

## ABSTRACT

Title of Thesis:

BUILDING WELLNESS: REIMAGINING  
SPACE AND SHAPING URBAN  
LIFESTYLE

Brandon Bridge, Master of Architecture, 2018

Thesis Directed By:

Professor of the Practice, Peter Noonan, AIA,  
LEED AP, School of Architecture Planning and  
Preservation

What does it mean to live well? Philosophers and theorists have described the “good life” for thousands of years as the pursuit of happiness and success - living well. Today, Americans spend over 90% of their time indoors and in traffic. Whether an individual is indoors or outdoors, their bodies are continuously reacting to the cues of the surrounding environments. Indoor air quality, exposure to natural daylight, and proximity to views are just some of the triggers that influence a building occupant’s mood and wellness. With time being limited during the week, it’s often hard to maintain positive states of mental, physical, and occupational wellness on a daily basis. Through the exploration of space and connection to building occupant well-being, the goal is to redefine the daily lifestyles of Washington D.C. residents and employees through mixed-use development.

**BUILDING WELLNESS: REIMAGINING SPACE AND SHAPING URBAN  
LIFESTYLE**

by

Brandon Bridge

Thesis submitted to the Faculty of the Graduate School of the  
University of Maryland, College Park, in partial fulfillment  
of the requirements for the degree of  
Master of Architecture  
2018

**Advisory Committee:**

Professor of Practice, Peter Noonan, AIA, LEED AP, Chair  
Professor Emeritus, Karl Du Puy, AIA, Committee Member  
Associate Professor, Hooman Koliji, Committee Member

© Copyright by  
Brandon Bridge  
2018

# Table of Contents

Table of Contents .....	i
List of Figures .....	iii
Introduction .....	1
Overview .....	1
Wellness of Yesterday and Today .....	2
The Origins of Living Well.....	2
Living Well Psychology: Diverse Yet Integrated .....	5
Living Well Psychology: Descriptive and Prescriptive .....	5
Living Well Psychology: In Search for Wholeness .....	6
Understanding the Good Life.....	7
Analyzing the Good Life .....	8
Wellness Inside .....	9
Wellness Outside .....	10
The Dimensions of Wellness .....	11
Wellness Metrics.....	15
Time and Wellness.....	15
Priority and Wellness .....	15
Daily Time Use Surveys .....	17
Daily Activity Totals for Full-Time Employees .....	17
Daily Activity Totals by Age .....	18
Daily Children Care Activity Totals by Child Age .....	19
Daily Leisure Activity Totals - Men .....	20
Daily Leisure Activity Totals - Women.....	21
Daily Work at Home Totals for Employees .....	22
Analysis and Takeaways .....	23
Chart 1: Full-Time Employee Daily Activities.....	23
Chart 2: Daily Activities by Age .....	23
Chart 3: Parent Childcare by Child Age .....	23
Chart 4 and 5: Leisure Activities - Men and Women .....	24
Chart 6: Employee Work Activities at Home .....	24
The Connection Between Wellness and Space .....	25
Classifying the Space Types .....	25
Designing Wellness .....	30
Space Stressors.....	32
Environmental Impacts on Building Occupants .....	34
Sustainable Design with Wellness in Mind .....	34
Integrating Daylighting into Design .....	35
The Circadian Rhythm .....	36
Well-Being Performance Standards for Buildings .....	41
Introduction.....	41
Living Building Challenge.....	41
Health & Happiness Petal Intent.....	43

WELL Building Standard .....	45
Wellness and Body Systems .....	46
Site Analysis and Precedent Research .....	54
Initial Site Selection .....	54
Buzzard Point, Washington, D.C. ....	54
Logan Circle, Washington, D.C. ....	54
NoMa, Washington, D.C. ....	55
Site Description.....	56
Context.....	56
Zoning.....	57
Site Dimensions .....	59
Topography .....	59
Solar .....	60
Noise .....	60
Contextual Façade Study along Union Station Tracks .....	61
Precedent Study .....	62
Danish Architecture Center (BLOX), Copenhagen, Denmark .....	62
1250 Half St SE, Washington, D.C. ....	62
City Market at 0, Washington, D.C. ....	63
Program Investigations .....	64
Mixed-Use High-Rise .....	64
Living Spaces.....	64
Work Spaces .....	64
Wellness Spaces.....	65
Miscellaneous Spaces .....	65
Program Blocking .....	66
Graphic Representation.....	66
Scenario 1.....	67
Scenario 2.....	68
Scenario 3.....	69
Design .....	70
Parti.....	70
Design Solution.....	72
Sequence .....	79
Conclusion .....	87
Bibliography .....	91

## List of Figures

Figure 1: Wellness Timeline (source: author) .....	3
Figure 2: Daily Activities - Employment (source: Bureau of Labor Statistics) .....	17
Figure 3: Daily Activities - Age (source: Bureau of Labor Statistics) .....	18
Figure 4: Parent Activities - Age (source: Bureau of Labor Statistics) .....	19
Figure 5: Leisure Activities - Men (source: Bureau of Labor Statistics).....	20
Figure 6: Leisure Activities - Women (source: Bureau of Labor Statistics) .....	21
Figure 7: Work at Home - Employees (source: Bureau of Labor Statistics) .....	22
Figure 8: Live / Work / Wellness Blend (source: author).....	30
Figure 9: Circadian Rhythm Clock (source: author).....	37
Figure 10: Circadian Rhythm Solar Timeline (source: Kim Aerts).....	39
Figure 11: Living Building Challenge (source: International Living Future Institute) .....	43
Figure 12: Health and Happiness (source: International Living Future Institute) .....	44
Figure 13: WELL Building Standard (source: International WELL Building Institute) .....	46
Figure 14: James Creek Marina Lot (source: Google Earth) .....	54
Figure 15: Lot Parking to the North (source: Google Earth) .....	54
Figure 16: R St NW Lot (source: Google Earth) .....	54
Figure 17: Lot along Vermont Ave NW (source: Google Earth) .....	54
Figure 18: Street Views of Chosen Site (source: Google Earth with author) .....	55
Figure 19: NoMA Context along the West Edge of the Union Station Rail Line (source: author) .....	56
Figure 20: Zoning Map along Rail Line (source: author).....	57

Figure 21: Program Context (source: author) .....	58
Figure 22: Washington D.C. D-5 Zoning Standards (source: DC Office of Zoning).....	58
Figure 23: Site Dimensions (source: author) .....	59
Figure 24: Topography (source: author) .....	59
Figure 25: Solar (source: author) .....	60
Figure 26: Noise (source: author) .....	60
Figure 27: Figure 27: Zoning Map along Rail Line (source: author) .....	61
Figure 28: BLOX Exterior (source: author).....	62
Figure 29: BLOX Section (source: author).....	62
Figure 30: 1250 Half St (source: author) .....	62
Figure 31: 1250 Half St Roof Terraces (source: author) .....	62
Figure 32: City Market from the South (source: author) .....	63
Figure 33: City Market from the North (source: author) .....	63
Figure 34: Living Spaces (source: author) .....	64
Figure 35: Work Spaces (source: author) .....	64
Figure 36: Wellness Spaces (source: author) .....	65
Figure 37: Misc. Spaces (source: author) .....	65
Figure 38: Graphic Blocking (source: author) .....	66
Figure 39: Graphic Stacking 1 (source: author).....	67
Figure 40: Graphic Stacking 2 (source: author).....	68
Figure 41: Graphic Stacking 3 (source: author).....	69

Figure 42: Parti Sequence (source: author) .....	70
Figure 43: Site Plan NTS (source: author) .....	72
Figure 44: Ground Floor Plan NTS (source: author) .....	73
Figure 45: Third Floor Plan NTS (source: author) .....	74
Figure 46: Typical Floor Plan NTS (source: author) .....	75
Figure 47: Exploded Axon (source: author) .....	76
Figure 48: Roof Plan NTS (source: author) .....	77
Figure 49: Elevations NTS (source: author) .....	78
Figure 50: Sections NTS (source: author) .....	79
Figure 51: L Street Approach (source: author) .....	79
Figure 52: Wellness Courtyard (source: author) .....	80
Figure 53: Courtyard (source: author) .....	81
Figure 54: Residential Balcony (source: author) .....	82
Figure 55: Fitness Center (source: author) .....	83
Figure 56: Tennis Court (source: author) .....	84
Figure 57: Sky Track (source: author) .....	85
Figure 58: Union Station Approach (source: author) .....	86
Figure 59: Rock Climbing Wall (source: author) .....	87
Figure 60: Presentation Boards (source: author) .....	90

# Introduction

## Overview

Wellness is a process that's been debated for many centuries. Many early philosophers interpreted wellness as factors that determined individual's happiness in achieving a "good life" through knowledge and success. In the 21<sup>st</sup> century, wellness has made its way directly into the mainstream conversation of the greater population. Sometimes hidden beneath the surface, an individual's state of well-being is always being stimulated by its surrounding environment.

This thesis aims to challenge high-density residential development in urban contexts by blending mixed-program uses with various wellness spaces and strategies. By analyzing the different types of space, convenience and temptation can be integrated into sequences of space to encourage healthy decisions. In a dense metropolitan region, pedestrians have the luxury of public transit to get them from one amenity to another with ease. However, vehicular congestion becomes a nuisance that cannot be avoided.

This thesis reimagines habitable spaces that can house amenities that encourage healthier lifestyles through building form, sequence, and proximity. Even in the most congested urban settings, mixed-use development can help to suppress the limitation of time within anyone's daily lifestyle.

# Wellness of Yesterday and Today

## The Origins of Living Well

What does it mean to live well? How can people achieve and sustain the “good life” by living well? These questions about life have been challenged for thousands of years. Almost every philosophical and religious tradition throughout history has described the meaning and purpose of life, to some extent, in terms of the pursuit of happiness and success - living well. Confucius (551-479 BCE), for example, believed that the purpose of life was found within discipline, education, and strong relationships between individuals throughout the course of human existence. Plato (429-347 BCE) proposed that the meaning of life was provided by true knowledge of what is good. Aristotle (384-322 BCE) viewed happiness (Eudaimonia) as the ultimate goal of life, achieved by living in harmony with arête, or virtue, by attaining one's highest potential.<sup>1</sup>

---

<sup>1</sup> Nansook Park and Christopher Peterson. "Achieving and Sustaining a Good Life," *Perspectives on Psychological Science*, no. 4 (2009): 422.

## The History of Living Well

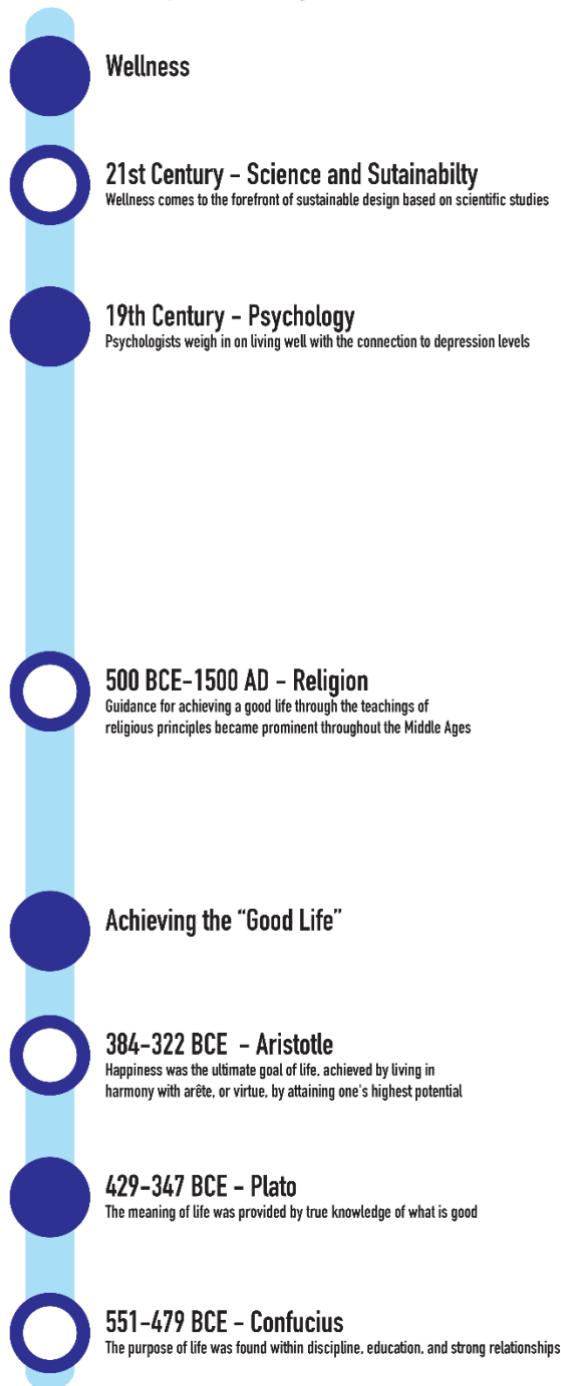


Figure 1: Wellness Timeline (source: author)

There have been many attempts to understand, improve, and sustain the quality of life for all members of society throughout time. Various religions provide guidance for achieving a good life through the teachings of religious principles. Despite the absence of a sound science of living well in the 21st century, psychologists continue to weigh in on these matters as well. According to the World Health Organization,<sup>2</sup> depression is the world's leading cause of disability. Even among those who are not clinically depressed, life satisfaction for many is not as high as it can be. Although many cities or regions release reports claiming that "most of their residents are happy," what this means is that a majority of the surveyors scored above the midpoint of life satisfaction levels, far dissimilar from an abundance of positive results that would otherwise scale the top of the charts.<sup>3</sup> Evidently, many individuals alike do not live particularly well, or as well as they potentially can.

Living well is not simply what one does not do; it critically involves what one does do. Social scientists have long focused on both preventing and solving problems.<sup>4</sup> Perhaps there needs to be more attention paid to living well, thriving, and moving beyond the mere absence of what is negative. Commonly referred to solely as "wellness" today, living well has been examined by psychologists for many centuries predating modern times. From a psychological perspective, one may ask, just how can one live well? And, if a good life is achieved, how can it be sustained?

---

<sup>2</sup> Nansook Park and Christopher Peterson. "Achieving and Sustaining a Good Life," *Perspectives on Psychological Science*, no. 4 (2009): 422.

<sup>3</sup> Ibid.

<sup>4</sup> Ibid.

## **Living Well Psychology: Diverse Yet Integrated**

Since its beginning, psychology has been variously defined in relation to the elements of consciousness through structuralism, functionalism, behaviorism, psychoanalysis, cognitive revolution, and so on. With psychology being pursued as a natural science, as well as a social science, it employs numerous qualitative and quantitative research methods. Psychology is currently expanding in two different but equally exciting directions - inward (joins forces with neuroscience) and outward (joins forces with anthropology and sociology).<sup>5</sup> When the field of psychology is defined within these terms, it can be categorized as both sprawling and diverse. This diversity of psychology means that it itself challenges to identify a single issue or question of interest to all or even most psychologists.

## **Living Well Psychology: Descriptive and Prescriptive**

In the 21<sup>st</sup> century, psychology is typically regarded as both descriptive and prescriptive. Psychology is descriptive in the sense that it uses scientific methods to describe the "what" and "why" of human conditions. Psychology is also prescriptive in the general sense that all sciences are infused by the beliefs and values of scientists.

Beyond that, psychologists choose certain topics that are most deserving of study - usually those that address pressing concerns about human conditions.<sup>6</sup>

The concept of living well is blatantly prescriptive, as studies of living well inevitably comprise of value-driven theories that may cause discomfort among some

---

<sup>5</sup> Nansook Park and Christopher Peterson. "Achieving and Sustaining a Good Life," *Perspectives on Psychological Science*, no. 4 (2009): 423.

<sup>6</sup> Ibid.

psychologists. If the ultimate goal is to promote the good life, one must go beyond some of the old ways of thinking about psychology. What makes psychology a science is not the topics that are studied, but rather the methods and procedures that are used. As a matter of fact, psychologists have long been telling people how to live, and they have tried, often successfully, to base their recommendations on research findings, all while trying to make their values explicit.<sup>7</sup>

When analyzing the acknowledged goals of applied psychologists over the years, one will see an elevated focus placed on: reducing prejudice and discrimination; eliminating poverty, disease, and war; helping people who are anxious, depressed, or addicted; improving institutions like families, schools, businesses, and communities; and so on. How about a goal that is centered on guiding individuals towards living well? Now, can all of the goals mentioned prior play a role in getting one closer to reaching a well-lived good life? Absolutely, but these underlying assumptions need to be spelled out for people in ways that can be understood; in ways that can easily be translated from one individual to another.<sup>8</sup>

### **Living Well Psychology: In Search for Wholeness**

Generally speaking, psychologists know much more about eliminating or mitigating problems, rather than moving people beyond the zero point of distress to a life that is not just simply better, but actually good. Since World War II, psychologists have devoted much of their efforts to already-established problems. Rightfully so, that

---

<sup>7</sup> Nansook Park and Christopher Peterson. "Achieving and Sustaining a Good Life," *Perspectives on Psychological Science*, no. 4 (2009): 423.

<sup>8</sup> Ibid.

yield of work was necessary and undoubtedly successful. With that being said, what psychologists today know about people is severely incomplete.<sup>9</sup>

Recipes for how to ruin children, marriages, and careers can be provided at ease.

Detailed scripts for bad schools and bad communities can be created in an instant.

The advice that would then be given to overcome this knowledge is unequivocal: Do not follow this recipe or script.<sup>10</sup> The good life is not the troubled life avoided or undone. Interventions intended to achieve and sustain the good life may need to do more than simply reverse or undo the causes of the not-so-good life. For example, aspirin is a useful remedy for headaches, but "aspirin deficiency" is hardly a cause of headaches in the first place.<sup>11</sup> In particular, the factors that maintain behavior change are not well understood. If the goal is to help people live well in a lasting way, people that can make lasting impacts, such as psychologists, need to go beyond what is currently known.

## **Understanding the Good Life**

The question poses itself again, how can one actually live and sustain a good life?

When still being pursued in part by psychology, living well needs to be defined in psychological terms. Ideally, a typical good life would include but not be limited to: experiencing more positive feelings than negative feelings, judging that life has been lived well, identifying and using talents and strengths on an ongoing basis, having close interpersonal relationships, being engaged in work and leisure activities,

---

<sup>9</sup> Nansook Park and Christopher Peterson. "Achieving and Sustaining a Good Life," *Perspectives on Psychological Science*, no. 4 (2009): 425.

<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

contributing to a social community, perceiving meaning and purpose to life, being healthy, and feeling safe.<sup>12</sup> But who is to say that these really are components of the good life? Yes, many of theorists have said so, and they have drawn on research linking most, if not all, of these components to desirable life outcomes such as: psychological wellbeing, physical health, and success.

### **Analyzing the Good Life**

Perhaps there needs to be more discussion, and possibly, a consensus of what it means to live well. Psychologists already have the tools - surveys, interviews, and focus groups, to gauge and synthesize opinions. Beyond that, various experts from different fields and the general public could both be consulted about what the good life entails as well. All things considered, studying actual people who live well in one or more ways with a special emphasis placed on what they actually do (behavior), as opposed to what they say they do, is arguably the most feasible course of action.<sup>13</sup> Psychologists are understandably interested in processes and mechanisms. The problem with this focus is that behavior often receives inadequate attention, and living well entails behavior. However, with the exception of Sigmund Freud's vision of the good life (love and work is deeply connected to one's happiness), many available definitions of living well are phrased more in terms of processes than behaviors.

---

<sup>12</sup> Nansook Park and Christopher Peterson. "Achieving and Sustaining a Good Life," *Perspectives on Psychological Science*, no. 4 (2009): 425.

<sup>13</sup> Ibid.

