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Inspiring a Ripple: A Case for Evidence-Based, Biophilic Design for Affordable Housing

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INSPIRING A RIPPLE

a case for:

Evidence-Based, Biophilic Design for Affordable Housing

a thesis proposal by Chelcey Dunham

INSPIRING A RIPPLE

A CASE FOR
EVIDENCE-BASED, BIOPHILIC DESIGN
FOR AFFORDABLE HOUSING

CHELCEY DUNHAM
MFA | 2024| INTERIOR DESIGN |VCU

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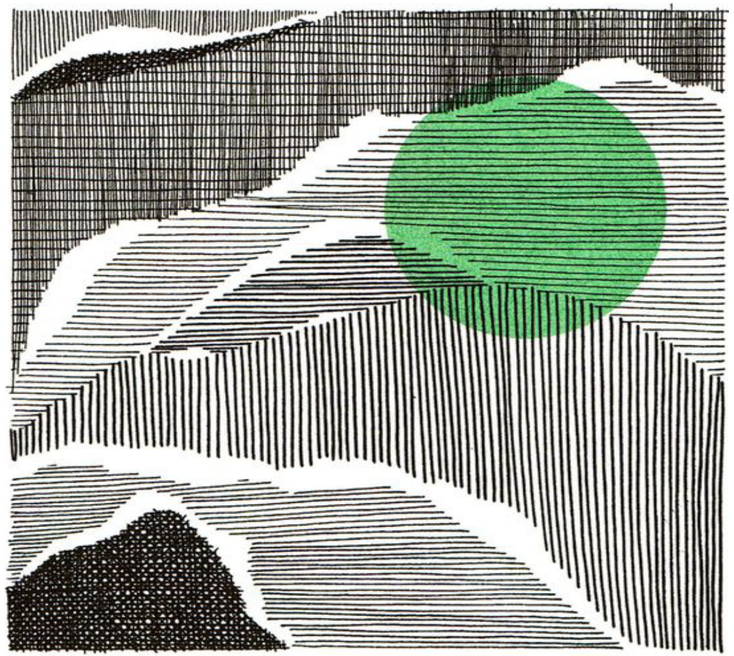
Project Statement



Abstract Landscape | Risograph Print | Rachel Elwell Art

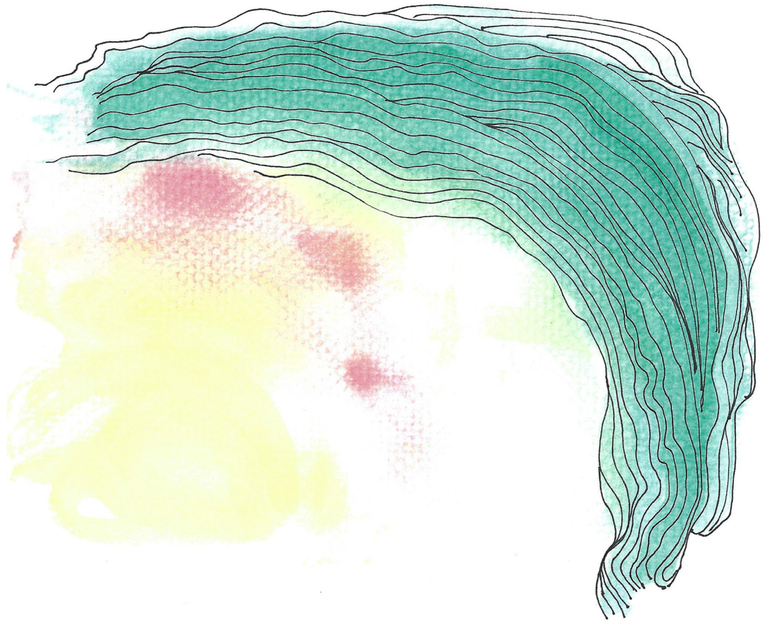
PROJECT STATEMENT

Responding to the increasing need for housing and set within a 1930s concrete warehouse,
this affordable housing design includes fourteen residential units, a lobby, a community club house, and a central courtyard. The design is informed by Evidence-Based, Biophilic Design as a means for enhancing individual and community well being, as well as increasing the return on investment of government funding.

PERSONAL STATEMENT

In my first career as a social worker, one of my jobs was as a "housing specialist" for which I performed HUD prescripted housing inspections as part of the administration of a subsidy program. These HUD inspections were one hundred percent geared toward safety concerns as a means of liability protection as well as overall concern for the safety of the recipients of the subsidy. It struck me then, as it does now, that there is an opportunity for a greater return on investment for subsidized housing, through the implementation of enhanced building guidelines to include design characteristics which are known to have a beneficial impact on well-being. If subsidy funding (ie- tax dollars) could not only ensure safe shelter for those in need, but also enhance individual and community well-being, wouldn't that be of great benefit to *ALL*?

Design Ethos



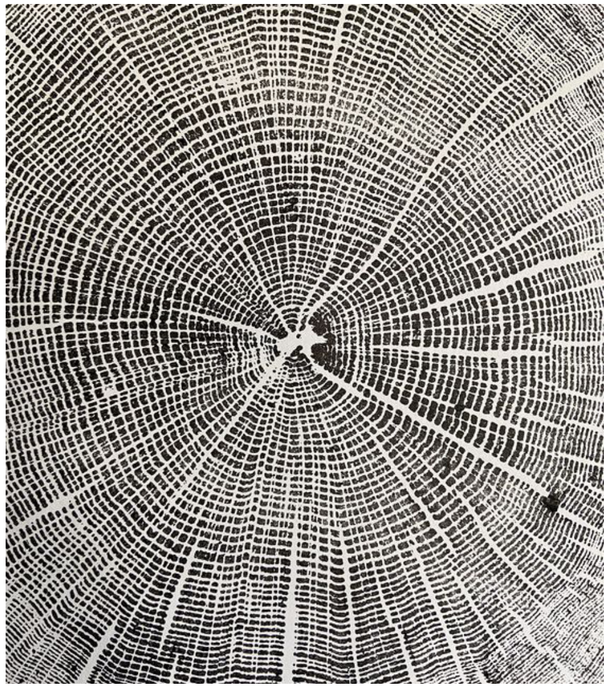
Concept Study | watercolor and pen | Original Artwork

I BELIEVE...

design should be holistically sustainable, user-centric, biophilic, innovative, and beautiful.

SUSTAINABILITY extends beyond environmental concerns to encompass adaptability and efficiency, ensuring timeless, user-friendly designs. **USER-CENTRICITY** prioritizes inclusivity, cultural sensitivity, and empowerment, fostering spaces that cater to diverse needs. **BIOPHILIC DESIGN** enhances well-being by connecting occupants with nature through light, views, and natural patterns. **INNOVATION** drives the exploration of new methods, technologies, and materials to address social and environmental challenges creatively. Lastly, the pursuit of **BEAUTY** adds emotional resonance, enhancing the aesthetic appeal and enriching the user experience. Together, these principles form a comprehensive approach to design that balances functionality, social responsibility, and aesthetic appreciation.

Research



Maine Oak Tree Print | Wood & Ink Print on Paper | Erik Linton

ABSTRACT

RELEVANCE

Currently in the US, 4 million families in need of affordable housing are not housed in affordable units and are spending 30-50% of their monthly income toward rent (Aurand, 2023.) Due to this shortage of affordable housing and the trajectory of its growth, advocacy groups and policy makers are making a push to fund more affordable housing projects. What if the designs of these projects were informed in such a way that individual and community mental health and wellness could be addressed in addition to meeting the demand for affordable, safe shelter? In this way, the return on investment for the funding of these projects would be significantly increased, in the form of the ripple effects caused by increased community well being.

ISSUE/PROBLEM

Government standards for affordable housing projects (and thus, funding initiatives) focus solely on the economics of the building and the physical health and safety of residents (HUD.gov, 2023.) Given the growing body of evidence pointing toward the mental health and well-being benefits of biophilic design, this project makes a call to action to amend current HUD building standards to include biophilic design characteristics so that mental health and well-being are also addressed by tax-payer funded building projects.

CONTEXT

Evidence-based design practices within the healthcare and workplace industries have made significant strides in the last few decades, developing and implementing strategies for successfully bridging research and design practices. (Hamilton, 2009) This has resulted in better informed design decisions that positively affect the health of patients and staff (healthcare) and increased productivity and retention (workplace.) With the general goal of an overall increase in community mental health and wellbeing, to what extent could similar evidence-based design efforts be applied within the affordable housing design industry? And what specific benefits could residents and communities realize as a result of this implementation?

METHODS OF INVESTIGATION

Using relevant existing research, precedents of “social housing” projects in Austria, interviews with current residents of affordable housing projects, and interviews with affordable housing designers Kia Weatherspoon & Sarah McInerney, this project will identify and define specific biophilic design methods in the context of affordable housing design which are particularly likely to have a significant beneficial impact on the overall mental health and well-being of residents, and thus surrounding communities.

OUTCOMES

Research around the impact of home environments on its residents indicates that the built environment has a significant impact on overall mental health and well-being (Amerio, 2020.) Analysis and reviews of research in the areas of environmental psychology, restorative environments, and evidence-based design applied in various building types consistently indicate the principles of biophilic design as an effective framework for making design decisions in the built environment (Hamilton, 2009, Peters, 2021.) Biophilic Design principles include design characteristics that promote the human-nature relationship via exposure to nature itself, natural light, views of nature, and nature imagery/natural patterns.

ENGAGEMENT

Specified, evidence-based, biophilic design methods will inform specific suggestions for additions to the current HUD requirements for affordable housing building projects. Additionally, set within the context of a Mid-Atlantic City of 250,000, a proposal of an affordable housing/adaptive reuse design project will demonstrate a prototype of the identified evidence-based, biophilic design methods.

RESEARCH EXPANSION

THE PROBLEM AND THE OPPORTUNITY

It is not difficult to imagine that in today's post-pandemic-housing-market-bubble-POP, we may be facing shortages in the area of affordable housing. But what does "affordable housing" actually mean, and who is experiencing the greatest challenges to finding affordable homes? The U.S. Department of Housing and Urban Development (HUD) considers housing costs (including rent or mortgage payments, utilities, and other basic housing expenses) that are no more than 30% of a household's gross income to be *affordable*. HUD's definition of affordable housing is used in the context of various government-subsidized housing programs, such as public housing, housing choice vouchers, and multifamily housing initiatives, which are in place to ensure that individuals and families with low incomes have access to affordable, safe, and decent housing options.

What does "low income" mean? Naturally, there are different levels of low income, but they are all calculated based on the Area Median Income (AMI) of a region. There is low income, very low income, and extremely low income. It should come as no surprise that the greatest shortage of affordable housing is with the population that is considered "extremely low income," or, those whose incomes are 30% of the AMI. In most cases, those with extremely low income are also considered to be at or below the national poverty level.

According to the latest annual report of the National Low Income Housing Coalition (NLIHC), there are only 7 million affordable units for 11 million households with extremely low incomes, but of the 7 million, 3.3 million are occupied by households with higher incomes (Aurand et al, 2023.)

In Richmond, Va, where this thesis design project is based, the local government has declared itself to be in a housing crisis, due in part to the 4,000 families on the wait list for affordable housing (VA Housing Commission, 2023.)

What can be done to alleviate this situation nationally, and locally in Richmond? The NLIHC concludes that significant, lasting investments from federal and state governments are vital in addressing the shortage of affordable housing units, and recommends increasing funding in affordable housing programs to spur the development of more affordable housing units (Aurand et al, 2023.) The good news: this appears to be happening in Richmond, with 23.4 million dollars awarded in state funded loans for affordable housing building projects in 2023 (VADHCD, 2023.) Additionally, according to the VA Housing Commission, there are currently 550 vacant and/or blighted properties in residentially zoned areas which could be rehabilitated using these funds.

It does seem that a response to the shortage of affordable housing is happening, at least in Richmond. However, is it not worth considering the quality of the response?

Could funding initiatives be optimized so that they go beyond inspiring affordable, safe shelter by also addressing the WELL-BEING of residents and communities?

Given the well documented, causative relationship between poverty and mental health issues (Deighton et al, 2019), shouldn't we be thinking about how the design of housing for impoverished people could contribute to supporting their overall wellbeing? In other words, the government's response to the shortage of affordable housing in the United States should be opportunistic in its approach. Another facet of return on investment of tax funded housing projects could be realized by meeting the housing need with affordable housing units which incorporate design characteristics known to maximize the wellbeing of residents.

Virginia Housing Development Authority (aka VA Housing) is the primary government agency that provides funding and regulations for the provision of affordable housing units in Richmond. Builders compete for low interest loans as well as tax credits administered by VA Housing, which is how most affordable housing comes to life (McInerney, 2023.) Most VA Housing regulations are informed by HUD regulations, and in both cases, regulations are primarily interested in physical safety concerns and best building practice. Could these regulations be expanded to address other areas of concern, namely: wellbeing?

In a review/research study around what is known about the impact of US Federal Housing Subsidy Programs (aka affordable housing) on mental health, DeVoss (et al, 2022) concluded that housing subsidies do have mental health benefits for users, and that those benefits vary according to housing type. The authors assert that key decisions about how to assess subsidy programs (ie, how much to invest in housing subsidy programs overall, and which types of programs should be expanded or discontinued), should be informed by evidence on how these programs affect residents' health and well-being.

Since it is not the subsidy program, but the design of the building that the subsidy supports which could have an effect on the health and wellbeing of residents, the authors' assertions directly suggest that Evidence-Based Design is an important factor to bring into the conversation around mental health/wellbeing and subsidies/affordable housing.

