

ABSTRACT

Title of Thesis: REBUILDING HOME
Revitalizing Neighborhoods by Rehabilitating
Vacant Historic Homes in Baltimore

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Architecture, Planning, and Preservation

In American cities now, there is simultaneously a demand for housing and, in some shrinking cities, a surplus of abandoned, vacant structures. Many of these homes are not habitable after a long period of vacancy, leading neighbors to feel unsafe and move as well, further perpetuating the cycle until entire neighborhoods are vacant. To address this, examining the historical context is critical to developing an approach that is responsive to the local environment and takes key components of the vernacular architecture into consideration. Without this, architecture has the modern issue of developing homogeneity across cities. This thesis will propose a framework for design of housing using Baltimore rowhouse shells. By creating adaptable plans for varying sizes of housing, from studio apartments to large units of multiple rowhouses, architecture will encourage diverse, vibrant, and resilient neighborhoods.

This thesis will propose modular, systematic interventions using a matrix of design options to create a system which can be applied across neighborhoods in Baltimore and other American cities. The interventions will be determined by the dimensions, program usage, and circulation, as well as the needs of the existing community. This approach addresses the housing shortage by promoting local home ownership at an individual level, community building at a neighborhood scale, and preserving city legacy.

REBUILDING HOME:
Revitalizing Neighborhoods by Rehabilitating Vacant Historic Homes in Baltimore

by

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Chapter 1: Introduction

Introduction

Driving through Baltimore, one can see blocks of abandoned, vacant buildings, followed shortly by well maintained homes, all in a ten minute route. This begs the question, why do some neighborhoods become vacant while others thrive? As a child, my understanding of this question was framed by adults' interpretations: the crime, the poverty, the innate discomfort many suburban Marylanders have with Baltimore. However, I always appreciated the architectural qualities of the city. The dense, tree lined streets in some neighborhoods, the constant brick, and the consistent patina of age juxtaposed with the new. These structures reflect the people who have resided in them, and are deserving of respect and the opportunity to be reborn to revitalize Baltimore.



Fig. 1 Baltimore Rowhomes Postcard.¹

¹ Accessed December 1, 2025. https://commons.wikimedia.org/wiki/File:Rowhouses_in_Baltimore.jpg.

As of June 2025, there are 12,307 vacant buildings in Baltimore. These buildings are not all residential; some are industrial, civic, or commercial. However, there is a predominance of rowhouses. Baltimore is thought of as a monolithic city, with the rowhouse typology in almost all neighborhoods, and limited stock of other residential typologies like single family homes and multifamily buildings. Typically, each neighborhood will have one size of rowhouse, intended for the class of individual it was built for in the early 1900s. For example, a working class neighborhood will have mainly two story rowhouses, all of a similar square footage, while a wealthier neighborhood will have only large, three story rowhouses. This has led to struggles in maintaining healthy, diverse, and resilient neighborhoods. When current families in the city outgrow their home, they must move to a new neighborhood in order to upsize. If individuals are going through financially challenging times and are unable to afford their rent, there are no smaller, cheaper alternatives, and they must again move to a new neighborhood. This prevents long term residence, and has contributed in part to the issue of vacancy in Baltimore.

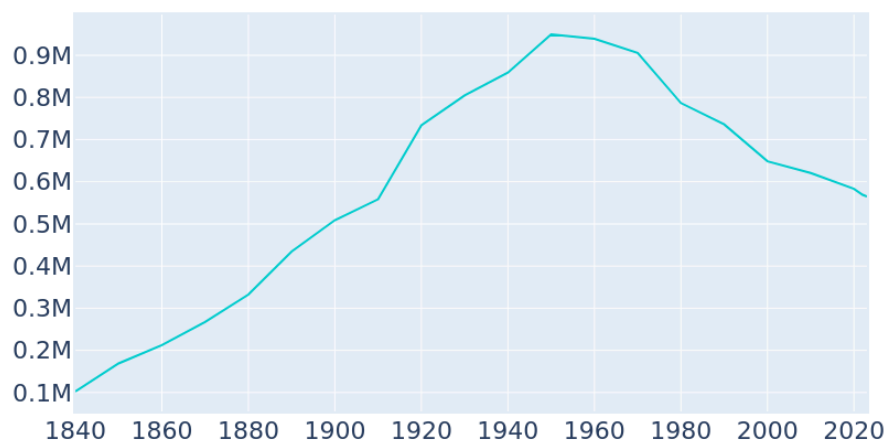


Fig. 2. Baltimore Population over time, courtesy of www.biggestuscities.com.

The history of Redlining and Urban Renewal has also contributed. As Baltimore began to attempt Urban Renewal in the 1960s, the city relied on demolition heavily in Black neighborhoods, replacing rowhouses with new housing projects mainly focused towards white residents. This destroyed the built history and culture of these neighborhoods, and prevented Black Baltimoreans from thriving. These neighborhoods haven't recovered, leaving the majority of vacant buildings in these underserved areas. The continued lack of investment in Black neighborhoods, from historic through modern times, has exacerbated the issue of vacancy, making it an issue of funding and resources as well as safety and revitalization.

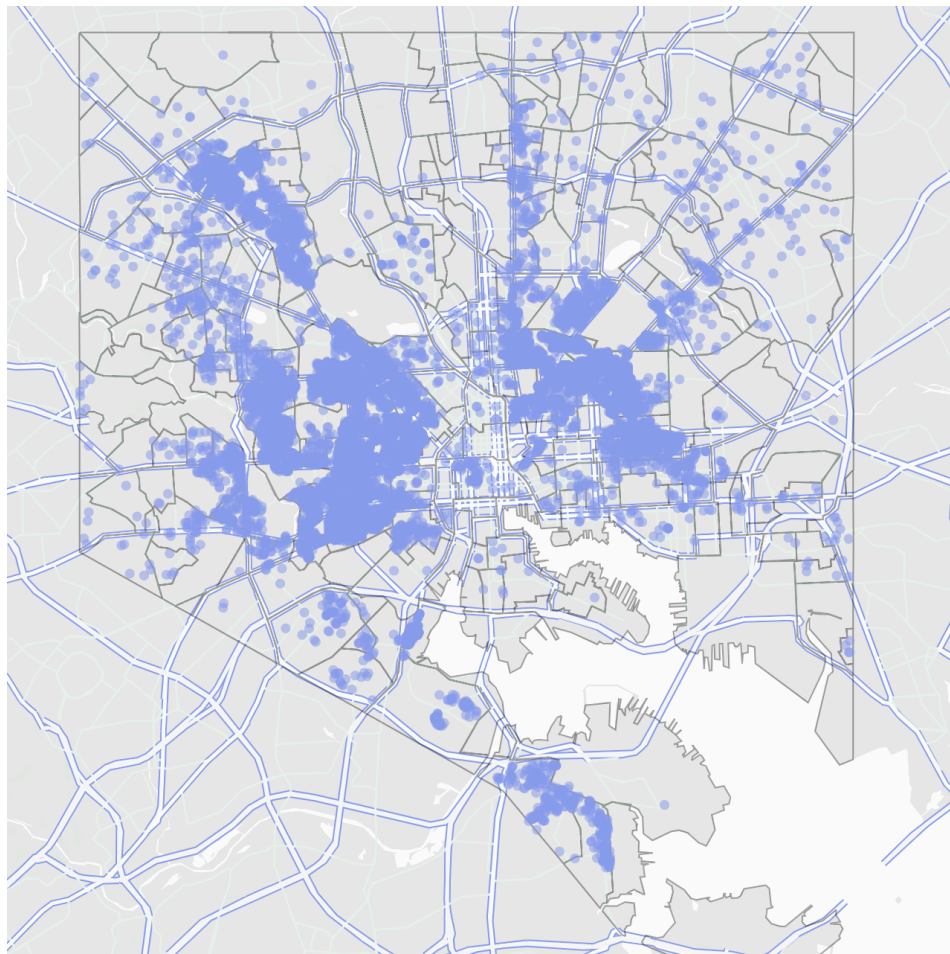


Fig. 3. Map of Vacant Properties in Baltimore, by the Author.

Vacant properties vary in condition; the city mainly proposes demolition and redevelopment due to the cost of renovating homes to be habitable. However, this can result in new buildings which don't reflect the characteristics of the neighborhood, and alienate current residents. Preservation and revitalization together, on a large scale, require a new approach.

Aims and Objectives

This thesis aims to explore how adaptive reuse of existing historic rowhouses can contribute to the revitalization of neighborhoods. In the 1960s Urban Renewal, neighborhoods were demolished without input from their communities, leaving both physical scars on the urban fabric as well as mental scars on the former residents. Using this as a basis for understanding poor urban revitalization, we understand that respectful and dignified redevelopment will include input from the community, as well as respect towards their current homes. By preserving the historic rowhouse fabric as much as possible, we can preserve the cultural heritage. This thesis asks the question, *What is the role of reuse in the revitalization of historically underserved urban environments?*

To answer this question, this thesis proposes a design decision matrix to give a variety of options suited for the area. These options are reliant on the conditions of the existing buildings, historical value, the neighborhood demographics and housing needs, and surrounding context. The existing structures are rated on their state of decay, based mainly on roof condition to estimate how salvageable the interiors are. The neighborhood demographics provide a glimpse into housing needs, to determine if more single family homes, more multifamily apartments, or a combination of them would be most beneficial. The historic value is considered to determine how invasive an intervention should be applied.

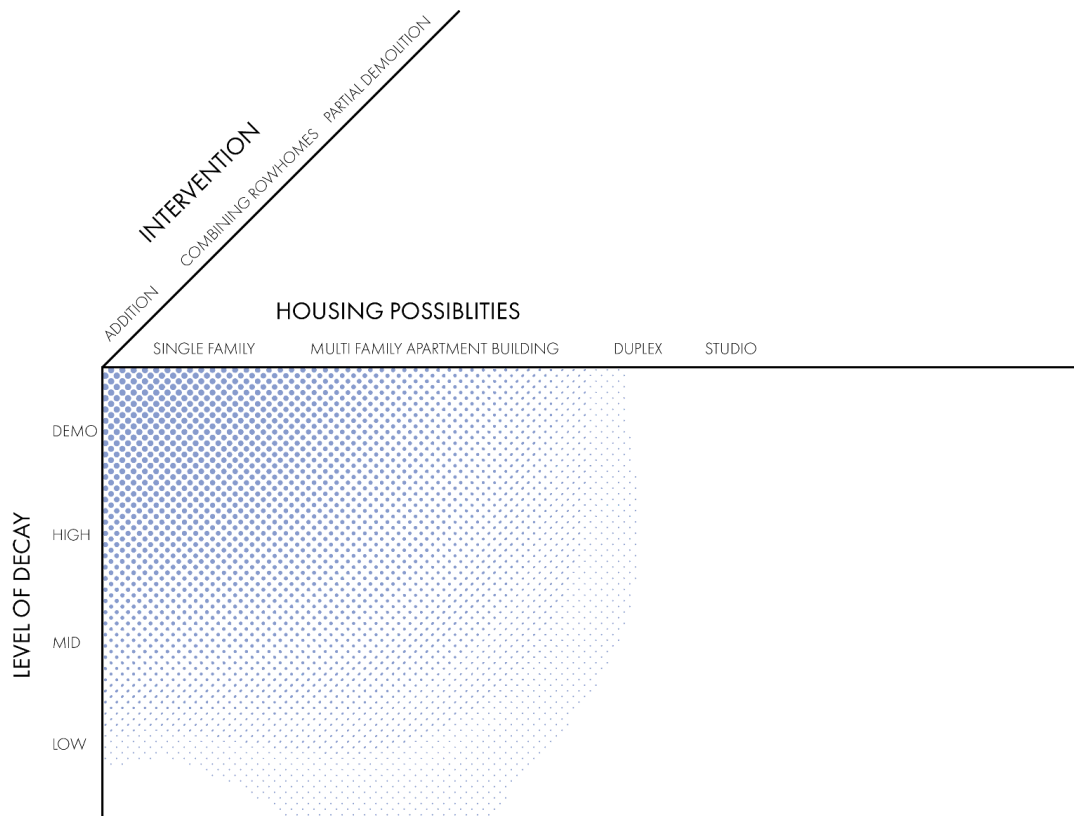


Fig.4. Visualization of the Design Matrix, by the Author.

