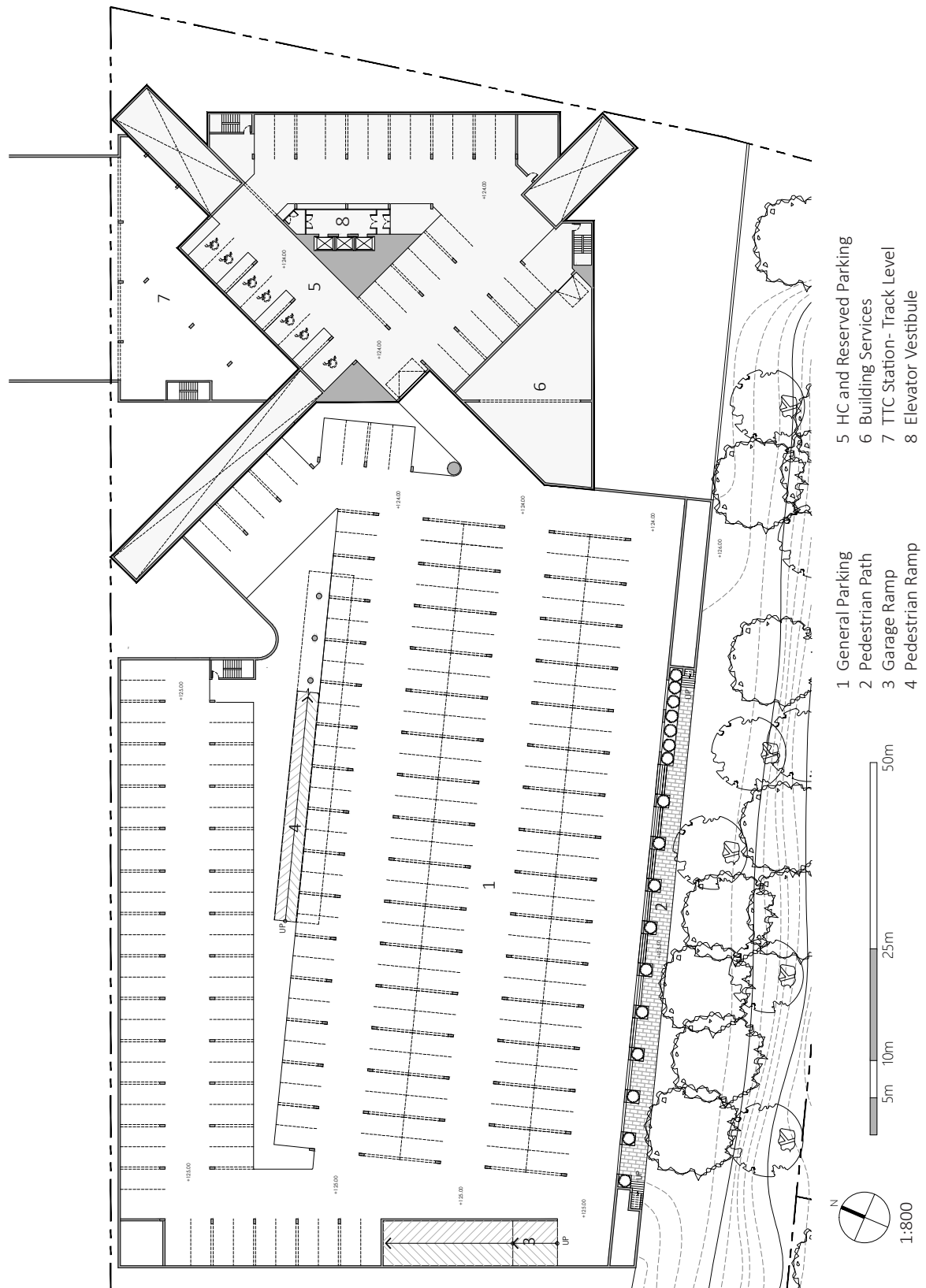
a critical component of this thesis research. That being said; design characteristics such as daylighting and occupant control were considered. In order to allow for natural daylighting through the floor space, the depth of the floor plates are less than 20 meters. The cladding system was designed based on the typical six feet by six feet dimensions of today's private workstation, so that each workstation, placed along the facade would have access to an operable window, situated at a suitable height from the floor for both siting and standing desks.

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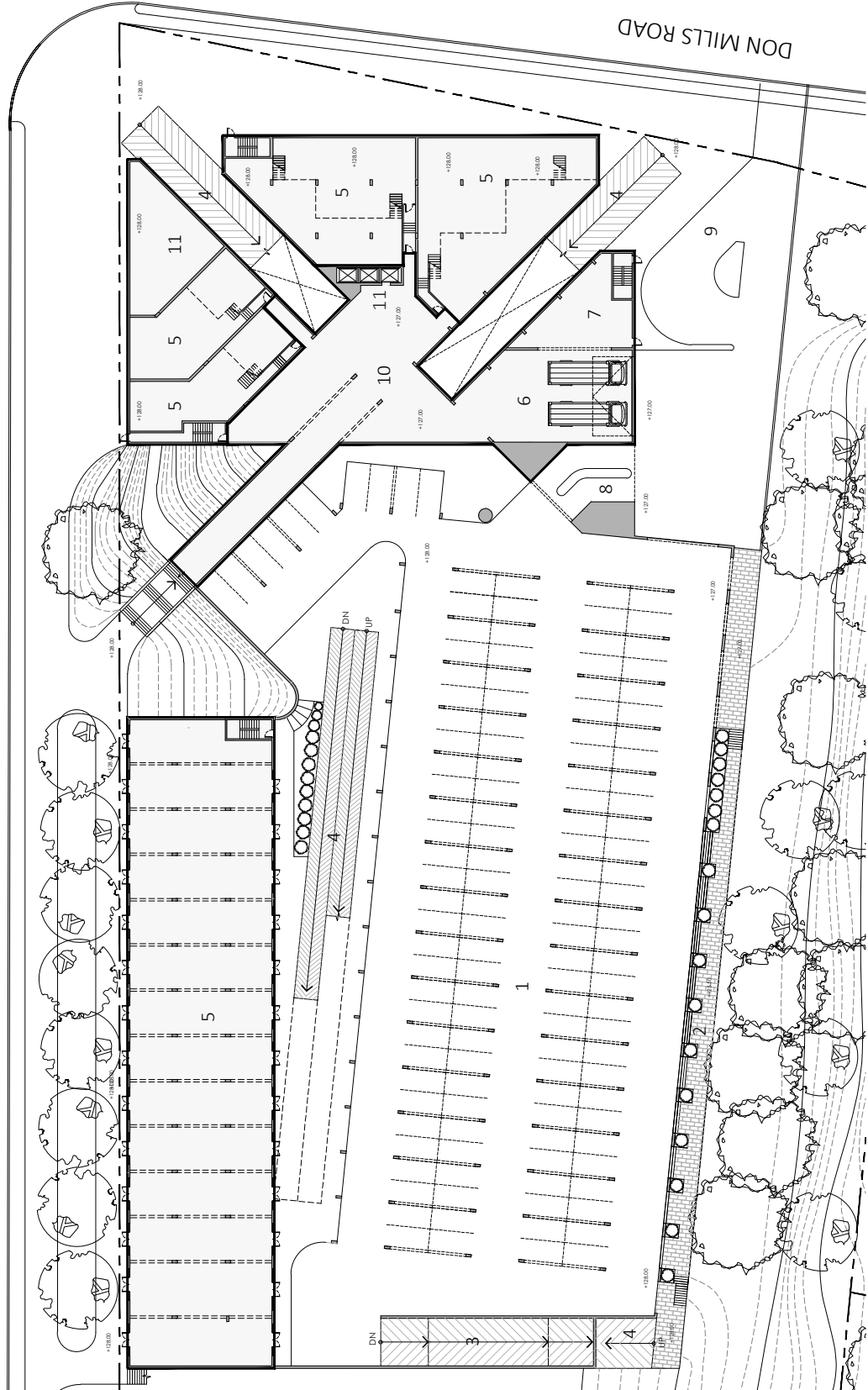
## FLOOR PLANS

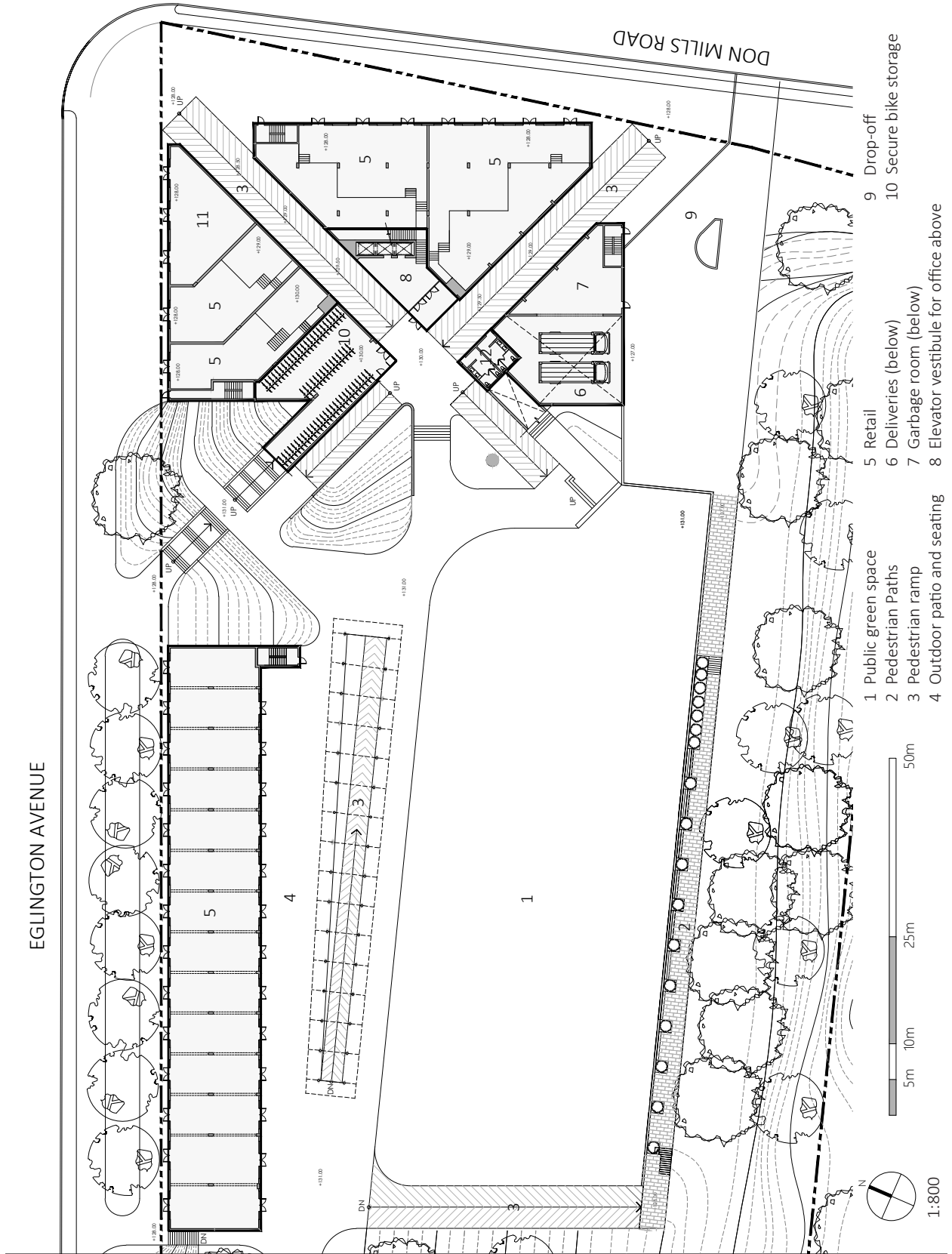
The strategies associated with these agents of movement are illustrated as fragmented design conditions in the succeeding chapters. Given the non-linearity of the design process and the complexity of the ideas being discussed, it was impossible to present these concepts in a linear manner. As a result, the detailed floor plans are presented as foreshadowing to the strategies in which they developed from. These floor plans should be bookmarked and referenced for further understanding and clarity to the strategies introduced in the succeeding chapters.