To remedy the fragmentation of psychological knowledge about the good life, multivariate research may also be needed.<sup>14</sup> Rather than looking at just a few variables at a time, quality research that simultaneously measures multiple variables and human interactions is a must. At the very least, multiple outcome measures should be used more routinely than they are in intervention research.

The good life unfolds over time, and researchers must therefore undertake more longitudinal studies over extended periods of time. Many of the studies that reveal the most about the good life are ambitiously longitudinal.<sup>15</sup> Although similar studies are daunting, it is well worth the required effort if the goal is to understand what makes life most worth living and how a good life can be sustained over time. To understand the good life and how to help attain and sustain it, more interdisciplinary dialogue and collaboration is also needed. In speaking about the psychological good life, people tend to be fond of saying that other people matter. It also appears that other people matter in science as well.<sup>16</sup>

### **Wellness Inside**

As mentioned prior, this broad concept of living well in hopes of achieving the quote, good life, has seemingly been condensed into a much simpler phrase today, wellness. As challenging as it may be to comprehend just how to live well and obtain the good life, breaking wellness into simpler parts, or dimensions, can narrow the gap in finding these very answers. After all, wellness isn't necessarily physical; it's not

---

<sup>14</sup> Nansook Park and Christopher Peterson. "Achieving and Sustaining a Good Life," *Perspectives on Psychological Science*, no. 4 (2009): 426.

<sup>15</sup> Ibid.

<sup>16</sup> Ibid.

something that you can reach out and touch, or at times, even see. Living well can be viewed as both objective and subjective.

Individuals have their own views on personal levels of success and happiness. For example, one may *feel* that his or her life is balanced between several positive states of wellness, such as physical, emotional, and occupational, but financially, not so much. That same individual though, may be perfectly content with his or her lifestyle and exceedingly happy, perhaps the most important goal of this entire discussion. Who's to say that that individual isn't living the good life? Conversely, one may strive to create the best life outcomes imaginable, and work hard towards doing so. Again, without any major setbacks, a good life that's easy to comprehend.

### **Wellness Outside**

With psychology playing a lead role in understanding the levels of wellness of people within, science can provide answers for what influences wellness outside of the individual. In other words, the greater atmosphere that is surrounding that person. The entirety of one's atmosphere, both natural and manmade, sends cues to the systems of the body. The human body subconsciously reacts to those cues both mentally and physically. People have the ability to identify whether or not they are happy, tired, comfortable, confident, and so on. With that being said, it's often difficult to pinpoint the source for all of those feelings. That is where the science aspect of wellness can come into play.

These so-called trigger sources, such as air quality, exposure to daylight, access to human interaction, just to name a few, are scientifically proven to regulate one's different levels of wellness. What's exciting about this end of the equation, is that

these triggers are directly connected to open or closed pieces of the atmosphere-space. Space, whether it be interior or exterior, natural or manmade, contains an atmosphere within itself. Taking it just one step further, architecture can create, divide, and carve out space. Over thousands of years, architecture has essentially become a manmade host for regulating wellness; more effectively as time has gone on. As this all comes full circle with the earliest theories of living well and sustaining the good life, a couple of questions come to mind: how can “wellness interventions” be created at a building and urban scale? And how will these interventions specifically interact with individuals’ various states of wellness?

### **The Dimensions of Wellness**

When looking at wellness from a holistic perspective, there are several dimensions, or levels, that are openly considered today. In terms of living well, ideally, one would strive to stay balanced between all of the dimensions, not just one or two. As this topic continues to become more of a central focus throughout architecture, professionals alike break wellness down into 7-9 dimensions. The Health Promotion and Wellness Services of Auburn University’s Student Affairs<sup>17</sup> recognizes these nine:

- **Physical Wellness**

A physically well person actively makes healthy decisions on a daily basis by eating a nutritionally balanced diet, getting an adequate amount of sleep and visiting the doctor on a routine basis. Exercising three to five

---

<sup>17</sup> “Nine Dimensions of Wellness.” Auburn University. Last modified 2018, accessed March 24, 2018.

times per week is essential, allowing one the ability to identify their personal needs and become aware of their body's limitations. Maintaining positive interpersonal relationships and making healthy sexual decisions will be consistent with one's personal values and beliefs.

- **Emotional Wellness**

An emotionally well person successfully expresses and manages an entire range of feelings including anger, doubt, hope, joy, as well as many others. One will maintain a high self-esteem, positive body-image, and be able to regulate personal feelings. Seeking support and help regarding mental health is never overlooked.

- **Intellectual Wellness**

An intellectually well person engages in lifelong learning by seeking knowledge and activities that further develop critical thinking and global awareness. Engaging in activities associated with the arts, philosophy, and reasoning is embraced.<sup>18</sup>

- **Spiritual Wellness**

A spiritually well person identifies a core set of beliefs which guide their decision making, and other faith based endeavors. While firm in their spiritual beliefs, they understand others may have a distinctly different set of guiding principles. Recognizing the relationship between spirituality and identity in all individuals also becomes very apparent.

---

<sup>18</sup> “Nine Dimensions of Wellness.” Auburn University. Last modified 2018, accessed March 24, 2018.

- **Social Wellness**

A socially well person builds healthy relationships based on interdependence, trust, and respect. Aware of the feelings of others, one will develop a network of friends and co-workers who share a common purpose by providing support and validation.

- **Environmental Wellness**

An environmentally well person appreciates the external cues and stimuli that an environment can provide. By recognizing the limits that control an environment, one will seek to understand the role he or she plays in that environment.

- **Occupational Wellness**

An occupationally well person enjoys the pursuit of a career they believe to be fulfilling on a variety of levels. While finding satisfaction and enrichment in work, one will always pursue opportunities that will help them reach their professional goals.<sup>19</sup>

- **Financial Wellness**

A financially well person is fully aware of their current financial state. One will set long and short-term goals regarding finances that will allow for personal goals and self-defined financial successes to be achieved.

---

<sup>19</sup> “Nine Dimensions of Wellness.” Auburn University. Last modified 2018, accessed March 24, 2018.

- **Cultural Wellness**

A culturally well person is aware of their own cultural background, as well as the diversity and richness present in other cultural backgrounds.

Cultural wellness implies understanding, awareness, and intrinsic respect for aspects of diversity such as sexual orientation, religion, gender, racial and ethnic backgrounds, age groups, and disabilities.<sup>20</sup>

---

<sup>20</sup> “Nine Dimensions of Wellness.” Auburn University. Last modified 2018, accessed March 24, 2018.

# **Wellness Metrics**

## **Time and Wellness**

Wellness as a whole is a rather complex microcosm of maintaining the many states of well-being in a positive fashion. As previously stated, wellness is a multifaceted entity that has no off switch. People on the other hand, in terms of sleep, do have a hypothetical off switch. Sleeping takes up a major percentage of everyone's life. It's clear that not everyone gets the same amount of sleep on a daily basis. For the sake of wellness, however, essential sleeping patterns should range somewhere between 6-10 hours per night for adults. On average, that is roughly 33% of every single day allotted to nothing but sleep. When employed full-time, the average American works around 40 hours a week, or 8 hours per week day. Another 33% of every single work day (typically during the week) is spent at work. This starts to speak to the progression of everyone's day – time.

## **Priority and Wellness**

Priorities are conditions that are regarded as more important than others. An action cannot be taken by an individual without a choice. Negative levels of wellness may cause one to make poor decisions with time not even being part of the equation. For example, if someone gets into an argument with their boss at work, they may choose to come home and take a nap to postpone the emotional uneasiness. After waking up over an hour or two later in the evening, they will no longer "have enough time" to fit the gym in that night. In this case, the individual prioritized a nap over going to the gym to exercise and potentially socialize to relieve that stress instead of sleeping. As

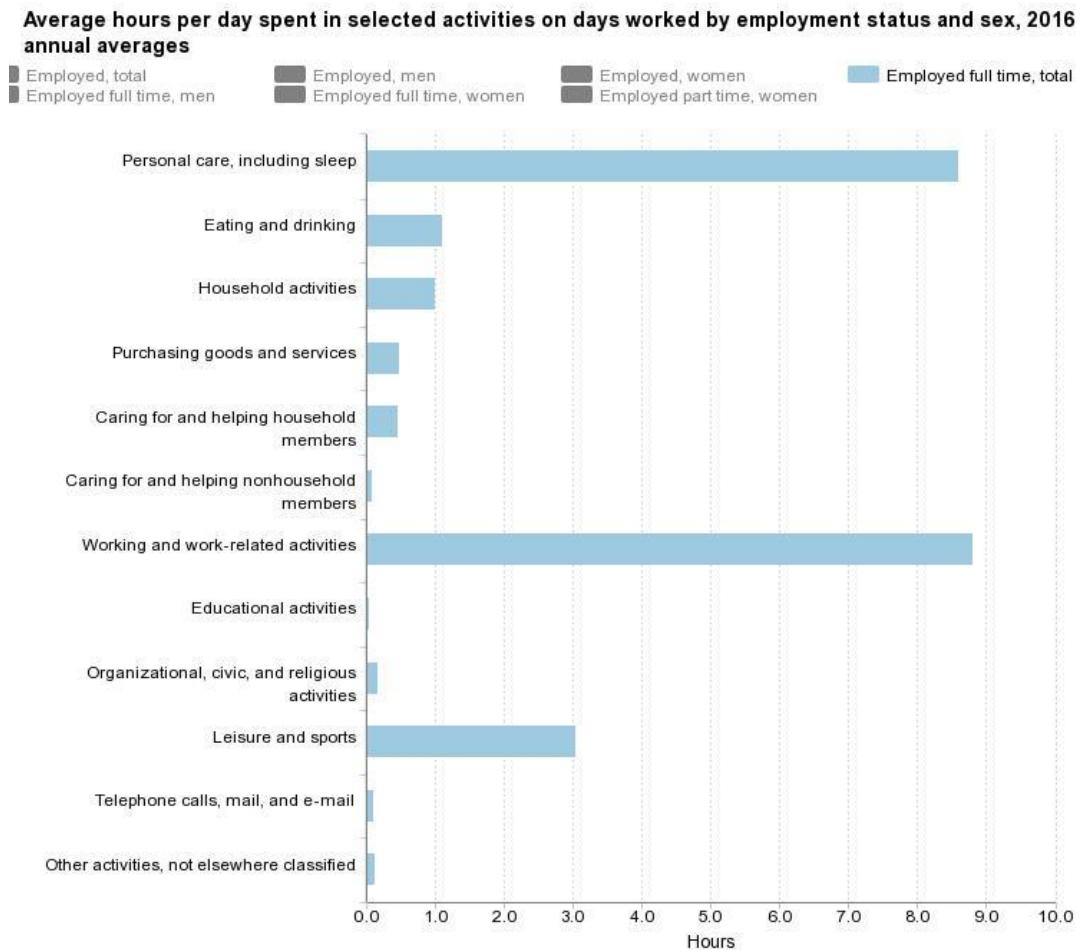
demonstrated in this hypothetical scenario, the amount of time in this person's day never changed, as it was always constant.

Beyond this discussion of time vs. priority, in terms of taking action or responding to something, however, lies the intervals of time that individuals spend doing daily functions. These functions, sometimes instincts, are almost automatic, and highly routinely. Obvious examples include eating, sleeping, working, etc.

The Bureau of Labor Statistics tracks these national averages among gender, age, employment status, and so on. These measurements help to streamline the general understanding of what individuals spend their time doing throughout every single day. Those measurements can then be connected to spaces, again verb (action), to noun (place), to develop a more precise understanding of how space can influence wellness. The overlap of specific activities performed across multiple space types can begin to formulate a shift in the boundaries of what defines a work space as a work space; that being just one example.

## Daily Time Use Surveys

### Daily Activity Totals for Full-Time Employees



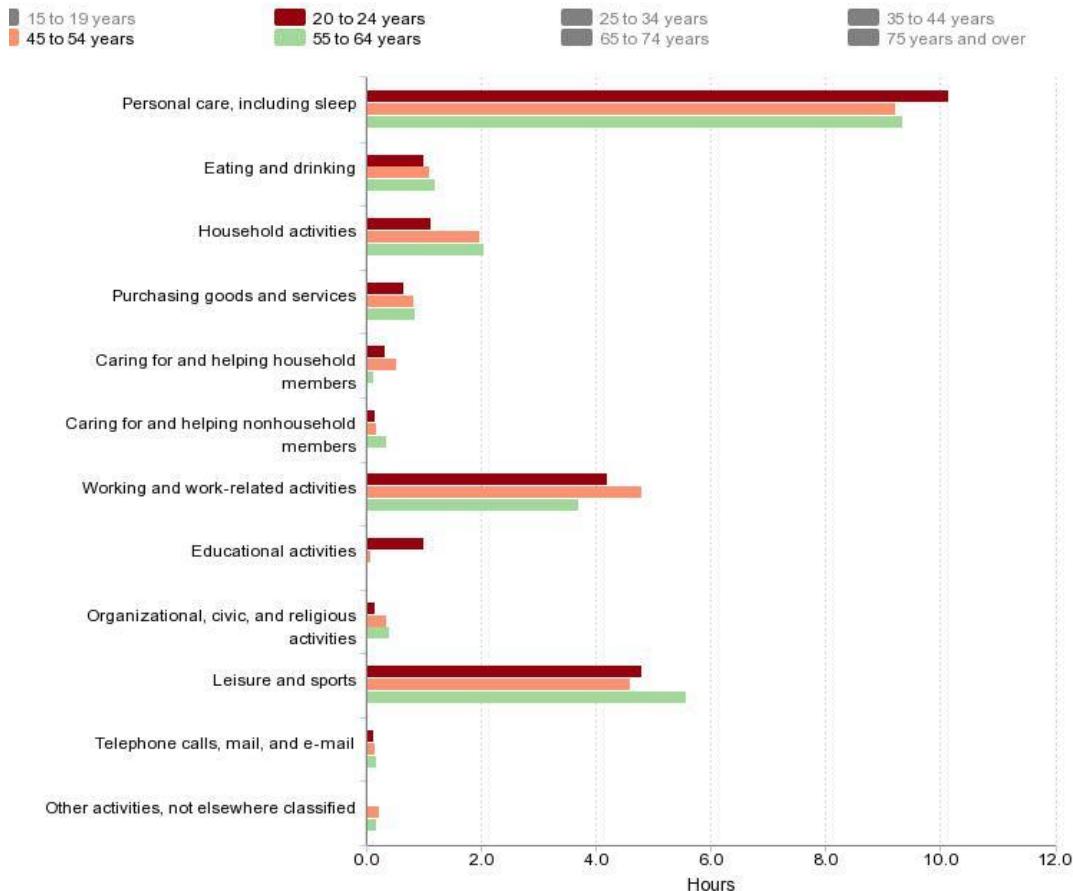
Data for men employed part time do not meet publication criteria.  
Hover over chart to view data.

Source: U.S. Bureau of Labor Statistics.

Figure 2: Daily Activities - Employment (source: Bureau of Labor Statistics)

## Daily Activity Totals by Age

Average hours per day spent in selected activities by age, 2016 annual averages



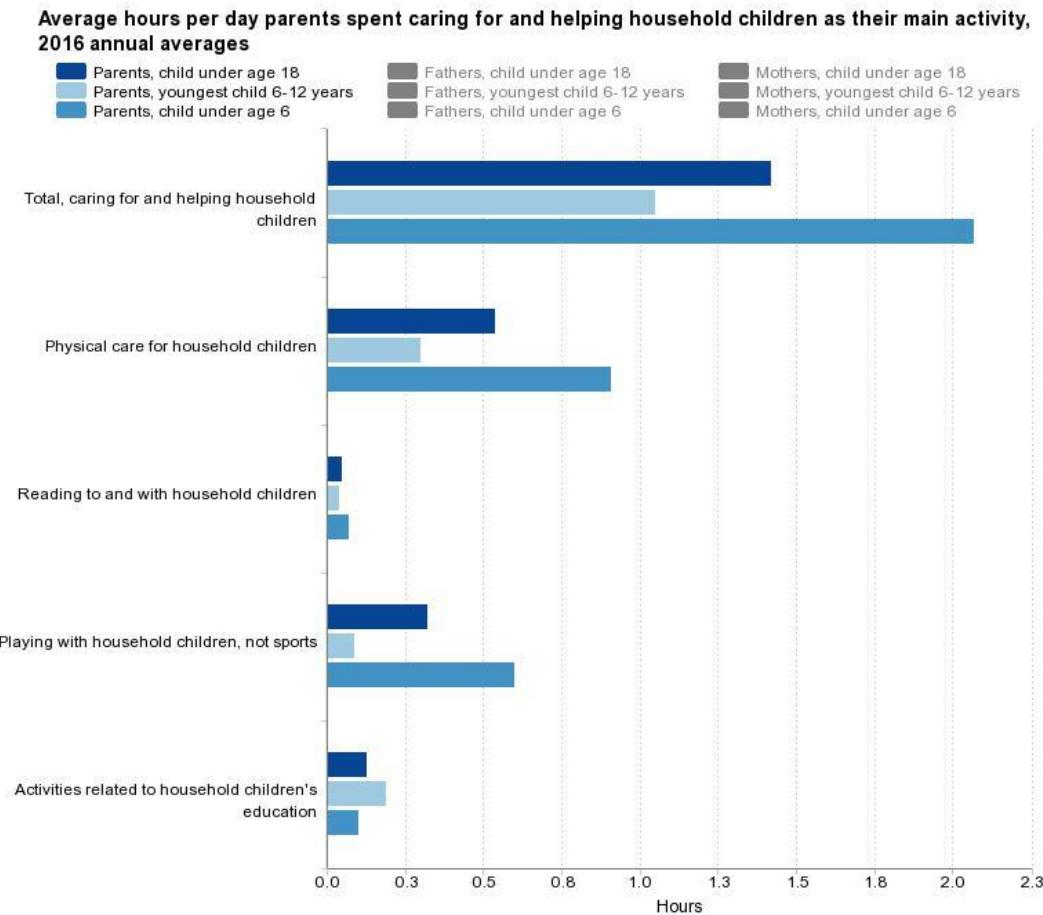
Data refer to all days of the week.

Hover over chart to view data.

Source: U.S. Bureau of Labor Statistics.

