// MAINFRAME ARCHITECTURE: PROJECTING THE DIGITAL HUMAN THROUGH ARCHITECTURE

by

Jason Ramelson

B.Arch.Sci., Ryerson University, 2012

A thesis

presented to Ryerson University

in partial fulfillment of the

requirements for the degree of

Master of Architecture

in the program of

Architecture

Toronto, Ontario, Canada, 2016

© Jason Ramelson 2016

Mainframe Architecture:

Projecting the Digital Human Through Architecture

Jason Ramelson

B.Arch.Sci., Ryerson University, 2012

Ryerson University

Faculty of Engineering, Architecture and Science

Department of Architectural Science

Supervisor: John Cirka / Colin Ripley

Second Reader: June Komisar

Program Representative: Leila Farah

// AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I authorize Ryerson University to lend this thesis to other institutions or individuals for the purpose of scholarly research.

I further authorize Ryerson University to reproduce this thesis by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

I understand that my thesis may be made electronically available to the public.

// ABSTRACT

Mainframe Architecture:

Projecting the Digital Human Through Architecture

Master of Architecture, 2016

Jason Ramelson

Ryerson University

Faculty of Engineering, Architecture and Science

Department of Architectural Science

In today's society we are in a post-digital age and as a result humans are offered the ability to enter into a range of spaces not facilitated by the built environment. The virtual realm unveils opportunities for architecture to become an interpretive platform for the sensing and actuation of our built environment. This shift allows us to identify ourselves differently in forms that exceed our physical bodies which is indicative of a new type of human; the digital human. By revealing the relationships between activities in both physical and virtual spaces we may find a place in architecture that allows the augmented human to thrive within the built environment. This poses an opportunity for architecture to become a platform for the projection of the "humans" and their experiences; a feat that is becoming relevant in capturing the current social conditions of the 21st Century.

// DEDICATION

For my parents; Lisa and Ken.

// TABLE OF CONTENTS

// LIST OF FIGURES

Figure 36: The Fun Palace, 1961.

https://8late.wordpress.com/2013/11/06/remnants-of-the-new-ancients/

Figure 37: Archigram, Plug-In City, 1964.

https://classconnection.s3.amazonaws.com/749/flashcards/3405749/png/screen_shot_2013-12-08_at_122247_am-142D0DF67BF2B8117A7.png

Figure 38: Centre Georges Pompidou.

https://classconnection.s3.amazonaws.com/726/flashcards/1242726/png/12-3-skeleton1335900322495.png

Figure 39: Supersheds, Illustrated.

Edited from:
http://leadbettercarr.co.nz/2011/03/inspiration/

https://8late.wordpress.com/2013/11/06/remnants-of-the-new-ancients/

https://classconnection.s3.amazonaws.com/749/flashcards/3405749/png/screen_shot_2013-12-08_at_122247_am-142D0DF67BF2B8117A7.png

https://vaprendretadouche.wordpress.com/

https://parentheticalpilgrim.wordpress.com/tag/buildings/

http://5piecesgallery.blogspot.ca/2015/01/contemporary-art-biennials.html

http://www.nicolas-denis.net/2015/07/actualites-novembre-2014/

http://www.pbase.com/image/103042498

http://georginabister.com/blog/?p=837

http://ameblo.jp/ekijyun/theme-10059361079.html

https://rhino494asu.wordpress.com/rhino-assessment-1-the-living-pod-and-living-pod-tower/

http://abduzeedo.com/most-incredibles-museums-around-world-part-1

http://www.desertlivingtoday.com/2011/07/14/bonjour-oma-architecture/

http://www.arqchile.cl/congresos_roma.htm

http://www.arcspace.com/features/alsop-architects/blizard-building/

http://www.votpusk.ru/story/article.asp?ID=8178

Figure 40: The Philip's Pavilion.

http://www.dafne.com/architecture/le-corbusier/

Figure 41: The Philip's Pavilion, Projection 1.

https://ccrma.stanford.edu/CCRMA/Courses/154/Varese%20images.html

Figure 42: The Philip's Pavilion, Projection 2.

http://www.archdaily.com/157658/ad-classics-expo-58-philips-pavilion-le-corbusier-and-iannis-xenakis/

Figure 43: The Philip's Pavilion, Projection 3.

http://photo.sh/photo-i964409915903160776 _1462009459.html

Figure 44: The Philip's Pavilion, Projection 4.

http://buziaulane.blogspot.ca/2013/09/bpn-1661.html

Figure 45: Gordon Pask's Colloquy of Mobiles Project, 1968.

http://www.medienkunstnetz.de/works/colloquy-of-mobiles/

Figure 46: SEEK, Nicholas Negroponte.

http://cyberneticzoo.com/robots-in-art/1969-70-seek-nicholas-negroponte-american/

Figure 47: Google Data Centre.

http://www.teknoblog.com/google-veri-merkezi-yari-iletken-fabrika-114670/

// MAINFRAME ARCHITECTURE:

PROJECTING THE DIGITAL HUMAN THROUGH ARCHITECTURE

Figure 1: Public devices, St. Peter's Square, 2005-2013.

1.0 // STATUS

// INTRODUCTION

At the beginning of the twenty-first century, society became entranced with the concept of connection. Being able to form new relationships with information is at the forefront of how we as humans have evolved. Where we once had to make considerable efforts to indulge in such practices, the reality of today's technology has now elevated the potential for constant streams of connection. In other words, technology has evolved and with it so has our ability to hone and adopt these new modes of engagement.

Technology is now entwined with everything from economic organizations to our social make-up and these interconnections form what we now understand as an unlimited collection of information obtained, collected and authored by people. The ability to make a contribution to this database or simply be able to navigate through it allows us as individuals to decipher what information is important to us and what is not. This fundamental relationship is one that is not new; we have always pushed our own preferences over those that mean little to us. However, this relationship

Figure 2: The "Dinner Table" Effect.

Figure 3: A Typical Hikikomori.

is altered nowadays and presents new modes of how we are able to understand ourselves. Technology in this case carries the potential for a new understanding of individual identities within the context of a whole society. The notion of a personal digital repository (one that contains all of the information related to us) is not outlandish and the possibility of it occurring in our day-to-day lives is becoming increasingly promising. This suggests that as we develop and gather all of the information about ourselves, we may begin to utilize it in ways that define or enhance our daily activities, occupations and lifestyles. For example, drawing connections within the virtual realm (whether it is between social networking, financial information, political allegiances, or media preferences – the list is endless) would allow for us to express ourselves in ways that could bring new meaning to personal preference or identity.

The reality of the use of our technologies today has been met with extreme criticism. Not only are people drawn away from physical activities, they are becoming fundamentally encapsulated by virtual space. The "dinner table" effect is one example of this shift in social practice. The dinner table is a forum for conversation and dining, but now with our digital devices, we are sucked away from this normal place and transported to other "spaces". The most extreme example of this phenomenon is someone becoming a hikikomori. This is where "…an individual becomes a recluse from society, typically confining him – or herself to the house or a single room for a very long time." (Hikikomori Definitions, n.d.) In both cases, the spaces in which people occupy play no significant role in aiding this transition of societal practice.

Products such as phones, tablets and computers are items acting as our personal gateway to the virtual realm. While it is commonly agreed that these devices are portable, they are still static contraptions acting as distractors to potentially valuable actors or agents in a participatory capacity. They allows us to bond relationships with a connected world, they move with us, evolve with our preferences and ultimately create the opportunity for virtual engagement. As a result, relationships we currently have with these technologies are exponentially growing. New types of software and products are being released into the marketplace for consumer use. We are updating and upgrading for the newest and most connected tools and for the most part, these new options present completely new modes of how we participate within society.

// NEW SOCIAL LANDSCAPES

Digital technology has dramatically affected the world around us which has resulted in numerous changes to our everyday lives. Where we once had to make meaningful connections with the processes of our existence, we now have become reliant on new technologies that either benefit us or become a detriment to society. In most cases technological innovations or inventions have freed us from the inability to accomplish goals or generally make things better for ourselves, but in doing so there are

considerable effects that will always arise based off of these new methods.

In the post digital age we have seen an increased amount of access into the virtual realm. We can communicate seamlessly with people all around the world, send and receive information and enter into virtual spaces that all provide immense amounts of valuable (or in some cases, invaluable) content. The ability to enter into these dialogues has enabled people to become more efficient in their daily routines, business affairs or personal lives. Generally, digital technology has allowed us to become more connected to a global society and provides us with a means to form extended relationships with information and people across the globe. The social benefit to such a paradigm considers that while we are connected to virtual societies, we gain admittance to the overwhelmingly abundant connections that are available to us. Through these relationships we may advance ourselves in ways that exceed or elevate our current social make-up and allow us to develop in ways that we would have otherwise not been capable of. For example, areas such as economics, communication, transportation, health care and entertainment have all seen positive effects that have allowed us to advance and explore new ranges of how we can utilize technology for the greater good of society. We have been able to gain a greater understanding of our physiological build-up, we have new advances and efficiencies in how we travel from place to place, and our ability to create or consume digital media is constantly becoming a source for social evolution. All of these areas have benefited from digital technology; from the way we personally use these items to how they have affected our society on a global scale.

Consequently, with the rise of digital technology, we have also seen some negative consequences for people and society as a whole. While communication and the ability to make connections with the world around us has substantially elevated we are also seeing the detrimental effects that they bring. Digital technology has become a distracting force in the world. We use devices every day and our reliance on them is becoming indisputable. This effect has become negative so much so that we are losing or diminishing fundamental skills that technology now offsets. Technological devices such as calculators, spell check or search engines are replacing essential abilities that have been critical in the past. Entering into the virtual realm also lets us demarcate our presence wherever we go. We enter personal information and reveal ourselves to an overarching global network and in doing so we allow ourselves to be tracked, identified and understood which clearly indicates a fading level of privacy in the post digital era. While we are influenced by the content within virtual space, we are also encapsulated by all it has to offer. There is a clear warped sense of reality when occupying this virtual realm and has left us in an ongoing state questioning what is truly real and what is simply fabricated for our pleasures. The major benefit to technology in the twenty-first century is our ability to connect with each other, but the manner in

which we do so is almost contradictory to the concept of connection. Instead of meeting face-to-face and enjoying the emotional aspects of communication, we instead conceal ourselves behind screens in the comfort of our own environments. Technology sets us into a state of isolation because we are able to do so much on our own now without having to physically be engaged with the content we are utilizing. This then develops more so into the disadvantage of not developing valuable social skills and puts into question whether or not these abilities hinder our ability to leave the virtual realm and engage with social forces outside of comfort zones.

Technology has and will always be present and developing in society. In the post-digital age, technology has been developed that allows us to enter into a global network of connected individuals. This allows us the opportunity to utilize our own devices to connect into such a realm and occupy or navigate its extremely abundant content. It is up to each individual to decipher what qualities of its use will become a benefit or detriment to their lives, but ultimately the combined use of the virtual realm leaves some very specific as well as broad impact on our overall global social constructs.

// THE "INVISIBLE INFRASTRUCTURE"

Flowing throughout our built environment is "the digital". This electronic substance that is flowing in our atmosphere is constantly running, able to adapt and is undergoing levels of perpetual growth. The term 'invisible infrastructure' suggests a platform for the fundamental services for the operation of society, but with a minute level of physical presence. This is descriptive of "the digital" because it places meaning on the type of networks established and considers it to be instrumental in how we operate as a society. It also alludes to an intangible force upon society in which we are so dramatically affected. These unrestrained flows of information are seamlessly woven into our digital existence and help maintain connections with other digital portals (other digital humans, digital societies, etc.). Here, the 'invisible infrastructure' is a defining element in the societal constructs of the post-digital era.

An infrastructure is typically a physical manifestation supporting the activities of society. For example, roads and bridges allow for vehicular circulation or electrical wires and transmission towers provide energy distribution in the power grid. In the case of 'invisible infrastructure', physical barriers or structures are less important and mostly flows of information are considered. By indicating the "virtual" as a fundamental infrastructure of the world, we may now begin to think of these systems as vital for the operation of society. For instance, the value of transportation routes is essential in the sense that it allows for the physical connection of places – a necessity in the matrix of society. Now, with the proliferation of 'invisible infrastructure' we may begin to see flows of virtual information (social, political, economic, etc.) as building blocks for the future of society.

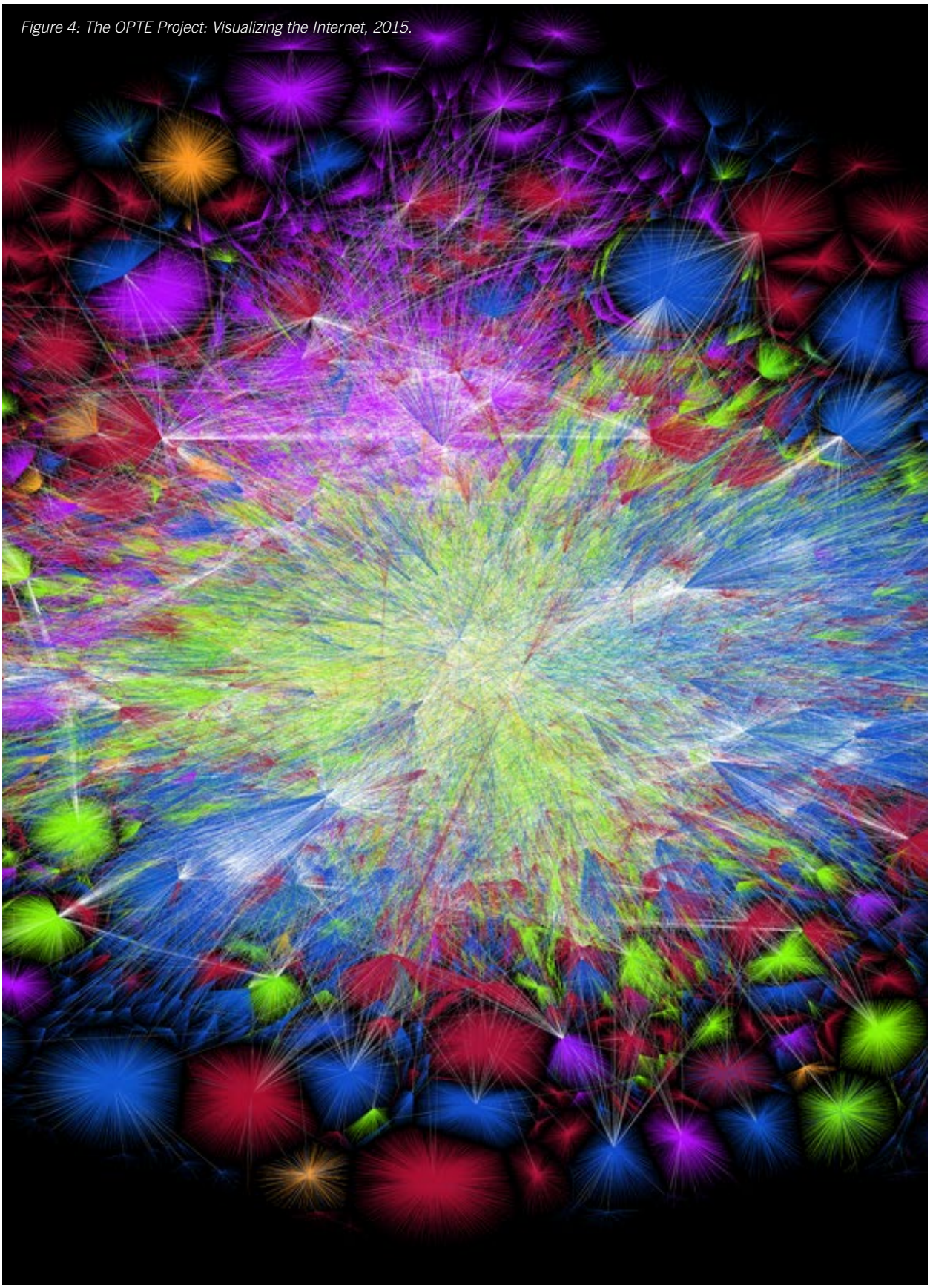


Figure 4: The OPTE Project: Visualizing the Internet, 2015.

In his essay From Box to Intersection: Architecture at the Crossroad, Aaron Betsky describes the capacity of architecture in the twenty-first century. “The building, in other words, becomes a direct translation of the social, economic, political and physical processes, articulated in relation to each other in the final building. Architecture becomes a way of realizing the network.” (Flachbart & Weibel, 2005, p. 255) Betsky argues for architecture as an enabling infrastructure that can take on a plethora of activity. The building acts as a node at the intersection of multiple flows and becomes a mediator between goods and services, people and information.

By introducing a fundamental design driver, such as ‘invisible infrastructure’ we begin to think of architecture as a facilitator for new modes of engagement. Flowing information can enable design through adaptable and pervasive systems allowing for the articulation of the technological processes that generate or influence our current digital society. The possibilities that can arise from this element of design are directly responsive to the activities occurring in virtual space and are contributing to architecture that has the capacity to showcase these new modes of societal practice. The way in which we must categorize this ‘invisible infrastructure’ within architecture is similar to how we engage with factors such as history, culture or tradition. The intangibility of each of these influences has always been made representable through material means, but now in the post-digital era, we might reconsider how we are able to articulate the virtual through architecture.

These new relationships may present themselves in ways that elicit the use of technological devices that influence the nature of formal, spatial, or aesthetic conditions of architecture.

// ARCHITECTURE AND TECHNOLOGY

In the past, technology made considerable contribution to architectural discourse in the form of a physical manifestation or by producing a means in which architecture would become plausible. From Brunelleschi’s new method of dome construction to the invention of float glass and beyond, architecture has always adopted new technologies in order to meet the changing requirements of the time. Learning and applying these innovative technologies are considered proponents of new methods which in turn provide an even greater level of achievement for architectural endeavors. In the simplest terms, technology helps us achieve what we thought was not possible and guides us towards new ways in which we can accomplish our goals.

Now in the post-digital age, we must realize the fundamental difference that technology has had on architecture and society as a whole. Vittorio Gregotti in his book Architecture, Means and Ends discusses the shift from industrial and post-industrial society to that of the post-digital age.

> “There is one difference, however, and an important one, between the world of mechanization and today’s world. It

> consists in the fact that mechanization had effects on the physical world that were not exclusively metaphorical but almost always direct, material, visible, and measurable. It had a similar effect on the invention of things artistic, at least such things as are directly connected with the construction of objects, paintings, sculptures, and works of architecture and interior design. The world of information technology seems to have an effect on works of art that is prevalently (and only prevalently, given the influence on them of multimedia techniques) allegorical and conceptual: an effect of image on image, of event on event; an effect that creates new collective myths that are homogeneous and transitory but intangible." (Gregotti, 2010, p.27)

The conditions that Gregotti presents here are fundamental in the shift from physical technologies into the digital. With technology becoming more pervasive, invisible and ubiquitous, the means of expression become different – the material catalogue of architecture today is practically incapable of representing the overwhelming content within the "invisible infrastructure". As we build digital infrastructures and engage in the exchange of information, we are creating content that is not available as a direct material manifestation. In other words, as we engage within the virtual realm, we are creating scenarios, whether social, informational, or organizational, that is beyond that of current modes of devising architecture. This poses the question of whether or not architecture has the ability to articulate the current technological processes of today's society. The intangible nature of such a paradigm means that architecture must take on a very different role in serving society. In doing so, it will encapsulate and articulate the ideals of the twenty-first century "electonomad" and base itself on offering the many modes of engagement that are available within the virtual realm. This poses the possibility that architecture should consider technological processes as a defining factor and that through advanced material means (such as sensing and actuating platforms) we may begin to see how virtual organizations may influence architecture.

> "What if architecture were to become no more than a prop for display or projection screen? If the separation between its two main functions, shelter and symbol, were to become definitive and the sheltering function were to divest itself of any iconographic ambition and withdraw behind the exterior? What would remain of architecture as we know it if spatial expression were to become a mere adjunct and all designing capacity and visual intelligence were to be put into directing the surface? Would architecture survive if the entire tectonic tradition of constructing and making connections were to vanish as a source of design inspiration in favor of the visual story for architecture when any of its buildings can be animated and

> transformed by projections and electronic displays? What is left of architecture if our architectural "sign" language is no longer etched in stone" (Flachbart & Weibel, 2005, p. 261)

Ole Bouman in his essay "Building Terminal for an Architecture Without Objectness", brings up the question of a diminishing architecture as a result of the quest for providing 'images'. He describes a scenario in which architecture dissolves into media, and the basic function of building, shelter, is reduced to the interior to be contained within a façade of descriptive imagery. While this can be considered an extreme on the spectrum of design, architecture should adopt these methods to a certain degree in order to facilitate use for the post-digital society. The result here is not the exclusive use of screens and displays, but how we incorporate these technologies and other technological processes into architecture to establish and advance the development of our discourse. Therefore the architect must take into consideration the processes of both physical and virtual realms as they are instrumental to the operation of society. In addition, the correlation between the two realms can further articulate and exemplify the post-digital society.

In a more defined way, Ole Bouman continues his point but in regards to the overall shift that architecture must make in order to consider people as agents or even actors within physical structures. He outlines how past architectural examples brought forth new modes of architectural engagement and proposes a variety of potential structures that may be built as a result of the current technological adoption society is facing today.

> "Where the baroque played the game of convex and concave and investigated the trompe l'oeil, where neo-classicism discovered the mirror, where 19th-century engineers made a hero of the freestanding structure, where modernism turned the free façade and the free ground plan into ideology, we are now on the threshold of a new development in the physiological game of spatial design. For this new spatial effect the physical space is no longer strictly necessary, although duplication has its attractions. The great leap consists of uncoupling spatial perception and architectural structure. Now that really is "lite" architecture. In addition to striving after even lighter structures, transparent and translucent walls and gravity-defying, curvilinear forms, architecture can now, via film, become truly immaterial. Contours fade, form becomes fluid, the relationship between human and architecture is no longer polar or dialectical, but "immersive." You can quite literally be swallowed up in it… Who will be the first architect to win the Oscar or Golden Palm for best director?" (Flachbart & Weibel, 2005, p. 262)

Bauman makes the comparison of film to architecture in that the methods of immersion and engagement becomes a factor of actors within a functional architectural construct. The interesting aspect of this comparison brings forth the concept that while people are engaged with architecture they might take on a greater role with regards to the functional and programmatic aspects of a building. Architecture can therefore take on other modes in addition to being representational or sheltering platforms. It now has the ability to become a catalyst for new social outcomes for today's technological society. This is made possible via the plausibility of interconnection between users, their environments and the overarching 'invisible infrastructure'.

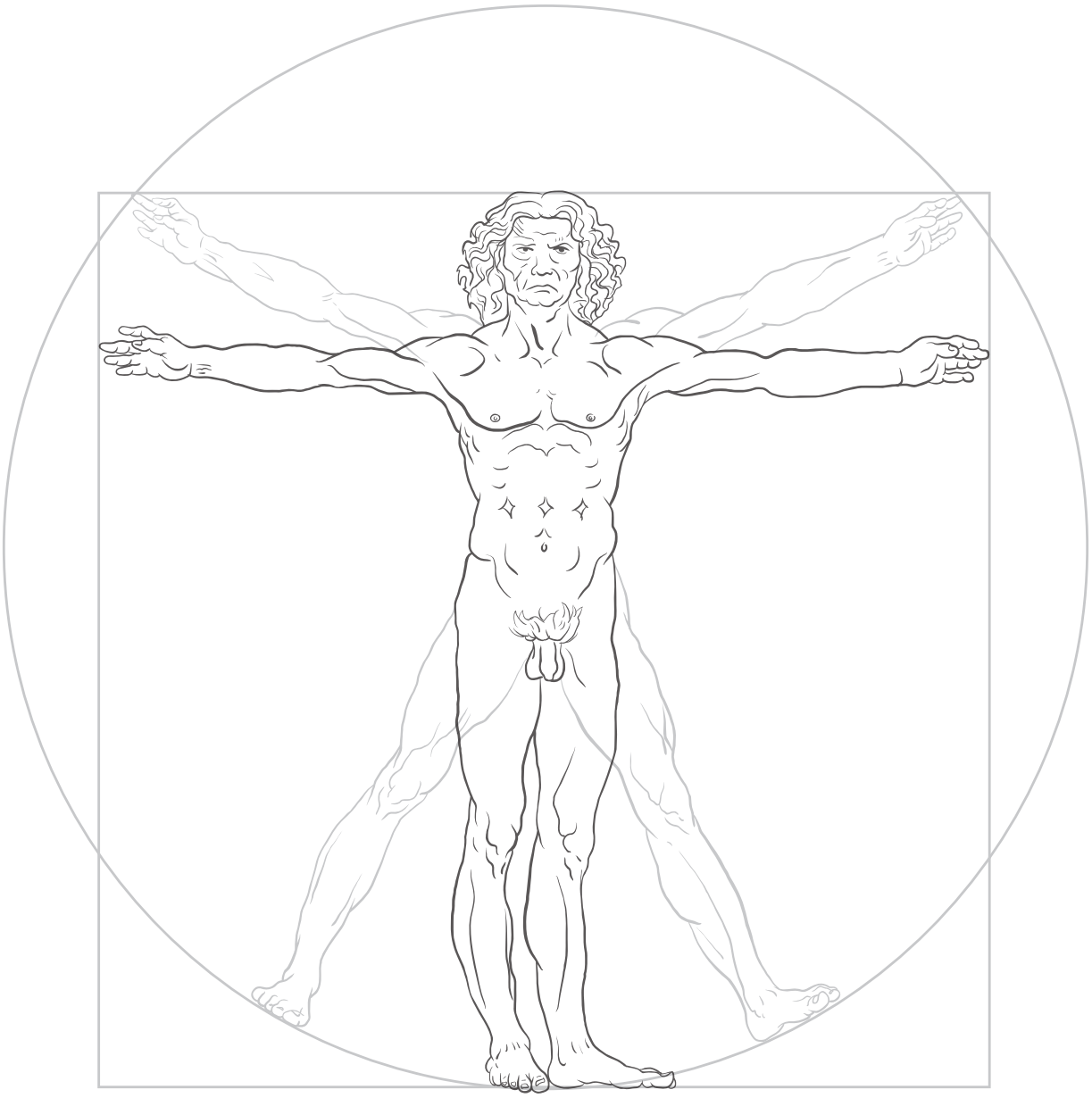
As we develop these methods and implement them into our architecture, new design variables can be considered. Kas Oosterhuis, in an interview entitled "Yes we build spaceships", illustrates a number of futuristic conceptions regarding the shift in architectural practice and the overall formation of architecture in the post-digital era. In the following excerpt, Oosterhuis answers the question "how do we build dream machines?" with respect to the overall theme of the discussion – "we build spaceships".

> "Buildings and built environments are becoming programmable. Form and substance can both be driven. An interactive relationship will effortlessly grow between the users and the built environment, in the way that users and smart appliances are beginning to communicate now. Buildings will develop into a smart swarm of building parts in contact with each other and with their users. All building elements will then know each others' position and influence each other in real time. Compare this with the behaviour of birds in a swarm. A few simple rules programmed into the birds themselves see to it that they don't fly too close to one another, but also that the swarm remains a single entity. Birds are always in motion. Our real-time dream machine works this way too: users and their environment are the members of the swarm, they are always in motion. All the time, building parts and users are taking account of one another. Reality and virtual hyperreality melt together into a new world of experience." (Oosterhuis & Hubers, 2003, p. 9)

Kas speaks to his developing concept of swarm architecture and revels in its capacity to feature a fluid and interconnected system of both users and environments. The potential to design architecture that is responsive to the dialogue between man and their environment suggests a more critical practice in the use of advanced technologies. These new methods are introduced by Oosterhuis as features embedded within the structures we occupy and are able to communicate seamlessly amongst them. This considers that while building parts are organized they may be implanted with devices that allow for a direct dialogue between each element but also

the ability for users to enter into this exchange. Kas provides the example of how birds are in motion and while this assertion is a questionable comparison it does give light to the possibility of how architectural components may be able to become technologically synced. For example, doors could be scanning individuals to gain a better understanding of room occupancies, heating/cooling loads or even allow for the initiation of interactive systems based off of who is in the building. The amount of connections could be exponential and if we consider that in this adoption there will be an influx of information into architecture which would allow for new correlations between users and their environments. In doing so, we can see how the incorporation of virtual technologies will lead to new discoveries in how the components, expressions, or identity of architecture may be influenced. This elevated level of gaining information from the built context and redistributing it back through architecture will open new dialogues between technology, humans and buildings.

Figure 5: The Vitruvian Man - The Physical Human.



2.0 // HUMANS

// THE PHYSICAL HUMAN

The physical human has a long history. We as human beings have evolved and adapted to societal progression and in most cases have succeeded as a species in conquering these shifts or changes. We are a curious breed which has always left us in a position to question our surroundings and generally make things better for ourselves and for our future. We create tools and technologies to overcome obstacles.

The human body has been considered for the longest time to be the ultimate measuring tool for our architectural creations. The Vitruvian Man, for example, is a fundamental design driver providing geometric and proportional information for the construction of architectural elements. Leonardo da Vinci created this drawing based on the writings of the ideal proportions of man as stated by Vitruvius and since then this drawing has become a benchmark for the evolution of informed architecture relating to the body. The concept of deriving information from our bodies is also evident in Le Corbusier's modular series. The proportional matrix gives sense to the

fact that the human body is the essential measuring device for all things man-made. This anthropometric way of judging and calculating the human body has led to an insurmountable amount of information pertaining to developing technologies. For example, the measurement of the body has led to proportional scales of building elements such as columns, doors or stairs and has also led to discoveries in non-architectural contexts such as computer keyboards, cars or sporting equipment. All of these discoveries based on geometric and proportional measurements of the human body are essential to our appropriate use of any object.

Consequently, we see the human body as a standard or a point of reference for the design of architecture. We reference the Vitruvian Man; its ideals as well as the underlying theory behind the illustration. Vitruvius' measurements have been understood and utilized in architecture throughout history and currently we use these examples as precedent for our own modern constructs. In this time of development, however, we have made changes and adopted these modes of measure which have evolved. The evolution of the human being has left us with opportunities for new methods and creations based off of the origins of the Vitruvian Man.

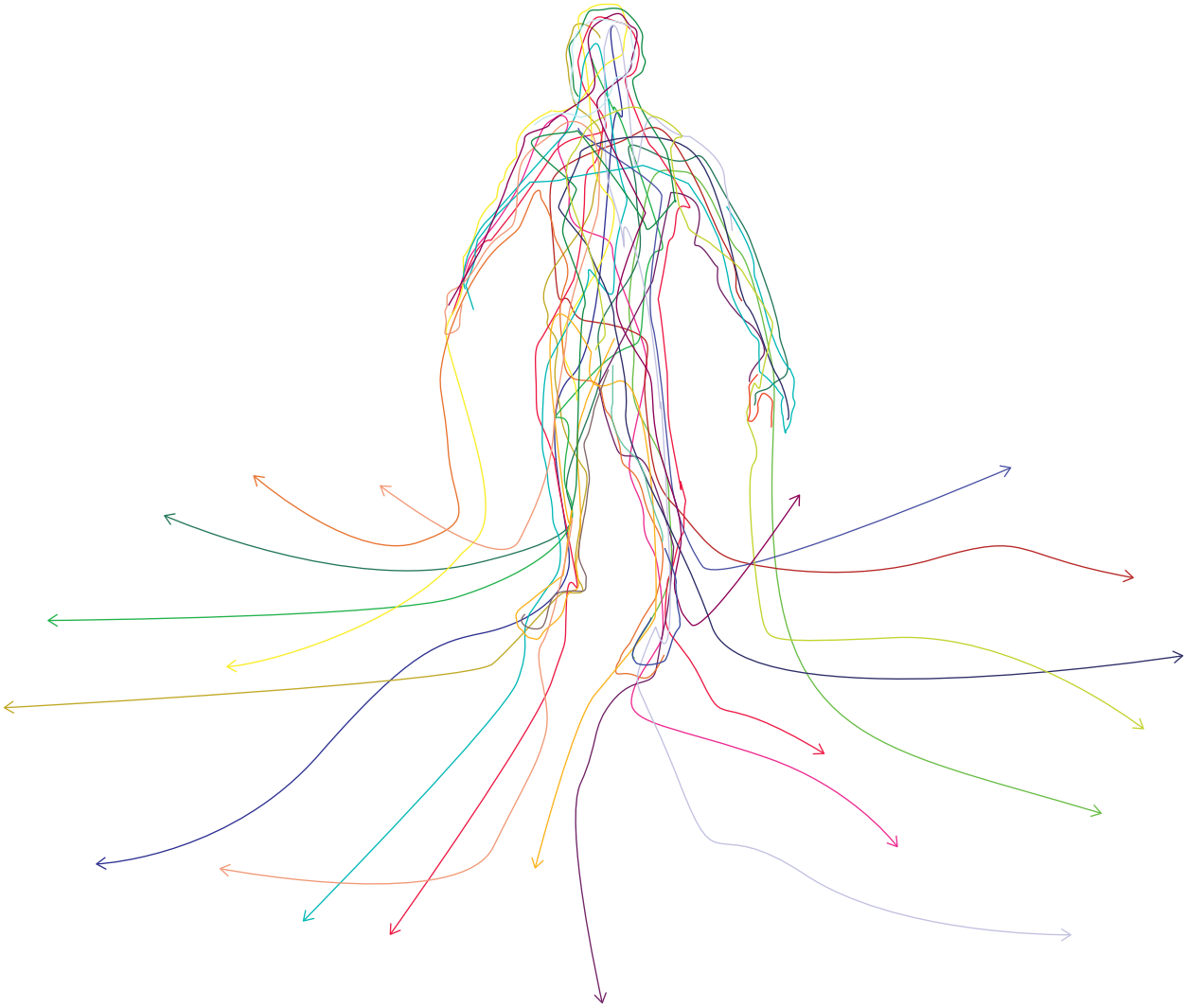
// THE DIGITAL HUMAN

With the advent of digital devices, our virtual existence is overwhelmingly a primary component in our everyday lives. People make connections via device portals that enable a direct link to a seemingly unlimited database of digital information. The ability to access, share, manipulate and ultimately author your own identity in the digital frontier has sparked a societal revolution that has unveiled and coordinated a series of interdependent digital beings. The digital human is comprised of multiple virtual extensions, each with their own unique characteristics but always associated back to the original host (the physical human). Therefore, the current social condition coordinates itself through multiple streams of connections showcasing the individual on a stage of perpetual activity. This shift in social practice has produced what William Mitchell describes as "electronomads", a new breed of human that is free from the localization of the built environment and has no direct correlation to any particular place.

> "Now, spatially dispersed yet coordinated fluid collections of wirelessly interconnecting individuals – perhaps assembled, from the beginning, in cyberspace rather than at any physical location – are becoming a crucial fact of urban life. They constitute a new category of human assemblage – one to add to our traditional conceptions of the gathering, the throng, the crowd, the masses, the mob, the cadre, the cell, the ensemble, the battalion, and the team." (Mitchell, 2004, p. 161)

This digital species cannot resist connecting into the "invisible infrastructure" to become a part of our

Figure 6: The Digital Human.



electronic society. They are fragmented within the virtual realm, able to occupy multiple spaces and "exist" from any physical location. This means that individuals capable of connecting into the virtual realm can extend themselves much further into society then that of their host – the physical human.

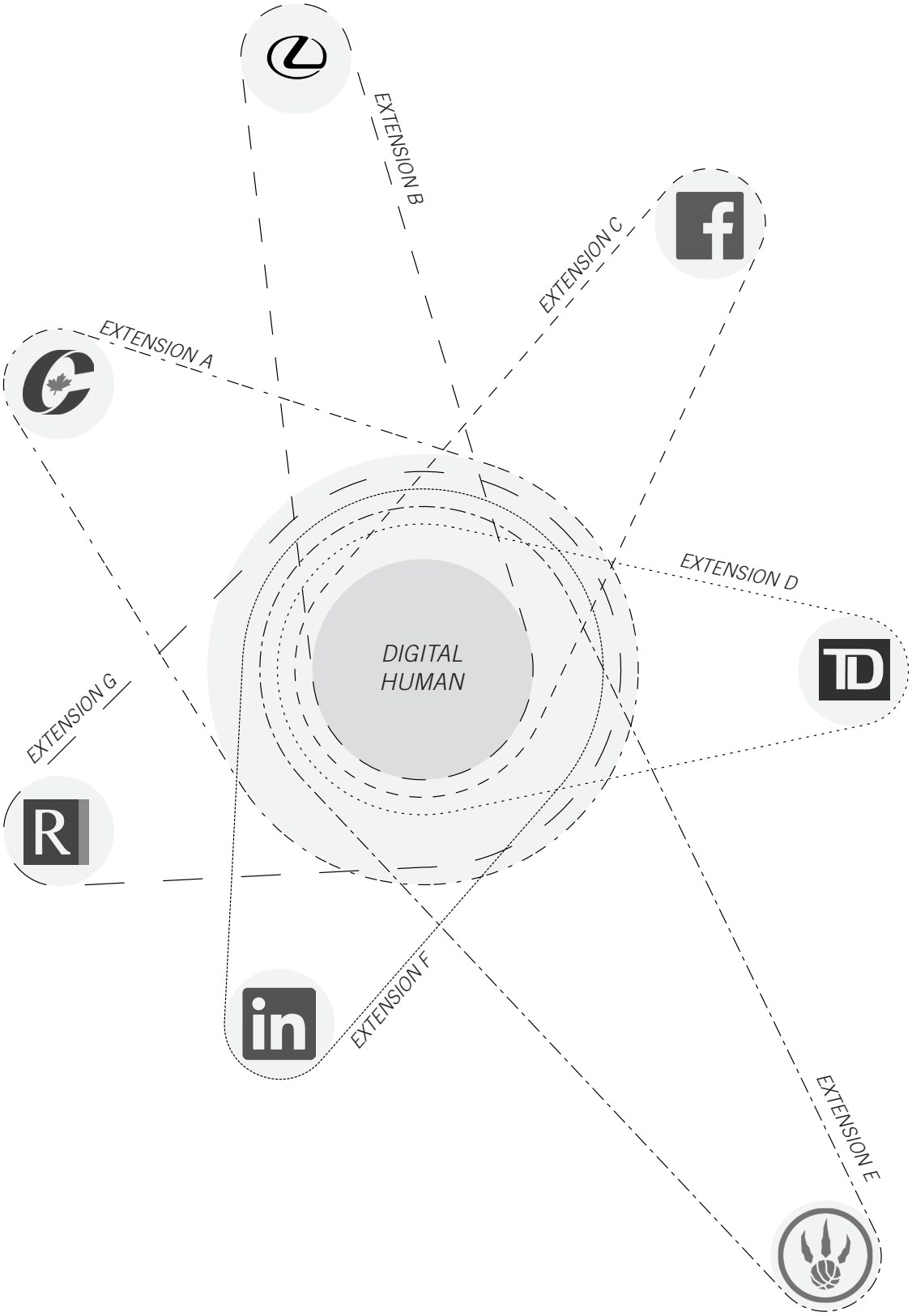
As the digital human enters into virtual space, they are met with a seemingly unlimited amount of information. The ability to author, alter or observe this content reveals opportunities to gain a better understanding of our digital make-up. This suggests that as we maintain our connection with virtual space, we can hone the relationships and interrelationships between who we are in both physical and virtual realms. While this concept is relatively novel, William Mitchell has already advocated a platform where our physiological and psychological bodies may one day become a part of this virtual network.

> "I'm not too sure about the brain science of all this; no doubt the inscription of information into organic neural networks is rather more complex than that of magnetic bits onto thinly spread iron oxide. And I would be surprised (to say the least) if the continuity of personal identity turned out to be such a straightforward matter, or if the mind/body distinction reduced so neatly to software/hardware. (Belief in this possibility is, of course, the extreme form of the digitalist dogma that "content" can always be cleanly separated from its current material embodiment.) But let us assume we can successfully read, decode, and copy all our brain files – the equivalents of WORD files of memorized text, JPG files of visual memory , MP3 files of unforgettable tunes, EXE files that specify how to get things done, and so on. Let us imagine a "post-biological future" in which we will think of ourselves as software, not hardware. What then?" (Mitchell, 2004, p. 167-168)

Mitchell's statement alludes to an evolved human; one that is fully uploaded via software files in virtual space. While this vision is quite valuable for the development of technology it does not assume a position for the digital human in both virtual and physical spaces. The disparity here is that while virtual activities are occurring, there is no indication of any physical result; or vise-versa. The most common example of such a paradigm exists in the development of virtual reality. Where physical humans enter into virtual space, they are transported to other realms that have no direct effect on the physical world around us. We are transposed through head gear or screens that replace our physical world with virtual content. To some degree, we can be considered uploaded to these realms but in actuality we are most likely encapsulated by a blank space that is only a container for these activities to occur.

The digital human is made of multiple virtual extensions each with their own respective identity but always associated back to the original host – the

Figure 7: Extensions of a Digital Human.



physical human. When we enter into digital space there are traces of our activities, various means in which we can explore these options and a universal platform for exchange. Here, the digital human extends into these 'spaces' and recreates an image of the original host, thus maintaining an extension. For example, social networking establishes a character profile of an individual, recreating personality, preferences and even a personal image. These extensions offer opportunities for further identification of the individual in modes that exceed solely physical representations of the host person. This means that as we develop as digital humans our extensions can help to divulge new societal organizations that are not available to us in the physical world. This then proposes a platform for interpretation between the digital humans and their physical bodies and where possible, these relationships will promote new approaches to how we understand ourselves within an interface between digital and physical environments.

With every new extension made in digital space, we maintain a layer of valuable information associated with the host individual. These layers represent possibilities for new relationships within the world we occupy and they promote additional connections within the virtual realm. The interesting point here is that while an individual enters into virtual space from any physical location, they can access these layers and build up their digital identities. These extensions are potentially unlimited and can be built up by simply entering into virtual space. They arise just as fast as new technologies develop and provide new access points upon which societal connections can occur. Where a new application becomes prevalent or a new mode of organization occurs, the digital human and their extensions are always evolving. The resulting factor here is that we, as digital humans, can now maintain a significantly more rigorous connection to people and environments in the post-digital age.

// THE AUGMENTED HUMAN

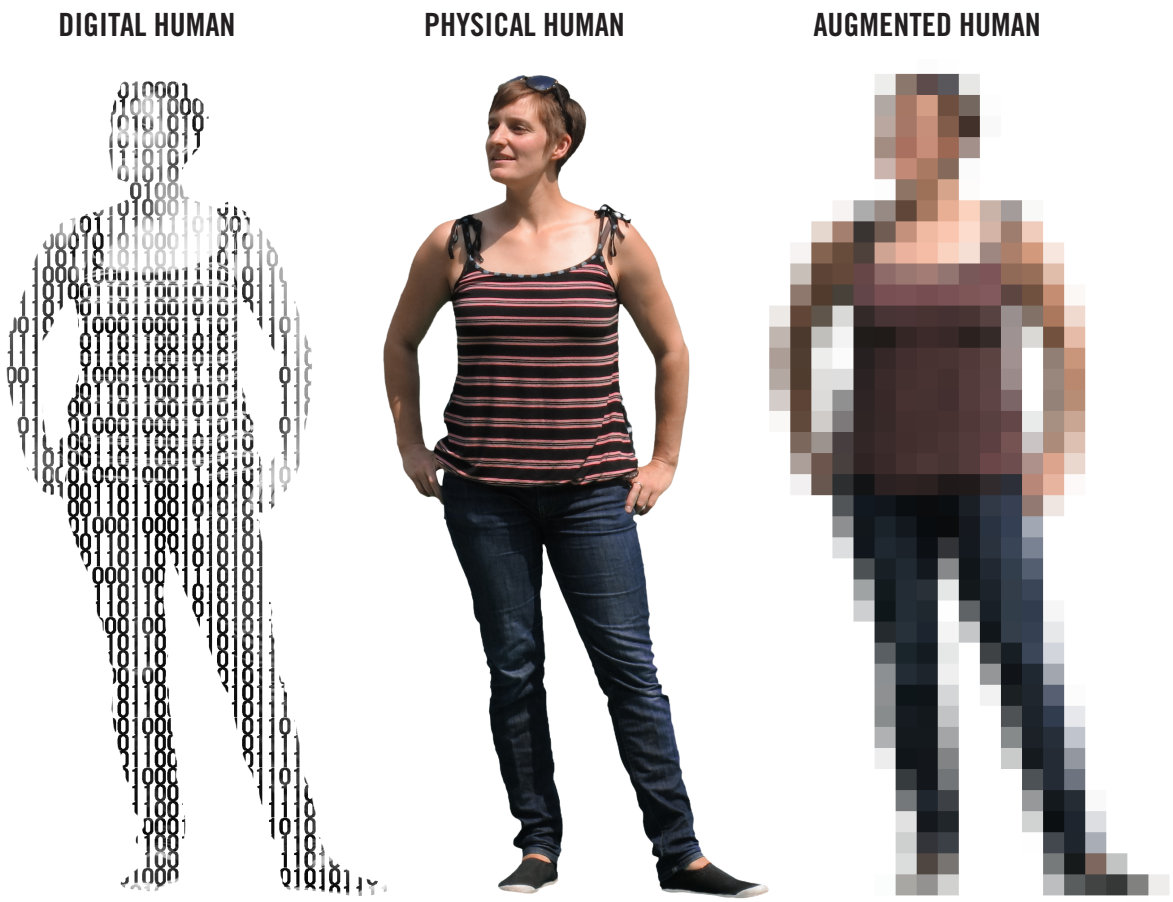
The augmented human is one that celebrates the use of their digital bodies/extensions within a physical context. While this assertion seems so straightforward, it assumes that humans along with their devices are a part of a larger organizational scheme that has the ability to identify them either physically, digitally, or both. The augmented human in this case, is one that is established as a result of the experiences that arise out of understanding and responding to the physical and digital human. Therefore, the augmented human becomes a byproduct of the dialogue between our physical and digital bodies and the technologies/ tools that enable these relationships. For example, an extension from a digital human may provoke a certain physical experience through the use of technological aids. Also, understanding that multiple digital humans are connecting, but only a few of those attributed physical humans are actually conversing, then the physical environment (through the use of technological and physical apparatus) may change to provoke a more intriguing social dialogue between the absent or disinterested physical humans. The combinations between these connections are virtually

Figure 8: Versions of the Augmented Human.

unlimited and always propose new results as to how the augmented human may present itself.