Commonly applied in the design of healthcare and workplace facilities, modern experts on the topic Dr. Kirk Hamilton and Dr. David Watkins define evidence-based design as "a process for the conscientious, explicit, and judicious use of current best evidence from research and practice in making critical decisions together with an informed client, about the design of each individual and unique project." (Hamilton and Watkins, 2009). Hamilton and Watkins state that "...buildings, when poorly conceived, often produce profoundly detrimental consequences for individuals, societies, and cities." Yet, though they are widely regarded as the modern experts in the field of Evidence-Based Design, and their book Evidence-Based Design for Multiple Building Types covers healthcare facilities, learning environments, work-place environments, retail environments, and assembly/performance environments, etc, it does NOT cover evidence-based design for residential environments. Given the common sense importance and impact that a home can have on its "users," this is very surprising omission.

The fact that research studies are challenging to design and require precision in regard to defining and measuring factors and outcomes is likely the reason that non-institutional residential environments, as varied as they are, have been an intimidating field of study. Still, don't we have a responsibility to forge ahead, given that we are talking about homes (and ideally, everyone should have one?) Dr. Sherry Ahrentzen offers a suggestion around how to proceed. She asserts that case studies are a useful way for practitioners to evaluate the success and failure of projects. If case study research could be "simplified" to a more evidence-based best practice, then practitioners could build on existing cases by understanding aspects of a project unique to a given context while gleaning principles useful in similar projects (Ahrentzen, 2008.) Additionally, she offers the concept of "translational research," which is defined as the process of applying research generated insights and discoveries to the treatment or prevention of human disease, as a template of sorts for applying insights from a research or case study to the design of a building. In other words, translational research is the bridge between research studies and day-to-day applications. Citing research method strides in the area of evidence-based design for healthcare facilities in the last few decades, Dr. Ahrentzen asks if we could imagine the same sorts of strides being made in the area of affordable housing? She states, "An evidence-seeking design culture in affordable housing design practice would continuously pose design questions central to long term social and economic concerns."
In addition to the creation of more affordable housing units to alleviate the current shortages, a professional approach to producing and preserving affordable housing, which incorporates evidence-based design for healthy, sustainable environments, seems crucial for maximizing the long-term socio-economic value of tax-funded projects.

"A stable, affordable home can act like a vaccine, providing multiple long-lasting benefits on both the individual level and the community level."
-Dr. Meagan Sandel (Miao et al 2023).

Since we obviously accept and expect that vaccines will be subject to vast amounts of research during production and post production, shouldn't we expect the same of government funded housing?

Additionally, just as laws and policies have historically played a central role in creating housing and mental health inequities, can't they also be leveraged to correct those harms?

The addition of regulations based on evidence-based design research to the HUD and VA Housing building codes and standards is a science-based opportunity to evolve the wellbeing of our communities, which should be the goal of any government funded project.

Vector Ripples | Revit | Original Design

A PROPOSED, EVIDENCE-BASED DESIGN FRAMEWORK

In terms of how to proceed with an informed, evidence-based design process for affordable housing, the challenge is to determine which types of case studies are appropriate to look at for insights. Additionally and/or alternatively, what research could be considered "translational" when it comes to implementation within an affordable housing design practice? And, is there an existing design philosophy or approach that could provide a justifiable framework for organizing the research?

In answer to these questions, it seems reasonable to take cues from the area within which most evidence-based design research has taken place: the healthcare industry.

There are many studies within the field of healthcare design which focus on the built environment's effects on human health and well-being.

Reviews of health care facility design research literature reveal some consistencies around the beneficial impact of exposure to nature (in various ways) on rates of healing and/or reports of increased wellbeing.

For example, a literature review study that identified and reviewed 30 "well conducted studies" to examine specific physical environmental stimuli that turn healthcare facilities into healing environments cited that predominantly positive effects were found for increased sunlight and increased size and occurrence of windows (Dijkstra et al, 2006.) Another systematic literature review found that layouts of facilities that enable a greater exposure to daylight and views of nature can reduce patient depression, length of stay, and enhance comfort (Halawa et al, 2020). In fact, Dr. Roger Ulrich, a pioneer advocate/researcher for the use of EBD in healthcare spaces, identified exposure to nature as pivotal in 5 out of 9 design variables (Ulrich et al., 2010). For example, within the proposed framework, "visual environment" is considered a design variable. Within that variable, positive distraction (ie, nature based scenery) and natural lighting are the main factors which contribute to improved rates of healing. Audio environment was another design variable, and within that variable, nature sounds were identified as factors that can reduce stress and pain.

It is exciting to identify the beneficial, exposure-to-nature-based design characteristic consistencies within the EBD literature in the healthcare sector. However, one could wonder if there might be a better means of describing these design characteristics, other than "beneficial, exposure-to-nature-based". The field of Biophilic Design offers a great solution.

Having emerged as a design ethos in the 1980s, Biophilic Design is defined as the attempt to achieve beneficial contact with nature in the modern built environment (Kellert, 2016.)

The concept was popularized by the American biologist Edward O. Wilson in his book "Biophilia" (1984), in which he proposed that humans possess an innate tendency to seek connections with

nature and other forms of life. This idea laid the foundation for the development of biophilic design principles, which aim to integrate natural elements and systems into the built environment to improve human health, well-being, and overall connection to the natural world. Since then, biophilic design has gained significant traction in various fields, including architecture, interior design, and urban planning, as a means of creating more sustainable, healthy, and harmonious living and working spaces.

According to Dr. Stephen Kellert (2016), most of what humans view as normal today (large-scale agriculture, mass production, electronic media, etc) only emerged during the past 500 years. Our senses, emotions, and intellect developed in interactive relation to mainly natural, not human-created/"artificial" forces. Now, however, the average person (in the industrially developed world) spends some 90 percent of the time in an indoor, built setting. More than 80 percent of humans reside in urban areas - the most environmentally transformed of all human habitats. The natural habitat of modern people has largely become the built environment.

"Biophilic design is about creating a good habitat for people as a biological organism in the modern built environment that enhances people's physical and mental health, fitness and wellbeing."
-Stephen Kellert, 2016

Light & Shadow| textured wallpaper | RawPixel

THE ETHOS OF BIOPHILIC DESIGN

Design should ensure repeated, ongoing, and sustained experiences of nature in the built environment.

The incorporation of green spaces, such as community gardens, parks, or rooftop gardens, within residential or commercial buildings gives opportunity for residents to repeatedly interact with nature. By integrating these green spaces into the building design, occupants can have regular access to natural elements, including plants, trees, and open sky, which can positively impact their overall well-being.

Design should incorporate human adaptations to the natural world that have historically enhanced health, fitness, and well-being.

Using materials like wood, stone, or natural fibers in the construction and interior finishes can help create a connection to nature within the built environment. Incorporating plants, natural lighting, and water features can evoke a sense of calm and relaxation, mirroring the psychological benefits that humans have historically experienced when surrounded by natural elements in outdoor settings.

Overall design should foster attachments to specific ecological and cultural settings and places throughout the design experiences.

In a community center located in a coastal region, the architectural design could be inspired by local marine life, incorporating elements such as wave-like patterns in the interior decor, artwork depicting local aquatic species, and materials that reflect the textures and colors of the nearby beach. By integrating these elements, the design creates a sense of belonging and cultural resonance, fostering a strong connection between the building and the local community. This approach celebrates the identity of the region and encourages a deeper appreciation of the local ecosystem, thus promoting a sense of community attachment to the ecological and cultural context of their surroundings.

Design should cultivate positive interactions between people and nature, thereby expanding the sense of community to include the nonhuman environment.

A good example would be the incorporation of a central communal garden within a housing development, whereby residents can come together to cultivate plants, share gardening tips, and enjoy the natural surroundings. Incorporating walking paths or nature trails throughout the community can encourage residents to engage in outdoor activities, fostering a sense of community and connection to the natural environment. This collaborative engagement with the nonhuman environment encourages a deeper appreciation of nature and cultivates a stronger sense of communal well-being and environmental stewardship.

Design should implement connected, mutually reinforcing, and integrated architectural solutions to enhance the overall experience.

An example of this would be the use of natural ventilation and daylighting strategies in a building design. By strategically incorporating elements such as operable windows, skylights, and light shelves, designers create an experience that not only enhances the indoor environmental quality but also promotes energy efficiency and reduces reliance on artificial lighting and mechanical ventilation systems. The integrated approach ensures that the building's architectural design works in harmony with the surrounding environment, harnessing natural elements to create a more sustainable and comfortable living or working space. This approach fosters a deeper connection between the building occupants and the natural world, while also promoting a sense of environmental responsibility and stewardship.

Tulip Arabesque | photograph| Laura Berman

BIOPHILIC DESIGN AS AN EVIDENCE-BASED FRAMEWORK

There are a plethora of research studies which specifically examine biophilic design in various settings, however, once again, there is difficulty in applying rigorous research within a non-institutional residential setting. Yet, there have been some valiant attempts. In a study which examined opportunities for combining biophilic interventions with interior design in order to foster disease-specific self-care, Huntsman & Bulaj (2022) cite research that shows that the benefits of nature connectedness include relaxation, stress relief, lower blood pressure and heart rate, decrease in chronic pain, improvement in cognitive functioning, increased positive emotions, and reduced fatigue, aggression and sadness. The authors conclude that

Therapeutic interior design that supports a connection with nature, healthy lifestyle and disease-specific self-care practices offers unique opportunities to improve healthcare outcomes in residential applications and beyond.

Recently, in a study which was not specifically intended to examine biophilic design and instead looked at the effects of the built environment on mental health during the Covid-19 lockdown, "Poor housing" was significantly associated with increased risk of depressive symptoms during COVID-19 lockdown. (Amerio et al, 2020.) "Poor housing" was defined as apartments less than 197 square feet with poor views and "scarce indoor quality." The authors concluded that

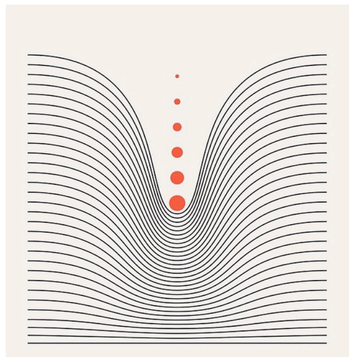
Housing design strategies should focus on larger living spaces,
which face green spaces-which are both strategies specific to biophilic design.

Another Covid-19 based, biophilic-design-parallel study looked at how our homes impact our health, by using a COVID-19 informed approach to examine urban apartment housing (Peters & Halleran, 2021.) This study focused on quality of life in urban mid and high-rise apartment housing, the fastest growing housing types in many cities around the world. The authors point out that this type of housing presents challenges relating to connection to nature, daylight and fresh air, and analyzed more than 100 published papers from peer-reviewed sources from environmental psychology, building science and architecture relevant to quality of life in high-rise housing. They concluded that

"Health-promoting" mid and high rise housing design must prioritize: (1) window placement and views which support stress recovery and restoration; (2) lighting levels based on spaces that can satisfy multiple uses and users; (3)bedrooms designed for restful sleep and contribute to circadian regulation; (4) living rooms with better indoor air quality and a focus on natural ventilation; (5) access to nature, through the purposeful design of balconies and (6) unit sizes and layouts that enable physical distancing and prevent crowding.

Again, though not framed in the context of biophilic design, this study seems to validate several of its principles.

Though evidence from the last 40 years has shown that contact with nature, in general, can improve human health (Andreucci et al, 2021), and biophilic design principles can provide evidence-based guidance around how to provide contact with nature within the built environment, there remains a gap. How can we develop expertise in the area of implementing nature-based design such that policy makers (eg, HUD) can be advised around how to go about meeting the demand for such spaces? The answer is, as always, more research is necessary. As more and more individual designers world wide become aware of the benefits of biophilic design, the pool of biophilically designed buildings which can be studied for their effects on well-being grows deeper.



Visual Geometric Pattern | Digital Media | Seth Nickerson

LOCAL APPLICATION AND CHALLENGES

With any design project, it is appropriate to gain insights from local users of similar building/space types. Four randomly selected residents of Port City apartments, an affordable housing complex located in the Manchester neighborhood of Richmond, were interviewed in regard to their experience of living at Port City- particularly with regard to biophilic experiences (ie- the natural light in their apartments, their access to nature, sense of spaciousness, etc.) Residents were also asked to comment on storage capacity, general maintenance of the buildings and grounds, and overall enjoyment of their home. In general, 3 of the 4 residents reported that they *very much appreciate their home,* and find it to be a very satisfactory place to live. Major reasons for their satisfaction pertained to the spacious layout of the units (per residents' report.) Additionally, all four residents appreciated the quality and character of the clubhouse space, the gym, and the pool - though all mentioned that the pool is very small. These comments support a general biophilic (and otherwise) value of a sense of spaciousness as well as the importance of access to community space.

In terms of areas of insufficiency, all four residents did comment that there was insufficient storage outside of the bedroom closets. In all units, only one other closet space was located outside of the bedrooms. One of the most surprising findings from these interviews was that despite the fact that the former tobacco warehouse buildings have huge expanses of windows, 3 of the 4 residents reported that natural light was a problem in their space. Upon further discussion, the problem did not seem due to lack of windows in the living space; rather, because of the need for privacy and/or protection from TOO MUCH sun, the windows need treatments which limit light in the units. Therefore, an important takeaway seems to be that providing exposure to nature and natural light via large windows presents the corresponding challenge of providing a private, light-controlled experience within the living space.

Before discussing other findings and take aways from the interviews at Port City, it should be noted that Port City was adapted under a common condition that

is NOT part of the scope of this thesis. Sarah McInerney, the principal architect responsible for designing the complex shared that not only did the general contractor of Port City receive low interest loans and/or tax credits from VA Housing as incentive for providing affordable housing, but they also received historic tax credits in exchange for preserving the historic character of the former tobacco warehouse. Given the additional set of restrictions around design quality of the exterior of the buildings, several factors of a potential biophilic design approach were not possible. For example, no additional exterior structures, such as balconies, could be added to the building. Landscaping had to be kept to a bare minimum, in order to maintain the historically industrial character of the property. No additional windows or perforations could be added. Basically, no visible, significant external changes could be made to the building.