Figure 3: Daily Activities - Age (source: Bureau of Labor Statistics)

## Daily Children Care Activity Totals by Child Age

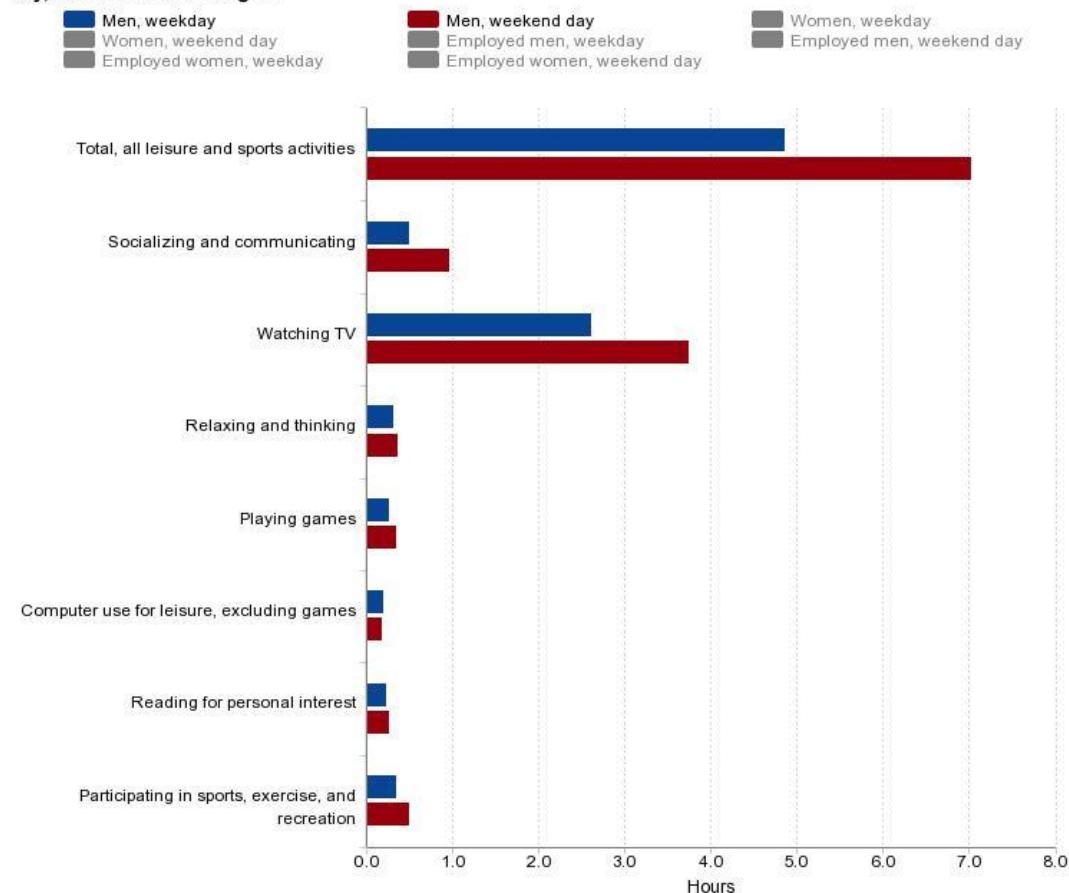


Some caring activities not shown.  
 Hover over chart to view data.  
 Source: U.S. Bureau of Labor Statistics.

Figure 4: Parent Activities - Age (source: Bureau of Labor Statistics)

## Daily Leisure Activity Totals - Men

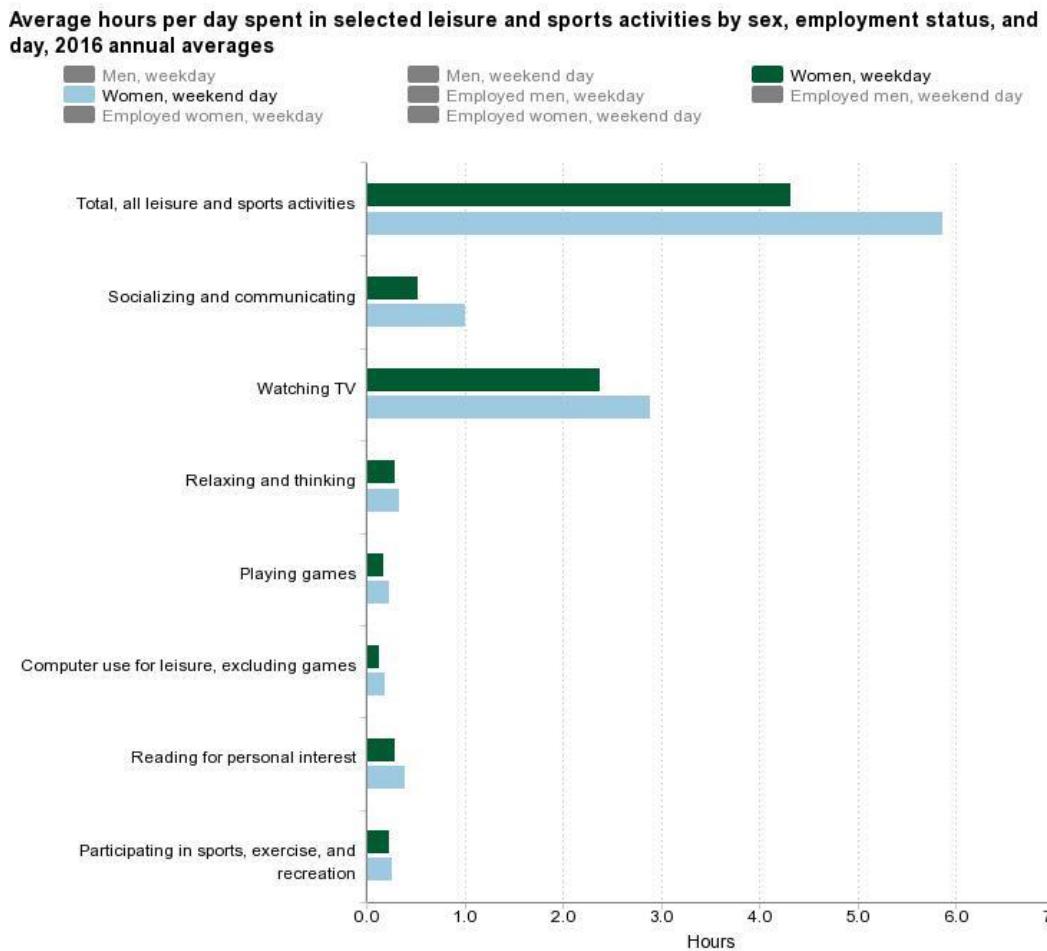
Average hours per day spent in selected leisure and sports activities by sex, employment status, and day, 2016 annual averages



Hover over chart to view data.  
Source: U.S. Bureau of Labor Statistics.

Figure 5: Leisure Activities - Men (source: Bureau of Labor Statistics)

## Daily Leisure Activity Totals – Women

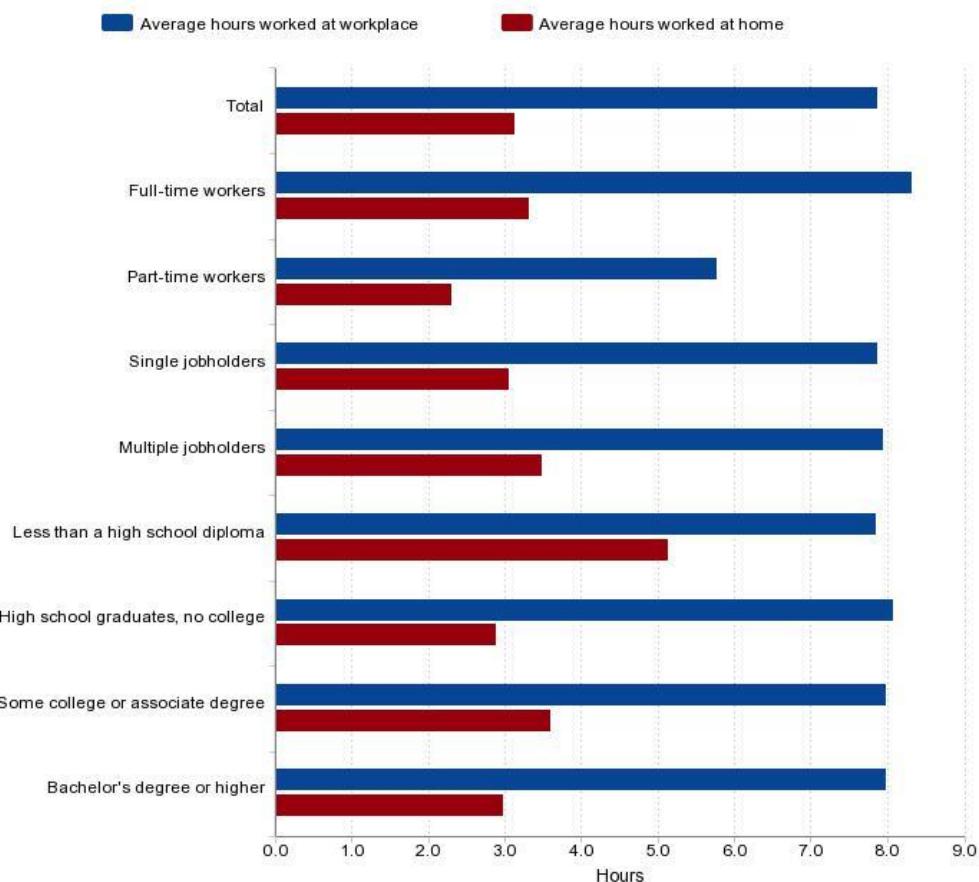


Hover over chart to view data.  
Source: U.S. Bureau of Labor Statistics.

*Figure 6: Leisure Activities - Women (source: Bureau of Labor Statistics)*

## Daily Work at Home Totals for Employees

Average hours employed people spent working at home and at their workplace on days worked at these locations, 2016 annual averages



Data for educational attainment refer to persons 25 years and over.

Work at home refers to both scheduled and unscheduled work done at home.

Hover over chart to view data.

Source: U.S. Bureau of Labor Statistics.

Figure 7: Work at Home - Employees (source: Bureau of Labor Statistics)

## **Analysis and Takeaways**

### **Chart 1: Full-Time Employee Daily Activities**

Right from the start, it's easy to see that two bars dominate this figure, and that is, of course, the 8-9 totals of hours spent sleeping and working per day. Surprisingly, eating only takes up 1 hour per day as leisure and sport-related activity takes up an additional 3. It would be interesting to see work commute taken into consideration, unless that it factored in as a work-related activity. Beyond that, the studies would have to be specific to employees who were commuting in and out of, or even across, the city.

### **Chart 2: Daily Activities by Age**

Jumping from full-time employment status to the general public, it's shocking to see how work totals are almost cut in half from 8 to 4. After all, these age ranges are all over 20 years of age. Leisure/sport activates, as well as time spent sleeping, both gain around an hour on average. Beyond these changes, most things stay relatively consistent. That within itself, begins to show just how similarly individuals spend the majorities of their day in a generalized sense.

### **Chart 3: Parent Childcare by Child Age**

This is a major metric to look at. This area of focus puts an entirely new spin on the concept of time and priority. As shown in the figure, parents spend somewhere in between 2-4 hours per day, on average, just caring for their children. All things considered, that is a reasonable chunk of everyday, especially when proper sleep hours of work are put into each given day. The question becomes, how can integrated

spaces within mixed-use development assist parents in maintaining positive states of wellness through rather busy segments of each given day? Right away, convenience and close proximity of program uses comes to mind.

#### **Chart 4 and 5: Leisure Activities – Men and Women**

When gender is brought into the mix, one can see that there really isn't much of a difference between the overall totals. Two of these metrics jump out right from the start, one for the good, and one for the worse. 4.5-7 hours spent on leisure and sport related activity per day seems to be a positive takeaway. 2.5-4 hours a day spent watching television, on the other hand, is less than ideal. It's interesting to see the jumps in these leisure activities from weekday to weekend. As these increases clearly make logical sense, wellness immediately comes to thought. Can well-maintained wellness throughout the week balance this offset and bring the totals closer together? Can more time be conserved during the week to incorporate even more leisure related activity during those busy weekdays?

#### **Chart 6: Employee Work Activities at Home**

This figure is something that directly speaks to the idea of a live/work blend lifestyle. On average, individuals spend about 3 hours working at home after working 8 hours at work. Now, what the term "work" actually means in terms of home-related activity is another question, but that is a significant metric to say the least. Whether it may be live/work units, or a working atmosphere that starts to take on some of the qualities of a living space, the need for flexibility within spaces becomes apparent.

# The Connection Between Wellness and Space

## Classifying the Space Types

Like wellness, space varies in great depths of complexity and fluctuation. In terms of architecture, space is typically presented in the form of a built (constructed) environment. Spaces can be categorized by many different aspects: uses and actions performed by inhabitants, general location, or connection to other entities, both natural and manmade. From a human perspective, if wellness is internal, space is external. For better or for worse, humans spend the vast majority of their lives dwelling within constructed space. If dwellings are tied closely to the concept of a traditional living space that still leaves the additional spaces that house the “work” and the “play.” With that in mind, perhaps space can be simplified into three major typologies: Living, Work, and Leisure.

What’s most intriguing about these three particular typologies, is that every action performed throughout any given day is accommodated within one or more of these spaces. One may pose the question: how can an action take place in two separate spaces at the same time? The typical American employee is used to going to work to work, leaving work to dwell at home, and enjoying their free time – elsewhere. As this framework will always ring true, what if portions of one’s daily living, working, and leisure actions can be encouraged within any one of these given spaces?

Substantial, a digital product studio, claims that there are six types of flexible office spaces: productive, communal, alternate, creative, quiet, and slack.<sup>21</sup> As one or more

---

<sup>21</sup> Donte Parks. “The Six Kinds of Space.” Substantial. Last modified 2014, accessed March 27, 2018.

of these types may be hard to really get behind, the list isn't meant to indicate that there needs to be designated spaces, or stations, throughout an office that are specific to each of the categories. Instead, physical spaces should contain at least two of these qualities, therefore, providing all that one would need within what is already available.

- **Productive**

The first and most obvious space listed is known as productive space - a place for work to get done. For individuals, a desk or work area, and for teams or groups, collaborative conference rooms, nooks, or annexes. If individuals are going to work productively, equipment that allows work to be done comfortably is needed. Conference rooms with the appropriate materials and an appropriate degree of isolation/soundproofing is necessary for groups of employees.<sup>22</sup>

- **Communal**

Stemming from group space, comes communal space. Impromptu standups, client calls, and consultations happen, and if the time allotted for such occasions isn't constructed in the form of a meeting, sometimes communal areas that vary in size are needed. People can't always work alone, so an extension of that freedom to work effectively in groups in set forth.<sup>23</sup>

---

<sup>22</sup> Donte Parks. "The Six Kinds of Space." Substantial. Last modified 2014, accessed March 27, 2018.

<sup>23</sup> Ibid.

- **Alternate**

Employees may be working on something that requires their complete attention. When it's hard to focus throughout portions of any given day, it's helpful to have another place to go to get things done. Maybe it's an open lounge, a series of lunch tables, or an empty conference room, but people need a place to go when their default work area isn't doing the trick for whatever reason.<sup>24</sup>

- **Creative**

Creativity isn't always neat and organized. Sometimes individuals need to scribble ideas for hours with dozens of different colors on dozens of pieces of paper before settling on a final approach. Other times, one may just need to go nuts on a whiteboard and capture ideas from a group.

Regardless of the exact mechanisms, a space with freedom is sometimes exactly what is necessary. A creative space provides that freedom to make a mess, make some noise, and simply, do whatever it takes to get the job done.<sup>25</sup>

- **Quiet**

A perennial challenge with open office is dealing with the constant chatter of all of the action that is taking place within that area. As collaboration in work is often stressed, sometimes the din of all that interaction can take

---

<sup>24</sup> Donte Parks. “The Six Kinds of Space.” Substantial. Last modified 2014, accessed March 27, 2018.

<sup>25</sup> Ibid.

one out of the flow of what he or she is doing. This is in many ways, a subset of the alternate space described above, but getting away doesn't necessarily mean quiet. This space however, is able to provide just that - silence.<sup>26</sup>

- **Slack**

This one may be a bit controversial. After all, employees are expected to go to work to work. Sure, but everyone needs a break, and that break can be more effective with a space made for it. Perhaps what makes sense is a comfortable chair or couch with a few available magazines, or a break room separated from desks/offices. People need to rest their bodies and their minds, and slack spaces can make that painless and integrated.<sup>27</sup>

The interesting thing about these six recommended office spaces in particular, is that all of the categories can be geared not only towards a workspace, but towards an effective living space, and potentially a leisure space as well. For instance, these six groups, all adjectives, can be directly connected to corresponding actions, or verbs, that take place within. For example:

### **Effective Workspace Categories (Adjectives)**

<b>Adjectives</b>	<b>Verbs</b>
Productive	→ Produce, make, construct, finish
Communal	→ Converse, collaborate, share

---

<sup>26</sup> Donte Parks. "The Six Kinds of Space." Substantial. Last modified 2014, accessed March 27, 2018.

<sup>27</sup> Ibid.

Alternate	→	Focus, release, liberate
Creative	→	Create, explore, express,
Quiet	→	Concentrate, relax, rejuvenate
Slack	→	Unwind, enjoy, procrastinate

The same connections can also be made between the three primary space typologies  
as well:

### **Primary Space Typologies (Nouns)**

Nouns	Verbs
Living	→ Dwell, reside, thrive, eat, sleep
Work	→ Exert, labor, thrive, eat
Leisure	→ Relax, enjoy, exercise, eat, sleep

Although no two verbs were repeated within the Workspace Categories comparison, it's easy to identify that many of the actions are similar and/or connected to one another. Conversely, the verbs within the Primary Space Typologies are repeated more frequently, presenting an overlap. An immediate takeaway that emerges from this quick comparison is the sheer level of similarities between the actions that take place within all of the aforementioned spaces. If the three primary spaces are generally viewed as spaces within residences (living), places of employment (work), and potentially anywhere else in and between (leisure), one can start to imagine many of the actions mentioned above taking place in specific locations.

It's interesting to see that all of the actions within the Effective Workspace Categories can absolutely all take place within living and leisure spaces. This thought alone, validates Substantial's outlook on effective workspaces, as it notions towards a more productive and well-rounded environment. It starts to become clear that the three primary space typologies can sometimes limit one's true potential when restricted to the traditional parameters of what living, work, and leisure spaces *should* provide. Humans are complex creatures, and if variety is the spice of life, maybe our cherished environments can become more enriched with the inner self through the origins of human health and wellness.



Figure 8: Live / Work / Wellness Blend (source: author)

## Designing Wellness

When design plays a significant role in human health, the way in which elements in a space are configured and manipulated will begin to mean more to its inhabitants than whether the color of the walls or texture of the carpet is accepted. On the most basic

level, certain environmental factors have universal effects on all inhabitants of space, for example, natural daylight and circadian rhythm (discussed thoroughly in next chapter). In other cases, these environmental factors are very personal and specific, based on our genetic wiring. One's own genetics for instance, set the stage, and the environment activates those genes in different ways.<sup>28</sup>

The most unfortunate thing is that very few organizations and even design professionals recognize the benefits of salutogenic design. Salutogenesis, describes the approach of focusing on factors that support human health and well-being, rather than on factors that cause disease (pathogenesis). What exactly is salutogenic design? It's not just something that's "cool" or "good for public relations." It's actually a measurable aspect of design that can help building inhabitants operate at peak levels of effectiveness while maintaining physical and mental well-being. This ultimately guides one to lead a healthier and therefore, longer life. From an architectural sense, it is the ultimate investment in people.<sup>29</sup>

The way that space is designed directly impacts physical and mental fatigue, awareness, memory cognition, depression, cardiovascular, and musculoskeletal health. Generally speaking, not enough emphasis is put on designing wellness into a space. Moving forward, organizations competing for the brightest hires should really begin to value wellness as a significant benefit to the people that will eventually be recruited and retained.<sup>30</sup>

---

<sup>28</sup> "The Connection Between Space and Wellness." Little Diversified Architectural Consulting. Last modified 2018, accessed March 27, 2018.

<sup>29</sup> Ibid.

<sup>30</sup> Ibid.

## Space Stressors

Stresses or challenges, physical or psychological, aren't always bad things per say.

Stress within the built environment has important repercussions. Unfortunately, many of which seem to be completely overlooked or accepted as something to simply live with. Northwestern National Life did a survey<sup>31</sup> in which 40% of workers reported that their job is very or extremely stressful. In another study conducted by Princeton Research Associates, 75% of respondents said that they think that the worker has more on the job stress than a generation ago. This stance is based on opinion, but still proposes an important piece of information, nonetheless. As one may be willing to guess, issues of environmental stress aren't confined to just the workplace. Any place where people spend significant periods of time can initiate stress in the user, i.e., the close connections that living and leisure spaces have with work spaces.<sup>32</sup>

Stresses have many different categorizations: organizational (ineffective processes), environmental (noise and temperature), social, physical, and biological or chemical (outgassing, VOC's). These stresses also have varying intensities, from ambient (perceptible but limited), to acute (sudden, intense, and short-lived), to chronic (on-going and pervasive). Although each of these stresses present issues, science proves that chronic stress directly correlates with some very serious health conditions, primarily physically, but psychologically as well. These sometimes-life-threatening conditions include higher levels of the stress hormone, cortisol; heart, stomach, and

---

<sup>31</sup> "The Connection Between Space and Wellness." Little Diversified Architectural Consulting. Last modified 2018, accessed March 27, 2018.