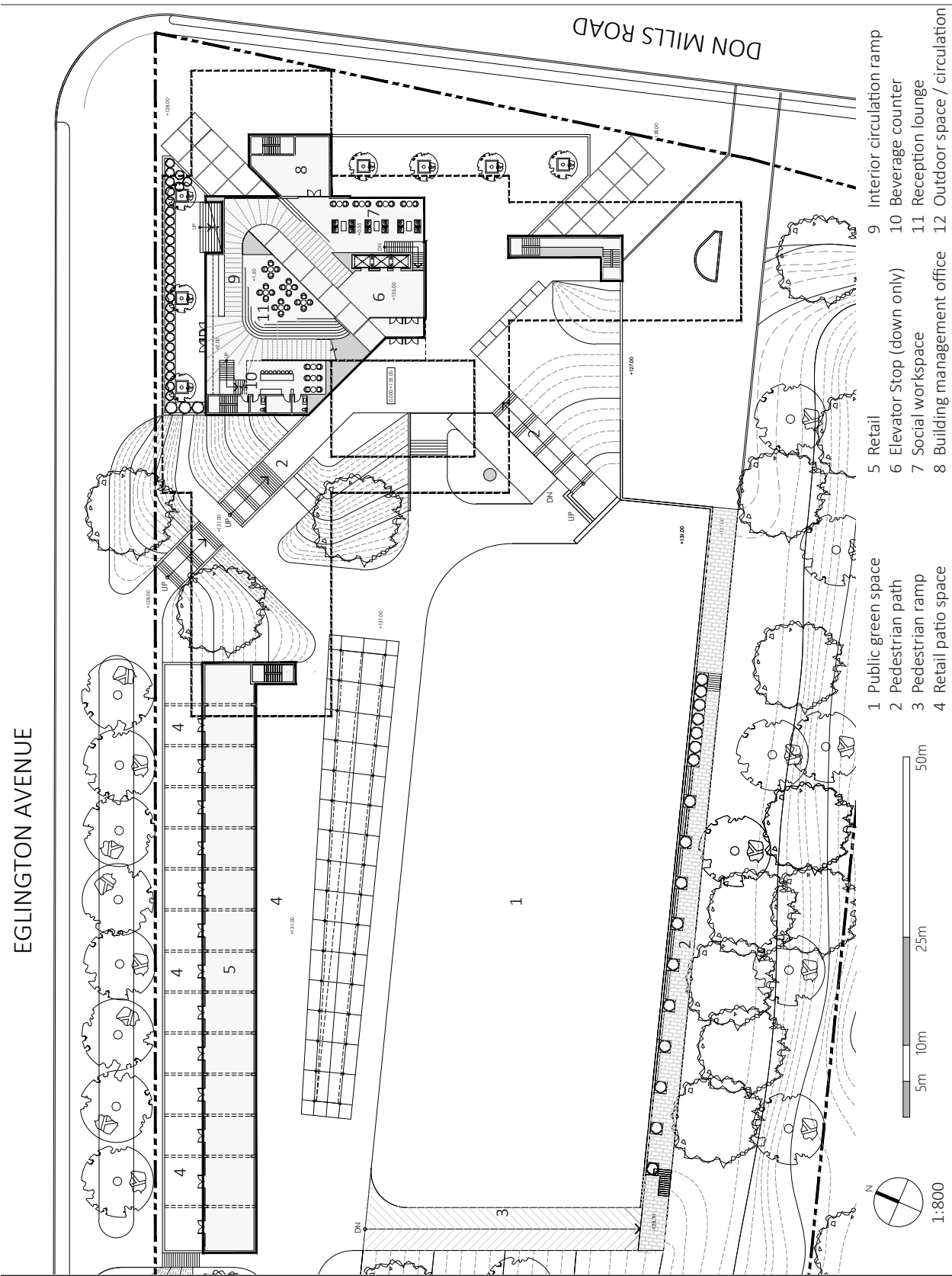


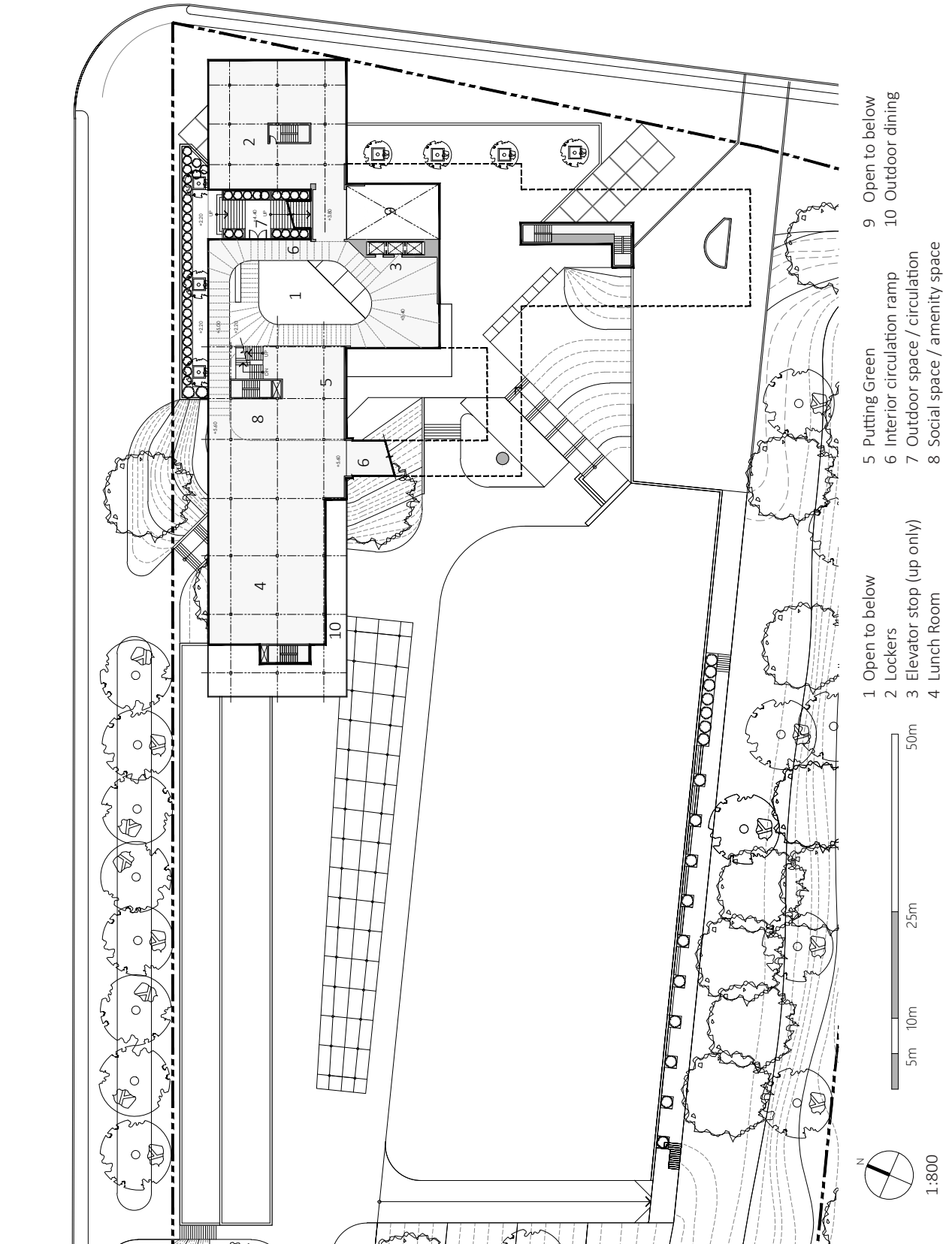


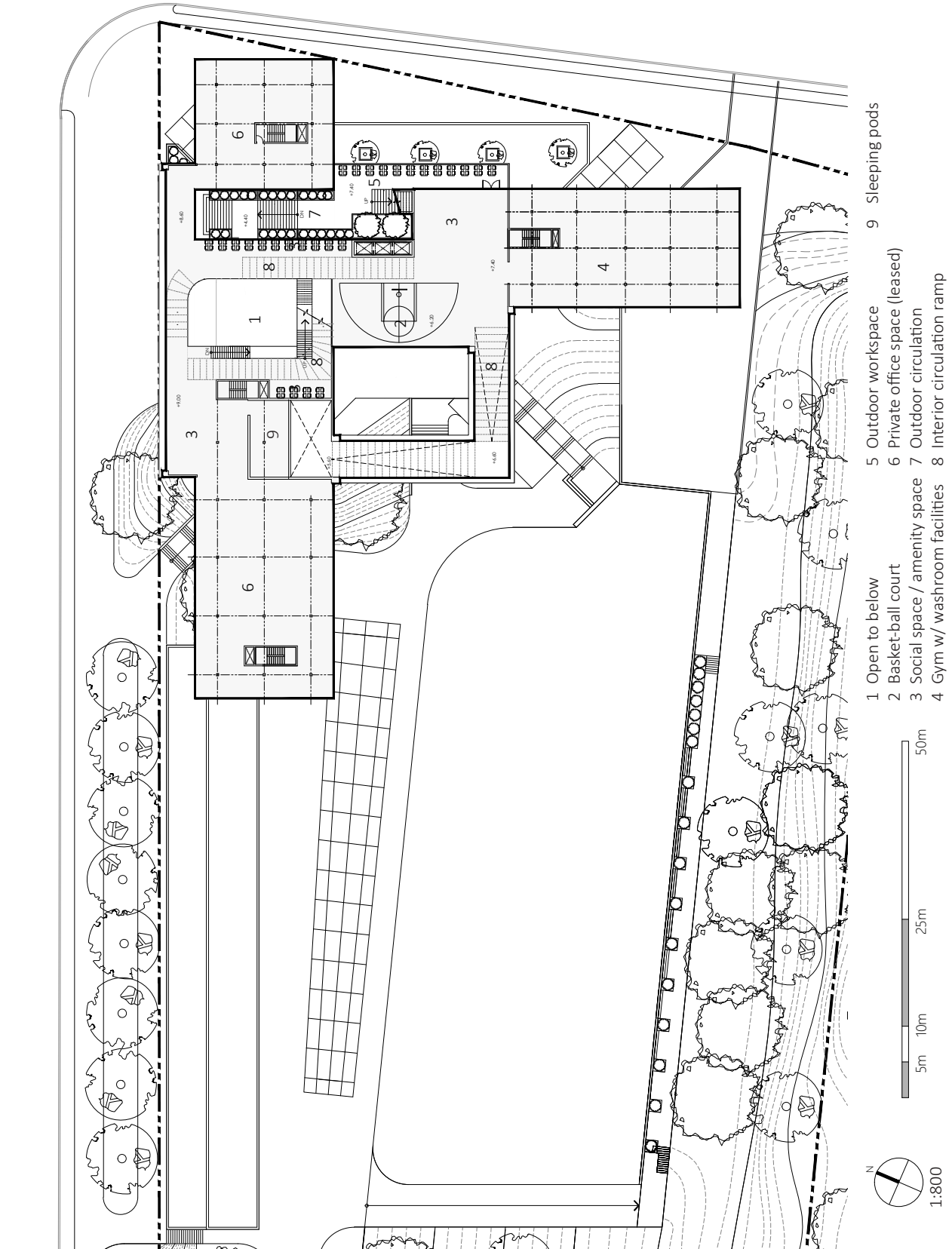
EGLINGTON AVENUE



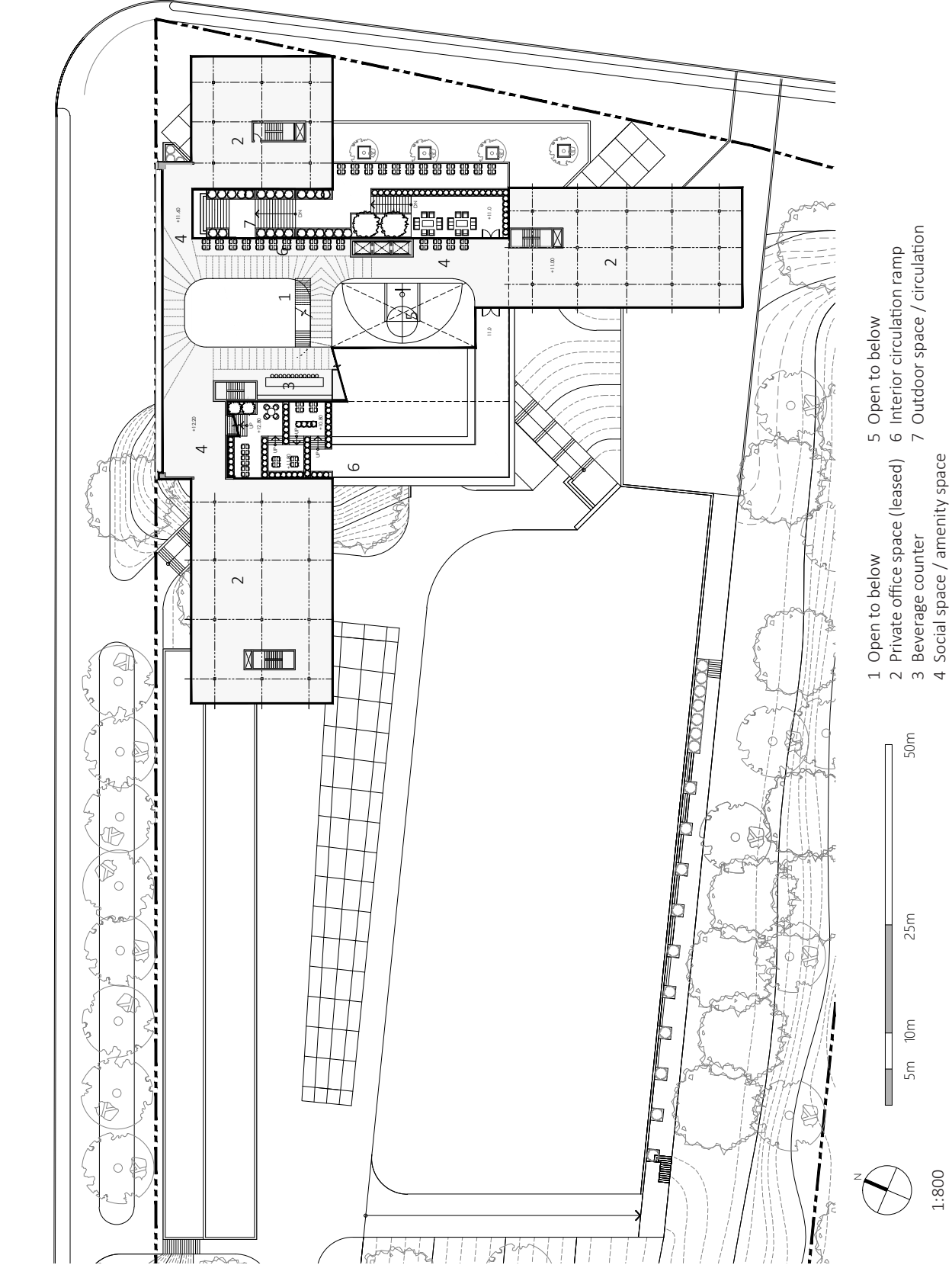


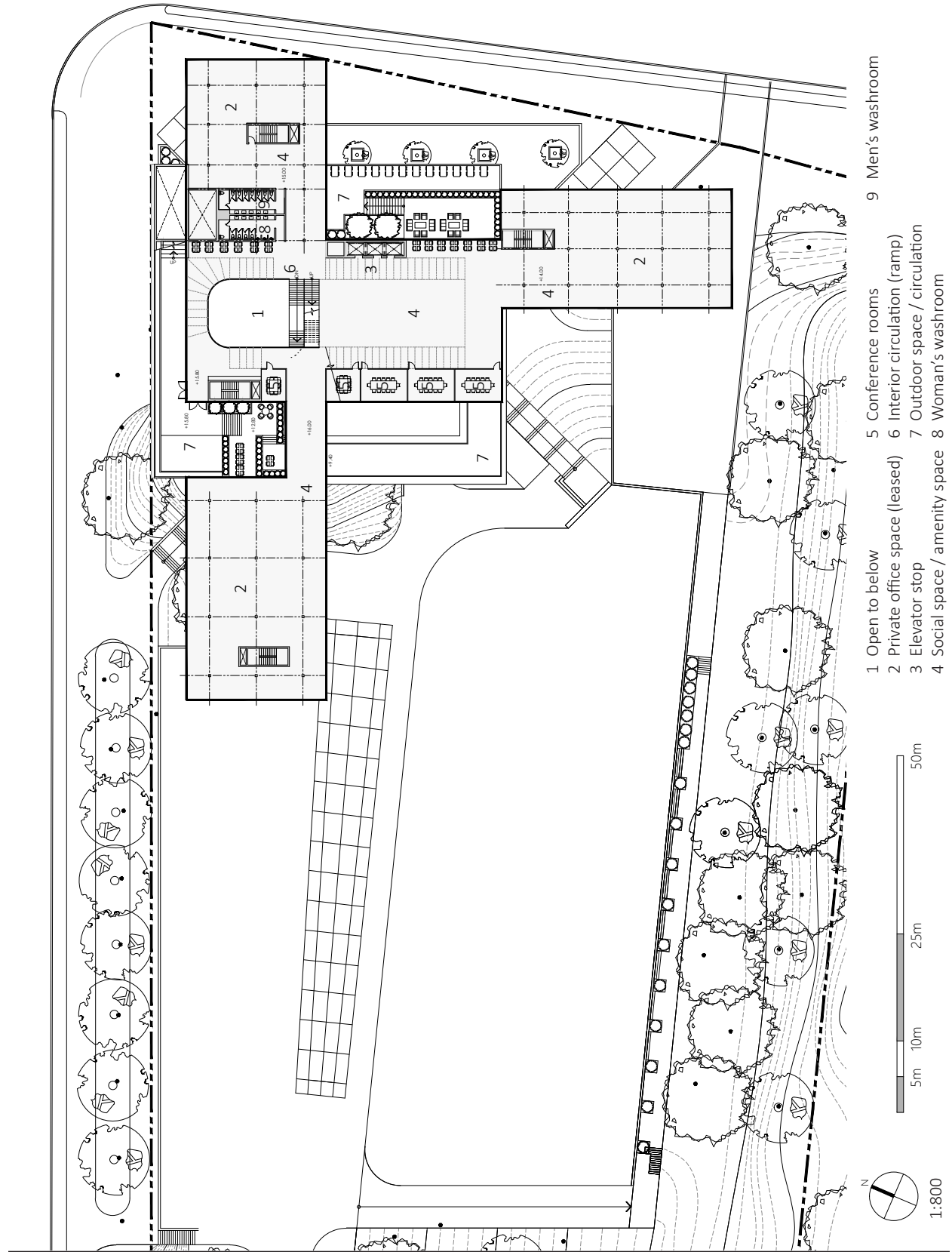




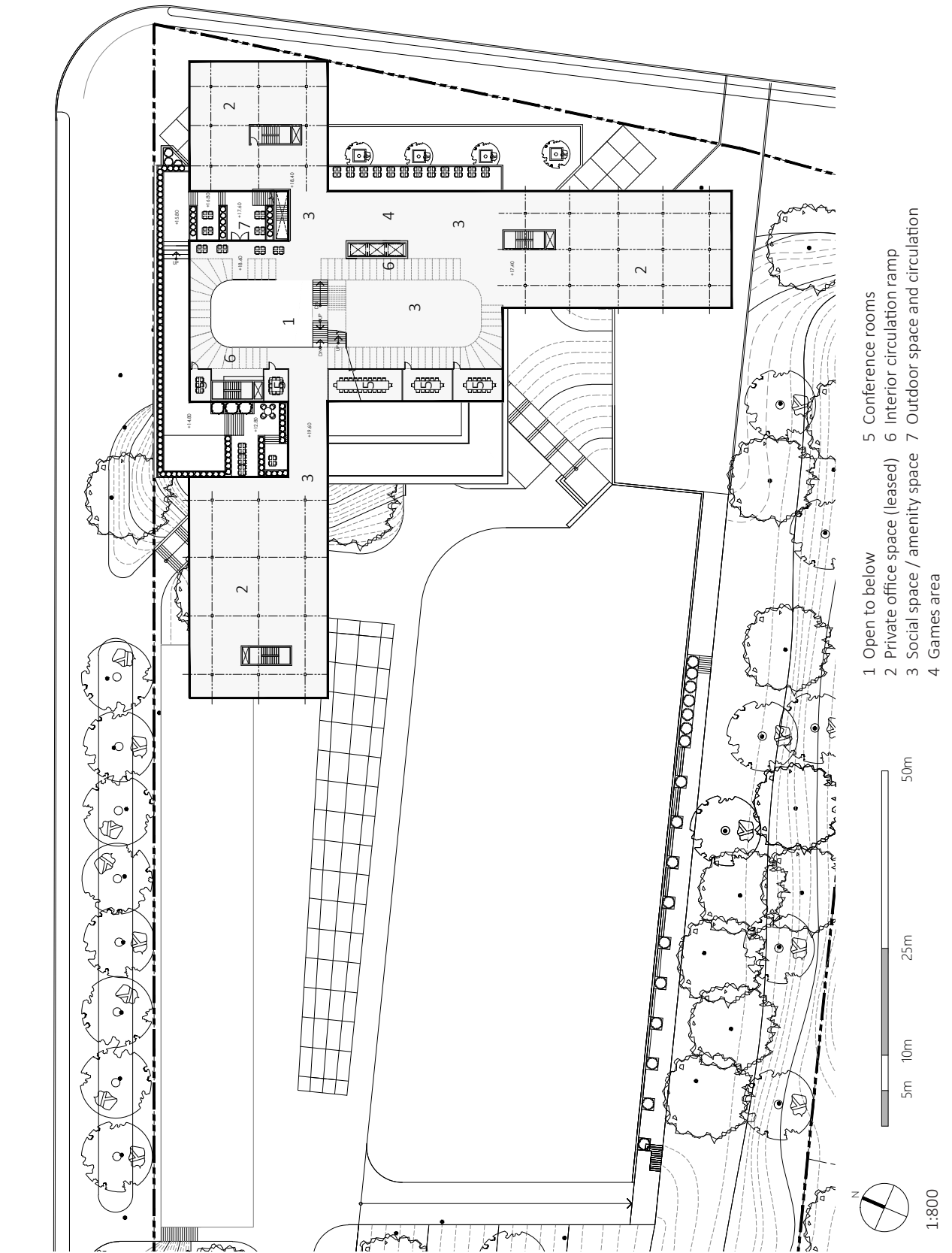


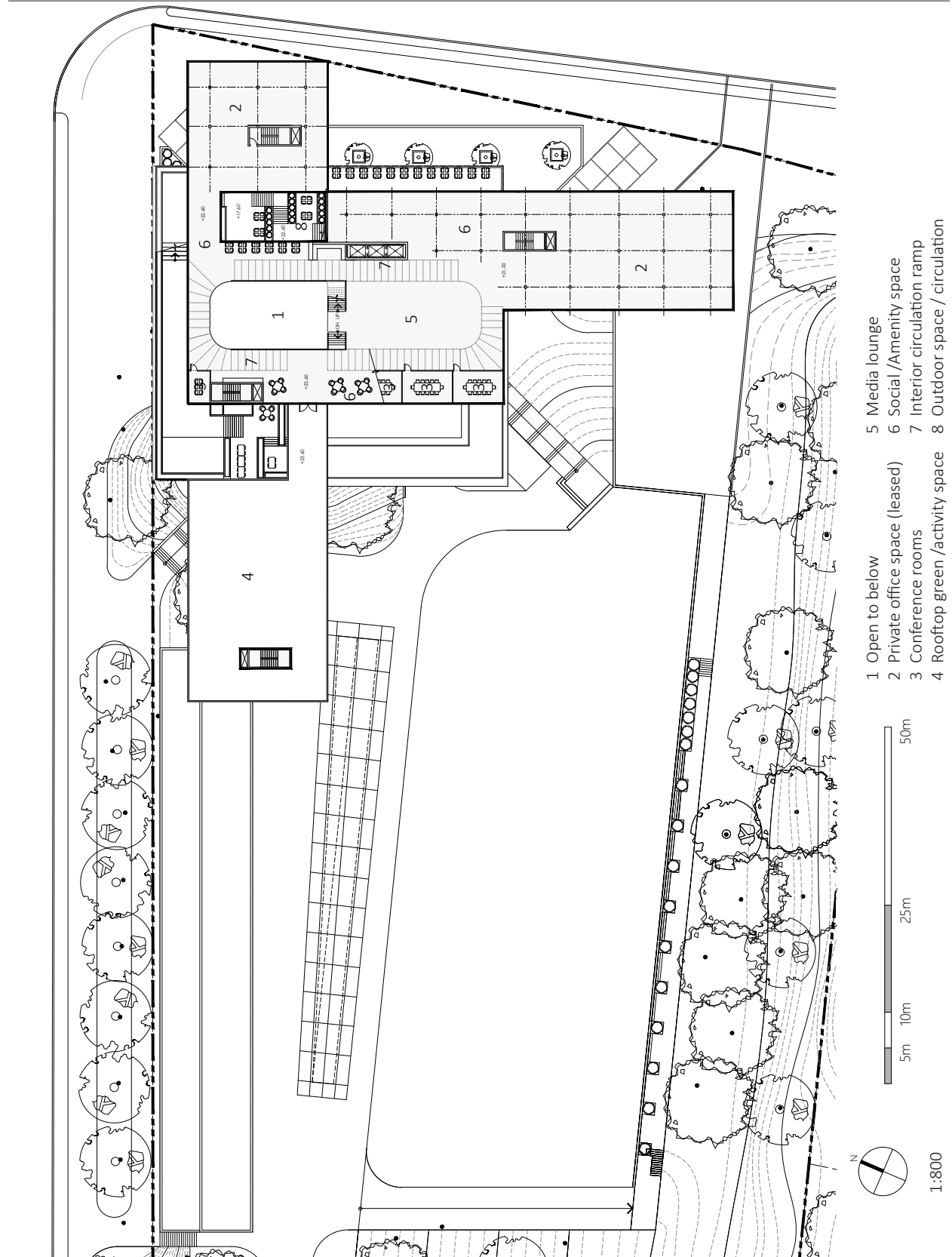


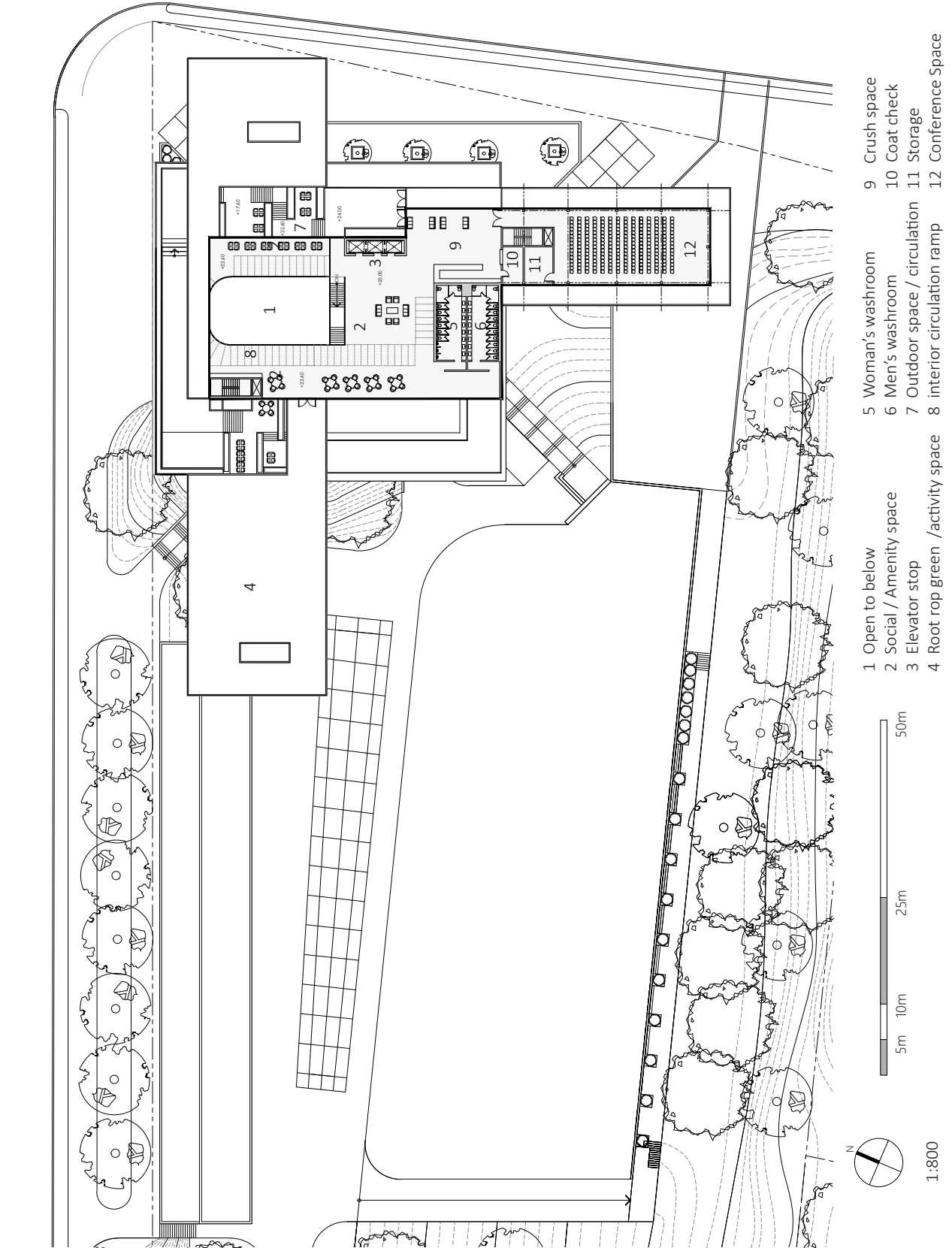












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[4-15] Exterior Perspective: North Elevation and East Elevation



[4-16] Exterior Perspective : East Elevation and South Elevation





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[4-17] Exterior Perspective : South elevation and West Elevation



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# CONTINGENT MOVEMENT

*“...this vision of the technical world as a constellation of active agencies (rather than fixed or sedimented constructs) invites intervention as a detournement of moving, flexible processes.”*  
- Stanford Kwinter (2001)

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Historically, architecture as a discipline has a tendency to rid space of its contingency with the goal of prescribing order, both visually and socially through spatial design. Our desire to make order from the disorderly is embedded within the classical roots of our discipline. Vitruvius’s concept and theory behind the Vitruvian Man is a prime example of the semblance of order that has had such a significant impact on shaping the trajectory of architectural discourse. “The Vitruvian body on which so much architecture still leans for support is thus much more than a nice metaphor of coherence; it designates a closed, homogeneous, monumental, centered and symmetrical system.” (Till, 2009, pg. 30) As we progressed into the modernist era of architecture, order was still considered to be the critical component of what defined the architectural discourse. In contrast, our associations with the word disorder quickly leads us to negative connotations. In his book *Precisions*, Le Corbusier (1930) described disorder as a form of illness or cancer that acts on society and in opposition, order related to good health. In fact, Le Corbusier believed that “to create architecture is to put into order.”

Our desire to control the environment by putting things into order is clearly illustrated in typical workplace design strategies. These spatial strategies are clear representations of control, through order and hierarchy. The rows of cubicles with assigned seating keeps occupants fixed to their seats, whereby their spatial organization within the office is a representation of their place within the corporate hierarchy. These spatial strategies attempt

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to control social conditions. By keeping the workplace fixed in its spatial layout, the building occupants remain fixed in their assigned seats. This creates the conditions where performance and productivity are measured based on the frequently and duration in which they occupy that place throughout the day. Through these fixed spatial design solutions, it is no surprise that our office workforce is suffering from the ill effects of sedentary behaviour- we have subconsciously designed these spaces to achieve static order. How can we combat sedentary behavior in the office? The first step is to free ourselves from the desire to fix and order, and instead promote a framework that allows for uncertainty, change, and by association, disorder.