On a neighborhood scale, this thesis aims to reimagine the street scape and apply interventions to calm traffic and promote a safe and enjoyable pedestrian experience. This contributes to safety and improves the perception of the neighborhood by both residents and outside visitors. At the block scale, this thesis aims to design floor plan options for each proposed intervention. These will cover a variety of housing options as well as existing rowhouse conditions. At the building scale, this thesis aims to propose modular components to lessen the cost prohibitive nature of vacancy remediation. These modular components will allow

for buildings to share a common system, which can be replicated and used as a component for any proposed floor plan.

Chapter 2: Literature Review

Literature Review Goals

This literature review aims to give an overview of literature regarding the issue of vacancy in shrinking cities, and specifically its adjacencies to the American Housing Crisis. The literature chosen reflects the desire to revitalize cities while retaining their individual characters. It also addresses the need for modernization of existing housing and the potential of building new housing. It will address the factors leading to vacancy and urban revitalization strategies, focusing on how historic preservation can play a key role in retaining unique character. It will also define terms commonly used throughout this thesis.

Definitions

Vacant buildings, as defined by the city of Baltimore, are buildings which meet one or more of the following criteria: considered unsafe or unfit for people to live or work in, has two or more code violations that have not been fixed, and has received six or more separate sanitation citations within a 12-month period.² This is different from an unoccupied building, which has no current residents but is being maintained by the owner. This thesis recognizes vacant buildings in Baltimore through the Vacant Building Notices data set, which records all buildings served with a Vacant Building Notice by the City. These buildings are in varying levels of distress, and are different typologies, not only rowhouses. As of November 2025, there are 12,336 vacant buildings in Baltimore.³

² "Vacants Violation reporting fact sheet." October 20, 2022. Accessed October 30, 2025.
<https://dhcd.baltimorecity.gov/sites/default/files/Vacants%20Violation%20reporting%20fact%20sheet.pdf>.

³ "Power BI Report." Accessed November 3, 2025.
<https://app.powerbigov.us/view?r=eyJrIjojOTIhNTVhNGE0MWYyOC00Y2FILTg0ODEtMDRhODEzNTFjM>

Revitalization, as used in this thesis, is the process of improving the livability of areas that have experienced decline, neglect, or underuse. This includes city economic investment in strategies aimed at restoring population and attracting residents, businesses, and private investment. In this thesis, the revitalization of neighborhoods will be addressed primarily through housing and commercial development, as well as through urban scale design regarding the street network.

Gentrification, as used in this thesis, is the process of a low income area being changed by new, wealthier inhabitants moving in and driving up the costs of living while attracting new investment in the area, displacing current inhabitants in the process.⁴ The first part of this process is not necessarily bad, since urban revitalization does require new, private investment. However, there is typically the side effect of forcing longtime residents to move due to cost of living increases. This thesis will address ways to mitigate gentrification while acknowledging that new, wealthier residents will likely move into revitalized neighborhoods.

Pocket Park is used in this thesis as defined by the Trust for Public Land. It defines a pocket park as, “public park spaces that occupy less than one acre of land.”⁵ It is used mainly to fill gaps in neighborhoods by placing a small park in areas without green space, or using existing non programmed green space more intentionally.

WJmliwidCI6ljMxMmNiMTI2LWM2YWUtNGZjMi04MDBkLTMxOGU2NzljZTZjNyJ9&pageName=ReportSection.

⁴ Feldman, Justin. “Gentrification, urban displacement and affordable housing: Overview and research roundup.” The Journalist's Resource. August 15, 2014. Accessed November 3, 2025. <https://journalistsresource.org/economics/gentrification-urban-displacement-affordable-housing-overview-research-roundup/?utm.com>.

⁵ April 6, 2020. Accessed November 3, 2025.

https://www.tpl.org/wp-content/uploads/2020/06/Pocket-Park-Tool-Kit_FINAL.pdf.

Roots of Vacancy

History of Redlining

Redlining is the term for the historic practice of denying financial services to residents of certain areas. Historically, the government and mortgage lenders would draw boundaries on a map of areas they would not lend to, coining the term “redlining.”⁶ This practice began in the 1910s, and caused instability in housing markets in minority communities, the effects of which are still felt today. Baltimore was the first major city to adopt redlining maps and codify racial segregation zoning, with Mayor Barry Mahool saying, “Blacks should be quarantined in isolated slums in order to reduce the incidence of civil disturbance, to prevent the spread of communicable disease into the nearby White neighborhoods, and to protect property values among the White majority.”⁷ By limiting access to mortgages, the city effectively prevented Black residents from owning their own homes, and severely cut the value of homes owned in redlined areas, limiting both financial and physical mobility.

This practice went hand in hand with infrastructure disinvestment. City governments prioritized developing bus routes, plumbing, and housing development in white areas, ignoring the redlined minority communities. While predominantly white areas increased their value, Black areas were left behind. Redlining was officially outlawed by The Fair Housing Act of 1968, but by this time significant damage was done to Black communities, which is still visible today.

⁶ Brown, Lawrence T. *The black butterfly: The harmful politics of Race and space in America*. Baltimore, MD: Johns Hopkins University Press, 2022.

⁷ Toval, Dario. “Was Baltimore the Proving Ground for Redlining?” Reading Partners, November 4, 2024. <https://readingpartners.org/blog/was-baltimore-the-proving-ground-for-redlining/>.

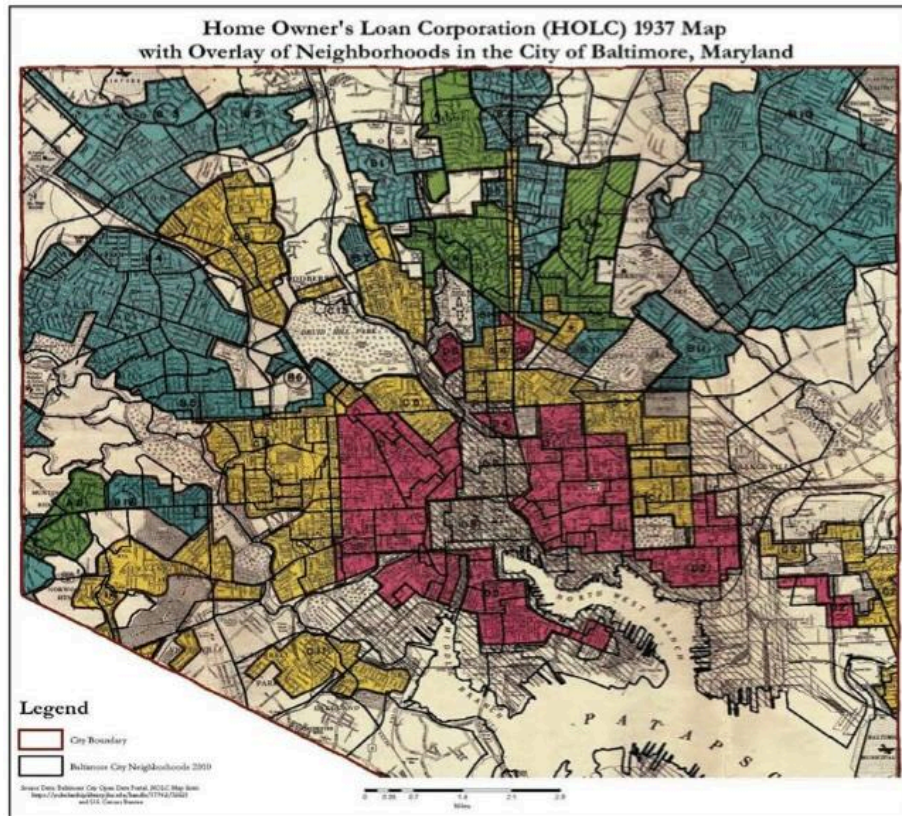


Fig. 5: Redlining Map of Baltimore

History of Urban Renewal

Urban Renewal is the 1950-60s practice of demolishing “blighted” neighborhoods, and updating infrastructure, with the presumed goal of eventually replacing it with new housing.⁸ However, in practice, this often meant destroying Black neighborhoods with no plan for relocating individuals. In Baltimore, many areas demolished by Urban Renewal were replaced with parks to be utilized by white residents.⁹ This is still seen in the fabric of the city today, with parks such as Preston Gardens Park and Rutter’s Mill Park used by majority white

⁸ Clipson, Grace. “The Creation of the US Federal Urban Renewal Program – The West End Museum.” The West End Museum – Boston’s Neighborhood Museum, April 12, 2024. <https://thewestendmuseum.org/history/era/new-boston/the-creation-of-the-us-federal-urban-renewal-program/>.

⁹ Brown, Lawrence T. The black butterfly: The harmful politics of Race and space in America. Baltimore, MD: Johns Hopkins University Press, 2022.

neighborhoods, while the Black communities that lived there before were relegated to the outskirts of Baltimore.

Another goal was the creation of the modern highway system. Famously in New York City, planner Robert Moses razed communities in low income areas such as the Bronx to create highways.¹⁰ This displaced tens of thousands of residents. Housing demolished during this time was also frequently replaced with high rise housing, which changed the way community members interacted. There was less street interaction and street visibility, which caused safety issues.

Modern Causes/The Cycle

In modern times, there are various causes associated with vacancy. In Baltimore, there is a predominance of monolithic rowhouse typology. Since the homes in a neighborhood are all a similar size, it limits who will live there. A single person is less likely to want or be able to afford a rowhouse, and a large family may need more space than a rowhouse offers. Therefore, the neighborhood is mainly limited to similar sized families. As they grow or shrink, they are forced to move to other neighborhoods to find appropriate housing. This causes more frequent turnover, which makes it challenging to stabilize a neighborhood.¹¹

Socially, any vacancy in an area can contribute to a perceived lack of safety and cause neighbors to move. This cycle is self perpetuating and reduces trust, safety, and social cohesion. For vacant areas, the low tax base creates a lack of funding for services like schools, trash collection, and general social services. This emphasizes the need for a comprehensive plan when

¹⁰ "Freeways & Urban Renewal." SEGREGATION BY DESIGN. Accessed October 22, 2025. <https://www.segregationbydesign.com/the-bronx/freeways>.