Because of the limitations of the historic preservation standards, three of the four residents did not have any private outdoor space. Green spaces around the property are a minimum, and are limited to the outskirts, which are not maintained with high priority. Instead of garden areas, rock beds border the buildings. When it comes to balancing the priorities of enhanced human experience/ well-being with historic preservation in a housing context, one could wonder if historic preservation should be considered an equal priority to enhanced well-being? Obviously, historic preservation as a financial incentive for rehabilitating existing buildings for affordable housing is a formidable challenge to the possibility of designing with a biophilic intent.

CONCLUSIONS

One of the first points of discussion in this writing was around the fact that guidelines and regulations for building affordable housing are limited to standards of physical health and safety, and do not appropriately address issues of well-being. Conversations with a local designer of affordable housing, as well as with residents of a local affordable housing complex have shed further light on the limitations around affordable housing building standards in VA. Though preserving historic character is important, and is arguably within the scope of the biophilic design ethos, it seems incredibly unfortunate that systematic funding for affordable housing limits well-being due (in part) to the systematic valuation of historic preservation.

Recommendations for the HUD and VA Housing Building Regulations

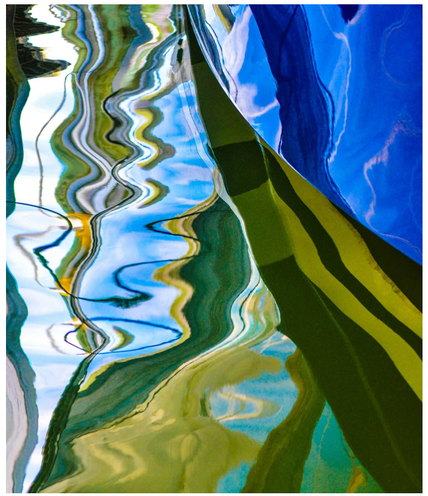
1. WINDOWS: Each unit should have the maximum glazing that the structure allows (ie- building integrity, sustainability, and fortitude should not be compromised.) Additionally, windows should be oriented and or externally treated for shading and privacy in such a way that exposure to natural light and views of nature are not altogether lost.

2. ACCESS TO THE OUTDOORS: Each unit should have its own access to outdoor space, with semi-private conditions.

3. UNIT SPACE CONSIDERATIONS: In addition to setting an evidence-based standard (requiring more research) for space minimum requirement per type of unit, open floor plan living spaces (including kitchens) should be employed.

4. COMMUNITY SPACES: Each residential complex shall reserve an evidence-based (requiring more research) amount of space, indoors and outdoors, dedicated as gathering space for its residents.

These recommendations will be incorporated into the following Evidence-Based, Biophilic, Affordable Housing Design Project.



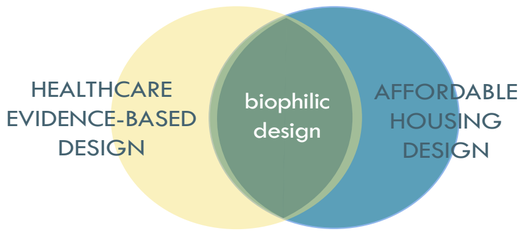
Chaos | photograph | Craig McAllister

Precedents

Series "For One Another" #21 | Watercolor on paper | Olga Drozd

Despite a lack of Evidence-Based Design research in the realm of affordable housing (and housing in general), the affordable housing and social housing projects that follow have consciously or inadvertently manifested evidence-based design research findings from the healthcare design sector.

These research findings and manifestations are inherently **BIOPHILIC.**



AFFORDABLE HOUSING PRECEDENT

VIA VERDE APARTMENTS

Grimshaw & Dattner Architects, 2012/ NYC

Living, dining, & kitchen areas are all oriented toward large windows in this open floor plan layout.

HEALTHCARE EVIDENCE-BASED DESIGN RESEARCH

Layouts of facilities that enable increased exposure to daylight & views of nature can reduce patient depression, length of stay, & enhance comfort.

Halawa, et al, 2020

HEALTHCARE EVIDENCE-BASED DESIGN RESEARCH

Increased sunlight & increased size/occurrence of windows has a positive impact on rates of healing in healthcare environments.

Dijkstra et al, 2006

AFFORDABLE HOUSING PRECEDENT

DORTHEAVEJ RESIDENCE

Bjarke Ingles Group, 2018/Copenhagen, Denmark

The glazed wall above is nearly 11' in height; glazing of similar proportions is used in an adjacent bedroom.

AFFORDABLE HOUSING PRECEDENT

TERRACE HOUSE

NL Architects, 2018/Frankfurt, Germany

Stepped units with exterior access allow for privacy and bilateral exposure to natural light and the outdoors.

POST COVID RESEARCH

Healthy housing design should prioritize views of & access to nature, adaptable lighting, indoor air quality, & spacious layouts that enable privacy/physical distancing.

Peters et al 2021;

Amerio et al, 2020

HEALTHCARE EVIDENCE-BASED

DESIGN RESEARCH

Nature based scenery & natural lighting are the main factors within the visual environment that contribute to improved rates of healing.

Ulrich, 2010

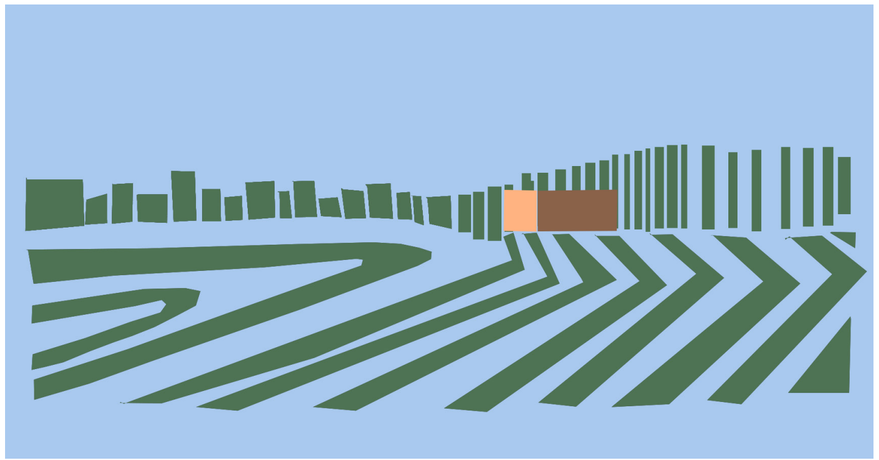
AFFORDABLE HOUSING PRECEDENT

The AXOLOTL HOUSING

Yu2e, 2023/ Los Angeles, CA

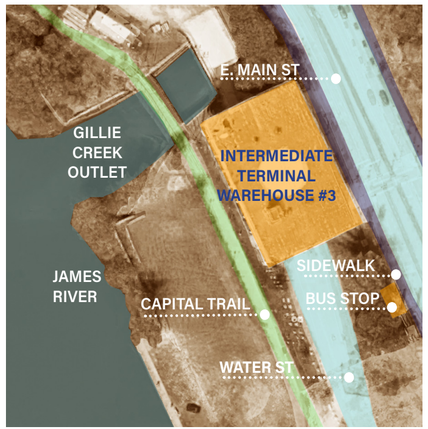
Maximized glazing allows for maximized natural light and views of natural surroundings.

Site



Terminal Warehouse Landscape- North Facing View | digital media | Original Artwork

3101 WATER STREET, RICHMOND, VIRGINIA



Site Map

The Intermediate Terminal Warehouse Building #3 has a location that perfectly serves the intent of this design project. The building sits 150' back from the James River, and is thus inherently connected with a major natural component. The Capitol Trail, which runs directly in front of the building is yet another conduit to connect community members with nature. In terms of other appropriate factors to consider for an afforable housing project, the closest bus stop is about 100' away, there are grocery stores within a mile of the building, there are restaurants a walkable distance away, and there are also a few other neighboring residential communities. It is almost surprising, given the location, that this building has not already been converted to housing.

BUILDING & NEIGHBORHOOD HISTORIES

South East Corner View| photograph + digital media| original image credit: Tim Wilson

HISTORICAL TRANSITION

The Terminal Warehouse Building stands as a testament to Richmond's river port as a once thriving hub of maritime activity. However, the port began to decline in significance during the late 19th and early 20th centuries. This was primarily due to the rise of more efficient and faster rail networks, which provided an alternative means of transporting goods, reducing the reliance on river-based transportation. Additionally, the development of road networks and the increasing popularity of trucking further diminished the importance of the river port as a primary hub for trade and commerce. As Richmond's economy diversified and transportation modes evolved, the port transformed into a regional conduit, catering mostly to local industries and trade within Virginia.

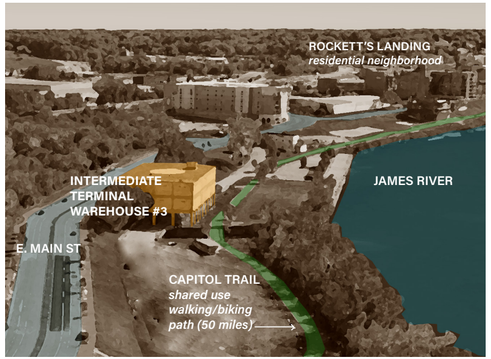
HISTORICAL CONTEXT

The Intermediate Terminal Warehouse Building #3, situated within Richmond's port on the James River, currently stands as an empty, boarded-up landmark of its time. Erected in 1938 with federal New Deal support, it remains the sole surviving structure among three original riverfront warehouses, reflecting the significance of Richmond's river port during its construction.

BUILDING DESIGN

Constructed by the Blackwell Engineering and Construction Company, the warehouse was designed to handle tons of sugar and tobacco. Engineered using steel-reinforced concrete, it was one of the first commercial buildings in Richmond to be constructed on piers, a design crafted to withstand the occasional flooding of the nearby James River. Its low-rise design was crafted mindfully, to ensure it didn't obstruct the scenic panorama of the James from the nearby Libby Hill neighborhood. This blending of practicality and aesthetics mirrored the architectural ethos of the New Deal era, which favored utilitarian designs accentuated by modernist influences.

Interior Collonade Experience| image credit: Abigail Fundling



Vicinity Map| original image from Google Earth

DISTRICT & PATHS

Technically and historically, the Intermediate Terminal Warehouse #3 is part of the neighborhood of Shockoe Bottom. However, given the change in use of the river port, and the fact that the building is now disconnected by distance and utility to its partnering buildings and paths in Shockoe Bottom, it seems to be the centerpiece landmark of its own historic river port district. The district's most significant path is East Main Street (with its corresponding sidewalks). Water Street runs off from East Main Street and directly to and underneath the Terminal Warehouse Building. A walking/biking path only, The Capitol Trail is an important path, as it provides a significant opportunity for connection with nature for its many users.

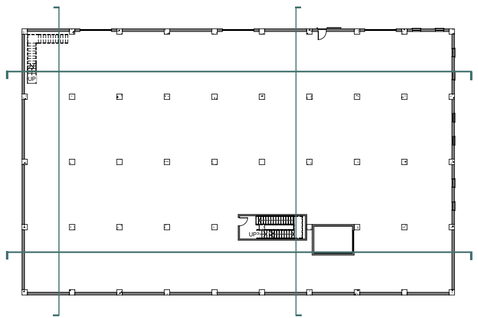
THE PRESENT & FUTURE

The future of the boarded up Terminal Warehouse Building has been a recent matter of debate. In 2018, Stone Brewing Company went through an extensive due diligence and design process with the intent to turn the building into a restaurant. However, the plan was abandoned in 2021 when the company was sold. Additionally, Stone reported some findings which indicated that the building was no longer structurally sound enough to support such a business. However, these findings seem to be somewhat controversial. The fate of the building is currently in the hands of the Richmond Economic Development Authority.