The hybridization and multidimensional aspects of the augmented human rely on a combination of physical and digital interfaces to elicit augmentation. William Mitchell in his essay entitled “After the Revolution: Instruments of Displacement” speaks about this profound discovery in the post-digital era. He states: “These various forms of overlays of the digital on the real are increasingly producing fusion space – architectural space in which electronic instruments of spatial and temporal displacement enable new and socially valuable contributions of people or activities.” (Flachbart & Weibel, 2005, p. 22) Mitchell describes the basic and fundamental scenario in which the augmented human arises. When the physical environment is supplemented by technologies, and when physical humans are enhanced by digital tools, then in actuality we are entering into states of augmentation. When we use our devices to understand ourselves as well as our surroundings we gain a more fruitful understanding of how we can pair physical and virtual realms. By implementing certain technologies and combining them with an abundance of physical and digital humans we may begin to see how these relationships may provoke new social conditions. For example, distributed lighting in architecture can be a result of understanding the amount of light needed in the space by knowing how many physical humans are occupying a space. This type of architectural actuation can be even

Figure 9: The Digital, Physical and Augmented Human.



The "Digital Human" has influence over what the "Augmented Human" is experiencing. The "Physical Human" becomes a means for these experiences to manifest themselves.

more complex when we have the ability to identify digital humans within the scenario. The idiosyncratic conditions of each digital human may be able to prompt specific lighting patterns, type of light or intensities that are directly respondent to the conditions required by the physical human. In the case of the augmented human, limitations do not exist, and when new variables enter into the equation, more and more opportunities for augmentation arise.

The augmented human is then comprised out of the almost infinite possibilities both physical and virtual environments have to offer. The opportunities for new modes of societal engagement between augmented humans are attributed to the overwhelmingly dense amount of combinations that can arise out of these complex systems. The use of digital technology in coordination with physical humans and environments can and will provide a level of augmentation. It is within the specific use of these elements that we can truly test the possibilities, extents, and potentials of the augmented human within architecture.

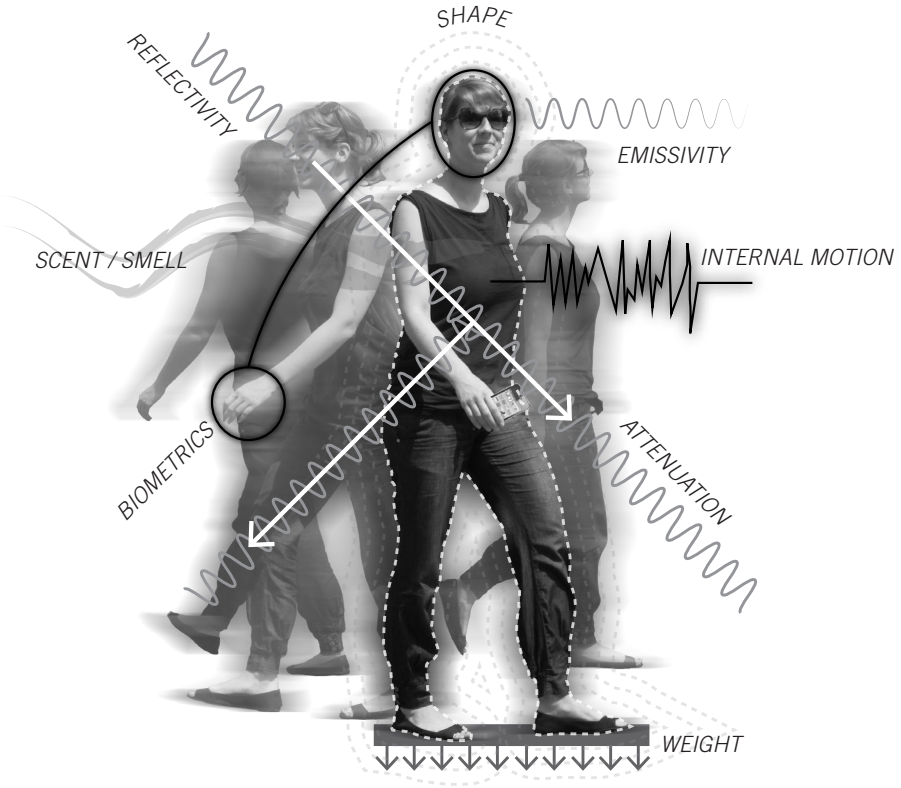
// HUMAN-ENVIRONMENT RELATIONSHIPS

The ties we now have with our environments are becoming more and more personal. We enter into information dialogues with different electronic portals which can dramatically alter the way in which we identify with our spaces. Environmental sensing proposes the absorption of real-time data so that we can gain a better understanding of our environments. The digital human's role in this dialogue allows for a more proficient understanding of personalization. This means that as we merge technology into the built environment we will be creating even more opportunities in which our digital extensions can be created or recognized. These correlations between different spaces then provide new user experiences and thoughtful consideration for how we might interact with the world around us.

Navigating 'invisible infrastructure' will inevitably land you in some sort of organizational scheme with other digital humans. Making connections with other extensions allows for a range of networks associated with social, political, economic, etc., connections that have just begun to surface in the post-digital age. Modes of creating, sharing or copying networks of shared interests are shaping the way in which society functions and as a result the understanding of these relationships will lead to new kinds of design information. While we establish virtual extensions and build up our digital humans, we are creating information that is available to us to use for architectural engagement. This means that when information about all the "humans" is considered, we can get an even more substantial understanding of who, as architects, we are designing for. The ability to identify these types of design variables allow us to use them within the context of sensing and actuating systems enabling architecture to become a product of the connections between physical, digital and augmented humans.

Conversions are the designed digital processes that

Figure 10: Intrinsic Sensing Attributes - Static.



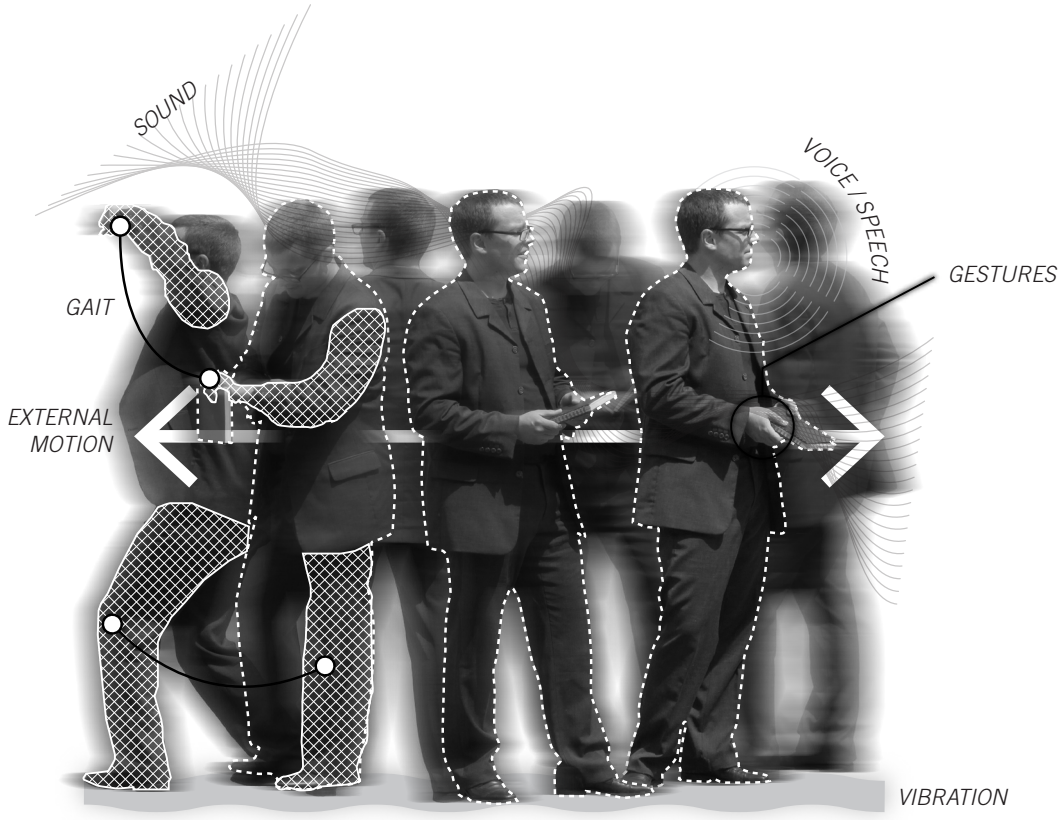


Figure 11: Intrinsic Sensing Attributes - Dynamic.

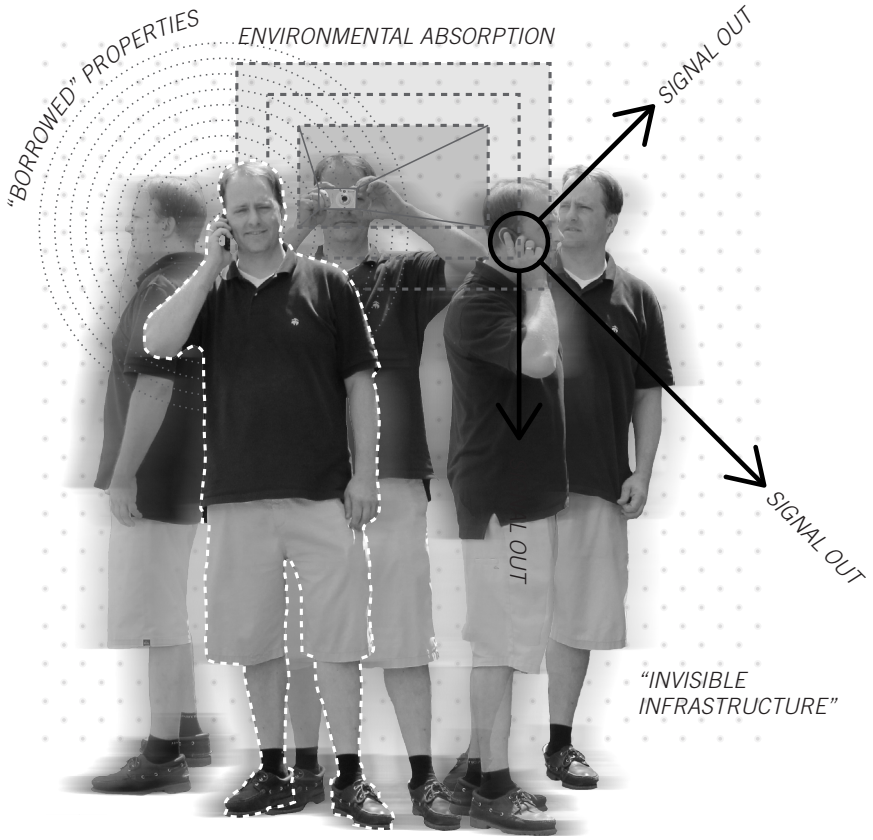
occur as a result of a dialogue between environments, humans, and their virtual extensions. Conversions are what make interactive, responsive or even intelligent architecture function. They are intermediate design protocols that allow for sensing platforms to be understood and then tabulated and organized towards some form of actuation. These platforms are complex and require both hardware and software systems to be injected into the material of architecture. For example, the use of pressure sensors within a floor assembly will provide information pertaining to the location, weight or trajectory of physical humans. This will allow buildings the ability to gain a fuller understanding of the users within the building which then supposes that the information received can be used for architectural engagement. Conversion tools, when integrated into the built environment provide levels of new engagement with users and environments posing new ways in which we are able to understand ourselves and surroundings.

According to "A Survey of Human-Sensing: Methods for Detecting Presence, Count, Location, Track, and identity" by Thiago Teixiera, Gershon Dublon, and Andreas Savvides, human sensing can be categorized into three categories: spatio-temporal properties, behavioral properties, and physiological properties. Within these three paradigms, there are intrinsic or extrinsic traits associated with the sensed person, object, place, etc. These differentiations allow for a more focused target reference as sensing is very singular in the sense of hardware. By breaking down typical sensing properties in physical space we can organize these opportunities in virtual space to provide for circumstances leading to physical actuation.

Intrinsic sensing traits are those that are associated with the physical human and can be separated into two categories: static and dynamic. In sensing, static attributes are those that do not change on your person, such as biometrics or weight. Dynamic attributes on the other hand are those that are associated with the body but have the ability to change, such as temperature or movements. The combinations of all sensing platforms can thus be integrated and correlated into data to then be used for actuation. Intrinsic traits are associated with the physical human and the surrounding environment. This mode of sensing takes this physical information and quantifies it within a computational platform which can then be correlated with each digital human via extensions. Overall, the ability to digitalize physical information provides opportunities to pair physical and digital humans within the context of both physical and virtual environments.

Extrinsic sensing traits are those that are associated with the digital human. These traits are sensed via device portals and throughout the 'invisible infrastructure'. In other words, extrinsic traits are those that are available for sensing through devices such as computers or cellular phones. While these traits are normally defined by usage and content, the introduction of the digital human presents new modes of not only sensing but also how we use this

Figure 12: Extrinsic Sensing Attributes.



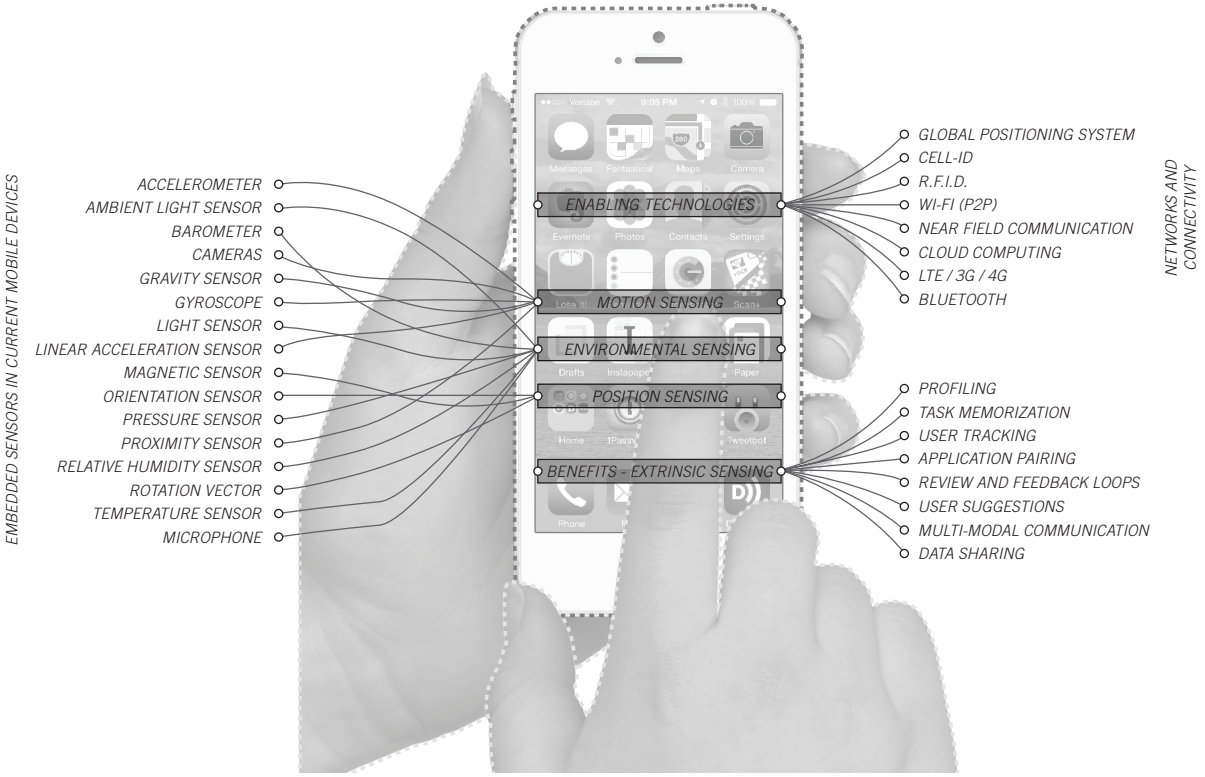


Figure 13: Device Diagram.

information in connection with our digital extensions. For example, the camera on a phone is considered a tool for extrinsic sensing. Paired within the body of our digital extensions, this camera can give us way more information than simply a visual image. When it is supplemented with other extrinsic sensing devices, perhaps a G.P.S., we establish even more information about the physical human than before. When all of these different devices are placed within the built environment or within the devices we carry, the potential for gathering information becomes increased which informs new knowledge in the relationships between physical and virtual spaces. (Teixeira, Dublon & Savvides, 2010)

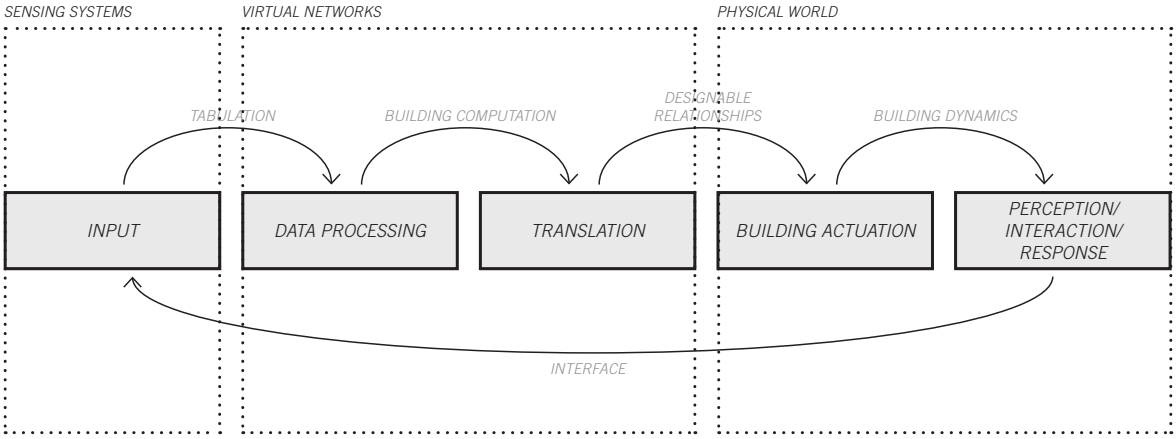
The availability of sensing equipment in the post-digital society is becoming ubiquitous. Not only do our phones now carry advanced sensing devices, but the built environment in which we roam will now feature several of these types of apparatus. Items such as household appliances, vehicles, and even shoes now carry elements that have the ability to provide information beyond that particular item's use. When multiple sensing devices are paired with each other an even more informed level of connection and understanding is established. The correlations between devices and the data provide unparalleled amounts of information pertaining to not only the devices themselves but also users. As we continue to adopt these technologies and integrate them within the built environment a more conscious regard towards their connection will be established. Our digital and physical bodies may now be even more tied to each other and the products of these dialogues will produce advanced methods as to how we are able to identify ourselves and our surroundings.

Implementing sensing and actuating systems within the built environment brings forth new ways in which we are able to utilize the information received or identified from the "humans". By obtaining information we can tabulate and organize it to meet the requirements of people for their daily use. For example, being able to understand preferences such as sound levels, humidity or light exposure will enable architects and designers to account for these conditions in design. We should also notice that through changing preferences and the addition of multiple users, sensing and actuation can further optimize and allow for a heighted efficiency in these types of designed environments. As a result, the "humans" provide a greater amount of information to be used by these systems so that we may design architecture that is coherent in its dialogue with its users and environments.

// HUMANS IN ARCHITECTURE

By dissecting the human into three areas: the digital human, the physical human and the augmented human, we can see how various relationships, either independent to each stream or connected amongst them all, can elicit the potential for a greater understanding of ourselves. While the digital human exists solely in virtual space, the information and database that it provides is invaluable to the

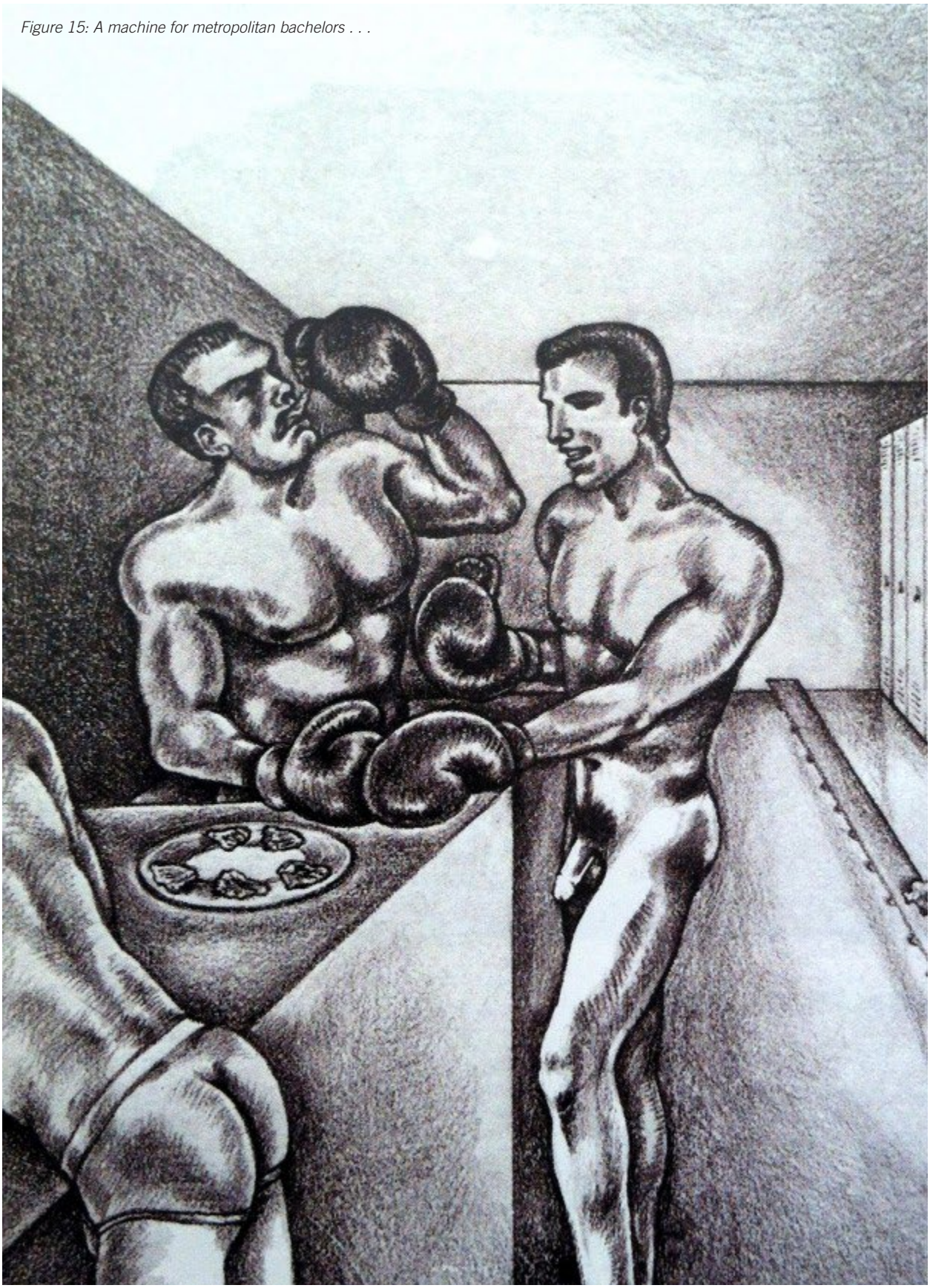
Figure 14: Sensing and Actuation Matrix.



understanding and identification of our virtual extensions. These extra layers of investigation provide further opportunities to tap into the individual aspects that architecture has the ability to provide. The physical human, through virtual extensions, can project themselves into virtual space in ways that allow us to further grasp their individual conditions or preferences. Furthermore, when pairing the "humans" and their technologies, we may identify the augmented human. Within the context of architecture, the augmented human has the ability to roam within both physical and virtual environments and become a key contributor to an evolved architecture that identifies and responds to the "humans" in all realms of space.

As we gain a better understanding of these streams of the human we can design for the possible instances that allow for architecture to evolve. This involves the capacity to tabulate complex digital systems and present them in a fashion that unveils new modes of how to engage with these various "humans". The ability for architecture to perform between and within virtual or physical spaces will lead to new and different architectural forms that are directly responsive to the dialogue and relationships between each stream of human.

Figure 15: A machine for metropolitan bachelors . . .



3.0 // AGAINST PROGRAM

// DIMINISHING HISTORY

The digital environment is a variable platform for information streams to flow between connected individuals. This assumes that virtual environments are always changing to suit the requirements of its users. This comes in the form of identifying personal preferences so that the individual is not wandering through virtual space but able to easily locate or enter into the spaces they require. A search engine, for example, is the most blatant example of how we are accessing information in virtual space. These applications are able to guide us towards information we would have otherwise not been able to access or even find. The relationships here consider that we as individuals are being catered to through the many applications available in the virtual realm.

By applying the concepts of adaptability and variability to architecture, it seems that we should be able to identify processes, whether virtual or physical, that can attribute new social interactions within the built world. By embedding technologies such as sensing and actuating systems we can introduce the virtual as

a means to provide for new architectural experiences dependent on both the expressive content and the processing power of digital spaces. These processes may enable architectural actuation through a means of distribution that is coordinated based on the types of activities that may be occurring. Space can then redefine itself as an initiator for adaptable architecture directly responsive to the relationships between digital and physical realms and presenting itself as an entity of functional, formal or systematic manipulation. Interactive technologies, ubiquitous computation and responsive systems are changing the way in which architecture is cultivated and proves that as we link virtual and physical realms, new design possibilities will arise. In all respects, architecture that is adaptable and is able to change constantly to meet human requirements can be immeasurable. This suggests that as we move forward with flexible, responsive, and intelligent design, a fundamental aspect of architecture will become displaced; the architectural program.

// SPACE VS. PLACE

Space versus place has been a topic in the discussion of architecture, but now in the post-digital era, this conversation has never been so prevalent. When we enter into virtual space, we are not tangibly associated with any physical location. This considers the ability for us to enter into various virtual realms but with no direct correlation to the physical experience that may be inherent. For example, in Walter Benjamin's essay "The Work of Art in the Age of Mechanical Reproduction" he suggests that as new tools/ technologies develop, primitive medias will diminish. He alludes to technology as a driving force behind the deterioration of the significance of objects and blames reproduction as a factor of diminishing authenticity. Now, in today's society, we are met with a similar condition; digital technology is strengthening our connection to particular spaces, but weakening our association to place. In this sense, technology is now offering us the ability to enter into a range of virtual spaces which suggests that as we do so, the places that we have historically been connected to (museums, art galleries, monuments, etc.) are losing their physical value.

Benjamin speaks of art as a diminishing element when photography and film have come into use. The reproductive state of this technology eliminated the need to go and see a landscape or event because it could be televised, photographed, or filmed. The medium in which information is displayed alters the condition of social norms; adoption and implementation of such new devices will force change. As technology flows throughout our built environment the spaces that are commonly used to house specific activities or types of information are no longer needed. Going to a coffee shop to meet a friend for conversation becomes less necessary if communication devices are readily available; attending a baseball game becomes a rarity because the best view of the game is on the television; going to a bank to see a teller becomes scarce due to the fact that online banking is commonplace. This condition

(i.e. the replacing of physical space with virtual space) is becoming routine and with this social transition comes a full transformation for the manners in which physical space is occupied and used. Similar to Walter Benjamin's overview of social change, the spread of digital technology and its subsequent displacement of usable space have altered the conditions of acquiring a sense of place with various locations. By entering into virtual space, we can undergo experiences that would have otherwise been allocated in or attributed to a physical space. For example, virtual space offsets activities such as gambling – online casinos take away the need to occupy a physical space in order to experience a compulsive thrill. Also, library content is now digitized and can be available to users anywhere in the world through digital devices. Furthermore, online shopping has reduced the need to occupy retail stores or malls because more variety is offered digitally and we can navigate these options at an unprecedented rate. All of these diminishing aspects are directly detrimental to the overall use of a particular space and demonstrate that while virtual activities are occurring they are not being facilitated by any form of physical space. This is because digital technology is responsible for the constant augmentation of place thus allowing us to disassociate ourselves from our immediate physical context. In this regard, augmentation refers to how our digital devices are able to allow us to mentally leave the physical space we might be occupying in lieu of accessing the content or experiences that virtual spaces have to offer. The fact that we are now accessing experience outside of architecture and specifically in virtual space means that these spaces are limiting our ability to connect with meaningful physical places.

// A NEW TYPE OF PROGRAM

Program is a critical aspect to any type of architectural conception. As a result, it is important to examine what it was in relation to its current fluctuating status. It is an entity of constraint. These constraints can be defining and encompassing of factors that include almost an unlimited amount of approaches to how space is defined, calculated and organized. Although this classification seems to include a level of variance in design, it is truly a process by which constructible entities merge to form what is typically considered a fixed user interface. William J. Mitchell reveals John Summerson's definition of program as "… a detailed list of required spaces, specifying floor areas, technical requirements, and adjacency needs." (Mitchell, 2004, p. 152). This definition suggests a calculated route towards how space is allocated and considers the pragmatic aspects of building and construction techniques. Mitchell adds that "the standard procedure of twentieth-century modernism was to start by distinguishing and separating functions – the better to optimize spaces for particular functions and to announce those functions visually." (Mitchell, 2004, p. 152). As we conceive architecture it is true that in today's organizational schemes, we find particular solutions for specific spaces and find interrelationships in order to place them in a hierarchy of functional divisions.

While this structure has proven to be successful it does not embrace the need to incorporate conditions beyond the functional aspects of architecture. As such, the essential characteristics of complex social constructs become irrelevant to these unyielding definitions. Fluctuation in space is a product of dynamism and variability in program. To achieve this condition, one may be required to incorporate additional 'flex' spaces to merge traditional spaces in a more creative fashion. If this consideration is fruitful, then Anthony Vidler provides us with an indication of futuristic thought at the forefront of a programmatic shift.

> "The emergence of a new sensibility to the architectural program considered in its broadest terms recalls the optimism of Reynar Banham and John Summerson in the late 1950s. Their premise deemed that a closer attention to science – whether of perception, information, or technology – would in the end lead to a fundamental reconception of modernist functionalism, not in order to free architecture from observance of function, but rather to cast functionalism in a vastly expanded field that included, from Banham's point of view, typology, perception, biology, genetics, information theory, and technology of all kinds." (Vidler, 2003, p. 60-61)

As Vidler summarizes the ideals of Banham and Summerson, he creates a foundation where we can see a transferal of programmatic conception. Now we can consider program as an all-encompassing entity capable of forming architecture by utilizing a series of informed subjects. Program, then, is a catalogue capable of providing for the public in a way that allows designers to pick and pull specific features and combine them as they systematically see fit. This catalogue is categorized by typology and would consist of a series of sections related to each field. For example, a library is a typology in itself but included in this chapter will be a variety of programs. These choices could range from study spaces to book stacks or circulation spaces to mechanical support. If this catalogue approach is successful then we must question that process of dissection, deconstruction and application. The approach to examining each space reveals an opportunity to understand its function amongst its supporting spaces and choose the appropriate combination for architectural success. Thus, if we consider a disregard for a specific program, architecture can contain a disjointed typology without connection or specific function. What now can be considered program if the spaces that are defined are inexistent (without relationship) and the catalogue contains blank pages that are simply defined by typology? In other words, can architecture exist if a typical program becomes fragmented so much so that the interrelationships of a building become an entity of variability?

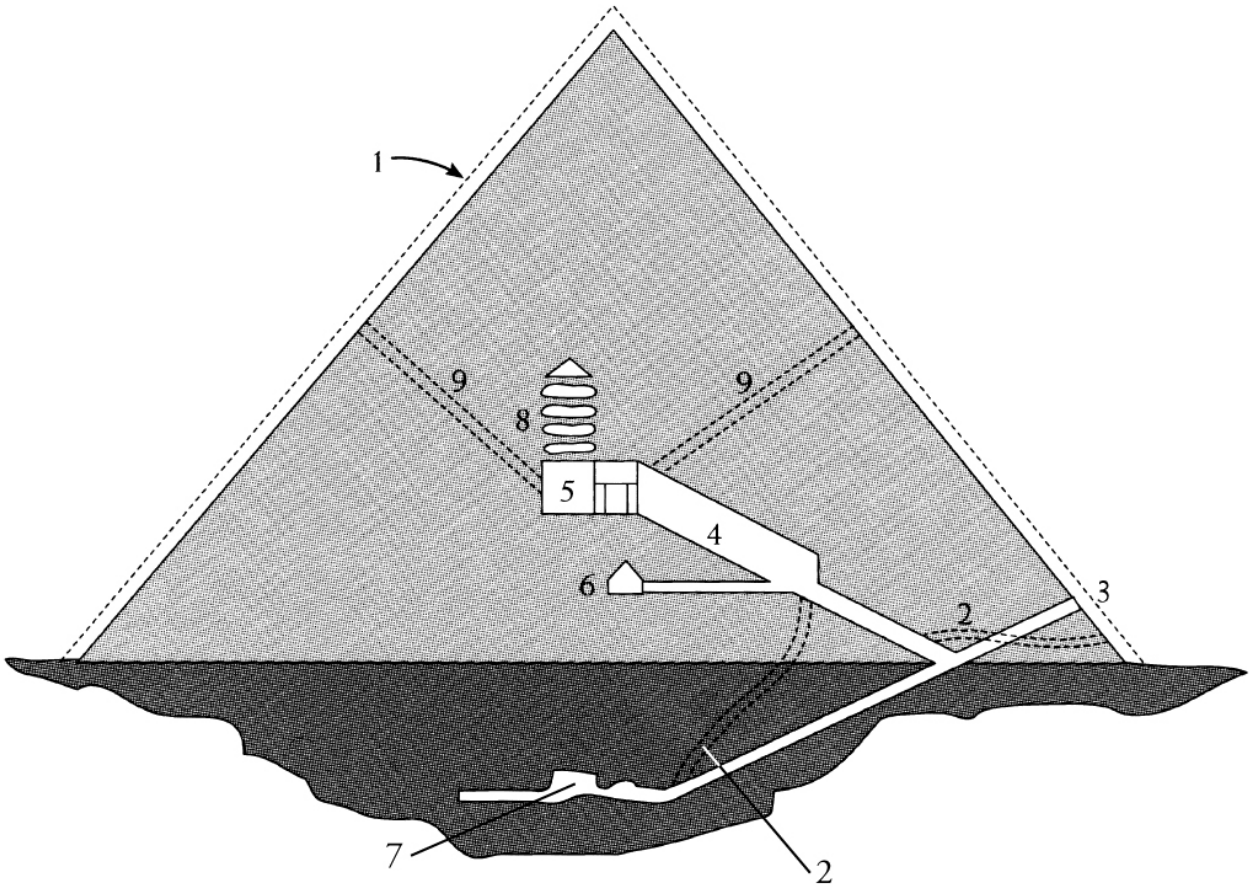
As the traditional sense of program becomes diluted within the framework of an evolving technological society, a redefinition or reinterpretation of the

concept is required. The emergence of adaptable spaces that are determinant on the needs, wants or requirements of the user is become more and more prevalent in design today. Already, buildings have the ability to incorporate sensors and monitoring systems to adjust functions that may include building systems, façade apertures or in some degree, manipulate space holistically providing the user with variability in occupiable space. If buildings have the ability to not only adjust their atmospheric conditions, but also provide a level of kinetic spatial interface, then it becomes evident that the rigid characteristics of program become an entity of confusion. Spaces can alter their physical, functional and systematic idiosyncrasies to define space as a loose term that may not even serve a specific function. Thus, the question must be raised; if space is no longer meant to serve a singular function, then how can we make connections with an overarching typology to eventually connect space in a harmonized built form? If this is the case, then program surely becomes a diminished entity and a new, looser definition of building organization is required to understand how the introduction of technologies have affected architecture.

> "… The architecture of the twenty-first century can (if we choose to take the opportunity) be far less about responding to such rigid programs and much more about creating flexible, diverse, humane habitats for electronically supported nomadic occupation. It can be an architecture not of stable routines and spatial patterns, but, as Michael Batty has suggested, of continually reconfiguring clusters of spatial events characterized by their duration, intensity, volatility, and location." (Mitchell, 2004, p. 162-163)

William Mitchell suggests a platform for architecture to be an elastic collection of space that bypasses the typical rigid interface and evolves towards a 'humane habitat'. This habitat, as explained by Michael Batty, is dependent on a variety of adaptable circumstances that should culminate as a unique set of spatial organizations fully initiated by users. This then suggests that as a result of user participation, a building will become what it needs to be in order to serve the functions that are required at that specific moment. As a result, the need to understand a new type of spatial organization is required. This type is not based on any rigid conditions but actuated by the individuals it must contain.

Figure 16: Pyramid of Khufu Sectional Diagram.



// SECTIONAL SPATIAL TAXONOMY

In the following pages, the concepts of a diminishing program will be illustrated. The versions of form are completely disconnected from architectural program which demonstrates the fact that program is not tied to form. The section was used as a tool to overcome rules of architecture where the fundamental aspects of convention are not considered and space is the only facet of investigation. The exercise stems from the section of the Pyramid of Khufu, a completely conceptual and speculative diagram of the internal spaces within the Great Pyramid.

Each section is labeled with a descriptive word; not explaining programmed spaces, but qualities or expressions of space that are commonly found in the built environment. This exercise attempts to not only find one solution to each descriptive word, but allows for the reinterpretation for each section associated with that word. These sections are illustrative of program-less space and suggest that each iteration can serve a multitude of functions that have the possibility of occurring.

Figure 17: Sectional Spatial Taxonomy: Volume 1.

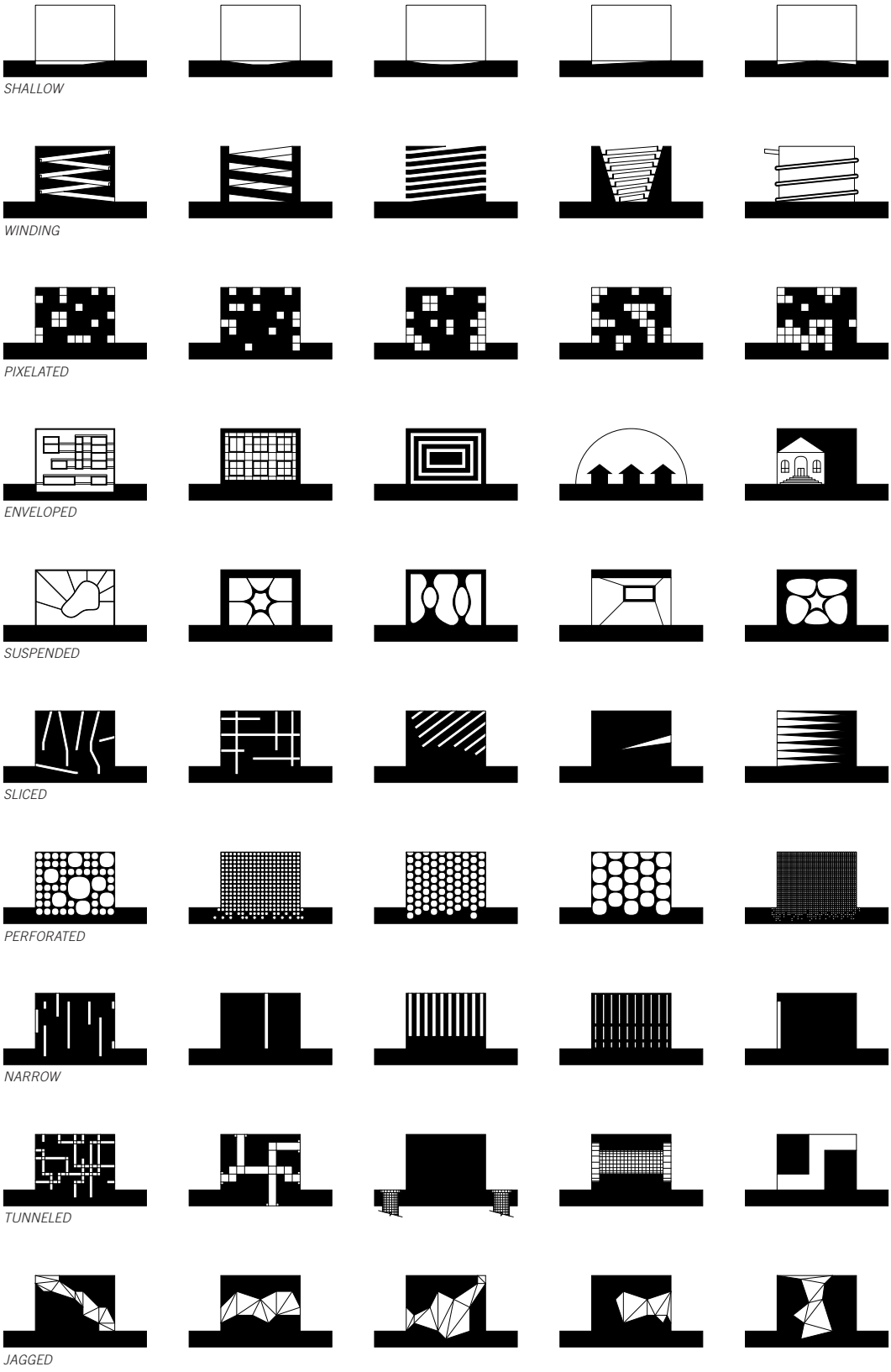


Figure 18: Sectional Spatial Taxonomy: Volume 2.

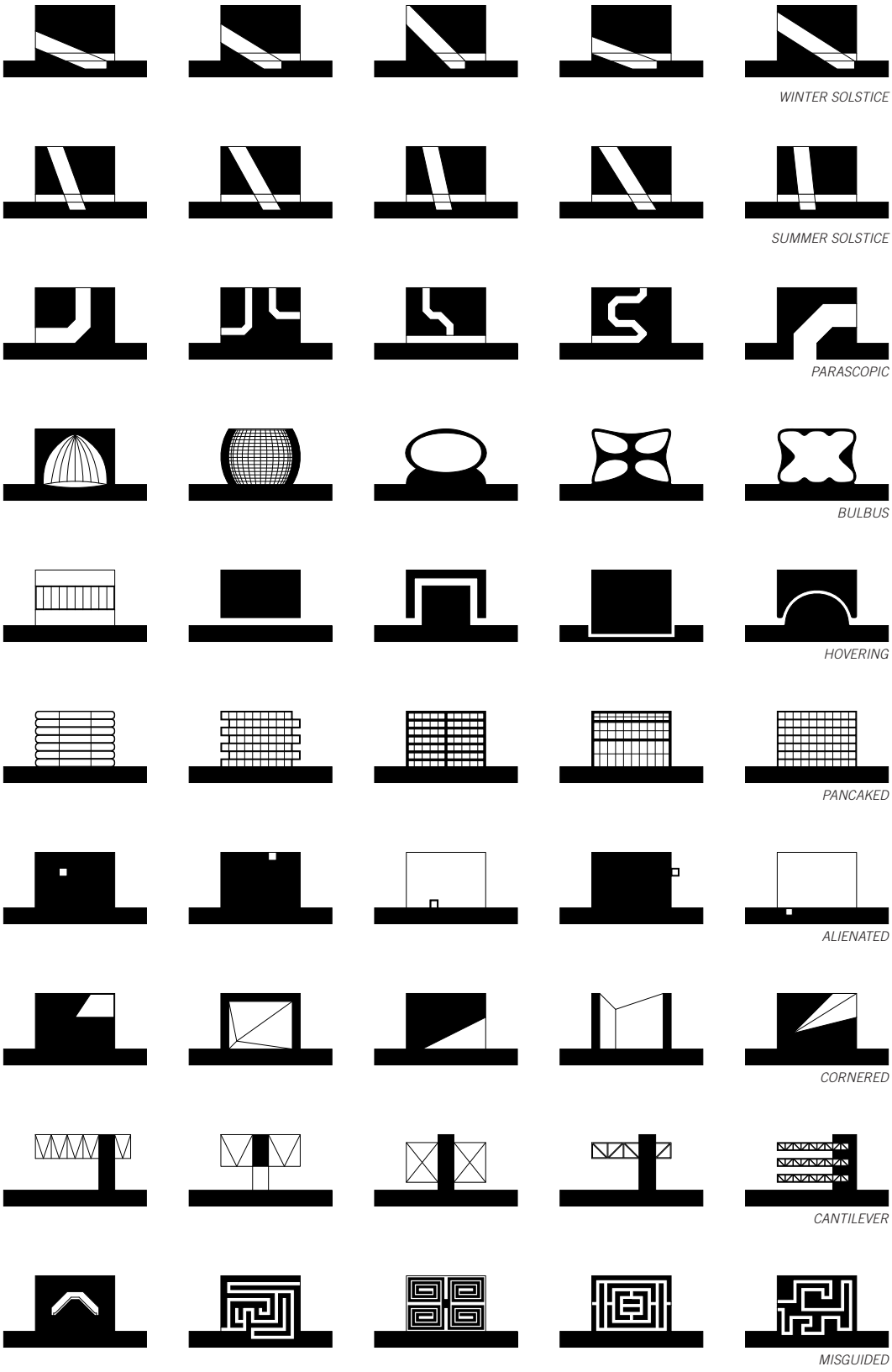


Figure 19: Sectional Spatial Taxonomy: Volume 3.