¹¹ CZB, and ReBUILD Metro. "Whole Blocks, Whole City: Reclaiming Vacant Property Throughout Baltimore." Abell Foundation , January 2023. <https://abell.org/publication/reclaiming-vacant-property/>.

addressing vacancy. Thinking about methods of financing, a variety of housing typologies, and planning for future development will be important.

Urban Revitalization Strategies

Historic Preservation

Historically, Urban Revitalization has included significant demolition of such blighted areas, destroying local communities and displacing individuals without a plan to relocate. Additionally, by replacing these areas quickly, often with one developer, new architecture is homogenous and reflects current trends rather than the vernacular architecture of the region. In modern times, architects and planners have focused on creating ways of improving local communities and inviting new economic growth without displacement. One such way is through Historic Preservation, preserving structures that reflect an area's history and using them adaptively. Another method is through Incremental Development, which in this instance means spreading development out over time to allow community members to participate in the design process. This can be to varying degrees- anything from community participant design to allowing homeowners to complete major construction and adapt their homes. Successful urban redevelopment is informed by communities and their needs, and empowers communities to take back their neighborhoods.

Balancing Gentrification

Historic Preservation is a double edged sword in urban revitalization. It can be a strategy for keeping homes affordable, by using only renovation as opposed to demolition and rebuilding. However, it can also increase prices and cost of living, as revitalization and increased awareness

of historic areas may cause increased interest from outside groups. This increased outside interest can lead to investment that outpaces local economic growth, leading to gentrification.¹² Studies have shown that this typically happens in cities with very limited housing stock, such as New York City, but in shrinking cities like Baltimore, this is less likely. In order to keep homes affordable, architects must work with city agencies and community groups to provide support for individuals to remain resilient against economic change.¹³ In Butcher's Hill, Baltimore, architects worked with nonprofit groups, such as Jubilee Baltimore, to restore historic buildings and provide mixed use housing. This housing drove economic growth by attracting new tenants who enjoyed the historic housing and relatively cheap rents, while maintaining over half of residents on Section 8 housing vouchers or low and reduced income rents. Part of the success of this project is due to the Historic Tax Credit, which gives credit to rehabilitate eligible historic buildings, and partially due to cooperation and funding by local governments and nonprofit organizations. Preservation cannot alone serve to create affordable housing- it requires the participation of many other groups.

Collective Memory

Collective memory is the idea of memory shared by a group, using the environment and architecture as anchors for shared experiences. A clear definition by author Mac Duy describes collective memory as, "understanding architecture and memory as concepts that are semantically linked and that emerge in the spatial present"¹⁴ Difficulties posed by preserving historic buildings

¹² McCabe, Brian J. "Protecting Neighborhoods or Priming Them for Gentrification? Historic Preservation, Housing, and Neighborhood Change." *Housing Policy Debate* 29, no. 1 (December 17, 2018): 181–83. <https://doi.org/10.1080/10511482.2018.1506391>.

¹³ Cohen, James R. 1998. "Combining Historic Preservation and Income Class Integration: A Case Study of the Butchers Hill Neighborhood of Baltimore." *Housing Policy Debate* 9 (3): 663–97. doi:10.1080/10511482.1998.9521311.

¹⁴ Mac, Duy. "Constructions of Collective Memory: David Adjaye." *Making Memory*. February 22, 2019. Accessed November 3, 2025.

in vacant or low income areas are balanced by the benefits of collective memory, and the importance of preserving the fabric and character of a city. Cities in the modern era have been impacted by homogeneity in design, as it is cheaper for developers to reuse plans and replicate similar buildings across the country. This erases the feeling of individuality in a city, and important characteristics. In New Orleans, post Katrina, for example, ethnographers found that preserving historic buildings was correlated with linking the future to the past, and imbuing the everyday with ongoing references to history.¹⁵ In Detroit, the modern city government has demolished entire neighborhoods deemed blighted. These areas are typically predominantly Black neighborhoods which were historically harmed in the 1960s through segregation, disinvestment, and at times destruction by the city government.¹⁶ This loss of history, which is opposed by many residents, erases social legacies of racism for a sanitized future. It also removes agency from community members to build their community as they see fit. The importance of historical buildings is in the memory and heritage of a place, and they serve as an important reminder of the past, while adapting to the future.

Sustainability

Preservation is also a method of sustainability, in that it uses the least carbon and doesn't require as many new materials. In many older buildings, architects used techniques specific to the region that were inherently energy efficient.¹⁷ For example, many Baltimore rowhouses

https://www.detail.de/de_en/constructions-of-collective-memory-david-adjaye-making-memory-33791?srsid=AfmBOoqr_LcHzpRBqpAYKuf-OU5i4jBJ9d4y2eKOjH8fhJ4MAYnY8to1.

¹⁵ Milligan, Melinda J. "Buildings as History: The Place of Collective Memory in the Study of Historic Preservation." *Symbolic Interaction* 30, no. 1 (2007): 105–23. <https://doi.org/10.1525/si.2007.30.1.105>.

¹⁶ Herstad, Kaeleigh. "'Reclaiming' Detroit: Demolition and Deconstruction in the Motor City." *The Public Historian* 39, no. 4 (2017): 85–113. <https://www.jstor.org/stable/26421016>.

¹⁷ Smith, Baird M., and Carl Elefante. "Sustainable Design in Historic Buildings: Foundations and the Future." *APT Bulletin: The Journal of Preservation Technology* 40, no. 3/4 (2009): 19–26. <http://www.jstor.org/stable/40284500>.

predate the advent of air conditioning, and used passive techniques for cooling such as orientation and prioritizing air flow. Researchers in Italy found that using a matrix to determine the best usage of cultural heritage properties was effective in promoting sustainability.¹⁸ By examining each building in several criteria, developers and architects can identify buildings which are most suited to various uses, and which might be best demolished, in conjunction with community needs.

Incremental Development

Incremental Development is another technique for urban revitalization, which spreads development out over time to allow for different developers and community members to take part in the process. Current advocates for incremental development cite efforts to reclaim and transform vacant spaces into resources like gardens and cooperatives, and advocate for a “pause in the growth machine”¹⁹ to allow space for communities to develop naturally. This can also increase home ownership by promoting slow, sustainable growth in affordable properties rather than fast paced development that can lead to gentrification. In Baltimore, some neighborhood community development corporations have slowly acquired vacant properties and renovated them, fostering local investment in the projects and slowly improving the area.²⁰ By lengthening development, there is more potential for diversification of architecture, and a natural process to fill in gaps, rather than imposing a new architecture.

¹⁸ Della Spina, Lucia. “Adaptive Sustainable Reuse for Cultural Heritage: A Multiple Criteria Decision Aiding Approach Supporting Urban Development Processes.” *Sustainability* 12, no. 4 (February 13, 2020): 1363. <https://doi.org/10.3390/su12041363>.

¹⁹ Amato, Rebecca. “On Empty Spaces, Silence, and the Pause.” In *Aesthetics of Gentrification: Seductive Spaces and Exclusive Communities in the Neoliberal City*, edited by Christoph Lindner and Gerard F. Sandoval, 247–68. Amsterdam University Press, 2021. <https://doi.org/10.2307/j.ctv1hp5hpc.15>.

²⁰ Kelly, James J. “Refreshing the Heart of the City: Vacant Building Receivership As a Tool for Neighborhood Revitalization and Community Empowerment.” *Journal of Affordable Housing & Community Development Law* 13, no. 2 (2004): 210–38. <http://www.jstor.org/stable/25782687>.

Housing Diversification

Adaptable Housing

Another means of incremental development is adaptable housing, in which communities alter their housing as they live there, building to their needs. This is typically done in the global south, where income is extremely low. Architects such as Elemental have designed houses which are built at about half the size of a typical home, and allow for community members to build as they save money to pay for construction materials, as well as personalize their homes to their needs.²¹ Some architects advocate for this approach in the US. It can help individuals own a home sooner, as small starter homes become more unaffordable.²² This approach is interesting, but policy in the US makes this more challenging than in other regions, since there are stringent permitting and building requirements. However, leaving room to expand homes on their lot, or allowing Accessory Dwelling Units, may be a good solution.

Accessory Dwelling Units (ADUs)

Accessory Dwelling Units are small dwellings which exist on a larger plot. Typically in the US this means adapting sheds into livable apartments, or building tiny homes on the plot of a larger home. In some cities, carriage houses have become desirable ADU apartments. This is another solution which requires changes in zoning, and has the potential to create small, affordable homes in cities. Historically, this has existed in some form with carriage houses on larger plots, and servant quarters. This has also become popular with the idea of ‘mother in law suites’, in which family members live in separate apartments on the same plot.

²¹ ARAVENA, ALEJANDRO. “ELEMENTAL-INTERVIEW.” *Perspecta* 42 (2010): 85–89. <http://www.jstor.org/stable/41679225>.

²² Mukhija, Vinit. “The Value of Incremental Development and Design in Affordable Housing.” *Cityscape* 16, no. 2 (2014): 11–20. <http://www.jstor.org/stable/26326881>.

Affordable and Public Housing

Policy History

In the US, public housing began in 1937 with the creation of the U.S. Housing Act. This was in response to declining city populations post WWII, and led to the previously mentioned period of Urban Renewal. Cities began creating programs of affordable housing to entice families to stay rather than migrate to the suburbs. The Department of Housing and Urban Development (HUD), created in 1965, provided affordable subsidized housing. In the 1980s, homelessness increased, leading to development of more affordable housing and Section 8 vouchers. However, the production of housing has been outpaced by demand, and many affordable housing programs have significant wait lists.²³

In some growing cities like New York City and San Francisco, the demand for housing in general, not just affordable housing, has surged due to economic growth. Housing construction has not kept pace, leading to a significant imbalance.²⁴ In other cities like Baltimore and Detroit, diminishing industry jobs have led to a shrinking population and economic downturn, leading to vacancy of larger homes and no affordable homes to turn to.²⁵

Architectural History

Affordable and public housing has had many aesthetics and philosophies over the decades. In the 1930s, the general attitude was towards low rise buildings such as the Techwood

²³ “The Gap.” National Low Income Housing Coalition. Accessed October 22, 2025. <https://nlihc.org/gap>.

²⁴ Karlinsky, Sarah, Kristy Wang, Sarah Jo Szambelan, and Nick Josefowitz. “What Caused the Housing Crisis?” Edited by Karen Steen. What It Will Really Take to Create an Affordable Bay Area: How Much Housing Does the Region Need to Build to Prevent Income Inequality from Getting Worse? SPUR (San Francisco Bay Area Planning and Urban Research Association), 2020. <http://www.jstor.org/stable/resrep26076.4>.