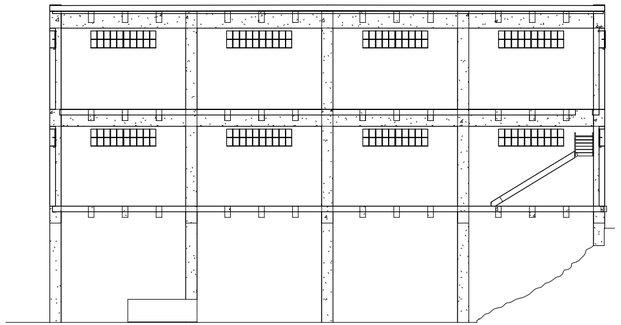
View From Across the James River

EXISTING BUILDING DRAWINGS

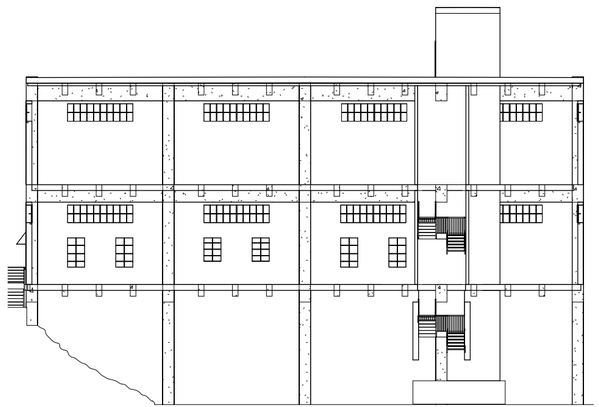
↑N *(Project North)*



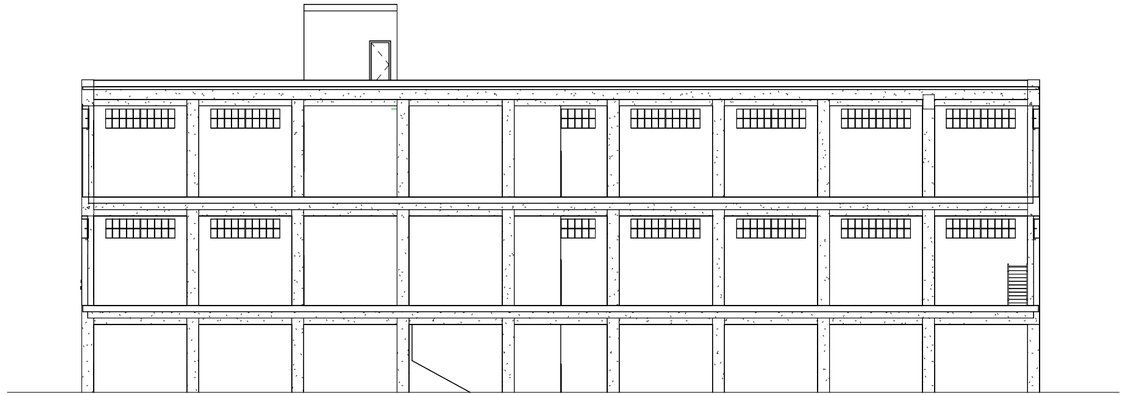
Main Level & Second Level Plan - nts



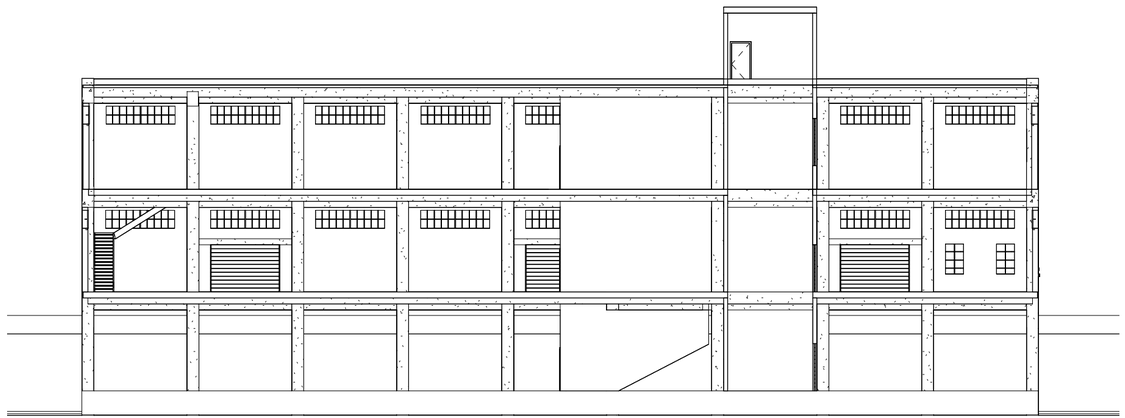
Transverse Section East - nts



Transverse Section West - nts



Longitudinal Section North - nts

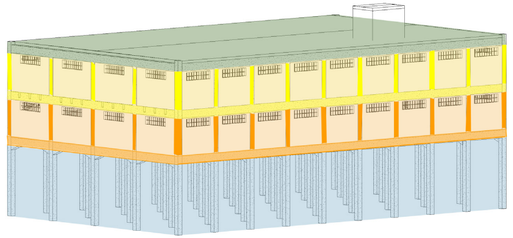


Longitudinal Section South - nts

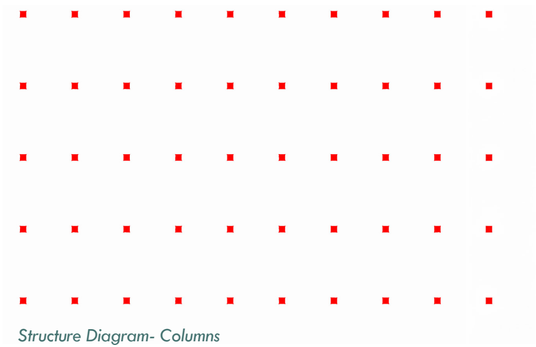
EXISTING BUILDING DIAGRAMS

The Diagrams on this page are graphical explorations of some of the existing conditions of the building, as a means of gaining understanding of the organization of the existing structure.

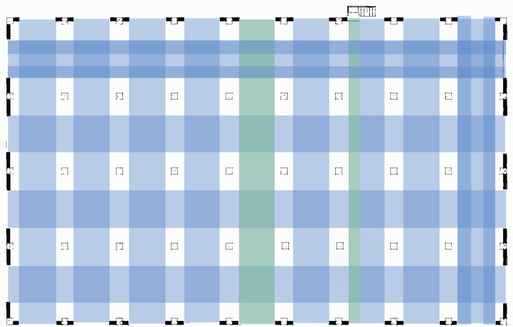
The existing Terminal Warehouse building is an extremely simple structure, with no embellishment and no interior walls.



Levels Diagram



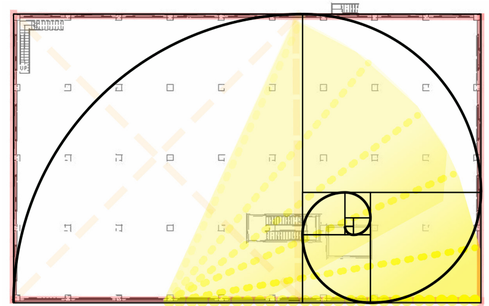
Structure Diagram- Columns



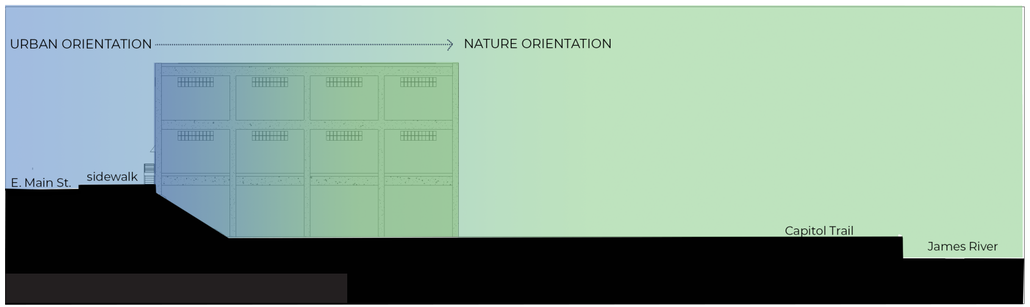
Fenestration diagram- window openings

Right: The Intermediate Terminal Warehouse Building #3 was constructed with a rectangular proportion that is known as the "Golden Ratio." This type of rectangle is thought to be easily appreciated aesthetically, and several prominent artists and architects in history have used this proportion as a starting point for their designs.

Below: It was helpful to focus on the various view opportunities from different angles in the Terminal Warehouse Building, given how important views of nature are to the project.



Golden Ratio Diagram



Views Diagram- West Elevation

EXISTING BUILDING MODEL

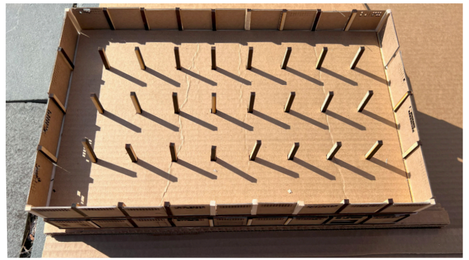
North West Ground Level Perspective

East Corner

South West Elevation

North East Elevation

North West End



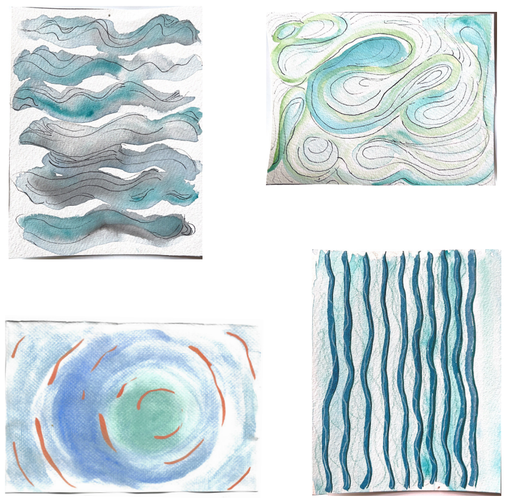
Interior View of Second Level

A “working” existing building model with site context was a requirement for the project.
This model was built with cardboard, basswood dowels, and chipboard. Walls and dowels were cut with a laser cutter and then assembled with glue. The model was built so that it could be disassembled at each level in order to physically investigate alterations to the structure and architecture.

Below, the model has been altered to accommodate a 2 story, main level courtyard, and a concept model of a ripple has been added to express the significance of the courtyard.

Conceptual Courtyard Model

Concept Design



Ripple Type Explorations | watercolor & pen |Original Artwork

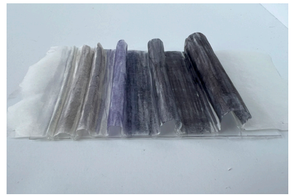
CONCEPT STATEMENT

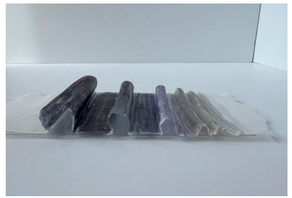
Acknowledging the nearby James River and informed by evidence-based, biophilic design, this multi-family affordable housing prototype seeks to embody a dynamic fusion of **exposure to** + **interaction** with **nature.**

The intent: to foster well-being within homes, and thus a natural, community wide RIPPLE of **positive change.**

CONCEPT MODELS AND DIAGRAMS

an experiment with orthogonal ripple forms and the pattern of sizing that happens as a ripple replicates and moves

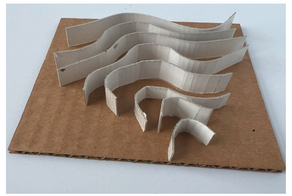




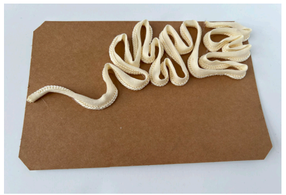
plexiglass, trace paper, marker

left: playing with ripple replication and differentiation

right: an expression of a singular ripple pattern, typically occurring as a texture within a plant or stone



cardboard, scored chipboard

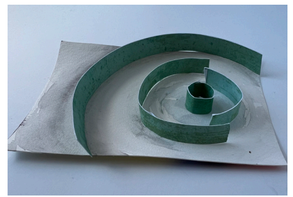


cardboard, fabric piping

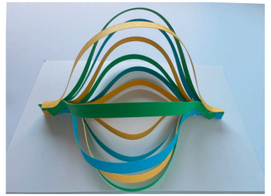
left: a dissection of each stage of a ripple in motion

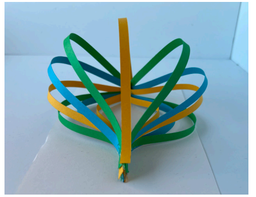
right: an exploration of truncated forms within a ripple

chipboard, colored paper



watercolor paper, water color, colored paper

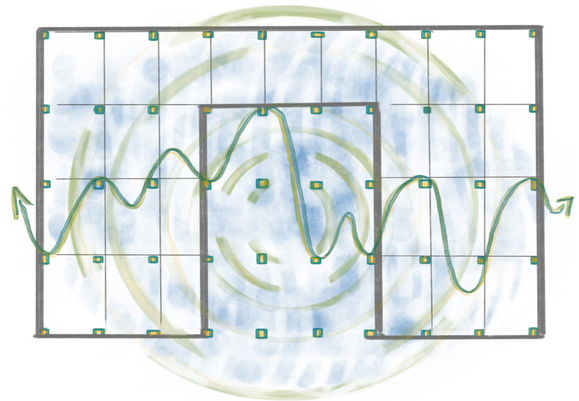




a 3 dimensional exploration of a ripple segment/snapshot

colored paper strips

experimenting with various ripple forms interacting with rectangles and describing the exposure-to-nature-and-natural-light induced well being impact from the courtyard



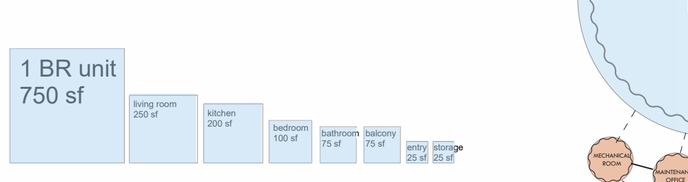
digital media diagram

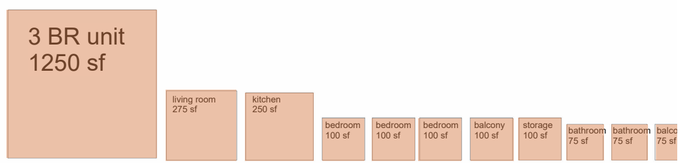
Program

Ripple Patterns in Water | photograph| Original Artwork

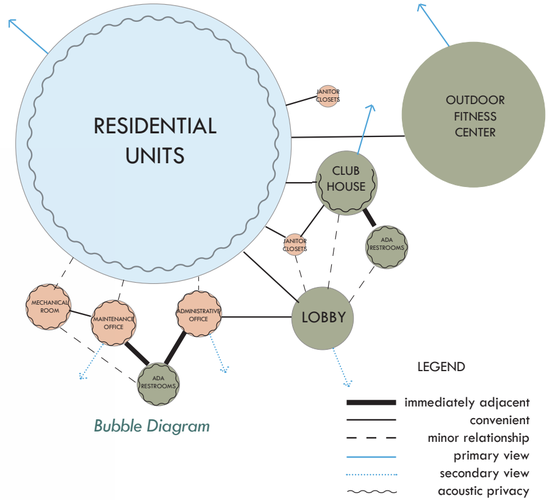
PROCESS PROGRAM DIAGRAMS

The diagrams on this page and following were developed during design planning stages and reflect initial ideas about square footage, adjacencies, and types of spaces.