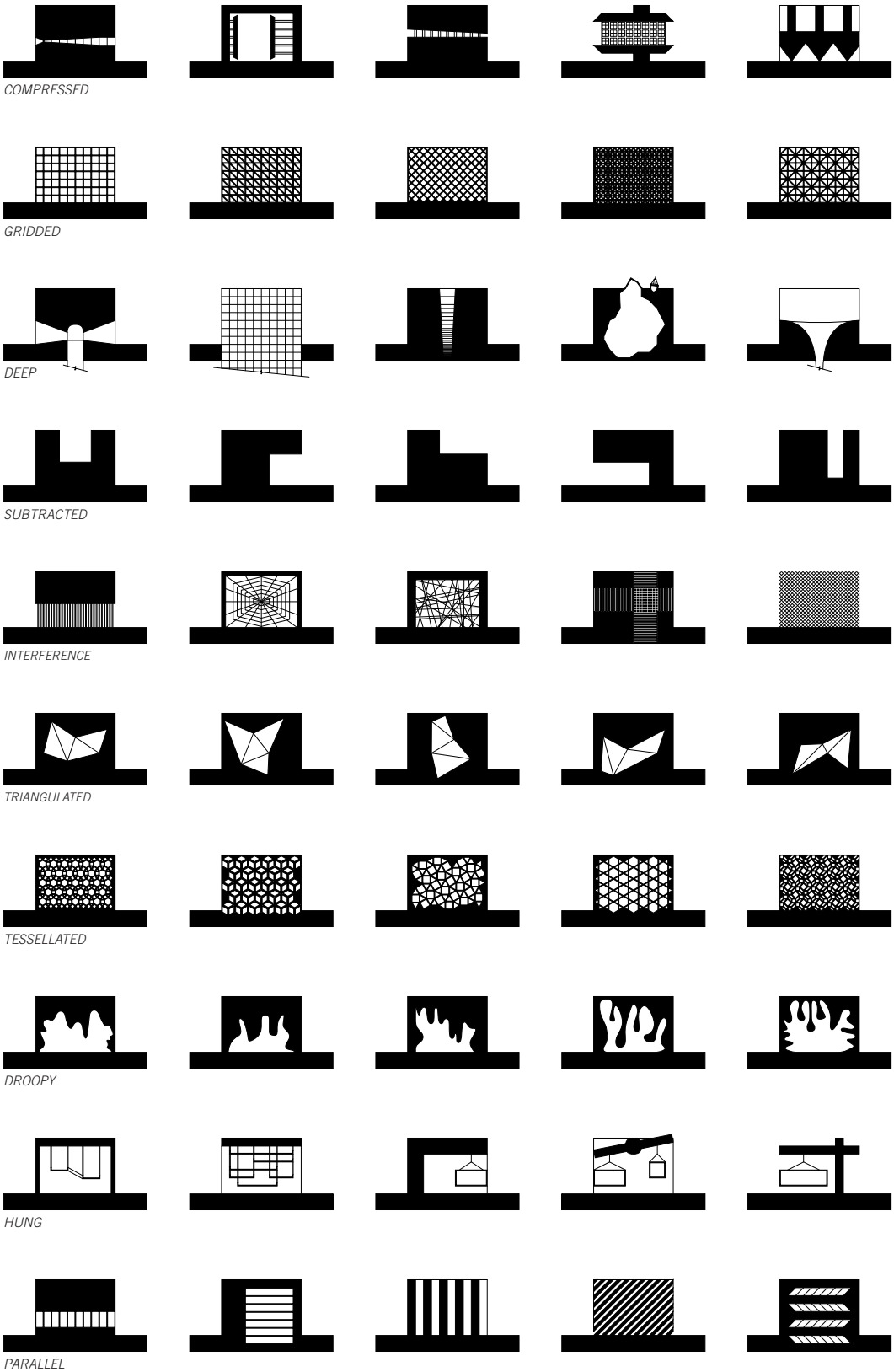


Figure 20: Sectional Spatial Taxonomy: Volume 4.

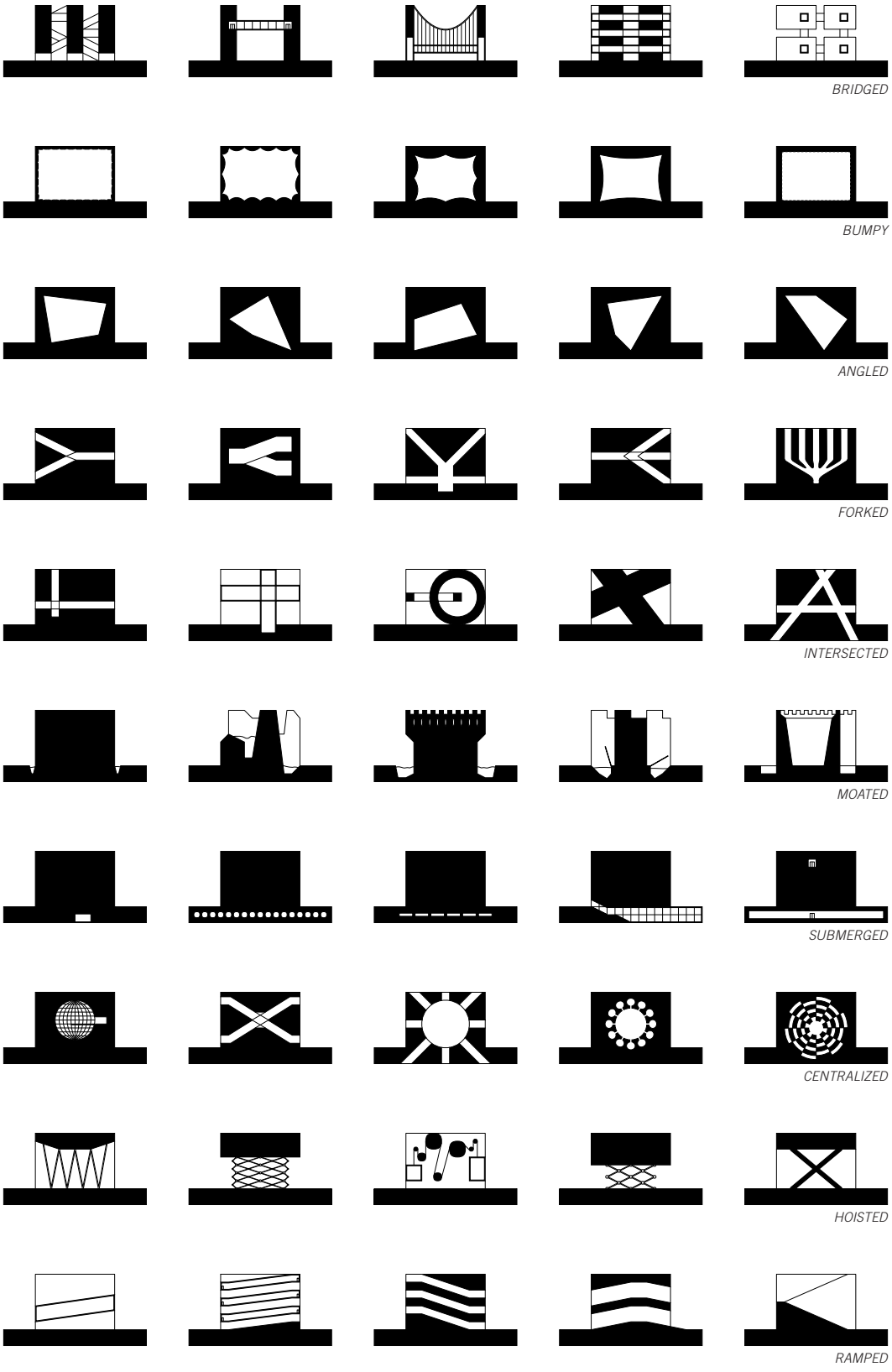


Figure 21: Sectional Spatial Taxonomy: Volume 5.

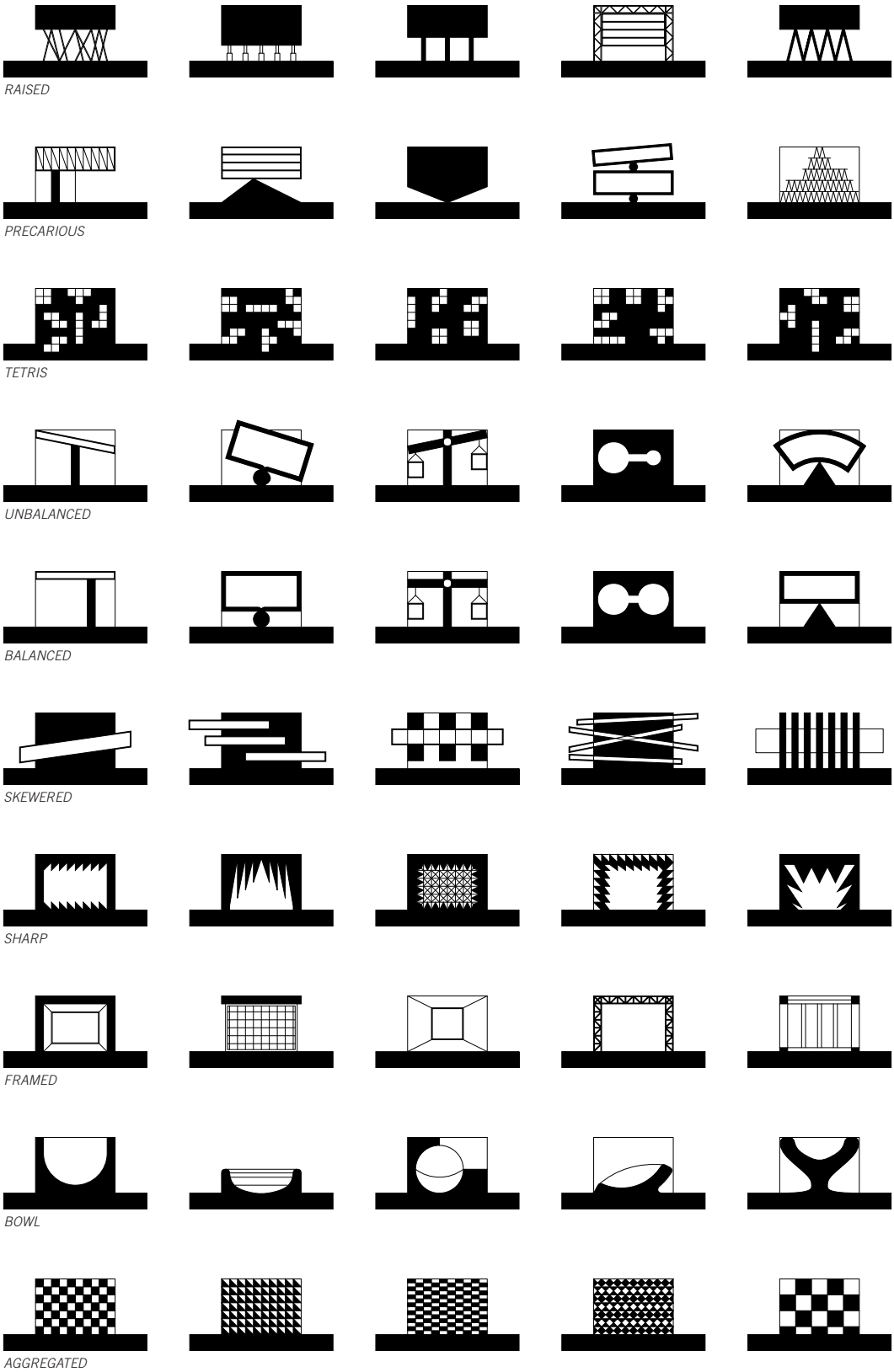


Figure 22: Sectional Spatial Taxonomy: Volume 6.

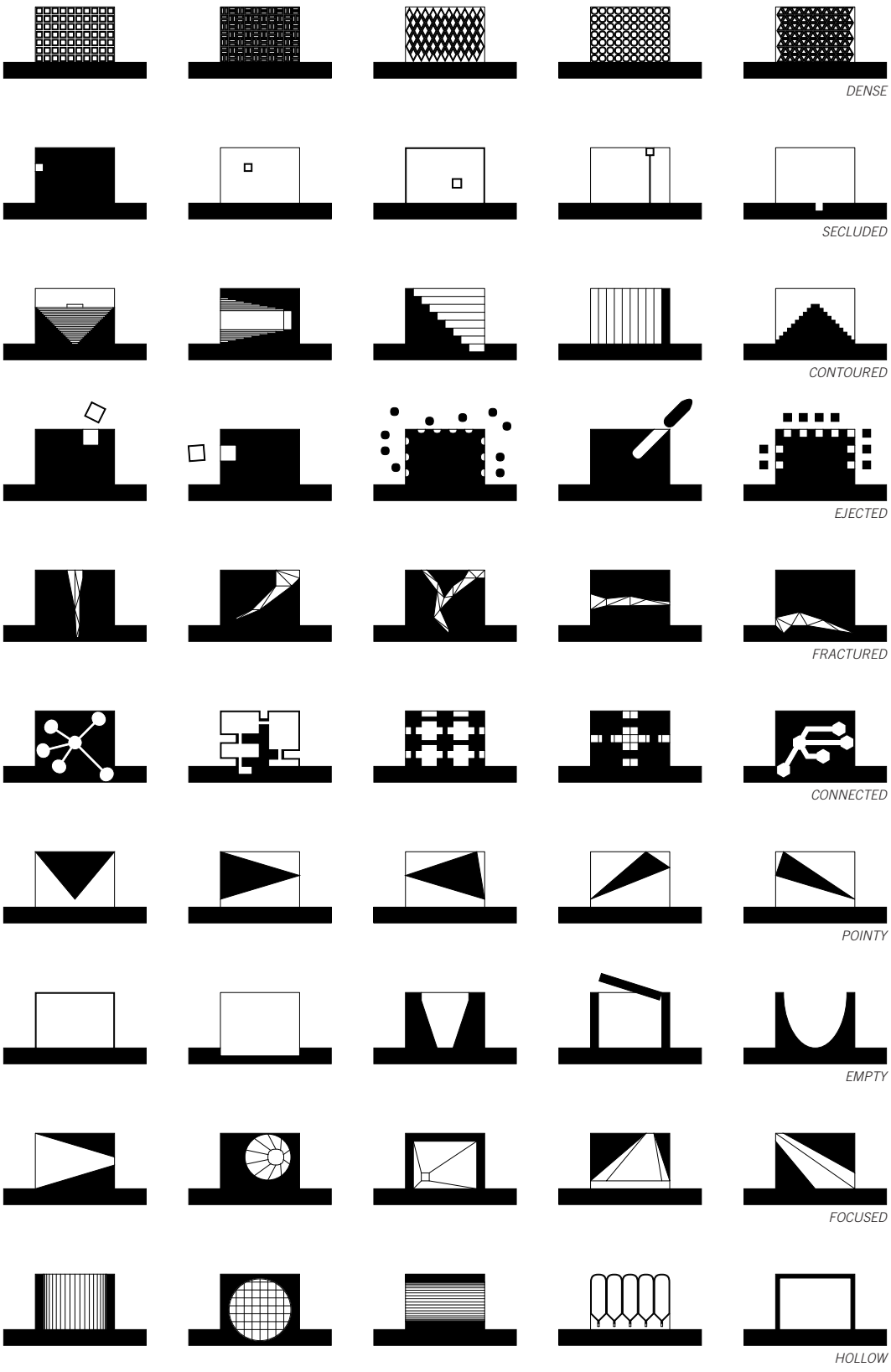


Figure 23: Sectional Spatial Taxonomy: Volume 7.

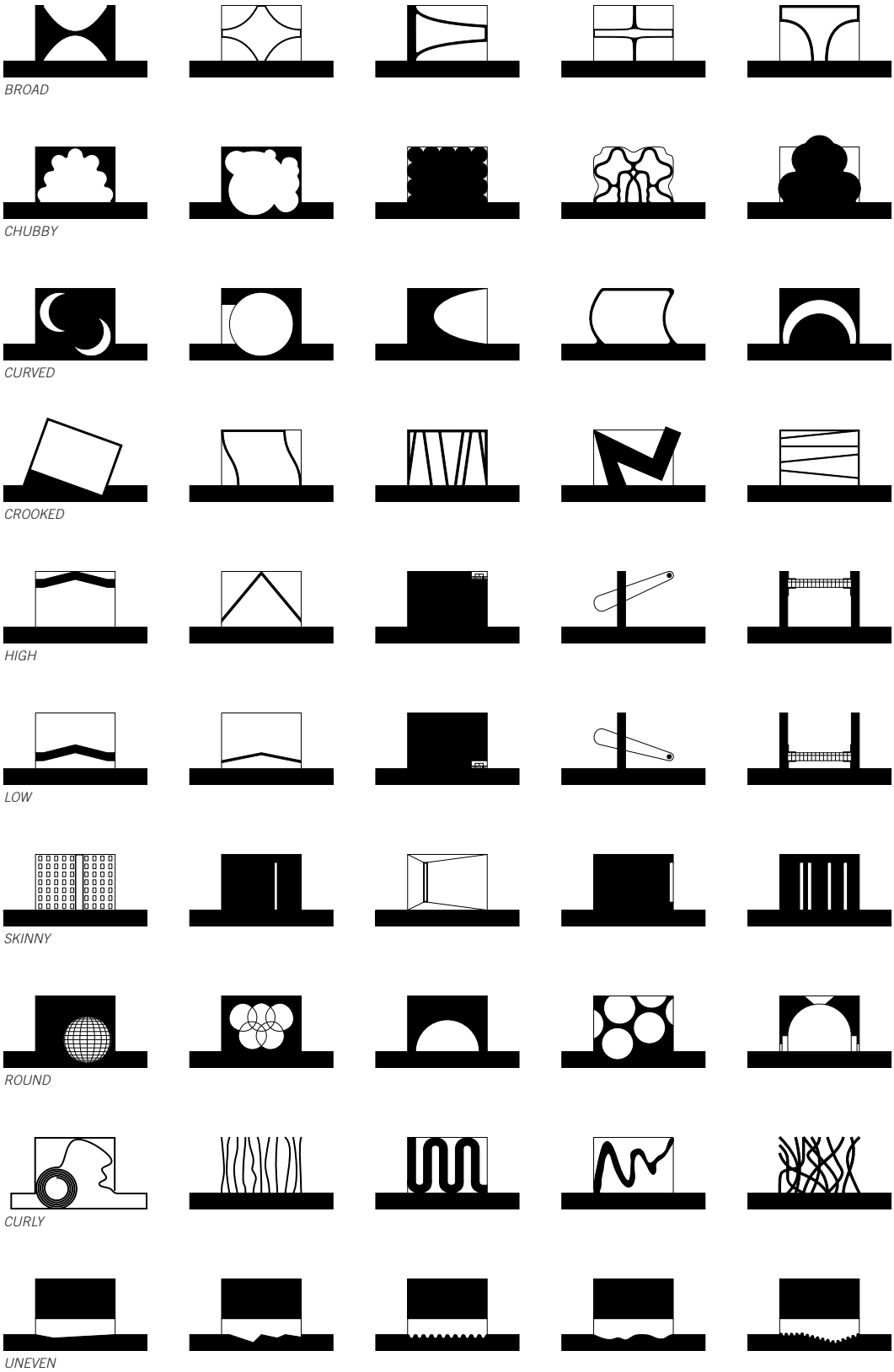


Figure 24: Sectional Spatial Taxonomy: Volume 8.

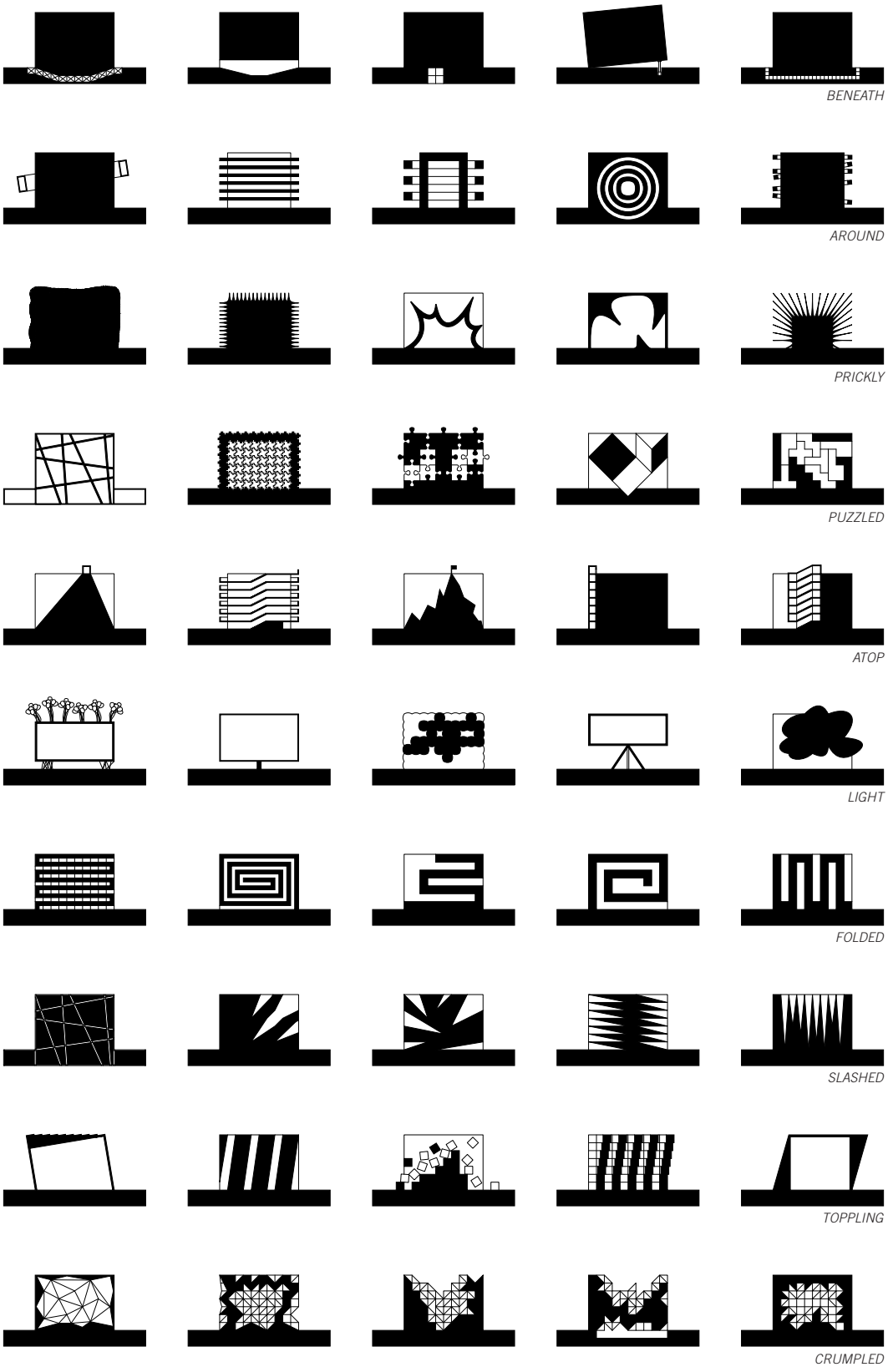


Figure 25: Sectional Spatial Taxonomy: Volume 9.

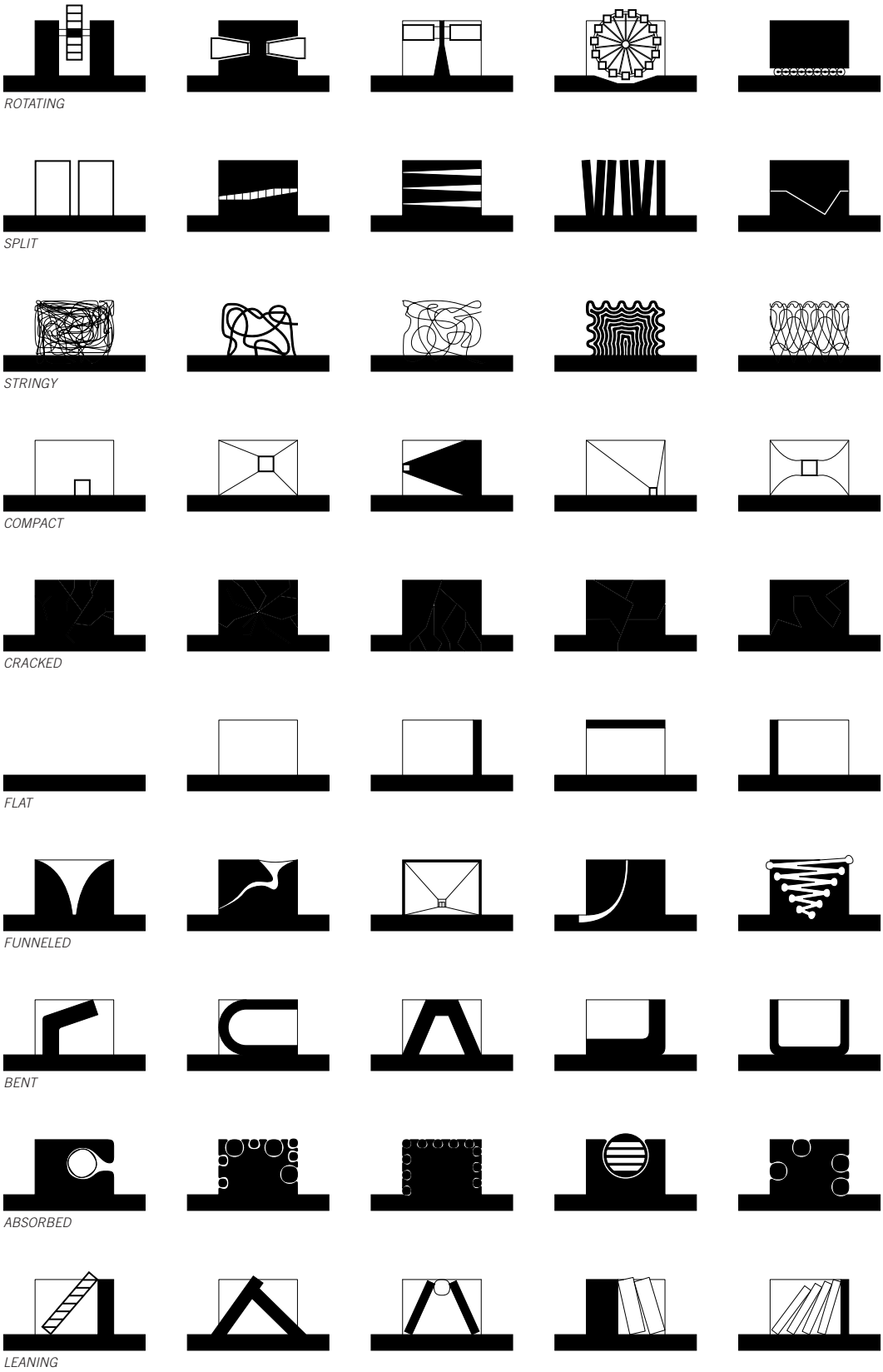
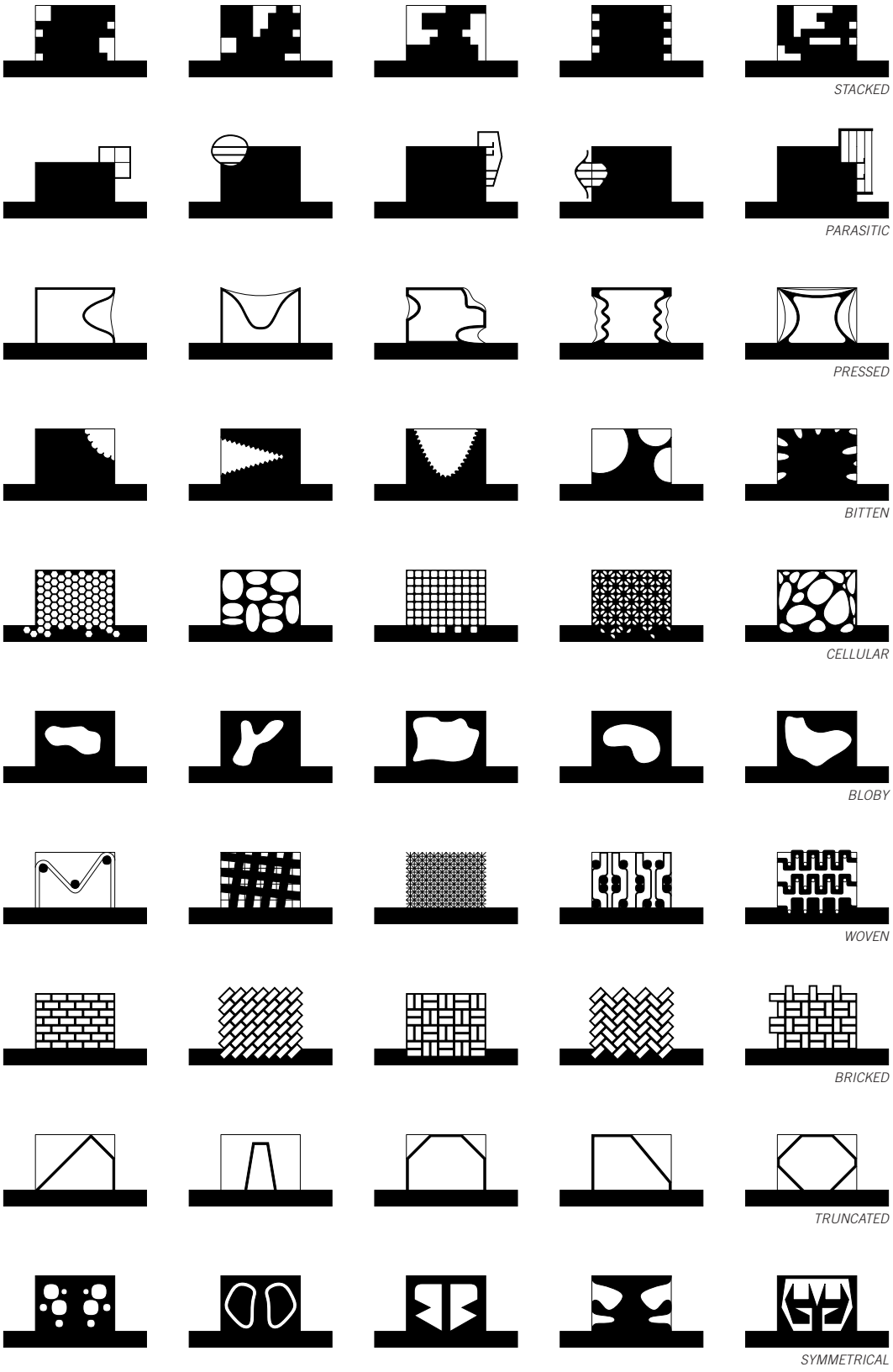


Figure 26: Sectional Spatial Taxonomy: Volume 10.



// CRITIQUE

Architecture should incorporate the use of adaptive, interactive, responsive, and intelligent systems to respond to immediate environmental or human requirements. This is suggestive of a variable platform capable of mediating environments by constantly shifting form for the sake of spatial congruency with networked materials. In working with the sectional spatial taxonomy, architecture should ideally be able to adapt and form in order to provide for the overwhelming list of experiences, events, qualities, functions etc. without any restrictions in the form of overarching and restrictive programs.

In the section Against Program, the relationship between program and form are disjointed. Here the concepts are amalgamated to demonstrate the potentials of architecture. In Rem Koolhaas' Delirious New York, he describes "… a Constructivist Social Condenser: a machine to generate and intensify desirable forms of human intercourse." (Koolhaas, 1994, p. 152) The Downtown Athletic Club, designed by architects Starrett and Vleck, is "… an incubator for adults, an instrument that permits the members – too impatient to await the outcome of evolution – to reach new strata of maturity by transforming themselves into new beings, this time according to their individual designs." (Koolhaas, 1994, p. 158) Program is used as a generator for individual enrichment; a skyscraper-sized locker room for all of the necessities of healthy living. An interesting facet of this building is that it features introverted circulation where members of the club can sift through "38 plots" or program spaces in any sequence to fit their immediate needs. This disconnects each program space and offers completely new stories to each member as they seemingly circulate through the many program opportunities this building offers.

By implementing the Downtown Athletic Club as a foil for criticism, we are able to identify how program is a limiting factor in experience and that the range of options available will far exceed "38 plots". For example, the rigid options available in the Downtown Athletic Club cannot be altered or manipulated to serve any other function other than what is prescribed in the building's program. Now in today's technological society there are an unlimited amount of spatial possibilities not able to be offered in this current programmatic paradigm. For example, the famous quote by Rem Koolhaas on the subject suggests that a "plot" or "narrative" of architecture is made possible through the use of programmatic distinction and a subsequent connection between space and expanded activities. He states, "Eating oysters with boxing gloves, naked, on the nth floor – such is the "plot" of the ninth story, or, the 20th Century in action." (Koolhaas, 1994, p. 155) The Downtown Athletic Club exists as a programmatic framework for activity to occur. While this opens the possibility for any activity to occur, it does not however suggest any spatial alterations in order to meet the specific or evolving requirements of those activities.

Figure 27: Downtown Athletic Club Section.

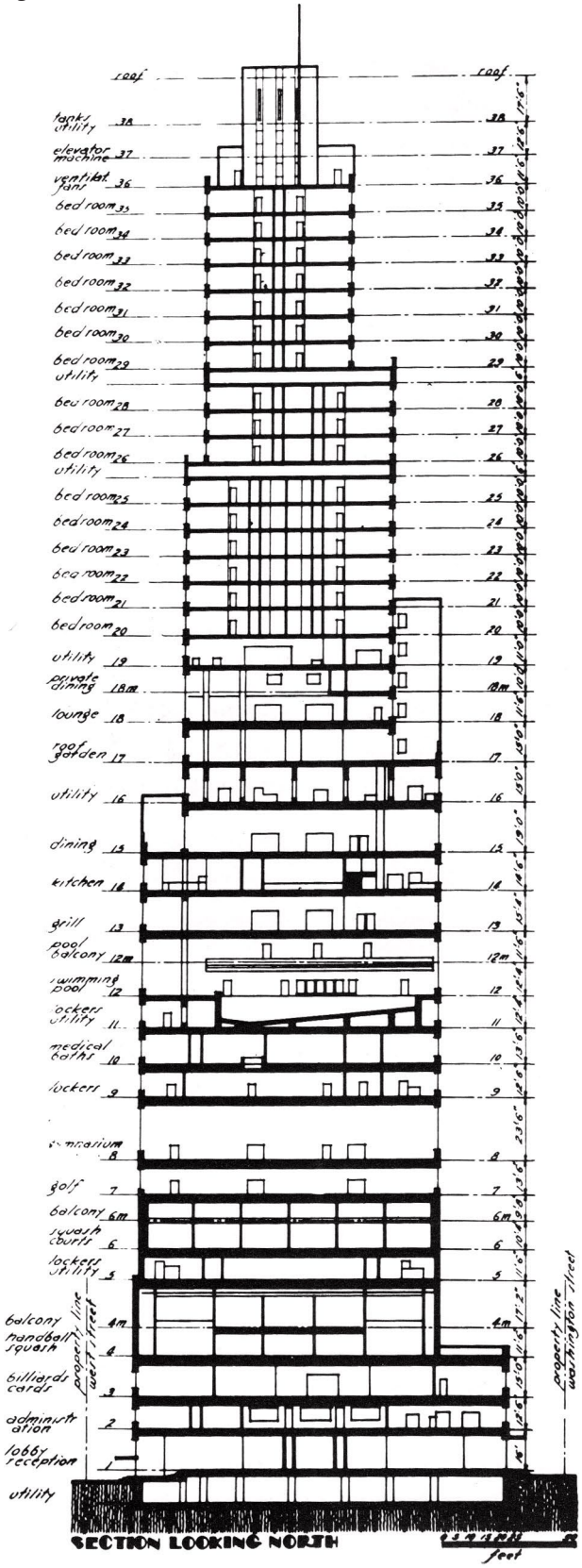


Figure 28: Programmatic and Circulatory Organizations.

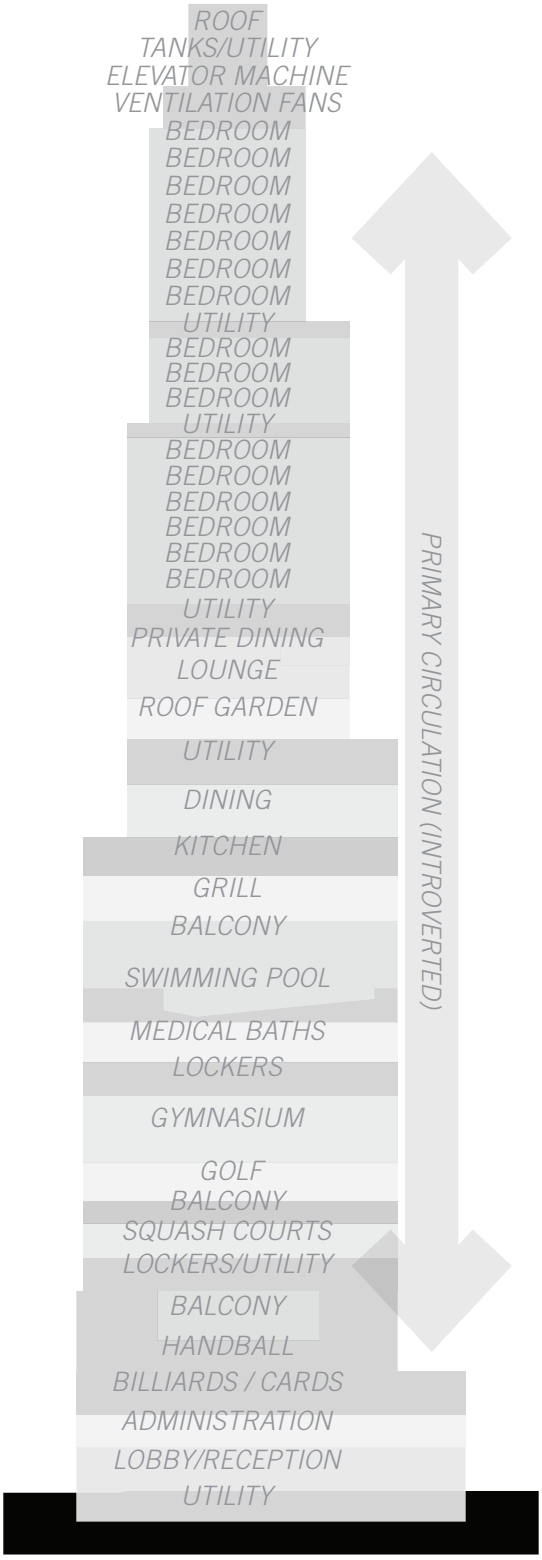


Figure 29: Sensing Modes Applied to Downtown Athletic Club.

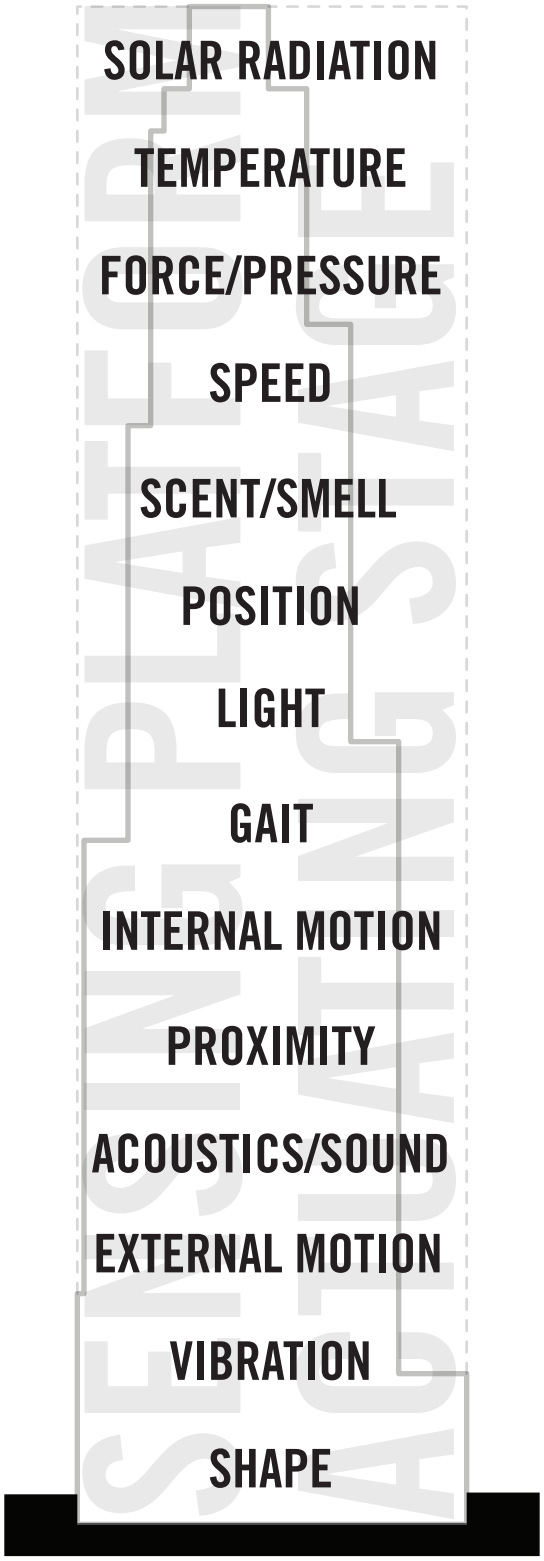


Figure 30: Spatial Opportunities - Variation 1.

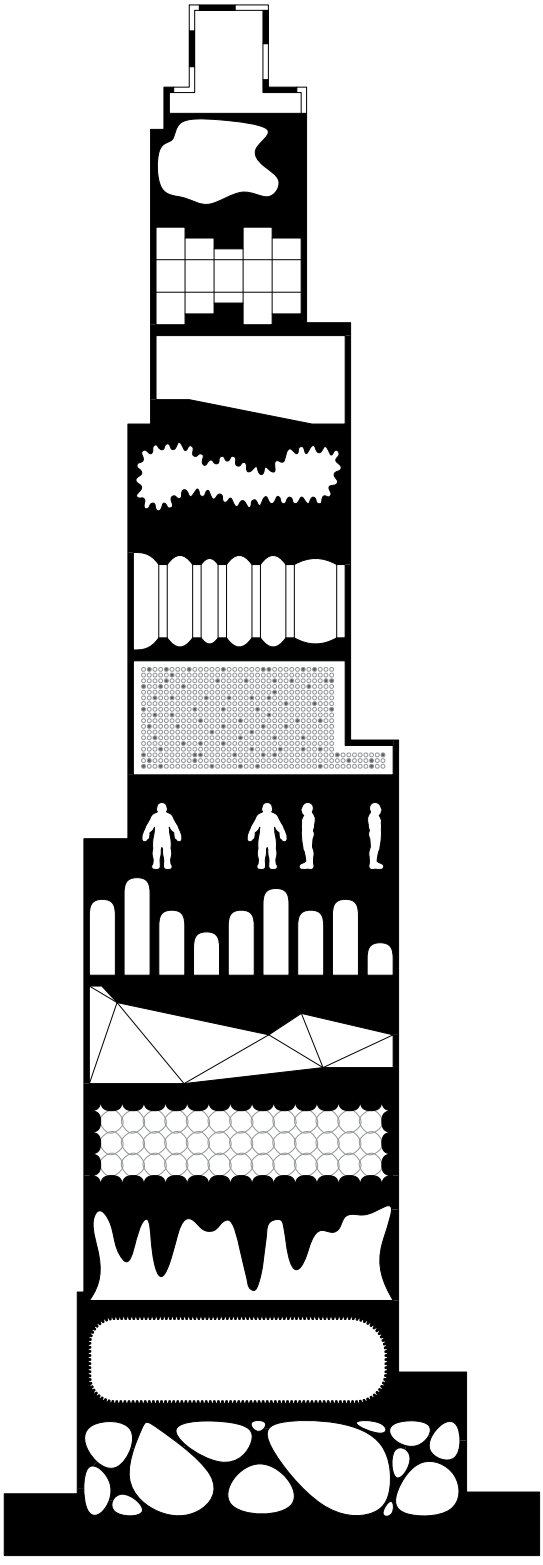


Figure 31: Spatial Opportunities - Variation 2.