²⁵ Metcalf, Gabriel. “Sand Castles Before the Tide? Affordable Housing in Expensive Cities.” *The Journal of Economic Perspectives* 32, no. 1 (2018): 59–80. <http://www.jstor.org/stable/26297969>.

homes in Atlanta, Georgia. These homes were for whites only, and replaced a Black neighborhood, Techwood Flats.²⁶ In the 1950s and 1960s, the trend was towards high rise buildings, in order to fit more housing within a lot. This is exemplified in the Cabrini Green housing project in Chicago. This high rise building was lauded as the future of public housing and planned to be integrated.²⁷ However, it was very poorly maintained and quickly became unsafe for residents. The high rise model meant there were plenty of stairwells that became hot spots for gang activity and robberies, and the density concentrated poverty in the area. It also isolated residents of public housing from other residents of the neighborhoods.

After this time, the focus returned towards low rise rowhouses with green space. However, in President Reagan's term, public housing was cut back severely, with housing no longer thought of as a right.²⁸ This changed the housing landscape in favor of housing vouchers rather than public housing. HOPE VI is the latest public housing initiative, started in 1992, which gave funding to demolish and rebuild public housing in poor conditions. This has drawn some criticism since fewer low income units are built than demolished, leaving many without homes. It also focused on mixed income development, and using modern urban principles such as walkability, and a focus on low rise development.

Modern Designs

Modern public and affordable housing generally has a focus on community development. In New York City, El Borinquen is a 10 story, 148 unit building which has a ground level art gallery for community engagement, as well as offering some social services. Architecturally, it

²⁶ Accessed November 6, 2025. <https://www.georgiaencyclopedia.org/articles/arts-culture/techwood-homes/>.

²⁷ Cancino, Alejandra. "Cabrini-Green: A History of Broken Promises." December 15, 2021. Accessed November 3, 2025. <https://blockclubchicago.org/2021/12/15/cabrini-green-a-history-of-broken-promises/>.

²⁸ "Public Housing History." National Low Income Housing Coalition. October 17, 2019. Accessed November 6, 2025. <https://nlihc.org/resource/public-housing-history>.

uses natural light and open floor plans, as well as bright colors to create a comfortable space. The bright colors and artwork are reminiscent of Latin American art, to honor the mainly latin community. In London, Holmes Road Studios is an example of modern, low rise housing. Similar to el Borinquen, it uses bright colors as distinguishing elements. It is at a more human scale, and has a community garden at the center for residents to meet each other.

Reclaiming the Street

Urban Greening

Urban greening is the design strategy to add vegetation to typically barren areas of the city. This requires different techniques, such as small pocket parks, green walls, bioswales, and community gardens. This has been found to have social benefits like improved security due to more people on the street.²⁹ It also reduces the heat island effect. This is also a way to promote social justice, due to disparities in access to parks between African American and white populations. In Baltimore, while more African Americans have parks within walking distance, whites have access to larger park areas.³⁰ Increasing green space is good for the social fabric of the city, and needs to be addressed at the neighborhood level.

Stooping

In Baltimore, “stooping” is a term for sitting on the front stoop of a rowhouse to chat with neighbors and passers by. With faster street traffic and reduced public transit, this social interaction became less prevalent. Neighborhood dynamics changed, leading neighbors to

²⁹ Pomeroy, Jason. “Greening the Urban Habitat: Singapore.” CTBUH Journal, no. 1 (2012): 30–35. <http://www.jstor.org/stable/24193049>.

³⁰ Boone, Christopher G., Geoffrey L. Buckley, J. Morgan Grove, and Chona Sister. “Parks and People: An Environmental Justice Inquiry in Baltimore, Maryland.” *Annals of the Association of American Geographers* 99, no. 4 (2009): 767–87. <http://www.jstor.org/stable/20621242>.

interact less frequently and lose a sense of community. By rehabilitating vacant rowhouses, planners and architects can encourage community interaction that adds to safety and sense of place, returning the possibility of street level activity.

Complete Streets

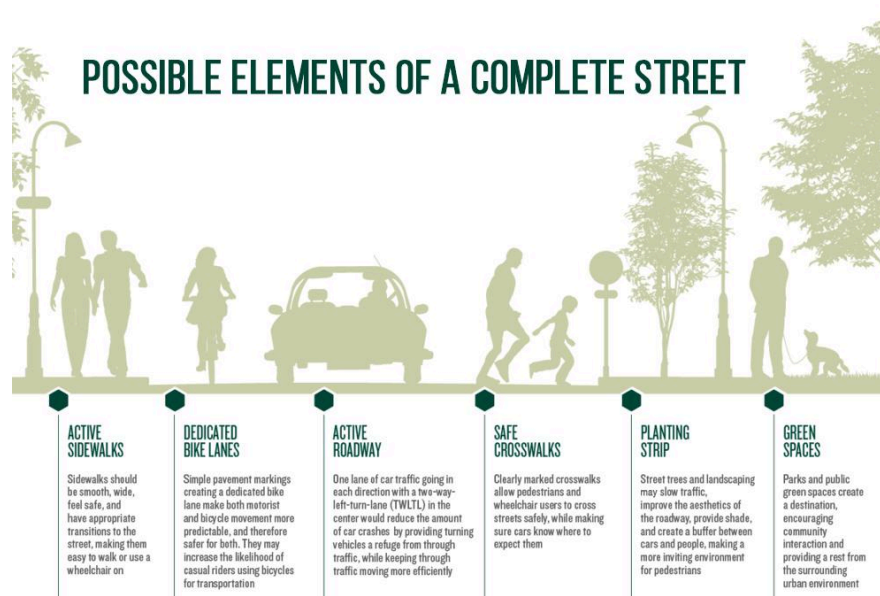


Fig 6. "Complete Streets."³¹

Complete Streets focus on balancing the needs of different street users, such as pedestrians, cars, and bicyclists. It also emphasizes the pedestrian experience by having wider sidewalks, shading devices, and plantings.³² This addresses the modern issue of car centric planning and streets, which create an unpleasant environment and discourages pedestrian traffic. By including more

³¹ Gardner MA. Accessed November 6, 2025.
<https://www.gardner-ma.gov/730/Complete-Streets>.

³² Lenker, James A., Jordana L. Maisel, and Molly E. Ranahan. "ASSESSING THE IMPLEMENTATION OF COMPLETE STREETS PROJECTS." *Journal of Architectural and Planning Research* 33, no. 3 (2016): 199–212.
<http://www.jstor.org/stable/44987200>.

elements like sidewalks, bike lanes, crosswalks, and green spaces in addition to the roadway, planners and architects can encourage community engagement.

Chapter 3: Research Methodologies

Introduction

This thesis will conduct research through a literature review, precedent studies, data mapping studies, and ethnographic research. The goal of this thesis is to propose a system for rehabilitating blocks which can be applied across Baltimore, demonstrated using a single block prototype. To address all factors necessary to develop this system, it must be broken down into smaller questions. This thesis researches literature on affordable housing, preservation, and urban revitalization. The study evaluates existing approaches, identifies gaps, and synthesizes relevant strategies. The usage of data mapping will help locate areas of vacancy and provide a basis to demonstrate the system's efficacy across neighborhoods. Ethnographic research provides a look into resident's lives and culture, and will drive solutions that are community oriented. Physical prototyping will test possible modular interventions, and develop flexible solutions. These methods are used to learn about the problem area before designing the solution.

Literature Review

The literature review serves to define a field of research, narrowed from Vacancy and Urban Revitalization Strategies. Beginning research, the literature review must answer the necessary first question when approaching this topic: *What are the drivers of vacancy in cities?* Without a baseline understanding of this question, one cannot hope to address vacancy. By investigating these further, research branched down other avenues. These included Homelessness, Crime and CPTED, Incremental Development, and Shared Streets. This study was conducted by using the research question to delve into broad research topics, gradually

becoming more specific, and then zooming out again to see the big picture. This research pulled mainly from journal articles and books. Many articles were written in the past ten years; however, older literature on Urban Renewal was examined to understand how planners' mindsets have changed since the 1960s. Overall, the literature review served to further the development of the research question and focus.

Precedent Studies

Precedent research will analyze case studies on an urban scale from other cities that have successfully revitalized housing stock, focusing on the housing typologies, financing models, and community-based processes employed. This will explore some European cities as precedents, but focus more heavily on Baltimore's history of urban renewal and other American cities that deal with the same issues of homelessness and vacancies. Some of these studies will provide examples of beneficial processes, while others will examine the failures of previous housing policies and projects.

On a building scale, this thesis will examine the Hidden House, the Salk Institute, Museo Nacional de Arte Romano, House N, and Nakagin Capsule Tower. These projects are not all housing- however they all offer insight on different factors relevant to this thesis. This thesis aims to create architecture in an adaptive reuse setting, with the mindset that additive portions of the building should be visually distinct. This idea is present in the design of the Museo Nacional de Arte Romano by Rafael Moneo and in the Hidden House by Hombre de Piedra Arquitectos. In both projects, there is an existing structure which defines some geometries and materials, but the new architecture is visually modern and distinct. The Salk Institute and Nakagin Capsule Tower are both examples of architecture using consistent modules. The Salk Institute's floor plan

allows for portions to be swapped out as they age, while the Nakagin Capsule Tower is directly comprised of modular housing units. For this thesis, a modular bent is considered, but is not the prime method. Finally, House N demonstrates how architecture can become layered with zones for public and private engagement. These precedents all serve to direct the design process exploration.

Data Mapping and Visualization

After identifying major factors of vacancy, data mapping will begin to demonstrate how modern and historic drivers of vacancy interact in Baltimore. Historic redlining data was overlaid with modern vacancy data to examine their correlation throughout Baltimore. Baltimore recognized Historic Districts were also overlaid, to examine how they may interact with vacancy. This data was analyzed through GIS and MapBox to do spatial analysis of vacant housing clusters and identify potential site regions. This data also demonstrates the widespread nature of vacancy, and provides a basis for the idea that a block prototype will be widely applicable in Baltimore. This data will be further applied to identify potential intervention zones beyond the proposed site for this thesis.

Ethnographic Research

Ethnographic research focuses on the lives of residents of a region. Studying how current residents interact with the built environment and street edge helps inform future design. As a designer, observing the nodes of activity, typical daytime and nighttime activities, and transit patterns inform the design process. This will also determine the types of housing needed. For example, the Penn North Neighborhood has a prevalence of drug addiction recovery services.

This may inform co-living or halfway housing as a potential design typology. Additionally, by observing how users interact with this block as opposed to stable, non vacant blocks, the designer can identify which elements may be missing from vacant blocks.

Physical Prototyping

Physical prototyping is a valuable architectural method of exploration. On an urban scale, modeling existing buildings and their proposed interventions is useful to the design process. At the building scale, this thesis will prototype different modular building options. These include the wikihouse frame which is a type of Panelized Construction, Volumetric Modular Construction, and hybrid types. These will be applied to the proposed interventions to test which type is most suitable for the rowhouse typology, and what will be most adaptable. This process will help guide the architectural design process and test the iterations.