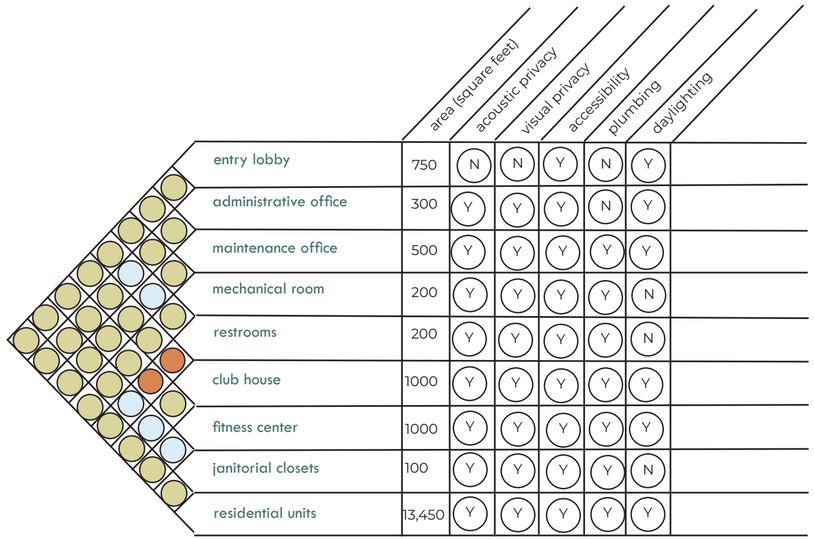
Graphic Visualization of Spaces Within Different Apartment Sizes



Bubble Diagram

Though helpful to formulate these diagrams as part of the process, these values are not reflective of what is manifest in the final design iteration.

PROCESS DIAGRAMS, *Continued*



	area (square feet)	acoustic privacy	visual privacy	accessibility	plumbing	daylighting
entry lobby	750	N	N	Y	N	Y
administrative office	300	Y	Y	Y	N	Y
maintenance office	500	Y	Y	Y	Y	Y
mechanical room	200	Y	Y	Y	Y	N
restrooms	200	Y	Y	Y	Y	N
club house	1000	Y	Y	Y	Y	Y
fitness center	1000	Y	Y	Y	Y	Y
janitorial closets	100	Y	Y	Y	Y	N
residential units	13,450	Y	Y	Y	Y	Y

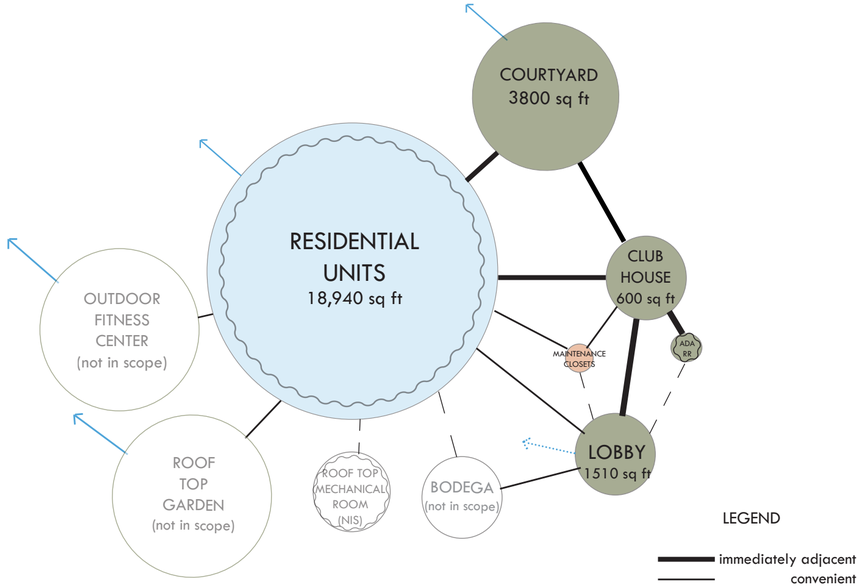
Adjacency Matrix

FINAL PROGRAM DIAGRAM

After further research and design work, the administrative offices were omitted due to the realization that those spaces are not standard or necessary in a building with 14 residential units.

Additionally, due to an intensive focus on the spaces of the main and second levels, the design of outdoor fitness center and roof top garden areas were designated to a later phase of the project, as well as a Bodega on the main level.

Occupancy (Code):
Residential Group 2

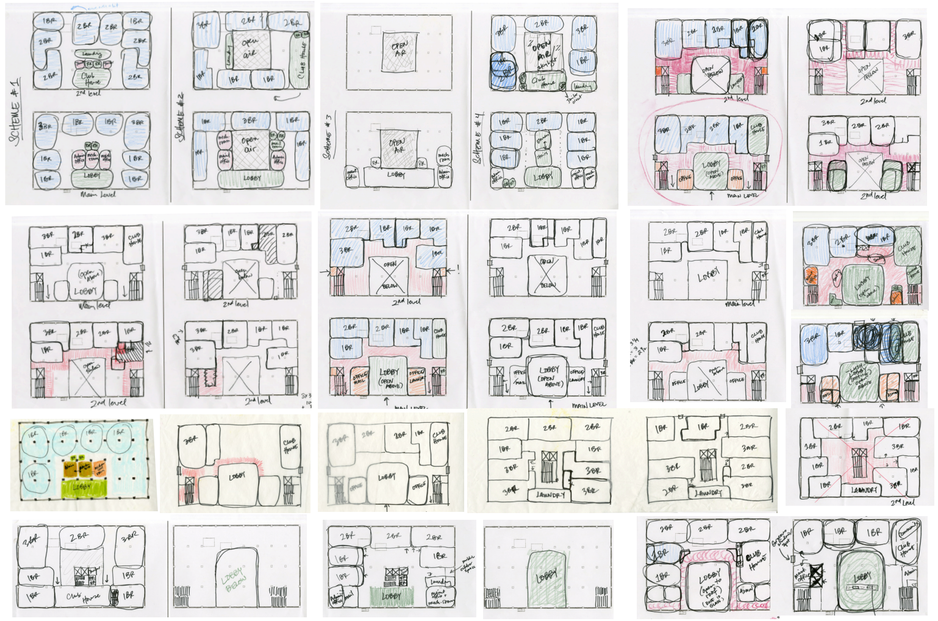


Bubble Diagram

Schematic Design

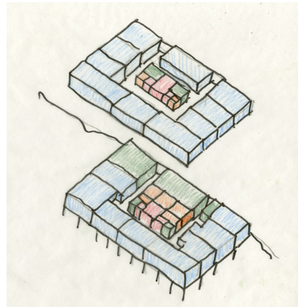
Vitality | giclee on canvas |Kristine Sarley

PROCESS SCHEMATIC DIAGRAMS

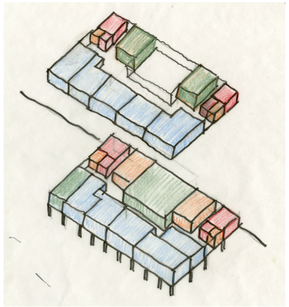


Space Planning: Process Iterations

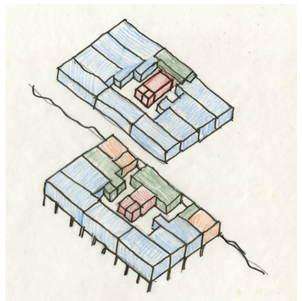
PROCESS SCHEMATIC DIAGRAMS, *Continued*



axon schematic iteration I



axon schematic iteration II



axon schematic iteration III

- Residential Units
- Community Spaces
- Circulation (stairs/elevators)
- Administrative Spaces

FINAL SCHEMATIC DIAGRAM

- Maintenance Closets- 241 sq ft
- Lobby & Club House - 2110 sq ft
- Circulation- 2864 sq ft
- Courtyard- 3800 sq ft
- Residential Units (14) - 18,940 sq ft

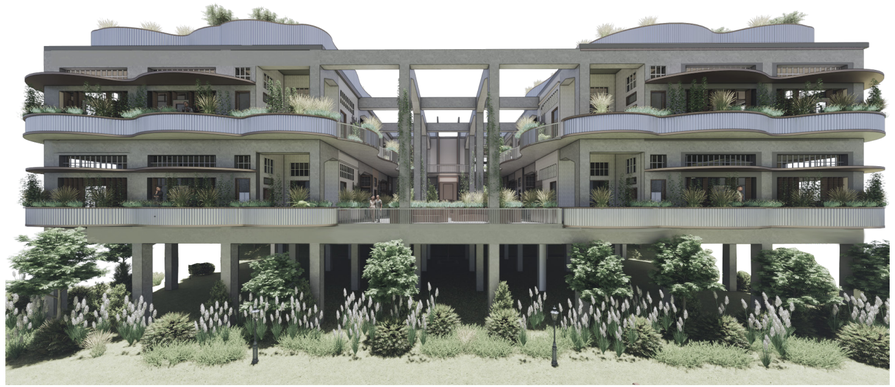
TOTAL DESIGN AREA: 27,955 sq ft

Exploded Axon Schematic Diagram

Design Solution

Cartone Assignment | digital media/hand | Original Artwork

EXTERIOR VIEWS



Exterior View From Capital Trail

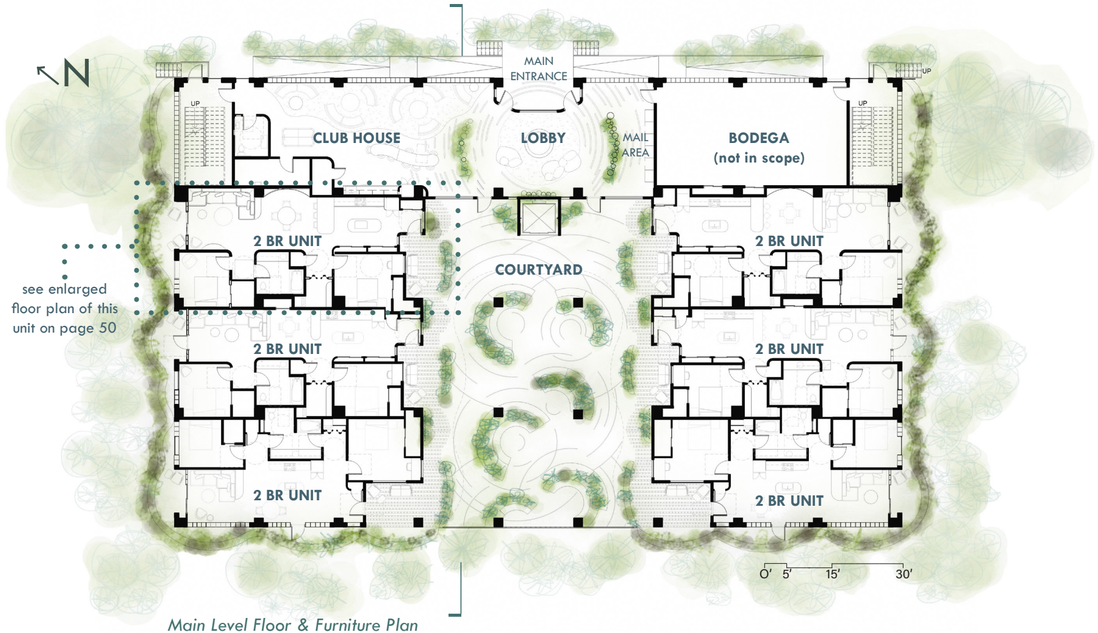
The new courtyard is clearly visible here. The demolition of nearly a third of the interior portion of the rectangular building allows for an outdoor community space, a means for each unit to have bilateral access to natural light and the outside.

EXTERIOR VIEWS, Continued

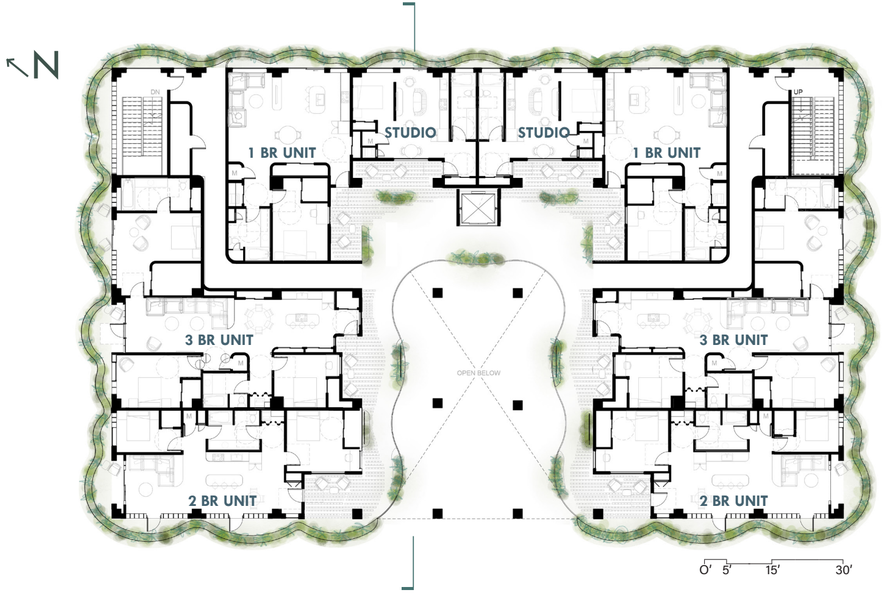
The balconies edged with continuous planter railings have been added to the exterior of the building, to give residents the opportunity to have a private space outside.
A balcony roof corresponding to the profile of the balconies provides shade for the balconies and serves as an exterior light shelf due to its placement underneath the clerestory windows.
Upright growing plants are used as a privacy screening.