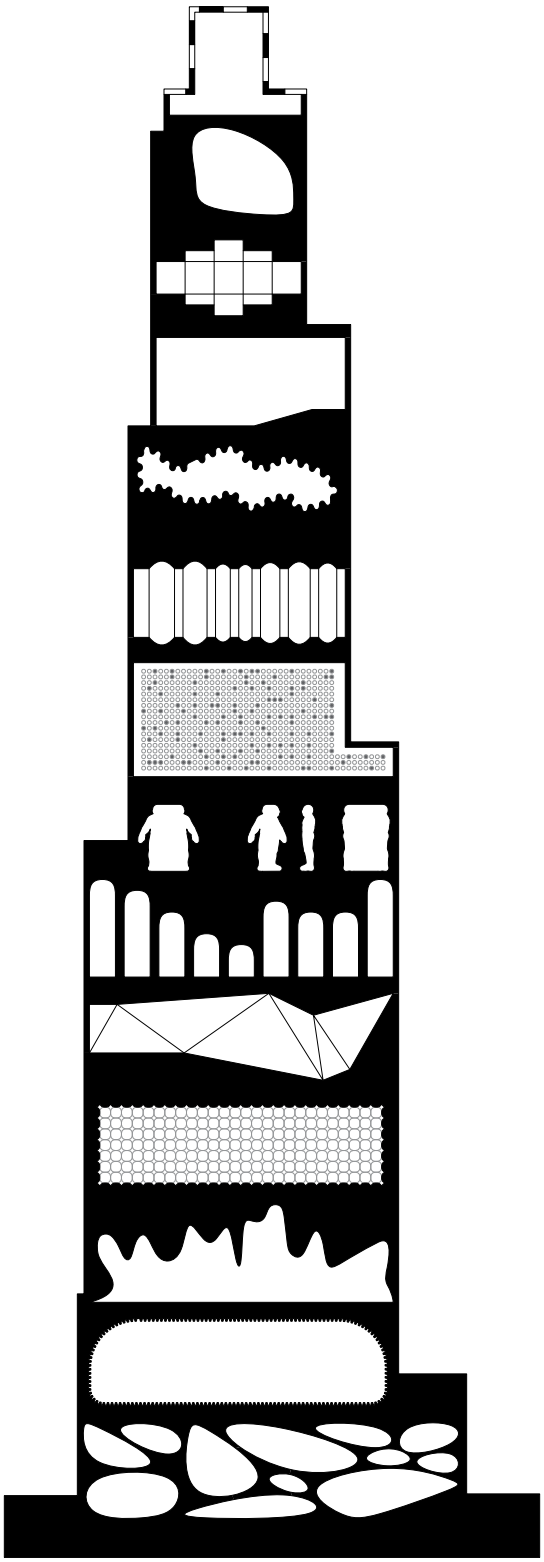
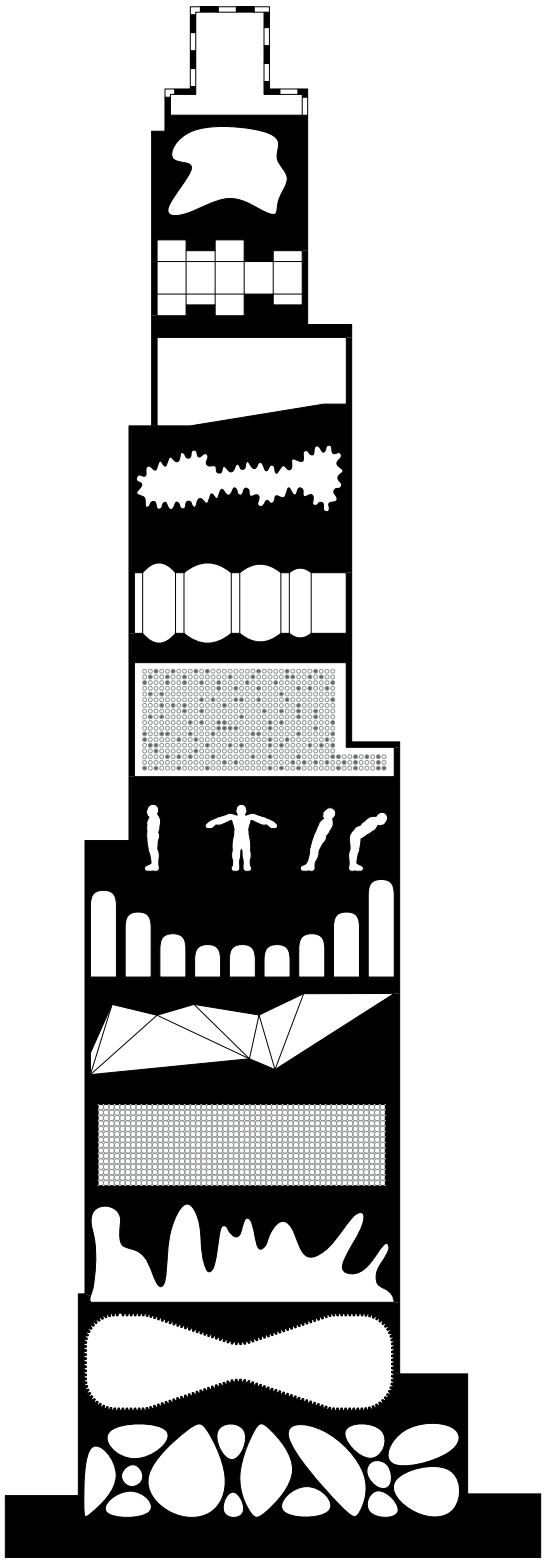


Figure 32: Spatial Opportunities - Variation 3.



With the advancement of technologies and our capacity to construct complicated and complex architecture we may now see Rem Koolhaas' quotation change in the 21st Century. The quote might now read: "messaging your friend, while playing a video game, eating lobster and all while never leaving your seat in an airplane." The consequences of such change is evident in the technological changes that have altered society and it is within these changes that make us question whether or not architecture should be an evolving factor in meeting these new requirements.

In the illustrated exercise the Downtown Athletic Club is considered to be a manifested tower of spatial possibilities. Unlike the original building section, where program is a defining factor of form, the new model of the club is suggestive of spaces required by users. The spaces identified are those that are manifested through current sensing and actuating modes such as light, sound, or motion and are reciprocal to the events that would be occurring in each of the desired spaces. Now, the sections are loose and can be considered to be dynamic in the sense that expanding spatial options are always changing for the needs, wants, or requirements of the user.

// CONCLUSIONS

In using the sectional spatial taxonomy as well as critiquing the Downtown Athletic Club, the concepts of a diminishing program in architecture is examined. Here we see that while architectural space is responsible for providing a magnitude of functional options, the spaces in which these activities occur does not necessarily meet the needs of those particular events. As a result, architectural programs are not inherently tied to form. This statement considers that spatial experience extends well beyond that of a singular form. In the case of the sectional spatial taxonomy, experience and qualities are drivers of architectural form. In the case of the revised Downtown Athletic Club, individual needs/wants tabulated via sensing devices are establishing form. What is interesting here and of course an important contribution to architectural praxis is that architecture, in theory, has the ability to change itself based on the requirements of its users. This is hypothesizing that architecture in the 21st Century will be able to form itself on the idea of catering to its users. This may be in the form of responsive, intelligent and kinetic structures that are premised on the idea that architecture must be able to adhere to an exhaustive list of idiosyncratic conditions.

The other side to this conclusion is however, our limits and the capabilities we have today in actually constructing these marvelous ideas. The ability to pair technology is not fully harmonized and to create such dynamic systems suggests a complexity that is only yet surfacing in architecture today. These examples have been showcased as prototypes or installations, props within architecture used to emulate experience in a very particular way. The question of whether or not these concepts can be translated into whole

building designs is still very questionable. A complete disregard for program also questions the status of the most basic elements of architecture. What would an ever evolving structure look like? How do you heat and cool these spaces? These questions can be endless. The very notion of changing space challenges the standards of construction and it considers a realm of architecture that has not yet been created. Even in both of the above exercises, a framework was applied, a structure, an idea of an exterior form/framework that is holding all of these options up. That begs the question; should all of the pages be blacked out, leaving only the spaces?

All in all, these ideas are something that can be obtainable. In one way or another, a program-less or a space-creating architecture is something that we can hypothesize about. The state in which we can express these ideas today is something that sparks consideration into a different type of architecture.

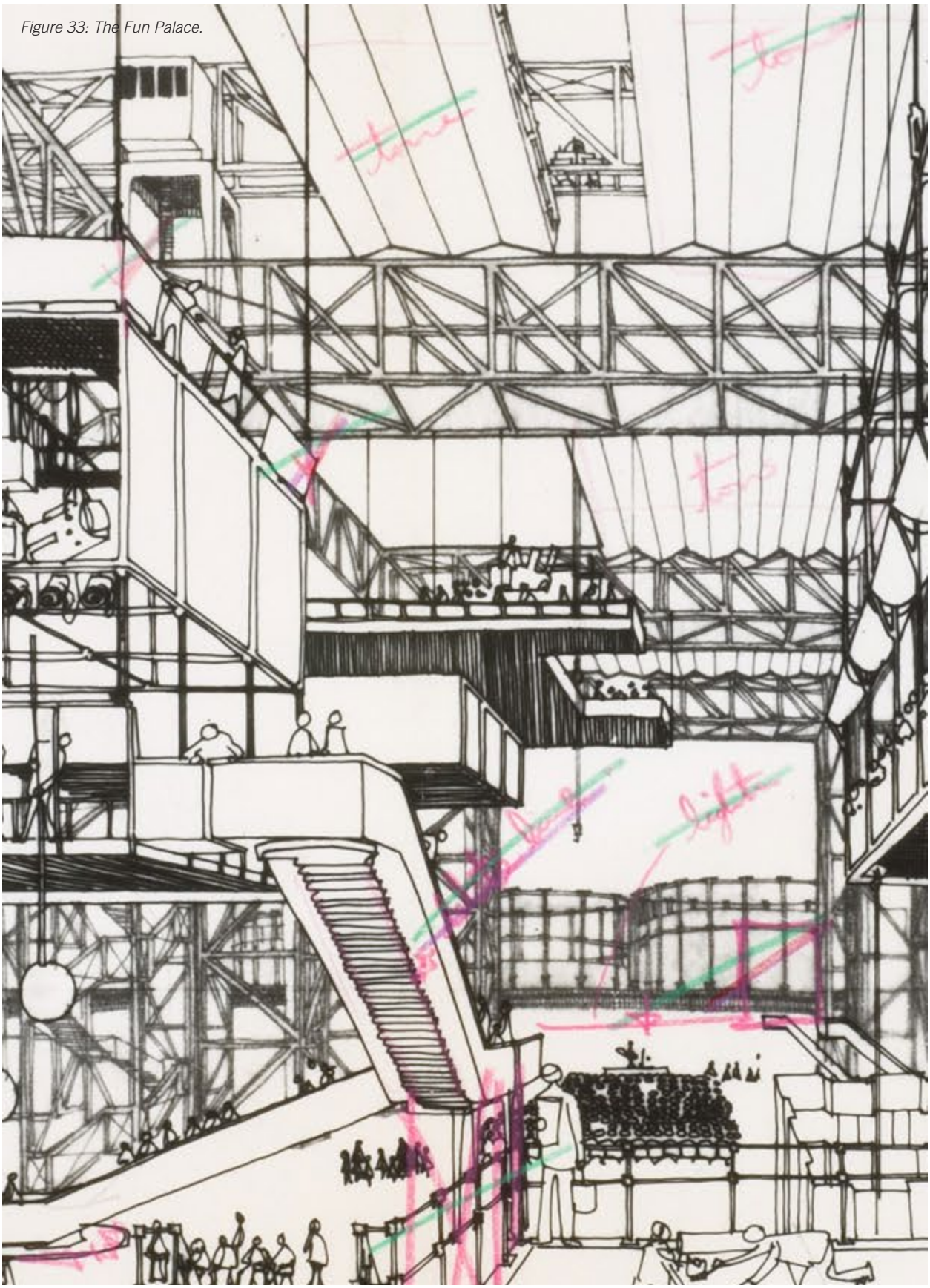


Figure 33: The Fun Palace.

4.0 // HISTORICAL INTERLUDE

In examining the potential for new social conditions in architecture, we must begin at the stages in which technology and flexibility present themselves in architecture throughout history. Mies van der Rohe and his colleagues during the Modernist period established a style in which flexibility and freedom in spatial organization became the norm. While the strongest examples of modernist work are open to architectural freedom, they are restricted in terms of gathering the social nuances of today's society. Subsequently, Cedric Price and Joan Littlewood began tinkering with architectural performance and how architecture can facilitate an abundance of spatial experiences within a project. They established a framework for people to control their environments in a supershed format where all of the necessary instruments would be available for change. It was during this process where Gordon Pask was able to direct his research in Conversation Theory and Cybernetics. Media in architecture is also reviewed with a close consideration to the Philips Pavilion as being an example of Marshall McLuhan's most famous theories: "the medium is the message". More recently, but still in historical context, is Nicholas

Negroponte's vision of intelligent architecture and how environments may be able to dictate their own spatial organizations. In the following section, these concepts are expanded upon in terms of how their implications on architecture can be utilized in the 21st Century post-digital era.

// UNIVERSAL SPACE

Unique to the style of the twentieth century, Mies van der Rohe realized a new type of modern space known as 'universal space'. It was defined by Mies as an unobstructed clear volume enclosed by a transparent skin. He reinforces this concept by articulating it in various ways: "… 'open room', an 'open space', an 'open plan', a 'free plan', or a 'clear, uncluttered space'." (Kim, 2006, p. 73) All of these straightforward connotations of space reveal architecture as an undivided volume of interior space but with an intense dialogue between inside and outside as a result of a fully glazed envelope. In his manuscript of 1933, Mies van der Rohe explains this phenomenon as it relates to expanding architectural space to the exterior and how it truly establishes spatial freedom. He goes on by explaining that "they permit a measure of freedom in spatial composition that we will not relinquish any more. Only now can we articulate space freely, open it up and connect it to the landscape." (Kim, 2006, p. 148) Universal space allows for the free articulation of inner spaces and while doing so also opens up views towards the exterior landscape – a direct result of the use of glazing as a primary façade element.

In his description for the 'Museum for a Small City', Mies eloquently describes the advantages to the open or free plan. "Interior sculptures enjoy equal spatial freedom because the open plan permits them to be seen against the surrounding hills. The architectural space, thus achieved, becomes a defining rather than a confining space. A work such as Picasso's Guernica has been difficult to place in the usual museum gallery. Here it can be shown to great advantage and becomes an element in space against a changing background." (Schulze & Windhorst, 2012, p. 219) The advantage to Mies' open plan suggests a significant influence from the exterior environment in establishing a forum for the flexibility of potential functions. Where architecture was typically considered for containment, Mies argues that building content can be dramatically augmented and experienced differently as a result of universal space. Works of art, he suggests, will be displayed and revealed in new modes because of the expansive wealth of a complementary background image - the exterior landscape.

Additionally, in his collage completed in 1964, Mies illustrates these concepts by superimposing features onto an image of the interior of the Glenn Martin Aircraft Assembly Building (Albert Kahn, 1937). This building was an ideal subject for investigation as it expresses a long-span single-volume space in which flexibility and adaptability will ensue. Mies places a number of free standing planes into the space representing movable partitions and components that can be altered to suit changing requirements. These

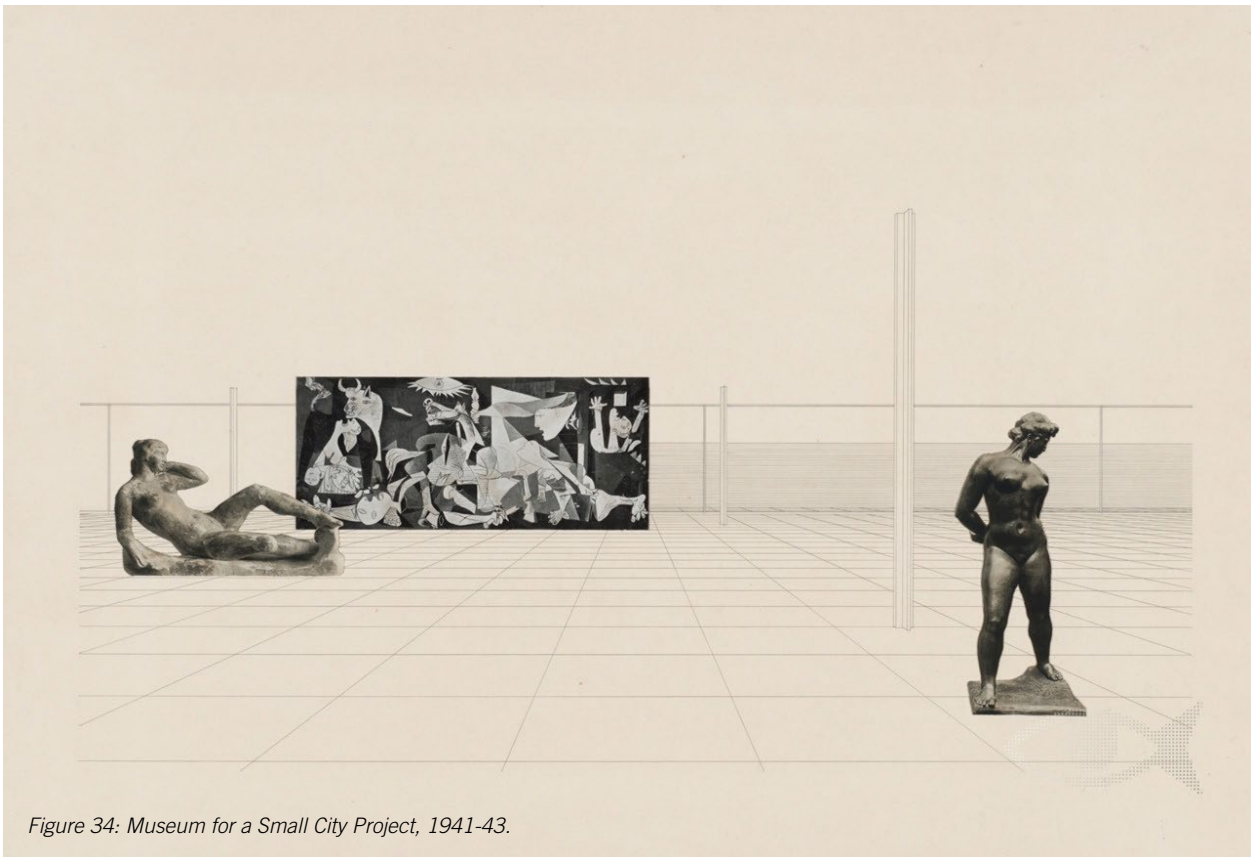


Figure 34: Museum for a Small City Project, 1941-43.

Figure 35: Collage, Mies van der Rohe, 1964.

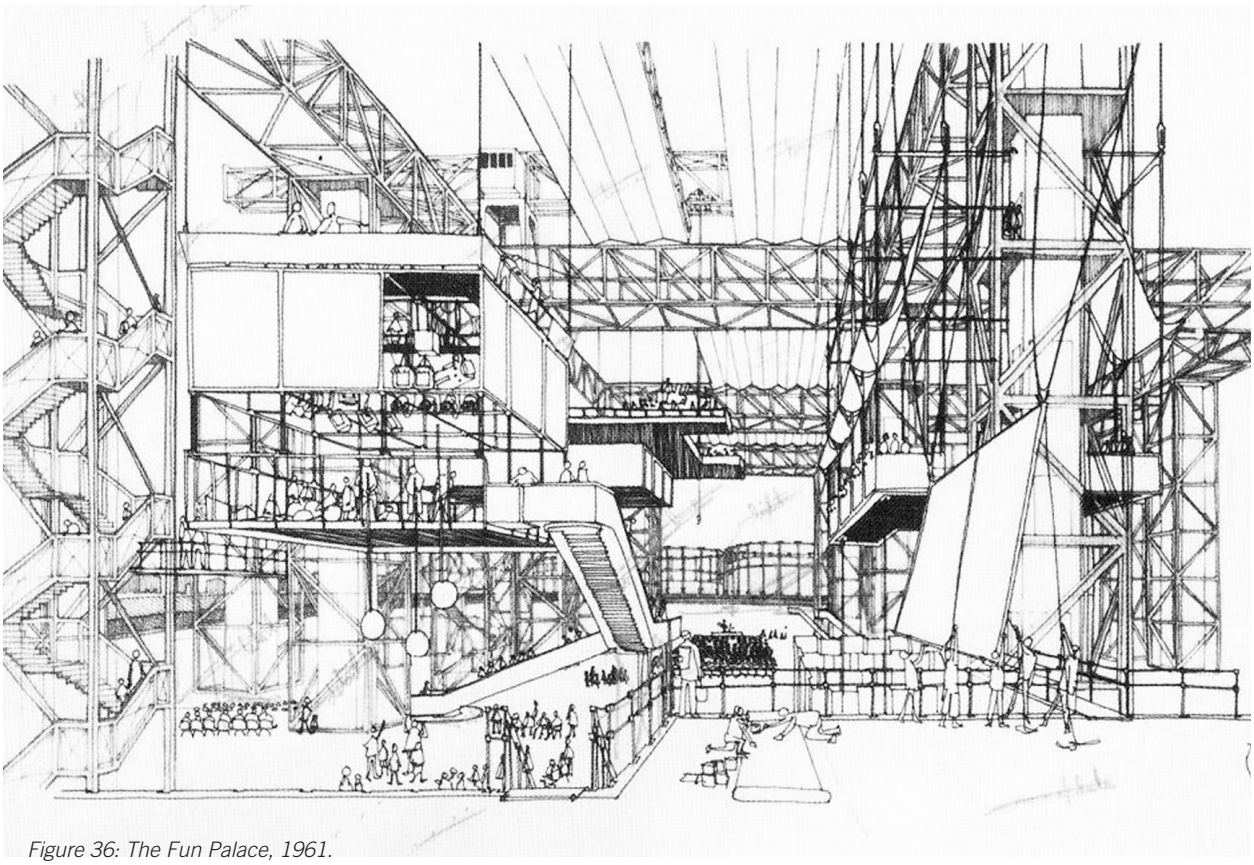


Figure 36: The Fun Palace, 1961.

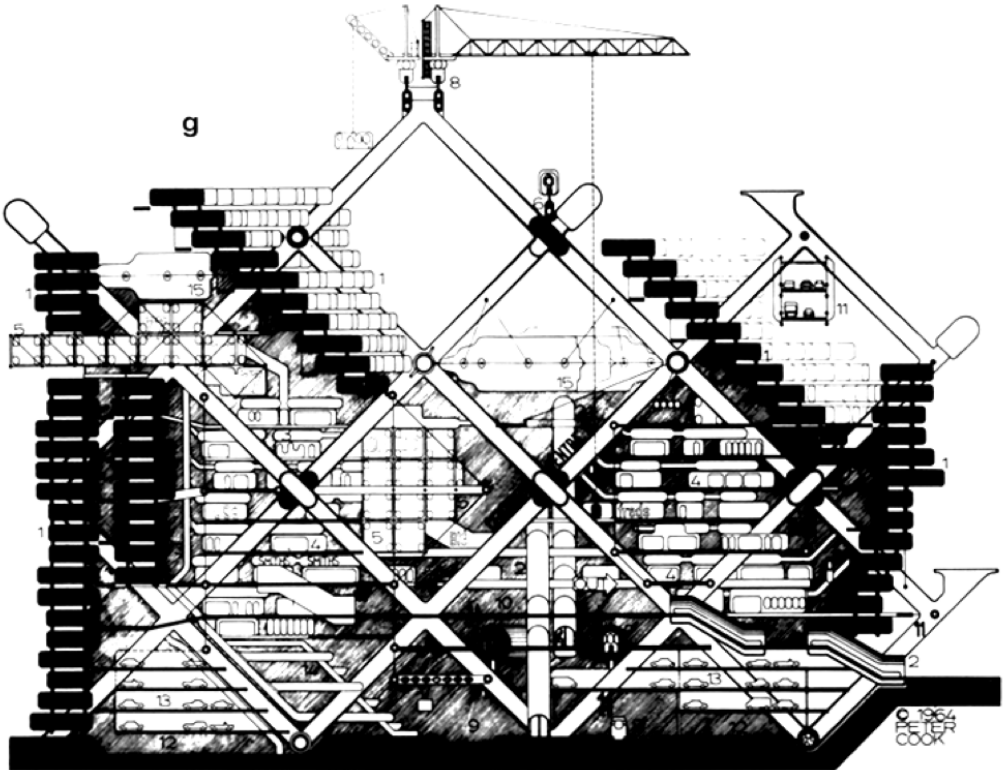


Figure 37: Archigram: Plug-In City, 1964.

elements allow for many possible configurations which suggests the opportunity for a range of architectural programs and activities to ensue.

// SUPERSHEDS

"The term supersheds can be applied to buildings which enclose universal space and can be defined as 'buildings enclosing a large single volume of space with relatively long spans and without major subdivision.'" (Wilkinson, 1991, p. vii) This type of architecture is derived out of pure functionality, has no formal aspirations and develops its aesthetic from a direct expression of its purpose. The trajectory of this building type is directly reciprocal to the technological capacity of the time; starting with large train halls or great exhibition spaces. In the 1850's Joseph Paxton's Crystal Palace is the best example of an early supershed. In the latter half of the 19th century, after the industrial revolution, large-span steel structures became extremely popular. Trains, airships, boats and other large-scale infrastructure projects needed large spaces to accommodate for the versatility of the assembly line, for the abundances of activities that occur during these types of endeavors, or for just sheer size of program. In any regard, a supershed, utilizes universal space to adapt to the versatile requirements of 20th Century industrial/ commercial activities.

The evolution of the supershed has extended fruitfully in the second half of the 20th Century. In the 1960's, Joan Littlewood and Cedric Price attempted to challenge the notion of a flexible public realm where people could lose themselves in the pleasure of leisure. The controlling concepts in the Fun Palace were that users would be able to determine and control their own environments through the use of a variety of pre-fabricated modular units. Price explains, "Its form and structure, resembling a large shipyard in which enclosures such as theatres, cinemas, restaurants, workshops, rally areas, can be assembled, moved, rearranged and scrapped continuously." (Matthews, 2007, p. 73) He goes on by explaining the construct as an anti-building, one that would be best described as ad-hoc, unstable, or undetermined. "The varied and ever-changing activities will determine the form of the site. To enclose these activities the anti-building must have equal flexibility. Thus the prime motivation of the area is caused by the people and their activities and the resultant form is continually dependent on them." (Matthews, 2007, p. 73) The Fun Palace consists of an overarching structural framework by which an innumerable amount of activity can occur. It carries a series of architectural possibilities through the use of variable artifacts available for the public to transform. The project was never realized but still holds value in the efforts towards interactive and cybernetic architecture. The project remains as one of the most prolific organizations of space and it serves as a precedent for the many attempts at social control systems in the form of architecture.

Peter Cook's Plug-In City exists within a large scale network structure that contains not only essential

Figure 38: Centre Georges Pompidou.

services and circulatory systems but specific units catering to the needs of a municipal collective. The entire system of units becomes maneuverable as cranes and other mechanical devices are able to overlay spaces in various configurations. The interior of each unit is equipped with electronic devices and mechanical systems to cater to the spatial or programmatic requirements of the individual. The structural framework supporting all of this infrastructure/architecture is hollow and enables the use of lifts to circulate people, goods and services. The composition of program also takes on considerable weight when discussing the fact that their organization is based off of operation and use where the longer lasting parts are composed at the base of the city and seldom used objects are at the top. Ultimately all of the systems, including that of the users are in constant surveillance to grasp functional requirements and determine the most optimal configurations for day-to-day use of the city.

The Pompidou Centre by Renzo Piano and Richard Rogers, stems off the concepts brought forth by the Fun Palace and Plug-In City, but with a more rigorous attitude to functionality, practicality and overall build-ability. The building employs the concepts of universal space and in doing so create a dynamic façade revealing the networks of circulation, plumbing, electrical, etc. that would have otherwise clogged up interior space. This supershed provides the opportunity for activity to flourish by providing open-span spaces for an unlimited configuration of curated artifacts. By substituting the mandatory elements of buildings, and providing for universal space, the opportunity for change is illimitable.

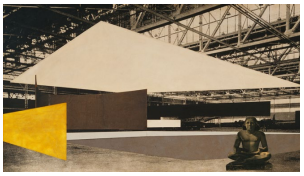
In another example, the 1970 World's Fair Festival Plaza, designed by Arita Isozaki, exemplifies the concepts of the supershed, but also highlights the built potential of either the Fun Palace or Plug-In City. The plaza is covered by an extremely functional roof containing units of space that would be lowered down to serve various activities. It also houses a number of permanent installations that further extend into the grand space, allowing for multiple activities to occur simultaneously. This architectural conquest may very well be the most prolific built example of a supershed that contains versatile space while allowing further flexibility through the technical use of an overarching shed structure. The possibilities are dependent on the requirements of users and/or predetermined scenarios and are constantly shifting or rearranging to provide for a multiplicity of uses.

Norman Foster's Sainsbury Centre for Visual Arts is another strong example of a supershed. Where it is common to reduce the interior to provide for universal space as well as offer opportunity for various functions to occur, Foster succeeds. The building is a clear span structure enclosing a single space of activity while leaving building services to occupy the interior of the all-encompassing structural system. The goal of the project seeks enclose a multiplicity of unique experiences in one single space. The superimposition of all art exhibits as well as common building programs unveils the opportunity for supersheds to

Figure 39: Supersheds, illustrated.

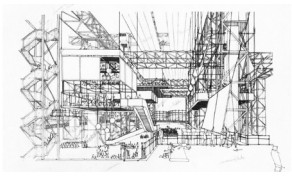
SUPERSHEDS CONCEPT

UNIVERSAL SPACE



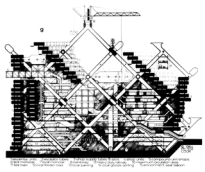
COLLAGE, 1964
MIES VAN DER ROHE

CYBERNETICS



FUN PALACE, 1961
CEDRIC PRICE, JOAN LITTLEWOOD, GORDON PASK

PLUG-IN ACTIVITY



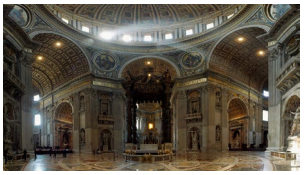
ARCHIGRAM: PLUG-IN CITY, 1964
PETER COOK

CLEARING UP SPACE - BY EXPOSING

CENTRE GEORGES POMPIDOU, 1977
RENZO PIANO & RICHARD ROGERS

SUPERSHEDS EVOLUTION

WORSHIP



ST. PETERS BASILICA
MISC.

EXHIBITION

CRYSTAL PALACE, 1851
JOSEPH PAXTON

WAREHOUSE

THE GOODYEAR AIRDOCK
DR. KARL ARNSTEIN

EXHIBITION

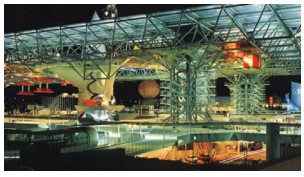
USA PAVILION, MONTREAL EXPO '67
BUCKMINSTER FULLER

SUPERSHEDS LINEAGE

CONTAINER FLEXIBILITY

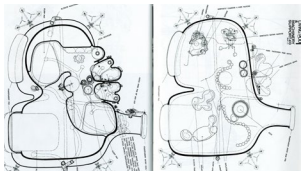
INTER-ACTION CENTRE, 1976
CEDRIC PRICE

DEPLOYABLE ROOF STRUCTURES



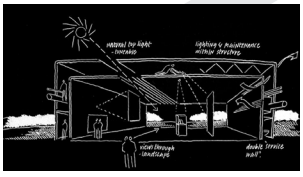
1970 WORLD'S FAIR FESTIVAL PLAZA
ARITA ISOZAKI

OPPORTUNITIES IN SCALE



ARCHIGRAM: LIVING-POD, 1966
DAVID GREENE

ALL-ENCOMPASSING STRUCTURE



THE SAINSBURY VISUAL ARTS CENTRE, 1978
FOSTER ASSOCIATES

SUPERSHEDS CURRENT MODELS

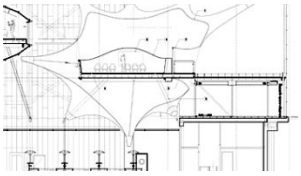
"BIGNESS"

PARC DES EXPOSITIONS, 2018
OMA

"THECA / CLOUD / BLADE"

ROME-EUR CONVENTION CENTRE & HOTEL, ONGOING
MASSIMILIANO FUKSAS

HUNG MONUMENTS



BLIZARD BUILDING, 2005
WILL ALSOP

CONTAINMENT & SURVEILLANCE

BEIJING AIRPORT TERMINAL 3
NACO, FOSTER + PARTNERS, ARUP

encompass almost any type of configuration. This considers that the building takes on a new role in providing various uses as well as reconsideration as to how multiple curated events take place.

Now in the 21st Century, supersheds have developed into structures of absolute grandeur, serving society in ways that facilitate versatile programs, extensions of space and of course the ability to overcome limitations in spatial use. Supersheds are all encompassing, serving a multitude of functions and providing a means for universal space to flourish. In all of the aforementioned precedents, the concept of an overarching structure containing a plethora of activities and programs is evident. They extend beyond that of conventional buildings and celebrate the cohesion of space as oppose to organizations that are separated by function and use.

// MEDIA ARCHITECTURE

In the post-digital age, technology has advanced so much so that we are encapsulated by an ever growing amount of media. This current phenomenon and its resultant consequences can be best described in length by Marshall McLuhan. In his famous text, Understanding Media, McLuhan explains the concept "the medium is the message". (McLuhan, 1964, p. 7) He explains by illustrating that any medium (new, old, or future) that is available in society and has direct influences on our lives is going to impact us way further than whatever content that medium carries. McLuhan provides the example of the electric light to explain his ideas.

> "The electric light is pure information. It is a medium without a message, as it were, unless it is used to spell out some verbal ad or name. This fact, characteristic of all media, means that the "content" of any medium is always another medium. … Whether the light is being used for brain surgery or night baseball is matter of indifference. It could be argued that these activities are in some way the "content" of the electric light, since they could not exist without the electric light. This fact merely underlines the point that "the medium is the message" because it is the medium that shapes and controls the scale and form of human association and action." (McLuhan, 1964, p. 8-9)

While technologies present modes of content, it is not these effects that are truly affecting society. Instead it is the way in which each medium is considered (beyond the obvious and usually considered "content") to provide changes or effects that are enabled or provided by the medium itself. The message of the electric light is then "like the message of the electric power in industry, totally radical, pervasive, and decentralized. For electric light and power are separate from their uses, yet they eliminate time and space factors in human association exactly as do radio, telegraph, telephone, and TV, creating involvement in depth." (McLuhan, 1964, p. 9) The electric light, as stated by McLuhan

Figure 40: The Philips Pavilion.

Figure 41: The Philips Pavilion, Projection 1.

Figure 42: The Philips Pavilion, Projection 2.

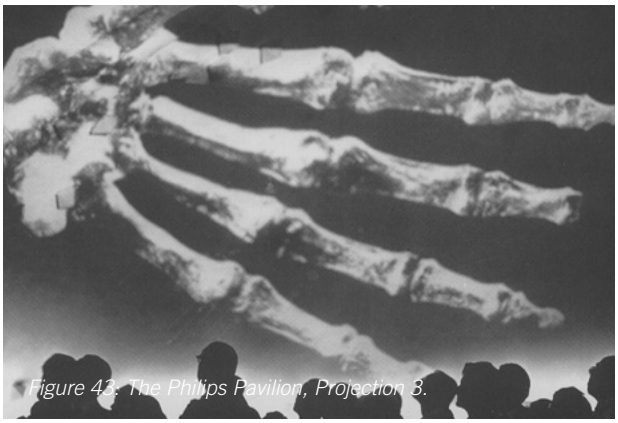


Figure 43: The Philips Pavilion, Projection 3.

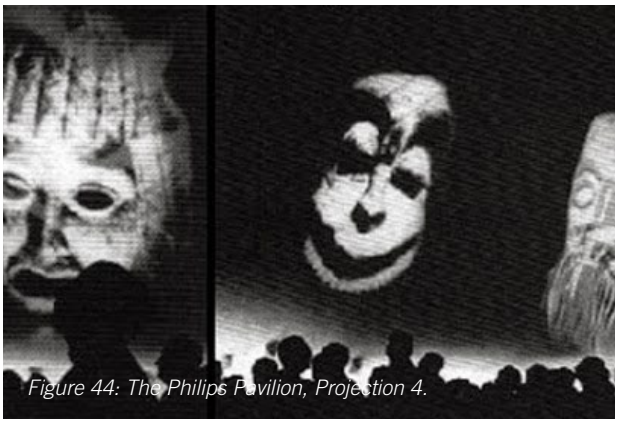


Figure 44: The Philips Pavilion, Projection 4.

creates an environment solely by its sheer presence and it is within these modes of effect that unveil the true meaning behind the message. Therefore, all things that bring fourth change to our bodies, mind and soul such as inventions, innovations or ideas are considered to be McLuhan Medias. The fundamental understanding here is that noticing change in societal conditions indicates the existence of a new message or in other words, the effects of a medium.

To bring these concepts into architectural praxis assumes that whenever a new mode of design is unveiled into building practice it can be considered a new medium in which to draw effects. This means that when new designs are present they elicit change to the parties involved and transform the way in which architecture is viewed. In support of McLuhan Medias, any new media that enters into the built environment is important to architecture in a way that stimulates social, political, economic, etc. change as oppose to the actual physical content that is being displayed.

The Philip's Pavilion at the 1958 World's Fair in Brussels, designed by Le Corbusier and Iannis Xenakis, was a revolutionary projected that demonstrates the concepts as outlined by Marshall McLuhan. This was the first experiential space that combined the disciplines of architecture, film, light and music into a project which allowed users to visually spatialize their movements through a curation of technologies such as video projections, lighting, and musical compositions. Basically, people entered into the pavilion through an entry space to be funneled into a blackened interior in which an 8-minute multimedia experience would occur, they would exit after the event ended. This experience was termed "Poème électronique"; a compositional matrix of technologies merged into an architectural space. The underlying theme of the pavilion was to provoke mass experience and articulate the technological innovations at the time. "The Poème's narrative illustrates the evolution of the human species, artistic expressions of faith, the devastation of war and the desire for redemption." (Clarke, 2012, p. 216)

The 1958 World's Fair was the first exhibition held after World War Two and the Philips Pavilion was representative of the societal progression at the time. Being the first hybridized architectural space, combining various disciplines of media created an environment that the public has never seen before. Thus, the merging between these mediums creates an entirely new medium in which society was able to draw from. Where Marshall McLuhan's statement of "the medium is the message" applies to new modes of changes with regards to innovation, inventions, ideas, etc., the Philip's Pavilion becomes a proponent of this change. The purpose of the pavilion sparks consideration as to how technologies were able to articulate the current state of society (which was in a state of progression) and inspire new generations into the design of mixed-media architecture.

// INTERACTIVE/RESPONSIVE ARCHITECTURE

Historically, architects have the ability to design for users by understanding their characteristics within the context of where a building may be situated. These characteristics are almost endless and provide an essential backing to design intent. This is a product of our inherent ability to understand the relationship between people and the built environment. The consequences of drawing these connections are variables in which we use to derive conceptual frameworks for our architectural creations. With the introduction of interactive or responsive architecture, these fundamental processes are evolving and becoming increasingly complex. They are platforms for the elimination of drawing these valuable connections by regressing from the normal methods of establishing design intent and instead allowing design to be free for users to shape their own environments. In other words, through new technological processes today, architecture and building practices can now utilize people and environments at an unprecedented level. In doing so, the vital aspects of drawing connections is relied upon less on the formation of concrete architectural concepts such as organizational schemes, functional hierarchies or performance. It does however, rely more on the integration of variability and catering for occupant requirements within the built environment.

Michael Fox and Miles Kemp bring forth a new idea as outlined by Adam Greenfield. "(He) coined the term everyware to describe information processing that has been removed from the context of the personal computer and distributed everywhere in the built environment." (Fox & Kemp, 2009, p. 179). This shift reveals that sensing, processing and actuation are now less about personal use but are considered tools of design that are embedded in the objects of the built world. As a result, the formation of architecture must consider the ability for individuals to make solid contributions to the creation of our physical environments. This assumes that within the world around us are technologies that are able to grasp the requirements of people or environments and provide options as to how to shape out built world.

The integration of interaction brings forth a new magnitude of variables within the design process. Designers must now face the reality that people are not simply users but also measurable variables that initiate possibilities in architecture. The ability for architecture to now integrate digital assessment of environments and occupants opens entirely new realms of designable outcomes. This is to say that while building design has a final product, the use of interaction in architecture today, may facilitate a provisional and variable architecture that is entirely representative of the ongoing technological revolution occurring in society.

Interactive or responsive architecture can be employed in a variety of fashions. It is a design of activities as opposed to objects. These events contain restraints or releases (comprised of, but not limited to: social activity, context, scale, resources, information,

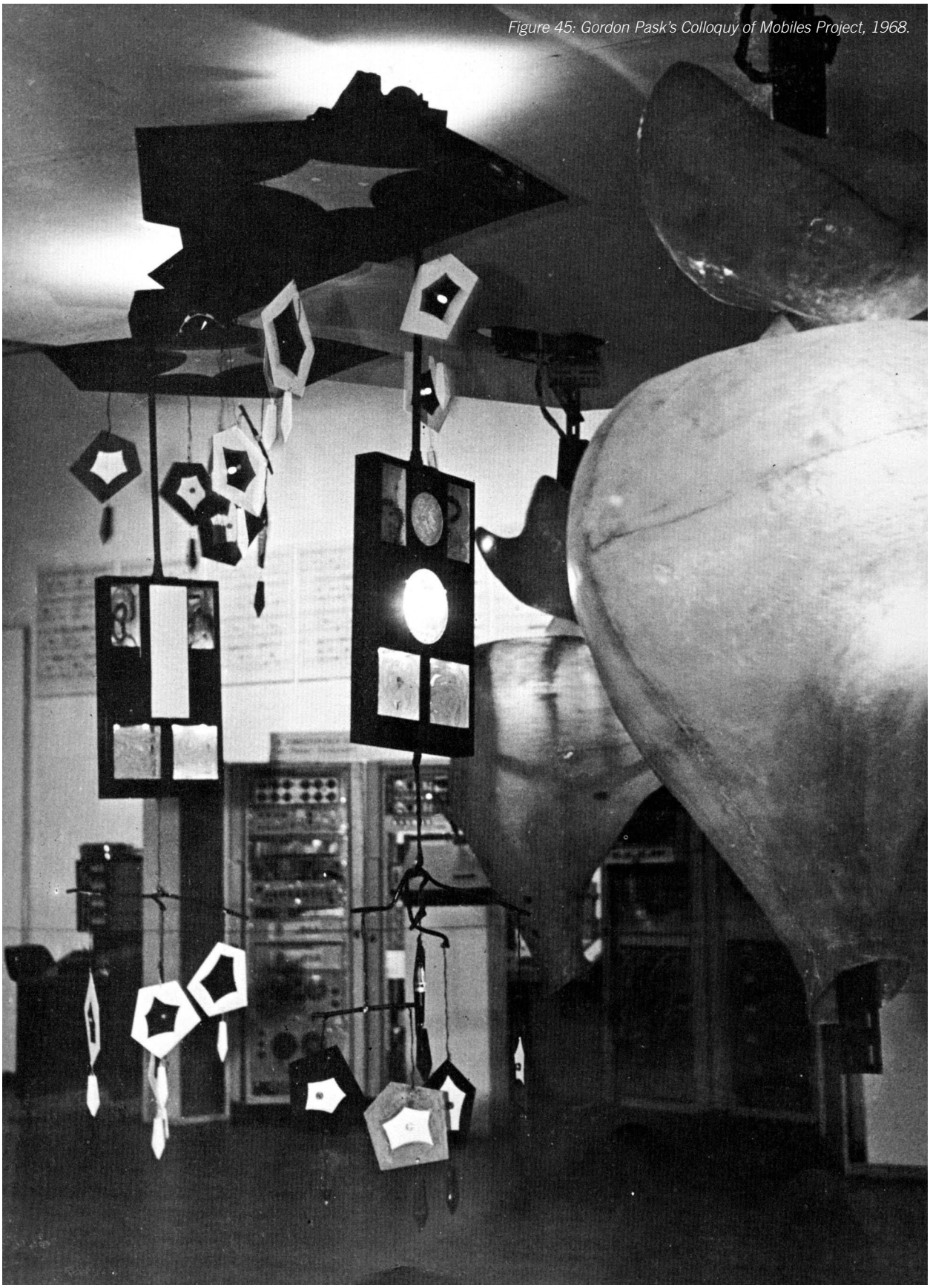


Figure 45: Gordon Pask's Colloquy of Mobiles Project, 1968.

technology, expression, construction, form, cognition, function, etc.) that provides information for actuation to be cultivated into some form of architectural experience. This dialogue between users and their environments allow people the ability to involve themselves in their surroundings at a more enriched level. Through interactive/responsive architecture, people have the ability to form their environment, pose new ways in which we envision the world around us, and ultimately contribute to their own creations. This imprint is valuable to architecture in the way that has not truly been realized, but now with today's technological society it is becoming more readily available. With superior computation tools, including sensing and actuating systems, we now have the ability to cultivate these experiences and include people more critically in architecture.

It can also lead to new types of design outcomes that are not dependent on the designer, but function with the information provided by people and their environments. Within these processes designers will be able to take on insight towards a new form of architecture and remanufacture their own design procedures to include the likes of developing technologies. The result of the adoption allows the built environment to truly be able to encapsulate its users in a way that allows for them to leave their mark on the world around us and actually see their contributions within architectural space.

// CYBERNETICS AND CONVERSATION THEORY

Cybernetics is "the study of control and communication in goal-driven systems of animals and machines." (Haque, 2007, p. 54) In actuality a cybernetic environment consists of interaction loops that force/influence other actions. For example, actions would lead to impacts on the containing environment; the resulting dialogue then presents completely new and alternative actions within the variable environment, thus providing an almost unlimited continuity (albeit new circumstances are always arising) to an environment and users within. "To Pask, the central theme of cybernetics was the study of the ways in which complex biological, social or mechanical systems organise, regulate and reproduce themselves, evolve, and learn." (Matthews, 2007, p. 75)

Gordon Pask develops 'Conversation Theory', the concept of influence that the observer and users have on determining complex outcomes in cybernetic systems. It considers social systems that require interaction between two or more cognitive beings. The result of this theory is a manifestation in construction knowledge or recognition of valuable social systems that can then be directed towards design applications. As a result, the applicability of social systems in cybernetic design paradigms reveal possibilities as to how we may design responsive or intelligent systems that include complete human interaction with architecture. Now more than ever, Pask's theory is suggestive of the dialogue between humans and

their devices and how might they be correlated within common environments.

As a consultant on the Fun Palace project, Pask was able to inject his idea of architecture into the proposal. Joan Littlewood and Cedrick Price sought the help of Pask to help in the systematic understanding of the Fun Palace. "He would gradually shift the focus of the Fun Palace from Brechtian theatre towards cybernetics, interaction and social control." (Matthews, 2007, p. 75) He lead the cybernetic subcommittee on the design team and established the goal of the project as "new forms of environment capable of adapting to meet the possibly changing needs of a human population and capable also, of encouraging human participation in various activities." (Matthews, 2007, p. 114) Ultimately, the role of cybernetics in the Fun Palace allowed users to be quantified in relation to their physical surroundings which would then unveil patterns of use and trends to eventually set parameters for the modification of spaces and activities within the building.