In his book, *Architecture Depends*, Jeremy Till creates an argument for the future discipline of architecture to embrace the unruly, and the uncertain to free ourselves from our desire to fix, order and control. "I am only suggesting that contingency is a pivotal feature and needs to be taken into account rather than avoided as a potential threat. In this contingency situates us in the real world, providing opportunities for trans-formative change while also avoiding the siren calls of ideals." (Till, 2009. Pg. 61) Contingency is a characteristic of today's global context, or more generally modernity as a whole. As a result, closed systems of order can no longer engage in today's spatial context which is undergoing constant change at unprecedented speeds.

"It is true that change may and ought to be seen as a type of movement – the flow of matter through time" (Kwinter, 2001) that acts on even the static elements of space. If by fixing things in space, we are creating static space and static occupants, than by designing space to be open-ended and unpredictable we are in turn creating a dynamic space, which allows for human movement. When we design a spatial framework which supports change, we foster new forms, new paths and new possibilities for movement. This is the concept behind *Contingent Movement*.

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The following strategies are ways in which Contingent Movement could be applied to office environments in order to allow for greater human movement and activity to take place.

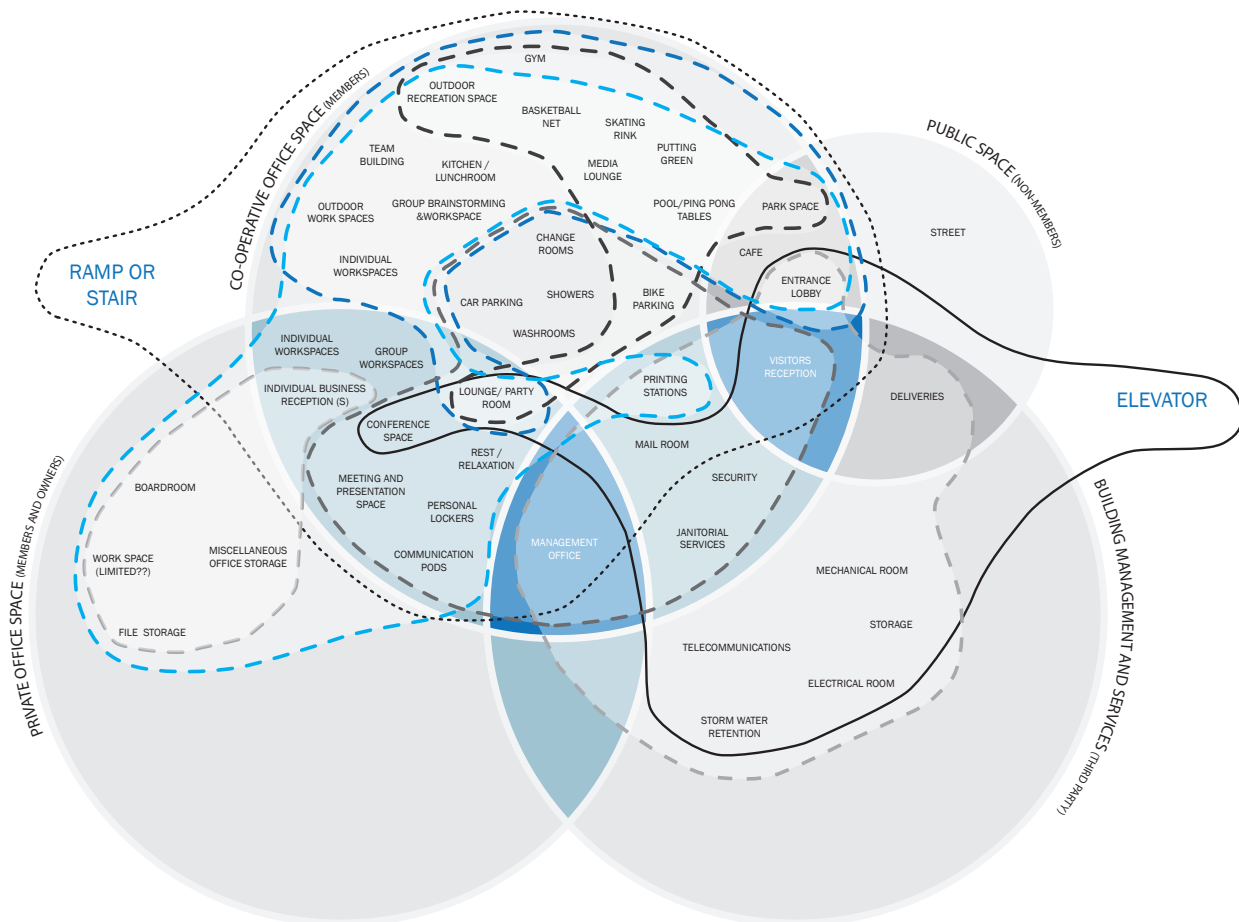
### 1. Decentralize the workplace

In 1967, the office cubicle was invented and quickly became wide spread among offices. The cubicle was an attempt to accommodate all day-to-day work activities in a standard footprint. Not only were some aspects of office activities compromised within this limiting space, but it also meant that people spent their entire day sitting in one spot. Since modern technology enables people to break away from their assigned desks, the office should become decentralized in its organization of space and provide spaces that are designed for specific activities, throughout the building. This gets people moving, but it also ensures that the spaces for certain activities are designed to be productive. The typological study prepared in the previous chapter, *Social-Spatial Transformations*, sets up the spatial conditions to allow for a decentralized workplace. Rather than cramming the diversity of work that goes on throughout each employee's workday into one space (the cubicle), or cram the diversity of employee personalities into one standard footprint, a decentralized space is one which provides a diversity of spaces throughout the building to support different types of functions and activities to accommodate the diversity of employee personalities and physiological needs. By providing a rich-array of diverse spaces, it facilitates employees to move freely and change their location spontaneously to different spaces throughout the day. In turn, the office becomes an active streetscape of amenities with the hustle and bustle of employees in movement.



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[5-1] The decentralized workplace - facilitating nomadic workplace behavior



Evidence suggests that in activity-based office layouts, there are significant increases in productivity over conventional cellular and open plan office types. “Activity-based planning achieves approximately 13 percent greater performance, 15 percent greater communication, 18 percent greater collaboration, and 10 percent increased creativity.” (CABE, BCO, 2005, pg. 51) “Sun Microsystems’ Director of Workplace Effectiveness reports that the introduction of a variety of settings designed to enhance the informal spread of ideas contributed to a perceived 10 percent gain in individual productivity and 7 percent gain in team productivity; and added that even if the amounts are half that, it results in millions of dollars in productivity gains.” (Haynes, et al., 2000) Not very many companies can provide the same amenities

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and activity spaces that Google, or other large corporations can; but by sharing these spaces within a social and collaborative hub among other companies, it becomes economical, and allows everyone, big and small, to benefit from the addition of amenity and activity-based spaces within the workplace. Despite the fact that the workforce today has significantly smaller individual spaces than in the past, we can now choose from more spaces which cater to a diversity of office needs, while also enhancing personal comfort and well-being. All of this can be done with the ratios of square footage per employee being pretty similar to what is found in traditional office typologies. By providing on-site amenities within the workplace for employees, it makes coming to work every day more enjoyable and encourages employees to work on-site and face-to face with their colleagues.

## 2. Allow for occupant choice

Wireless technology allows us to be connected without being chained to our desk. As a result, there is a possibility to encourage a nomadic or migratory lifestyle at the micro scale of the office. Rather than a closed, static system of order, the office environment has the potential to become an evolutionary system, one that allows for constant change, and movement. Dovetailing off the previous strategy, by providing many options of where to work, you are giving occupants the freedom to choose and change where they work instead of prescribing order through assigned seating. Studies suggest that an increased level of performance was achieved by employees when they were offered the choice of where they wanted work. (Stringer, n.d.). “One’s chair and desk gets stale after a while, the familiarity becomes too much...People want that change to get up and go somewhere and refresh their minds and then maybe return to their desk.” (George, & Carey, 2003)

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### 3. Allow space to facilitate change and occupant flux

The first two strategies discussed address spatial strategies for *Contingent Movement* which provides occupants the ability to move and change locations within the building. In addition, spaces within the building also have the ability to change their spatial condition so that the function is not static and fixed. For example, spaces that are comprised of move-able furniture allow occupants to self-organize. One space could be a place for people to work privately, but could quickly be reconfigured to accommodate group brainstorming activities and collaboration. Many of the spaces within the social interstitial space are able to change their program and accommodate different functions. For example, the main lobby of the ground floor is generally organized to provide a brief meeting place and reception lounge. However, the furniture can be removed, and it becomes a place to have lectures, presentations and special events. Steps worked into the design of the ramp become stadium seating for spectators and furniture can be arranged along the ramp that wraps around the atrium to allow occupants to watch and listen from the floors above.

The basketball court is also a space that accommodates both work and play. Furniture can be re-arranged to allow for casual play while collaborating with colleagues or can be moved out of the way to allow for more intensive game play. Given the contingency of the modern workforce, this type of space is beneficial because it can adapt to different occupant demands, such as the times of the year when the density within the building is very high, and an accommodation to overflow is required.

The conference space on the top floor can accommodate special events associated with the business sector. That being said; corporate conferences do not happen every day, and this space

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would be underutilized for the majority of the time. Rather than thinking of the workplace as only a container for work, this event space could also be rented out for weddings, and other special events which tend to happen outside work hours. By opening its doors to the public, this brings in additional income to allow for more spending towards amenities and occupant well-being for day-to day building users.

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# MOTIVATED MOVEMENT

*Behaviorism: individual behaviour can be influenced, even rationalized, by the organization of space. -Bernard Tchumi (1994)*

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We make behavioural decisions based on our perception of space, and by understanding the cognitive functions of how we perceive and choose to move and act in space, we can make better decisions on how to design space so that it can become a vehicle to choreograph the everyday performances of human beings. Body and space share a symbiotic relationship with one another and many of the decisions we make throughout our day are the result of subtle cues from the built environment that surround us.

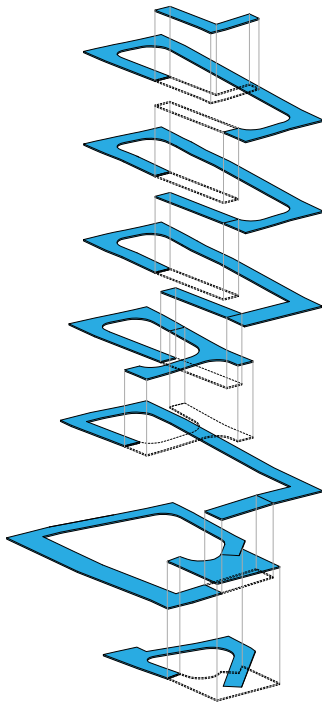
It has been said that “there are no bad people, just bad incentives” and throughout our daily routine our built environment provides us with an ongoing series of bad incentives. A store located within the center of an extensive parking lot encourages us to travel by car. A workplace with no safe place to lock up our bike encourages us to make the decision to leave our bike at home. As we walk into most buildings, the first thing that becomes visible is the elevator lobby, which directs us to use it for transit to our desired location. In most of the buildings built today, the stairs are tucked away and only expected to be used during emergency evacuations. It is no surprise that the contemporary lifestyle is sedentary – our built environment is constantly telling us to be inactive.

A growing body of research suggests that evidence-based architectural and urban design strategies can increase regular physical activity. (Active design guidelines, 2010) Urban design guidelines produced across North America are beginning to set standards on how to provide better incentives for urban

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inhabitants. Walkability is a popular term to describe the design of the built environment that promotes pedestrian and bike-friendly streetscapes, but rarely do we discuss walkability at the micro scale of the building. *Motivated Movement* is created through an environment whose form encourages us to move through the building in ways that are healthier for our bodies, encourages us to engage in social interactions, and provides us with a spatial experience. *Motivated Movement* focuses on behaviour and perception of the human body in order to emphasize and subconsciously promote one movement path over the other. There are many ways in which architecture can intelligently provide us with good incentives to make better decisions about how we carry out our daily lives. The following strategies are ways in which *Motivated Movement* were implemented within this thesis project.

### 1. Promote walkability within buildings

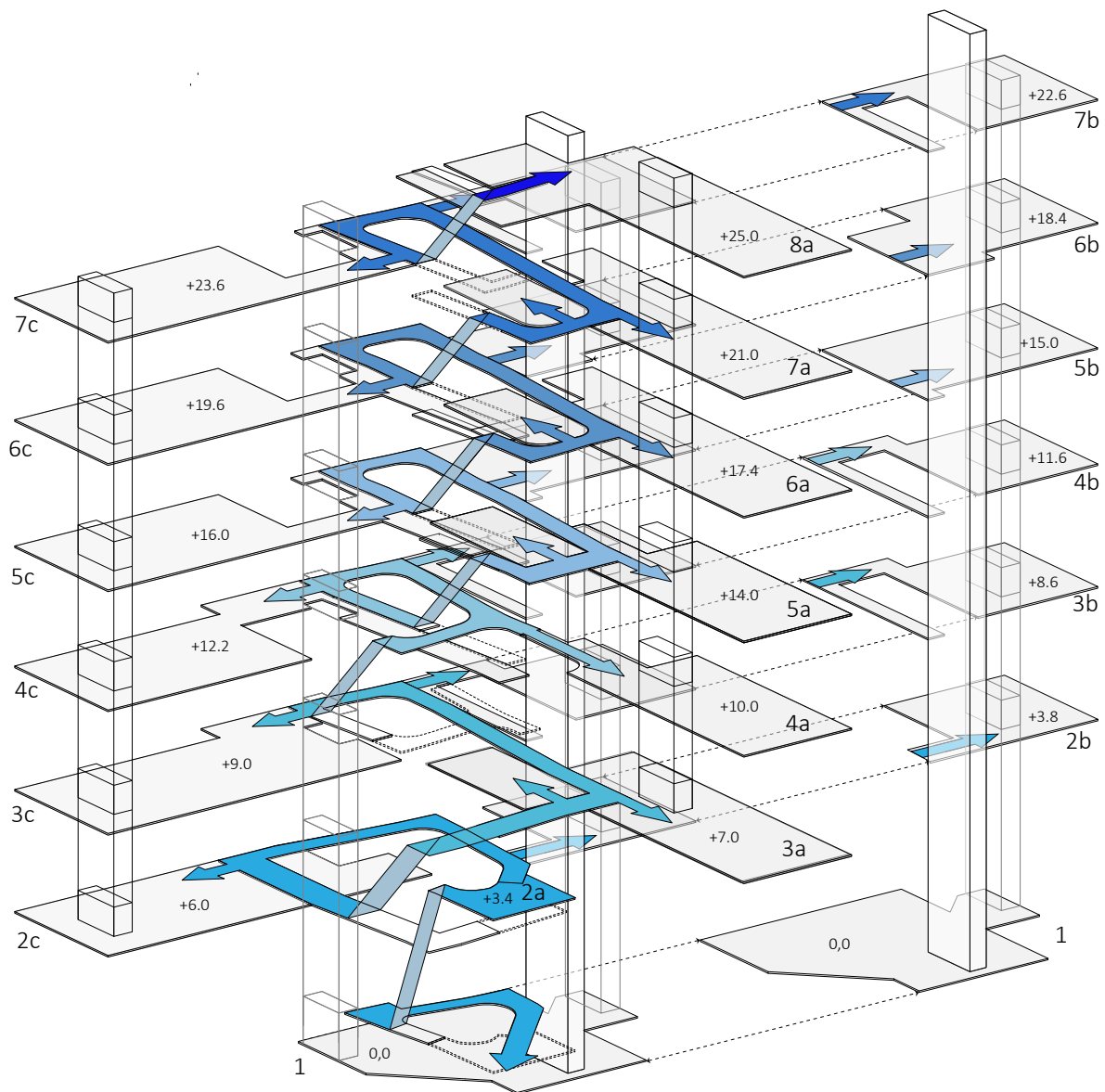


[6-1] Diagram of pedestrian circulation ramp

Within the scale of the building, the elevator creates a scenario similar to that of a highway. It creates accessible connections between larger distances but creates discontinuity at the micro scale. It is typical today that buildings have stacked floor plates where the only means of travel between them is via an elevator or egress stairs (where the latter is often hidden out of sight.) These buildings provide no option for human physical movement between floors. In order to get people moving within a building, we have to provide a means of movement for them to do so, through a continuous surface designed to facilitate human movement between floors. The flow of human movement requires continuity in the path of travel. Simply put, this could be a stair, and in the past, prior to elevators, grand central staircases were the interior promenades for physical movement within great buildings. That being said, although stairs are an excellent source of exercise, they do not cater universally to people of all ages and physical abilities. Instead, this project proposes a system of ramping, with at most a five percent slope to provide

a continuous surface for the human being to comfortably move physically, regardless of their abilities or limitations. The design of the ramp was done so that the floor plates of the three different office spaces are staggered by 1.2 meters (+/-) vertically from each other giving a floor to floor height of 3.6 meters in most conditions. By staggering the floor plates it also allows for continuity in the program, breaking up the vertical distance between floors.

[6-2] Exploded Diagram: Interior circulation ramp





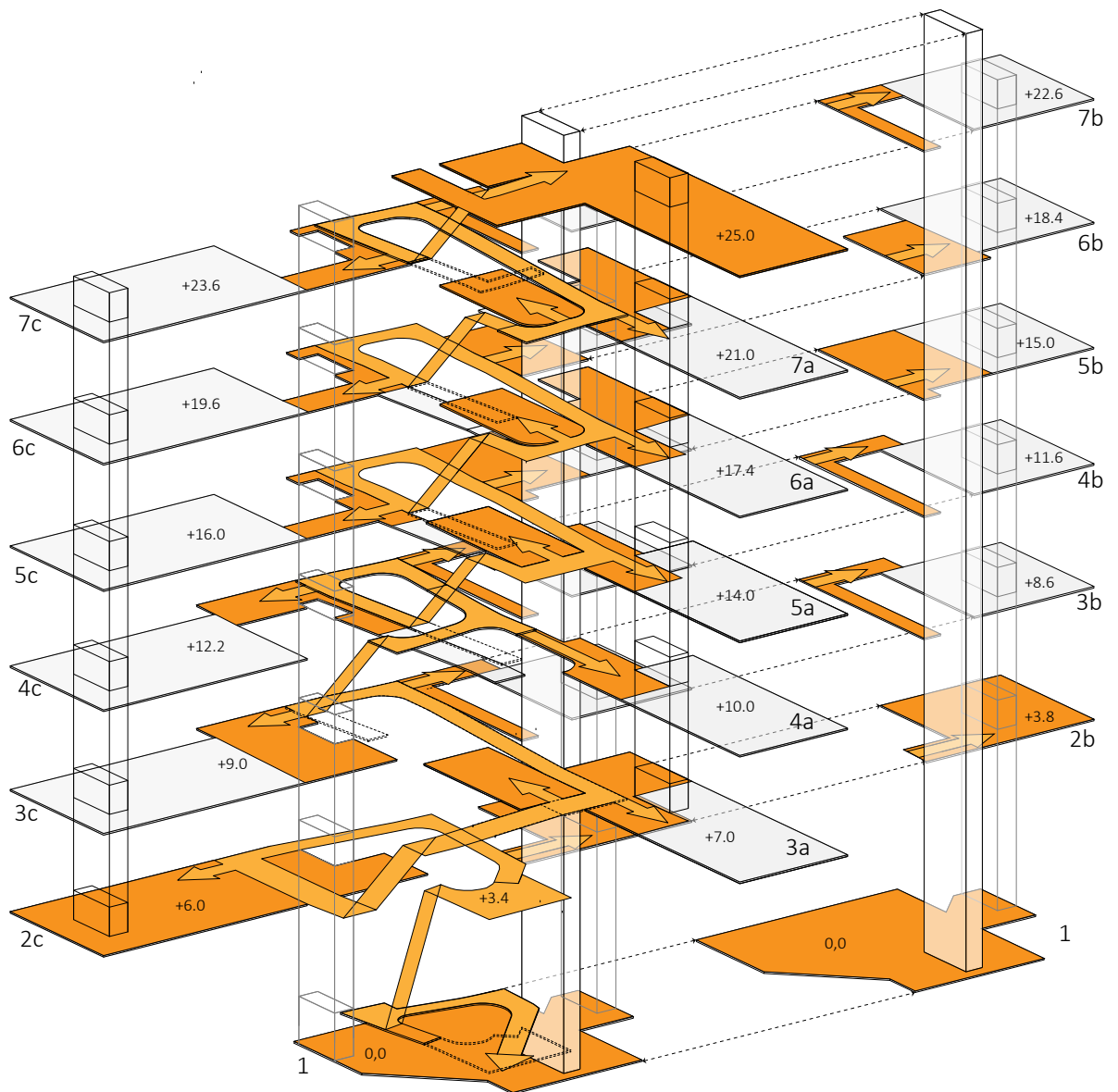
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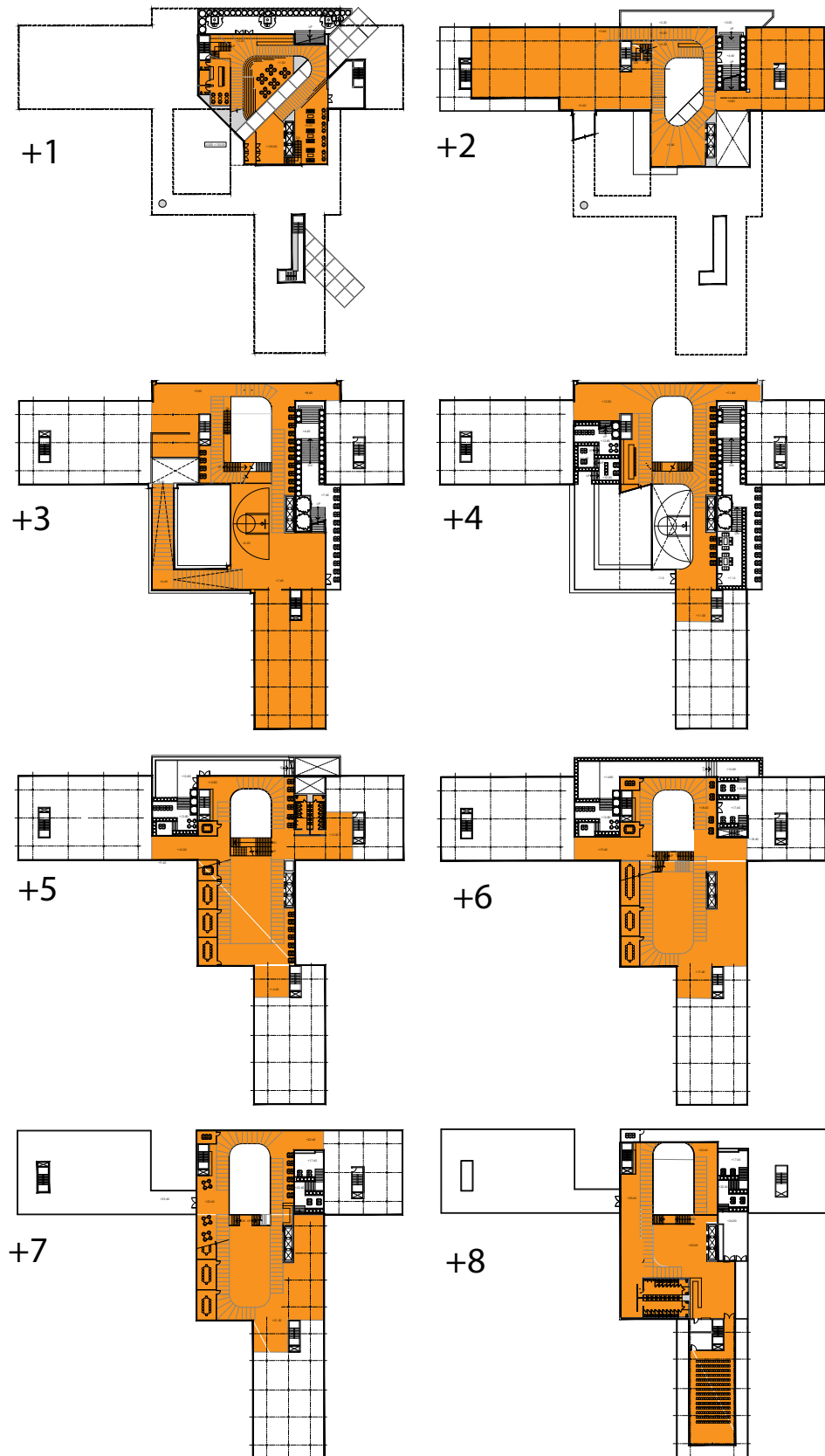
## 2. Circulation space should be social space – a streetscape