North West Corner View

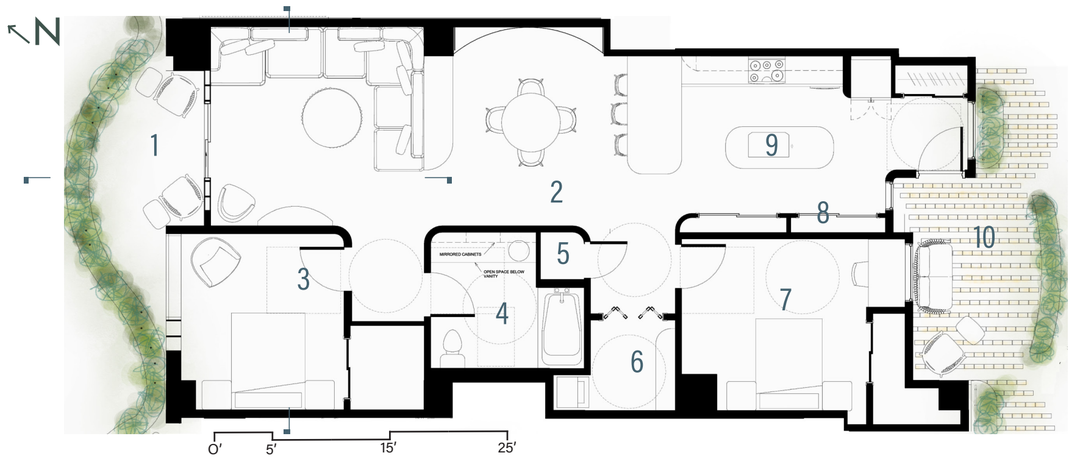
FINAL DESIGN DRAWINGS



Main Level Floor & Furniture Plan

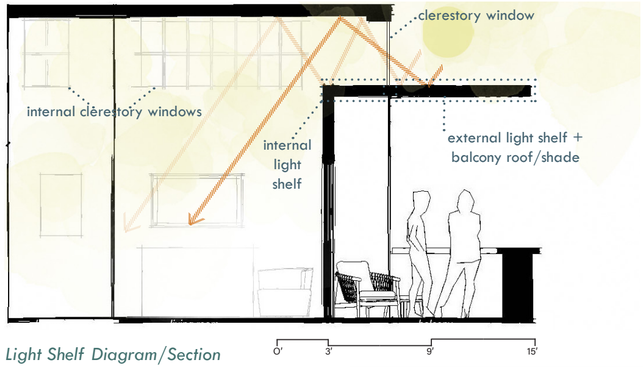


Second Level Floor & Furniture Plan



1. Balcony with integrated planter railings
2. Open Floor Plan Living, Dining, Kitchen
3. Bedroom 1
4. Accessible/Adaptable Bathroom
5. Mechanical Closet
6. Laundry Room
7. Bedroom 2
8. Pantry
9. Dually Accessible Sink
10. Courtyard "yard" signified by inlaid pavers

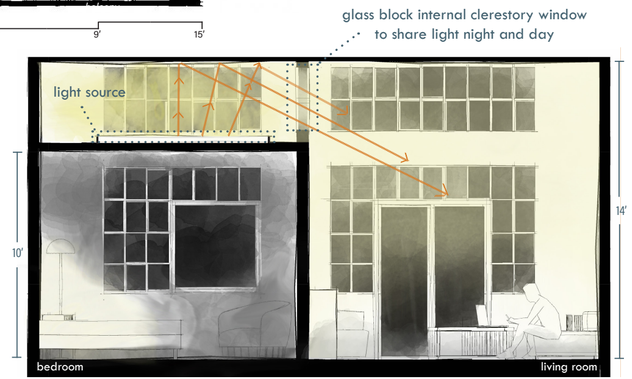
Enlarged 2 Bedroom Unit Floor Plan



Light Shelf Diagram/Section

The implementation of both an external and internal light shelf (by insetting the balcony space a bit from the exterior wall) allows for a maximum delivery of natural light into the main living space.

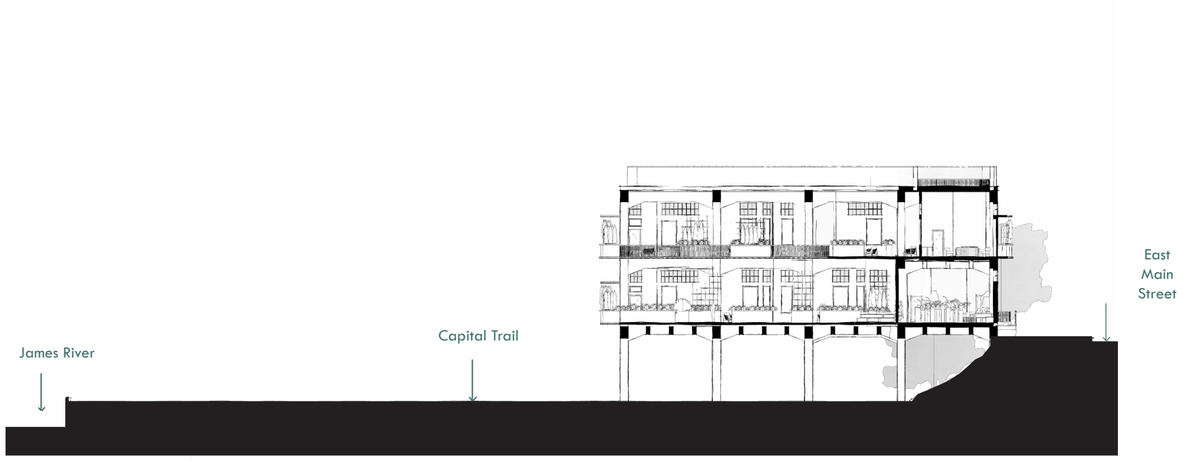
This drawing shows how the internal clerestory windows (made with glass block) are able to share natural light with neighboring rooms during the day, as well as stand in as the primary ambient lighting strategy for nighttime light needs.



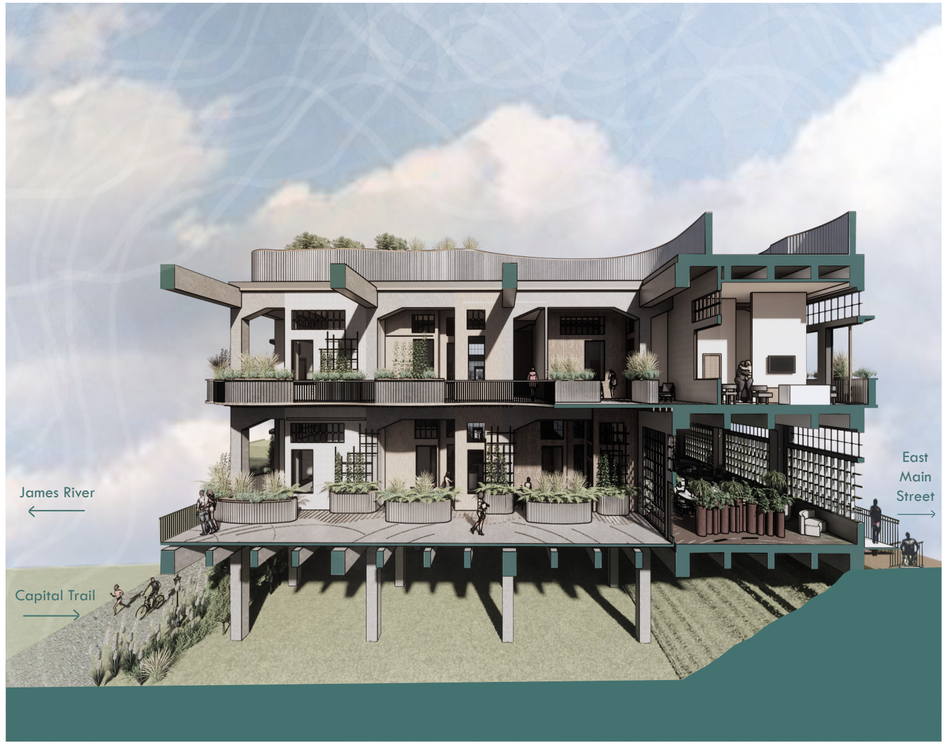
Natural and Artificial Lighting Strategy Diagram/Section

FINAL DESIGN DRAWINGS, Continued

The 2 drawings on these pages are of the same section cut through the building. The significance of the drawing on this page is to display the site context of the building and to provide a more technical section drawing. To the right, the perspective drawing is a bit more understandable in terms of the building spaces and details.



Transverse Section | 1'-0" = 0'- 1/32"

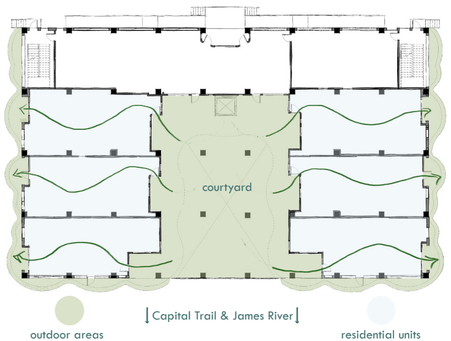


Transverse Section Perspective

DESIGN APPLICATION OF RESEARCH

As was necessary when selecting excellent precedents for this project, it was necessary to rely on Health Care Facility Design Research and Post Covid Research to inform design decisions. The diagram and images on these pages are snapshots of a few direct design decisions related to the identified, relevant research.

Post Covid Housing Research: Views of and access to nature, adaptable lighting, indoor air quality, and spacious layouts that enable privacy/physical distancing are all important factors of healthy housing design. Peters et al, 2021; Amerio et al, 2020



Research Application Strategy: The introduction of a central courtyard in conjunction with the balconies allows for bilateral access to the outside, corresponding increased daylight, and excellent air flow through each unit.

Nature Access Diagram: Main Level

Healthcare Facility Research: Healthcare Facility Research: Nature based scenery & natural lighting are the main factors within the visual environment that contribute to improved rates of healing. Ulrich, 2010

Research Application Strategy: Frosted glass blocks used in tandem with clear glazing preserves privacy without sacrificing natural light. Balconies (with integrated planter railings) provide opportunity for views of nature.

2 Bedroom Unit

Healthcare Facility Research:
Layouts of facilities that enable increased exposure to daylight & views of nature can reduce patient depression, length of stay, & enhance comfort. Halawa, et al, 2020

Research Application Strategy: Living, dining, & kitchen areas are all illuminated by the large windows in this open floor plan layout.

1 Bedroom Unit

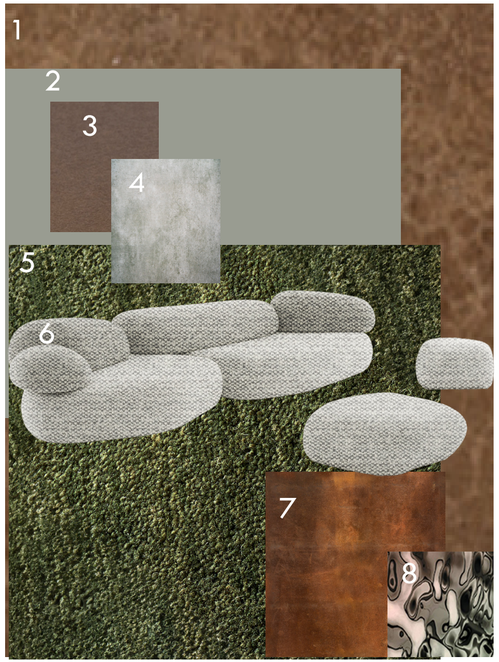
PERSPECTIVES & DETAILS

Lobby : View from the Main Entrance

Meant to be a very transitional space, the way finding inlaid concrete floor detail works in tandem with the custom lighting to guide residents and guests through the lobby to the courtyard.

Mail boxes are accessed behind the planter walls on the left, and the clubhouse is visible over the half height planter walls on the right.

The stone like seating is situated to give users an opportunity to pause and wait in the lobby, with a view to the main entrance.



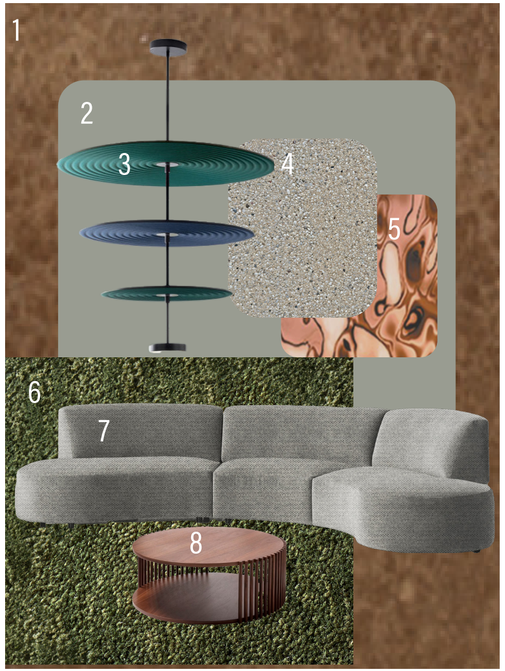
1. ARTesian water based concrete stain in “Dark Walnut” - main flooring material
2. American Clay Natural Earth Plaster in “Ashland” - walls
3. Richlite compressed recycled paper solid surface in “Rosedale” - custom lobby table top
4. Distressed concrete - floor inlay
5. Contessa “Moss Point” 100% Wool Carpet
6. Pebble Rubble seating system by Front, in “Cameo Dove” (wool/viscose) - lobby
7. Recycled/rusted metal oil pipes - planter “walls”
8. Water Rhythm Rimex Metal Sheeting in “Onyx”- custom lobby table

Club House: View from the Main Entrance

The Club House is an open community space for residents to socialize with each other and/or other guests. There is a full kitchen, an air hockey table, several seating vignettes, an ADA restroom toward the back, and a large dual height dining table.