Conclusion

Together, these research methodologies form a framework for understanding and addressing vacancy in Baltimore. The literature review establishes the conceptual foundation, clarifying the systemic forces that shape disinvestment and exploring existing strategies. Precedent studies offer architectural and urban examples that guide design. Data mapping reveals spatial patterns and historic inequities, ensuring that the proposed system responds to existing conditions rather than abstractions. Ethnographic research centers the lived experiences of residents, grounding the work in community needs and cultural dynamics. Finally, physical prototyping tests the interventions. Collectively, these methods create a comprehensive, iterative,

and community-responsive approach to developing a block-scale rehabilitation system for Baltimore.

Chapter 4: Case Studies

Introduction

Precedents are an important part of any architectural research process. By delving into the intricacies of built projects, one can examine the methods used to create a sense of space and place. In this thesis, the program is the normative apartment or house, with the innovation existing in the layers of history using adaptive reuse, as well as the overall neighborhood revitalization, and modular design. Each selected precedent illuminates a different dimension of this inquiry. Some address the complexities of working within historically layered structures; others explore the social and architectural implications of densification, affordability, or incremental development. Others demonstrate how modular components can enable flexibility and efficient rehabilitation across multiple sites. Together, these precedents outline a range of possible trajectories for the thesis design, offering both conceptual frameworks and practical tactics.

My examination of these precedents involved several layers of research. I conducted historical research to understand each project's context, motivations, and constraints, as well as site research to evaluate its physical and urban conditions. This was followed by analytical diagramming to distill spatial organization, circulation, structural logic, and relationships between new and existing elements. Beyond this formal analysis, I also value the intangible insights gained through firsthand experience—observing how spaces feel, how they are used, and how they contribute to the life of a street or neighborhood. These impressions draw from my broader knowledge of architectural precedent, informed primarily by visits and study of projects in Western Europe and the United States.

Collectively, these investigations provide both a critical lens and a creative foundation. They help establish the architectural, social, and urban ambitions of the thesis, and they frame the possibilities for intervention in Baltimore's rowhouse fabric.

The Hidden House



Fig 7. Hidden House Perspective.

This house was built in 2024 as adaptive reuse of a historic farmhouse in Spain. The area of Spain has also dealt with the issue of vacancy, as farming has died out in the area and people left for larger cities. The town has many vacant farm houses which don't have the needed typology for new residents. The architects kept the thick, stone exterior wall, the most durable and culturally significant element, while removing the interior partitions and roof to insert a new, clearly contemporary structure. At the street level, the project maintains its traditional

appearance, reinforcing the continuity of the rural village fabric. However, once inside, the contrast becomes immediately apparent: the modern intervention is expressed as a lightweight, rectilinear volume that sits within the historic shell. This creates an interior courtyard that functions as a spatial hinge between old and new, bringing natural light and ventilation deep into the plan and introducing moments of greenery that reinterpret the agricultural landscape on a domestic scale. The courtyard also becomes a new form of collective or semi-public space within a private dwelling, reimagining how interior-exterior relationships can operate in adaptive reuse.

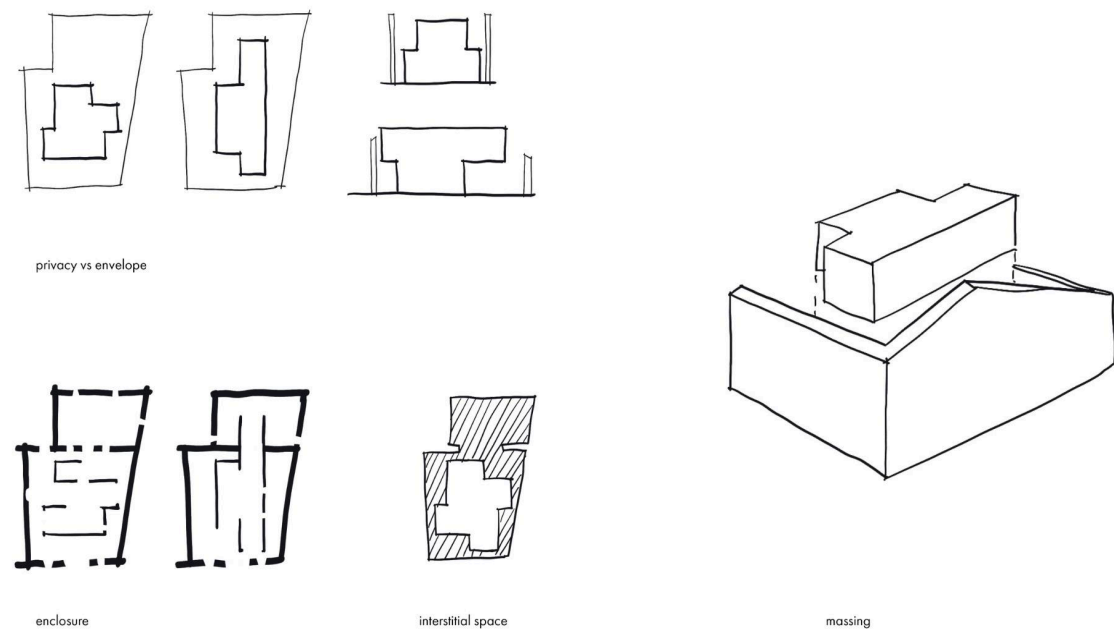
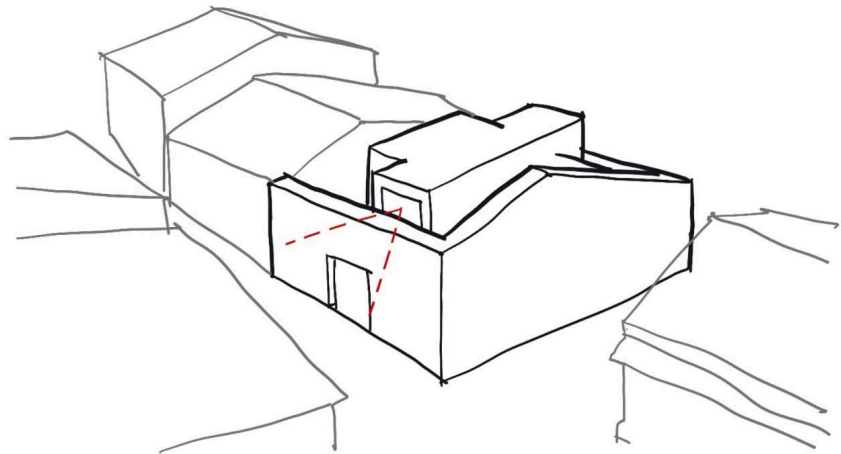


Fig 7. Hidden House Diagrams. By author..



facade in context



views

Fig 8. Hidden House Diagrams. By author..

Materially, the project achieves a juxtaposition of the modern and historic. The modern structure incorporates modified shipping containers as enclosed volumes, used for modularity and cost-effectiveness while intentionally masking their industrial origins. The exterior treatments cover the corrugated metal and allow it to fade into the background of the historic portion.

Structurally, the modern insert appears to rest on the historic walls at select points, but for the most part looks to be self-supporting. The walls of the existing structure are also capped with a modern metal trim to preserve it and create a similarity between the historic and modern structure. This condition could apply in Baltimore, if modular interventions require structural support from the party walls of rowhouses. In rowhouses, further stabilization of the brick would likely be required. Overall, this project successfully contrasts historic and modern intervention to adapt a vacant home into one that offers a new typology for the area.

The Salk Institute



Fig 9. Salk Institute Perspective. By Liao Yusheng.

This project is a science laboratory in California, made primarily of cast concrete, teak paneling, and travertine stone. The project is somewhat modular, with a series of towers which interact at different angles to create unique, contemplative spaces. The shared spaces are bright, while the more private spaces are more shaded and hidden. The courtyard space is sparse, with only a single stream of water dividing the site.

The program layout of the Salk Institute is organized around a clear separation of public, shared, and private research zones. Each of the towers on either side of the courtyard contain two primary components: the laboratories themselves and the more intimate office spaces for researchers. The labs occupy the largest rooms, organized as open, flexible workspaces that can be reconfigured over time. This was intended as modular planning that allows the building to evolve as scientific needs change. Above the labs, smaller office volumes cantilever outward, providing quieter, shaded environments for concentration and study.

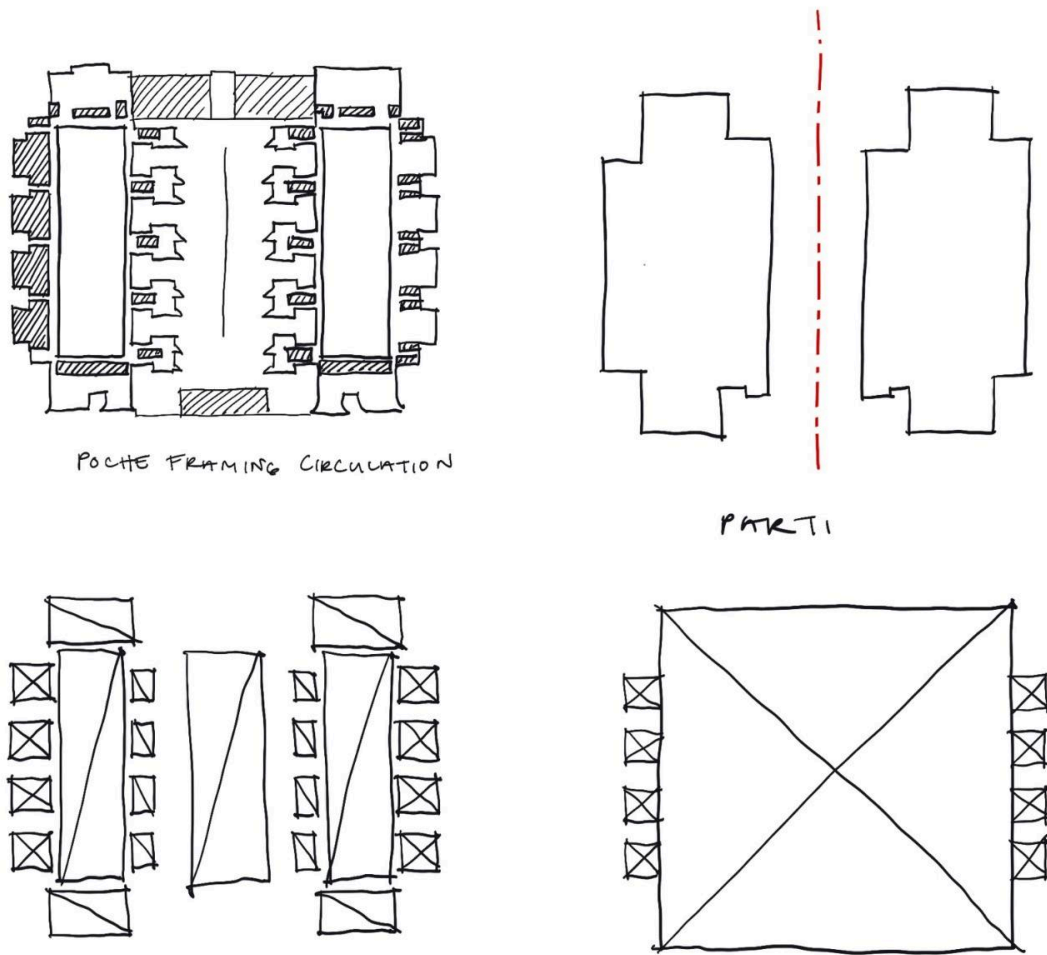


Fig 10. Salk Institute Diagrams. By author..