In order to encourage walkability at the urban scale, you want to create a vibrant and active streetscape. The same applies for interior walkability, the paths for circulation should be a social space, and programmed with a mix of informal and formal meeting places. In traditional office buildings, the interstitial space, was often long corridors that allowed you transition from one program elements to the next but the circulation space itself was unoccupied. In fact, offices or programmed spaces turned their backs to these interstitial spaces. As a result, they were mundane, and there were no experiential qualities associated with the process of human movement. We've learned through urban design interventions that we want to open up to the street, and make these spaces transparent, or incorporated into the paths for human travel in order to promote people to move along them. As a result, these interstitial spaces can become charged with activity by programming areas to work, to collaborative, to take a break with friends, or to enjoy moments of play. Social spaces, can also be called informal spaces, and within these informal spaces, lots of productive work can get done. "A study at M.I.T. found that 80 percent of the breakthrough innovations in products and services did not occur in training sessions or formal meetings. Rather, dynamic innovation was almost always the result of informal (even chance) encounters." (Goman, 2012)

*"A study at M.I.T. found that 80 percent of the breakthrough innovations in products and services did not occur in training sessions or formal meetings. Rather, dynamic innovation was almost always the result of informal (even chance) encounters." (Goman, 2012)*

[6-3] Exploded Diagram: Social Space interconnected with interstitial space





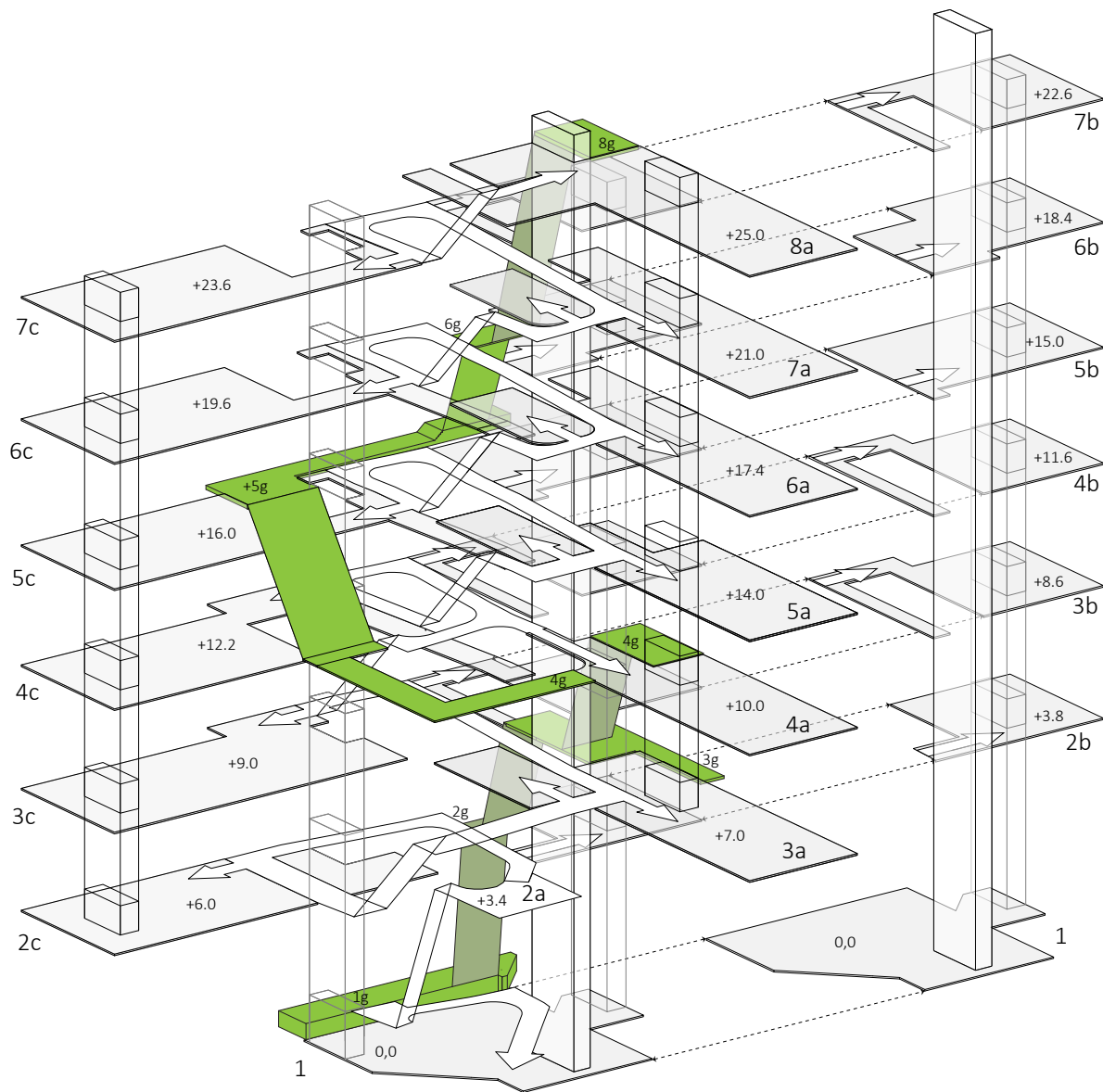
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### 3. Circulation spaces should be appealing walking routes

Dovetailing on the previous strategy, circulation spaces should be designed to make them places where people enjoy the experience of moving through. Similar to exterior walkability strategies, landscape and natural elements make these interior and exterior streetscape more inviting. Creating appealing views from within the circulation spaces act as stimuli to make a walk feel shorter and more enjoyable. In addition, providing bright day-lit spaces, and natural ventilation within the interior circulation spaces make them feel more like the outdoors, full of sensory experience. With these ideas in mind, in order to provide interesting views from within the circulation space, outdoor landscaped paths and programming wrap around the interior ramp system. The exterior space also provides a means of circulation, which wraps its way down to the lobby of the building and up to the conference space on the top floor. By providing the option of an exterior route to travel vertically through the building, employees can have meetings while on the move in a refreshing outdoor setting without leaving the office. In addition, spaces for outdoor work are provided adjacent to the exterior walking path. There are also benefits associated with providing places to work and move outdoors. Studies show that employees who work outdoors are significantly more productive throughout the bulk of their day as oppose to people who work indoors. (Workplace Design Magazine, 2012) The band of outdoor circulation not only provides appealing views for the interior circulation and spaces for outdoor work, but it also manipulates the form of the building to provide the private spaces, more access to natural light and ventilation.

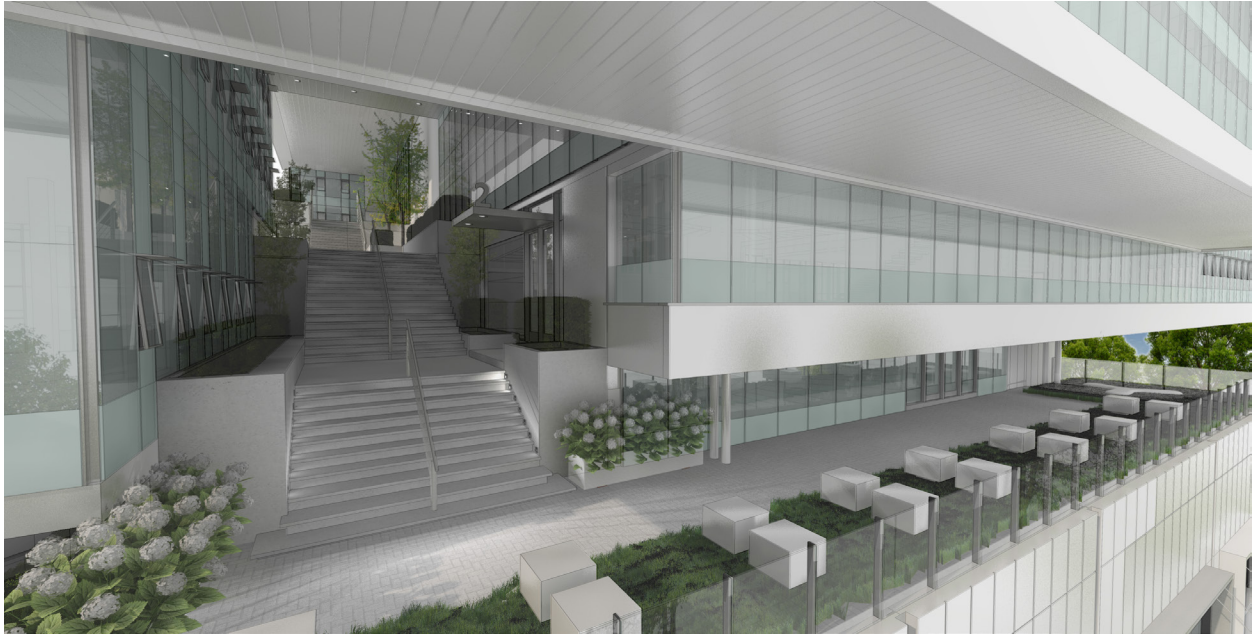
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[6-5] Exploded Diagram: outdoor circulation wraps around the interior circulation



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[6-7] Rendering: Outdoor Circulation Space (floor level 1)



[6-8] Rendering: Outdoor Circulation space (floor level 5)





[6-9] Outdoor green space



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## 2. Provide stairs for everyday use

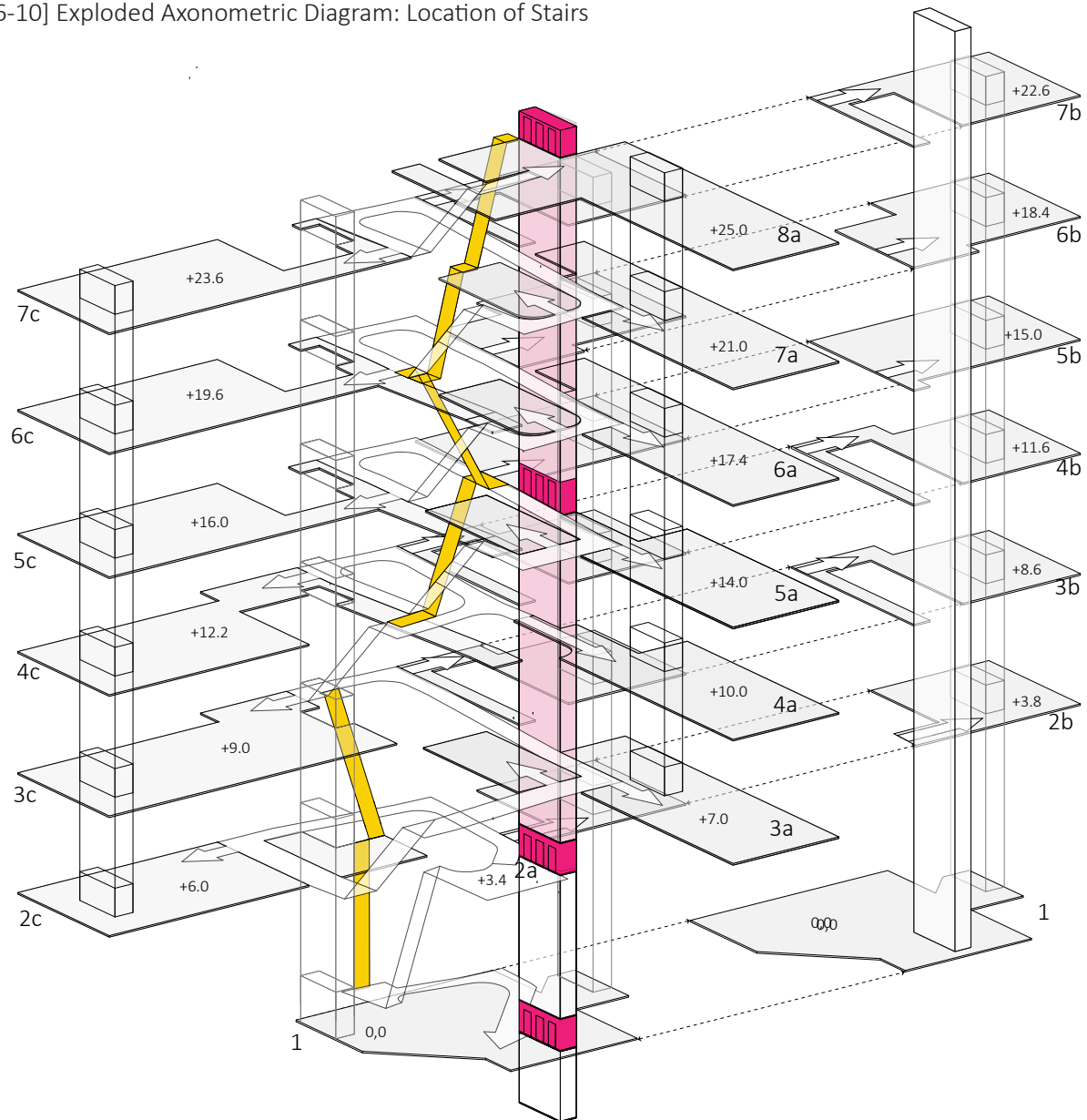
Despite a continuous ramp available for movement, some employees may want to take a more direct route. Stairs burn twice as many calories as walking, so they are great mediums to add a shortcut in a movement path without limiting the amount of movement people are experiencing. Stairs also have positive health gains. “Something as simple as two minutes of stair climbing per day, about six to eight floors per day – burns enough calories to prevent the average annual weight gains that you see in US adults.” (Lee, & Nicoll, 2011) “In a study of over 100,000 Harvard men, those who climbed twenty to thirty-four floors of stairs per week – about 4-7 flights/day for a 5-day work week – had a nearly 30% reduction in their risk of stroke. That was independent of whether they exercised in their leisure time.” (Lee, & Nicoll, 2011) That being said; the location of a stair has considerable influence over its use.

A few factors should be considered when locating a stair. First of all, it should be highly visible, so in the case of this project, it makes sense to be located within the atrium associated with the main circulation system; the ramp. Evidence suggests that stairs attract more use when they are highly visible from paths of travel and easy to access. (Nicoll, 2007) Secondly, on floors where there is a stop for the elevator, the stair should be located adjacent and in view, so that if employees get impatient waiting for an elevator, they may be motivated to take the stairs instead. (Nicoll, 2007) Lastly, research indicates that stairs directly accessible and visible from the building’s elevator waiting areas, atrium, entry vestibules, and most-used public corridors are more likely to be utilized for everyday travel. As a result, when entering a building, the stairs should be the first visual means of vertical travel, instead of the elevator. Although, the elevator is the first line of sight when



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[6-10] Exploded Axonometric Diagram: Location of Stairs

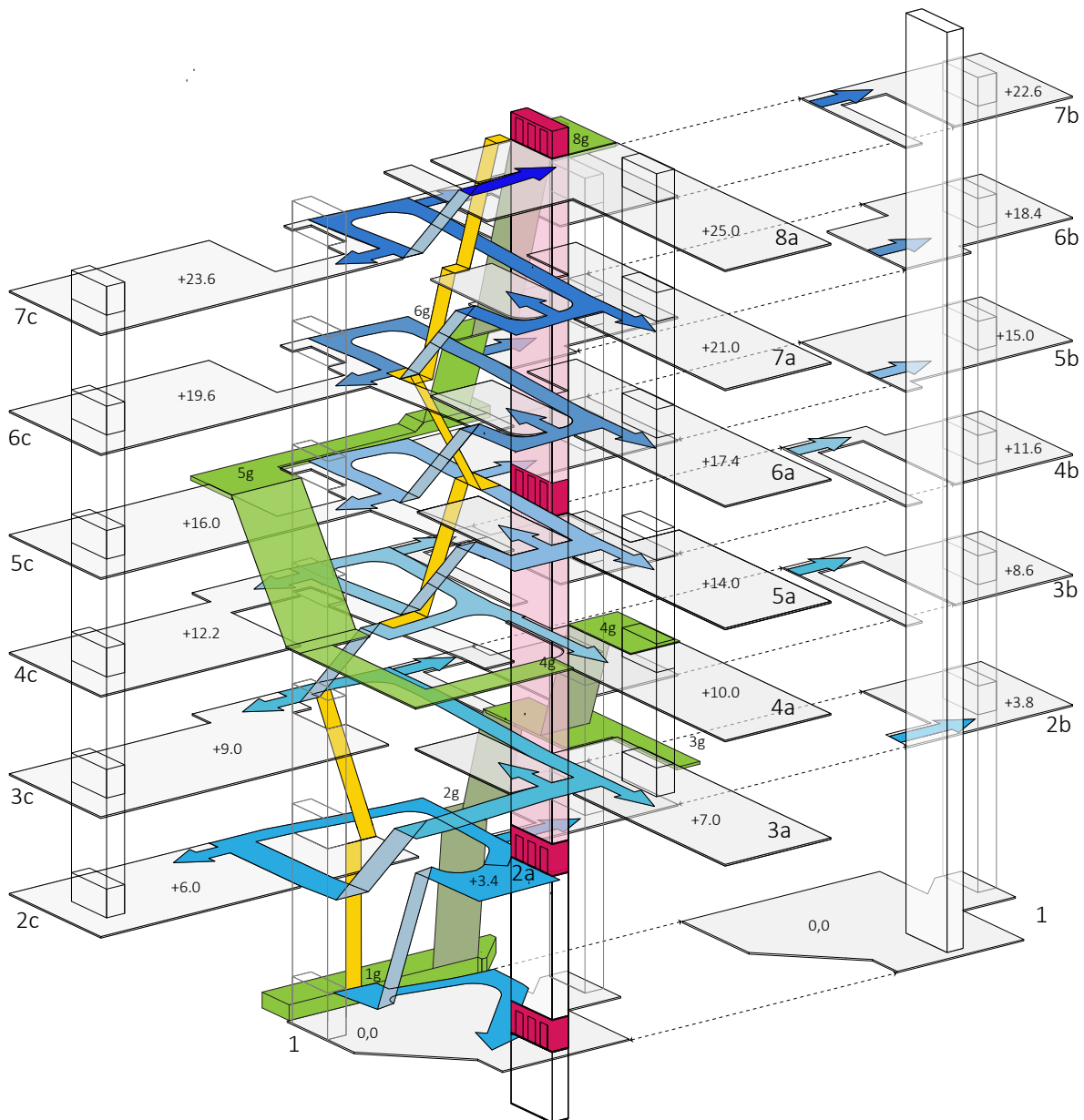


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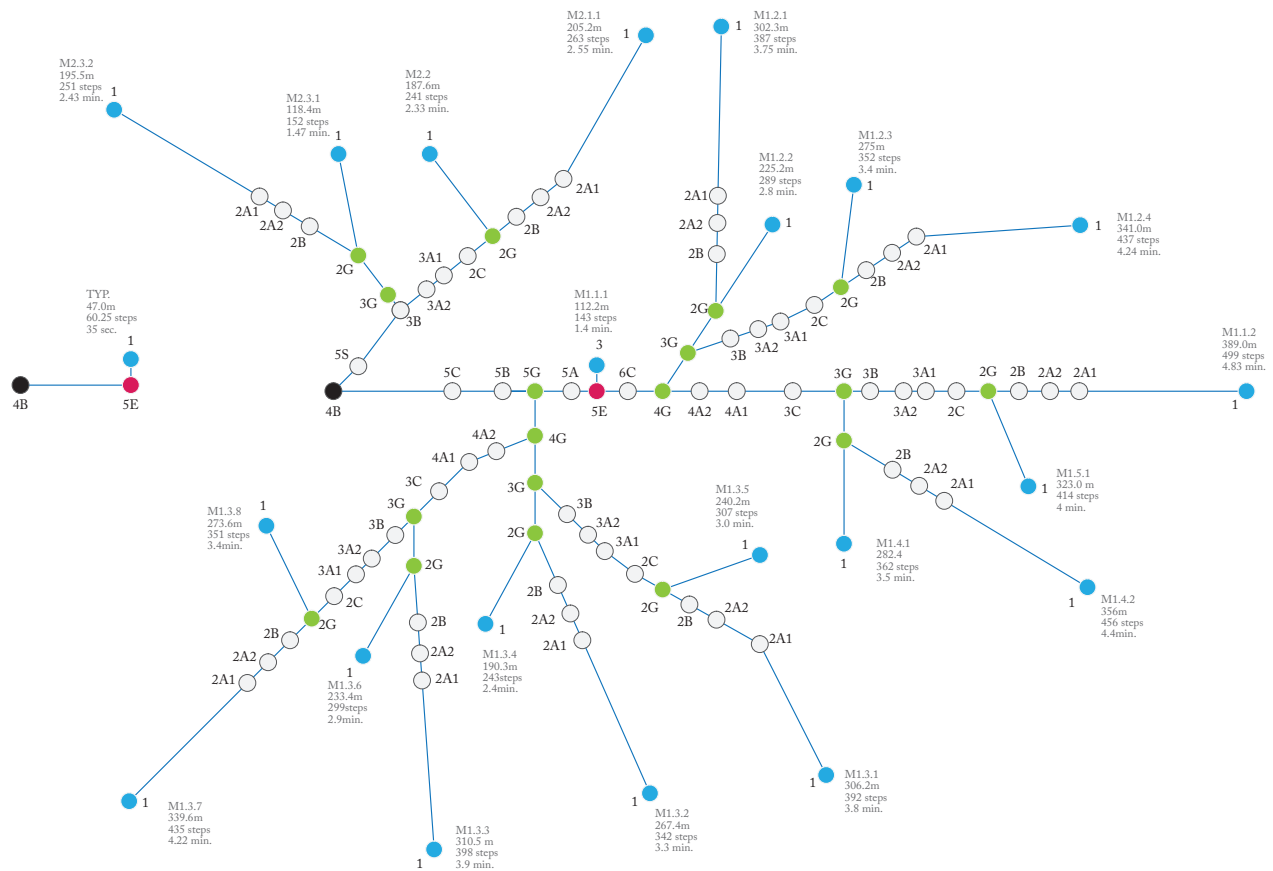
entering the lobby of this project, these elevators do not travel vertically into the office building from this location; they only drop people off from the ground level and parking levels below. This condition allows for the lobby stair is the first visual path for vertical movement after making your way through the office reception and security. In a study by Dr. Gayle Nicoll, she found