<sup>32</sup> Ibid.

blood pressure issues; impaired cognitive function; lowered immunity; musculoskeletal and bone density issues; depression; and certain cancers.<sup>33</sup> Organizations whose employees report these environmental stressors also see increased tardiness, frequent lateness, and incidences of workers quitting. When one considers the cost of backfilling an open position, the cost exceeds the salary of the new employee. These costs can add up to 1-5 times the annual salary of the position.<sup>34</sup> Organizations with healthy spaces and lower rates of illness and disability, sustain a competitiveness within the marketplace by putting value on the individual.<sup>35</sup>

---

<sup>33</sup> “The Connection between Space and Wellness.” Little Diversified Architectural Consulting. Last modified 2018, accessed March 27, 2018.

<sup>34</sup> Ibid.

<sup>35</sup> Ibid.

# Environmental Impacts on Building Occupants

## **Sustainable Design with Wellness in Mind**

Sustainable strategies not only present benefits to a building's immediate users, but also for the community at large. Issues like bad indoor air quality and poor lighting can immediately have a negative impact on its inhabitants, even if attention is not called to them directly. When environments are created to be physically legible, tension will be minimized. The building users will understand how to use a space intuitively, based on the sequencing, materiality, way finding, lighting, and other design elements that are used to help people make sense of a space. Conversely, pressure will increase when a person is confused and doesn't understand how to navigate a space and effectively find what he or she needs.<sup>36</sup>

Beyond sustainability, comes the promotion of social interaction, in which people are encouraged to participate or be exposed to the activity of others. Disengagement and lack of connection is one of the biggest issues in workspaces today. Creating collaborative (or communal) spaces such as these will create opportunities for interaction and deepen the relationship between a person, their space, and the other occupants.<sup>37</sup>

Natural elements such as courtyards, plants, or living walls that are implemented throughout any habitable space also become essential. Using natural materials can present a sense of scale, texture, color, and materiality that have a naturally calming effect on people, both biologically and neurologically. Every person involved in

---

<sup>36</sup>"The Connection between Space and Wellness." Little Diversified Architectural Consulting. Last modified 2018, accessed March 27, 2018.

<sup>37</sup>Ibid.

design needs to recognize and embrace the call to incorporate elements of wellness into the spaces that they create. The concepts and responses are frequently simple, yet the simplest of ideas can yield meaningful results for the human organism. For instance, introducing natural elements into an interior space may not always be entirely feasible, but window and glazing placement then becomes paramount. This interior to exterior connection eases inhabitant stress levels through natural daylight exposure and desirable views. As long as designers remain aware of the impact that designs have on people at a biological and neurological level, a significant difference can be made for anyone coming in contact with those given spaces and buildings.<sup>38</sup>

### **Integrating Daylighting into Design**

Arguably the most critical impact on any designed space or building, is lighting. While daylight is a variable and often unpredictable, light source contains a wide spectrum that depends on solar position and sky conditions. Daylight in buildings will support human and well-being, particularly for people in northern latitudes who occupy areas near a window or other daylit sources.<sup>39</sup> More specifically, daylight will support human alertness and productivity, regardless of latitude or exposure duration. Lighting manufacturers, for one, have jumped on the bandwagon and attempted to mimic these cycles through electric light sources and lighting systems. This will be expanded upon in the following chapter when circadian rhythm is analyzed. Designers can glean two points from this innovative strategy. First, daylit spaces hold the potential to yield substantial benefits, including increased energy savings,

---

<sup>38</sup> “The Connection between Space and Wellness.” Little Diversified Architectural Consulting. Last modified 2018, accessed March 27, 2018.

<sup>39</sup> Ibid.

increased revenue in retail applications, and improvements to human health and productivity. Second, several important factors ranging from design, to installation and operation, must be carefully addressed in order to realize these benefits.<sup>40</sup> Many resources are available to guide decision-making in daylighting design. Three tasks in particular, that are critical to a successful daylighting installation are: the control of direct sunlight at visual task areas during all occupied hours; the provision of balanced luminance on interior surfaces, particularly between perimeter windows and key vertical surfaces within the interior volume; and the provision of sufficient ambient daylight illumination for visual tasks. Once a design is executed, operational success needs to be ensured by educating building occupants and operators on the intent of the daylighting design, how to use the lighting controls, and how to access and use shading controls.<sup>41</sup>

### **The Circadian Rhythm**

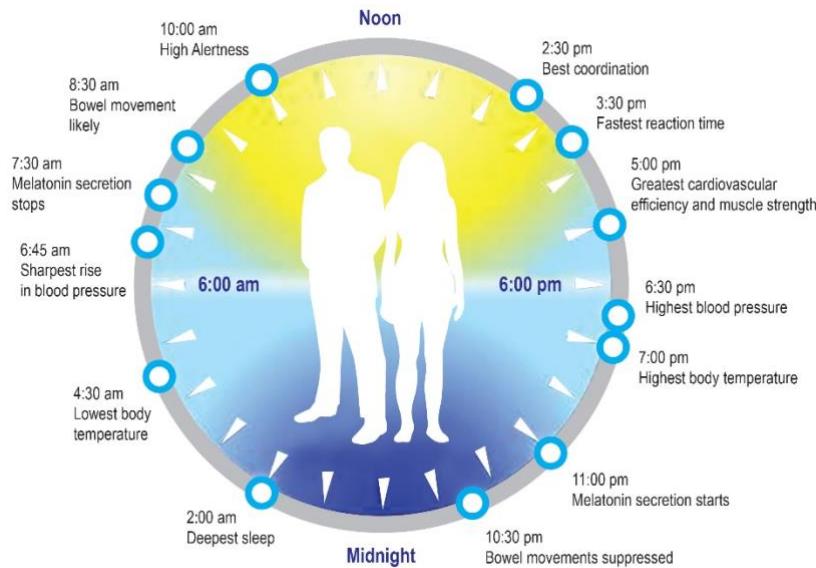
As stated prior, lighting as a whole, whether it be natural or artificial, plays a crucial role in wellness. A biological process regulated by light, called the circadian rhythm, in some ways, creates the foundation for the entirety of one's well-being. This system is often described as an internal clock that controls everyone's sleep - wake cycle, primarily through the release of melatonin throughout each night. Beyond that, feeding patterns, alertness, core body temperature, brain wave activity, hormone production, regulation of glucose and insulin levels, urine production, and cell

---

<sup>40</sup> "The Connection between Space and Wellness." Little Diversified Architectural Consulting. Last modified 2018, accessed March 27, 2018.

<sup>41</sup> Ibid.

regeneration, are all controlled by this particular process.<sup>42</sup> Without exposure to normal 24-hour light - dark cycles, an individual's own cycle can stray by as much as two hours per day.<sup>43</sup> That statement alone creates many concerns.



*Figure 9: Circadian Rhythm Clock (source: author)*

An imbalanced sleep - wake cycle may produce advanced or delayed sleep-phase disorders and lead to chronic sleep debt. In a 2006 longitudinal study (ideal for analyzing wellness), “Light at Night—Cancer Risks of Shift Work,” researchers from Thomas Jefferson University in Philadelphia, PA, and the Mary Imogene Bassett Hospital in Cooperstown, N.Y., found an increased rate of breast cancer in night-shift workers that resulted from the suppression of the pineal gland’s production of melatonin from over exposure to bright light throughout the various nights.<sup>44</sup>

---

<sup>42</sup> “Circadian Rhythms - How Sleep Works.” HowSleepWorks. Last modified 2018, accessed March 30, 2018.

<sup>43</sup> Ibid.

<sup>44</sup> Ibid.

With that being said, a lack of daylight inside a building doesn't necessarily spell doom for its occupants.

Exposure to bright light at the appropriate time of day for the appropriate duration can alleviate these disorders. Darkness at night, not just brightness during the day, is also critical to a healthy sleep-wake cycle. The bright, early afternoon daylight, however, is the one resource that can provide the exposure that is most beneficial for regulating the timing and duration of human cycles.<sup>45</sup>

In order to minimize melatonin suppression, "one should keep exposure to light at night as short as possible, as dim as possible, and as warm or red as possible," says Steven Lockley,<sup>46</sup> an associate professor of medicine in the division of sleep medicine at Harvard Medical School and at Brigham and Women's Hospital in Boston. With this in mind, daylighting design in spaces with sleeping quarters should also consider accommodating nighttime darkness.<sup>47</sup>

Interesting enough, color temperature within artificial lighting, can now emulate the same color temperatures that the sun releases. Color temperature essentially describes the color intensity of light in terms of a low reddish-orange tone, to a high blueish-white tone. The sun releases a low, warm color temperature in the morning to ease individuals into an awakening stage and intensifies to its highest cool temperature around noon when the sun is highest in the sky. Subsequently, the sun's color temperature lowers and warms in the evening to prepare individuals for their eventual

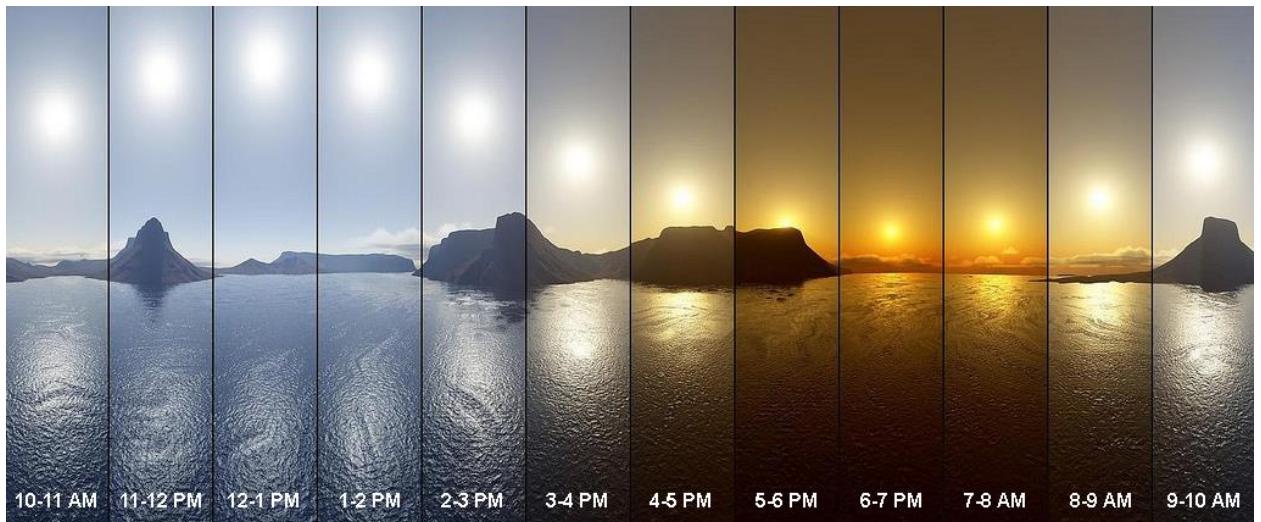
---

<sup>45</sup> "Circadian Rhythms - How Sleep Works." HowSleepWorks. Last modified 2018, accessed March 30, 2018.

<sup>46</sup> Ibid.

<sup>47</sup> Ibid.

night's sleep. As higher color temperatures are believed to alleviate some disorders, it is proven that these high (color) temperatures also promote user productivity.



*Figure 10: Circadian Rhythm Solar Timeline (source: Kim Aerts)*

The discovery of both a novel retinal photoreceptor in the human eye and the photopigment melanopsin has renewed the attention paid to circadian research and has drawn substantial interest from the lighting community. In the 2001 paper “Action Spectrum for Melatonin Regulation in Humans: Evidence for a Novel Circadian Photoreceptor,”<sup>48</sup> Thomas Jefferson University researchers found that the circadian system is in fact, most sensitive to short-wavelength (bluer) light. Typically manufactured in the form of LED lighting, bluer light is commonly used in office spaces to constantly stimulate alertness throughout every typical weekday. The issue with this strategy in particular, is that eight straight hours of over exposure to high, bright light can be overstimulating. If an individual doesn’t leave his or her office for 8 straight hours of constant stimulation, before eventually departing to go

---

<sup>48</sup> “Circadian Rhythms - How Sleep Works.” HowSleepWorks. Last modified 2018, accessed March 30, 2018.

home in the evening, the circadian cycle will be thrown off altogether. That individual will either “crash” sooner than expected from the system being overworked, or most likely, struggle to get to sleep as soon as desired. As mentioned prior, lighting technologies now exist that allow for “circadian rhythm lighting” to be incorporated into the design of spaces. This LED software, managed by user controls, will closely emulate the color intensity of the sun at the same intervals throughout the day, continuously adjusting from warm to cool, and cool to warm temperatures.

# Well-Being Performance Standards for Buildings

## Introduction

After addressing many of the sustainable impacts that buildings can have on the environment, the discussion can be taken to the next level by dissecting some of the most notable building performance rating systems that are available at the international level. LEED, Leadership in Energy and Environment Design, is the most widely used building performance rating system in the world today. The key phrase here is building performance. When it comes to energy efficiency and successful environmental design, LEED has become the go-to framework for many individuals across the globe. However, there are other ratings systems available that place more of an emphasis on building occupant performance, even more so than LEED typically does.

## Living Building Challenge

### Intent

The Living Building Challenge is an attempt to dramatically raise the bar from a standard of doing less harm to one in by becoming stewards and co-creators of a true Living Future. The Challenge claims to define the most advanced measures of sustainability in the built environment and act rapidly to diminish the gap between current limits and the positive solutions of an ultimate goal.<sup>49</sup> The Challenge also aims to transform individuals think about every single act of design and construction as an opportunity to positively impact the greater community

---

<sup>49</sup> "Living Building Challenge 3.0: A Visionary Path to a Regenerative Future." *International Living Future Institute*. Last modified 2014, accessed May 17, 2018: 6

of life and the cultural fabric of human communities. The program has always acted as a philosophical worldview, cloaked within the frame of a certification program. The processes is successful because it satisfies the left brain craving for order and thresholds and the right brain intuition of the focus of understanding life as a whole.<sup>50</sup> The Living Building Challenge focuses on humanity's largest creations - buildings. In essence, it is a unified tool for transformative thought, allowing people to envision a future that is socially just, culturally rich and ecologically restorative.

Regardless of any given project scale , the Living Building Challenge provides a framework for design, construction and the symbiotic relationship between people and all aspects of community. "The Challenge" is not a merely a noun that defines the character of a particular solution for development, but a more relevant and classified series of verbs. These verbs, or calls for action, describe not only the building of all of humanity's longest-lasting artifacts, but also of the relationships and broader sense of community and connectivity they cause.<sup>51</sup>

### **Living Petal Certification**

A project achieves Living Building Certification by attaining all imperatives assigned to its typology. All twenty imperatives are required for buildings that are seeking certification. While Living Certification is the ultimate goal, meeting the imperatives of multiple Petals is a significant achievement in and of itself. Petal Certification requires the achievement of at least three of the seven Petals, one of which must be

---

<sup>50</sup> "Living Building Challenge 3.0: A Visionary Path to a Regenerative Future." *International Living Future Institute*. Last modified 2014, accessed May 17, 2018: 6

<sup>51</sup> Ibid.

either the Water, Energy or Materials Petal.<sup>52</sup> Among these Petals, lies an additional category that applies directly to wellness – Health and Happiness.

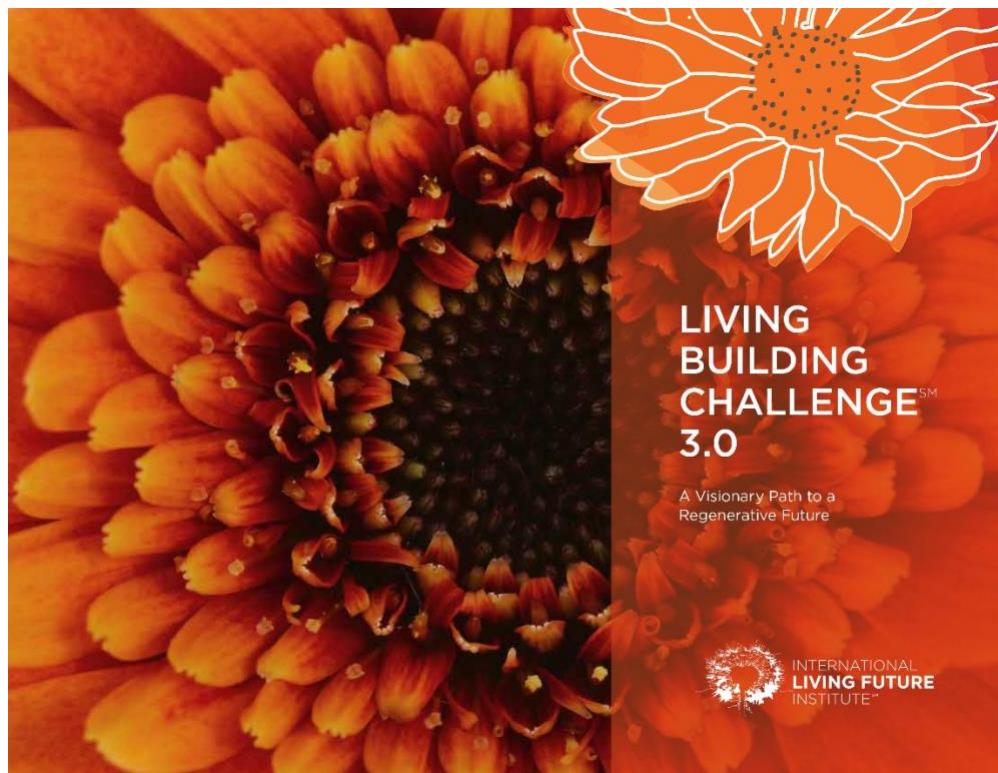


Figure 11: Living Building Challenge (source: International Living Future Institute)

### **Health & Happiness Petal Intent**

The intent of the Health and Happiness Petal is to focus on the most important environmental conditions that must be present to create healthy and robust spaces, rather than addressing all of the potential ways that an interior environment could be compromised.

Many developments provide substandard conditions for health and productivity (high color temperature artificial lighting), greatly diminishing human potential in those

---

<sup>52</sup> "Living Building Challenge 3.0: A Visionary Path to a Regenerative Future." *International Living Future Institute*. Last modified 2014, accessed May 17, 2018: 11

spaces. By focusing attention on the major pathways of health, environments can be designed and created to optimize well-being.<sup>53</sup>



Figure 12: Health and Happiness (source: International Living Future Institute)

### Ideal Conditions and Current Limitations

The Living Building Challenge envisions a nourishing, highly productive and healthy built environment. However, even the best available solutions require acceptance and engagement by the project occupants and project owner. It can be rather difficult to ensure that developments will remain healthy over time, since environmental

---

<sup>53</sup> "Living Building Challenge 3.0: A Visionary Path to a Regenerative Future." *International Living Future Institute*. Last modified 2014, accessed May 17, 2018: 37

conditions such as air quality, thermal control, and visual comfort can easily be compromised in numerous ways. It may also be complicated to ensure optimal conditions due to the unpredictable nature of how people operate and maintain indoor spaces.<sup>54</sup>

## **WELL Building Standard**

### **Features, Parts, and Requirements**

Similar to The Living Building Challenge, The WELL Building Standard is organized into seven categories, but with an even deeper connection to wellness. These seven concepts include: Air, Water, Nourishment, Light, Fitness, Comfort and Mind. Each Concept is comprised of Features, which are further divided into Parts and Requirements. Every Feature is intended to address specific health, comfort or knowledge aspects. Each feature is subdivided into Parts, tailored to a specific building type.<sup>55</sup>

---

<sup>54</sup> “Living Building Challenge 3.0: A Visionary Path to a Regenerative Future.” *International Living Future Institute*. Last modified 2014, accessed May 17, 2018: 11

<sup>55</sup> Ibid, 9.