Pask's own work truly explains Conversation Theory within the context of architectural space. In his Colloquy of Mobiles project (1968), Pask constructed a series of suspended artefacts; mechanical apparatus that directed beams of light and objects utilizing mirrors and motors to reflect light. The scheme saw the objects work in sequence to find collaborative light patterns and equilibrium arrangements – something that was not preprogrammed and ultimately provided for various combinations. The project manifests itself as a series of conversations through the medium of light. Once equilibrium was reached, the mirrors and motors would alter their configuration leading to optimization and subsequently new ways in which the light is envisioned. When humans or users entered into the space even more opportunities were provided for light effects. People caused shadows, breaks in light beams or even produced light on their own – all factors contributing to more options and arrangements leading to a greater repository of light effects.

Overall, the benefit or relevance of Cybernetics and Conversation Theory in architecture rests solely on the imaginative aspects of individuals within the framework of an interface. The dialogue between these systems contributes to informed environments that are constantly evolving and attributed to the connections of individuals within interactive social systems. As Usman Haque explains: "Now, at the beginning of the 21st century, Pask's Conversation Theory seems particularly important because it suggests how, in the growing field of ubiquitous computing, humans, devices and their shared environments might coexist in a mutually constructive relationship." (Haque, 2007, p. 55)

// SMART/INTELLIGENT ARCHITECTURE

> "When I return at night and ask my wife to
> put the whatchamacallit youknowwhere,
> she most surely knows exactly what I mean

Figure 46: SEEK, Nicolas Negoponte.

> and where I mean. She knows because she knows me in terms of all the models and models of models previously discussed and because she can use this information in the context of my facial expressions, the weather outside, and whether we are going out to dinner that night. At the same time, her response is in the context of her own intentions, and her level of commitment to one behavior versus another is achieved by our participating in the same events with the same objects.
>
> Transposing a similar responsiveness to the physical environment suggests that it, too, must have purpose and intentions, and it must have all the paraphernalia required to build the necessary models of me and to use them in context. In brief, it is not a regulatory control system, it is an intelligent system." (Negroponte, 1975, p. 134)

Nicholas Negroponte is one of the original minds behind intelligent design in architecture. In this excerpt, he explains a technological construct that features an intelligent atmosphere inherent in everyday living. This system is a technological marvel that poses significant discourse on the subject of gathering human information on a digital level and using it in some form in the physical world. This system fundamentally thinks about architecture becoming "… an environmental regulating device mediating between its inhabitants and the external environment. As the functions handled autonomously increase in complexity and interconnectedness so the response will become more personal". (Negroponte, 1975, p. 128). The most important thing to take away from Negroponte's assertions is that architecture has the means of becoming much more than simply static shelters. He proposes a state in which a dialogue exists between machine and human where information is constantly being exchanged to ultimately create more fluid connections. These associations then provide the means for an evolved architecture capable of understanding humans at a substantial level that has not yet been available in architecture today.

Intelligent architecture takes into account a feedback loop that starts by sensing the environment in which it is situated and emits responses reciprocal to the information analyzed. This type of architecture is a systematic assembly that requires an interface of mediation to reveal adaptable conditions solely dependent on the specific user. It can provide a basis by which spatial formation can become a component of intelligent responses directly linked to what is warranted at that particular time. Consequently, we can think of society as initiators of architecture as opposed to simply users. This then suggests that a focus of architecture is "… shifting to self-configuring electronic environments – enabled by electronic devices that can immediately begin to communicate wirelessly with one another when they are brought into proximity and that can work together to support whatever activities are taking place." (Mitchell, 2004,

p. 164) Here, Mitchell describes a construct in which operational platforms utilize environmental knowing and the current state of the user to ultimately induce a logical response. These virtual environments and the interactions within have the ability to inform architecture.

SEEK, a project by Negroponte and the Architecture Machine Group at M.I.T., demonstrates the technological capacity of the 1970s in the pursuit of architectural intelligence. The machine contains gerbils, most known for their curiosity, and a series of five-hundred two-inch squared metal cubes. The sole purpose of this enclosure was metaphorical; to seek the relationship between man and environment. The armature was programmed to constantly realign blocks, if their orientation was modified, however, if the blocks were completely moved to another location, then the machine would recognize the preference of the gerbil and realign blocks accordingly. As a result, SEEK organizes itself as a reconfiguring landscape based off of the assumption that the gerbils know where they want their cubes. The implications of such a design paradigm reveal that architecture may in fact be able to be a resulting factor of a dialogue (through the use of mediated environments) between man and their environments.

As we seek to redefine architecture it becomes apparent that technology will become a driving force for change. Intelligent architecture is a product of technological expansion and its onset has shifted the way in which we can conceive informed architecture. Intelligence in architectural systems is something that is extremely hard to strive for – thus intelligent applications in architecture is scarce. Rather, we are noticing an influx of new responsive or interactive systems that inch closer to intelligent systems but do not fully represent a platform of inherent learning. The current state of our stride towards intelligent architecture is one that is extremely introductory. Although the theoretical framework exists, the technological capacity to realize such construct is just not available. As a result, we must now think of methods to work around the traditional definition and think of systems that pose to be mediators within architectural constructs.

As a result, smart architecture is a conquest of today's society. Being able to identify with environmental and human conditions is becoming more prevalent and the use of this information is yielding building designs that are able to react to provide for certain characteristics. Changes in building systems, including heating, lighting, optical effects, or security are becoming commonplace in buildings and the coordination of these systems are establishing new levels of human and environmental understanding. The resulting factors of smart architecture are typically found in systematic optimization which in turn has led to economic or physiological efficiency. Overall, smart architecture is the first real step towards the theories on intelligence as proposed by Negroponte. While we are a ways away from cultivating intelligent environments, we are able to start to manifest architecture that begins to understand humans and

propose new methods as to how space may function in the post-digital era.

// CONCLUSION

Over time architecture has progressed into many streams of theory. In this section, Historical Interlude, the examination of these streams is dissected into six categories: universal space, supersheds, media architecture, interactive/responsive architecture, cybernetics/conversation theory and intelligent/smart architecture. Each discussion in it's own respect presents supplementary ways as to how architecture is or can be facilitated. In all regards, the ability for users and environments to be considered as a tool in design is examined and each particular mode of design reveals ways in which the latter is plausible. By examining each subject we may get a sense of how interrelationships may begin to inform hybridizations of these theories to inform new ways in which architecture can be conceived. Universal space in conjunction with the aforementioned concepts can be applied to allow for more openness and freedom in an attempt to provide for many solutions that may arise out of technological adaptation. Where Conversation Theory or Cybernetics and Intelligent or Smart architecture succeeds we may begin to see how buildings may encapsulate these ideals and present a range of possibilities based off of the information gathered.

Gordon Pask's theories are entwined into the theoretical basis for a pervasive architecture to exist and in all cases, aims to be a mediator (through the use of complex systems) between man and their environment. The supershed is then a mode of design in which will allow for the merging of flexibility or openness into the schemes of media and technological systems. This may result in new organization in which the supershed may present itself, not as a container simply holding one large-span space, but a mix of various universal spaces all connected to each other via architectural and technological control systems.

The history and progression of architecture has always focused on involving new routes towards design, encapsulating the ideals of society and pushing human technological ability at the same time. In the post-digital era, architecture has begun to shift towards incorporating new media and technologies so that we may expand our design outcomes. In all respects, it delves down to the introspective consideration of users and their environments to pose new designable relationships for architecture. As we have seen in precedent there are many ways in which we can hone in on technological progression and to utilize these developments in design. These effects, whether directly affecting a singular occupant or a building community as a whole, all provide an unprecedented amount of knowledge pertaining to the formation of the architecture in the 21st century.

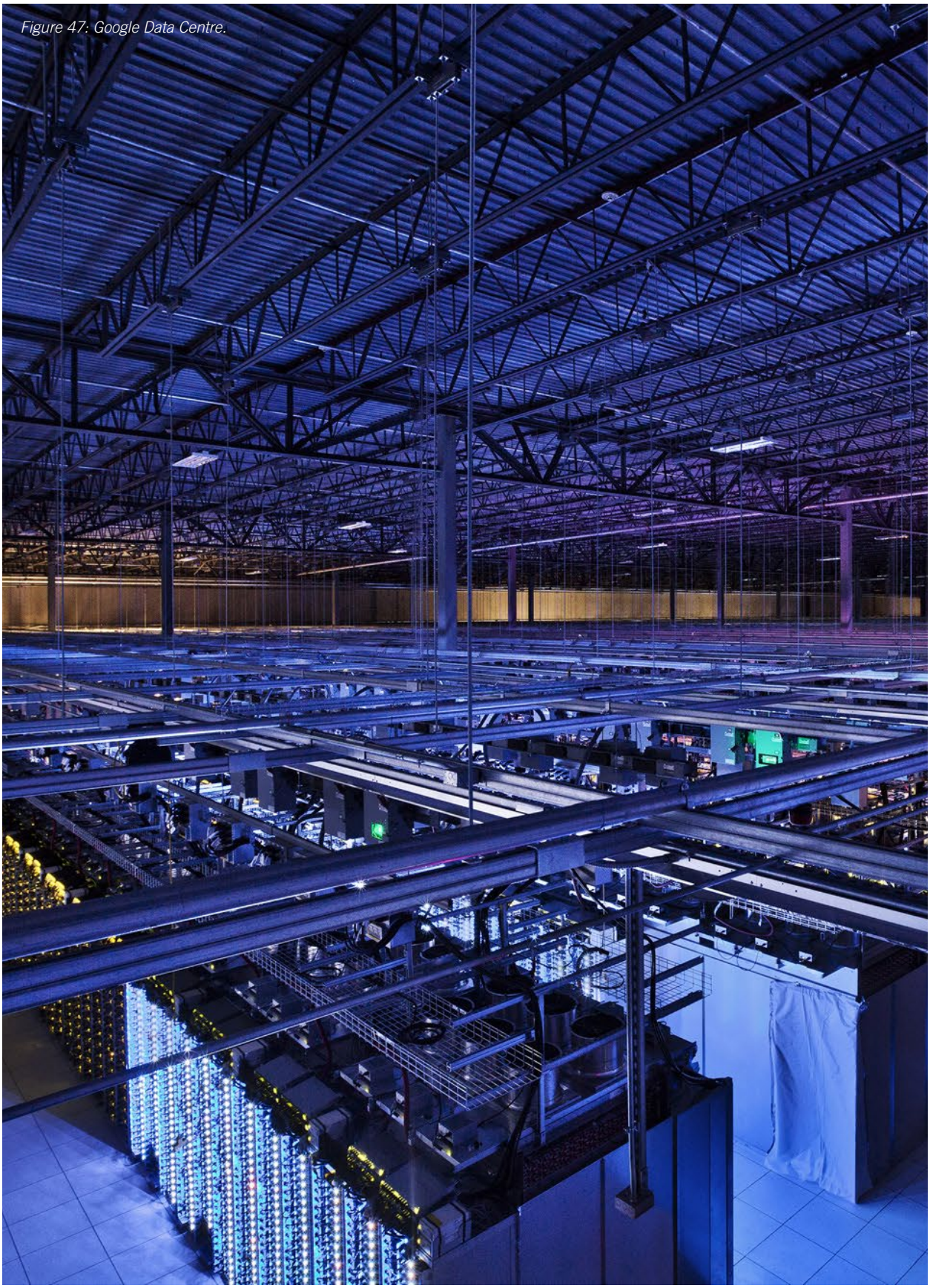


Figure 47: Google Data Centre.

5.0 // MAINFRAME ARCHITECTURE

// DEFINITIONS

Mainframe // A large computer, in particular one to which other computers can be connected so that they can share facilities the mainframe provides. The term usually refers to hardware only, namely, main storage, execution circuitry and peripheral units. (IBM Knowledge Center, n.d.)

Mainframe Architecture (Computer Science) // The act of designing and construction digital hardware platforms. Mainframe architecture consists of a centralized organization of computing which differs from distributed local area networks (LANs) or the expansion of the web. (IBM Knowledge Center, n.d.)

Architecture // A building imbued with meaning articulating or representative of the society in which it is situated.

Mainframe Architecture // A type of building that organizes space and technology congruently to allow for a more enriched level of experience for all types of “humans” in any realm of space - physical or virtual.

Figure 48: Site Location Overview.

// CONTEXT

For Mainframe Architecture to succeed, context is of utmost importance. The difference between rural versus urban scenarios is that the abundance of users and more frequent flowing of information exists mostly in the latter. An urban setting offers the wealth of opportunities for different types of information to exist, be transferred and manipulated. The more enriched the neighborhood for example would allow for various architectural interfaces that are either particular to that region or ones that extend past that locale. The vital link between user and system is the interface in which this dialogue occurs. The convergence of information can be an influencing factor of architecture and the place where it merges must allow for an abundance of conditions.

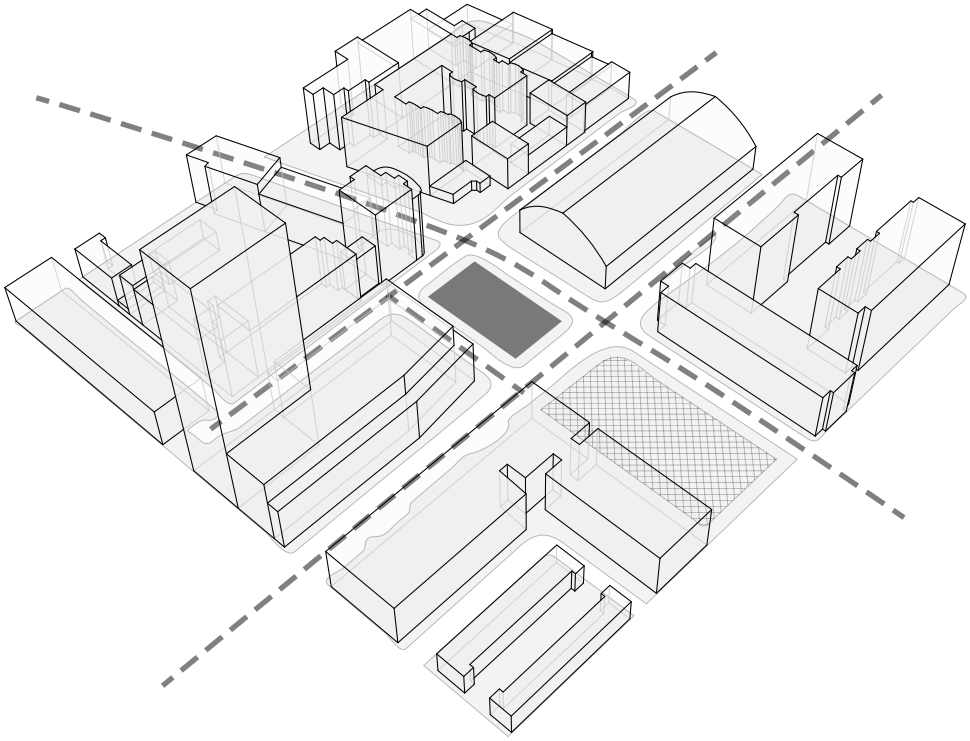
A site with informational flows is one that can be found within the context of urban physical environments. They must be attributed to constant and frequent diversity in circulation, this consists of mainly physical streams which present the opportunity for more digital presence amongst the population. As the digital, physical, or augmented human wanders through physical space, their digital extensions can enable dialogue with the built environment. Thus, various types of flow (vehicular, pedestrian, physical, electrical, etc.) should be a prominent in the location for Mainframe Architecture.

The city of Toronto is an urban location that houses one of the most multi-cultural populations in the world. It is a growing city and every year this population grows, thus increasing the amount of different flows of information. This profusion of connections is flowing throughout our streets and neighborhoods and should provide a more than adequate resource for the conception of Mainframe Architecture.

The site to be examined is located within a district of Toronto synonymous with culture, history and community. The St. Lawrence neighborhood is one that contains a plethora of informational flows in addition to physical exchanges. The region supports a wide range of demographics, which helps to introduce a variety of individuals ready to contribute to a larger scope of activity. This historical neighborhood already houses a variety of public buildings, including art galleries, theatres and of course the famous market. All of these amusements cater to the individual but speak volumes to the eccentric community they are situated in. The entirety of the neighborhood can be considered a hybrid of historical architecture from the earliest foundation of the city of Toronto and a new influx of buildings or amenities that are new in the 21st Century. The neighborhood offers a plethora of food options as well as community spaces all catering to the wealth of individuals who have taken up residence in the area. David Crombie Park, for example, stretches throughout the physical locale of the community which extends to provide connections between the many public resources available.

Located in an empty parking lot just south of the

Figure 49: Site Overview.



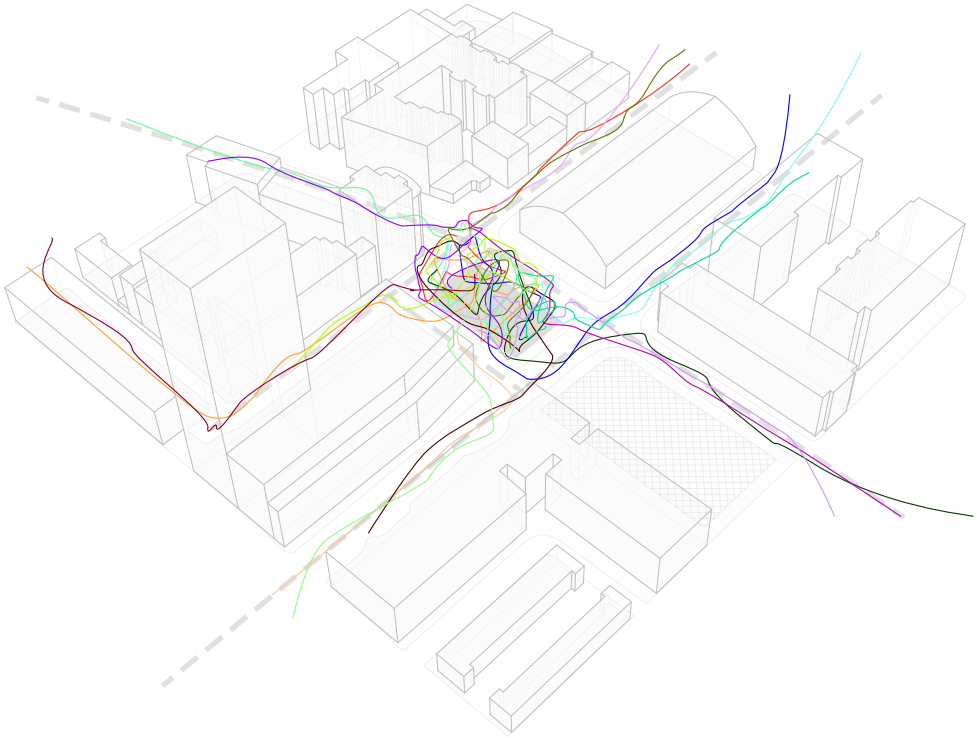


Figure 50: Digital flows into Architecture.

Figure 51: Site Analysis Axonometric.

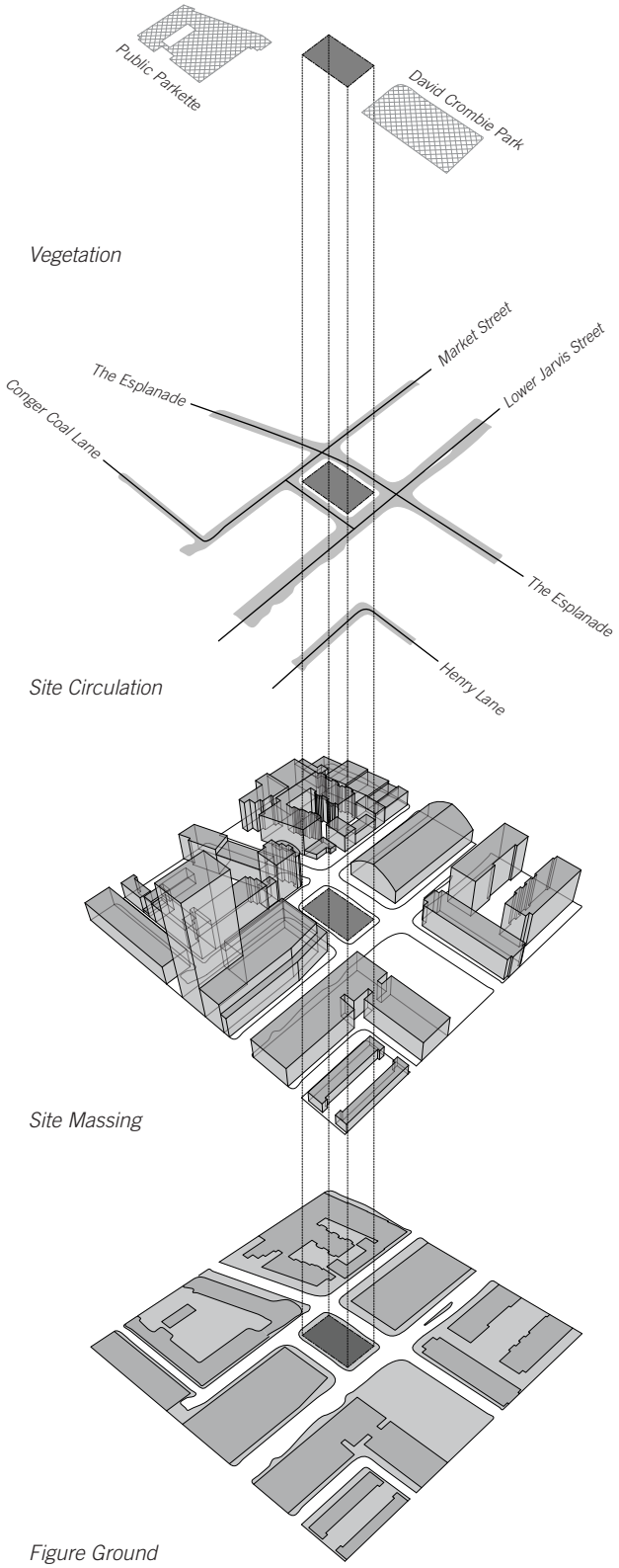
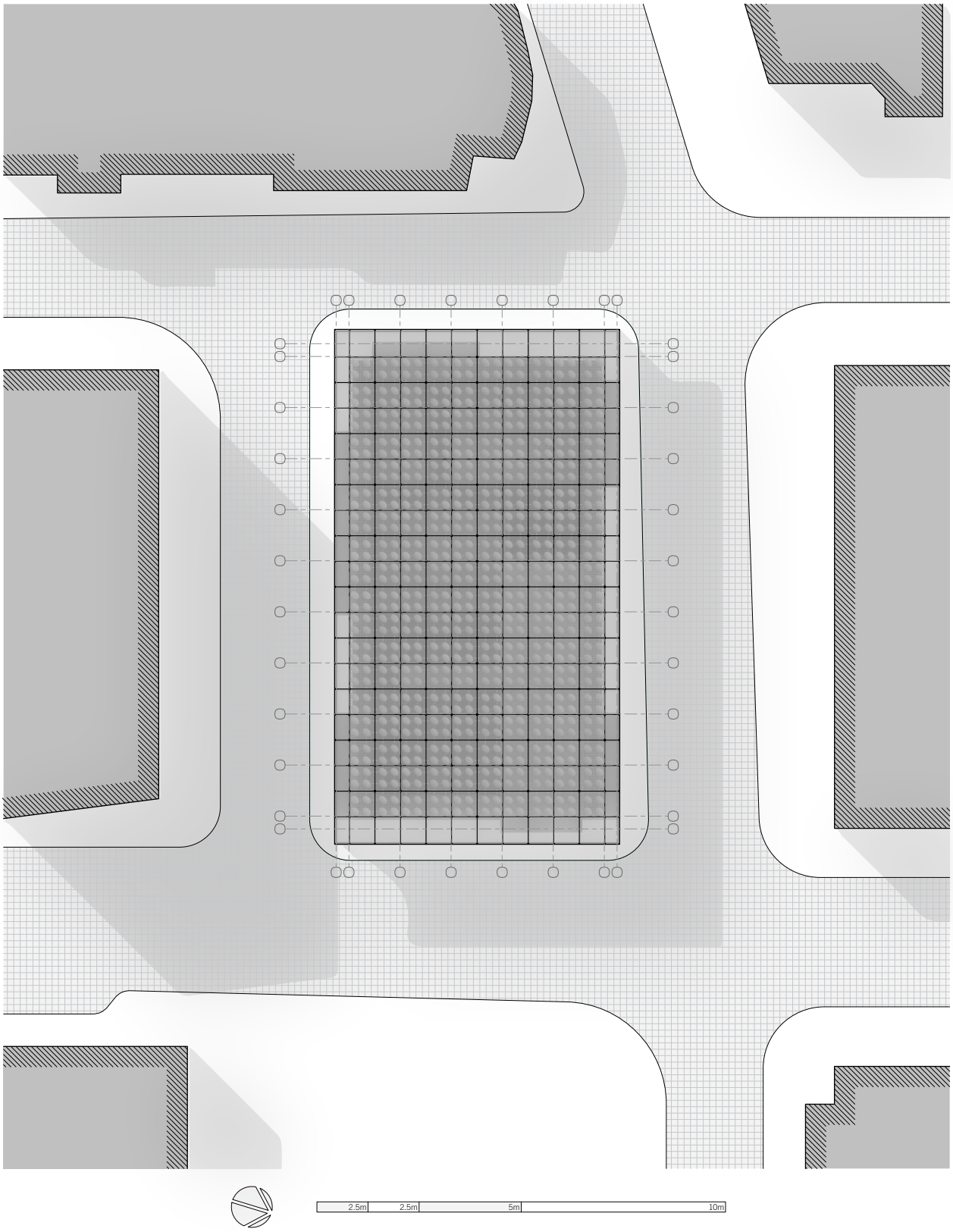


Figure 52: Context Plan.

Figure 53: Site Plan.



historic St. Lawrence Market, a Media Museum will be established. It will support the activities of not only the surrounding population but also reach out to the city on a grander scheme. Being placed within the historical district of the St. Lawrence Neighborhood provides the opportunity to capture the flows of each unique individual and provide an outlet for the expanding wealth of connections that are available in the community. The St. Lawrence Neighborhood is a perfect location to implement Mainframe Architecture due to the ever growing population, its vibrancy, and the fact that it provides places for people to congregate approaching from other regions of the city.

In all respects, the ability for the site to draw in people and establish connections is crucial to the formation and operation of Mainframe Architecture.

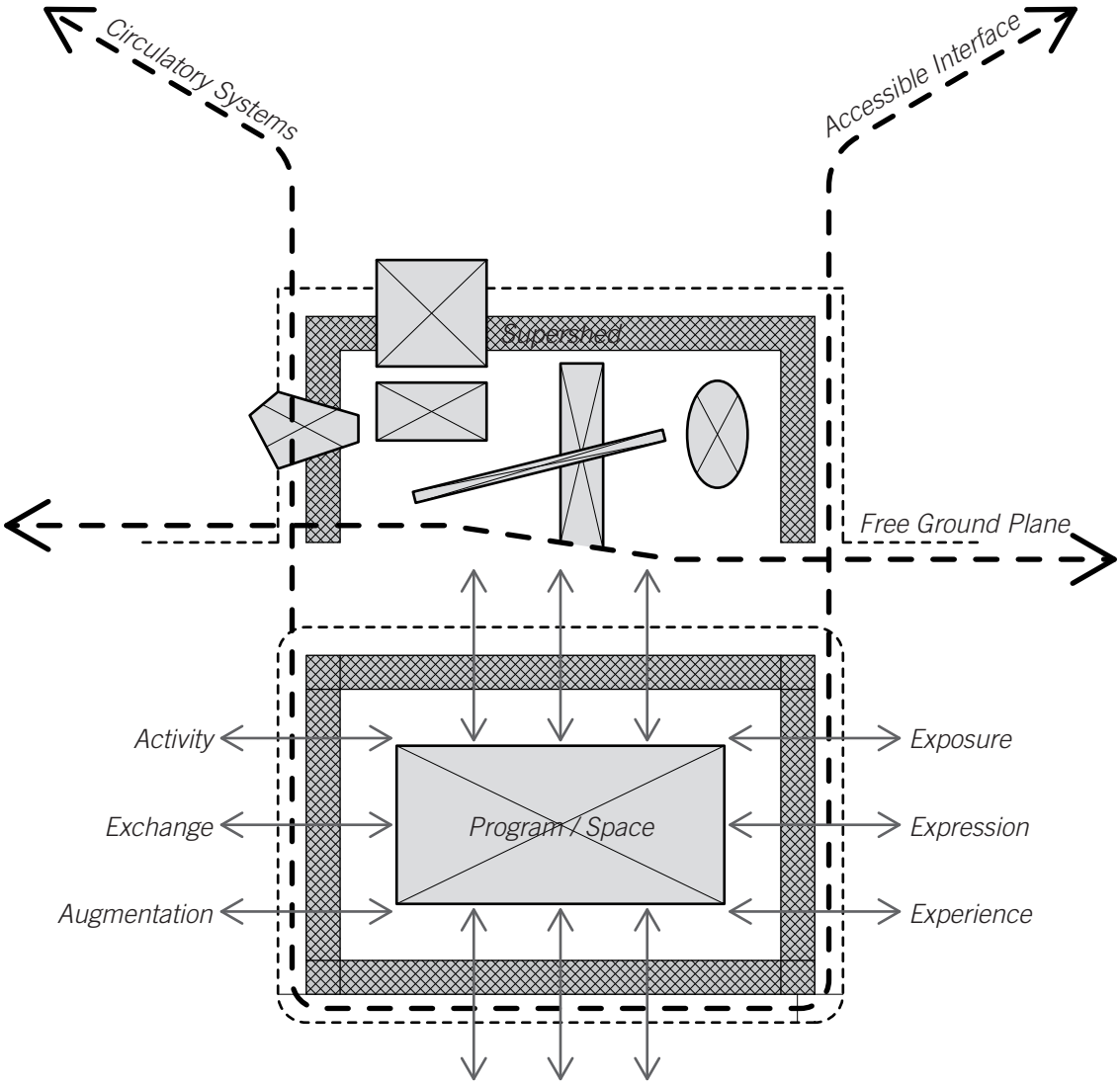
// SCOPE

Mainframe Architecture is unveiled as an all-encompassing structure capable of mediating local environments by providing a platform for the exchange, cultivation and conversion of digital information. By implementing sensing systems throughout the building we are able to obtain an unprecedented level of knowledge on the people that are using our spaces as well as the containing environment. The development of this understanding, both physical and virtual, brings fourth new design variables that are only surfacing now in architecture. Mainframe Architecture takes these conditions and merges them into a building that facilitates new social activities based off of the information gathered from the “humans”. This technological platform enables users to enter into a building that is able to identify with the individual and can use their information to mediate their environment based off of the conditions presented. Ultimately, sensing devices are used to hone in on the informational aspects of both the digital and physical humans which helps to inform architecture and in turn establish a platform for the augmented human to arise.

The technological systems within Mainframe Architecture act as a mediating platform between the “humans” which illustrates the fact that the building must become an active part in this process. As a result, the building is equipped with a number of technical surfaces, interfaces and components to provide an architectural platform capable of being either a catalyst for social activity or an outcome branching out of these particular experiences. In all cases, technology in Mainframe Architecture is constantly negotiating between physical and virtual environments by either tapping into the digital population that is occupying the building, sensing the surrounding environment, or providing actuation as a way of initiating architectural experience.

Overall, most of the digital aspects of this building are hidden. As part of the “invisible infrastructure”, the digital human may tap into these networks. These aspects are invisible to the physical humans contained within the building and are only available as representations through the many technological

Figure 54: Concept Diagram for Mainframe Architecture.



systems/architectural assemblies that are made available – thus unveiling the augmented human. Mainframe Architecture utilizes responsive and interactive design to provide these converted experiences and uses them in relation to the overarching information that is provided by users. In all cases, the digital, physical and augmented humans are linked to these systems and are symbiotically connected to their performance. These elements are always functioning and are constantly changing depending on the requirements of the users which in turn becomes a feature of architecture that is always negotiating between physical and virtual environments.

Mainframe Architecture spawns off of the concepts presented in the section Against Program. The concept of evolving spaces, without program, acts as a basis by which we can resolve the issue of underutilized architecture. Instead of incorporating fluid and limitless contraptions that respond to every spatial need of an individual, Mainframe Architecture uses technology and space congruently to establish architecture that subtly responds to individuals in the form of appropriate and carefully placed systems. For example, spaces do not morph to become something new every time a user enters the space. However, the fact that individual users might need different qualities within space establishes a forum for the possibility of incorporating systems that cohesively alter or condition the spaces in which we utilize.

The understanding of the individual contribution to architecture is critical to the overarching themes present in Mainframe Architecture. The fact that one individual may seek very specific conditions in comparison to other users speaks to the fact that typical buildings today, are not capable of facilitating these personal experiences. As a result, Mainframe Architecture utilizes extremely personal information in both physical and virtual forms to unveil experiences that tap into the requirements that each user may desire. This concept considers the fact that digital and physical humans are able to be understood at a heightened level and that through architecture the augmented human is unveiled.

In order to achieve functional requirements within architecture, the typology of a Media Museum is to be examined. The programmatic requirements of such a type necessitate extreme flexibility in spaces which helps to reduce the need for specified programmed spaces that usually provide a rigid platform for activity. In escaping from pre-programmed space, Mainframe Architecture seeks to establish a number of universal spaces that can each offer a multiplicity of activities. When these spaces are collected within a cohesive building, they act as complementary pieces supporting a larger scheme of activity occurring within architecture. Independently, spaces are being utilized in their own fashion, creating their own visual identities and establishing themselves as very unique volumes of space. Content in this case is the driving factor of what may be occurring in each black-slate space and the way in which people respond to such activity will induce further options as to how

architecture can become a by-product of experience. Mainframe Architecture merges these spaces into a building that is representative of the abundance of activities that may be occurring at any point in time. Curation is a large component of these individual spaces which provide content as a driving force for the experience to be had in other interstitial or communal spaces.

The overall composition of this type of architecture suggests a high level of coordination within the building and a level of connectivity that has otherwise not been explored in architecture today. The celebration of use and performance of these systems within the building create an evolving and dynamic architecture that is indicative of the dialogue between "humans" and their environments. Sensing and actuating platforms are critical in this regard and feature evolving systems that are continuously augmenting space and the "humans" within.

Overall, the intent of Mainframe Architecture is to hone in on the personal requirements of a building and present these individual instances on a broad scheme of collective connectivity. This means that as single users utilize space they might induce experiences for themselves but also contribute to the overarching factors of an evolving and variable architecture. The constant reconfiguration of responsive and interactive systems in a building will expose architecture as a figure for collective identity, that both contains and distributes (literally and metaphorically) ideas for/of the city. This interpretive structure is elemental of the individual contributions to architecture which suggests that in this building people are able to project themselves (either internally or externally) through the evolving systems present.

// ELEMENTS

Mainframe Architecture operates within a single structural volume, following Chris Wilkinson's concepts of a supershed. In this case, the proposed building is encompassed by a singular shed comprised of a collection of spaces that span within the structural volume. This extruded volume acts as a structural base for all other spaces to be hinged upon. This creates a dynamic opportunity for creating platforms or containers that facilitates all types of possible functions. Using trusses and suspension systems, the shed is able to carry a number of spaces all facilitating various spatial requirements curated by the Media Museum. The shed opens up the site allowing Mainframe Architecture to provide for universal space as noted by Meis van der Rohe. The difference here is that while universal space is famous for being an open-plan, typically in the form of a single building or a series of repetitive floor plans, Mainframe Architecture utilizes the freedom and potential of the shed to introduce these universal spaces in a multitude of ways. By spanning, hanging or extruding off of the structure, spaces float freely within the shed allowing for not only flexibility in each of the spaces but also an abundance of interstitial spaces. The structure itself is minimalized to a degree in which it is not overbearing to the overall aesthetic

of the building. This is a result of the nature of the shed structure which is a singular system in itself that allows for it to be modified only in areas that are affected by physical spaces. This reduces the amount of careless structure that might be blocking the potential for universal space.

The cores of the shed, on the north and south of the site, allows for vertical circulation to flow seamlessly as they can be inserted within the structure. By reducing these critical elements to the edges of the shed's cores circulation is concentrated within these external structural walls allowing the interior of the shed to be free from these usually overbearing elements. This then also allows for further flexibility in the formation of programmed spaces within the shed. These cores also provide for direct access for building services (MEC) to exist which further compartmentalizes these essential building components. The opportunity this offers is insurmountable to the ability to provide for selections of universal spaces with no obstructions and allows for easy and direct access for any maintenance that may occur.

Dissimilar to that of the Downtown Athletic Club, the vertical circulation of Mainframe Architecture is not meant to be introverted (elevators feeding singular vertical program) but should bring people to an area of confluence to eventually guide them into the spaces feeding off that particular route. This then enables social scenarios that are dependent on whether or not a user of the building was meant to be in that location. It also provides for a level of randomness and fluidity to the circulation due to the availability of multiple vertical routes. This supposes that there are multiple routes to each space but with very specific areas of gathering before entering any particular space. These specific circulatory routes are always adjacent to a transparent glass façade or interactive glazing systems. The placement of these systems along these routes also provides a heightened level of augmented opportunities at the very perimeter of the whole construct. This first layer of investigation prompts intrigue from the exterior due to its constantly evolving material and aesthetic condition which in turn helps to modify the visual effects of the building. These opportunities guide building systems towards actuation thus furthering the architectural possibilities that may result out of the activity occurring within.

Circulatory routes within the proposed building take on a various catalytic roles. In all cases horizontal circulation provides direct routes to various spaces. They are linear in nature and feed program spaces directly. These routes are all facing the exterior and flowing within the containing supershed. The main reason as to why primary corridors extend into these realms is to not only maintain visual presence of the people occupying the building, but also to allow for a direct procession into specific spaces without having to circulate through different areas of the building. The primary advantage to this method of circulation allows for very strict tracking of whom is either circulating through the building and who is occupying a distinct space. The distinction is extremely important – it is crucial that building

systems are able to recognize the users of a particular space; who might be attempting to access the space, who is actually utilizing each space, or who might be leaving the space. Understanding this dialogue has prompted a complete separation between program and circulatory elements, leaving sensing controls to be able to differentiate between many users within the different spaces Mainframe Architecture has to offer.

The ground floor of the building is almost completely free from obstruction, as the majority of the building is lifted above the ground plane. This creates intrigue from the surrounding context as it is a complete extension of the public realm but also clearly a part of the overarching construct. This allows people to question what is occurring in the building mass above as well as helping to create a procession into the building that acts as a delineated buffer between interior and exterior conditions. The important thing here is that the public realm is considered a vital part of the success of Mainframe Architecture. By reducing the distinction between interior and exterior space, the building allows for a more active approach to entering and exiting which introduces a less private approach to architecture. This falls in line with the current status of society in which the essence of privacy is diminishing rapidly. All types of "humans" may find interest in occupying Mainframe Architecture, and this method of approach into the building defines the disregard for separation in lieu of celebrating connection.

Materiality in Mainframe Architecture emulates a pallet that helps to break the distinctions of spatial separation. The symbolic shed is covered in a transparent/translucent skin and all the intersecting spaces are cladded in very solid or opaque material. This helps to reinforce the uniqueness of each functional volume with respect to the overall containment these spaces flow from. Glazing is an important feature for universal space, and in the case of Mainframe Architecture, it is used to delineate all concreteness away from spaces in which most of the augmented activities will occur. For example, the layering of glass on circulatory routes enables refraction and reflections to be cast onto the interior of the building as well as onto the façade. It also contains a number of digital displays, whether photochromic or electrochromic. These glass displays can provide for a range of transparency changes in glazing through the conversion of heat, light or voltage. In addition, electrochromic displays are becoming smarter and are now able to articulate full virtual interfaces on panes of glass. The advantages to using these elements are attributed to the way in which augmentation is presented. Transparencies may be influenced by user tracking, physical impressions on the material, or indirect manipulations via virtual space. Glazing is then an extremely important factor in Mainframe Architecture. It its most basic state it provides a range of transparency but when technologically induced, it offers new possibilities that help to create new modes of user interface and augmentation.

Surrounding the entirety of the façade there is a large responsive envelope carrying a grid of mechanically functioning disks. These disks are constructed out of electrochromic glazing and are able to rotate on an axis providing multiple visual conditions. For example, the electrochromic panels can change their shade or colour producing an insurmountable amount of visual effects. Due to their ability to rotate, they can offer penetrations into the building or block off the façade entirely. This interactive and responsive system has multiple functions to provide shading opportunities for the interior as well as creating a cohesive display that is able to produce an unlimited amount of pixelated images. The responsive façade is also used to gauge the individual on a larger scale by being able to sense their presence along the façade and create patterns based off of proximity, motion or digital input. It also has the ability to merge these personal responses to create a cohesive display based off of the activity occurring within the building. Through technological systems which elude to wither Cybernetic or intelligent systems, the building will be able to negotiate between these instances and provide for local opportunities for augmentation or larger schemes that are representative of the whole building environment.

The range of images that can be created by the building may be either controlled via curation or actuated based off of sensing systems. These images may be uploaded to the façade system or utilized through responsive generation while undergoing influence from users or their surrounding environment. The primary theory here is that people, through augmentation, are able to project themselves onto the building façade, thus creating extensions of their image (deriving information from the “humans”) and contributing to the collective identity of the building. The result of this feature allows people to then project themselves onto the surrounding environment initiating a deeper dialogue between the physical world around us and the virtual activities occurring within the Media Museum. The type of content available through the use of this system is limitless and when engaged in a state of perplexity, it is a responsive architectural feature that is fully representing the activity occurring within the building. The idea here is that through the use of technologically savvy systems and by engaging with the “humans”, architecture is created that focuses on containing and distributing images or ideas of the city and its occupants. Therefore, this representational platform is indicative of our current technological society in the post-digital age.

In Mainframe Architecture, lightness and obstruction-less views are coveted. Where possible, all program spaces span between circulatory routes producing clear span, open volume space. These spaces seemingly float within the shed, pierce its form and stand out as their own individual volumes. They are set within a framework providing very particular spatial and programmatic opportunities that are different from each space to the next. The overlapping and layering of these spaces within the shed allow for a mixture of activity to be presented within the architecture. This superimposition creates complexity

in the building which in turn acts as an intriguing element within the social make-up of Mainframe Architecture. People are elevated in several areas, looking towards the exterior from multiple vantage points which allow space and its use to be a defining factor in how this architecture is perceived. Each solid volume contained within the Media Museum are poking through to the exterior providing gaps of program on the façade and breaking the material condition on the exterior. This helps to focus attention onto the curated event or display that is occurring within. The transient nature of each space will in fact present itself onto the surrounding environment which poses architecture as an evolving and changing entity. The fact that each of these programmed spaces breaks the continuity of the façade allows the opportunity for a dialogue between these elements. Where programmed activity is occurring it may spill out into the interstitial spaces within the museum to be captured by the responsive façade. This may entail that the experiences evolving from these spaces will induce activity from patrons which will then produce visual effects onto the exterior. The fact that each space remains separated from the remainder of the building puts emphasis on the singular activities which supposes that the region around them will be engaged (through the façade) in completely different manner then that of their adjacent spaces. Thus, programmatic indeterminacy allows for multiple uses which in turn provides for infinite conditions in individual spaces but also in the museum as a whole. Through the sensing of the “humans” we may get a sense of these individual experiences gained from each space and correlate building systems to represent these moments onto the world around us.

Mainframe Architecture as a whole is a mixed-media platform for the interpretation of the “humans”. Programmed spaces as part of the Media Museum are influencing factors upon which we have the ability to gain experiential information from. This dialogue is critical to the overarching theme of obtaining information and presenting it in an augmented form. Through an abundance of temporary curated events, each space facilitates experience from all users upon which they may draw specific effects to their physical bodies or digital extensions. By identifying these trends in architecture, the Media Museum has the ability to not only house curated artifacts but also become one in itself. The building will constantly be shifting to produce augmented images of the “humans” and will consequently become a functional derivative out of its own activity. Mainframe Architecture then becomes an icon for change and an interpretive structure for the individual or collective identity in the post-digital society.

// VISUALIZATION

In the next pages, Mainframe Architecture in the form of a Media Museum is unveiled. It is dissected in a series of architectural drawings that display the possibilities and potential for digital, physical and augmented humans to exist within architecture.

Figure 55: Visualization, Mainframe Architecture: A Media Museum.

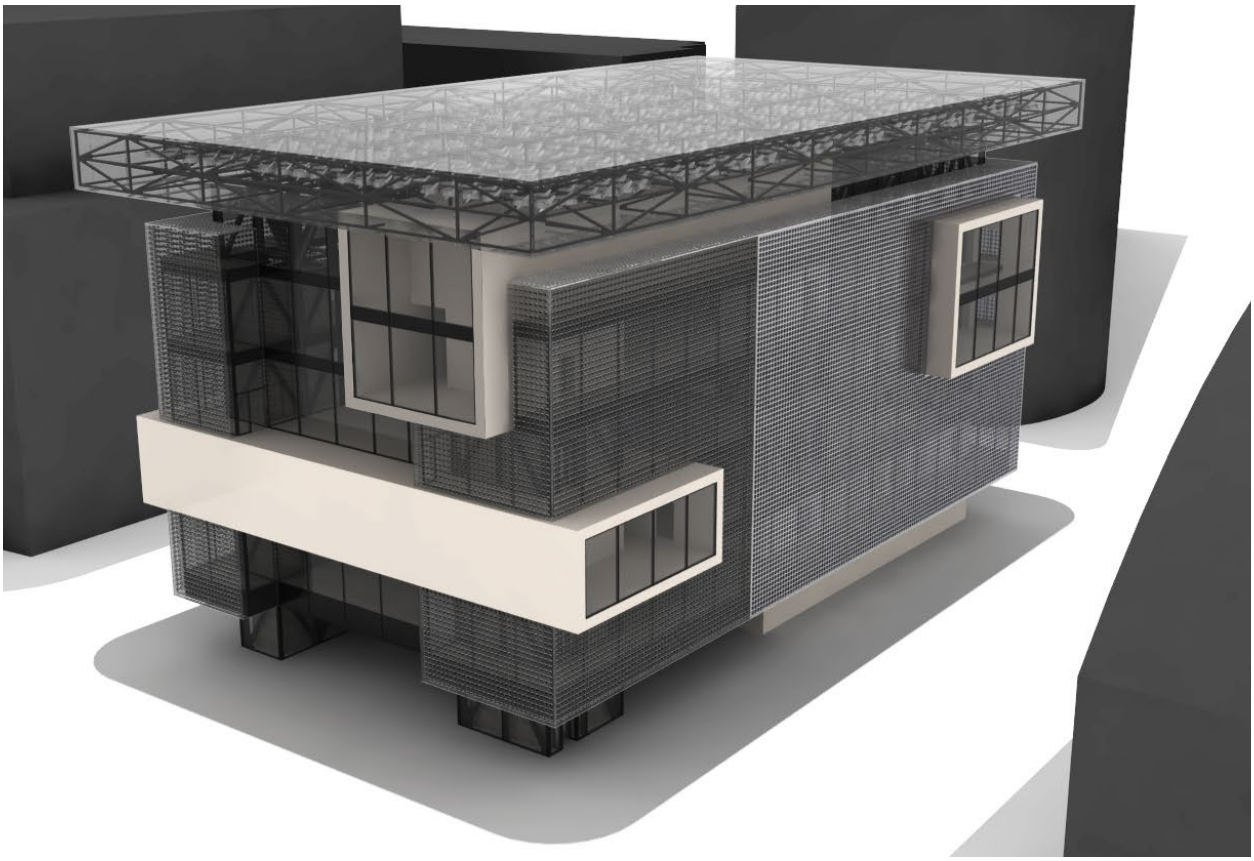


Figure 56: Second Basement Floor Plan.