that stairs which are located closer to the entrance and in better eyesight than the elevator, get more than triple the use over an elevator that is further from the entrance and out of sight. (Nicoll, 2007)

[6-11] Interconnectivity diagram



## [6-12] Interconnectivity matrix : number of path options from point A to B



## 6. The circulation system should be highly interconnected

Similar to urban planning street networks, providing interior walking routes which are highly interconnected provide choice in your path, as well as options to change your trajectory along the way. . In a study of office environments, it was found that office spaces that were rated with high interconnectivity resulted in employees walking more throughout their day while also taking more frequent breaks from sitting. (Duncan, et al., 2013). Diagramming the connections between spaces is a good tool for checking the success of your circulation system. In a traditional office typology, there is often only one movement path provided to access to lobby from a program space (when not considering the option for fire exits). In the case of this project, the way the

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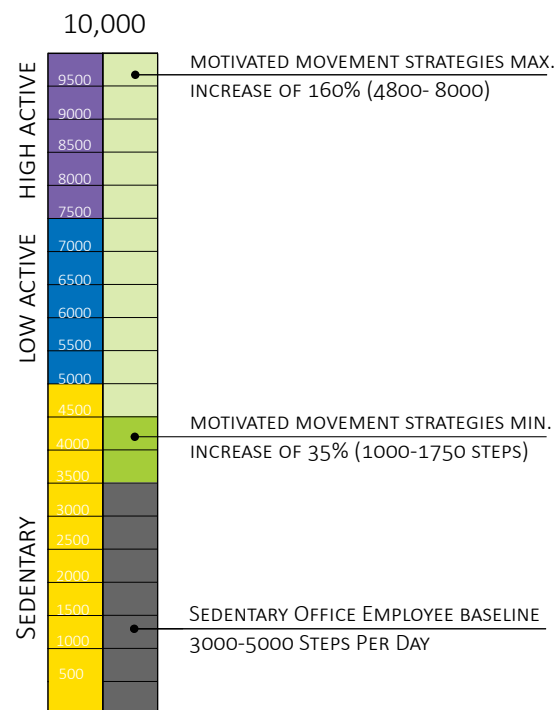
circulation system has been designed creates an abundance of options for occupants to choose their path and redirect to another route along the way. Figure 6-12 clearly illustrates the high level of interconnectivity the interior ramp system, the exterior walking route, and the stairs create.

## 7. Create moments for play

Places for play should be provided throughout the office building. Workplace physical activity programs in the United States have been shown to reduce short-term sick leave and health care costs and to increase productivity. (World Health Organization, 2003) Within this project these moments of play include a gym, a basketball court a media lounge, a putting green, pool and ping pong tables, a rooftop outdoor activity space, and the public green which is part of the podium design. Many of these spaces are dispersed within the interior atrium of the building so that they are visual to people passing by in order to promote their use. In addition, many of these spaces have views looking over the green space below and beyond into the Don River Park system. Research indicates that exercise is more appealing when it occurs in spaces with views to nature and human activities. (Active Design Guidelines, 2010) By providing these moments of play around the office, employers are making going to work more fun. “If an employee is happy to be at the workplace and having fun at the workplace then they eagerly go to work, they have [fewer] sickies and time off and, more importantly, they are about 30 to 40 percent more productive.” (McNeilage, 2012) These spaces also help to break down formal barriers between employees and allow them to feel more comfortable at sharing their ideas.

These *Motivated Movement* strategies do not force occupants into greater levels of activity; instead it creates the spatial conditions to provide appealing incentives for human movement. These strategies are derived from successful interventions that support walkability at the urban scale. Walkability within the urban fabric has been studied to a greater extent than pedestrian behavior in building interiors. However, it can be assumed that these interventions can produce similar metrics in increased pedestrianism when applied to interior building communities. Metrics indicate that these types of interventions that enhance the pedestrian experience can increase physical activity through walking behaviors by 35-160 percent. (Lee & Nicoll, 2011) Based on these metrics, *motivated movement* strategies have the potential to increase occupant walking behaviours so that their level of activity is no longer categorised as sedentary, but instead active.

[6-13] Increased steps count associated with *Motivated Movement* Strategies



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# CONTROLLED MOVEMENT

*“There is no doubt what so ever, about the influence of architecture and structure upon human character and action. We make our buildings and afterwards they make us. They regulate the course of our lives.”*     -Winston Churchill (1924)<sup>1</sup>

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Time is a very valuable resource, one which comes and goes far too quickly. We often blame our lack of time for the poor decisions we make regarding our health and well-being. In fact, the number one excuse for why people don’t meet the minimal requirements for physical activity is because they don’t have time. Since time and space are relative, what if the design of space could become a medium which unknowingly is programming time for physical activity into occupant lifestyles?

This idea is the concept behind *Controlled Movement*. Unlike motivated movement strategies which are ‘pull’ strategies, Controlled movement strategies regulate your options so that you are ‘pushed’ down a certain path. As designers we are able to manipulate a movement path between two points and design the conditions of that segment, in this case to promote a certain degree or type of movement.

This is counter-intuitive to current practice. As designers, we tend to limit the need for movement as things that are located closer together are considered more convenient. Convenience is associated with things or conditions that can make our day to day activities go faster and easier. In most cases, it is seen as a positive trait and many of the spaces we design today are done so with convenience being an important priority. However, if everything

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1 Winston Churchill, addressing the English Architectural Association, 1924

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is at hand, or just a step away, and there is no need for physical movement, than convenience can be seen as a negative condition as it acts as an aid for sedentary behavior.

The following are strategies are *controlled movement* strategies which were implemented within this project. These strategies work to regulate the amount and frequency of movement that building occupants undergo throughout their day.

### 1. Facilitate a NEED for Movement

In his book “The Mastery of Movement” Rudolph Laban (1950) begins by stating that all movement begins with a need for movement- “Man moves in order to satisfy a need.” (Laban, 1950) This is the case for most living creatures, our need for nomadism is rooted in tangible needs for survival. Water is perhaps a living creature’s greatest need, and a catalyst for physical movement, and also and agent for creating a social hub. It is no surprise that the water cooler becomes a place that brings people together into social encounters within the office just like a waterhole becomes a place for gathering in the wild. There are many programmatic elements which are needed within one’s day to day activities. Generally speaking theses needs are universal, therefore, these

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[7-1] Places of need: Analogy between the waterhole, and the water cooler



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places become hubs for chance social interaction. This concept is the basis for the first design strategy emerging from the designer's ability to control movement.

Buildings and the spaces within them have been becoming more and more convenient through design and technology. Most of our needs are at our finger tips and those that aren't are a quick elevator ride away. Although for many people, the net savings in time through the creation of 'convenient' spaces is not transitioning towards use in physical exercise and is instead facilitating a greater degree of inactivity. "It has been reported that for a given amount of total daily sedentary time and physical activity, individuals who take more frequent breaks (e.g. standing, or walking down the hall at a leisurely pace) have lower body weight, waist circumference, triglycerides and higher oral glucose tolerance. This suggests that simply breaking up sedentary time may help mitigate the health risks when sedentary behaviour is unavoidable." (Healy, et al., 2008) Brief bouts of movement need to be designed into a buildings spatial layout, because if occupants are not taking the time out of their day to be active, then time must be programmed in their day by manipulating a buildings spatial and circulatory layout.

Many of the regular used program spaces within a building can be organised so that they create movement. For example, the washroom facilities are located in a central location within the circulation space of the atrium, but they are not provided on every floor level. Through this controlled movement strategy alone, it ensures that occupants are getting up from their workstations, about four to six times a day, and walking on average, about 360 steps each time. Through this single human process, and design response, we can estimate that most employees will achieve at minimum 15 percent of their daily recommended activity, while also benefiting from the positive benefits of breaking up prolonged sitting.



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This same strategy is used for beverage counters, where access to water, coffee, and tea is centralized within the main atrium in a few different locations. Not only does this get people moving while they take a break from work, but it also brings them within the social space of the building where they are more likely to have chance encounters and conversations; before heading back to their desk. It is estimated that if each employee makes a couple trips to the beverage bar each day than this *controlled movement* strategy would add 575 steps of movement into their day accounting for a minimum of 5 percent of their daily activity target.

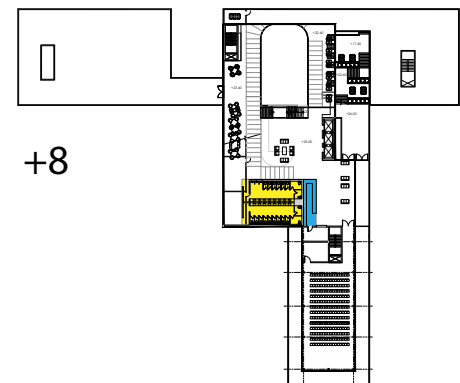
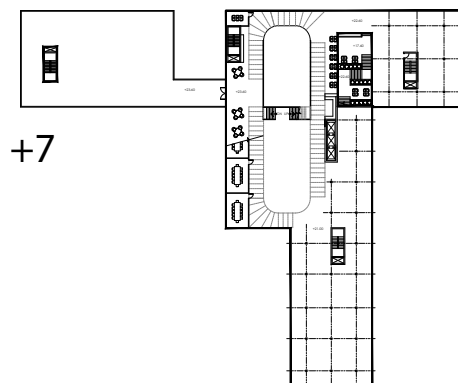
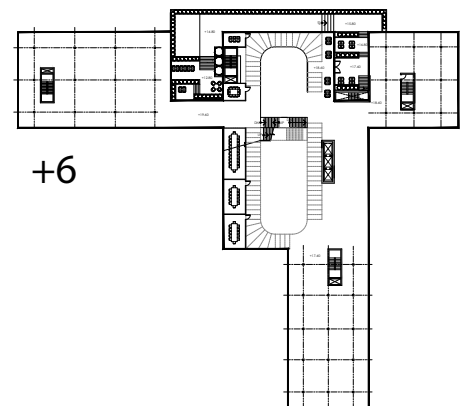
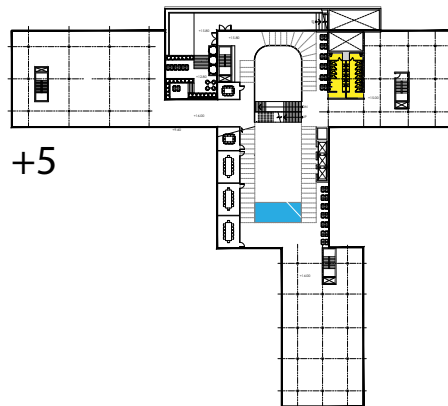
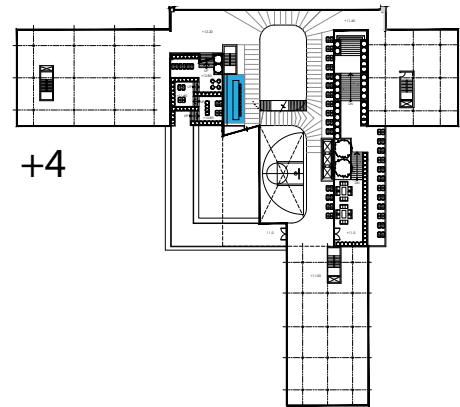
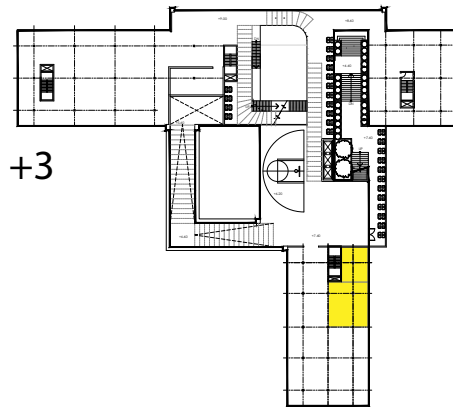
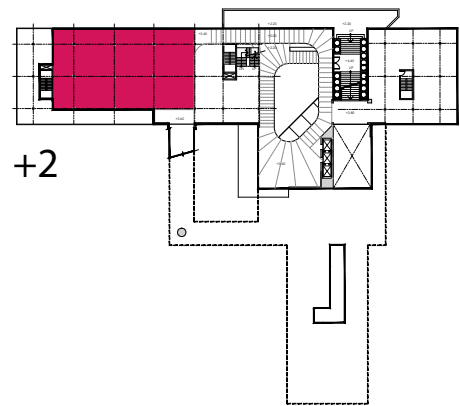
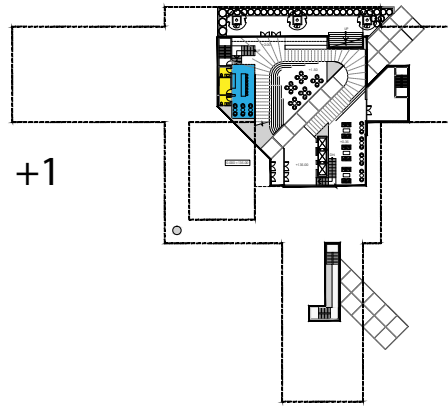
The lunch room can also be considered as a place of need. In order for employees to break up their day by ‘going for a walk,’ the lunch room has been located to so that the majority of employees will move along the bridge that is suspended over the park to access it. Rather than each office providing their own lunch space, the lunch room is a shared amenity throughout the building, providing a full kitchen, where employees can make fresh and healthy meals in case they did not have time to do so in the morning from home. The average step count created by the movement paths to the lunch space adds an additional 565 steps, or 5 percent of total activity target to occupant’s days.

By creating places of need within the building, the amount of movement throughout one’s day quickly adds up, and at minimum, building users will achieve approximately 25 percent of their daily activity just through the movement created to access regularly used program elements. “With only a small amount of consideration we can navigate the fine balance needed to ensure these support functions are close enough for the normal flow of business but far enough to require a little movement.” (Lee, & Nicoll, 2011)

[7-2] Places of need

Legend

- Washroom facilities
- Beverage Bars
- Lunch Room



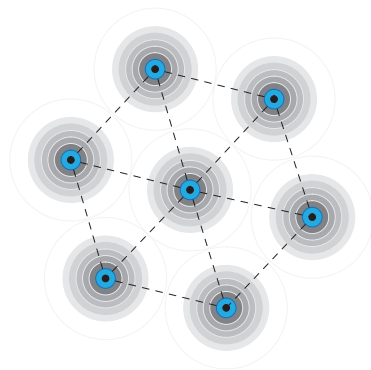
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## 2. Provide Skip-stop elevator systems

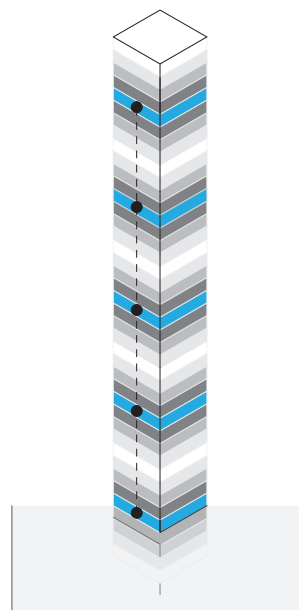
The introduction of skip-stop elevators into building design is a 'push' tactic to encourage occupants to undergo greater levels of physical activity while also lowering energy costs and by association, lowering its ecological footprint. Reducing usage of elevators and escalators also promises benefits for the environment and attendant cost savings, since mechanized conveying systems routinely account for approximately 3 to 10 percent of a building's energy use. (Active Design Guidelines, 2010, pg. 16) Rather than servicing every floor, the building is comprised of a collection of pedestrian-friendly vertical communities. Similar to how a subway system connects walkable nodes horizontally, the elevator should become a system that connects walkable nodes within the building vertically.

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[7-3] Walkable neighbourhoods, horizontally (urban scale) and vertically (building scale)



The subway connects walkable nodes  
horizontally

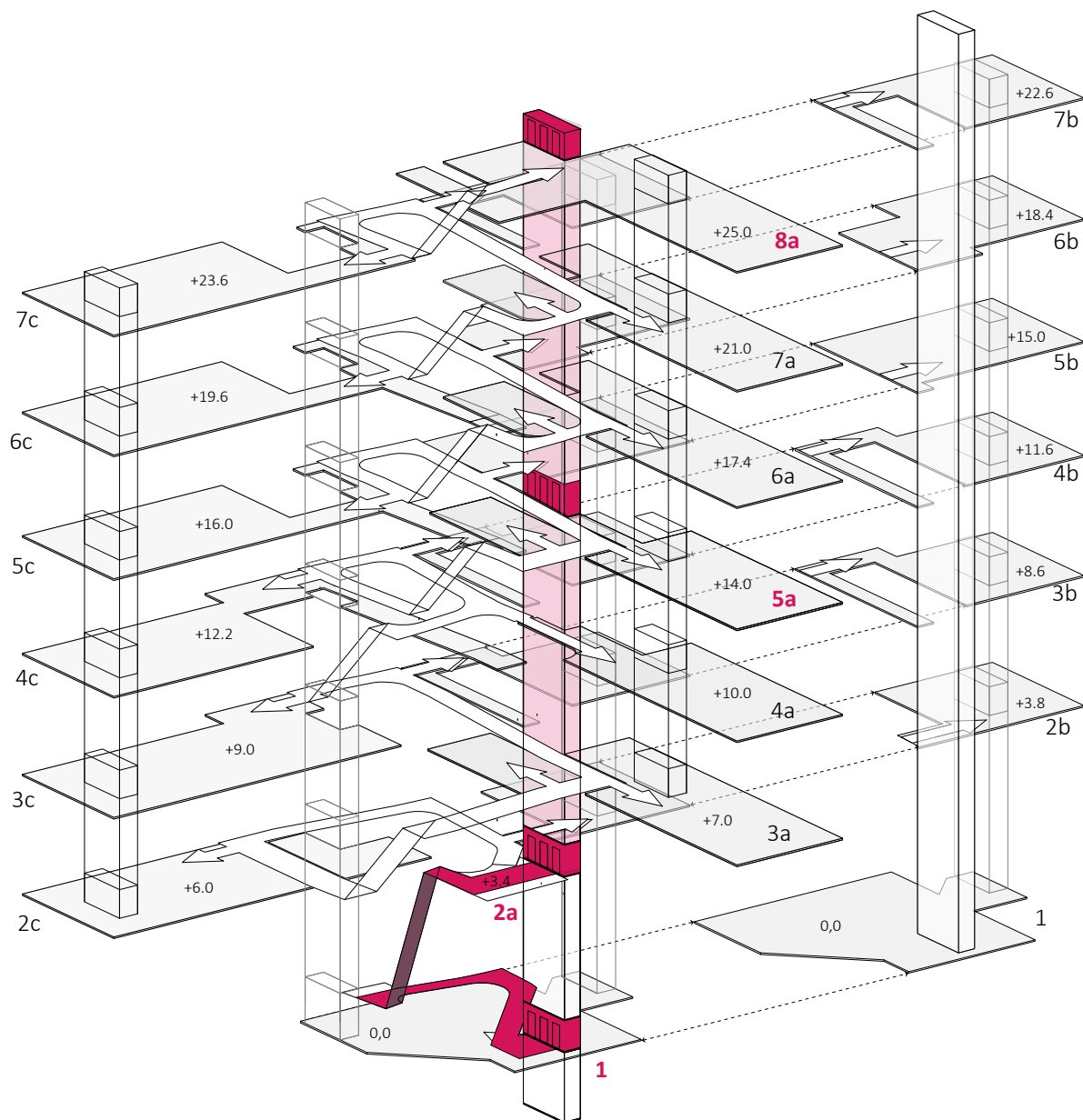


The elevator connects walkable nodes  
vertically

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Dr. Gayle Nicoll and a team of researchers completed a study within the Caltrans District 7 Headquarters designed by Morphosis Architects that implemented a skip stop elevator system. They found that there was much greater stair use in the skip-stop core. Within the thirteen-story building, 72 percent of the employees use the stairs. (Nicoll, & Zimring, 2009) Skip-Stop elevators were also implemented in 41 Copper Square which was also designed by Morphosis architects. This building is designed so that 50 percent of building users travel vertically only by foot. (Zardini, 2012). Both projects can be found in the appendix of this thesis.