Figure 13: WELL Building Standard (source: International WELL Building Institute)

## Wellness and Body Systems

Each Feature of the WELL Building Standard is attributed to the specific human body system that is intended to benefit from its implementation. This enables project teams to classify the intended benefits of each WELL Feature and develop a comprehensive set of strategies.

As any typical building can be divided into designated parts or sections, the human body can be as well. Within those different parts, lies a series of complex living systems that define the overall functions of those collective spaces.<sup>56</sup> While there are

---

<sup>56</sup> "The Well Building Standard: Version 1.0." *International WELL Building Institute*. Last modified October 20, 2014, accessed May 17, 2018: 10

different ways to group the body's various systems, the WELL Building Standard considers each Feature's impact to some of, but not limited to the following categories of body systems:

### **Cardiovascular System**

The cardiovascular system consists of the heart, vessels and blood. Its primary function is to supply nutrients and remove waste from the tissues of the body. However, stress, unhealthy diets and lifestyle choices, and exposure to environmental pollutants can negatively impact cardiovascular health and lead to the development of chronic conditions that reduce quality of life.

The WELL Building Standard addresses these factors that are vital to maintaining cardiovascular health; stress, nutrition, fitness and environmental pollutants. Comfort Features are designed to mitigate stress and help limit harmful hormone levels in the body. Healthy diets and active lifestyles control body weight and strengthen the muscles of the heart.<sup>57</sup>

### **Digestive System**

The digestive system consists of the mouth, esophagus, stomach, intestines, and the auxiliary organs, the liver and pancreas. This complex system is responsible for nutrient breakdown, absorption and assimilation. These critical functions are compromised by poor dietary habits, stress and by microbes and environmental pollutants in the foods we eat and surfaces that we touch.

Features of the WELL Building Standard support interventions that reduce factors that negatively impact digestive health. Comfort Features are designed to mitigate

---

<sup>57</sup> "The Well Building Standard: Version 1.0." *International WELL Building Institute*. Last modified October 20, 2014, accessed May 17, 2018: 10

stress, affecting the health and function of the microbiome. Proper diets help to limit consumption of harmful toxins and substances which can cause digestive discomfort and allergic reactions. Treatment of surfaces helps to prevent microbes and toxins from entering our digestive system via our foods.<sup>58</sup>

### **Immune System**

The immune system is a complex cohort of highly specialized cells, proteins, tissues and organs that make up the body's defense system. It is affected by the cumulative effect of toxins, poor sleep, nutrition and excessive stress. Failure to maintain proper immune function can increase the incidence of infections by bacterial and viral pathogens, and contribute towards the development of chronic conditions such as arthritis, diabetes, cardiovascular or respiratory disease and even cancer.

The Features that collectively form the WELL Building Standard focus on promoting and enhancing immune health. Water and air filtration systems limit exposure to bacterial and viral pathogens and allergens. In addition, WELL includes Features that are designed to reduce stress and improve nutrition and fitness, which help strengthen the immune function.<sup>59</sup>

### **Muscular System**

The human muscular system supports posture, joint stability and movement. It is also responsible for generating heat through the contraction of muscles. Balanced diet and fitness greatly affect muscular health, as muscles receive adequate nutrients to develop and function properly.

---

<sup>58</sup> "The Well Building Standard: Version 1.0." *International WELL Building Institute*.

Last modified October 20, 2014, accessed May 17, 2018: 10

<sup>59</sup> Ibid, 11.

The WELL Building Standard contains Features that are designed to encourage or enhance the opportunity for safe physical activity and healthier diets. Beyond that, ergonomic designs are intended to reduce the likelihood of ligament strain and muscular injuries.<sup>60</sup>

### **Nervous System**

The nervous system is divided into the central nervous system, made up of the brain and spinal cord, and the peripheral nervous system, composed of nerves that traverse the entire body. The nervous system is the main control center of the body. It directly and indirectly controls nearly every internal function of the body, including: senses and interactions with the external world, as well as thought, language, mood and personality traits and functions.

The WELL Building Standard places utmost importance on supporting neurologic and cognitive function through a variety of interventions. Light Features work to promote proper alignment of the circadian rhythm, which again, controls sleep and wake cycles. Features that mitigate environmental toxins in air and water limit exposure to substances that can affect cognitive health and performance.

Nourishment, fitness and comfort Features work in tandem to support neurologic health by providing adequate nutrition, levels of physical activity, enhancement of sleep and by reducing stress.<sup>61</sup>

---

<sup>60</sup> “The Well Building Standard: Version 1.0.” *International WELL Building Institute*.

Last modified October 20, 2014, accessed May 17, 2018: 12

<sup>61</sup> Ibid.

## **Respiratory System**

The respiratory system includes the mouth, nose, diaphragm, the trachea and the airways that reach deep into the lungs. The respiratory system works in tandem with the circulatory system in order to provide oxygen and remove carbon dioxide from the tissues of the body.

The Features of the WELL Building Standard help maintain proper respiratory system function by improving the quality of the air we breathe, limiting exposures to molds and microbes and by improving access to opportunities for greater fitness.

Fitness Features are intended to help to improve breathing and the overall strength of the respiratory system.<sup>62</sup>

Beyond the major body systems that are emphasized among every main Category, are the individual-based categories themselves, such as:

### **Nourishment**

The industrialization of agriculture in the last half-century has increased access to and altered the quality and quantity of the foods available to us. Busy lives and longer workdays are encouraging unhealthy behavior, including individuals to eat meals on the go and in front of the TV, while snacking in between meals and eating large-portioned restaurant meals. Unfortunately, the aspects of the food culture and eating practices have contributed to the rise of obesity, heart disease, diabetes, liver disease and cancer.<sup>63</sup> Food consumption decisions, eating habits and preparation practices all represent not only points of concern, but also venues for health improvement. It is

---

<sup>62</sup> “The Well Building Standard: Version 1.0.” *International WELL Building Institute*.

Last modified October 20, 2014, accessed May 17, 2018: 13

<sup>63</sup> Ibid, 75.

possible to put in place policies and structure physical environments so that people may more easily make more informed eating choices, and more powerfully benefit from good nutrition.

The WELL Building Standard for Nourishment requires the availability of fresh, wholesome foods, limits unhealthy ingredients and encourages better eating habits and food culture.<sup>64</sup>

### **Fitness**

Physical inactivity poses one of the most significant threats to public health in industrialized societies. It is attributable to 9.4% of all deaths worldwide, or 3.5 million people every year. Modern transportation, laborsaving conveniences, and sedentary jobs have created an environment in which millions of people fail to reach the minimum level of activity necessary to help prevent metabolic syndrome, type 2 diabetes, heart disease and other chronic conditions. In the United States alone, less than 5% of adults meet physical activity recommendations, as set forth by the Centers for Disease Control (CDC) and the American College of Sports Medicine (ACSM). Beyond strategies that depend on an individual's changes in lifestyle, there are also great potentials for fitness interventions that can encompass the passive adoption of active behaviors.<sup>65</sup> Urban planning and building design that is more consciously constructed to encourage regular movement and physical activity, as well as active transportation, are among several significant intervention strategies.

---

<sup>64</sup> “The Well Building Standard: Version 1.0.” *International WELL Building Institute*.

Last modified October 20, 2014, accessed May 17, 2018: 75

<sup>65</sup> Ibid, 108.

The WELL Building Standard for Fitness allows for the seamless integration of exercise and fitness into everyday life by providing the physical features and components to support an active and healthy lifestyle.

### **Comfort**

The indoor environment is ideally, place of comfort. The WELL Building Standard focuses on significantly reducing the most common sources of physiological disruption and irritation and on enhancing acoustic, ergonomic and thermal comfort. Sound allows individuals to communicate with each another, yet it can also help one relax or focus, and reach optimal productivity. The WELL Building Standard aims to enhance acoustic comfort to shape environments that enhance social interaction, learning and productivity. Thermal comfort also plays a significant role in the way people experience live and work spaces.

Intent: The WELL Building Standard for Comfort establishes requirements designed to create distraction-free, productive and comfortable indoor environments.<sup>66</sup>

### **Mind**

As many tend to conceptualize mental and physical health as separate domains, human minds and bodies are inextricably connected. For example, exercise increases the release of serotonin, which can elevate mood and regulate the sleep cycle. These interrelationships can also instigate negative feedback loops.

The growing knowledge of the connection between mental and physical health has changed the way individuals perceive and understand disease etiology. There is a growing body of evidence suggesting that stress can cause or worsen existing

---

<sup>66</sup> “The Well Building Standard: Version 1.0.” *International WELL Building Institute*. Last modified October 20, 2014, accessed May 17, 2018: 134

illnesses through various mechanisms. With the mind playing such a vital role in an individual's overall health and well-being, an atmosphere that supports a healthy The WELL Building Standard for Mind requires design, technology and treatment strategies designed to provide a physical environment that optimizes cognitive and emotional health.<sup>67</sup>

---

<sup>67</sup> “The Well Building Standard: Version 1.0.” *International WELL Building Institute*. Last modified October 20, 2014, accessed May 17, 2018: 13

# Site Analysis and Precedent Research

## Initial Site Selection

### Buzzard Point, Washington, D.C.



Figure 14: James Creek Marina Lot (source: Google Earth)



Figure 15: Lot Parking to the North (source: Google Earth)

Buzzard Point is a region located on the tip of the peninsula surrounded by the Potomac and Anacostia Rivers southwest of Washington, D.C. Outside of the Fort McNair base bounding the west edge of the peninsula, plans are in place to redevelop the greater area. With the waterfront being the main driving force in the site interest, there is just too much uncertainty surrounding the vast, mixed-use development that is underway to reasonably follow through with this area as a viable option.

### Logan Circle, Washington, D.C.



Figure 16: R St NW Lot (source: Google Earth)



Figure 17: Lot along Vermont Ave NW (source: Google Earth)

Moving on from Buzzard Point and into the denser urban fabric, the residential neighborhood of Logan Circle offered small lots that were usually connected to

adjacent school facilities. Despite the positive outcomes that high density mixed-use development could have brought into the area. The residential fabric typically consists of smaller single family units, as well as duplexes and 2-3 story apartments at the most.

### NoMa, Washington, D.C.



Figure 18: Street Views of Chosen Site (source: Google Earth with author)

## Site Description

### Context

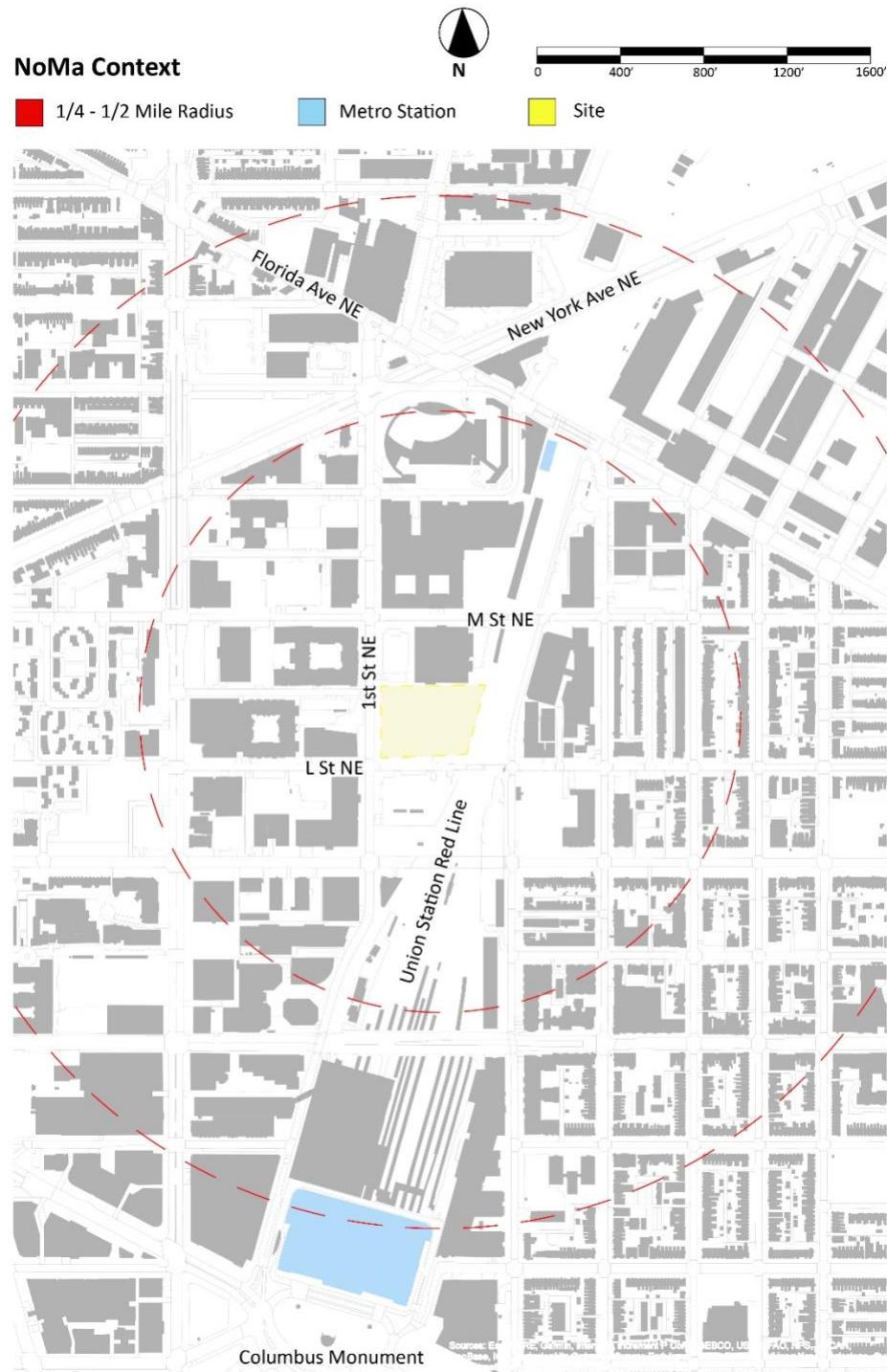


Figure 19: NoMA Context along the West Edge of the Union Station Rail Line (source: author)

This chosen site is located at the intersection of 1<sup>st</sup> Street NE and L Street NE. The major challenge with this site is the close proximity to the Union Station rail line. Fortunately, this high density mixed-use neighborhood creates several outcomes for an intervention that can challenge the height restriction and effects that it has on building receptiveness in that area. With current and future ties to a great deal of amenity, this site also capitalizes on the close proximity to the New York Ave Metro Station (1/4 mile) and Union Station Metro Station (1/2 mile).

### Zoning

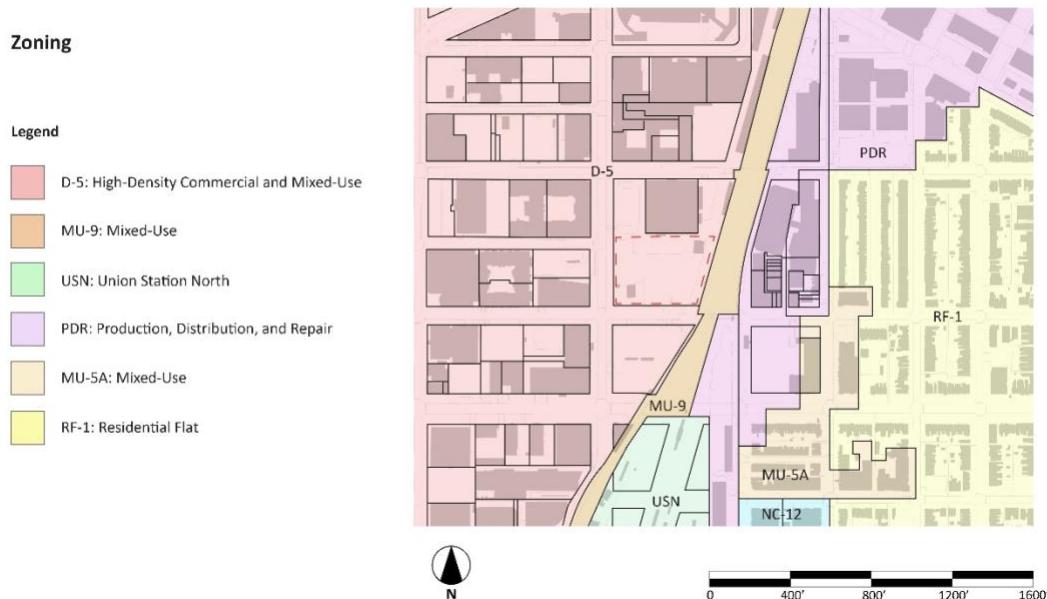


Figure 20: Zoning Map along Rail Line (source: author)

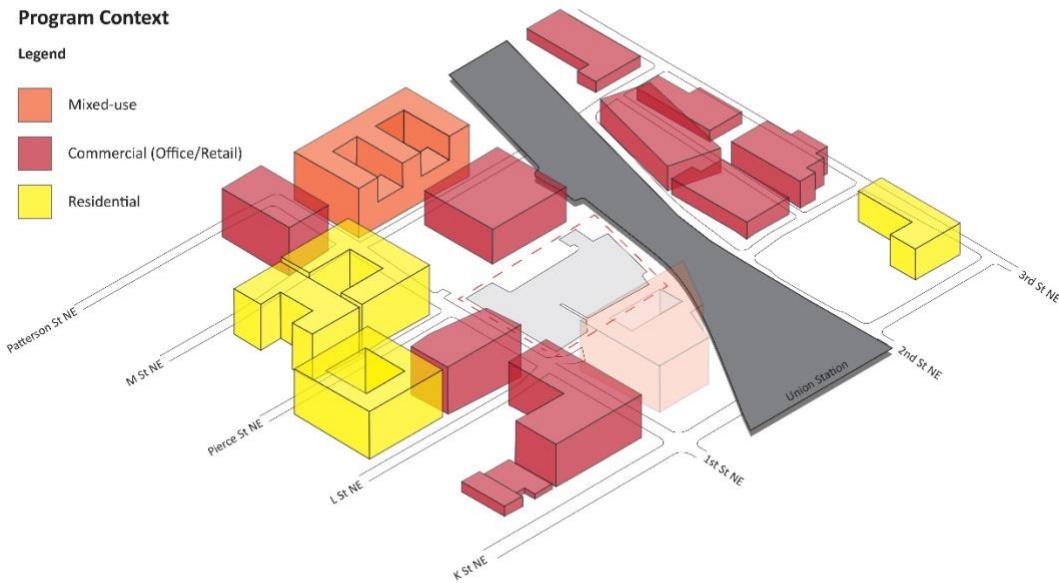


Figure 21: Program Context (source: author)

The site is located within the D-5 district, which houses high-density commercial and mixed-use. The FAR for this zone 6.5 for non-residential uses with 100% lot occupancy and 0.20 green area ratio. Full standards are shown below:

Development Standards								
	Floor Area Ratio (max.) <sup>1,2</sup>	Height (ft.) <sup>2</sup>	Penthouse Height (ft.)/Stories	Lot Occupancy (percentage) <sup>3</sup>	Rear Setback (ft.)	Side Setback (ft.)	Green Area Ratio	Zoning Regulation Reference
D-5	None	130 (fronts on right-of-way of at least 110 ft.)	20		2.5 in. per 1 ft. of vertical distance from the mean finished grade at the middle of the rear of the structure to the highest point of the main roof or parapet, but not less than 12 ft.	If provided, at least 2 in. wide for each 1 ft. of height of building but no less than 5 ft.	0.20	Subtitle I, Chapter 5
		120 (fronts on right-of-way of at least 100 ft. but less than 110 ft.)						
	6.5 (non-residential)	110 (fronts on right-of-way of at least 90 ft. but less than 100 ft.) No taller than the width of the street right of way, plus 20 ft (on streets less than 90 ft)	1 plus mezzanine; Second story permitted for penthouse mechanical space	100				