The entire right side of the space is lit by a full bank of windows which face East Main Street, and in the evening, the acoustically treated lighting creates a warm glow with both up and down lighting features.

Though this project emphasizes an outdoor/nature connection, the Club House serves as an indoor, biophilic respite when weather prohibits outdoor socializing.

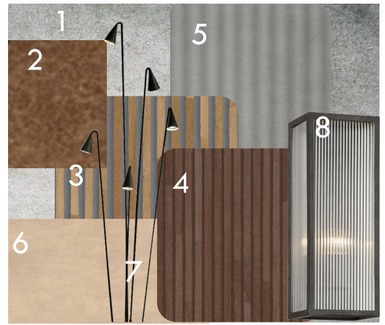


1. ARTesian water based concrete stain in "Dark Walnut"- main flooring material
2. American Clay Natural Earth Plaster in "Ashland"- walls
3. Feel Pendant Light (acoustic panel +metal) - clubhouse
4. Recycled, poured in place exposed aggregate concrete custom dining table top and counter top
5. Water Rhythm Rimex Metal Sheeting in "Rosey Gold"- feature wall
6. Contessa "Moss Point" 100% Wool Carpet- lobby & clubhouse
7. Arhaus Davis Sofa in "Cameo Dove" (wool/viscose)
8. Medulum Palafitte small coffee table in "Walnut"

Courtyard: View From the Elevator

Courtyard & Second Level Walkway: View Toward the River

The Courtyard serves several important functions for this design project. It creates a major opportunity for natural light exposure in all spaces. It also serves as the main circulation feature and makes it possible for residents to access their units from the outside instead of a hallway. The integrated planter benches stand as screening between units, and create several private and/or community outdoor gathering spaces for residents. Each unit has a small "yard" bordering the courtyard, which is designated by pavers which create a textured, rippled pattern on the floor of each yard. Most importantly, the views of the James River from the courtyard are fully accessible and enjoyable for all.



1. Distressed/existing concrete- floor
2. ARTesian water based concrete stain in Dark Walnut- floor inlay
3. Urban wood project reeded cladding - residence entries
4. Reeded Western cedar - custom planter benches
5. Recycled corrugated aluminum or steel - planters & planter railings
6. ORCA clay paver in "Calcite"- residence yards
7. Brisa Outdoor Light in Black -lighting within planters
8. Troy Lighting Tisoni Tall Outdoor Wall Sconce (metal and ribbed glass)

2 Bedroom Unit: View Toward the Balcony

2 Bedroom Unit: Ambient Lighting Strategy

Each residential unit was designed with an open floor plan to further enhance the sense of spaciousness created by the 14' high ceilings.

A daytime view to the left shows how far the natural light is invited into the space due to the copious amount of glazing and the dual action of the external and internal light shelves.

Above, a sunset view of the space depicts the artificial lighting streaming from above the bedroom through the internal clerestory windows. (See page 57 for details of the lighting strategy depicted here.)

Because it is typical for residents to provide their own furnishings, the furnishings displayed are suggestive. However, the general aesthetic ambiance created by the Hempwood flooring and the American Clay Natural Earth Plaster walls is a consistent design feature for all units.

1. Hempwood flooring in "Ash"- residential floors
2. American Clay Natural Earth Plaster in "Arden"
3. Modern Wave Shag Rug by West Elm; (wool & cotton) - hallway
4. Hieroglyph Wall Art by June Erica Vess; "Hieroglyph I;" ink on canvas- living room
5. Pen and Ink drawing by Alice Serres- hallway
6. Lulu Floor Lamp by AnthroLiving in "moss"; (iron & cotton velvet)- living room
7. Tylosand Corner Sofa by IKEA in "Cameo Dove" upholstery (wool, viscose)
8. Fern Artwork by Marianne Hendricks; "Botanicus C. III;" oil painting- hallway
9. Ribbed Glass block by Quality Glass - interior clerestory and balcony glazing
10. Green Turkish Rug from NonSlip Rug; cotton & polyester- living room
11. Joel Lounge Chair by Coalesse in "Cameo Dove" upholstery (wool, viscose)

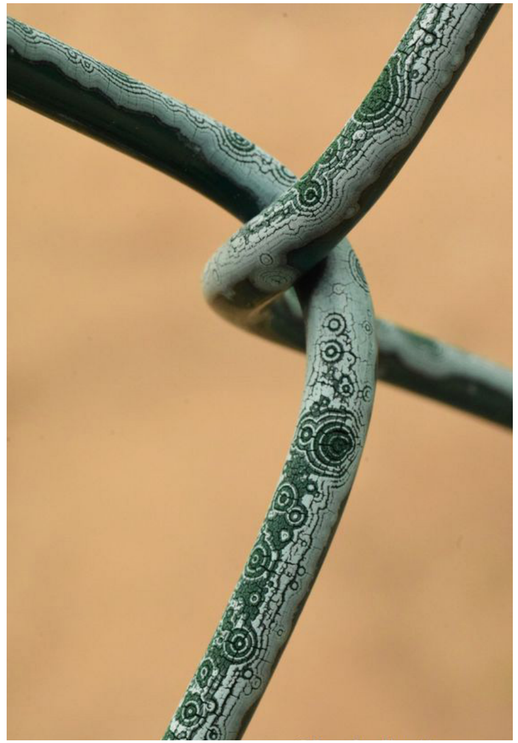
2 Bedroom Unit: View Toward the Balcony

The view to the left shows the curved wall that creates the back edge of the dining area, which is treated with Alpi composite wood veneer in “Sottsass Grey.” The veneer is also used as the back splash in the kitchen, and continues above the cabinetry to the ceiling.

Artwork and furnishings are suggestive, though the wooden decorative lighting features are consistent throughout the units.

1. Hempwood flooring in “Ash”
2. American Clay Natural Earth Plaster in “Arden”- all walls
3. Alpi composite wood veneer in “Sottsass Grey”- dining wall, back splash, & portions of custom tv cabinet & credenza
4. Wooden Water Ripple Parametric Wall art by Homey Decoration; dark walnut- dining room
5. Circus 1100 wooden chandelier by Sonliner
6. Fern Artwork by Marianne Hendricks; “Botanicus C. Ill;” oil painting- hallway
7. Corvo chair by Bernhardt design in “walnut”
8. Anza table by Bernhardt design in “walnut”- dining room
9. Recycled exposed aggregate concrete counter tops; poured on site
10. Richlite compressed recycled paper solid surface in “Rosedale” - kitchen cabinet base

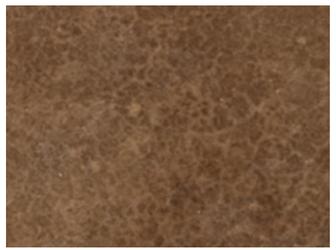
Specifications



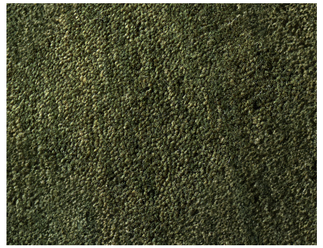
Fungus Pattern on a Chainlink Fence | photograph | Pudgy Viking

FLOORING

HEMP WOOD ORGANIC FLOORING
MANUFACTURER Hempwood
MATERIALS/FINISH “Ice”
LOCATION Residential Units
SUSTAINABILITY Made in USA; non toxic; each acre of hemp yeilds 6000 sq ft of flooring; takes 150 days from seed to harvest; extremely durable
NOTES/RATIONALE rippled texture resonates with concept; extremely sustainable and durable.
WEBSITE https://hempwood.com/product/hemp-wood-organic-flooring/

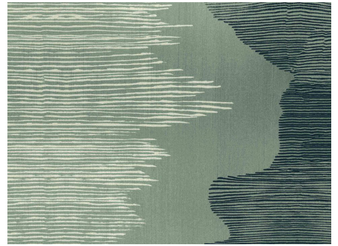


ARTesian CONCRETE STAIN
MANUFACTURER Brickform
MATERIALS/FINISH Dark Walnut
LOCATION Lobby & Club House
SUSTAINABILITY Zero VOC, Acid Free, Water Based
NOTES/RATIONALE Can use on existing floor; has an earthy, biophilic tone and texture
WEBSITE: https://www.brickform.com



HEMP WOOD ORGANIC FLOORING
MANUFACTURER Unique Carpets
MATERIALS/FINISH 100% Wool; Contessa - Moss Point
LOCATION Lobby & Club House
SUSTAINABILITY LEED compliant, renewable resource, acoustic properties, dirt/soil resistant, fire-retardant, non allergenic
NOTES/RATIONALE extremely sustainable, nature based color
WEBSITE https://www.greenbuildingsupply.com/All-Products/Wool-Carpet/Unique-Carpets-Contessa

WORN CLAY PAVER
MANUFACTURER ORCA
MATERIALS/FINISH natural clay in “Calcite”
LOCATION Residence “yards”
SUSTAINABILITY natural material, made in the USA
NOTES/RATIONALE natural/sustainable material
WEBSITE: https://www.orcaliving.com/collections/all/products/worn-clay-paver?variant=40090680557686



GREEN TURKISH RUG
MANUFACTURER NonSlip Rug
MATERIALS/FINISH Cotton & Polyester
LOCATION Living Area- Residential Units
SUSTAINABILITY Made partially with a renewable resource
NOTES/RATIONALE colors/pattern resonate with concept and biophilic intent
WEBSITE https://www.etsy.com/listing/1332554591/green-turkish-rug-bohemian-area-rug

MODERN WAVE SHAG RUG
MANUFACTURER West Elm
MATERIALS/FINISH Wool & Cotton
LOCATION Hallway- Residential Units
SUSTAINABILITY woven in a fair trade certified factory, made with sustainable resources
NOTES/RATIONALE pattern is resonant with concept
WEBSITE https://www.westelm.com/products/1589919

FEEL PENDANT
MANUFACTURER Penta
MATERIALS/FINISH metal, acoustic paneling
LOCATION Club House
SUSTAINABILITY LED
NOTES/RATIONALE the general shape and design resonates with the design concept; the light functions as an uplight and a downlight, and addresses some acoustic concerns within a space with an expansive ceiling height.
WEBSITE https://pentalight.com/en/prodotto/feel

CIRCUS 1100 EXTRA LARGE CHANDELIER
MANUFACTURER Sonliner
MATERIALS/FINISH birch plywood
LOCATION Residential Units
Sustainability wood construction; LED
NOTES/RATIONALE the shape resonates with concept; wood is considered a biophilic material
WEBSITE https://www.etsy.com/listing/1462876161/extra-large-ceiling-lamp-circus-1100

TISONI TALL OUTDOOR WALL SCONCE
MANUFACTURER Troy Lighting
MATERIALS/FINISH metal, ribbed glass
LOCATION Courtyard/exterior of residential units
SUSTAINABILITY LED
NOTES/RATIONALE the shape and the ribbed glass coordinate well with the building and the concept
WEBSITE https://www.build.com/product/summary/1737013

BELLFLOWER OUTDOOR FLOOR LAMP
MANUFACTURER Vakkerlight
MATERIALS/FINISH aluminum
LOCATION within courtyard planter benches
SUSTAINABILITY LED
NOTES/RATIONALE the shape blends in well with the plant forms and provides down lighting with minimal light pollution at night
WEBSITE https://vakkerlight.com/products/bellflower-outdoor-floor-lamp

PALAFITTE SMALL COFFEE TABLE
MANUFACTURER Medulum
MATERIALS/FINISH walnut
LOCATION Club House
SUSTAINABILITY made with a renewable resource (wood) NOTES/RATIONALE the shape and detailing is resonant with the concept
WEBSITE https://artemest.com/products/palafitte-small-coffee-table

DAVIS 3 PIECE SECTIONAL SOFA
MANUFACTURER Arhaus
MATERIALS/FINISH hardwood laminate, steel, foam, upholstery (“Cameo Dove”- wool & viscose)
LOCATION Clubhouse
SUSTAINABILITY Made in the USA, wood from FSC forests, recycled steel springs, foam is made partially with plant based fibers
NOTES/RATIONALE the shape is consistent with the concept and fits the intended function well
WEBSITE https://www.arhaus.com/products/davis-three-piece-sectional?variant=43299929686187

PEBBLE RUBBLE SYSTEM SEATING
MANUFACTURER Moroso
MATERIALS/FINISH wood, foam, upholstery (“Cameo Dove”- wool & viscose)
LOCATION Lobby
SUSTAINABILITY Complies with Cal TB117, removable covers
NOTES/RATIONALE the shape is reminiscent of stones, which resonates with biophilic intention
WEBSITE https://moroso.it/prodotti/pebble-rubble/?lang=en

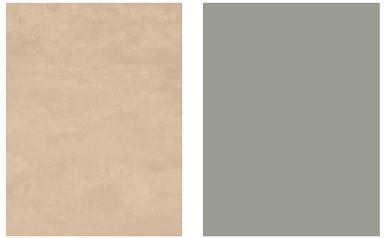
JOEL SWIVEL LOUNGE CHAIR
MANUFACTURER Coalesse
MATERIALS/FINISH LOCATION metal, wood, foam, upholstery (“Cameo Dove”- wool/viscose)
SUSTAINABILITY durable construction, made partially with natural and renewable resources (wood & metal)
NOTES/RATIONALE the size works well in the furniture plan; swivel feature is ideal
WEBSITE https://www.coalesse.com/products/seating/lounge-seating/joel-lounge-chair/#specs