Using these examples as precedents, skip-stop elevators can be implemented into office buildings as a controlled movement method. Both precedents use three floors as the typical interval for elevator access that was also applied to this project. An elevator stop is provided at the ground level, which in actuality is about one storey up the ramp that feeds into the public green space. The hope is that people are motivated to walk the exterior path through the park to access the lobby. However, if they take the elevator it is programmed to drop everyone off at the lobby level. The same applies for building users who are accessing the office building from the handicap and reserved parking area on level-2. This is for security reasons, and it pushes people into the office lobby and reception where they go through security and then continue up the ramp to the level above to access the elevator again; if required. The elevator services levels two, five, and eight within the vertical office community. There is an ADA compliant elevator which would have fob access from every level that is also the firefighting cab during emergencies and the service elevator deliveries and maintenance.



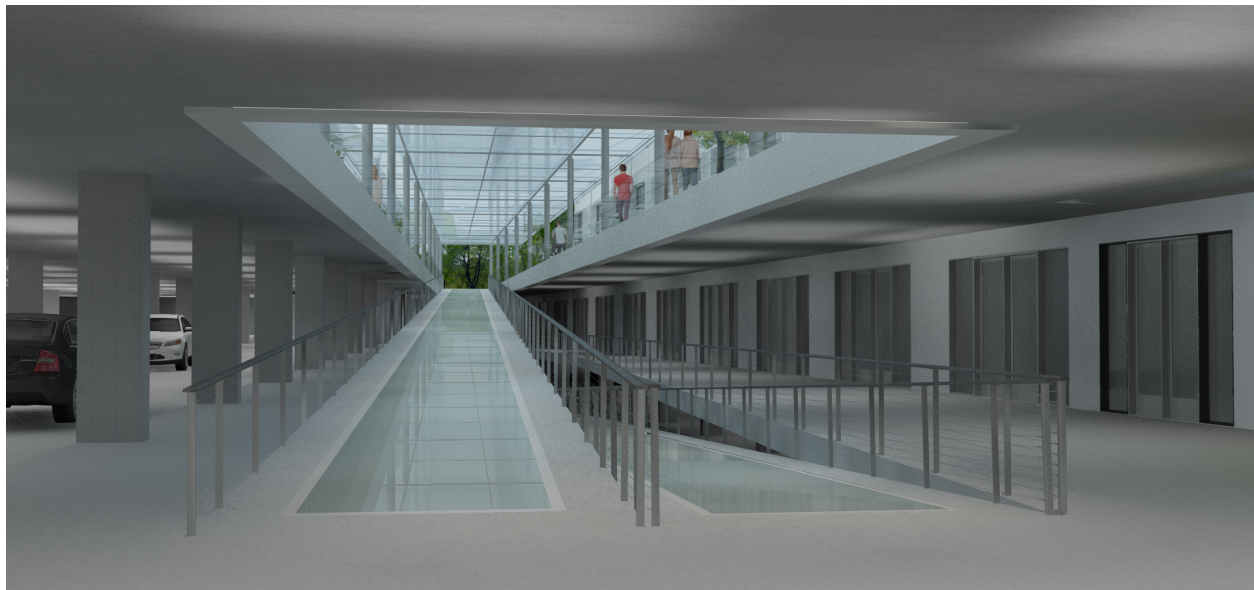
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### 3. Control movement paths associated with agents of sedentary behaviour

Controlled movement should target individuals who are more at risk of the negative health affects related to sedentary behavior. Those who drive, as oppose to cycling, or taking public transit are generally experiencing more time spent sitting and inactive. As a result, the controlled movement can be used as a push tactic to target these people at risk. In this projects case, the parking condition allows for opportunities to apply this 'push' tactic to get car users to experience more activity. The parking garage is open-air, and there are two levels provided. From both levels, access out of the parking garage is either to the south where people can walk up the exterior stairs into the green park space above or via a ramp system which also brings them into the public green space. From here, the hope is that motivational movement strategies will encourage these users to access the office lobby through the park space to contribute to an average walking distance of 420 steps or about a 5 minute walk.

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[7-5] Rendering: Pedestrian exit from parking garage



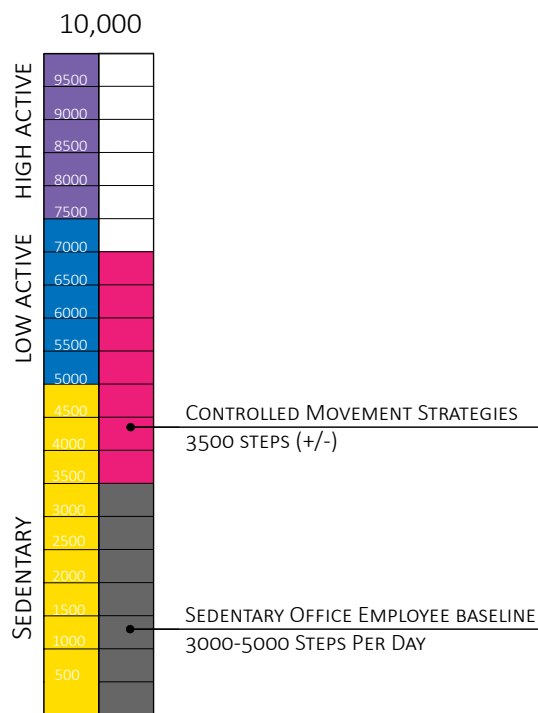
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Access to Visitor parking and handicap parking is provided by either fob access or by contacting security to enter the enclosed parking garage. Within this secured, and enclosed space there is an elevator provided from the parking to the office lobby for the individuals who required those services.

These controlled strategies implemented in the workplace regulate human movement so that each occupant achieves a higher level of activity by simply taking part in day-to day work activities. The average sedentary office worker takes approximately 3000-5000 steps per day. The strategies described in this chapter increased on occupant's steps count by approximately 3500 steps in comparison to traditional office typologies. Assuming worst case scenario, these controlled movement strategies regulate physical activity so that each occupant, at minimum, takes approximately 7000 steps a day, where 10,000 is the recommended benchmark.

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[7-6] Increased steps count associated with *Controlled Movement Strategies*





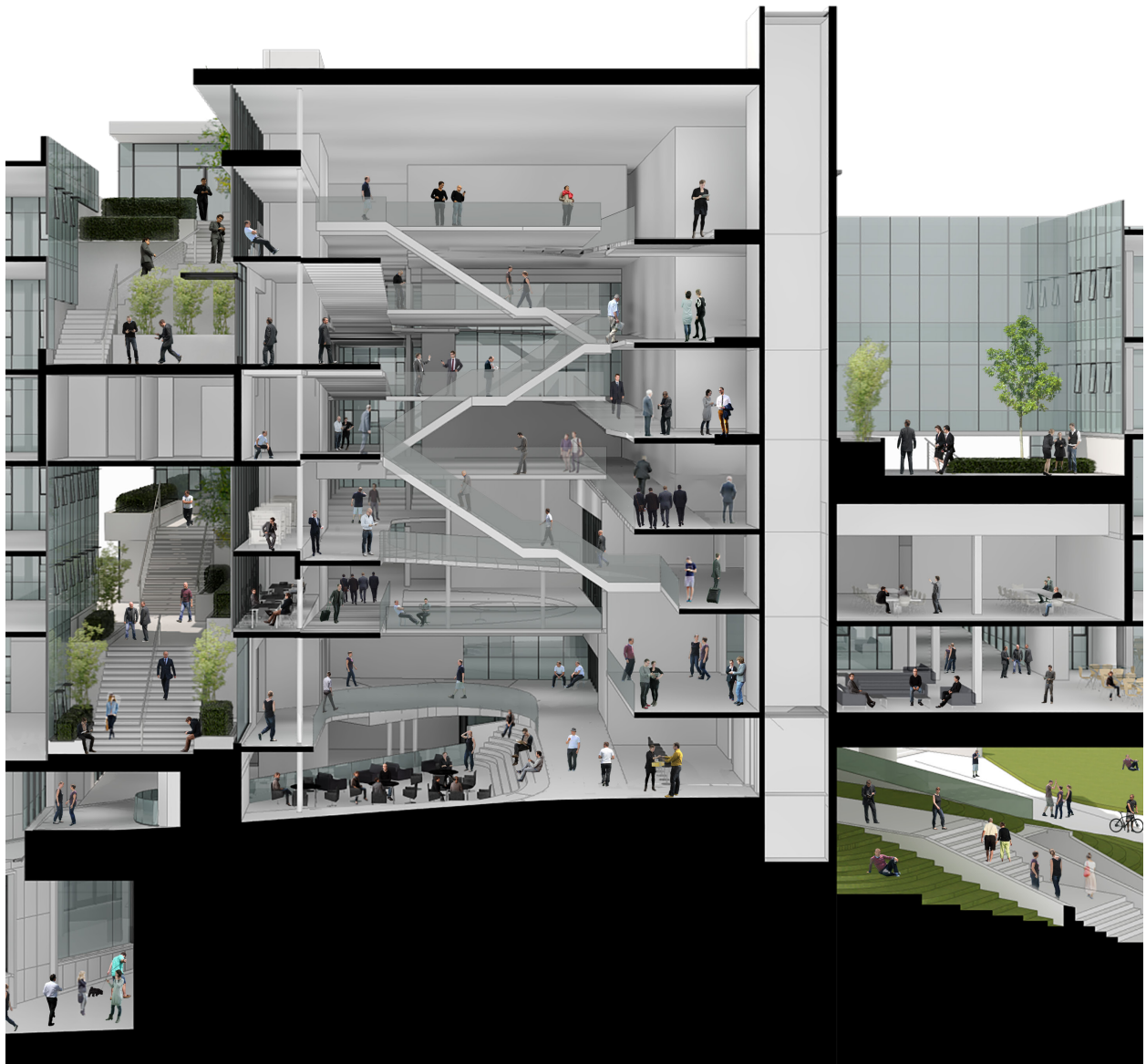
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In turn, even the most inactive occupants who work in this building will still achieve twice as much physical activity than occupants who choose to live inactive lifestyle and work within traditional office layout.

Although these push strategies may be read as inconvenient at first, it is important to note that all these routes are designed as appealing and enjoyable walking paths that are meant to enrich the users experience while acting as a vehicle for good health. It is also important to note that office buildings are generally moved through in a habitual manner. New building users may feel a bit lost at first when they are trying to find the elevator and then realise there is no stop on each floor. However, since they experience this space every day, way finding will become second nature.



[7-8] Building section through interstitial space and social hub (full)



[7-9] Building section through interstitial space and social hub (partial)

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# CONCLUSION & FUTURE APPLICATIONS

*“The environment in which we live and the environments that we design are key determinants of the health conditions and the health epidemics that [affect us].”*  
(Lee & Nicoll, 2011)

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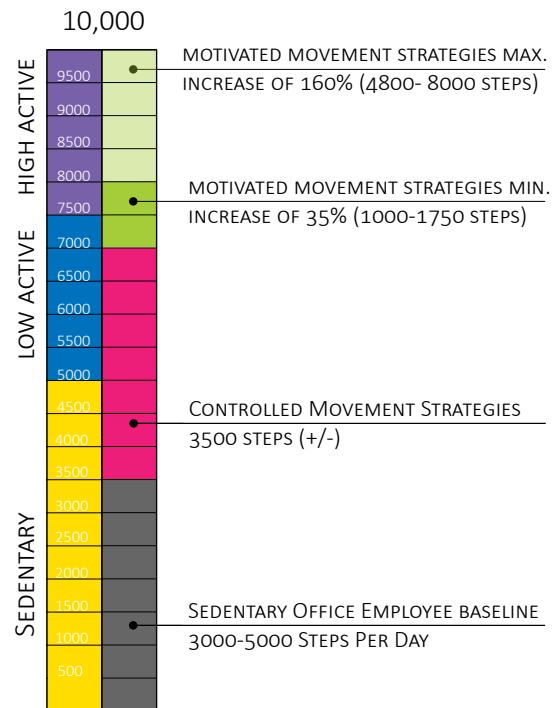
Today, three out of five people older than 20 years of age have a chronic disease (Elmslie, n.d.), and the spatial environment that we have designed and inhabited is the indirect cause. Understanding the effects our spatial environment has on human lifestyle has given rise to an emerging architectural paradigm which prioritizes the actions of architecture, as oppose to the objectified characteristics of aesthetics and form. With a focus on the performance of space, the objective of this thesis was to choreograph a human performance through spatial design to support physical activity and healthy lifestyles. What it does, is more important than what it looks like; the success of the project relies on how well it performs. In order to validate my hypothesis, I had to provide some measure of performance by analyzing how effective these design strategies were at fostering the degree of movement associated with healthy lifestyles.

The intended goal was to create a workplace environment which would be a medium to promote active lifestyles, and by association, decrease those affected by chronic disease. Based on an overwhelming amount of sources, 10,000 steps per day is considered the benchmark for active lifestyles. Individuals who are employed in workplace settings and considered to live sedentary lives generally take about 3000 to 5000 steps per day to carry out their day-to-day requirements. The controlled movement strategies implemented within this thesis project regulate human activity, whereby, the occupant step count associated with these strategies is increased by approximately 3500 steps in comparison

to an occupant working out of a traditional office typology. Both occupants, in each workplace layout, are undergoing the same day-to-day activities associated with the nine-to-five workday, but the occupant that works within the typology developed within this thesis would be considered significantly more active, achieving approximately 7000 steps per day at minimum.

Based on metrics associated with walkability at the urban scale, it is assumed that the *motivated movement* strategies could increase walking behaviour within building interiors by 35 – 160 percent. (Lee, & Nicoll, 2011) Based on these percentages, *motivational movement* strategies have the potential to increase sedentary occupant's lifestyles so that they meet or exceed the 10,000-step benchmark when compounded with the regulated movement produced through the *controlled movement* strategies. In response to my initial thesis questions, these calculations illustrate that architecture can play a primary role in

[8-1] Estimated daily step count for building occupants



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controlling the chronic health epidemics affecting society today by choreographing the human body using contingent movement, motivated movement and controlled movement strategies. In addition, this project enhances occupant well-being, increases workplace productivity, and lowers our ecological footprint due to the decreased dependence on external (non-human) energy sources.

In order to keep the possibilities endless, and to approach this project with an open mind, I came to the conclusion to work with an undeveloped site and a new office building. By approaching it in this way, I was able to develop a new typology as well as design strategies to control and motivate human movement. Now that these ideas have crystallized, these strategies can be applied not only to new construction but they can also be applied to retrofit exiting office buildings which no longer suit the needs, or fosters active lifestyles for our modern workforce.

Many of the office buildings within downtown Toronto are high rise towers. To tear these buildings down in order to build workplaces more suitable for today's demands is not economically feasible nor is it environmentally sustainable. Many employers are cutting down their square footage, not because their work force is smaller but because they require less space since private workstations are more compact. As a result, the percentage of office vacancy is on the rise – in Canada, 10.8% of office space is now vacant, up from 8.4% in 2013. (Mandel, 2014). If office tenants used 20% less of the nation's current office space, which has a total valuation of \$1.25 trillion - that decrease in demand would represent \$250 billion in excess office capacity. (Heschmeyer, 2013). With office supply high, and demand low within North America, Gensler Architects have proposed a concept of '*hacking*' that claims un-used office space and transforms it from its original use to provide new spaces suitable for our future workforce. (Gabriel Cruz., 2014) The focus in Gensler's concept of *hacking* was

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to provide shared amenities and social space for collaborative and interaction. Incrementally, piece by piece the stacked floor plates of traditional office towers can be cut, re-shaped, reorganized and connect to each other vertically. Although combating sedentary behaviour was not the motivation for the concept of hacking, the strategies developed within this thesis project compliment the design ideas proposed by Gensler. More information of Gensler's concept of 'hacked' offices can be found in the appendix.

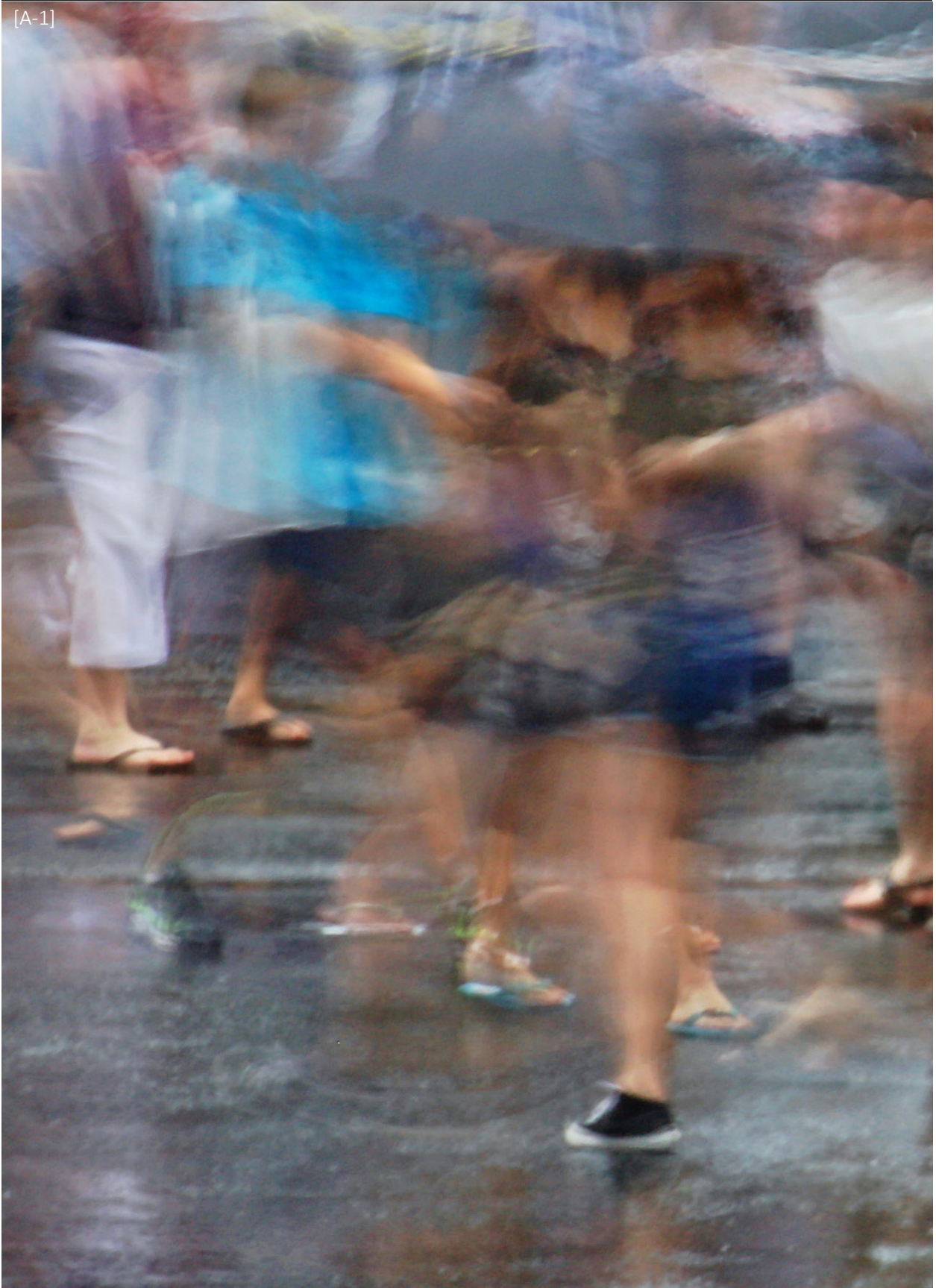
Using the framework proposed by Gensler, the strategies developed in this thesis to combat sedentary behaviour have future applications in existing office tower construction. Change is required as these existing structure do not accommodate the needs of today's workforce and their spatial condition is responsible for keeping people inactive while at work. Incrementally, connections between floors can be made for human travel, creating a vertical community to connect shared amenities and private office space. Overtime, a social hub will be created through the development of this interstitial space which will become the heart of future office buildings.

The solution to our chronic health epidemic is apparent, and overtime, changes to our physical environment can change the trajectory of sedentary behaviour and the negative health effects that come from inactivity. The architectural profession have the ability to initiate change, and it is our responsibility to be spatial agents through design interventions to promote activity for the greater good of society.