Figure 22: Washington D.C. D-5 Zoning Standards (source: DC Office of Zoning)

## Site Dimensions

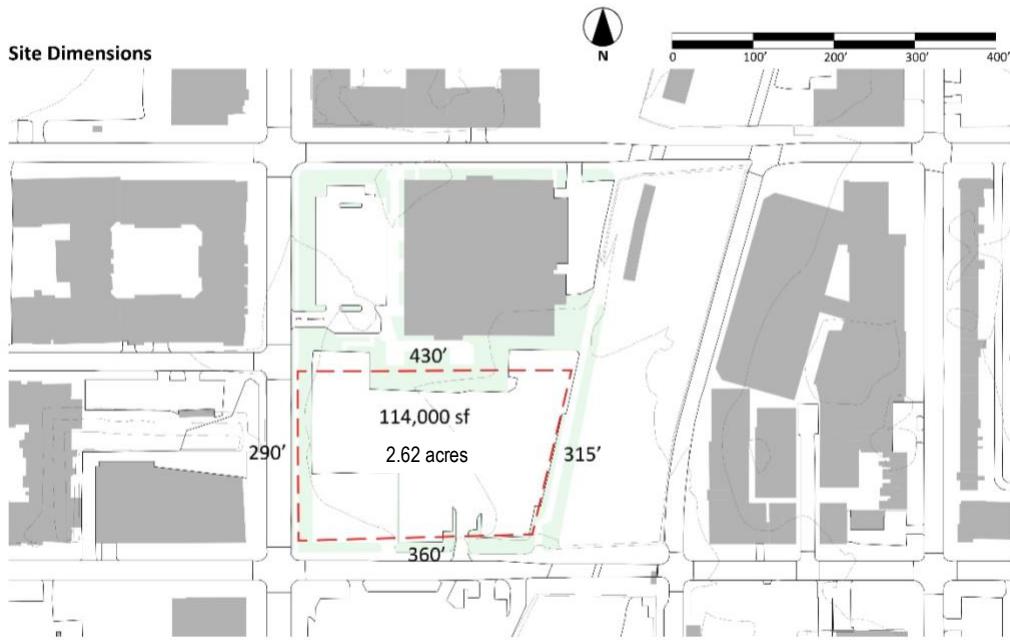


Figure 23: Site Dimensions (source: author)

## Topography

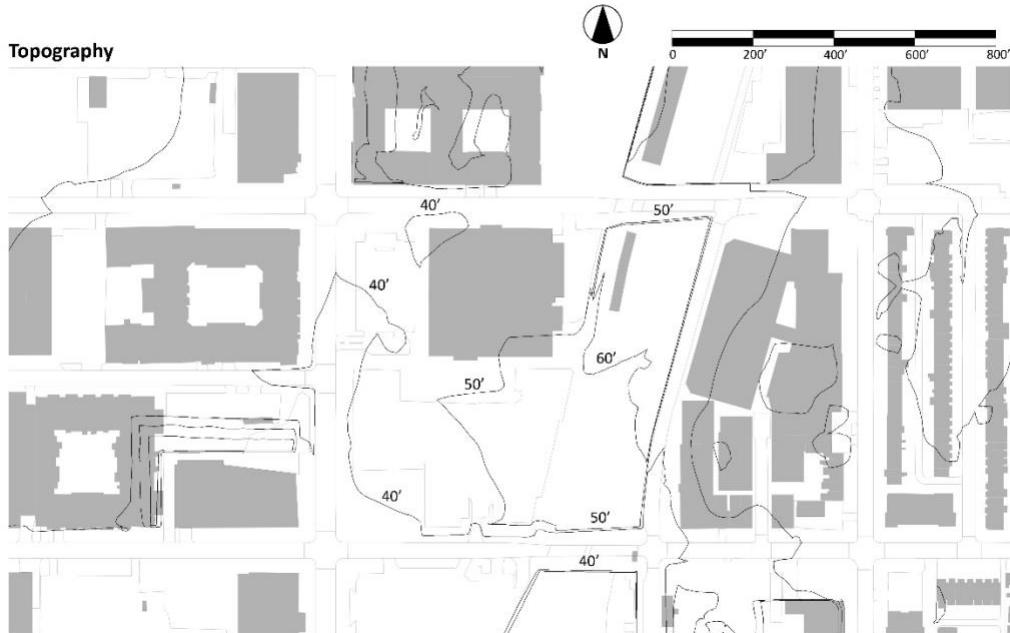


Figure 24: Topography (source: author)

## Solar

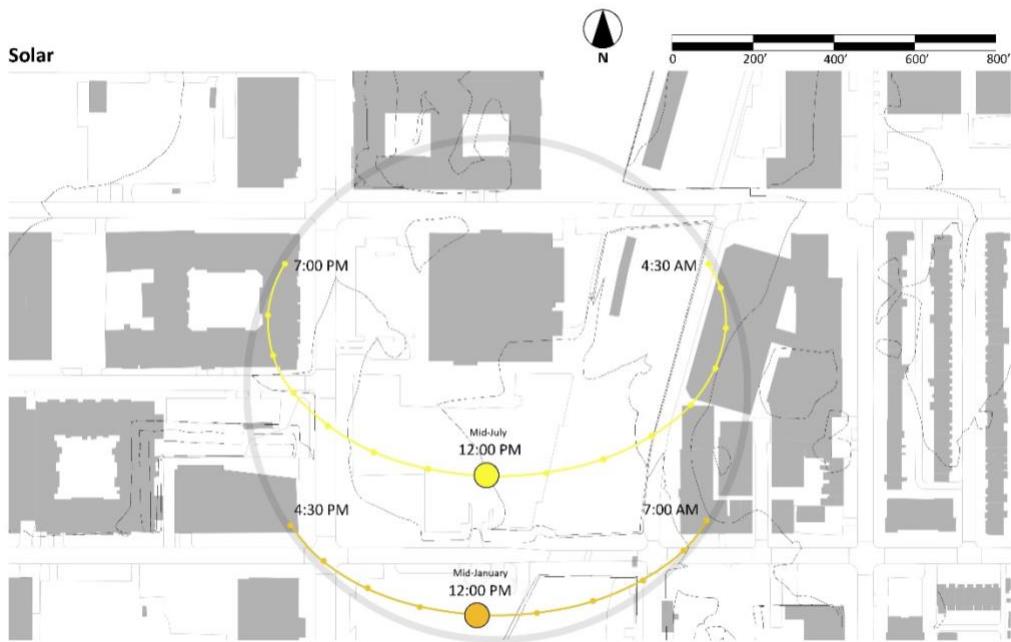


Figure 25: Solar (source: author)

## Noise

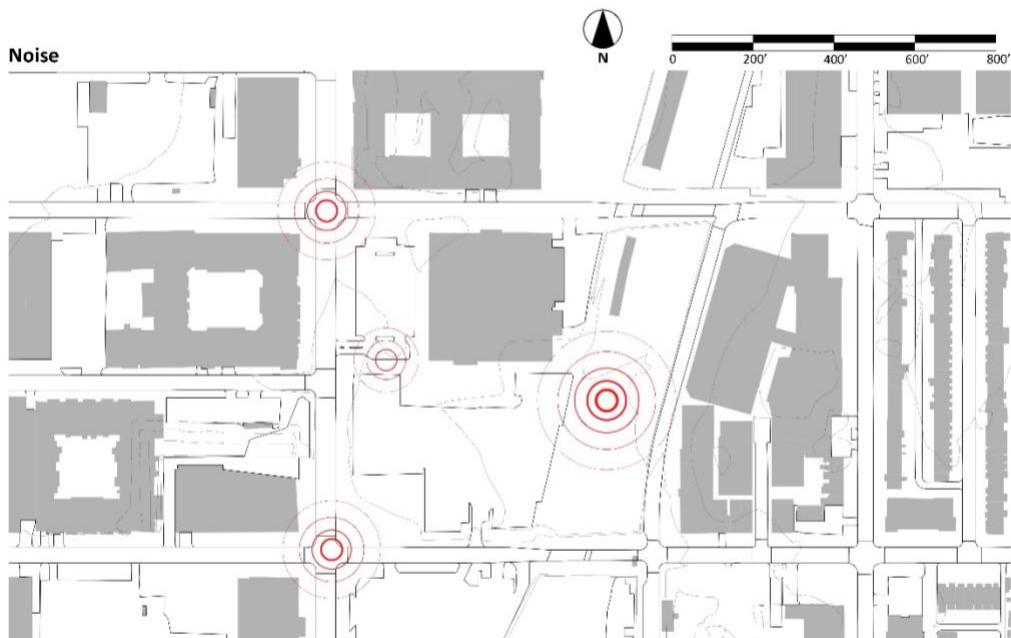


Figure 26: Noise (source: author)

### Contextual Façade Study along Union Station Tracks

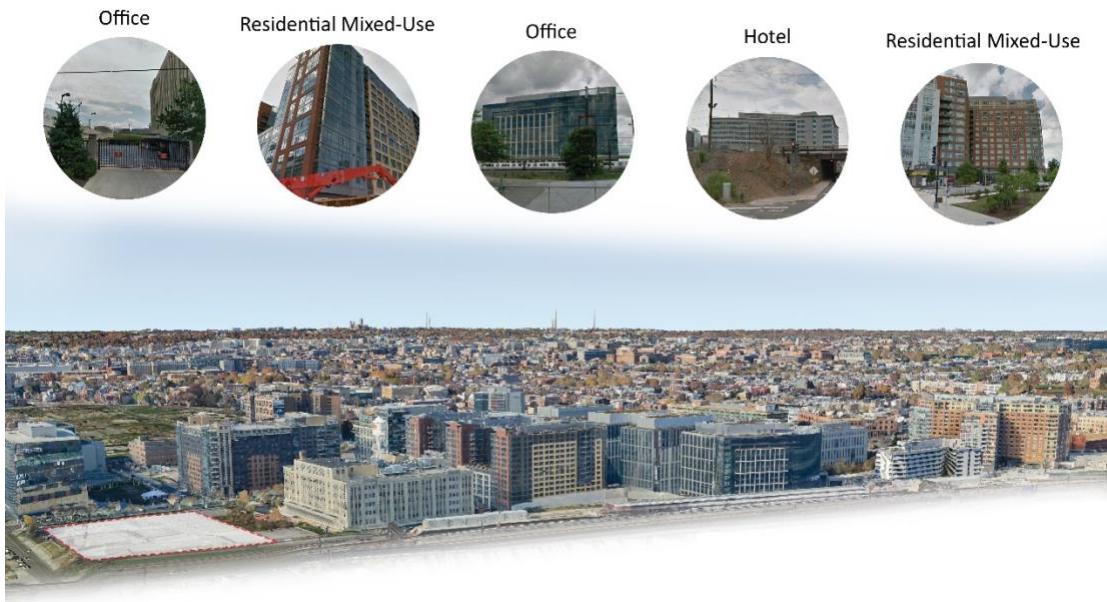


Figure 27: Zoning Map along Rail Line (source: author)

As mentioned prior, many high-rises along the rail line struggle with originality and innovation. With the rail line being a steady source of noise and obstructing views, adjacent developments continue to struggle with challenging these nuisances.

Whether it's some use of screening, buffers, vegetation, etc., one can see that façade treatments remain constant along all four sides of the buildings that are overlooking the tracks on at least one side. This creates controversy at both the building and urban scale, all while challenging wellness at the individual level.

## Precedent Study

### Danish Architecture Center (BLOX), Copenhagen, Denmark



Figure 28: BLOX Exterior (source: author)



Figure 29: BLOX Section (source: author)

Rem Koolhaus

Mixed-use

6 Stories

Building Footprint: 29,600 sq. ft.

Gross Square Footage: 177,600 sq. ft.

This precedent is a public facility and integrates housing within various floors of office space. While the building footprint and gross square footage is at a much smaller scale than the following examples, vast daylight utilization and successful integration of various use types makes for a highly effective sequence of spaces.

### 1250 Half St SE, Washington, D.C.



Figure 30: 1250 Half St (source: author)



Figure 31: 1250 Half St Roof Terraces (source: author)

Jair Lynch Real Estate Developers

Mixed-use

10 Stories

Building Footprint: 36,500 sq. ft.

Gross Square Footage: 360,600 sq. ft.

Residential Units: 430

This precedent jumps up in scale with a gross square footage of 360,000 sq. ft.

Despite the similar building footprint, this development is starting to speak to the high-density FAR that is common in mixed-use neighborhoods like NoMa. Among the 10 floors, 430 residential units are available.

### **City Market at O, Washington, D.C.**



Figure 32: City Market from the South (source: author)



Figure 33: City Market from the North (source: author)

Shalom Baranes Associate Architects

Mixed-use

9 Stories

Building Footprint: 47,500 sq. ft.

Gross Square Footage: 749,600 sq. ft.

Residential Units: 363 Residential

230 Hotel

This precedent really utilizes the site by optimizing the site occupancy percentage and altering façade treatments (glazing and materiality) on the various sides of the development. As mentioned prior, these strategies tend to be lacking within the immediate context of the NoMa mixed-use districts.

# Program Investigations

## Mixed-Use High-Rise

### Living Spaces

Living Spaces				
Residential Units				
Quantity:		Sq. Footages:		Totals:
1	Lobby	@	2,000 sq. ft.	2,000 sq. ft.
80	3 Bedroom Units	@	1,500 sq. ft.	120,000 sq. ft.
120	2 Bedroom Units	@	1,000 sq. ft.	120,000 sq. ft.
100	1 Bedroom Units	@	600 sq. ft.	60,000 sq. ft.
60	Live / Work Units	@	1,500 sq. ft.	90,000 sq ft.
				<u>392,000 sq. ft.</u>

Figure 34: Living Spaces (source: author)

### Work Spaces

Work Spaces				
Commercial Spaces				
Quantity:		Sq. Footages:		Totals:
1	Lobby	@	2,000 sq. ft.	2,000 sq. ft.
2	Offices	@	500 sq. ft.	1,000 sq. ft.
1	Mail Room	@	500 sq. ft.	500 sq. ft.
1	Loading Dock / Waste	@	1,000 sq. ft.	1,000 sq. ft.
2	Large Retail	@	20,000 sq. ft.	40,000 sq. ft.
10	Small Retail	@	1,500 sq. ft.	15,000 sq. ft.
2	Restaurant	@	5,000 sq. ft.	10,000 sq. ft.
30	Office Units	@	1,500 sq. ft.	45,000 sq. ft.
4	Live / Work Lounge	@	750 sq. ft.	3,000 sq. ft.
				<u>117,500 sq. ft.</u>

Figure 35: Work Spaces (source: author)

## Wellness Spaces

Wellness Spaces			
Recreation Spaces			
Quantity:		Sq. Footages:	Totals:
1	Fitness Center	@ 20,000 sq. ft.	20,000 sq. ft.
4	Rooftop Terraces	@ 2,500 sq. ft.	10,000 sq. ft.
2	Open Greenspaces	@ 5,000 sq. ft.	10,000 sq. ft.
1	Outdoor Pool Space	@ 4,000 sq. ft.	4,000 sq. ft.
2	Basketball Court	@ 4,700 sq. ft.	9,400 sq. ft.
2	Tennis Court	@ 2,100 sq. ft.	4,200 sq. ft.
			<b>57,600 sq. ft.</b>

Figure 36: Wellness Spaces (source: author)

## Miscellaneous Spaces

Misc. Spaces			
Underground Parking			
Quantity:		Sq. Footages:	Totals:
2	Total Sq. Footage of Lot	@ 114,000 sq. ft.	228,000 sq. ft.
Mechanical, Circulation, and Structure			
Quantity:		Sq. Footages:	Totals:
20%	Net Sq. Footage	@ 567,100 sq. ft.	<b>113,420</b>
			<b>680,520</b>

Figure 37: Misc. Spaces (source: author)

## Program Blocking

### Graphic Representation

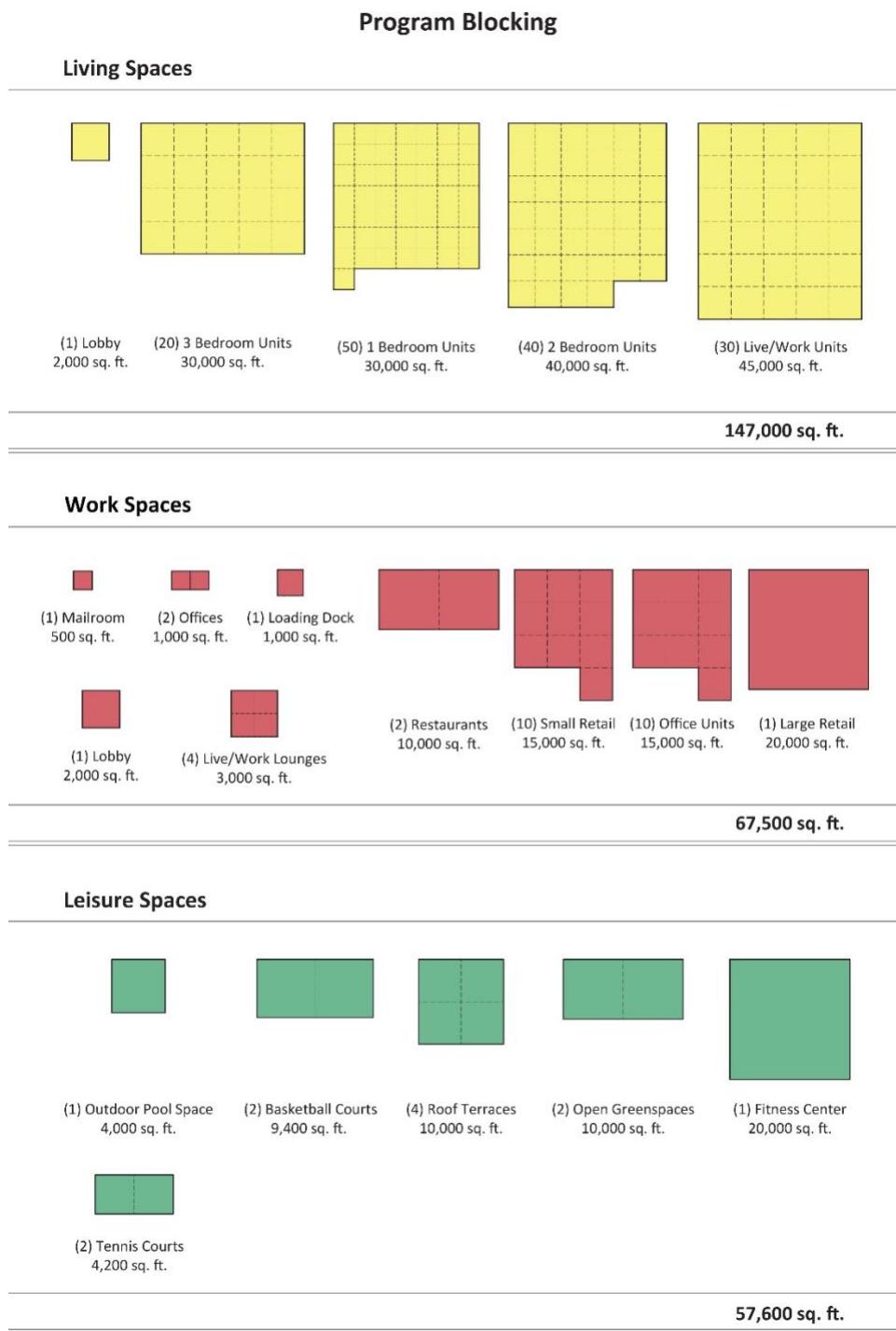
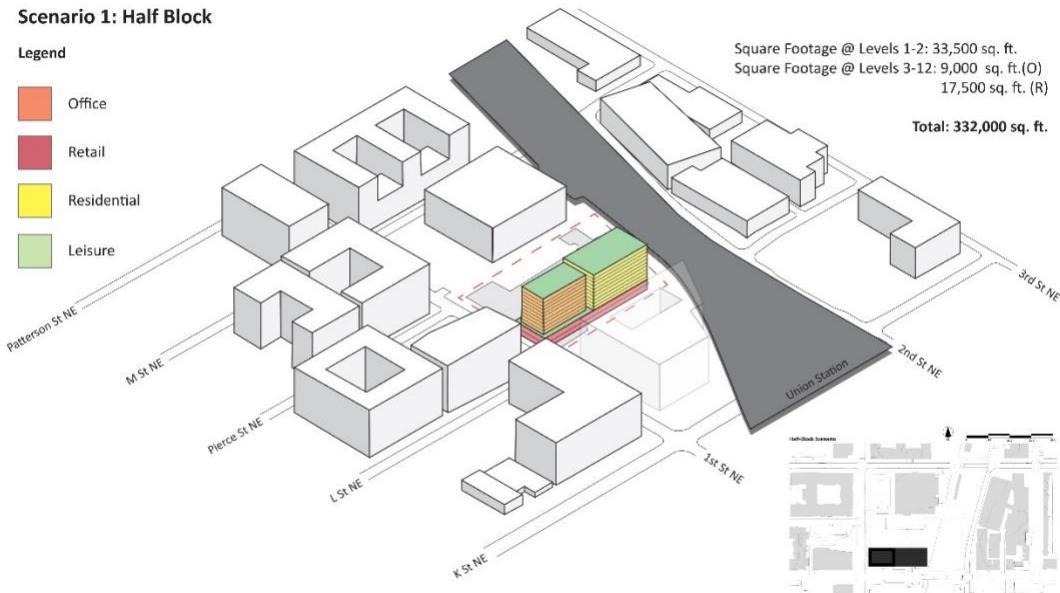


Figure 38: Graphic Blocking (source: author)

The graphic blocking is representative of a gross square footage of 326,520 sq. ft. This total is more of a baseline for the first scenario of stacking the blocking on and across the site. The three scenarios will begin to look at potential lot sizes of the greater lot with sub-dividing as an option. As stated prior, the overall site spans 114,000 sq. ft. With the FAR set 6.5 and lot occupancy percentage at 100, the total square footage for a full-block scenario would be around 741,000, without taking setbacks and incentives into consideration. That lot total of 114,000 sq. ft., subdivided, or cut in half, is 370,500 gross sq. ft.