This separation of functions is reinforced by the material and daylighting strategy. The laboratory floors use clerestories and light wells for bright workspaces suitable for scientific research. In contrast, the offices are shaded with teak paneling, receiving softer, filtered light that emphasizes privacy. Circulation threads between these zones using broad staircases, exterior walkways, and narrow passages to create shifting conditions of openness and enclosure. These create intentional thresholds between the public and private spaces.

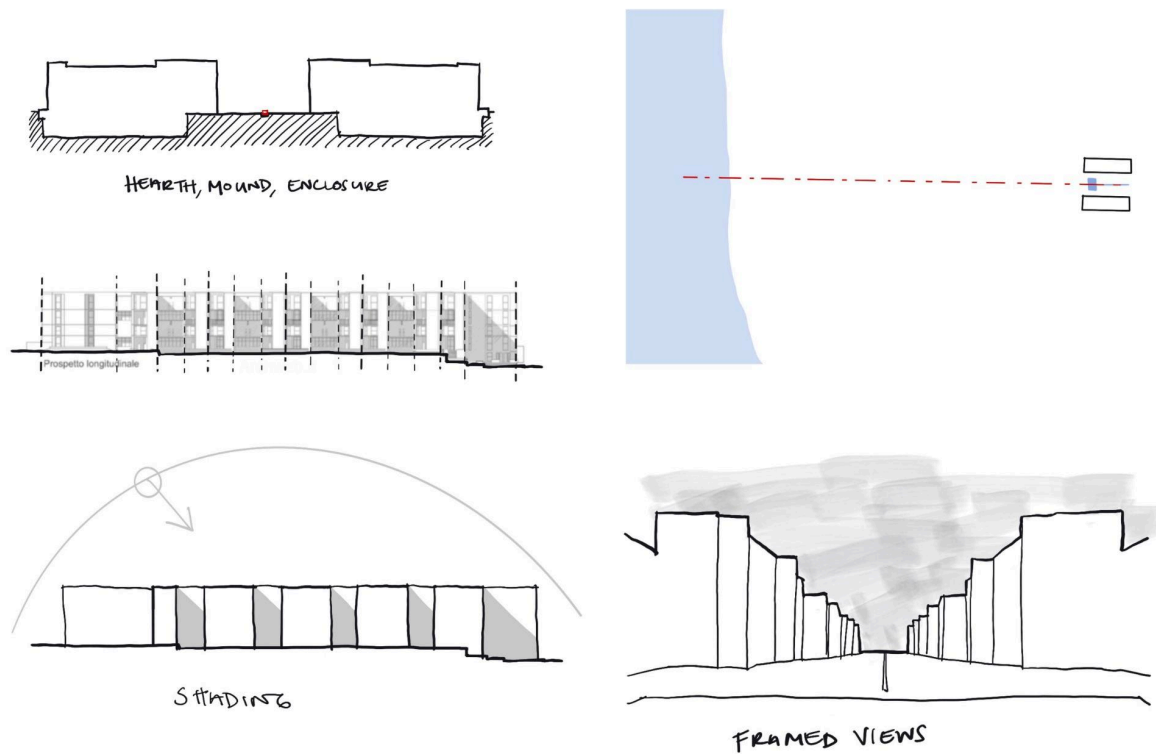


Fig 11. Salk Institute Diagrams. By author..

This project resembles some of the social housing researched for this thesis- it is modular, has alternating open balconies and closed walls to create privacy, and the other spaces are designed for collaboration. I also appreciate the sparse palette of materials and ability to remove panels for future design. The adaptability is also relevant for social and affordable housing.

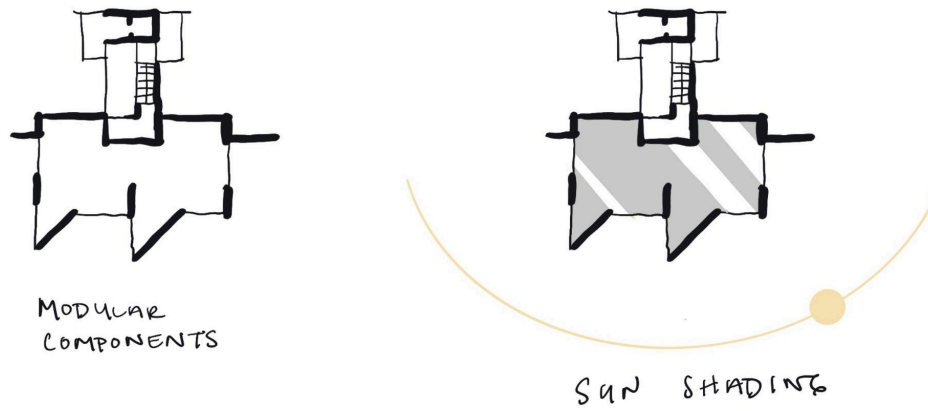


Fig 12. Salk Institute Diagrams. By author..

Museo Nacional de Arte Romano



Fig 13. Museo Nacional de Arte Romano.

The Museo Nacional de Arte Romano was completed in 1986 in Merida, Spain, by Rafael Moneo. It is a museum dedicated to ancient Rome, built on top of Roman ruins. The architecture is stunning, with masonry arches defining space, built using Roman techniques. The building is defined by the careful use of natural light in the space, filtering through the archways and skylights. This precedent is relevant because it uses historic techniques in modern architecture, and also uses historic materials in a respectful manner. The building was carefully constructed over the ruins, and protects them from the elements while alluding to Roman architecture.

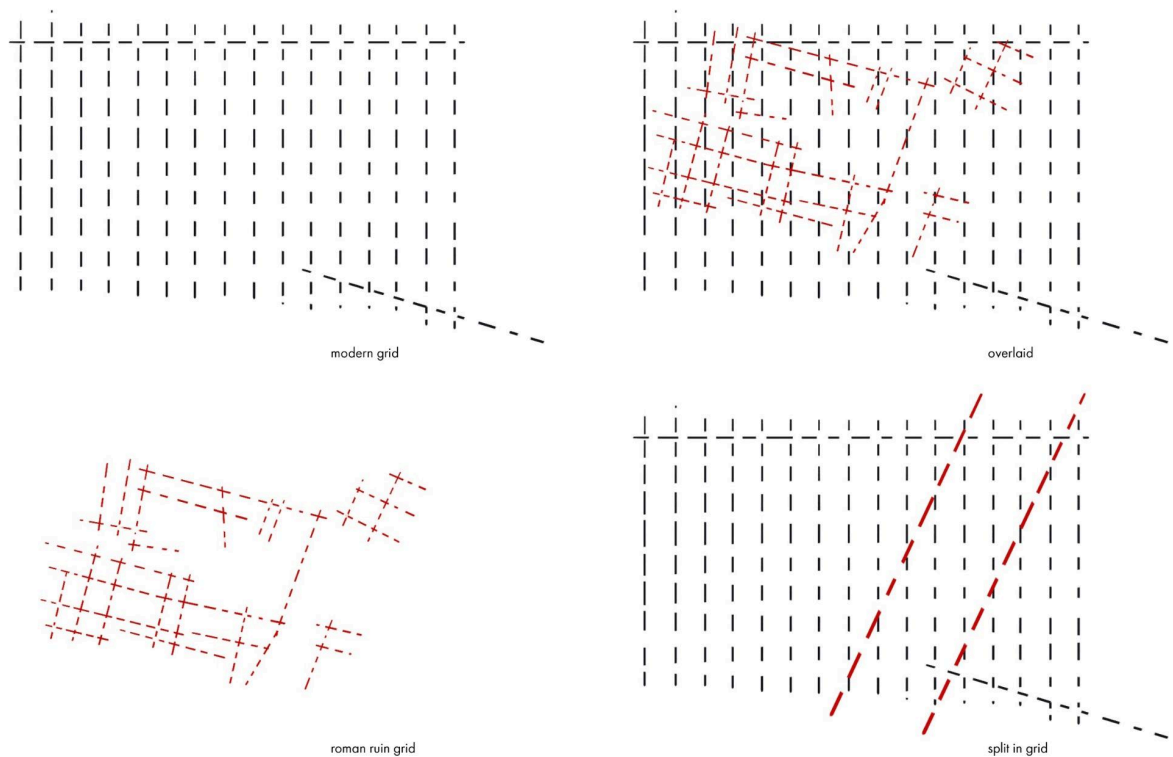


Fig 14. Museo Nacional de Arte Romano Diagrams. By author..

A crucial aspect of the museum's tectonics is its relationship to the Roman ruins below. Moneo elevated the new building on a system of foundations and structural spanning elements that lightly touch the archaeological remains. The floors, walkways, and platforms float above the ruins, allowing visitors to look down into excavated fragments. This strategy is both technical and symbolic: the modern construction protects the ruins from weathering and human wear, while making the layers of history present. The detailing throughout reinforces this dialogue—modern brick is laid with tighter tolerances and exacting precision, clearly distinct from the irregular, weathered Roman substrate beneath.

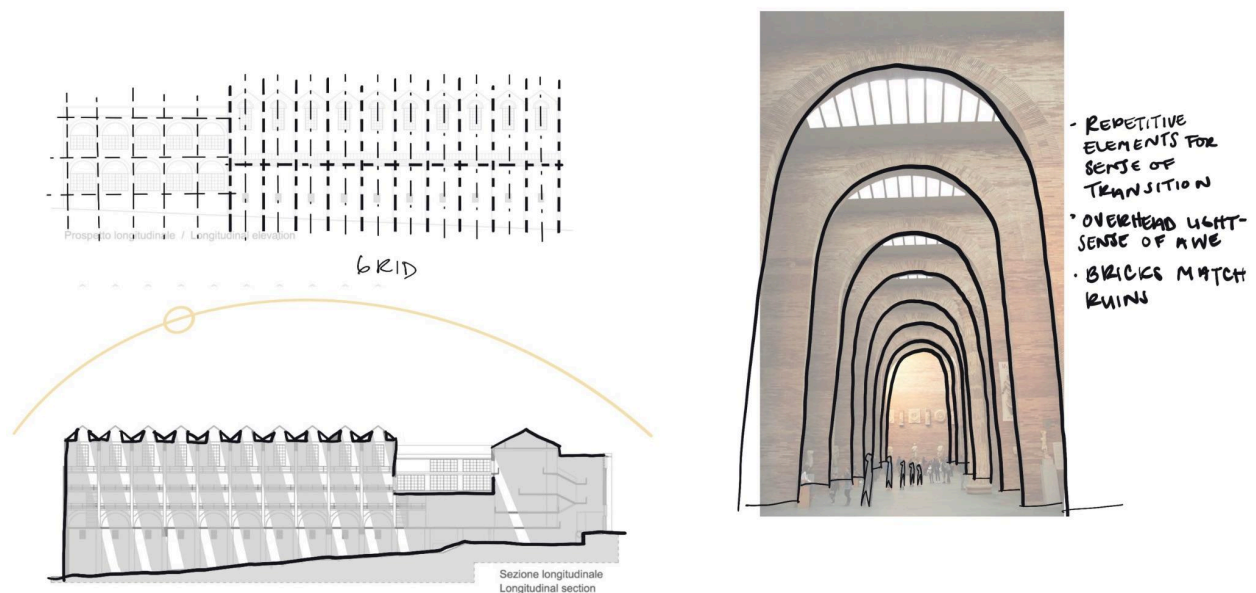


Fig 15. Museo Nacional de Arte Romano Diagrams. By author..