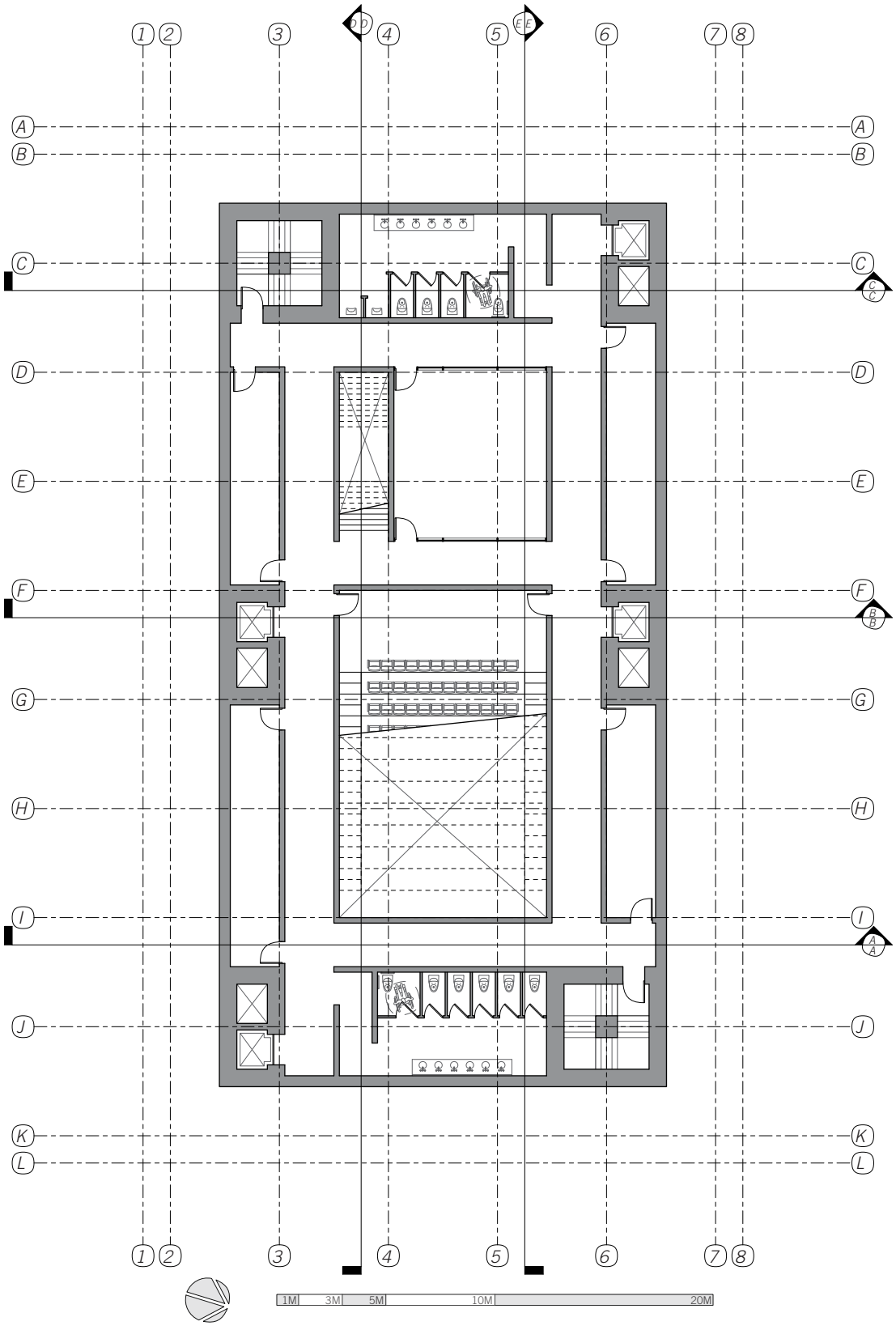


Figure 57: First Basement Floor Plan.

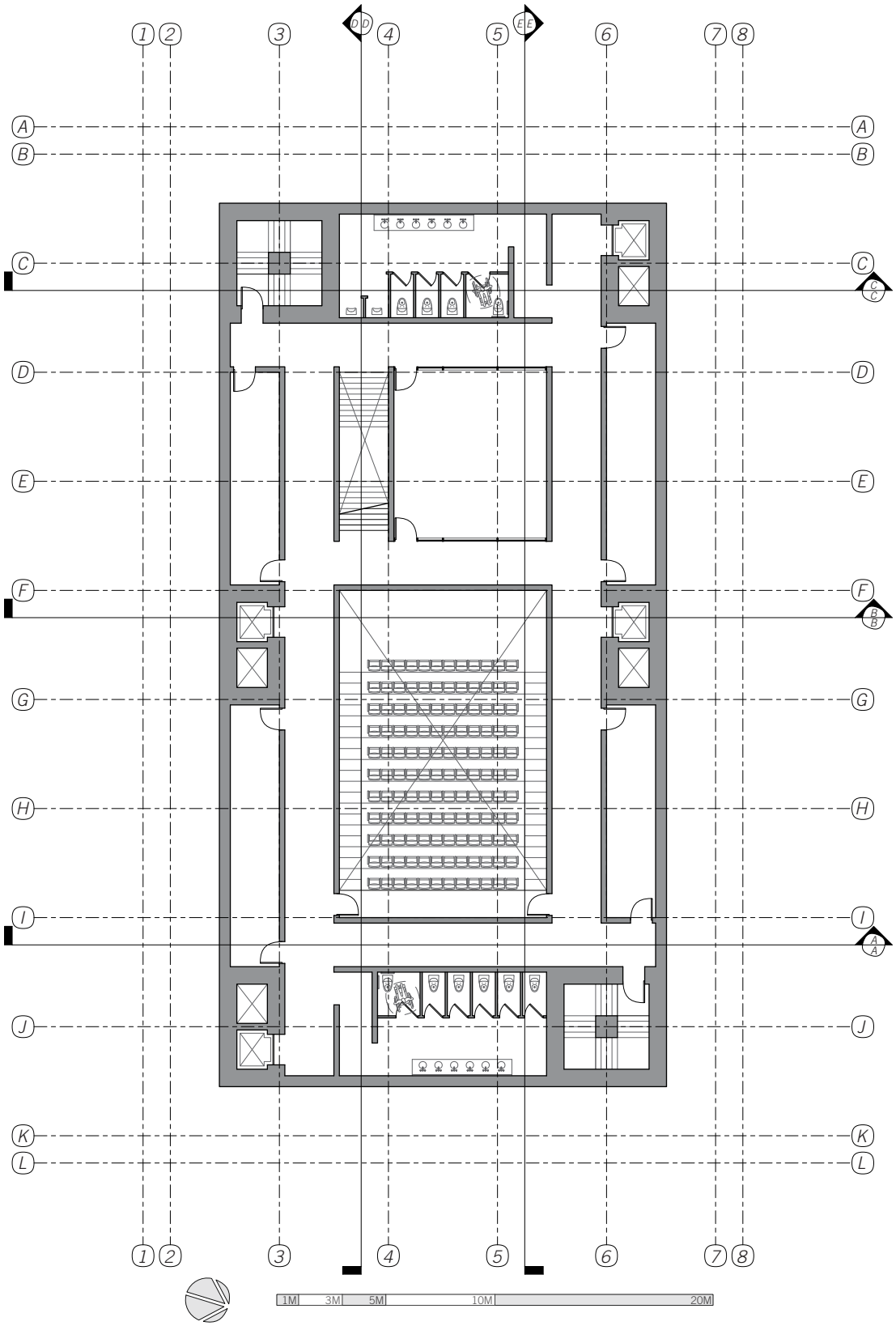


Figure 58: Ground Floor Plan.

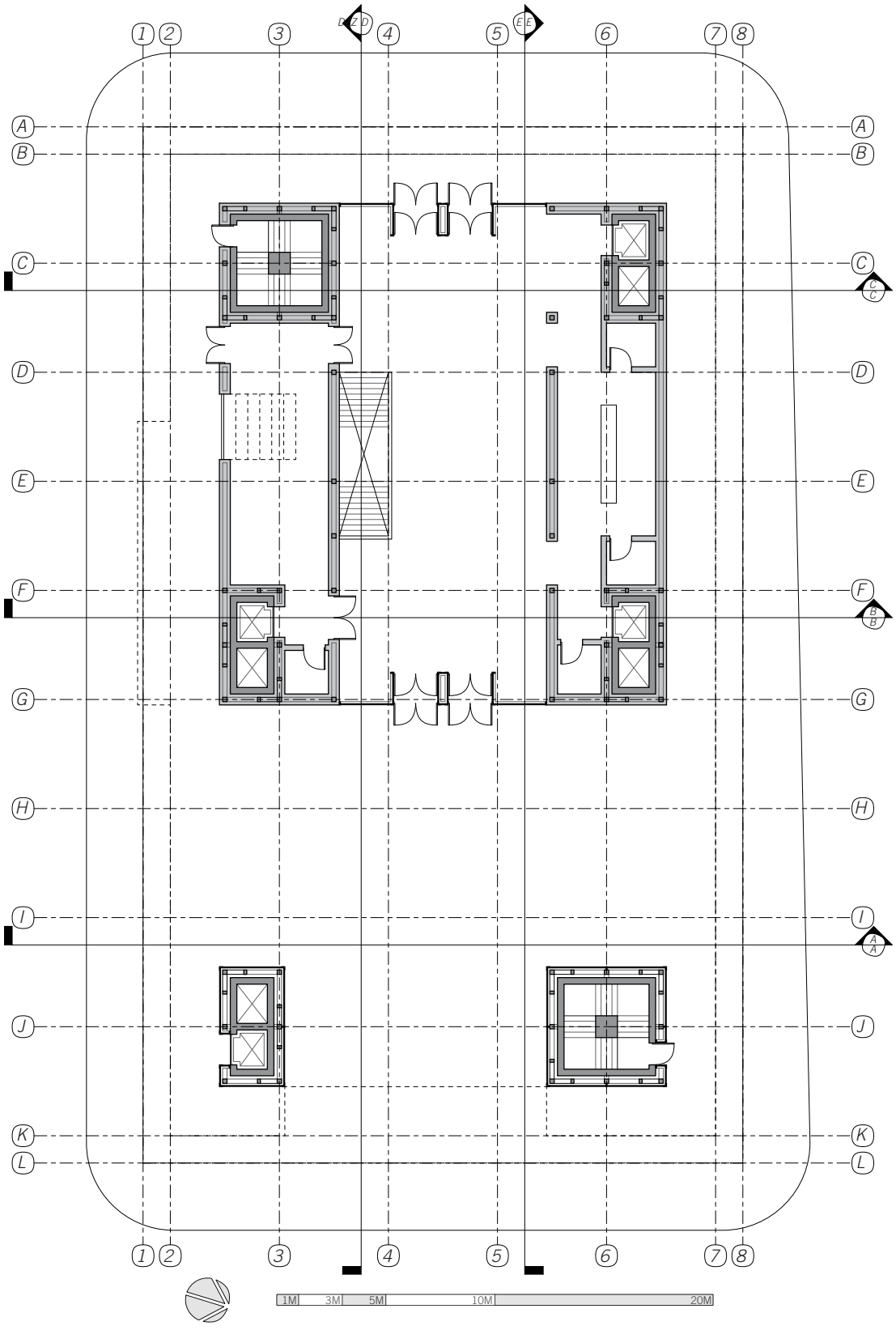


Figure 59: Second Floor Plan.

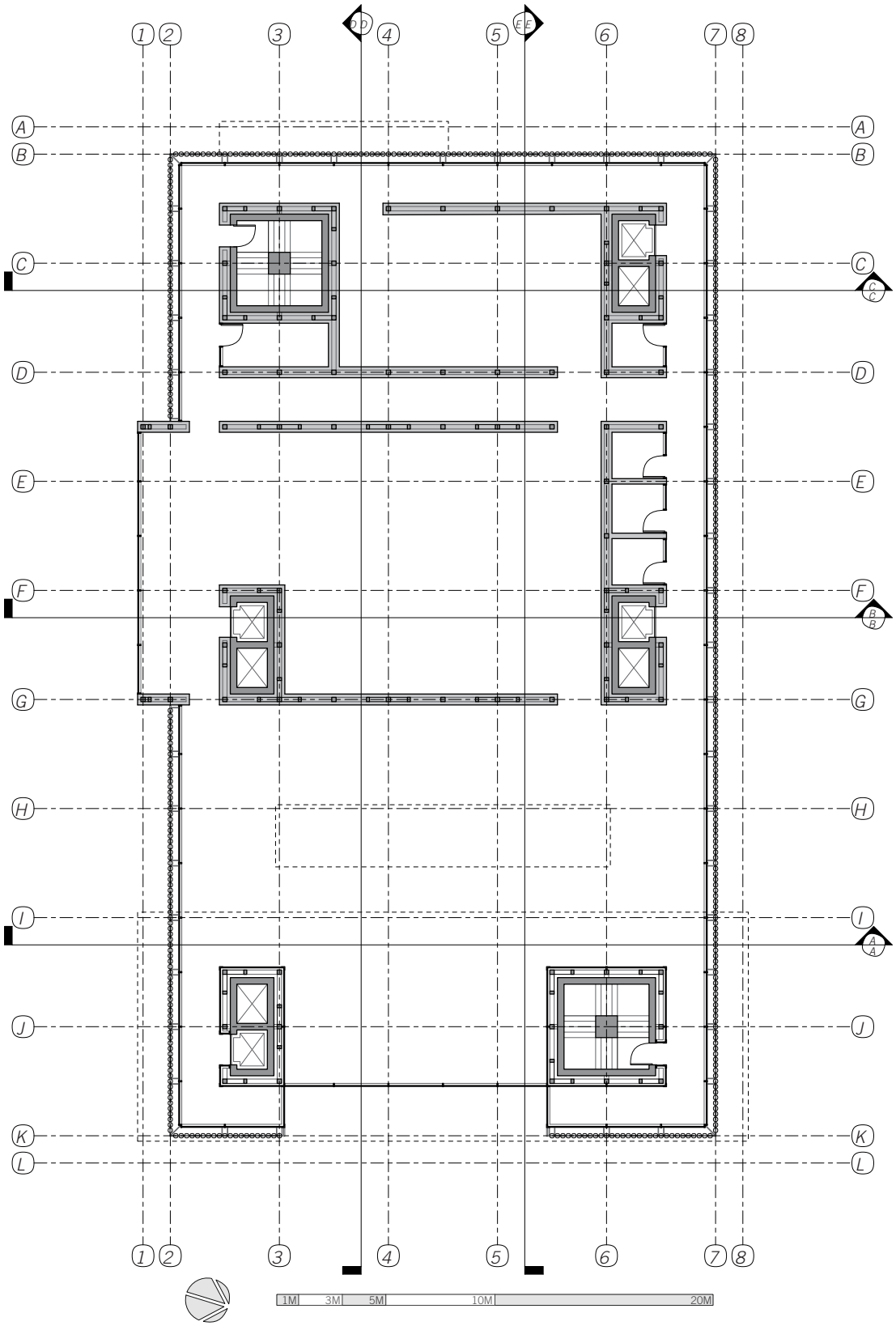


Figure 60: Third Floor Plan.

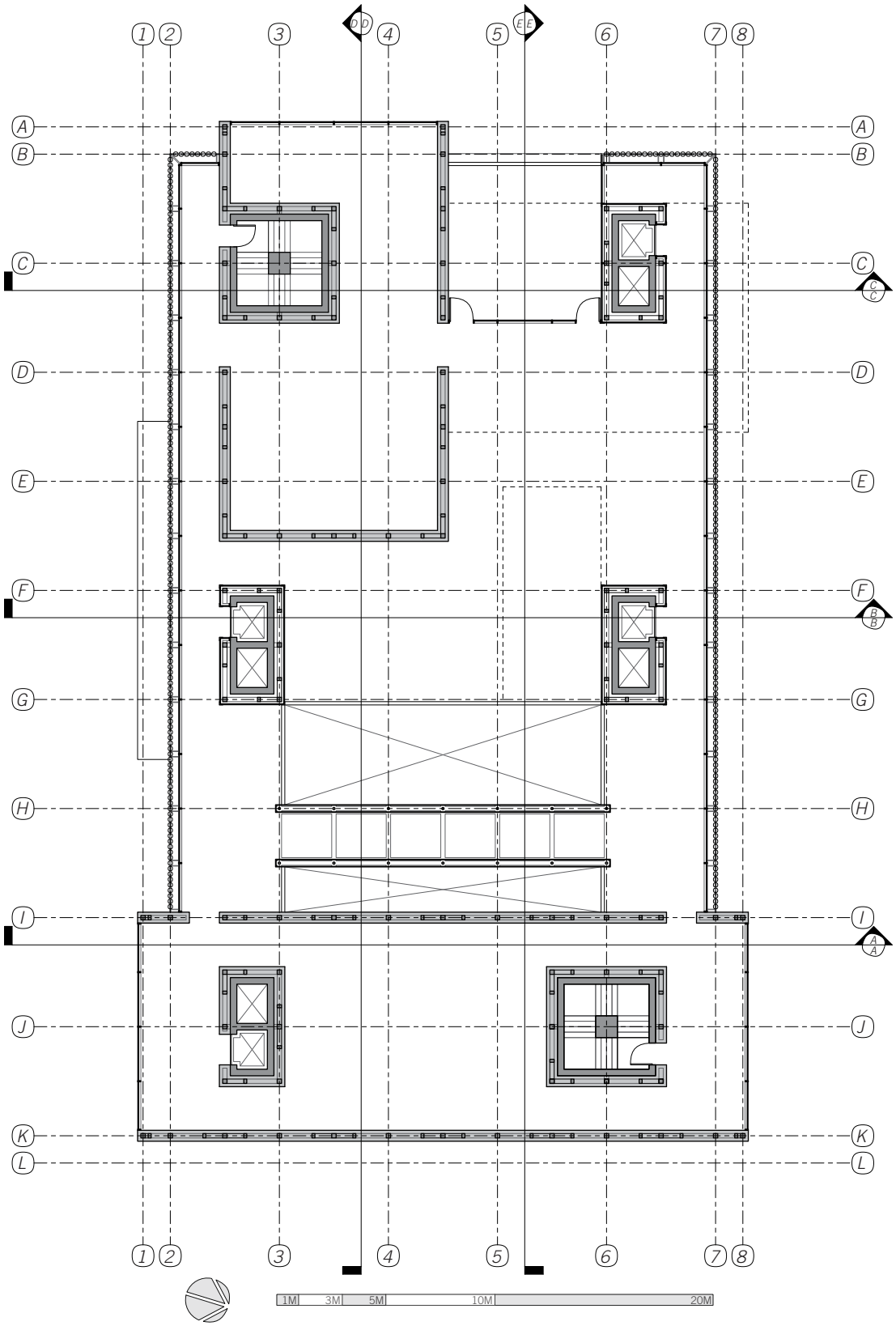


Figure 61: Fourth Floor Plan.

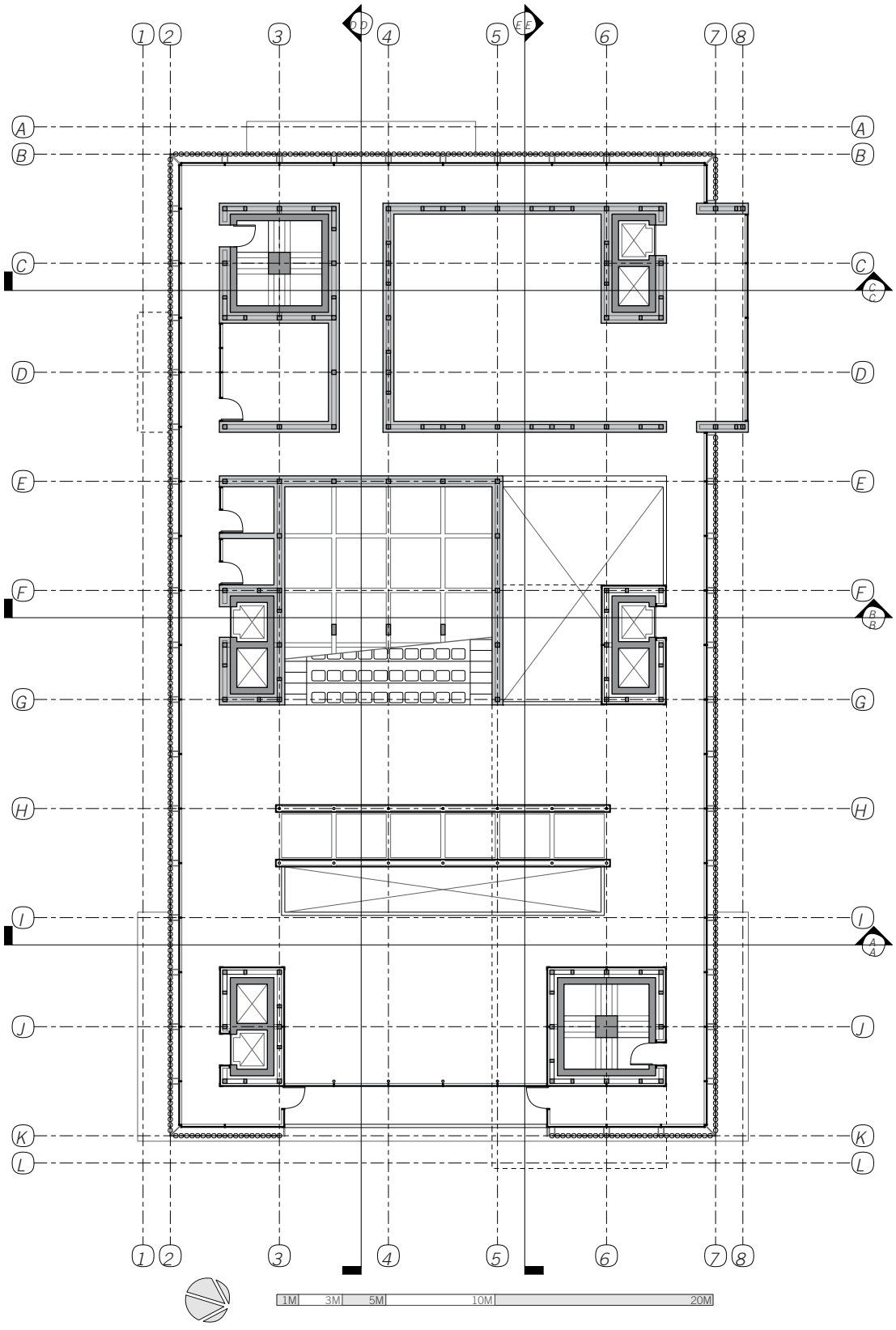


Figure 62: Fifth Floor Plan.

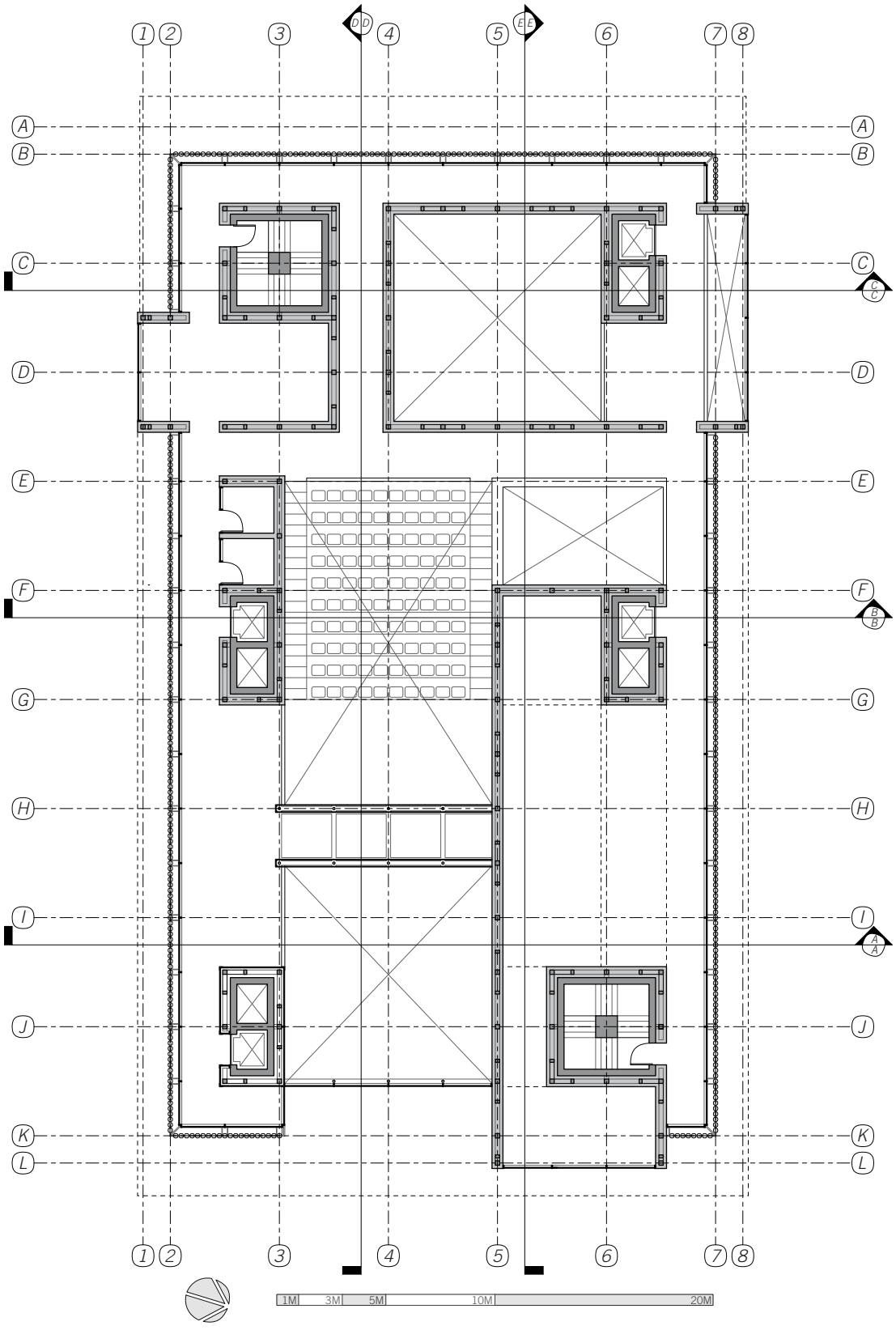
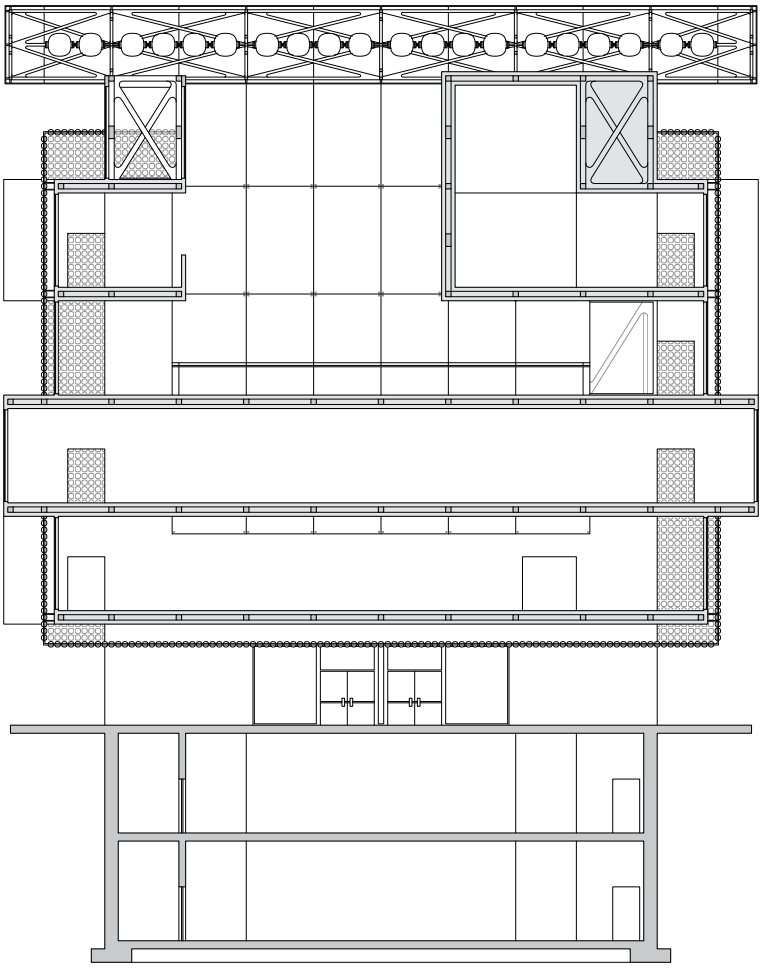


Figure 63: Transverse Section A-A.



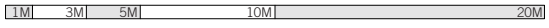


Figure 64: Transverse Section B-B.

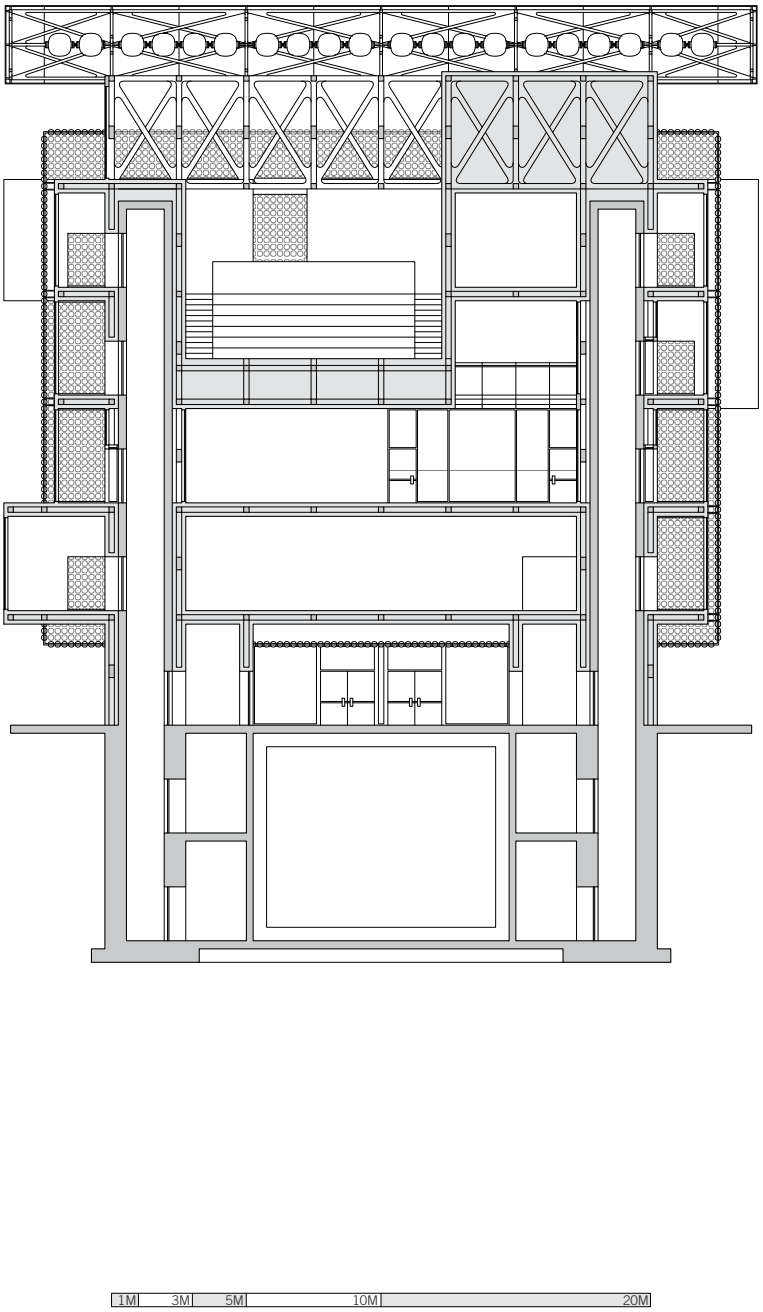


Figure 65: Transverse Section C-C.

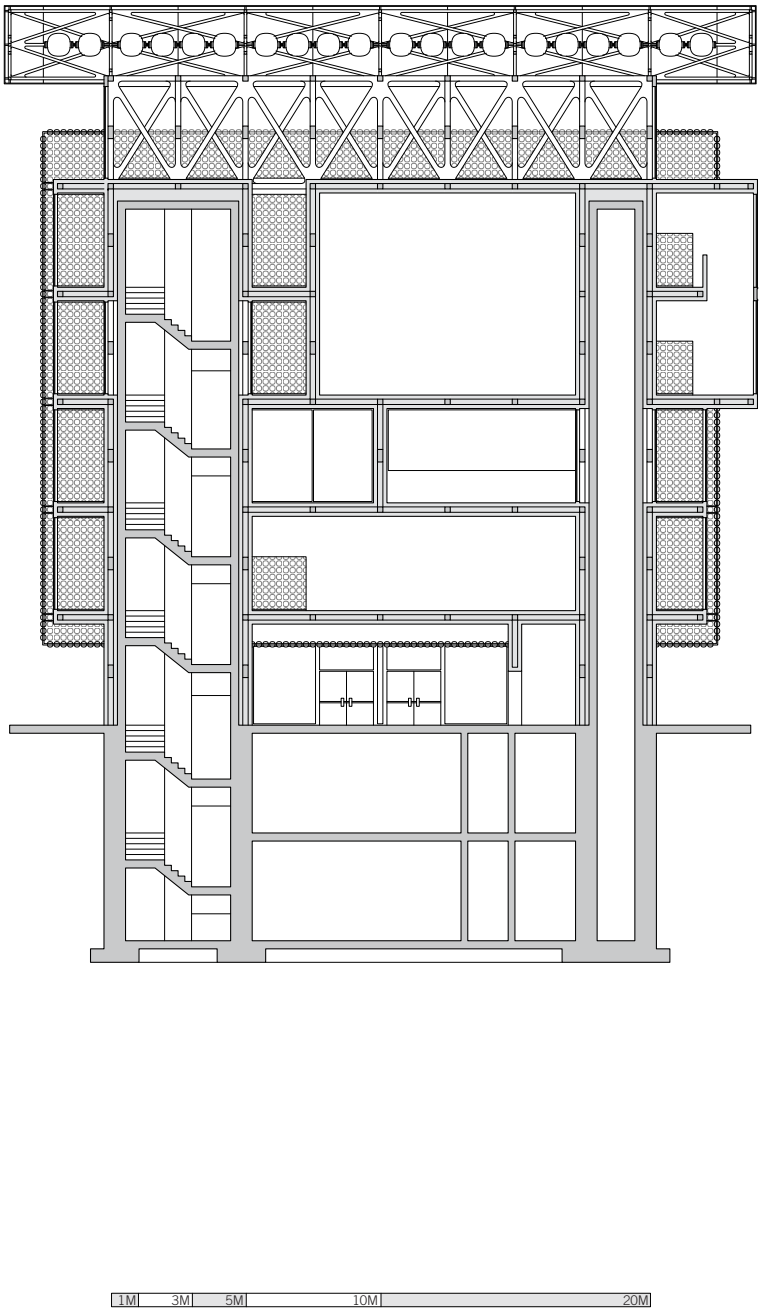


Figure 66: Longitudinal Section D-D.

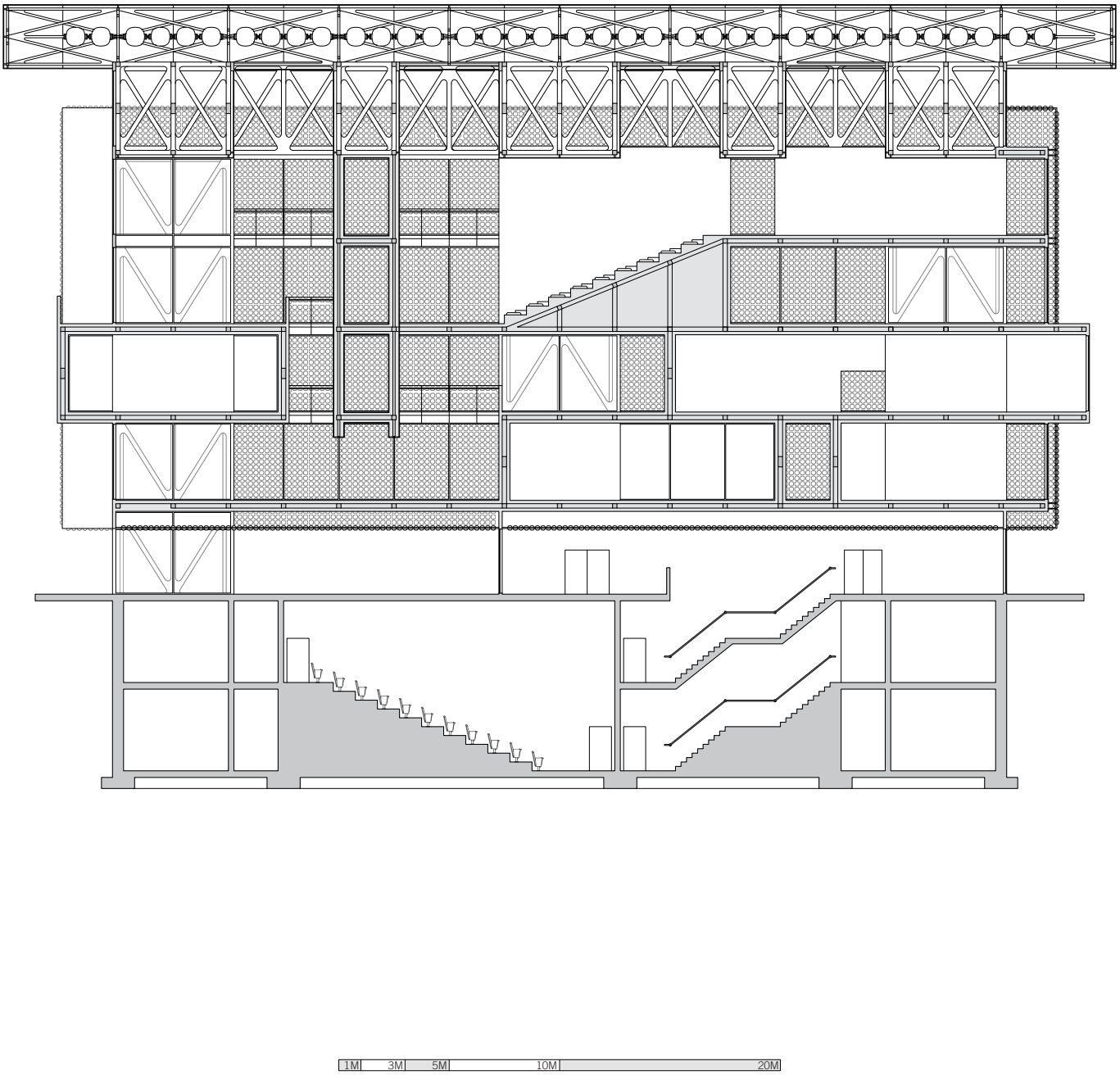


Figure 67: Longitudinal Section E-E.

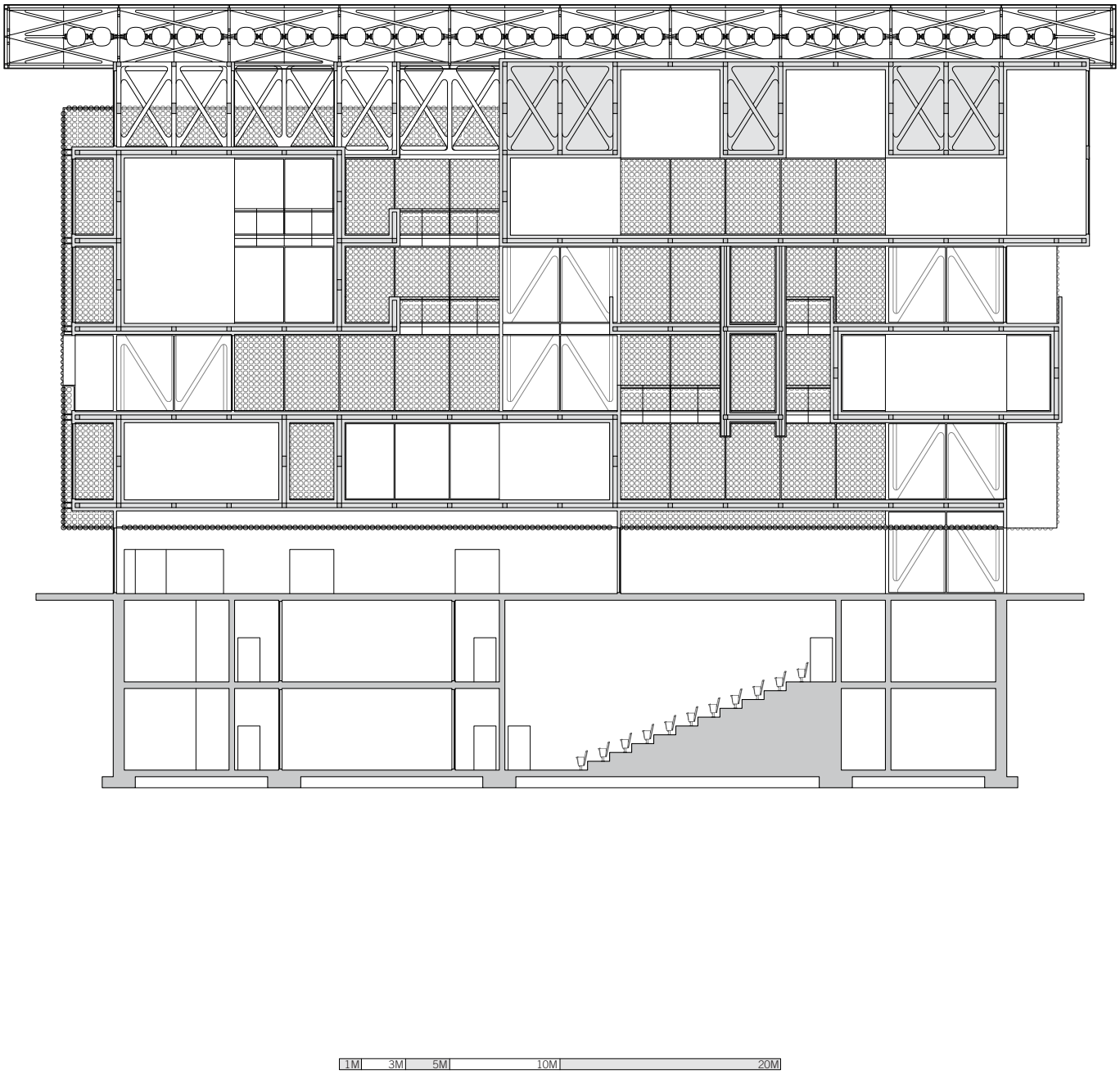


Image 68: North Elevation.

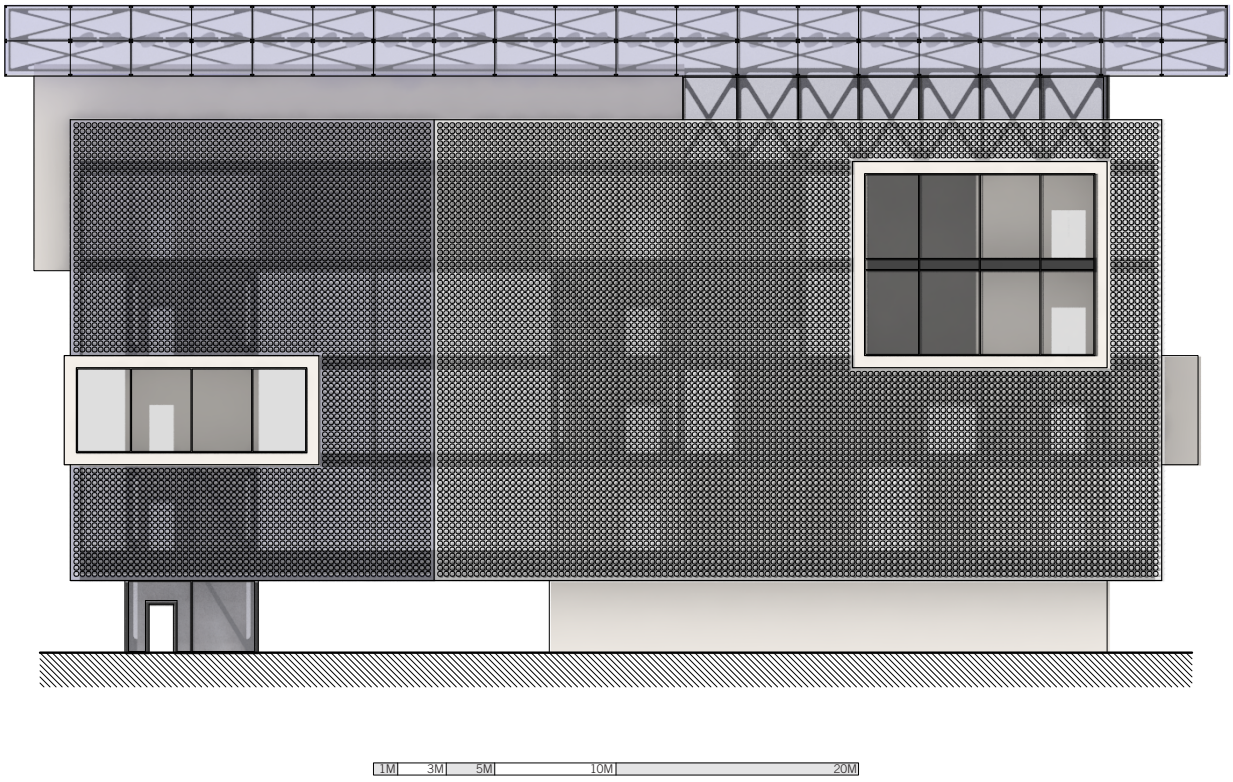


Image 69: South Elevation.