[“To movement, then, everything will be restored, and into movement everything will be resolved.” - Henri Bergson](#)



[A-1]





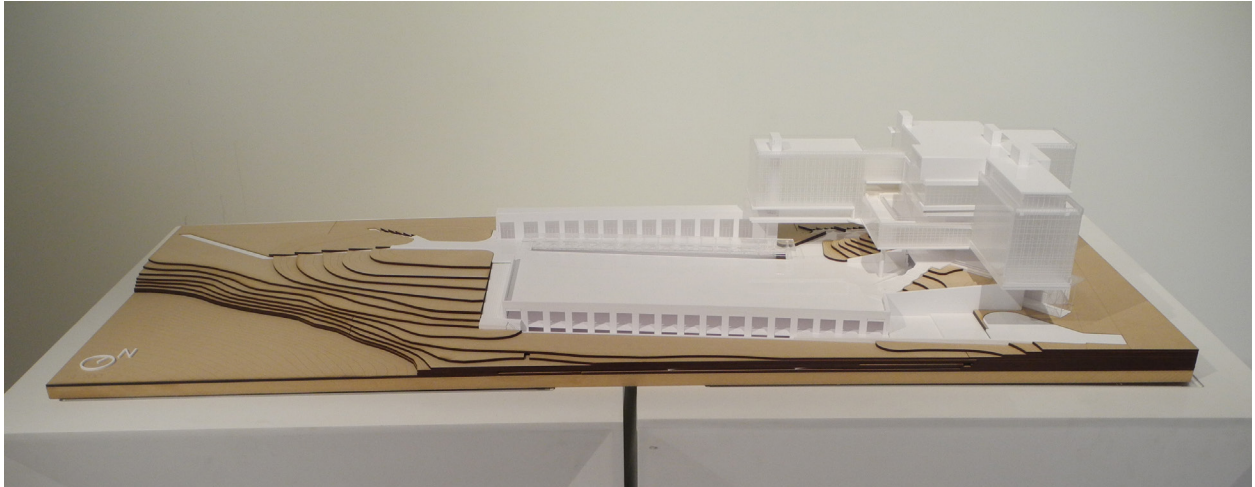
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# APPENDIX

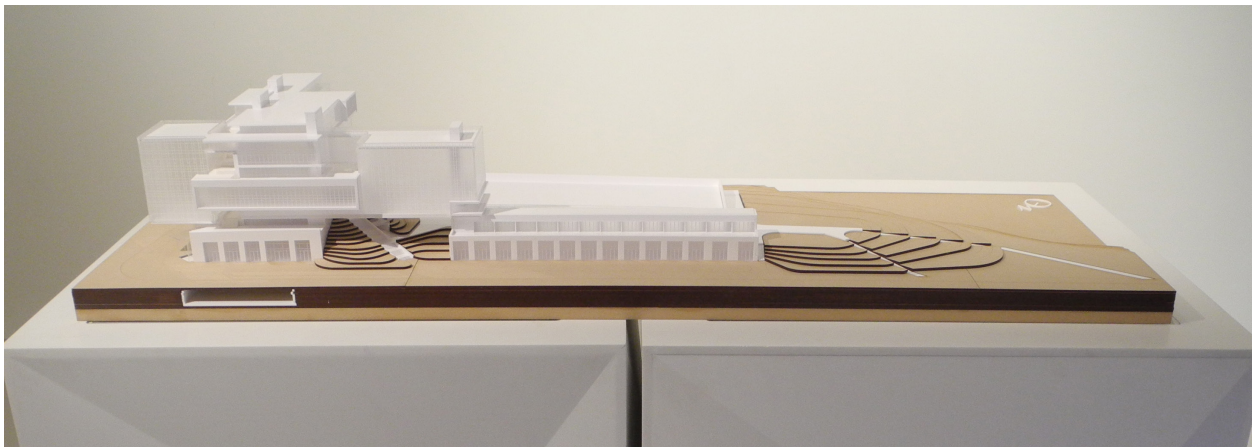
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## PHYSICAL MODELS : FINAL PRESENTATION MODEL

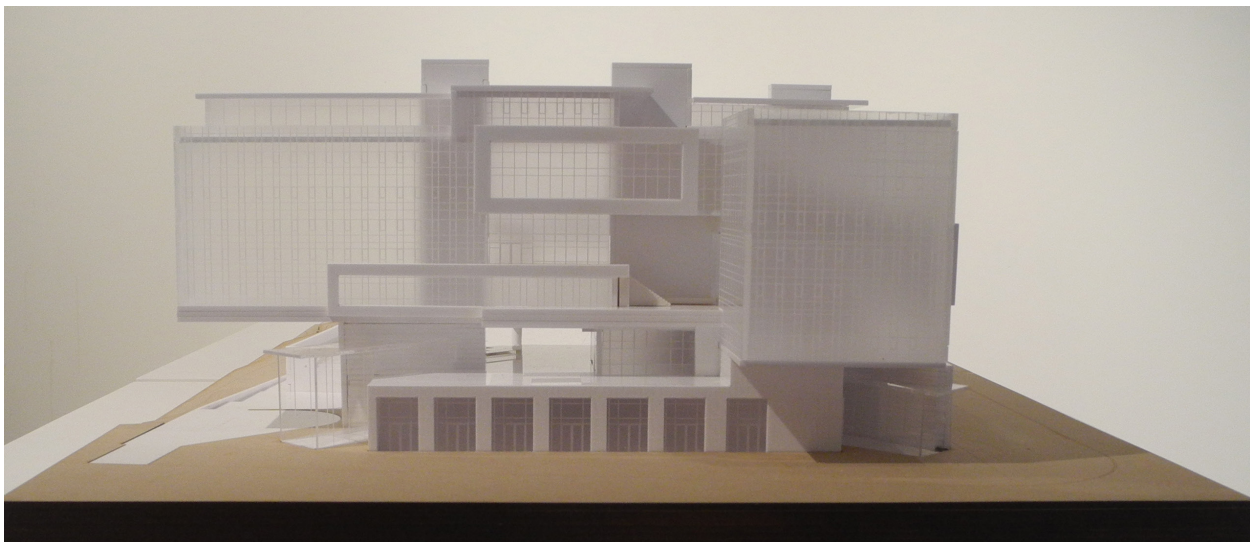
[A-2] photograph of physical model



[A-3] photograph of physical model



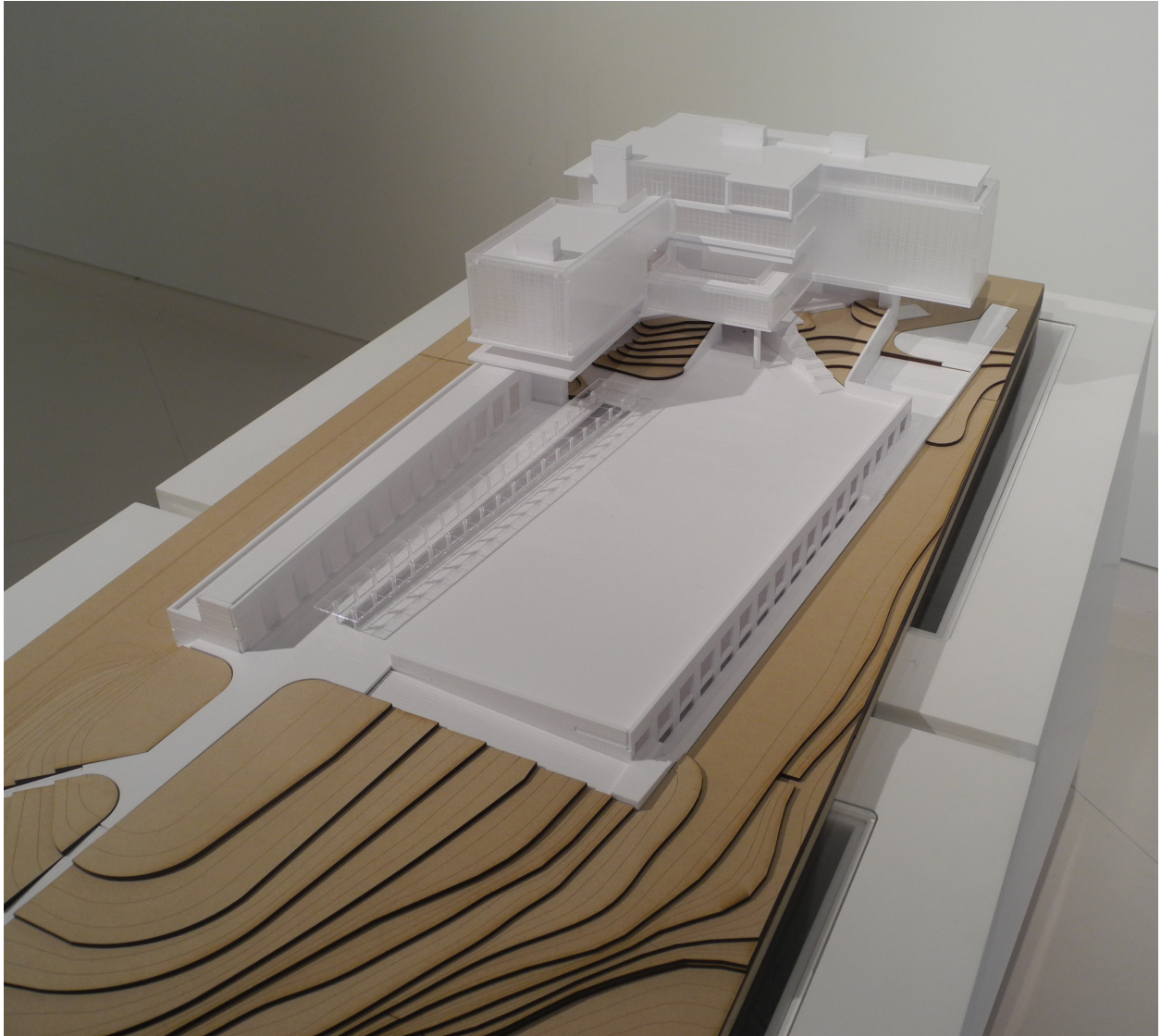
[A-4] photograph of physical model



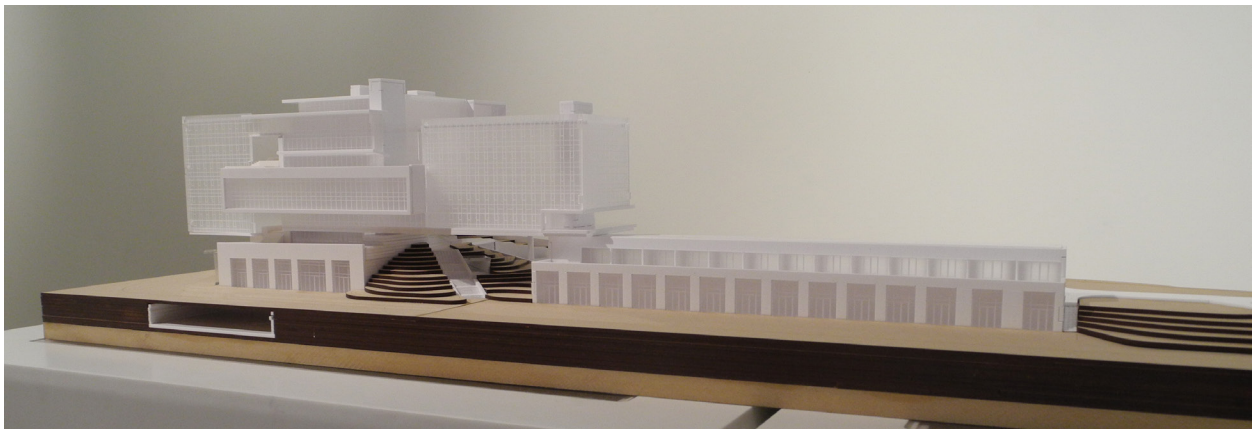


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[A-5] photograph of physical model



[A-6] photograph of physical model



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## PHYSICAL MODELS : PROCESS MODEL , SCHEMATIC CIRCULATION

[A-7] photograph of schematic model





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[A-8] photograph of schematic model



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## 41 COOPER SQUARE

Location: New York, USA

Architect: Morphosis Architects

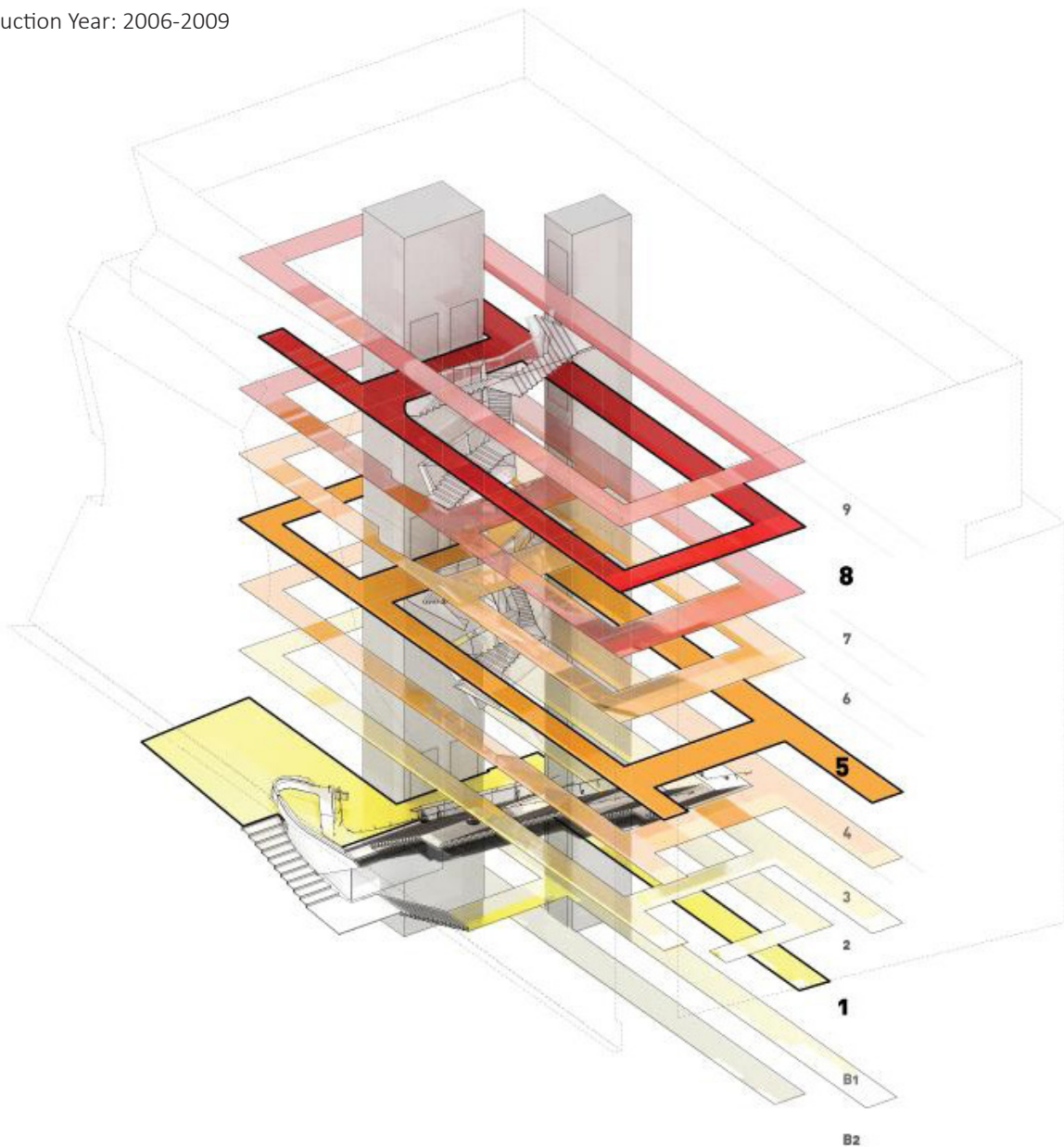
Client: The Cooper Union for the Advancement of Science and Art

Program: Academic and laboratory building with exhibition gallery, auditorium, lounge and multi-purpose space, and retail space

Constructed Area: 16,258 sqm

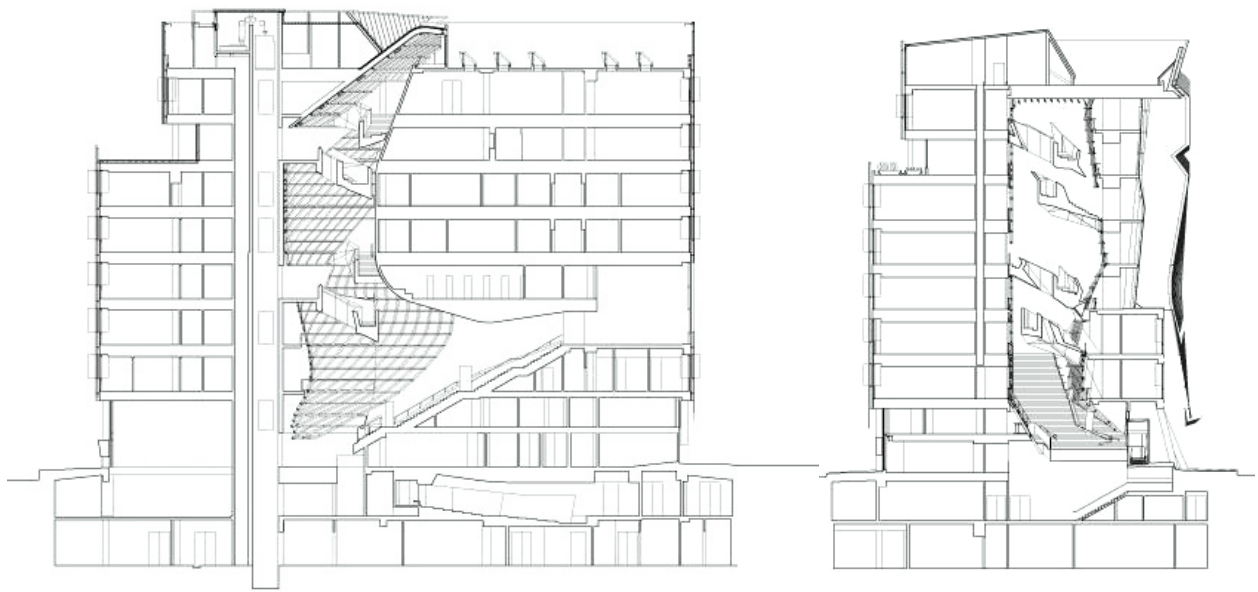
Design Year: 2004-2006

Construction Year: 2006-2009



[A-9] 41 Cooper Square: Building circulation



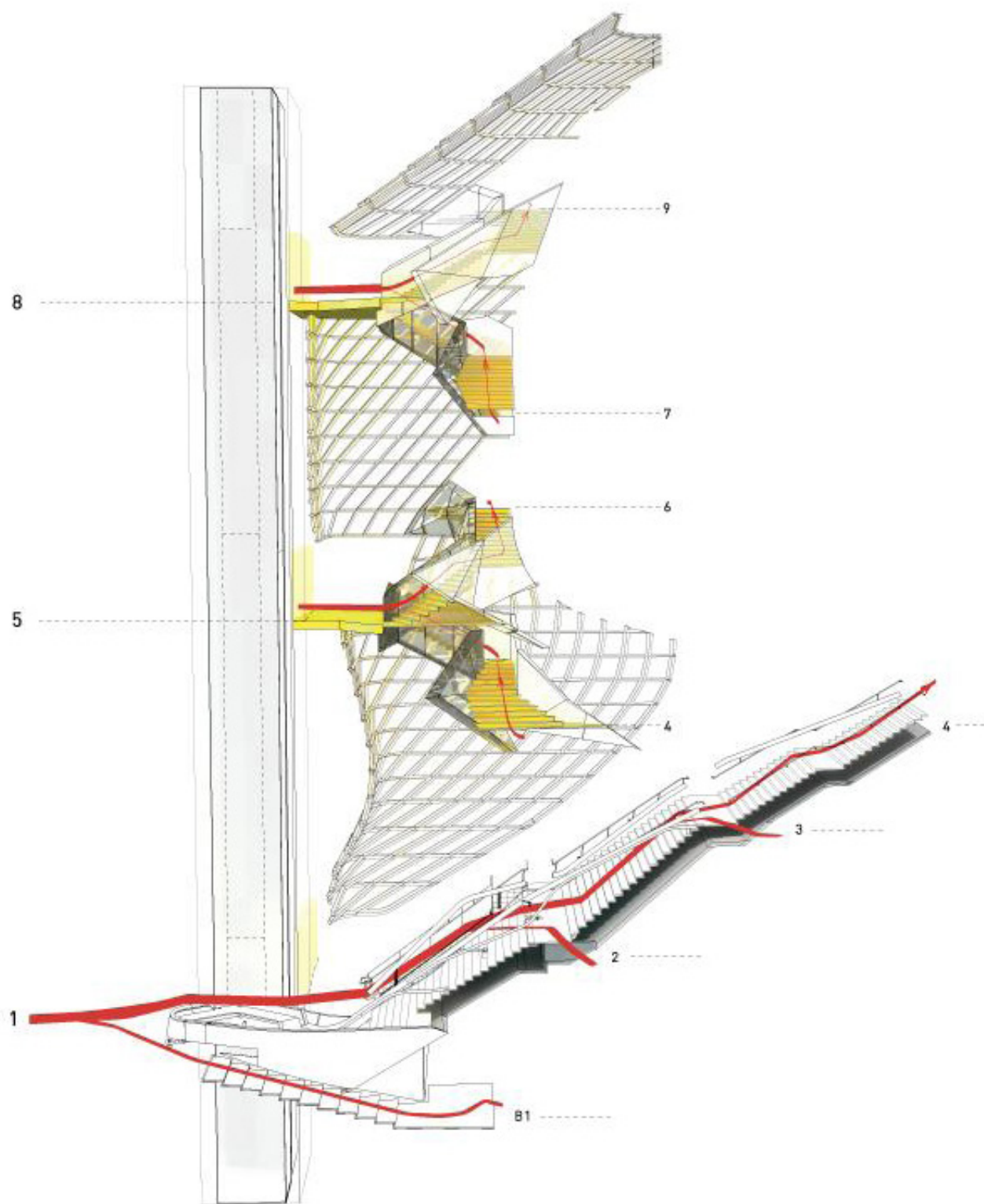


[A-10] 41 Copper Square: Building circulation



[A-11] 41 Copper square: Interior photograph





[A-12] 41 Copper square: circulation diagram

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[A-13] 41 Copper square: interior photograph