I examined the drawings to see how the new building interacts with the old. I think this will be relevant in this thesis design because reimagining the row house will require new materials interacting, and gives the potential for mimicking the historic construction techniques

and materials. This could similarly incorporate subtle, modern insertions that respect the original masonry shell. The clear articulation of structure, the expressive thickness of walls, and the manipulation of natural light all offer strategies for working within the narrow, light-poor interiors of mid-block rowhouses. Moneo's delicate treatment of the ruins offers a model for how new modular elements might hover within or around existing brick shells, preserving historic fabric while introducing new spatial possibilities with light.

House N



Fig 15. House N. By Iwan Baan.

House N by Sou Fujimoto, completed in 2008 in Oita, Japan, is an exploration of spatial layering, permeability, and the gradation between public and private life. Rather than treating the house as a singular, enclosed volume, Fujimoto created it as a sequence of nested shells. These three distinct enclosures define progressively more private zones. This layered approach allows the building to negotiate conditions of proximity, community, and privacy within a relatively small footprint. The house is made primarily of white painted concrete and light wood, creating a light and cloud like feel.

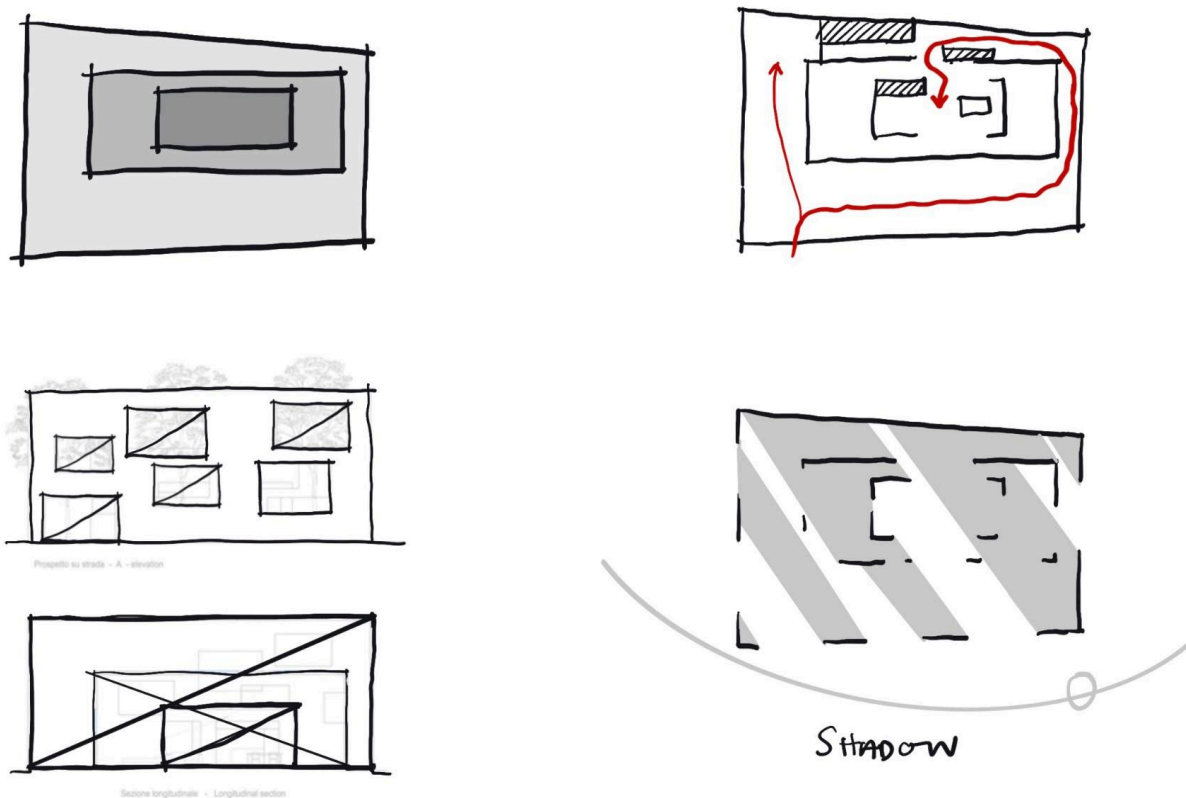


Fig 16. House N Diagrams. By author..

This house was examined for the zoning concept, and how it uses architecture to redefine how houses should interact with the street. Furthermore, it changes how humans interact with homes and with each other. For this thesis, House N offers a conceptual framework for rethinking the Baltimore rowhouse, particularly through layering new modular components behind a preserved historic façade. The strategy also reveals how modern materials and spatial planning can coexist with historical architecture. House N will be reverse engineered to examine program layout and square footage in the following chapter on Program.

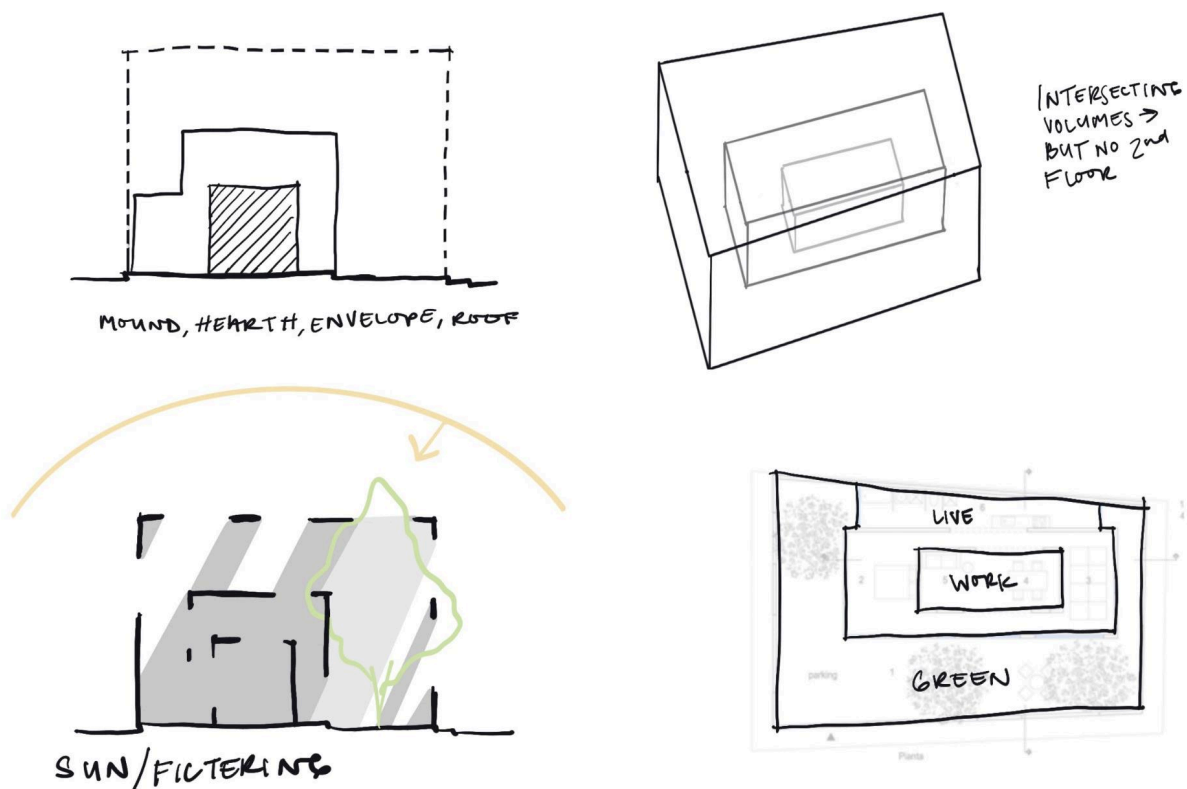
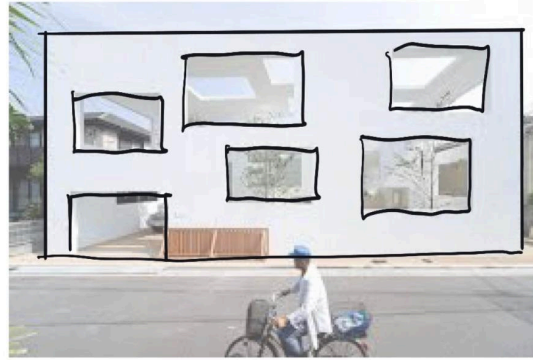


Fig 17. House N Diagrams. By author..



- TAKES UP MORE OF LOT THAN ITS NEIGHBORS - GREEN SPACE INSIDE
- CLOSER TO FRONT OF LOT → PEDESTRIANS CAN ENGAGE WITH RESIDENTS
- FRAMING VIEWS IN & OUT - CIVIC ENGAGEMENT

Fig 18. House N Diagrams. By author.

Nakagin Capsule Tower



Fig 19. Nakagin Capsule Tower. By JordyMeow.

The Nakagin Capsule Tower in Tokyo is a landmark of Metabolist architecture, a postwar Japanese movement that envisioned cities as living, evolving organisms. The building consists of two concrete core towers, intended to be permanent, to which 140 prefabricated steel capsules could be attached and detached. Each capsule, measuring about 110 square feet, was designed as an individual micro-apartment or office, fully equipped with built-in furniture and a circular window. These were constructed offsite and then brought as finished pieces to the tower.