Image 70: East Elevation.

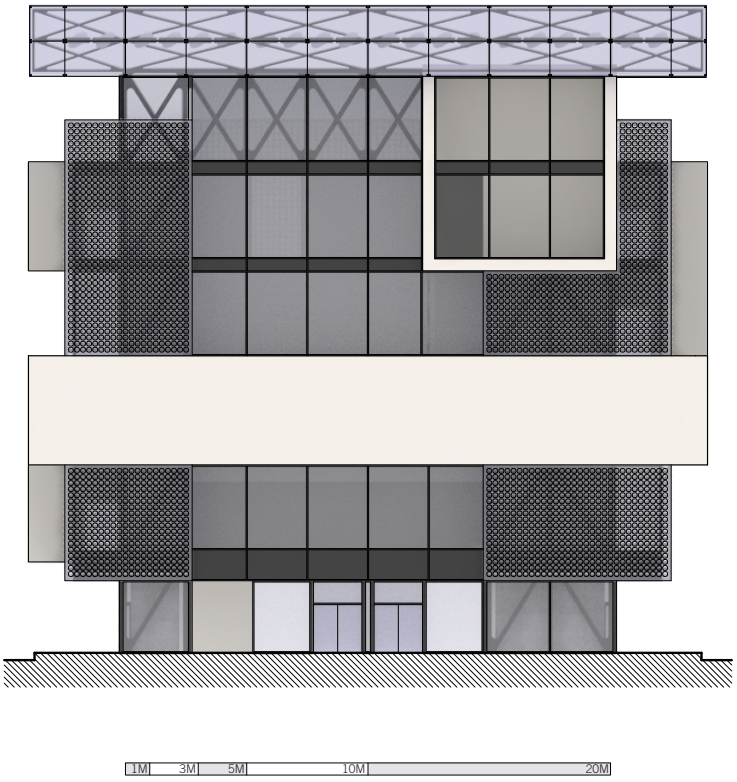
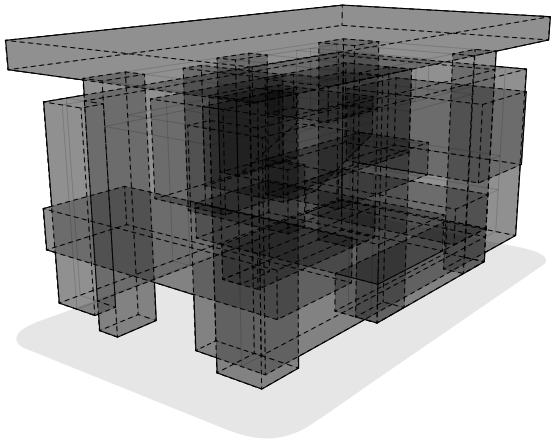
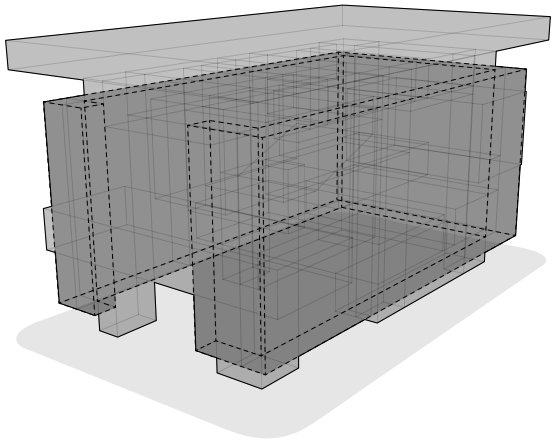


Image 71: West Elevation.

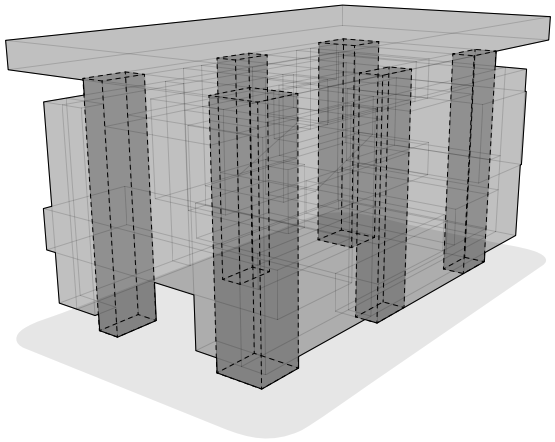
Image 72: Spatial Massing 1.



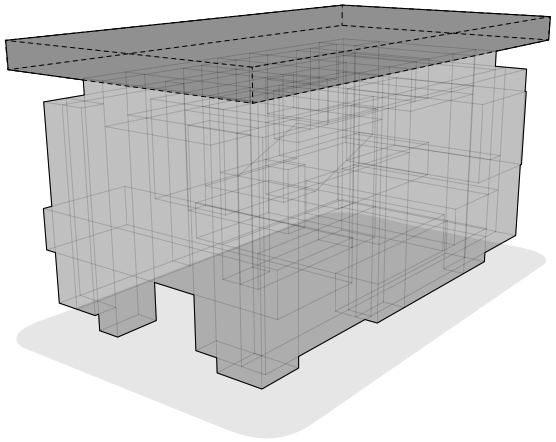
COMBINED



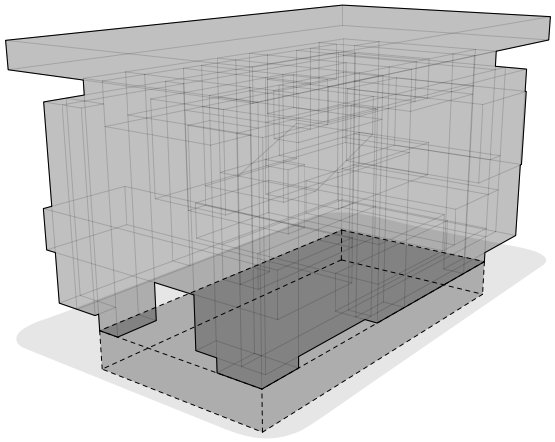
HORIZONTAL CIRCULATION



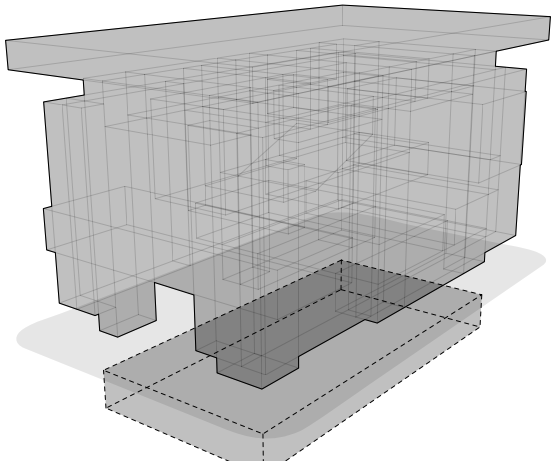
VERTICAL CIRCULATION



ROOF

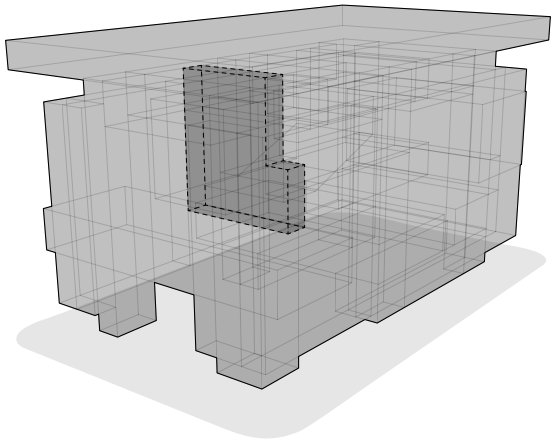


BASEMENT 1

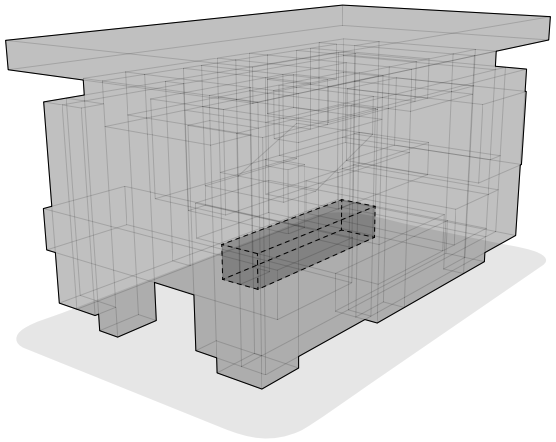


BASEMENT 2

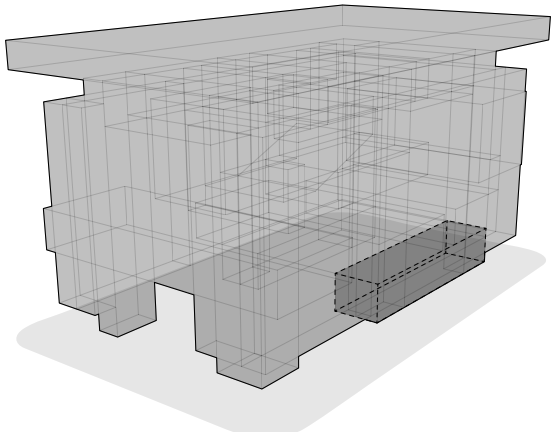
Image 73: Spatial Massing 2.



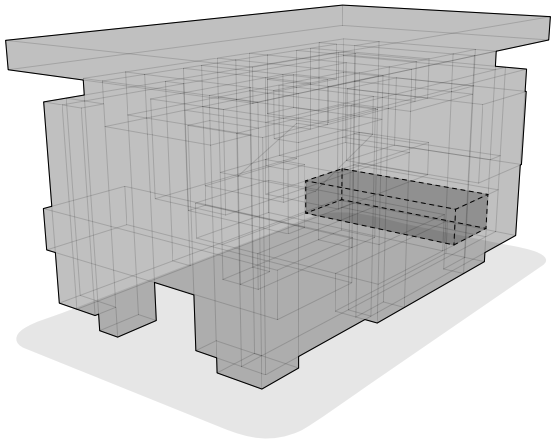
INTERFACE HALLWAY



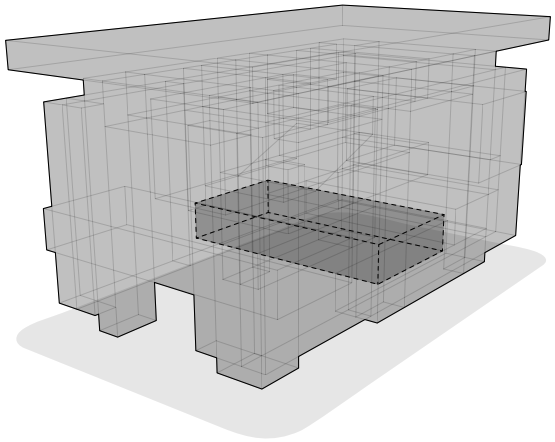
GROUND FLOOR - LOADING AND SERVICES



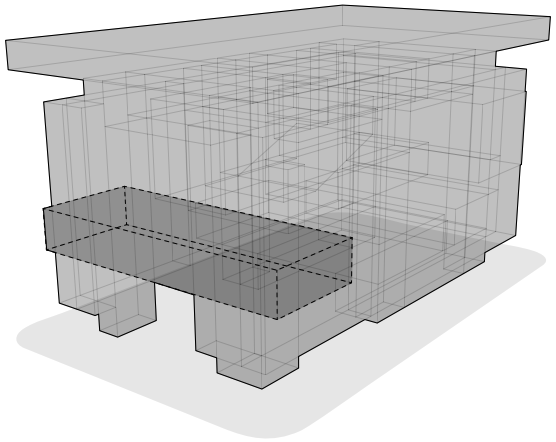
GROUND FLOOR - LOBBY AND RECEPTION



SECOND FLOOR GALLERY

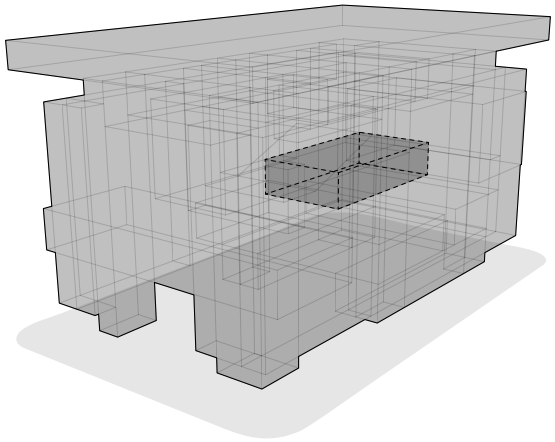


SECOND FLOOR GALLERY

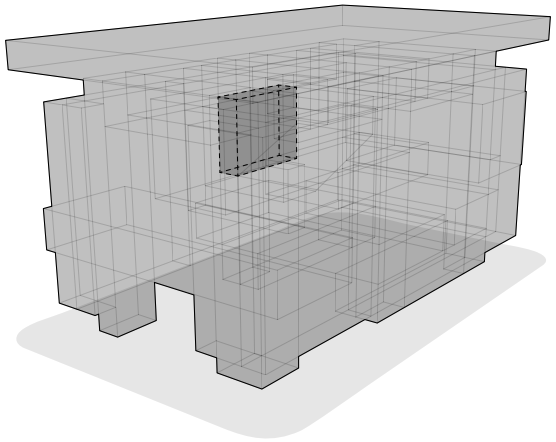


THIRD FLOOR GALLERY

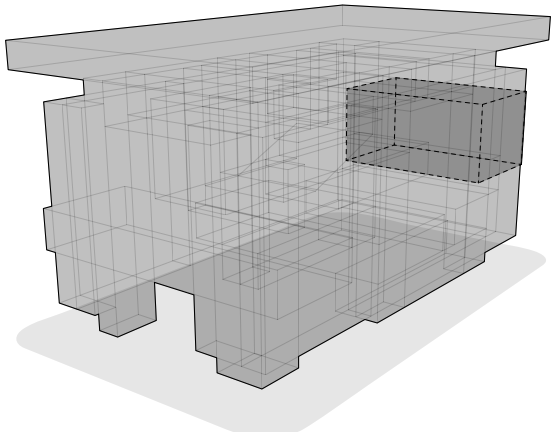
Image 74: Spatial Massing 3.



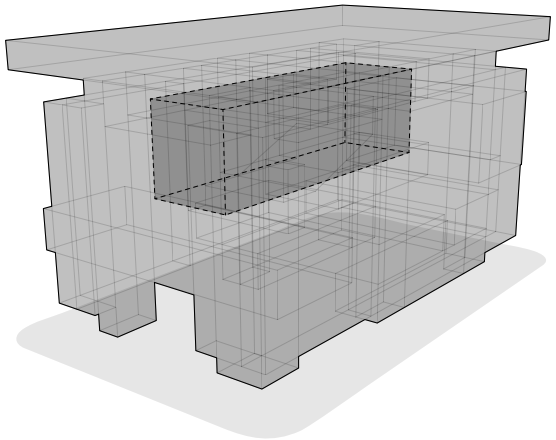
THIRD FLOOR GALLERY



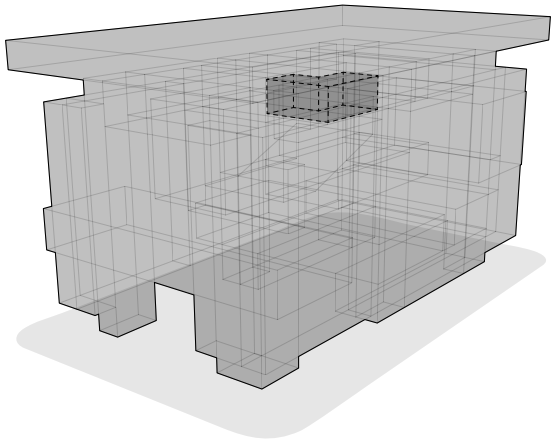
FOURTH FLOOR GALLERY



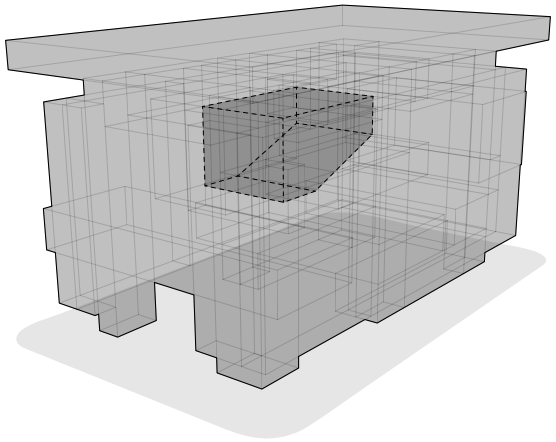
FOURTH FLOOR GALLERY



FIFTH FLOOR GALLERY

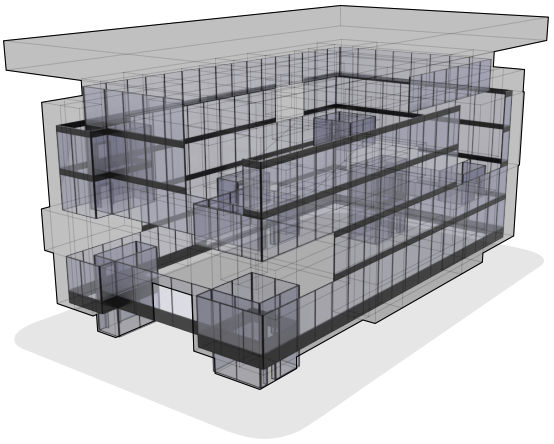


FIFTH FLOOR GALLERY

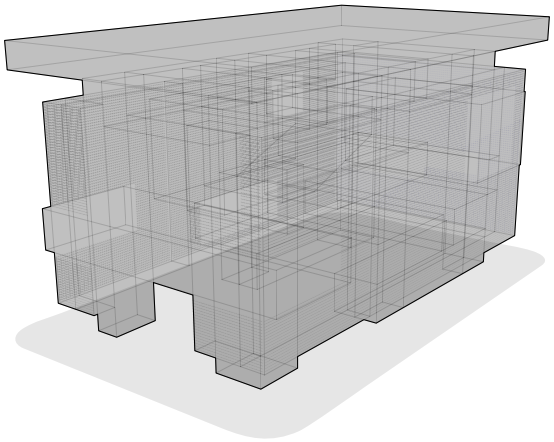


THEATRE

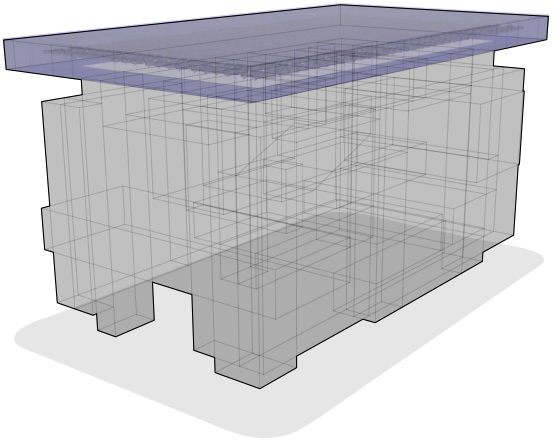
Image 75: Glazing Systems.



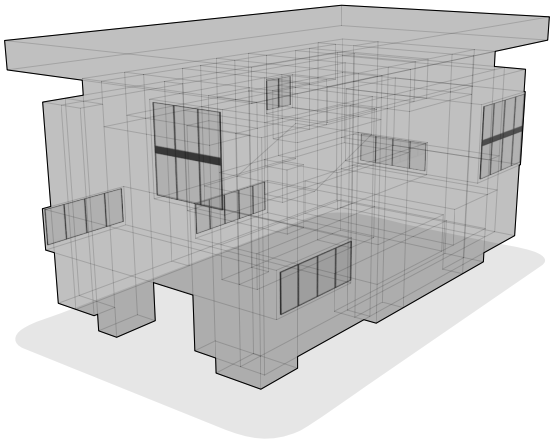
PRIMARY CURTAIN WALL



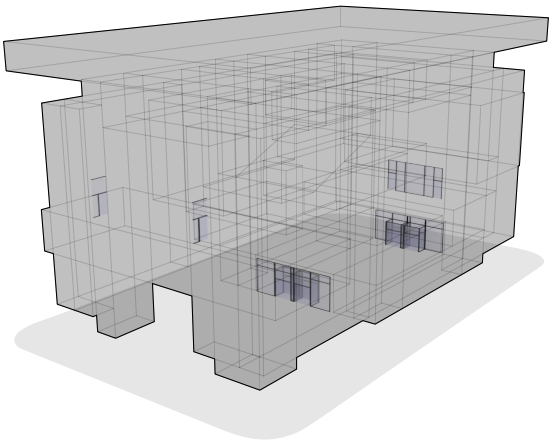
FACADE APERTURES



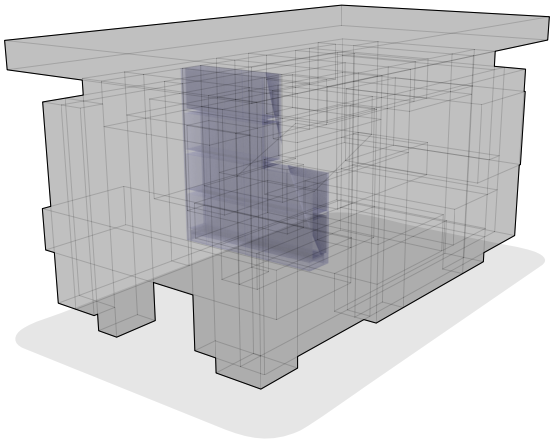
ROOF GLAZING



VOLUME GLAZING

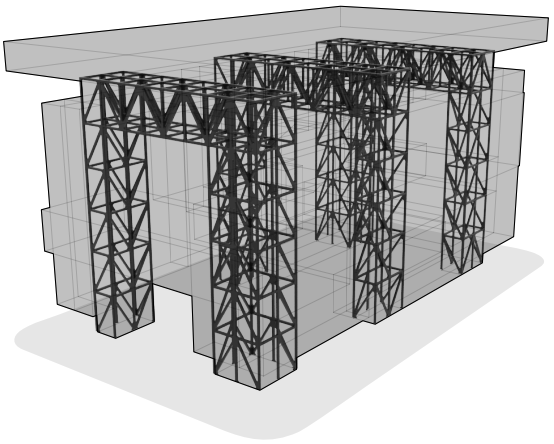


MAIN ENTRIES AND BALCONY DOORS

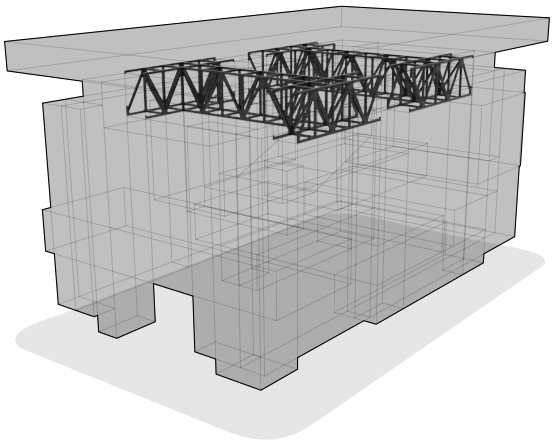


INTERFACE HALLWAY

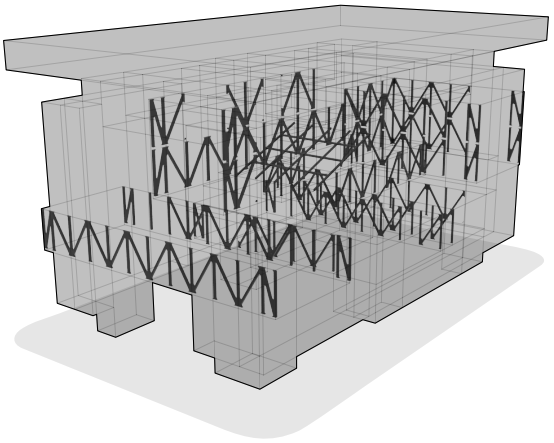
Image 76: Structural Components.



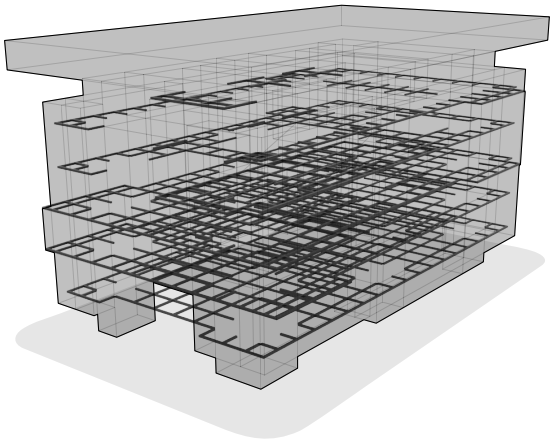
CORES STRUCTURE



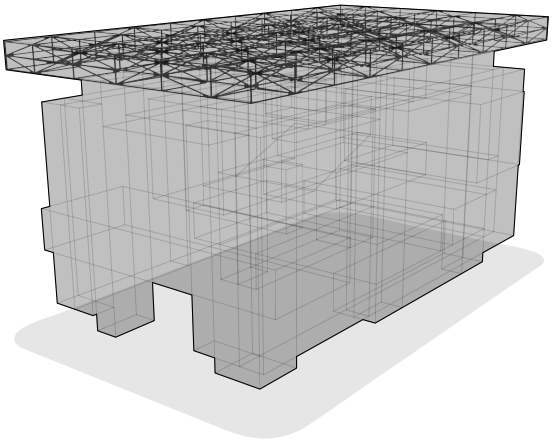
SHED TRUSSES



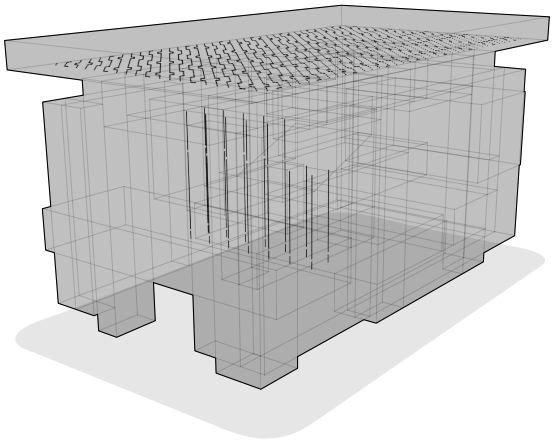
VOLUME TRUSSES



FLOOR STRUCTURE



ROOF SPACE-FRAME STRUCTURE



SUSPENSION RODS

Image 77: Spatial to Experiential Relationship.

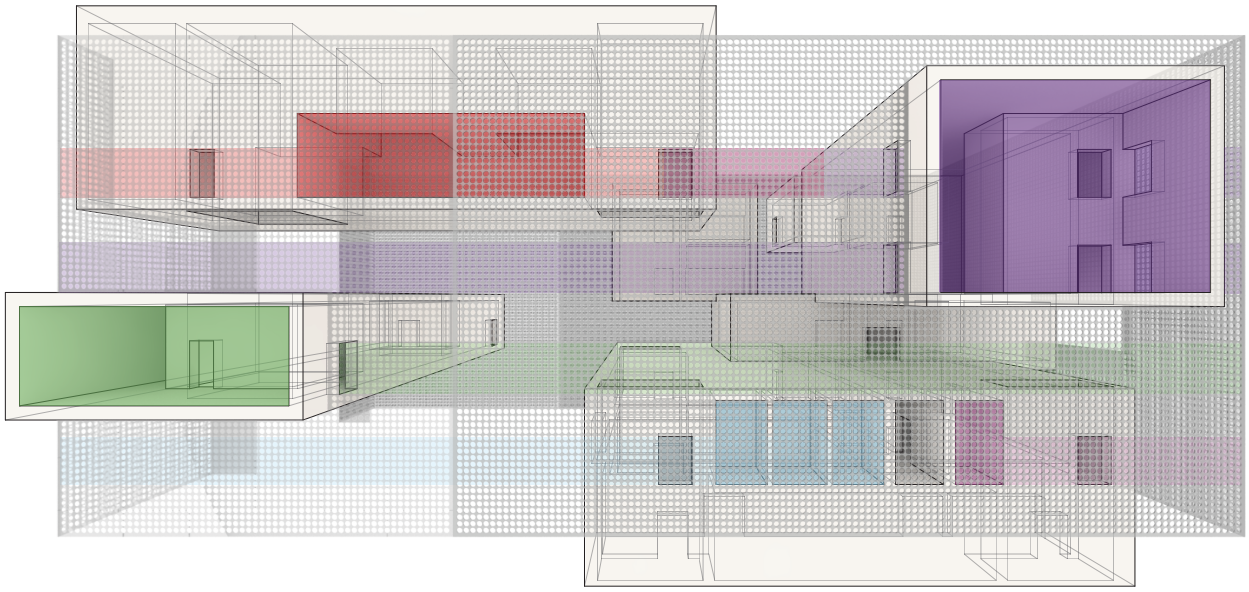
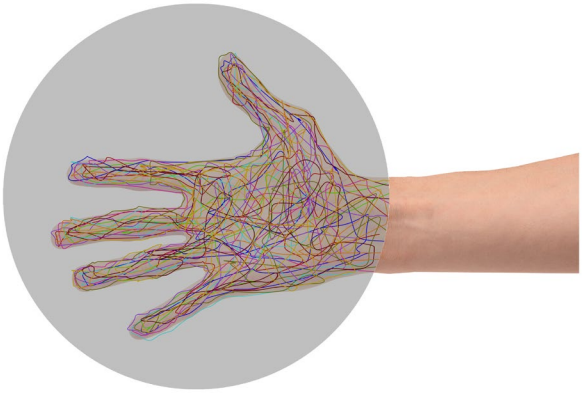
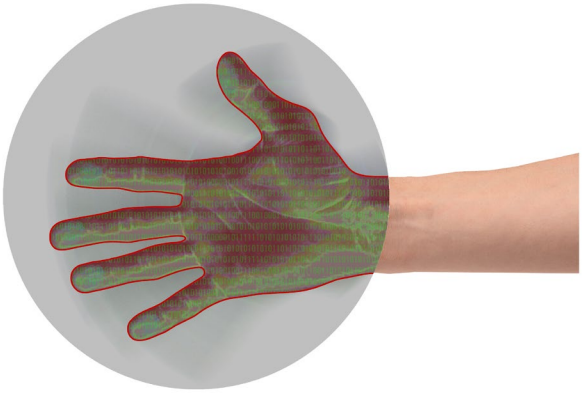


Image 78: Facade Component - Actuation Possibilities.



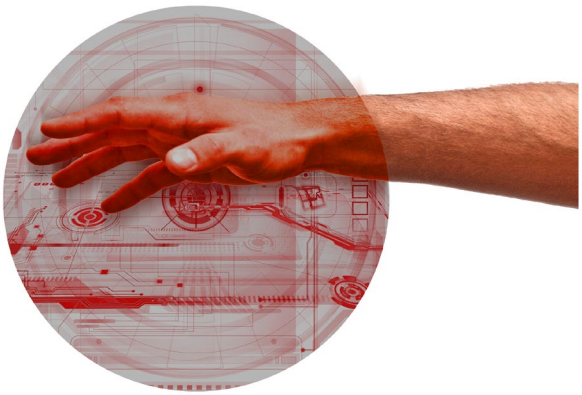
Identifying Digital Extensions



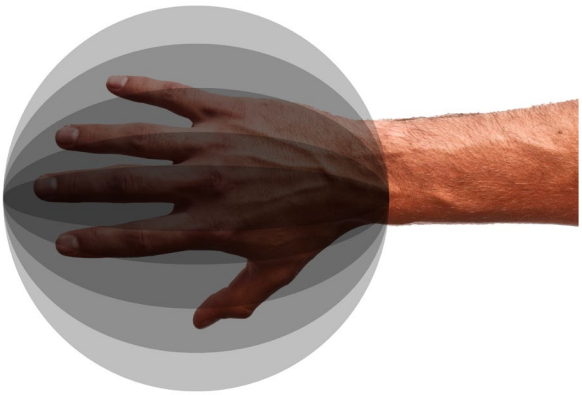
Projecting the Digital Human

Virtual Manipulation

Augmented Reality

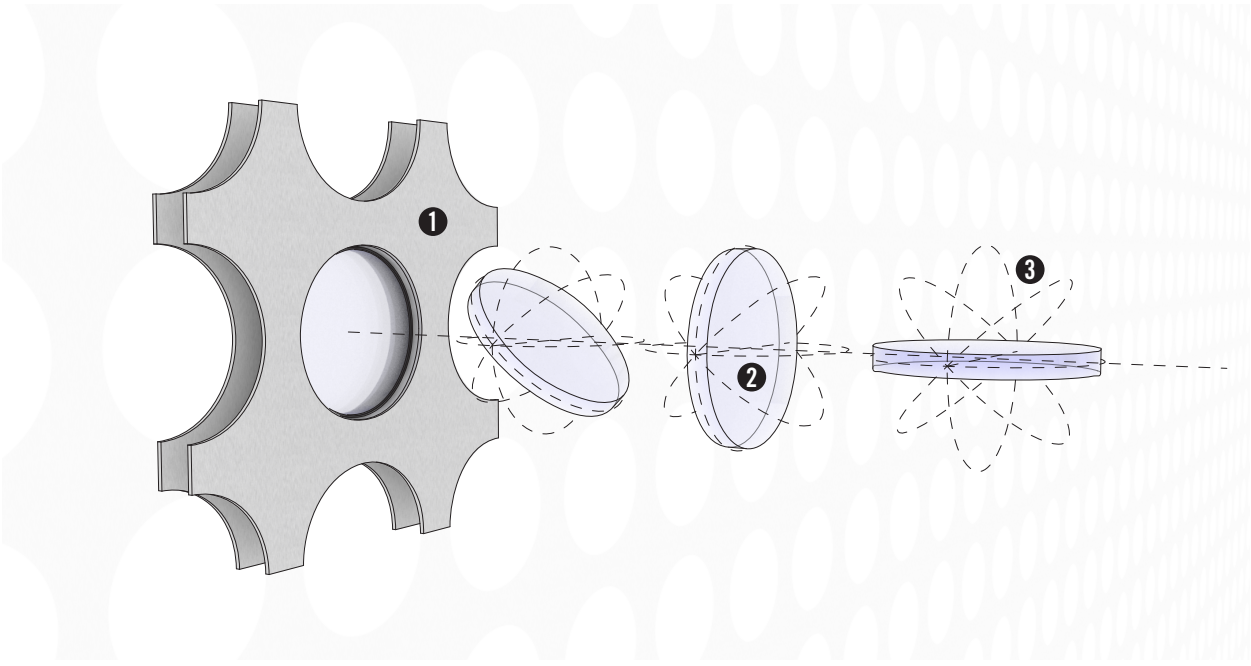


Virtual Interfaces



Physical Actuation

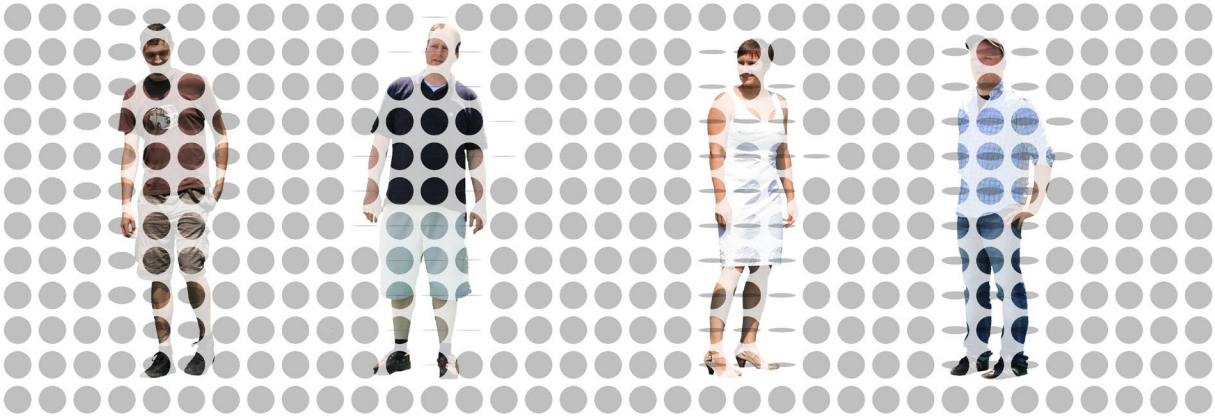
Image 79: Component Detail.



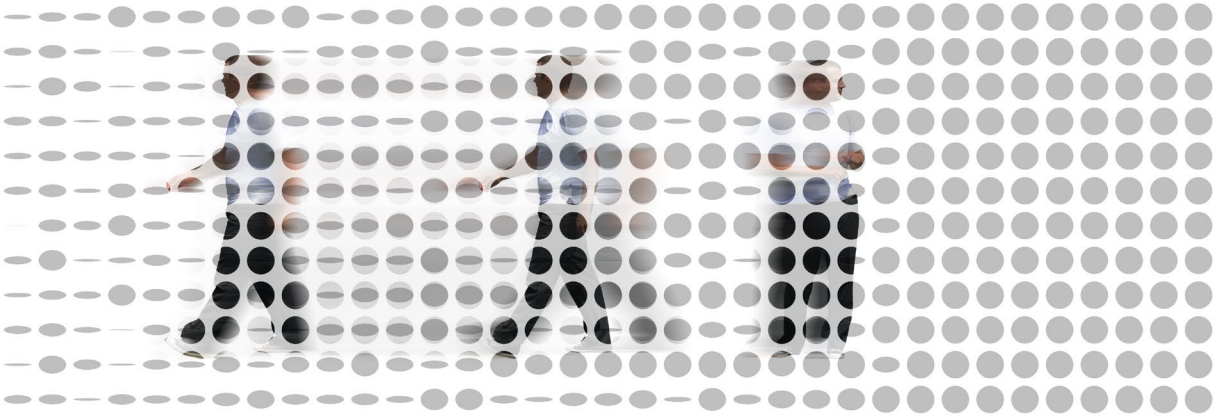
1. *Aluminum Sandwich Panel*
2. *Electrochromic Glazing Panel*
3. *360 Degrees Rotation Axis*

Image 80: Facade Projections, Personal Scale, Physical.

Revealing Physical Humans

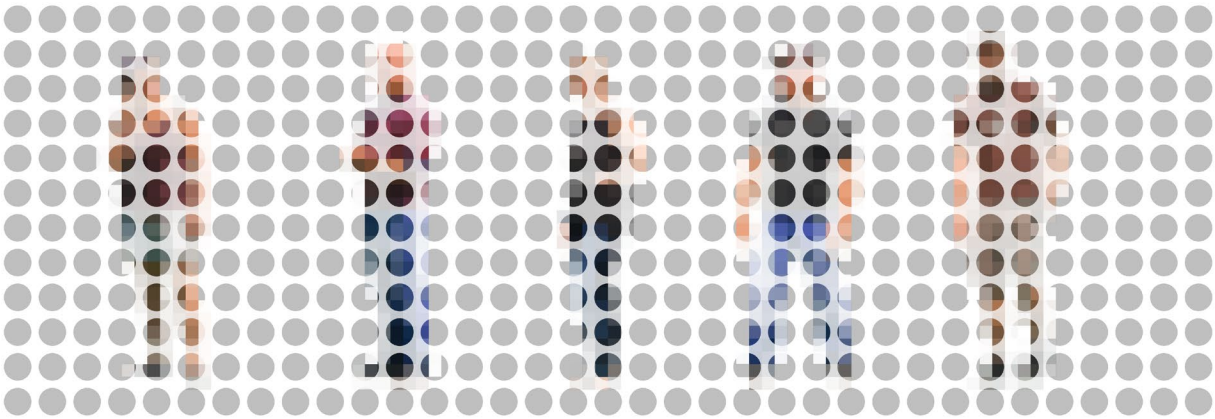


Identifying Visibility Preferences

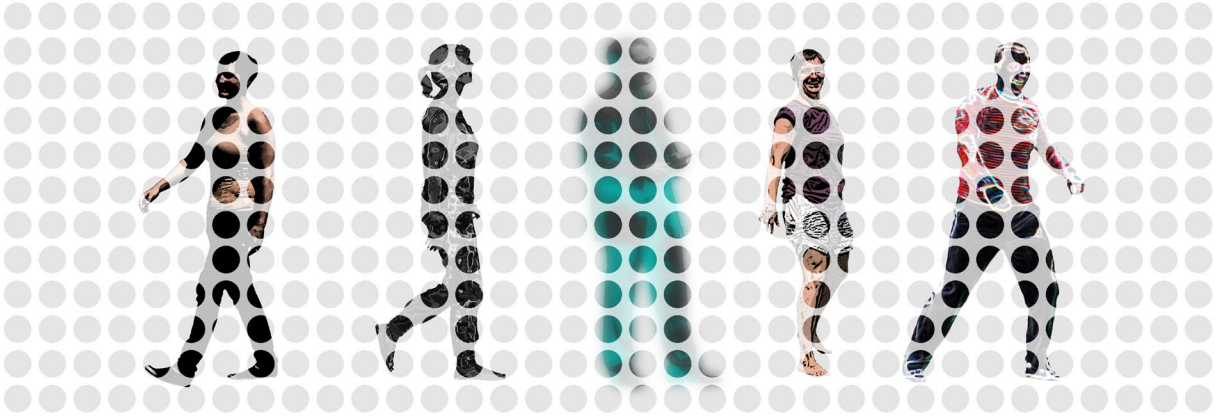


Tracking Movement

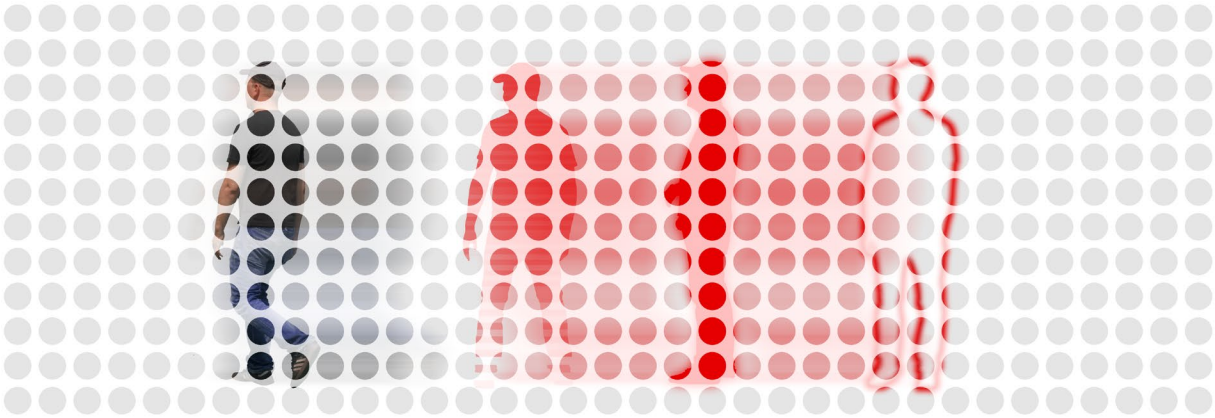
Image 81: Facade Projections, Personal Scale, Digital.



Capturing Presence



Visualizing the Extensions of Digital Humans



Leaving an Imprint

Image 82: Facade Projections, Intermediate Scale, Physical.

Image 83: Facade Projections, Intermediate Scale, Digital.