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## CALTRANS DISTRICT 7 HEADQUARTERS

Architects: Morphosis – Thom Mayne

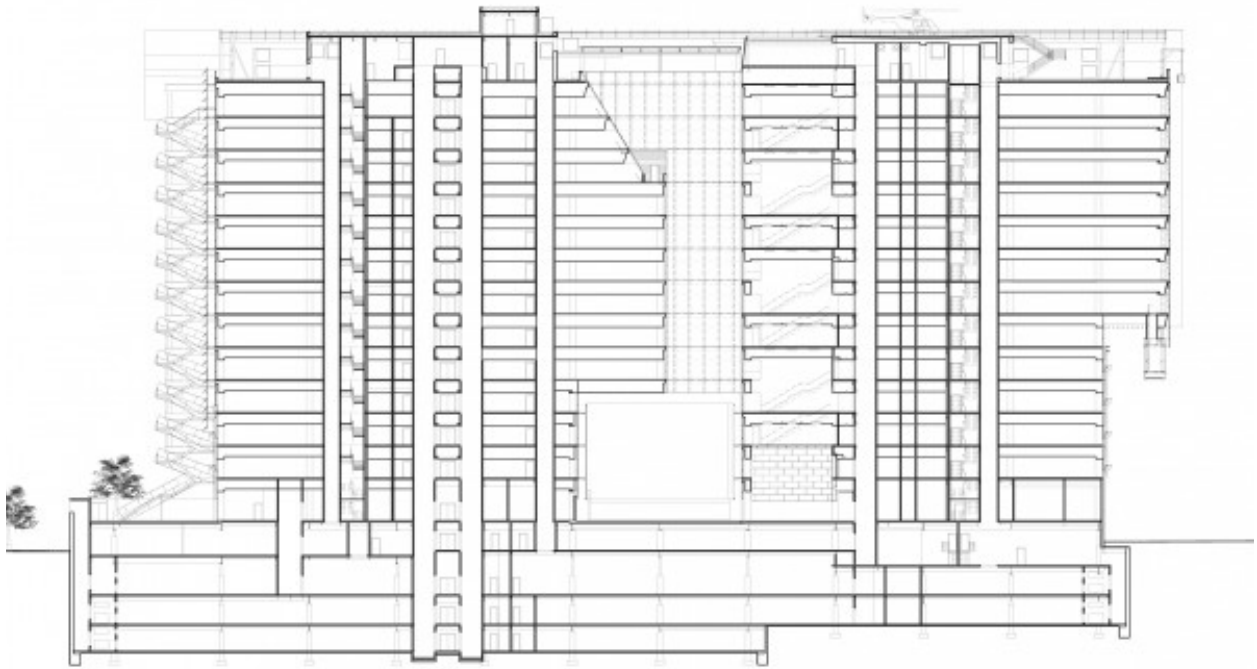
Location: 100 South Main St., Los Angeles, California, United States

Client: State of California, Department of General Services

Construction Years: 2002-2004

Building Area: 1,200,000 gross sq ft

[A-14] Caltrans district 7 headquarters: building section

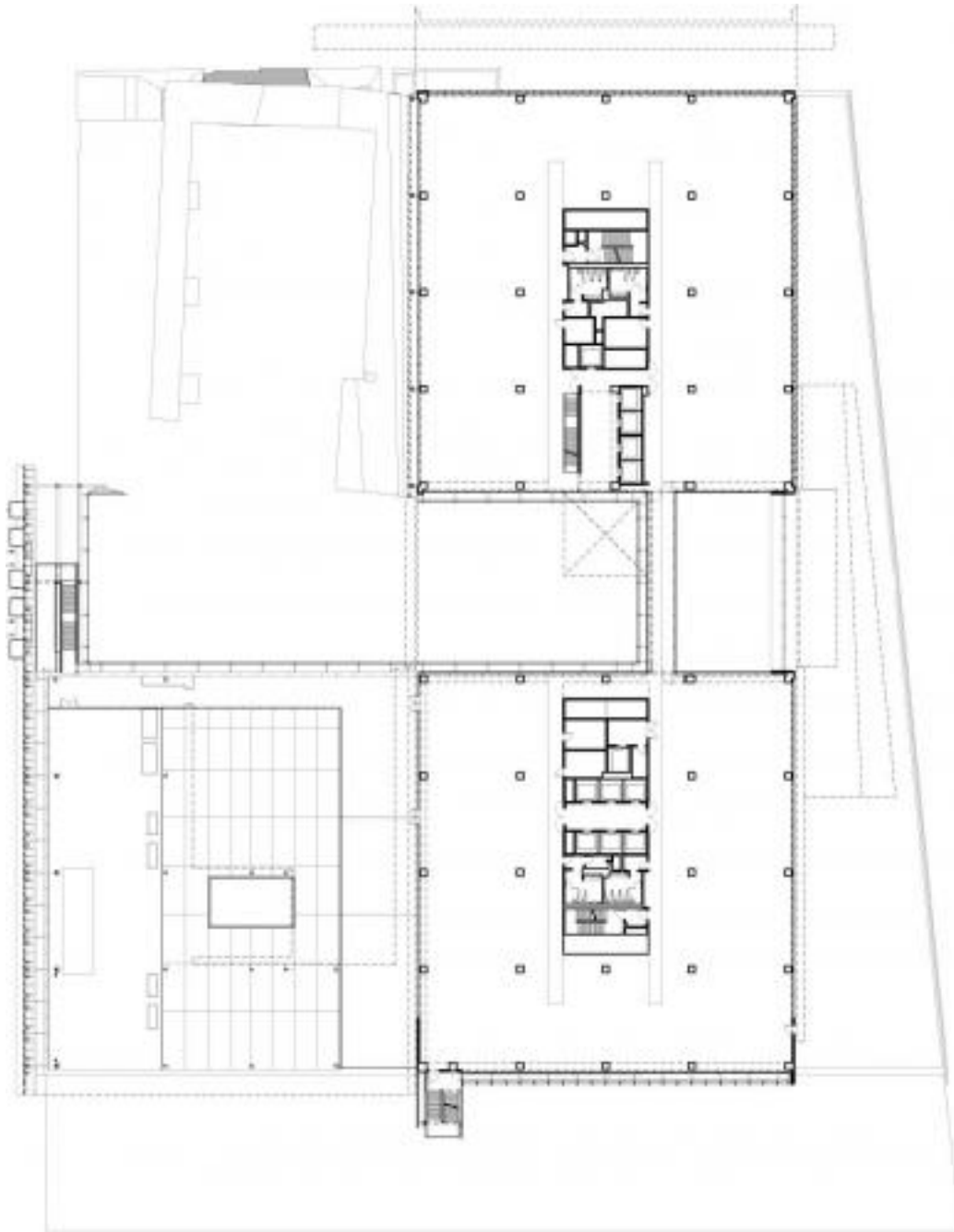


[A-15] Caltrans district 7 headquarters: exterior photograph



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[A-16] Caltrans district 7 headquarters: floor plan





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## ACTIVE DESIGN GUIDELINES: CHECKLIST

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### [A-17] Active Design Guidelines Checklist

<b>3.1 DESIGNATING STAIRS FOR EVERYDAY USE</b>	
<input type="checkbox"/>	Provide one or all stairs in a building for everyday use, whether in the form of a grand staircase or fire stairs that also serve as a principal means of travel.
<input type="checkbox"/>	Focus on stairs rather than elevators as the principal means of vertical travel for those who are able to climb the stairs.
<input type="checkbox"/>	In high-rise buildings, provide an integrated vertical circulation system that incorporates stair use for travel between adjacent floors, so that elevators are used primarily for vertical travel of four floors or more.
<input type="checkbox"/>	Integrate the stair with the principal areas of orientation and travel within the building.
<input type="checkbox"/>	Make the stairs accessible to the public areas of the building and, where possible, eliminate locks between staircases and floor areas.
<b>3.2 STAIR LOCATION AND VISIBILITY</b>	
<input type="checkbox"/>	Locate stairs near the building's entrance.
<input type="checkbox"/>	Locate a stair targeted for everyday use near the elevator.
<input type="checkbox"/>	Locate an appealing, visible stair directly on the building's principal paths of travel.
<input type="checkbox"/>	Design stairs to be more visible. Use one or more of the following:
<input type="checkbox"/>	Fire-rated glass enclosures instead of traditional opaque enclosures
<input type="checkbox"/>	Open stairs between two or more floors with either the same or associated tenancies
<b>3.3 STAIR DIMENSIONS</b>	
<input type="checkbox"/>	Make stairs wide enough to accommodate travel in groups and in two directions.
<input type="checkbox"/>	Design stair risers and treads that are comfortable and safe.
<b>3.4 APPEALING STAIR ENVIRONMENT</b>	
<input type="checkbox"/>	Use articulated and unique stair compositions:
<input type="checkbox"/>	Grand, sculptural staircases
<input type="checkbox"/>	Exciting stair construction
<input type="checkbox"/>	Provide visually appealing interior finishes.
<input type="checkbox"/>	Design stair environments that appeal to the senses.
<input type="checkbox"/>	Highlight interesting views, such as prospects onto nature or indoor gathering areas.
<input type="checkbox"/>	Incorporate artwork into the stair environment.
<input type="checkbox"/>	Add music to stairwells.
<input type="checkbox"/>	Incorporate natural ventilation.
<input type="checkbox"/>	Select bright, inviting colors.

		In large-scale multiple-building developments, provide for tenant spaces that can accommodate newsstands, post offices, places to purchase healthy food, and other functions.
		In mixed-use buildings, locate common functions in the lobby area to promote walking to routine lunchtime and after-work or after-school activities.
		In residential environments, place functions such as community and recreational spaces, mailrooms, and management offices on an alternative floor or a pleasant walking distance from individual residences and building entrances.
		Consider locating the principal building lobby functions on the second floor accessible by a prominent grand stair or ramp.
		Locate shared functions on alternative floors, adjacent to staircases or ramps.
		When arranging a building's program, consider the capacities and ages of specific inhabitants.
		Encourage personal interaction in addition to electronic communication.

### 3.8 APPEALING AND SUPPORTIVE WALKING ROUTES

		Provide visually appealing environments along paths of travel.
		Provide daylighting along paths of travel.
		Provide supportive infrastructure along walking routes.
		Restrooms
		Drinking fountains or water refilling stations
		Benches
		Provide information about walking routes within and around the building.
		Provide incremental distance markers.

### 3.9 BUILDING FACILITIES THAT SUPPORT EXERCISE

		Include physical activity spaces in commercial workplaces and residential buildings.
		Locate physical activity spaces within centrally visible locations in the building.
		Provide views to the outdoors from physical activity rooms.
		Provide shower and locker room facilities.
		Provide secure, sheltered, and accessible bicycle storage, preferably on the ground floor.
		Provide information boards and signage about facilities, services, and groups related to physical activities.
		Design activity spaces to accommodate a building's various occupant groups.
		Provide easily accessible drinking fountains throughout the building.

### 3.10 BUILDING EXTERIORS AND MASSING

		Maximize variety, detail, and continuity on the lower one-to-two floors of the building exterior.
		Provide multiple entries and maximum transparency along the street to help enliven the pedestrian environment.
		Incorporate canopies and awnings into building facades.
		Carefully incorporate stairs and ramps as building design features.
		Design building massing to enhance nearby parks, plazas, and open spaces.

	Design safe stairs.
	Provide slip-resistant floor finishes.
	Provide color or textural contrasts at tread nosings.
	Provide well-lit stair environments.
	Incorporate natural daylight into the stair environment.
	Provide illumination levels of 75 percent to equal that of adjacent corridors.
	Design stairs to be easily maintained.

### 3.5 STAIR PROMPTS

	Place signage at elevators and escalators to encourage stair use.
	Locate stair prompts where they will be most visible.
	Design informational and motivational messages to be linguistically and culturally appropriate to the building's users.
	Use multilingual messages compatible with building users.
	Match motivational message with building users' sensibilities and travel motivations.
	Use age appropriate messages.

### 3.6 ELEVATORS AND ESCALATORS

	Design elevators to be less prominent than the stairs for people who can use the stairs, while providing elevator access for people with disabilities.
	Locate elevators out of direct view from the building's entrance.
	Do not program the elevators to return to the ground floor and rest in the open position when not in use.
	Refrain from visually highlighting and articulating the elevator while visually emphasizing the stairs provided for everyday use.
	In high-rise commercial buildings, consider creating a second-floor lobby accessible from ground level by a grand or open stair.
	Consider limiting the number, size, and capacity of elevators to the minimum required by code, where appropriate.
	Consider reducing the elevator travel speed or the cab door open-and-close speeds, particularly in low-rise buildings.
	Consider installing skip-stop elevators, where appropriate for the building type.
	Use signage at the elevator and escalator entry areas to promote nearby stair use.
	Limit the use of escalators in buildings. Also consider one or more of the following strategies:
	Limit escalator use to rush hours.
	Slow escalators during non-rush hours.
	Retrofit existing escalators with motion sensor activation devices.

### 3.7 BUILDING PROGRAMMING

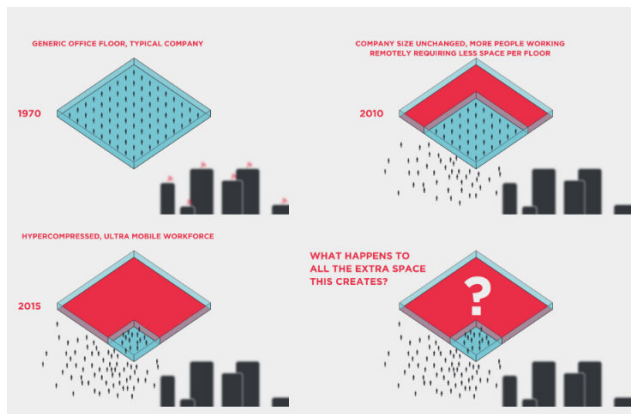
	Locate building functions to encourage brief bouts of walking to commonly used amenities within a building.
	In work environments, organize functions such as restrooms, lunchrooms or cafeteria, photocopy rooms, mailrooms, shared equipment spaces, staff lounges, and meeting rooms a pleasant walking distance from individual work spaces.



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## GENSLER : `HACKED` OFFICES

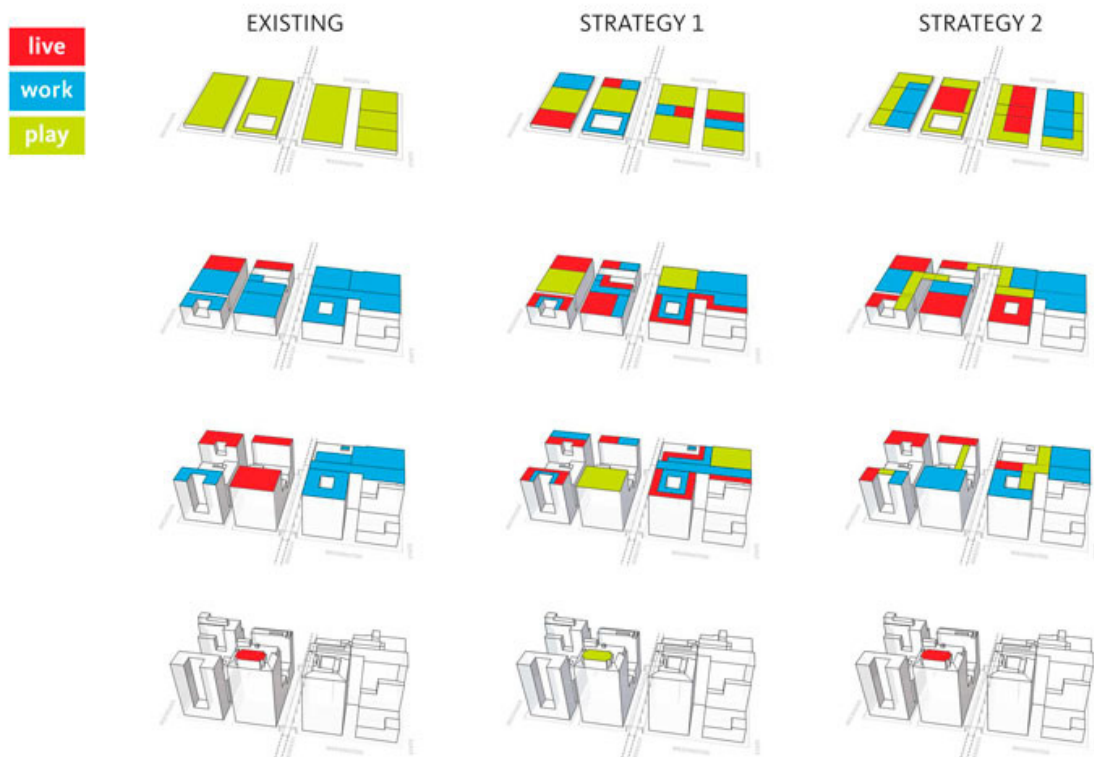
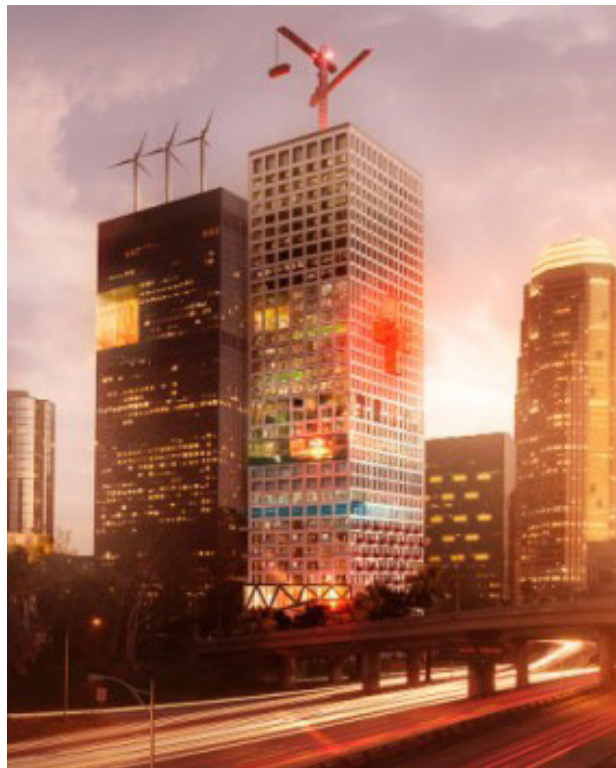
[A-18] Gensler- `Hacked` offices: Diagram



[A-19] Gensler- `Hacked` offices: Diagram

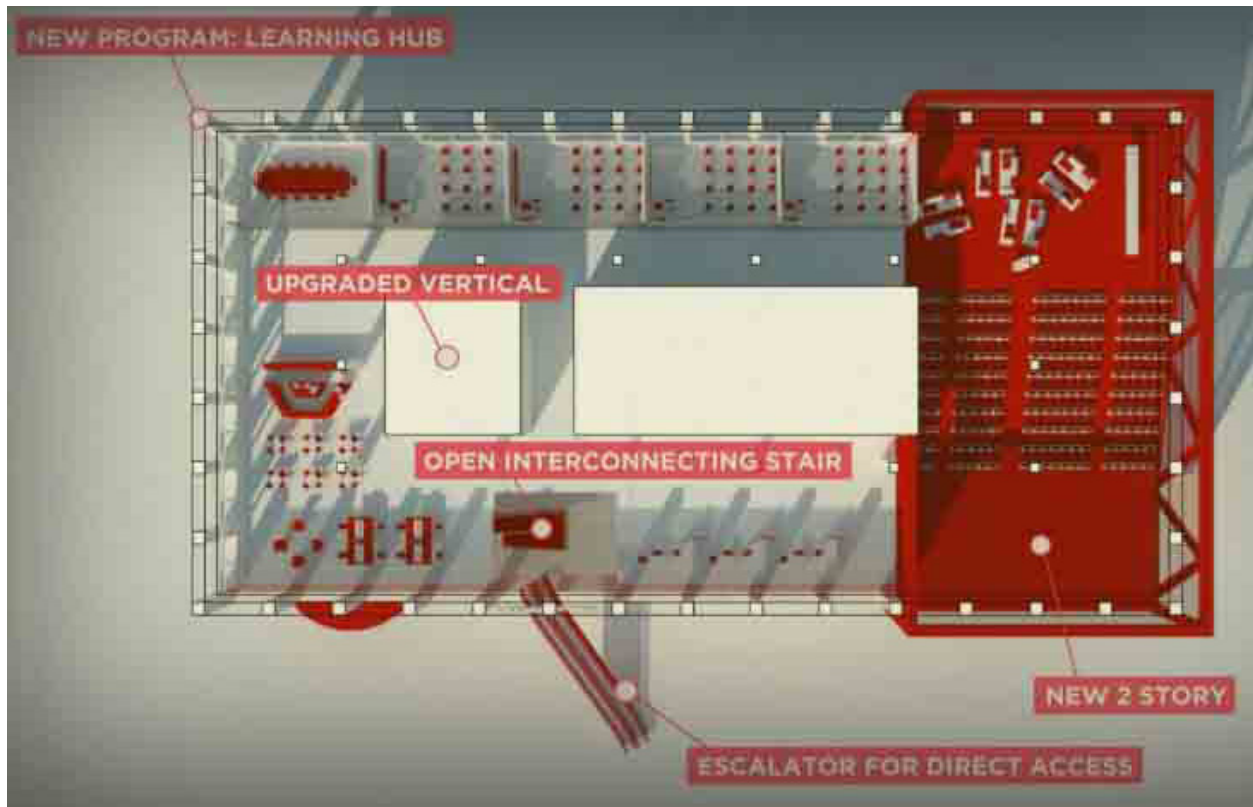


[A-20] Gensler- `Hacked` offices: Concept Rendering



[A-20] Gensler- `Hacked` offices: Concept Diagram

[A-21] Gensler- 'Hacked offices: Concept Diagram



[A-22] Gensler- 'Hacked offices: Concept Rendering



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[B-1]