FURNITURE

ANZA TABLE
MANUFACTURER Bernhardt Design
MATERIALS/FINISH Wood/ Walnut
LOCATION Residential Units
SUSTAINABILITY NSF Certified Company
NOTES/RATIONALE the shape and size works well within the dining area
WEBSITE https://bernhardtdesign.com/furniture/anza/

CORVO DINING CHAIR
MANUFACTURER Bernhardt Design
MATERIALS/FINISH walnut
LOCATION Residential Units
SUSTAINABILITY NSF Certified Company
NOTES/RATIONALE the shape and size works well within the dining area
WEBSITE https://bernhardtdesign.com/furniture/corvo/

WALLS

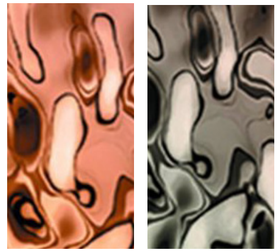


NATURAL EARTH PLASTER
MANUFACTURER American Clay
MATERIALS/FINISH Natural Earth Plaster in “Arden” (left) & “Ashland” (right)
LOCATION Lobby, Club House, & Residences
SUSTAINABILITY Non Toxic, natural substance
NOTES/RATIONALE Durable, Infinitely repairable,
biophilic earth texture
WEBSITE www.americanclay.com

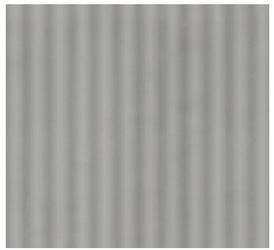
ETTORE SOTTSASS VENEER
MANUFACTURER Alpi Wood
MATERIALS/FINISH composite Veneer; grey finish
LOCATION Residences- cabinets
SUSTAINABILITY FSC certified; zero formaldehyde, several other International certifications
NOTES/RATIONALE The pattern of the wood grain resonates with concept; natural wood product is biophilic in nature
WEBSITE https://www.alpi.it/en

RIBBED GLASS BLOCK - Paralline
MANUFACTURER Quality Glass
MATERIALS/FINISH Glass
LOCATION Club House & Residences
SUSTAINABILITY more energy efficient than typical glass glazing
NOTES/RATIONALE fits with conceptual and evidence based intent
WEBSITE https://www.qualityglassblock.com/product/glass-block/basic-line/clear-glass/paralline/1919-8-paralline

REEDED EXTERIOR CLADDING
MANUFACTURER Urban Wood Project
MATERIALS/FINISH Cedar
LOCATION Residences
SUSTAINABILITY wood is sourced from trees cut down in the urban landscape
NOTES/RATIONALE The pattern of the wood grain resonates with concept; natural wood product is biophilic in nature
WEBSITE https://www.treesvirginia.org/services/virginia-urban-wood-group



WATER RHYTHM METAL SHEETING
MANUFACTURER Rim EX
MATERIALS/FINISH stainless steel in “rosey-gold” (left) & “onyx” (right)
LOCATION lobby (onyx) & club house (rosey- gold)
SUSTAINABILITY 100% recyclable; extremely durable
NOTES/RATIONALE texture resonates with concept; finish works well to enhance natural light reflection
WEBSITE https://us.rimexmetals.com/products/water-rhythm



RECYCLED/REPURPOSED CORRUGATED METAL
MANUFACTURER various
MATERIALS/FINISH ideally a silver tone finish
LOCATION planters and planter railings
SUSTAINABILITY 100% recycled and recyclable; extremely durable
NOTES/RATIONALE texture resonates with concept; finish works well to enhance natural light reflection
WEBSITE n/a

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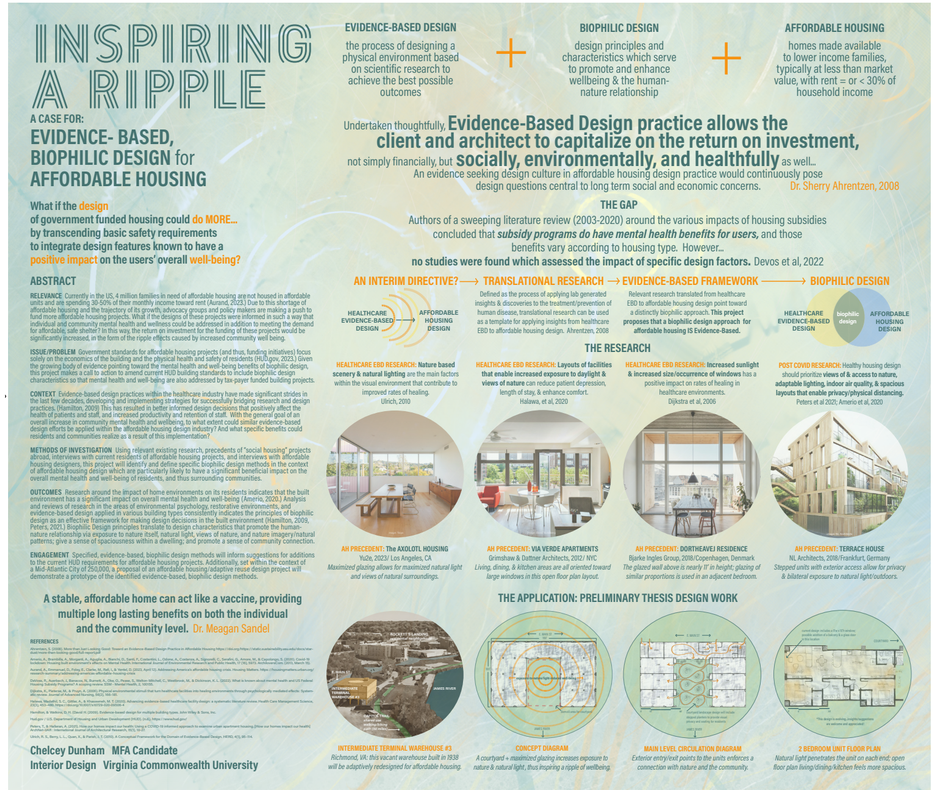
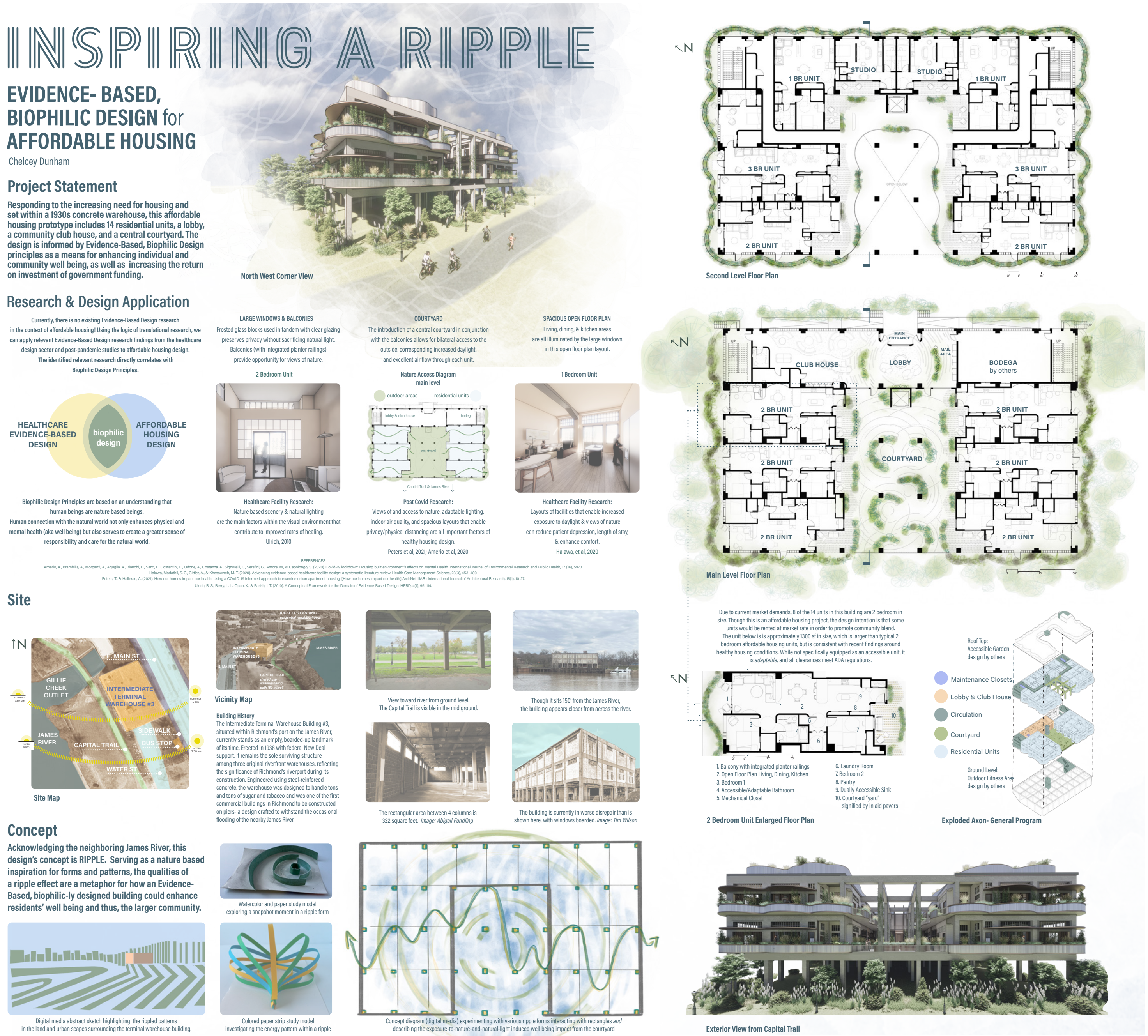
Presentations

Song Title Image: Steppin' Razor by The Kills | digital media | artist unknown



IDEC Poster Presentation | March 9, 2024 | New York School of Interior Design | NYC



Thesis Defense Poster | 5/2/24

Pollak Building, Rm 409 | VCU |Richmond, VA

Reflection

House on the Mist | photograph | Alfonso Arango

POST THESIS REFLECTION
5/2/24, 2pm

Thesis Defense: *5/2/24, 12pm*
Professors in Attendance:
Roberto Ventura, Emily Smith, Kristin Carleton, Tim Hamnett, Laura Battaglia, Sara Reed

What a pleasure to present to some of my favorite people, who have all helped me so much in this design journey. I had practiced the delivery of my presentation several times, but my actual thesis defense was by far my best, in large part due to the lovely, engaging faces of my audience.

Comments were mostly compliments, which was certainly gratifying! There were some questions around spacial dimensions of the residential units (ceiling height, the overall dimensions of the 2 bedroom unit, etc.). Tim wondered about considering a loft, given the expansive ceiling height of 14'. I said that I agreed that it was a good consideration, but in regard to accessibility I opted to leave that out of the design. He also wondered about the possibility of a powder room/second bathroom for the 2 bedroom units. I agree that it would be good to reconsider that possibility - possibly by reducing the size or omitting the laundry room.

Emily asked about whether or not I had thought about age diversity within the design, and I now understand that she was subtiley pointing out that I don't show any older people in my renderings. I think that was a missed opportunity on my part, since I did consider age diversity in my decision to make the entire place completely accessible.

Laura suggested that my concept is not in fact, "Ripple." She said that it is really conceptually about light. I think it's a valid consideration, and I agree that the project is about light in the sense that it is about the evidence based design research which supports the exposure to natural light as a design characteristic that enhances well being. However, I enjoyed allowing "ripple" to guide some of the more visual/formal design decisions and overall aesthetic, (which is what I understand to be an important function of concept) as well as the metaphoric meaning of the project (ie- the ripple effect of wellbeing brought on by the exposure to natural light.)

Kristin suggested that I incorporate the personal story I shared at the beginning of my presentation of how I was a housing inspector for a subsidy program in my mid 20s into this book...which I have now done. She felt that it was an important aspect of my expertise with this thesis topic. She also felt that the regular (revit issued) railings could have been more of a custom design, which I agree with whole heartedly and would love to investigate further.

I was happy to hear from Tim that my renderings did a good job reflecting the concept of ripple and the emphasis on natural light, both in style and in subject. I was also satisfied to know that the design made sense to him and that it re-imagined the building in a way that was not turning it into a "sauna," (too much inadequately treated glazing) as other projects (using the same building) have done in the past.

The final comments were from Rob, who said that he appreciated that my thesis topic identified a gap in the area of housing design, and that the research I did translated into an actual application within the project design. Certainly this was the case because of his direction and guidance throughout the process, and I'm glad I listened!

There are so many more ideas that I have for this design, including ways that it could be value engineered for a more practical, actual application. The learning that has taken place is immense, and hopefully I'll be able to easily and directly apply it (and some of my other ideas) in my next projects, which will hopefully come to fruition in real life!

Acknowledgments

Wise Rippled Trees | photograph | Original Artwork

Without the incredible support and love of my husband, Tony Uliano, who (for some reason) didn't think it was crazy for me to pursue an MFA at the age of 46, I would never have been able to get through the past 3 years. Much love, and many thanks to such a truly wonderful partner!

If not for my classmates: Aseel Alhaidari, Sarah Alrumayh, Tawny Chamberlain, Caroline Ciccone, Tommye Dean, Madison Goff, Zixuan Guo, Se Young Lee, Caitlin McClean, Nadia Mechboukh, Cindy Perdomo, Camille Rovani, Sholeh Salimi, Che Shannon, & Tessa Trowbridge... I would have quit so many times. The bond is real, and it is so strong! How grateful I am, for being able to learn and develop alongside such an incredibly talented group of people!

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