### Scenario 1



*Figure 39: Graphic Stacking 1 (source: author)*

In this scenario, the overall lot would be sub-divided, and then 100% of that half would then need to be developed on. The first 1-2 floors would be strictly retail with lobby and minimal office space. The next 8-10 levels would be split between two

towers, one that houses the residential units and one that houses the office space.

Wellness spaces are made up of greenspaces, exercise spaces, and so. These spaces could be inserted on the building, as well as within the building.

## Scenario 2

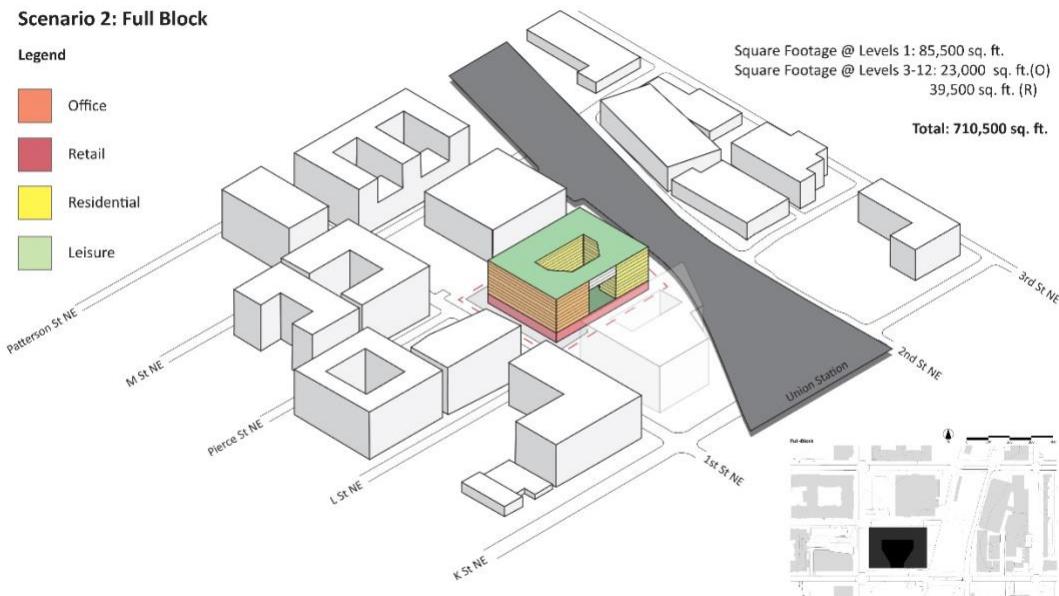


Figure 40: Graphic Stacking 2 (source: author)

This scenario doubles the overall site dimensions, and consequently, the building footprint as well. With the possibility of extending Pierce St across 1<sup>st</sup> Street to create a service drive in between the proposed site and office building to the north, this option utilizes the full block width. As the program is stacked above the retail on the ground floor, residential and office units would be divided across the east facing and west facing quadrants of the building, with a large central core open to the south.

### Scenario 3

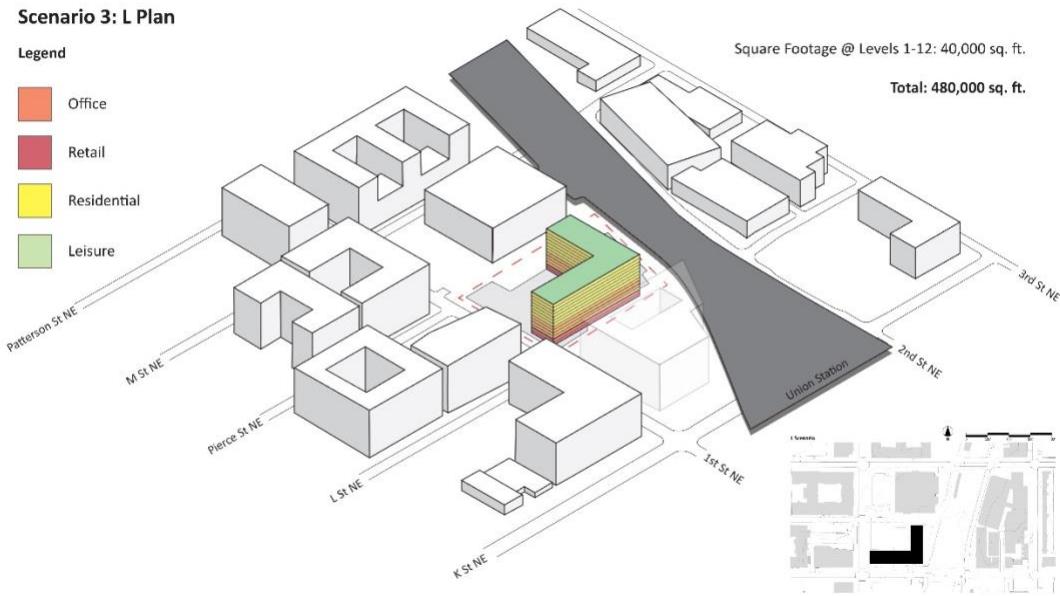


Figure 41: Graphic Stacking 3 (source: author)

This scenario takes the middle ground between the two prior options and forms two strong façade edges that face L St and towards the rail line to the east. As this “L Plan” can be rotated and mirrored within the parameters of the site, this exploration speaks to the possibility of developing some of the site as actual open space at ground level.

# Design

## Parti

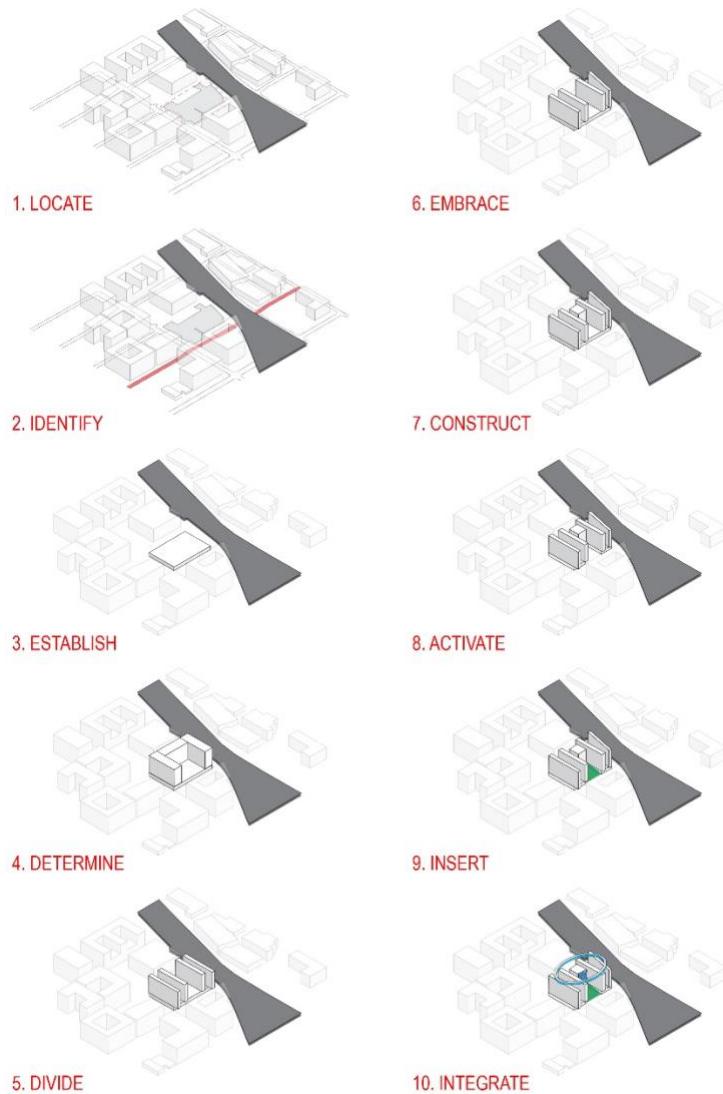


Figure 42: Parti Sequence (source: author)

The site was exploited with massing that responded to the primary access of L Street (south) and 1<sup>st</sup> Street (west). The greatest challenge of the site was coexisting with the hard edge of the Union Station metro rail line to the east. With the incoming retail along the ground level of the NoMa Junction across the street, public engagement along L Street was integral.

With 2-3 levels of retail and office established at the base of the building, a mixed-use foundation could then support the residential units that would follow. When determining the orientation and massing of the residential bars, exposure to natural light and air for all of the individual units was prioritized. Beyond that, courtyards that would house wellness spaces and open greenspace would be located between the footprints of each of the main bars.

Ultimately, four residential massings were oriented on the north-south axis with east-west sun exposure. Wellness comes in many different shapes and sizes, and so did the greater entirety of the residential bars. The long 405' edge of the base was divided between two double-loaded corridor bars that were placed within the core, supported with two single-loaded corridor bars that carried the outer edges of the development. As shown in Step 5, three courtyards were then left to compliment the connection between the bars at the newly established third level.

From step 6 and on, the west bar was rotated 9 degrees to carry the irregular edge of adjacent rail line, a wellness core was constructed, and wellness spaces were integrated to connect the street to the core of the development at the newly defined third level.

## Design Solution

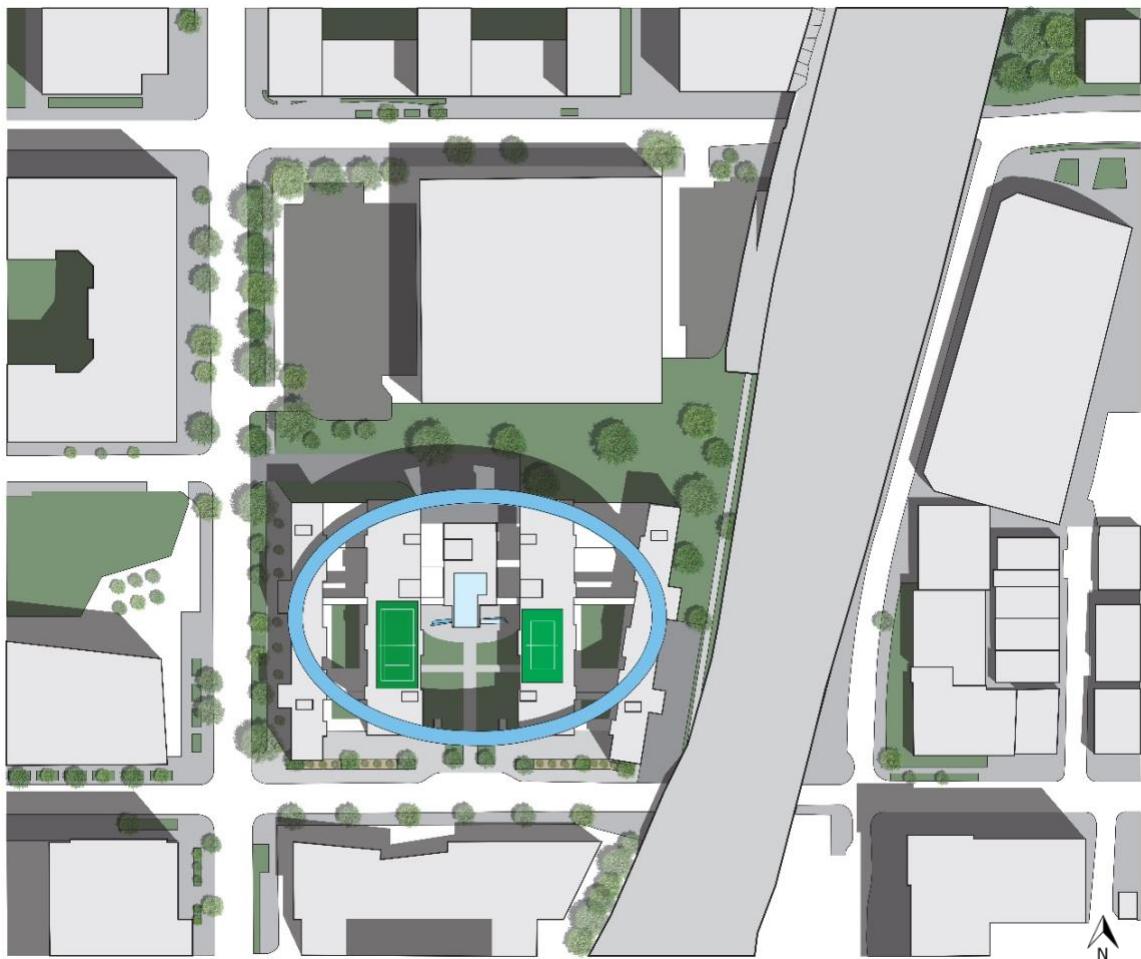


Figure 43: Site Plan NTS (source: author)

The mixed-use development plays into the primary public access along L Street as well as the secondary access from 1<sup>st</sup> Street. Walkability around and through the site is fundamental to not only the private residents, but for the public as well. Point-of-decision prompts, such as prominent stairs, and visual proximity to the rock climbing wall and sky track exemplify the sequence from destination to destination, all while encouraging healthy decisions to be made.

The site is lined with large and small retail along the south and southwest edge of the primary streets with the service tucked within the east wedge and north entry of the

building. One main wellness courtyard is accessed directly from the street level while the two secondary courtyards are elevated up onto the third level. The addition of open greenspace within these courtyards and in between the building and the tracks and existing office building to the north provide a desirable buffer for anyone that will be experiencing the site and its various spaces.

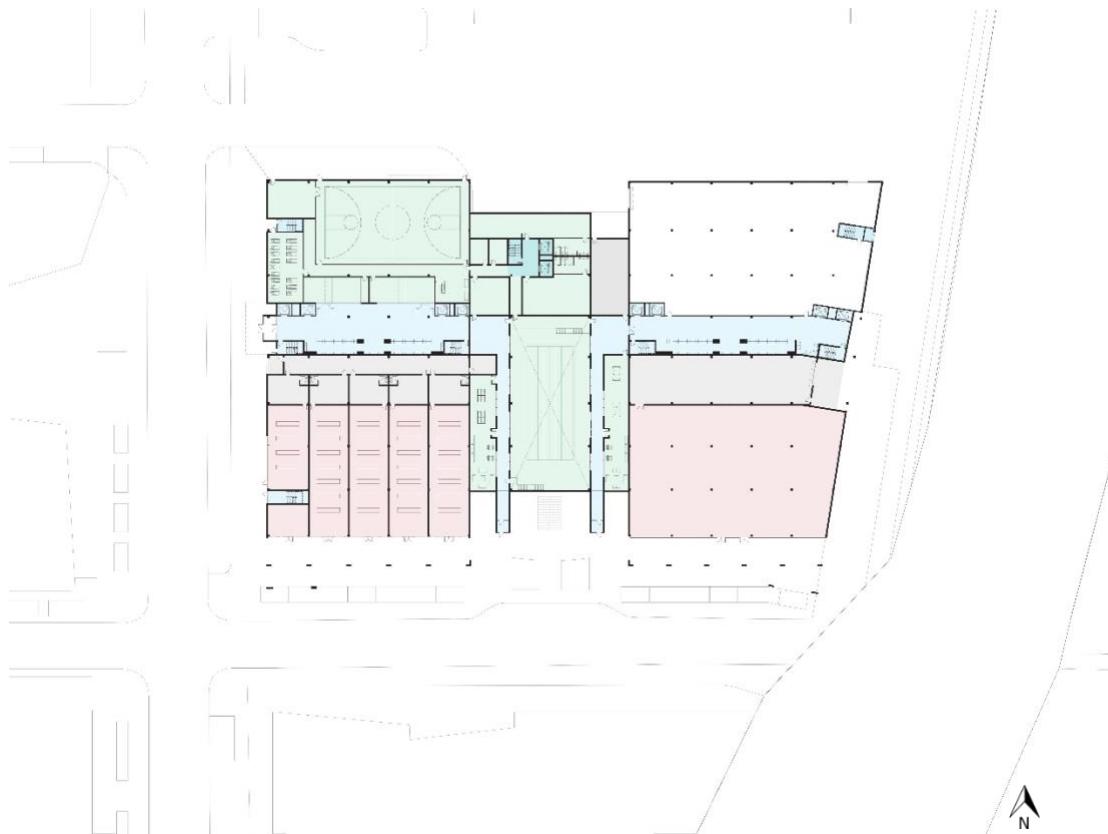
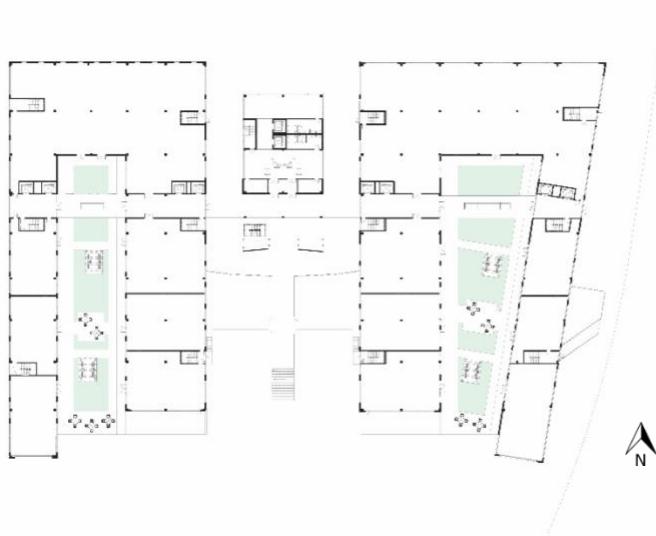


Figure 44: Ground Floor Plan NTS (source: author)

On the ground floor, circulation is highlighted in blue, retail is highlighted in red, service is highlighted in gray, and wellness/amenities are highlighted in green (parking is open space). The primary private entry points into the main vertical circulation lobbies are accessed through the extending corridors that reach out to L Street to the south. A secondary entry point is located in the middle of the west façade

along 1<sup>st</sup> Street. This gallery-expanding lobby extends to edges of each of the residential wings that are located above. In between the circulation, lies the wellness spaces that are controlled through the entry into the wellness core at the third level. The retail lining the south is flanked with service space that creates a buffer between these two major space types. Parking in the northeast corner of the building is accessed from the service drive along 1<sup>st</sup> Street.