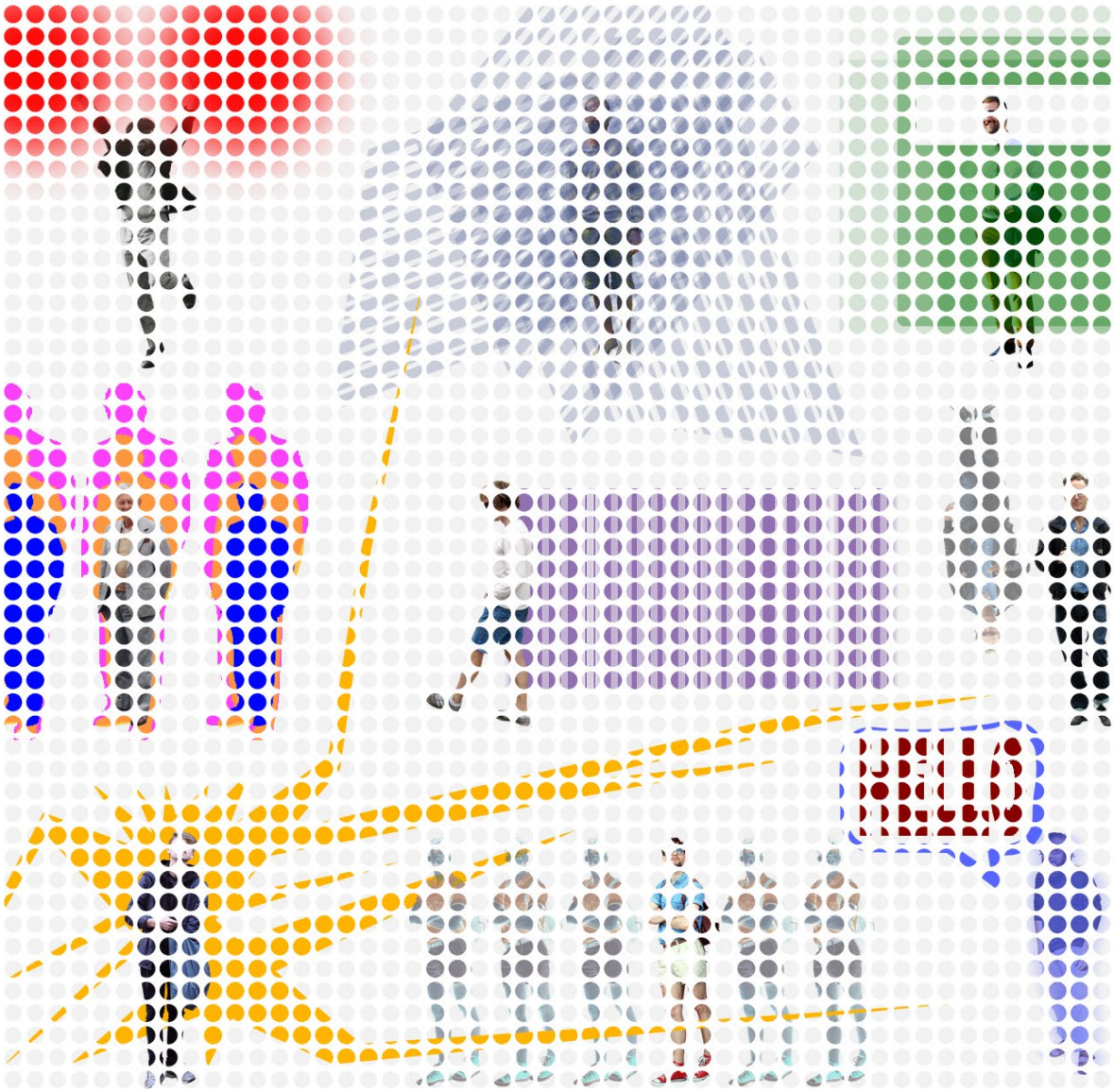


Image 84: Facade Projections, Full Scale, Physical.

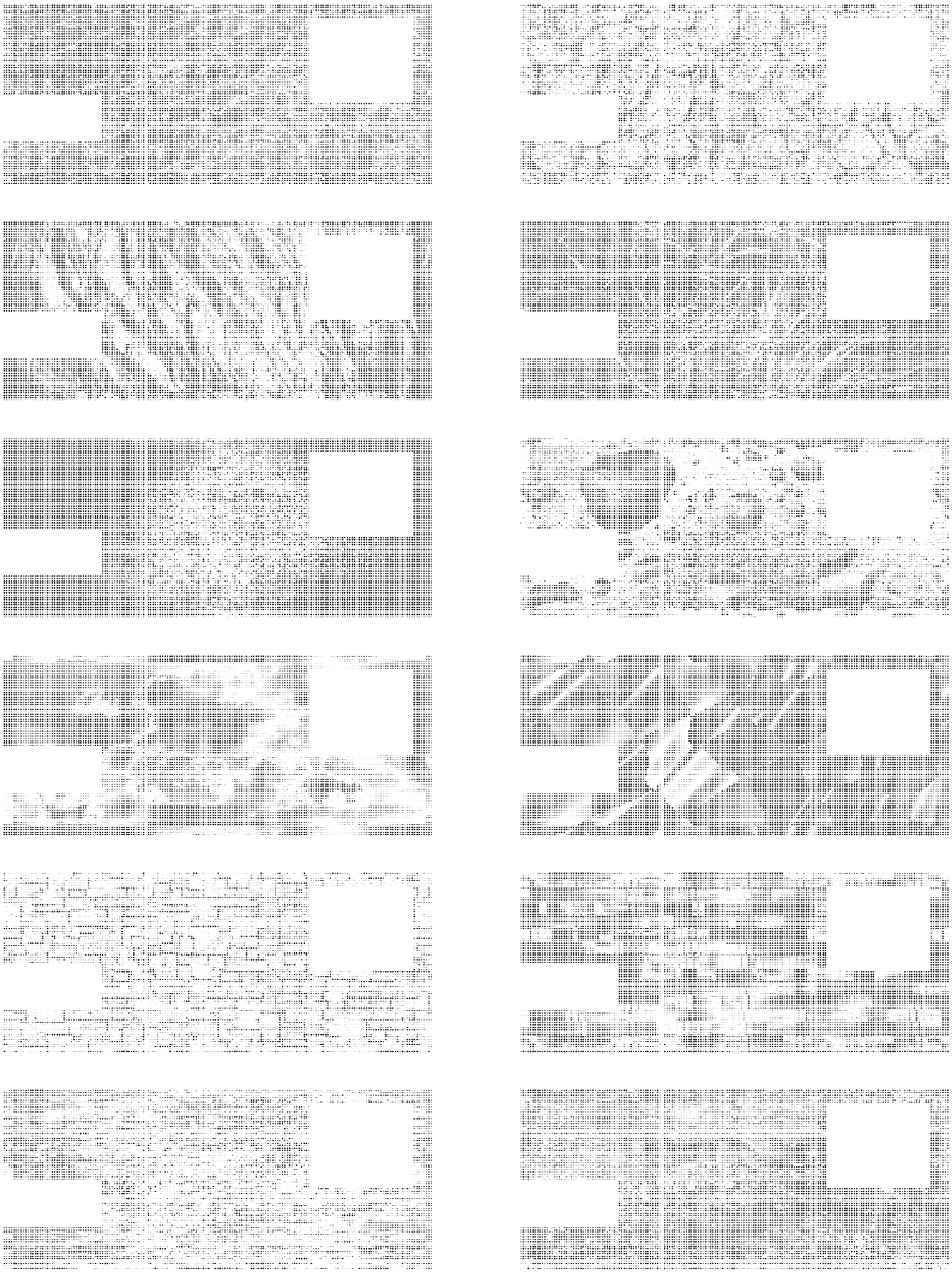


Image 85: Facade Projections, Full Scale, Physical.

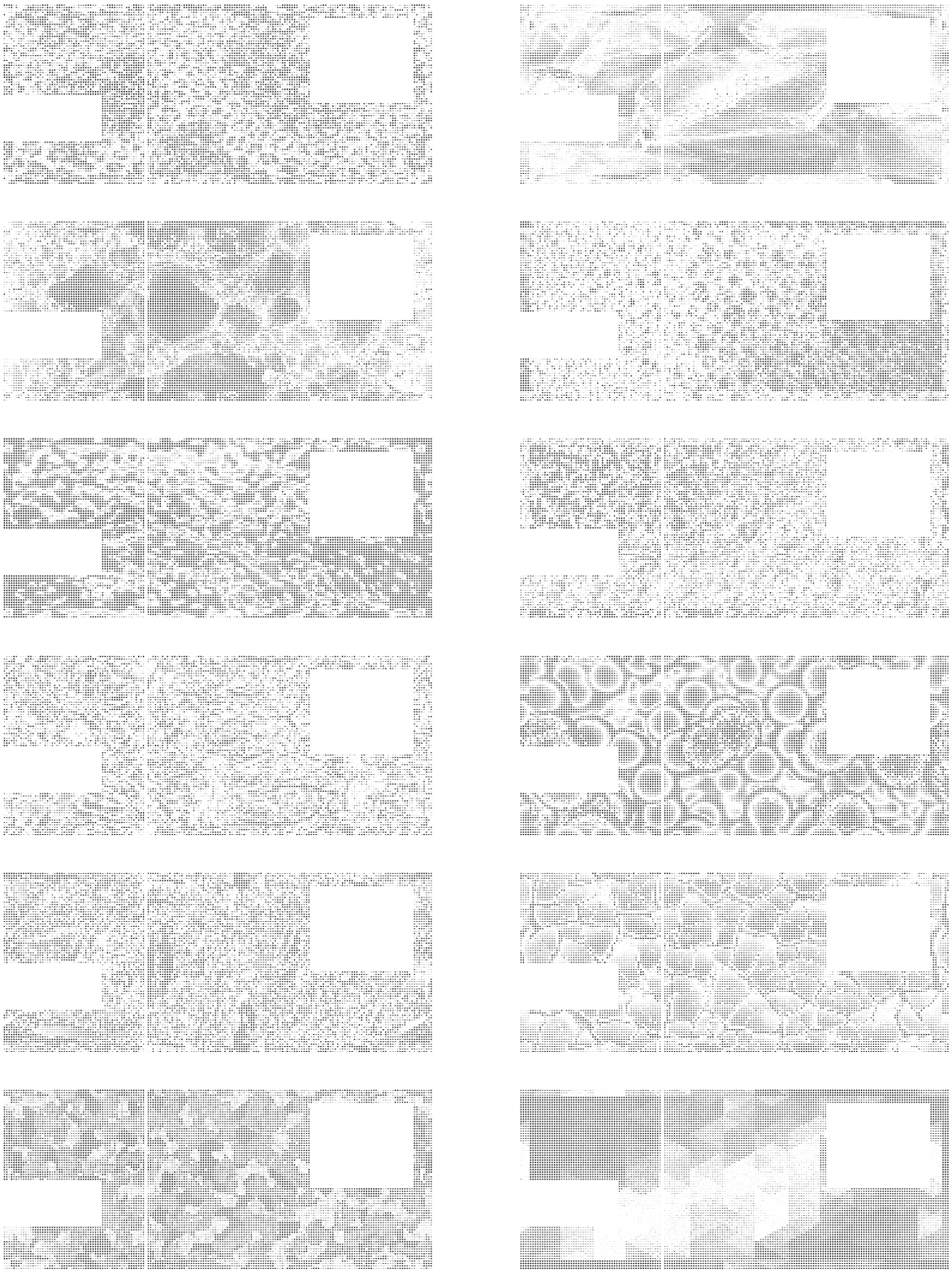


Image 86: Facade Projections, Full Scale, Physical.

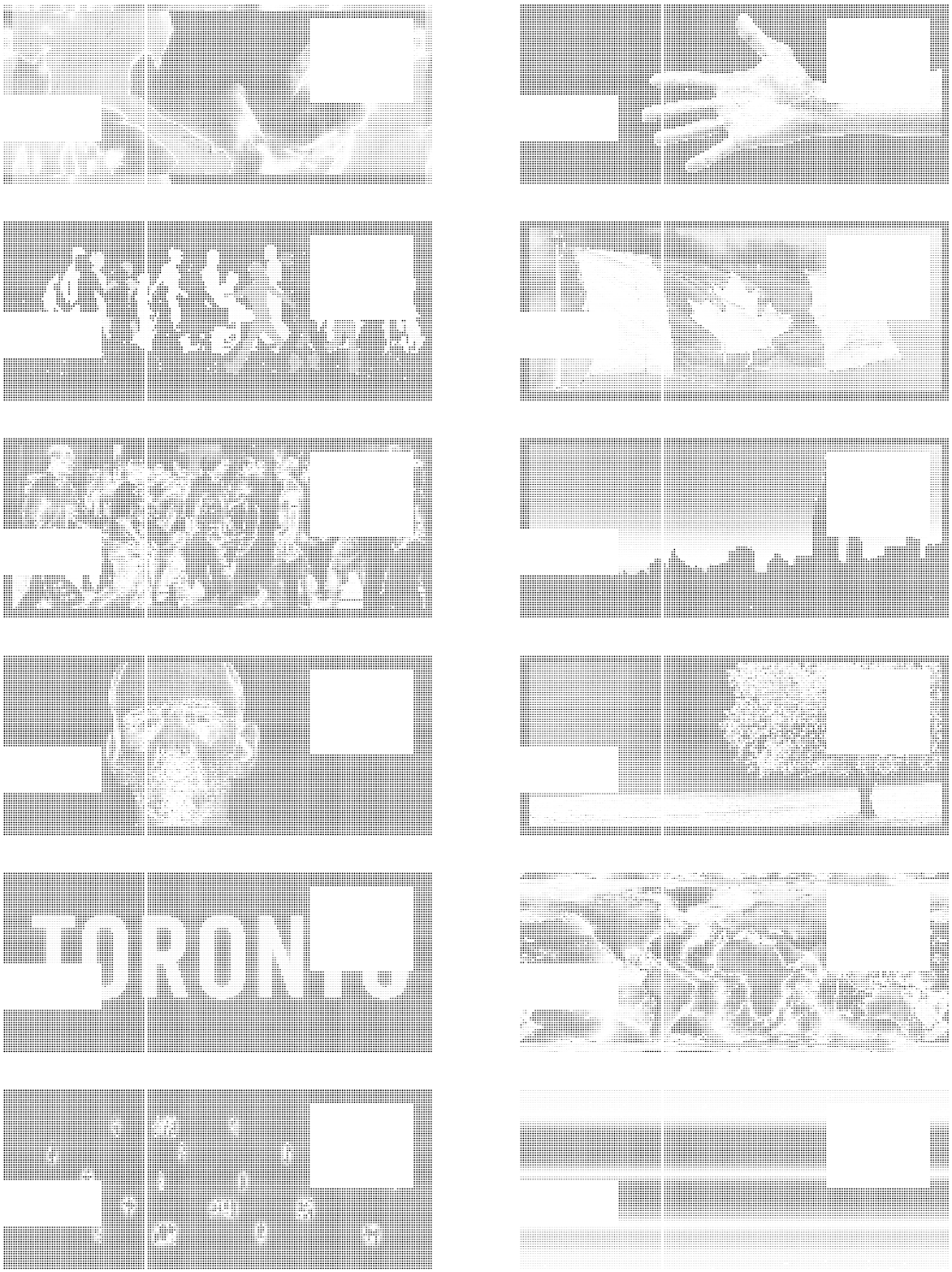


Image 87: Facade Projections, Full Scale, Physical.

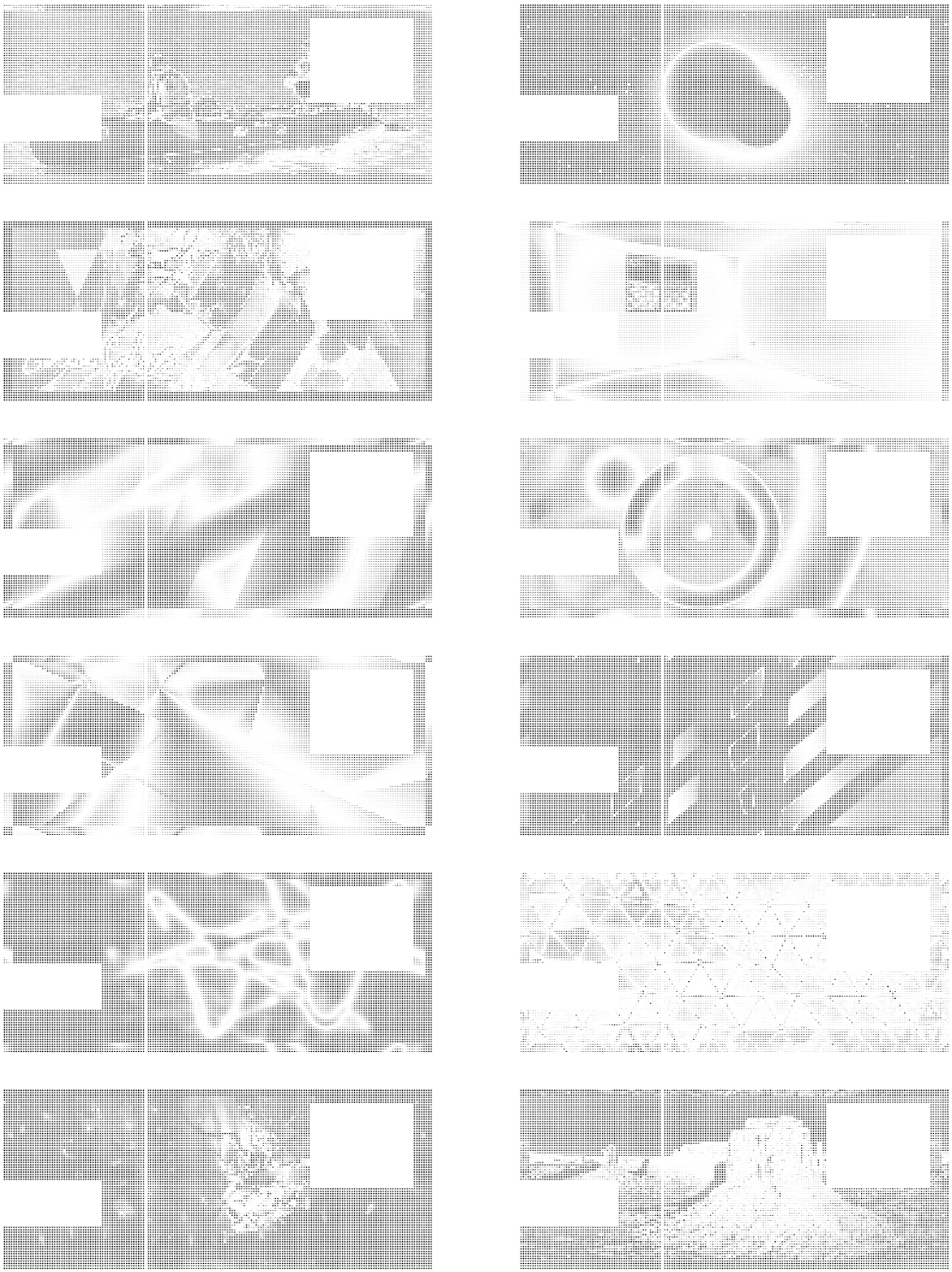


Image 88: Facade Projections, Full Scale, Digital.

Image 89: Facade Projections, Full Scale, Digital.

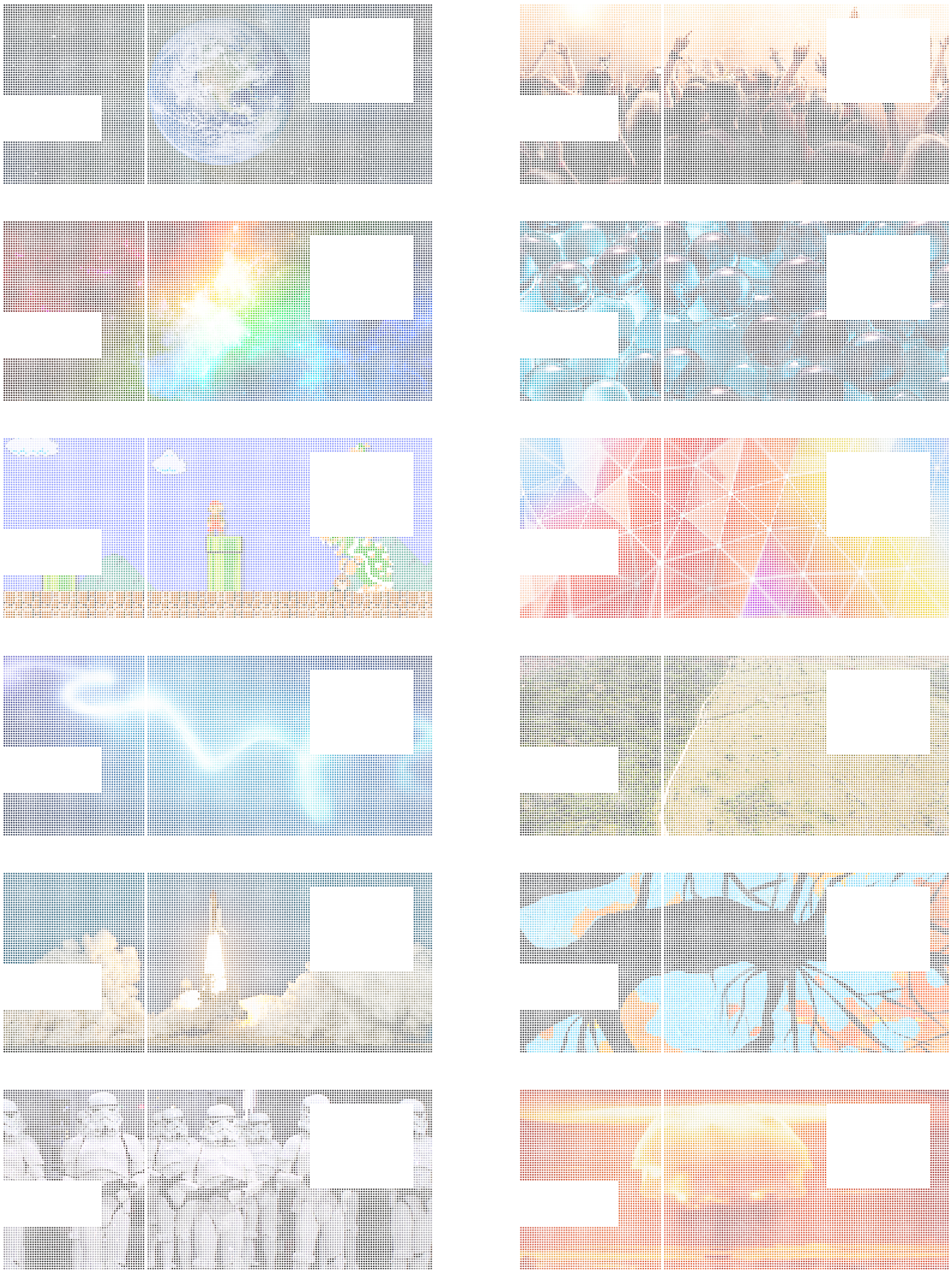


Image 90: Visualization, Exterior View - Aerial

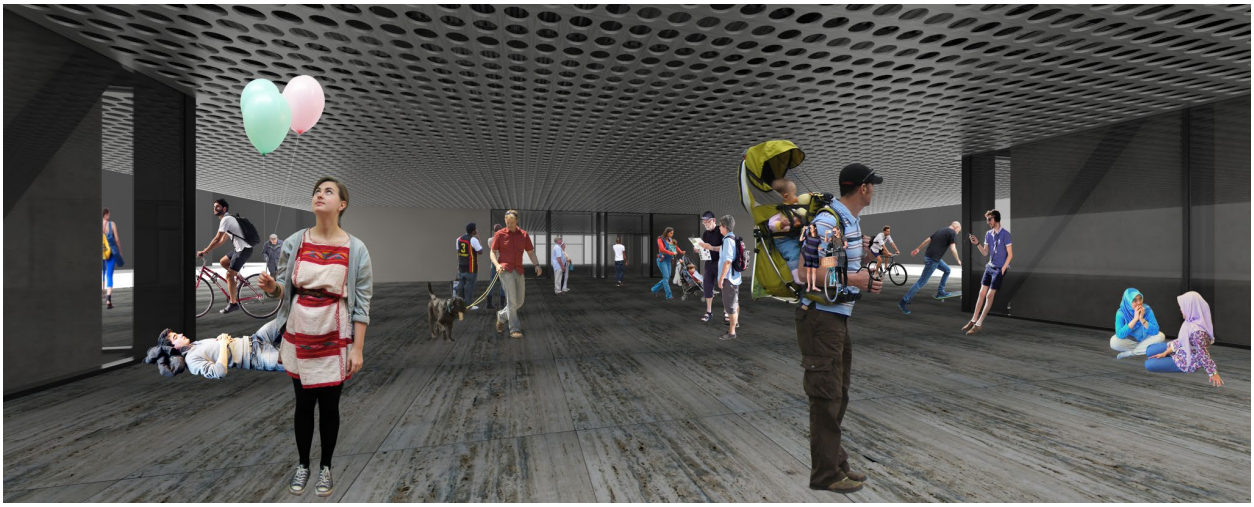


Image 91: Visualization, Ground Floor - Plaza.

Image 92: Visualization, Second Floor - Open.

Image 93: Visualization, Third Floor - Open.

Image 94: Visualization, Fourth Floor - Circulation.

Image 95: Visualization, Fourth Floor - Theatre.

Image 96: Visualization, Fourth Floor - Open.

Image 97: Visualization, Fifth Floor - Gallery.

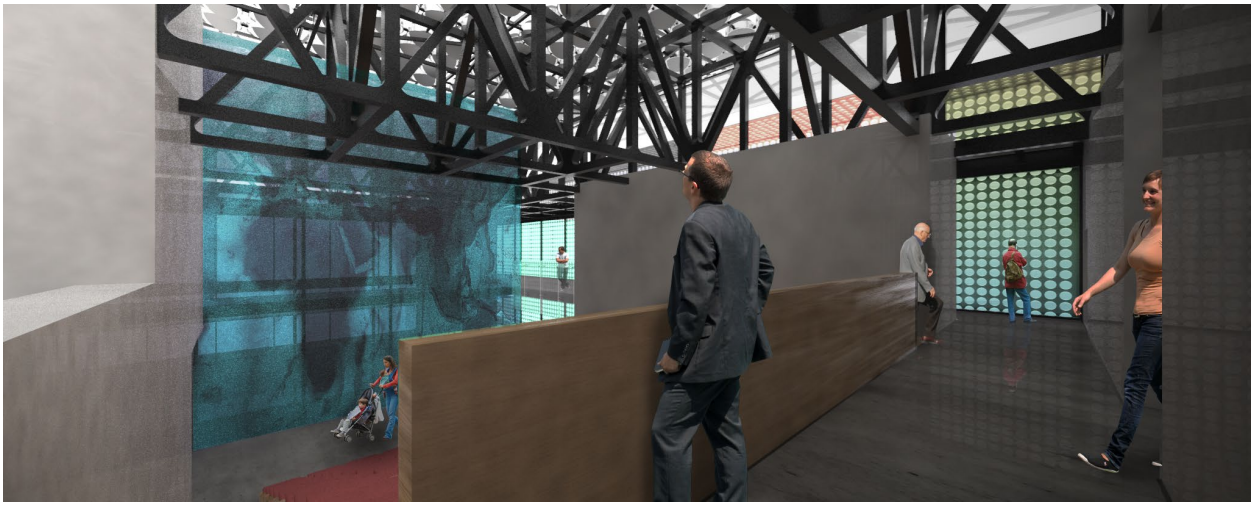


Image 98: Visualization, Fifth Floor - Theatre/Circulation.

Image 99: Visualization, Fifth Floor - Circulation.

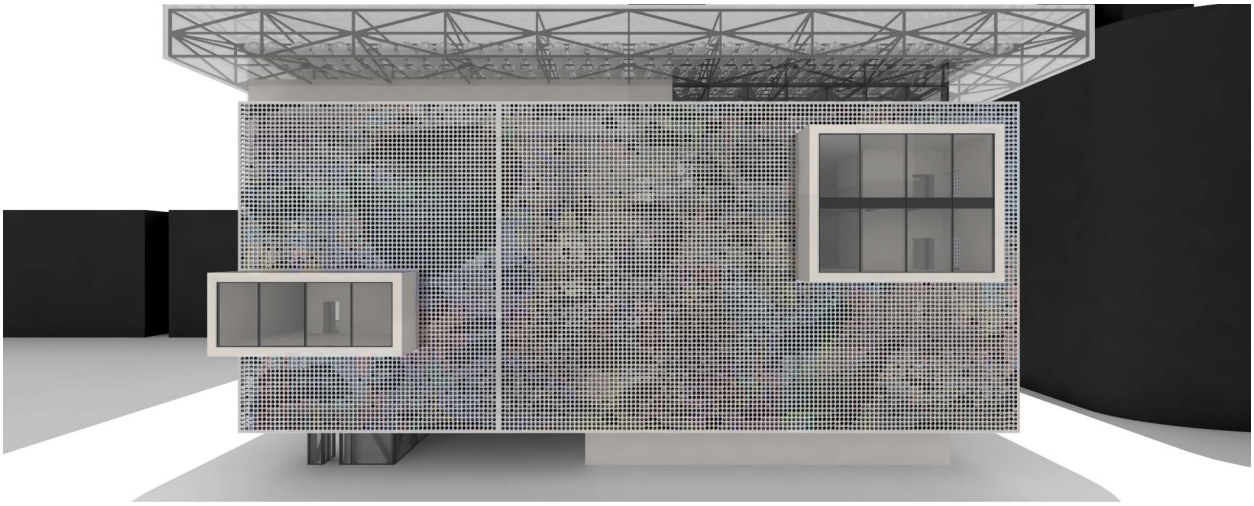


Image 100: Visualization, Exterior View - Looking South

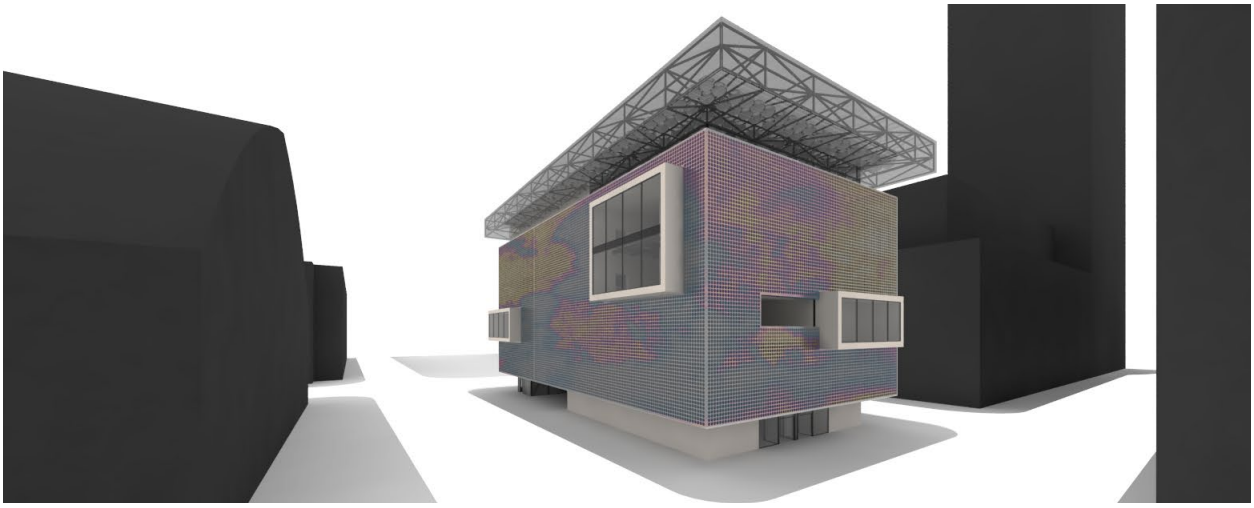


Image 101: Visualization, Exterior View - Looking Southeast.

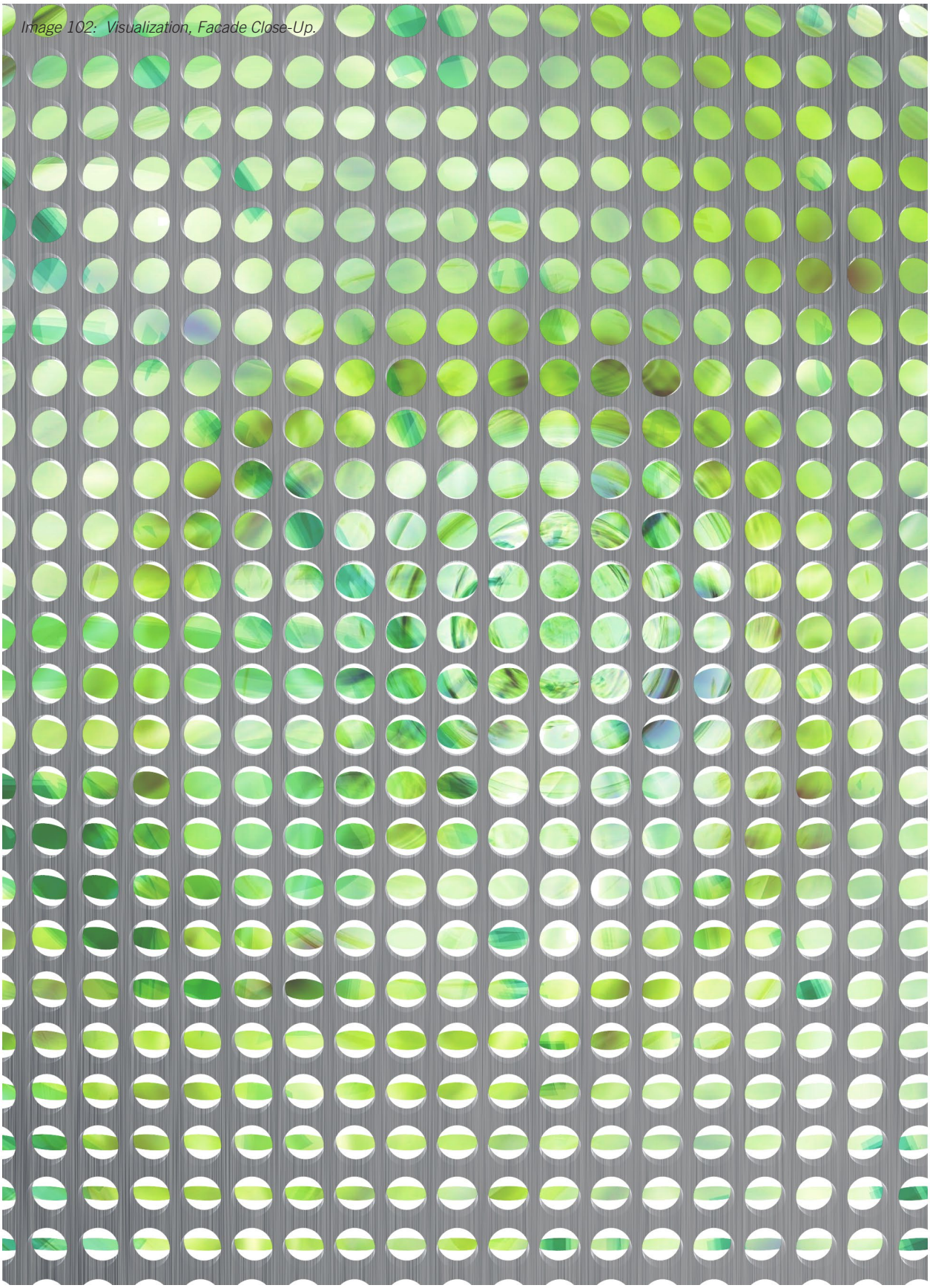


Image 102: Visualization, Facade Close-Up.

6.0 // CONCLUDING STATEMENTS

In the 21st Century we have entered into the post-digital era. Society is inundated by electronic devices that have enabled us to enter into a range of virtual realms that are not facilitated by the built environment. This has left us entranced with our devices and the experiences that they allow us to undergo. As a result, our reliance on hardware and software systems have established clear disconnect with the physical spaces which we typically utilize. Instead of exploring the built environment and all it has to offer, we are instead situating ourselves in virtual space where we can extend into multiple digital spaces. The virtual realm offers multiple experiences that are simply not available in the built environment and in some cases are becoming more desirable then those that are offered in physical spaces. What this means for architecture is a fundamental shift in how we are perceiving space – it is not fully articulating or encapsulating the processes that are occurring in our day-to-day lives. This means that society is shifting from undergoing physical experiences into ones that are mainly expressed via virtual means. This poses opportunity for architecture to hone in on these experiences and present them to society through new

forms of engagement which establish environments that involve the experiences found in both physical and virtual realms.

By treating architecture as a platform for revealing both physical and virtual experiences, we can assume that new or different methods of designing and utilizing architecture will arise. This considers that opportunities (social, political, economic, etc.) arising out of the virtual realm poses the possibility to engage with the physical world in forms that can spark new architectural experiences. By identifying these elements and utilizing them within the framework of design it is possible to understand a world in which the dialogue between physical and virtual realms exists. This suggests that architecture can become a means for exploring the integration of experiences found in all realms of space.

Within contemporary society there are new ways in which we see ourselves. In the exploration of the "humans" we are able to draw distinctions between how we function in each respective realm. The physical human is one that is not new and has been a benchmark for the cultivation of architecture throughout history. The digital human on the other hand is a completely new way of seeing people. It is a series of digital extensions within the "invisible infrastructure" – a fundamental construct of society now relevant in the post-digital age. These new modes of engagement have provided an even more in-depth consideration as to how we function in society today as well as how we might be able to identify ourselves within the evolving world. In today's technological society, we must design for all three "humans". The result is the conception of a platform for the augmented human to arise spawning off of the experiences that both physical and digital humans are experiencing.

In Mainframe Architecture, the use of sensing and actuating systems are able to understand these "humans" and provide information for the actuation of building systems. As a result, buildings must instigate variable systems responsive to the changing conditions required by users within a building. Responsiveness or intelligence in building systems reveals how these relationships are made possible and by designing for these instances architecture may now find itself as a defining feature in negotiating between physical and virtual realms. The proposed Media Museum derives from these circumstances and propels new experiences through the use of both physical and digital media. The building senses environmental and "human" information to allow for the projection of experience through architecture. In doing so, architecture becomes a byproduct of the physical experiences made available in the Media Museum and the digital affects that incur. The result is architecture that captures experience in each realm of space through the actuation of a technological facade to produce visual/kinetic images of the "humans" within. This suggests that as activity is occurring within the building, physical and digital humans may find a place in architecture that reveal the relationships between each other, thus revealing

the augmented human as a regular participant within the built environment.

This thesis explores the many ways in which technology has affected our society and in particular architecture as a discipline. Where Mainframe Architecture succeeds in allowing for the interpretation of the physical and digital humans and providing a place for the augmented human to occupy a building, it is only suggestive of one particular solution. The Media Museum however is able to manifest the pervasiveness of technology through architecture to allow for multiple conditions to present themselves. In all cases, the ability for one to enter into a dialogue within both physical and digital realms allows for social conditions that are just now developing in architecture. Mainframe Architecture allows for these instances by providing a means for the individual and collective to project themselves, their extensions, and experiences through architecture. By deciphering and designing for the "humans", they may now present themselves in a social context where technology meets architecture and the digital meets the physical.

7.0 // BIBLIOGRAPHY

Addington, M. & Schodek, D. (2005). Smart Materials and New Technologies. Oxford, U.K. Elsevier Architectural Press

Beigl, M., Flachbart, G., & Weibel, P. (2005). Disappearing architecture from real to virtual to quantum. Basel: Birkhäuser.

Bell, M. (2009). Engineered transparency the technical, visual, and spatial effects of glass. New York: Princeton Architectural Press.

Benjamin, W. (1968). Illuminations ([1st ed.). New York: Harcourt, Brace & World.

Boyer, M. C. (1994). The City of Collective Memory. Cambridge: MIT Press.

Braham, W. W., Hale, J. A., & Sadar, J. S. (2007). Rethinking technology a reader in architectural theory. London: Routledge.

Carpo, M. (2013). The digital turn in architecture 1992-2012. Chichester: Wiley.

Castells, M. (2012). Networks of Outrage and Hope: Social Movements in the Internet Age. Cambridge, UK: Polity.

Castells, M. (1996). The rise of the network society. Malden, Mass.: Blackwell Publishers.

Clarke, J. (2012). Iannis Xenakis and the Philips Pavilion. The Journal of Architecture, 17(2), 213-229.

Cook, P. (1973). Archigram. New York: Praeger Publishers.

Deleuze, G., & Guattari, F. (1987). A thousand plateaus: capitalism and schizophrenia. Minneapolis: University of Minnesota Press.

Dunne, A. (2005). Hertzian tales: Electronic products, aesthetic experience, and critical design. Cambridge, MA: MIT Press.

el-Khoury, R., Marcopoulos, C. & Moukheiber C. (2012). The Living, Breathing, Thinking, Responsive Buildings of the Future. London, England. Thames & Hudson.

Flachbart, G., & Weibel, P. (2005). Disappearing architecture: From real to virtual to quantum. Basel: Birkhäuser.

Fox , M. & Kemp, M. (2009). Interactive Architecture. New York, New York. Princeton Architectural Press.

Galloway, A. R. (2004). Protocol how control exists after decentralization. Cambridge, Mass.: MIT Press.

Gramazio, F., & Kohler, M. (n.d.). Digital Materiality in Architecture. Retrieved from http://architecture.mit.edu/pdfs/lecturereadings/030713-Kohler-Reading-3.pdf

Gregotti, V., & Cochrane, L. G. (2010). Architecture, means and ends. Chicago: University of Chicago Press.

Harman, G. (2009). Prince of networks: Bruno Latour and metaphysics. Prahran, Vic.: Re.press.

Harman, G. (2002). Tool-being: Heidegger and the metaphyics of objects. Chicago: Open Court.

Haque, U. (2007). The Architectural Relevance of Gordon Pask. Architectural Design, 77(4), 54-61.

Hikikomori Definitions. (n.d.). Retrieved from https://www.wordnik.com/words/hikikomori

IBM Knowledge Center. (n.d.). Retrieved from http://www-01.ibm.com/support/knowledgecenter/

Ihde, D. (1979). Technics and Praxis. Dordrecht, Holland: D. Reidel Pub.

Ito, T. (1991). Architecture in a simulated city. Kenchiku bunka, 46(542), 23-35.

Kim, R. (2006). The “art of building” (BAUKUNST) of Mies van der Rohe (Unpublished doctoral dissertation). Georgia Institute of Technology.

Koolhaas, R. (1994). Delirious New York: A retroactive manifesto for Manhattan. New York: Monacelli Press.

Latour, B. (2005). Reassembling the social an introduction to actor-network-theory. Oxford: Oxford University Press.

Leach, N. (2002). Designing for a digital world. Chichester: Wiley-Academic.

Lilley, B., & Beesley, P. (2007). Expanding bodies: art, cities, environment : proceedings of the ACADIA 2007 Conference, Halifax, Nova Scotia, October 1-7, 2007. Cambridge, Ont.?: Riverside Architectural Press ;.

Maeda, J. (2004). Creative Code. New York, N.Y.: Thames & Hudson.

Marble, S. (2013). Digital Workflows in Architecture Design - Assembly - Industry. Basel: De Gruyter.

Mathews, J. S. (2007). From agit-prop to free space: The architecture of Cedric Price. London: Black Dog Pub.

McCullough, M. (2013). Ambient commons attention in the age of embodied information. Cambridge, Massachusetts: The MIT Press.

McCullough, M. (2004). Digital Ground: Architecture, Pervasive Computing, and Environmental Knowing. Cambridge, Massachusetts. The MIT Press.

McLuhan, M. (1964). Understanding media: the extensions of man. (1st ed.). Toronto: McGraw-Hill.

McLuhan, M., & McLuhan, E. (2011). Media and formal cause. Houston, Tex.: NeoPoiesis Press.

McQuire, S. (2008). The media city: media, architecture and urban space. London: UK: Sage.

Mitcham, C. (1994). Thinking through technology: The path between engineering and philosophy. Chicago: University of Chicago Press.

Mitchell, W.J. (2004). Me++: The Cyborg Self and the Networked City. Cambridge, Massachusetts. The MIT Press.

Mumford, L. (1934). Technics and civilization. New York [N.Y.: Harcourt, Brace and Co.

Munster, A. (2006). Materializing New Media: Embodiment in Information Aesthetics. Dartmouth: Dartmouth College Press.

Negroponte, N. (1995). Being digital. New York: Alfred A. Knopf Inc.

Negroponte, N. (1975). Soft Architecture Machines. Cambridge, Massachusetts. The MIT Press.

Oosterhuis, K., & Hubers, H. (2003). Gamesetandmatch: Proceedings of the GSM conference, 13 December, 2001, gamesetandmatch, real-time interactive architecture. Delft: Publikatiebureau Bouwkunde.

Oosterhuis, K. (2011). Towards a new kind of building: tag, make, move, evolve. Rotterdam: NAi.

Pask, G. (1969). The architectural relevance of cybernetics. In Architectural Design, Sept 1969: 494-496.

Rheingol, H. (2002). Smart Mobs: The Next Social Revolution. New York: Basic Books.

Robertson, M. (2011). The architecture of information: architecture, interaction design and the patterning of digital information. Abingdon, Oxon: Routledge.

Rogers, P., & Smyth, M. (2010). Digital blur: creative practice at the boundaries of architecture, design and art. Faringdon: Libri Pub..

Rossi, A., & Eisenman, P. (1982). The Architecture of the City. Cambridge, Mass.: MIT Press.

Sadler, S. (2005). Archigram architecture without architecture. Cambridge, Mass.: MIT Press.

Schulze, F., & Windhorst, E. (2012). Mies van der Rohe: A critical biography. Chicago, IL: University of Chicago Press.

Shepard, M. (2011). Sentient city: ubiquitous computing, architecture, and the future of urban space. New York City: Architectural League of New York.

Stiegler, B. (1998). Technics and time (Vol. 1). Stanford, Calif.: Stanford University Press.

Stiegler, B., & Barker, S. (2009). Technics and time (Vol. 2). Stanford, Calif.: Stanford University Press.

Stiegler, B. (2011). Technics and time (Vol. 3). Stanford, Calif.: Stanford Univ. Press.

Teixeira, T., Dublon, G., & Savvides, A. (2010). A Survey of Human-Sensing: Methods for Detecting Presence, Count, Location, Track, and Identity. ACM Computing Surveys, V(N), 1-35.

Till, J. (2009). Architecture depends. Cambridge, Mass.: MIT Press.

Tschumi, B. (1994). Architecture and disjunction. Cambridge, Mass.: MIT Press.

Vidler, A. (1992). The architectural uncanny: essays in the modern unhomely. Cambridge, Mass.: MIT Press.

Waal, M. (2014). The city as interface: how new media are changing the city. Amsterdam: NAI Utigevers/Publishers Stitching.

Wilkinson, C. (1991). Supersheds: The architecture of long-span, large-volume buildings. Oxford: Butterworth Architecture.