*Figure 45: Third Floor Plan NTS (source: author)*

At the third floor, all three courtyards, wellness core, as well as the east and west wings of office space all become connected. Entry into the wellness core is controlled at this level, while the public can cut through each courtyard to get to any of the office spaces that are provided. All three of these courtyards provide open space for various activities, as well as more concentrated zones for seating and interaction. The secondary courtyards are respectively capped with a library and daycare at each of the north ends. The east wing has direct egress to the infill that lines the Union Station tracks.



*Figure 46: Typical Floor Plan NTS (source: author)*

The upper floors that house the residential units span from level 4 to level 12. The typical plan that is shown above demonstrates the corridor paths that mimic the main circulation paths that are established on the ground and third level. The longest corridor spans the entire length of the building from the east to west edge, while dissecting the front of the wellness core's fitness center. The two shorter connecting corridors link the vertical circulation lobbies above each of the smaller secondary courtyards that are below. Additional space for wellness activities are located at the end of each of these long spanning corridors. These spaces range in program, providing space for leisure, relaxation, yoga, gathering, etc.

As shown in Figure 47, full-circulation floors that are shown above are only located at level 5 and level 10. The double-loaded, internal bars provide only flat units while the single-loaded external bars vary between flat and duplex units. The duplex units are shown along the west wing of the typical floor plan. These two-story units are located at levels 6-9 and 10-11.

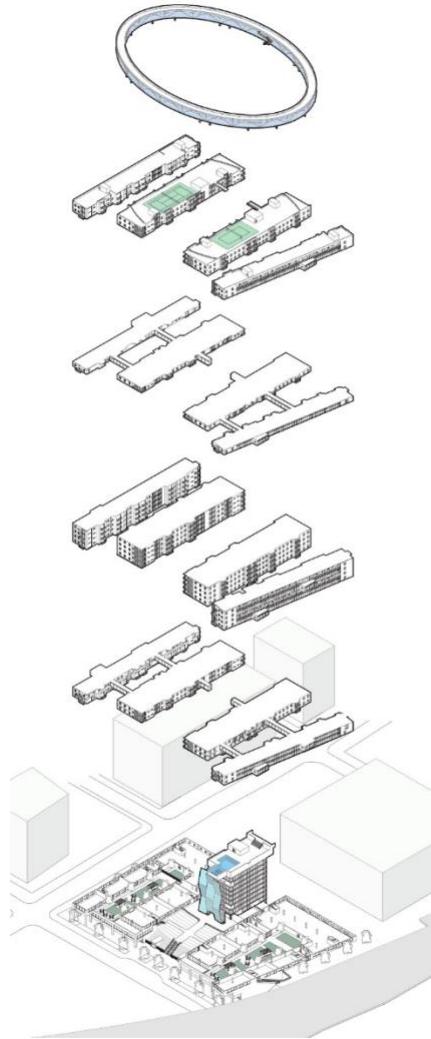


Figure 47: Exploded Axon (source: author)

In this exploded axon, the sequencing of floors is shown. At the shared ground and third level, the connection from the street level and through the wellness core, three courtyards, and office space is shown. The two internal double-loaded corridor bars stay the same from floor to floor, but the external single-loaded corridor bars range in unit type. Starting from the first sequence of floors above the shared ground level and wellness core, are levels 4 and 5, containing flats only. Levels 6-9 contain two sets of stacked duplex floors with the corridor present only on levels 6 and 8. Level 10 is a

full-circulation floor, identical to level 5, that also contains only flats. Levels 11 and 12 cap the residential unit floors with duplex units and a corridor only on level 11. The occupiable roof is located above level 12 with amenities such as a pool, tennis court, volleyball court, and sky track. The track bares directly on the four bars and encapsulates all of the amenities that are housed on the roof.

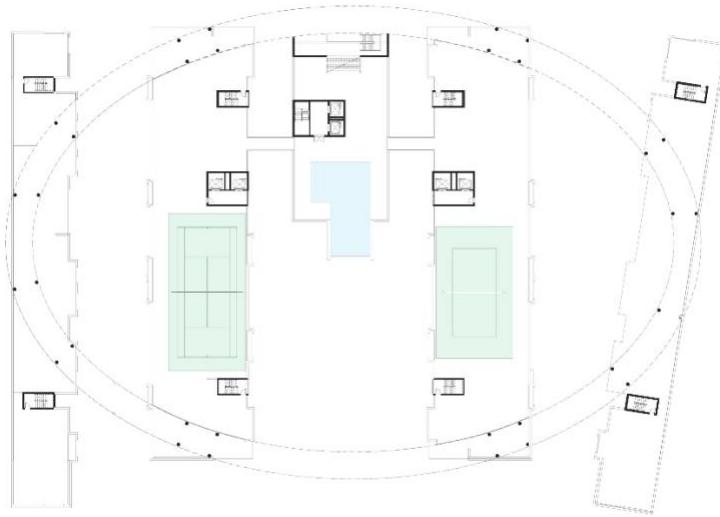


Figure 48: Roof Plan NTS (source: author)

The roof plan complements the wellness spaces that are located around, throughout, and on the building by providing additional spaces on top of the building. A pool located on top of the wellness core cantilevers over the rock climbing wall below. The poolside terrace provides access to the sky track that's above as well as bridges the adjacent roofs atop of the double-loaded residential bars. All vertical circulation within these bars connect to the roof, providing egress for the entire roof and sky track. Engagements such as playing tennis, volleyball, running, swimming, and climbing are all activities that will influence healthy decision making choices for all residents and visitors of the greater complex.



*Figure 49: Elevations NTS (source: author)*



Longitudinal - A



Transverse - B

*Figure 50: Sections NTS (source: author)*

## Sequence



*Figure 51: L Street Approach (source: author)*

When approaching the building from any direction, the sky track will most likely be the first thing someone sees. When coming from the intersection of 1<sup>st</sup> and L Street, one will see retail and vegetation lining the street edges. Public engagement at the street level is nothing out of the ordinary, but everything above those two levels is.

The housing units are split into four major bars that encourage residents to be out on their balconies spectating all of the activity that is taking place within the active community. Whether it's the interaction that is being observed on the rock climbing wall, up within the courtyards, or in the cantilever pool, this development blurs the lines between a mixed-use housing and recreation center.



*Figure 52: Wellness Courtyard (source: author)*

Once approaching the core of the development from L Street, residents and visitors are greeted with private access to the main lobbies or a stair that will take them right up into the wellness courtyard. A pull-off lane is located along this central axis to provide easy drop-off and pickup opportunity. Between the retail and wellness core housing all of the recreation spaces, the building houses more functions than just strictly private resident access.



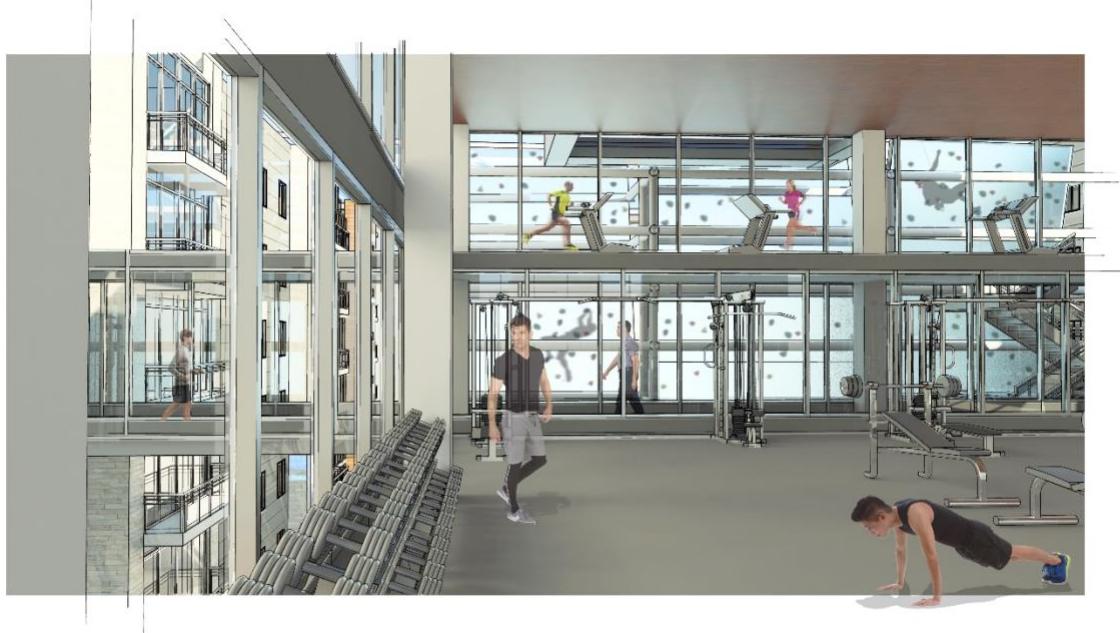
*Figure 53: Courtyard (source: author)*

After proceeding up to the main third level, two semi-private courtyards provide a destination that can provide a place for rest or interaction, as well as direct individuals across the site and up to their units. Excessive balcony space is also provided above each of the courtyards to give the residents more of a desire to step outside and experience nature from a different vantage point. Trees and vegetation are provided to create a natural buffer between the office space and open greenspace towards the centers of these spaces. As shown above, semi-private bridging between residential wings are visible from any area of the courtyard below. The sky track also wraps around both of these courtyards, continuously encouraging decision making that's geared towards physical activity.



*Figure 54: Residential Balcony (source: author)*

Building off of the courtyards, are the actual residential units themselves. Extensive glazing and balcony space are provided for natural circulation and daylighting. Interaction doesn't have to be face to face on the ground level, as neighbors can interact from balcony to balcony, while still being somewhat separated from one in another. At higher levels, residents will be able to see activities that are taking place on the roof such as volleyball or tennis.



*Figure 55: Fitness Center (source: author)*

The fitness center spans several floors within the wellness core. As shown in the typical floor plan, full-circulation paths are present on levels on 5 and 10. Fully enclosed corridors pass in between the rock climbing wall and south-facing façade of the fitness center to create a connection between typical circulation flows and physical activity. From the corridor, one is forced to walk in between continuous exercise. Within the fitness center itself, occupants are exposed to the typical circulation and interaction of residents while witnessing individuals climb up the side of the building or swim off of the poolside terrace edge.



*Figure 56: Tennis Court (source: author)*

Now on top of the occupiable roof, the wellness court spills recreation spaces across the roofs of the residential bars. Much like courtyards at the third level, these spaces provide space for interaction and engagement. A volleyball and tennis court provide spaces for pickup sports games. The sky track can be accessed directly from the roof of the wellness core behind the poolside terrace.



Figure 57: Sky Track (source: author)

The sky track acts as a sculptural piece that challenges the height restriction in the city. The track provides a panoramic view over the greater context of the site, from within the enclosed track, as well as above on the open level. The track caps the top of the development, and can be experienced from many different vantage points. Whether someone is on the street, in a courtyard, on their balcony, or within the actual track itself, it will always be encouraging healthy choices.



*Figure 58: Union Station Approach (source: author)*

Panning away the building itself, the track still remains a prominent attraction in the sky. When approaching the site from the metro, the track extends past the edge of the east-facing façade, while wrapping all the way around the far west wing of the building along 1<sup>st</sup> Street. The track physically and theoretically houses wellness for anyone that witnesses it.

## Conclusion

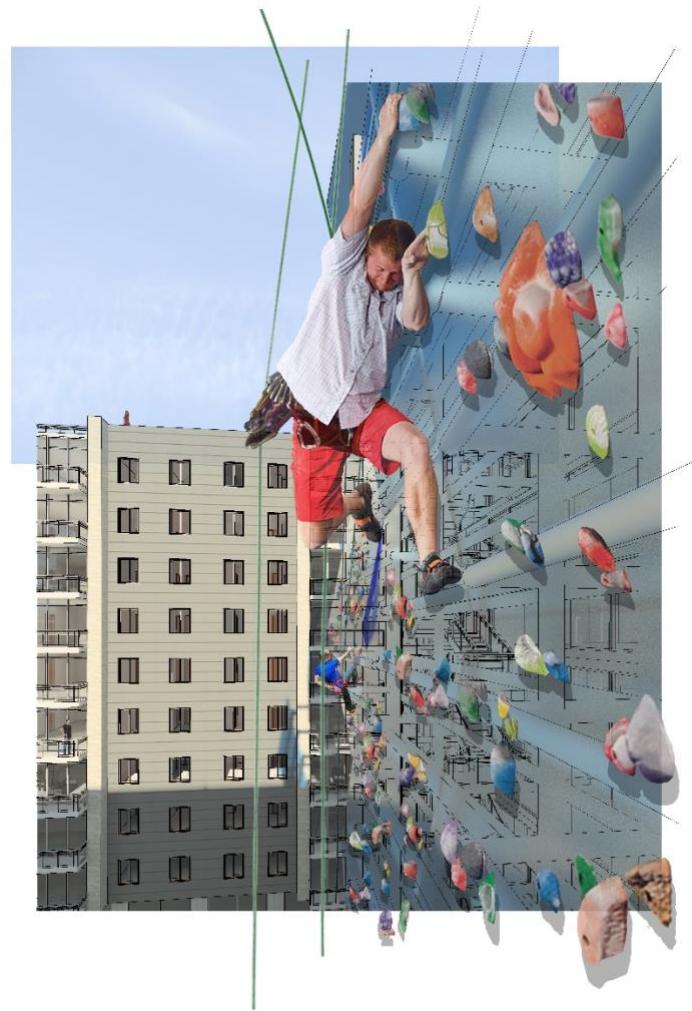


Figure 59: Rock Climbing Wall (source: author)

Wellness is an aspect of design that prioritizes the building occupants' well-being, happiness, and productivity. Everyone experiences and reacts to their atmosphere differently, making wellness a spectrum-based process. Space can be categorized into three major categories: living, working, and wellness. Whether interior or exterior, manmade or natural, space can be simplified into individual atmospheres that everyone interprets differently. These three major spaces can ultimately be combined

to create a conglomerate of space that house all of the essential program uses and services that any given individual may need on a daily basis.

Mixed-use development is a type of urban development that blends these spaces, formally known as residential, commercial/retail, and entertainment, to create one integrated network of programs. At an urban scale, mixed-use development becomes highly sought after. Amenity and convenience streamline the functions of daily activities by providing different services in one place.

Washington, D.C. is a city that faces great levels of traffic congestion, high-density zoning, and a height restriction for all development. NoMa (North of Massachusetts Avenue) is an emerging neighborhood located just north of the U.S. Capitol and Union Station that houses a great deal of mixed-use development. Office, residential, and mixed-use buildings all suffer from these three major limitations in the city, both in massing and façade complexity.

On a site that spans a full block from the west edge of 1st Street to the rotated east edge of the Union Station tracks, an opportunity for this type of mixed-use development becomes apparent. In a community that already promotes walkability, access to the adjacent Union Station and NoMa Pennsylvania Ave Metro stations expands the opportunities of pedestrians looking for additional amenities and services beyond the confides of their own neighborhood. Outside of the positive outcomes that come with metro connectivity within the city, the neighborhood still lacks open space, greenspace, and variation of wellness spaces.

High-density residential development stems from the basis of resident and building performance profitability in the eyes of the developer. Wellness needs to be incorporated into the design of all residential housing as a best practice strategy. Wellness spaces are a necessity for individuals to thrive in life through prolonged happiness and success. A fitness center or basketball court in a basement will get used by some, but not by as many as it ultimately could be if placed at a prime location instead. Commercial and retail space needs to have primary access for developers to invest in those specific services within a mixed-use development. Wellness spaces do not necessarily need to be located along a primary street, but should still be prioritized along circulation paths.

In a world where a percentage of the American population is always conscious of how many calories they have burned, steps they have walked, and minutes of physical activity they have taken part in on a daily basis, many individuals are still thriving for healthier lifestyles (physically). Fitbits and Apple Watches are some of the tools that can make this information so readily available. However, this information has now reached the point where it is just a given. These tools automatically provide performance results but fail to persuade individuals to do such physical activities.

In a neighborhood such as NoMa, running along the busy city streets may be challenging. Someone wanting to improve their physical health is one thing, but having the ability and services to do so is another. Something along the lines of 100' rock climbing wall cannot be found anywhere in the area. With these amenities now showcased right within the core of a mixed-use residential complex, these services will now encourage engagement at all times. Much like mixed-use development in a

vacuum, convenience and temptation is essential. If retail and commercial spaces coupled with residential units improves profitability, wellness spaces will only add to that equation. Wellness services improve individuals from a personal and molecular level, enhancing their happiness, productivity, and efficiency. Buildings are constructed for the people that are inhabiting them, and those people can't reach their highest potentials without wellness being brought to the forefront of all design intention.



Figure 60: Presentation Boards (source: author)

## Bibliography

“Circadian Rhythms - How Sleep Works.” HowSleepWorks. Last modified 2018, accessed March 30, 2018, [https://www.howsleepworks.com/how\\_circadian.html](https://www.howsleepworks.com/how_circadian.html).

“The Connection Between Space and Wellness.” Little Diversified Architectural Consulting. Last modified 2018, accessed March 27, 2018, <https://www.littleonline.com/think/the-connection-between-space-and-wellness>.

“Living Building Challenge 3.0: A Visionary Path to a Regenerative Future.” *International Living Future Institute*. Last modified 2014, accessed May 17, 2018, <https://living-future.org/wp-content/.../Living-Building-Challenge-3.0-Standard.pdf>

“Nine Dimensions of Wellness.” Auburn University. Last modified 2018, accessed March 24, 2018, <https://cws.auburn.edu/studentaffairs/healthandwellness/about/?Nine Dimensions>.

Park, Nansook, and Christopher Peterson. "Achieving and Sustaining a Good Life." *Perspectives on Psychological Science*, no. 4 (2009): 422-28. Accessed March 24, 2018. <http://www.jstor.org/stable/40645711>.

Parks, Donte. “The Six Kinds of Space.” Substantial. Last modified 2014, accessed March 27, 2018, <https://substantial.com/blog/2014/07/28/the-six-kinds-of-space/>.

“The Well Building Standard: Version 1.0.” *International WELL Building Institute*. Last modified October 20, 2014, accessed May 17, 2018, <https://www.wellcertified.com/en/standard/download>.

Wymelenberg, Kevin. "The Benefits of Natural Light: Research Supports Daylighting's Positive Effect on Building Performance and Human Health." ArchLighting. Last modified 2014, accessed March 30, 2018, <http://www.archlighting.com/technology/the-benefits-of-natural-light>.