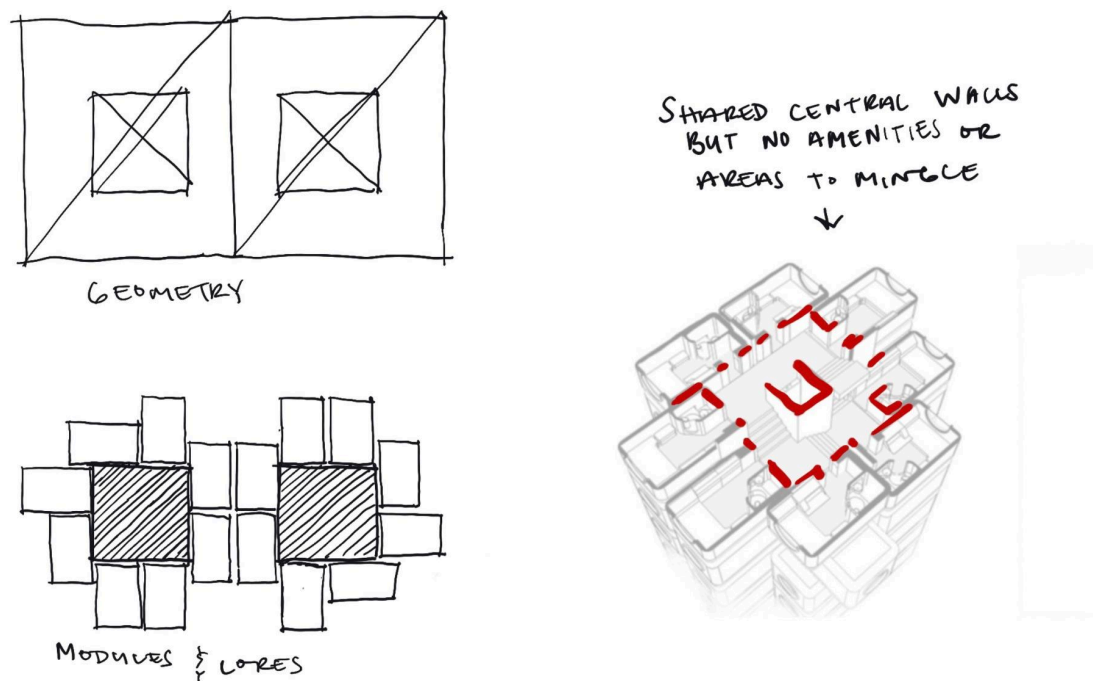


Fig 19. Nakagin Capsule Tower Diagrams. By author..

Kurokawa's concept was to create flexible, replaceable housing that could adapt to urban change. This was designed by using capsules meant to be detached and replaced every 25 years, reflecting the Metabolist idea of growth and renewal. However, this vision was never realized; the capsules deteriorated over time due to maintenance challenges and the difficulty of sourcing

replacement parts. The building was demolished in 2022 due to maintenance issues. I examined this building to understand the modular system, and see the pros and cons. The modules were incredibly small and were not able to be reused in new configurations.

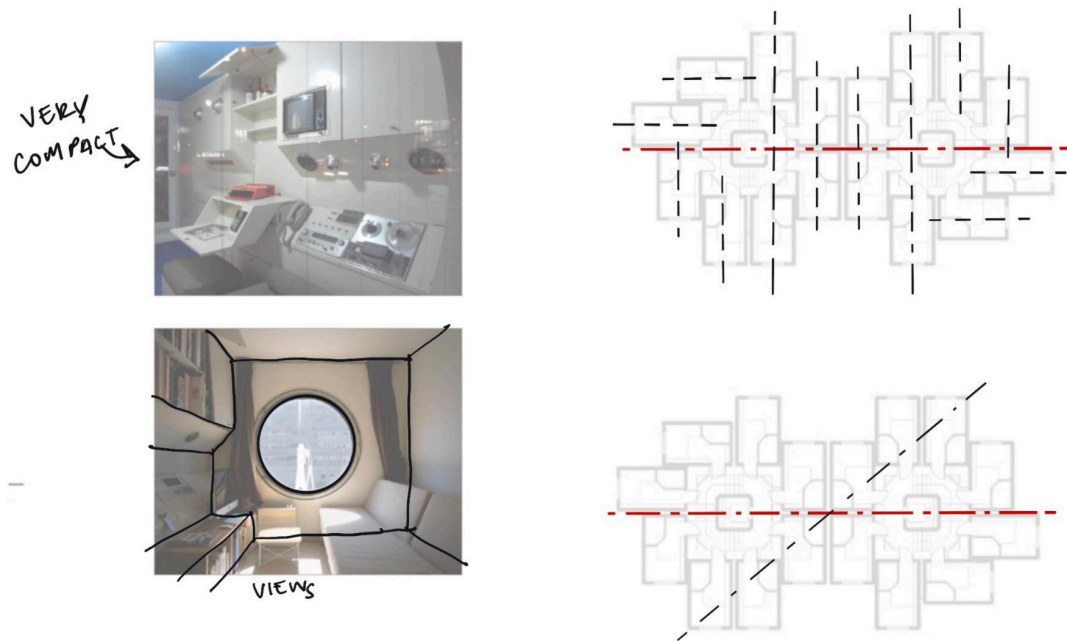


Fig 20. Nakagin Capsule Tower Diagrams. By author..

Although the capsules could not be replaced as intended, the original concept offered a vision of incremental development, with small units being added, removed, or replaced over time. This incremental idea relates to the thesis's goal of introducing modular elements into blocks with varying levels of vacancy, allowing neighborhoods to evolve gradually rather than through whole block redevelopment.

In examining Nakagin, one can examine the pros and cons. The tower demonstrates the potential of modular systems to reinvent existing building typologies, while also revealing the risks of insufficient adaptability, maintenance challenges, and overly rigid component design. By learning from these tectonic and operational issues, this thesis aims to explore modular

interventions that are not only innovative but feasible, maintainable, and responsive to the long-term needs of Baltimore's neighborhoods.

Conclusion

Each precedent was valuable in revealing distinct strategies for reimagining residential forms and understanding how architecture can mediate between past and future. These case studies clarified how adaptive reuse, modular systems, and sensitivity to historical context can be used to revitalize and reshape urban neighborhoods. The Hidden House demonstrated how preserving the exterior envelope while inserting a new interior can create interest and juxtapose the modern with the historic. The Salk Institute showed how modularity and flexible components can support both communal activity and privacy, similar to the needs of contemporary affordable and social housing.

The Museo Nacional de Arte Romano revealed how new interventions can coexist with historic fabric, using similar materiality to historic portions. This approach resonates with the challenge of working within narrow, mid-block rowhouse plots. House N provided a model for spatial zoning and layered thresholds, offering insight into how new modular additions can create gradations of privacy, community, and openness behind a preserved facade. Finally, the Nakagin Capsule Tower highlighted both the positives and negatives of true modular building, showing the importance of adaptability, maintainability, and long-term integration within the larger urban system.

In conclusion, these precedents helped describe both the intended social values and the possibilities for design. They demonstrated that meaningful revitalization will require detailed historical knowledge as well as architectural iteration. Through historical research, site analysis,

and experiential understanding, these case studies established a foundation for exploring how Baltimore's rowhouse fabric can be transformed into a more resilient model of urban living.

Chapter 5: Zones and the Program

Program Abstract

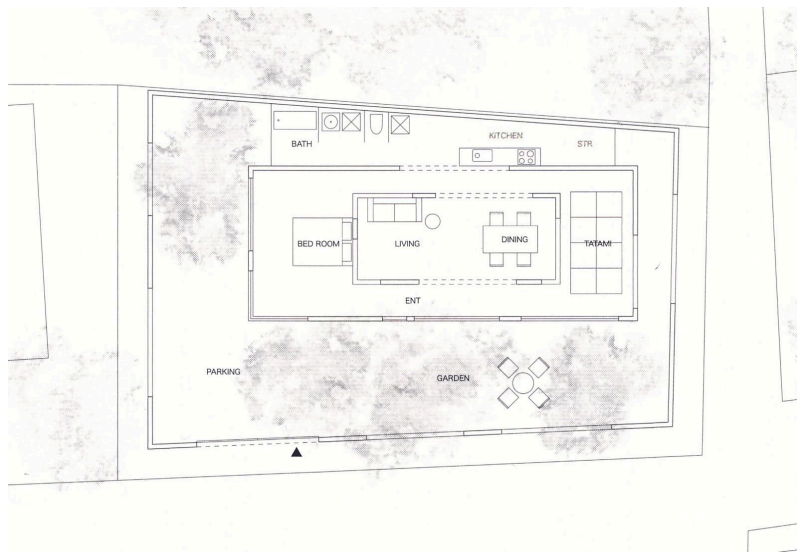
This thesis project revolves around housing, and adapting standard, single family rowhouses into different typologies: multi unit apartment buildings, condos, single family, and apartments over commercial storefronts. The purpose of the project is to create a diversity of affordable housing in neighborhoods where there is a single, frequently unaffordable typology. By diversifying the housing typologies, a wider demographic of people will have access to the neighborhood, creating a resilient and diverse community. This will revitalize formerly vacant, blighted areas and ensure that as individuals grow their families, there will be housing options available. With the increased population, there will be incentive for commercial development, further increasing the economic growth and job options of the area. The program will also include green spaces to encourage a sense of community, and a safe and public space for neighbors to engage with each other. This program will answer the question of if architecture can revitalize vacant neighborhoods while preventing homogeneity. This will be achieved by using the existing fabric of the neighborhood to create new housing which is more appropriate for the economic and demographic status, and create stronger communities.

Program Reverse Engineering

After conducting typical precedent analysis, I chose to analyze and reverse engineer House N by Sou Fujimoto Architects. This house was chosen due to its relevance to this thesis's proposed program: it is a relatively small house on a small lot in a mid size city declining due to the industrial revolution. Oita, Japan is a city on the eastern coast with a population of about

443,000. This particular home is a single family home on a corner lot of a residential zone. The architects sought to bring nature into the house and create:

“a gradation of rich domain accompanied by various senses of distance between streets and houses might be a possibility, such as: a place inside the house that is fairly near the street; a place that is a bit far from the street, and a place far off the street, in secure privacy.”³³



*Fig 21. House N - Floor Plan.*³⁴

This is accomplished by layering walls to create zones of enclosure. At the street edge, there is a semi perforated enclosure box. It has a shared tall, wide opening as the entrance for a car to park in as well as people. This blends into a semi enclosed courtyard with trees and greenery. At the next level of enclosure, one enters into the bedroom, kitchen, and bathroom. Finally, the most private zone is the living and dining room. This was surprising to see, since

³³ Saieh, Nico. “House N / Sou Fujimoto Architects.” ArchDaily. September 14, 2011. Accessed December 1, 2025. <https://www.archdaily.com/7484/house-n-sou-fujimoto>.

³⁴ “House N - Floor Plan - modlar.com.” Modlar. Accessed December 1, 2025. <https://www.modlar.com/photos/2217/house-n-floor-plan/>.

typically the bedroom would be considered the most private zone, which one might not want visitors to view and enter through. It places the bedroom as a circulation area rather than one of stasis. The kitchen, which is typically considered an area for gathering in modern homes, is placed at the rear and occupies another private zone. These atypical placements take a stance on how homes should be organized and signals importance to unusual zones.

The home overall occupies about 2,000 square feet. However, 1,050 square feet are semi-enclosed courtyard space and about 850 square feet are interior. It is all one floor. Compared to Baltimore rowhouses, the footprint is much larger, at about 32'-0" wide by 60'-0" deep. A typical rowhouse is between 12'-0" to 16'-0", and stacks the program over 2-3 floors for a total of either 1,400 square feet for a 2 story building or 2,200 square feet for a 3 story building. However, this means that House N's program can be placed over 2-3 floors for this thesis's proposed rowhouse sites. This would imply that a full floor would contain the outdoor space, either on the first floor or on the roof level, as an entrance courtyard or roof garden.

House N		
Interior	Living Room	100
	Kitchen	136
	Dining Room	100
	Bathroom	88
	Bedroom	443
Subtotal		867
Exterior	Garden	563
	Parking/Courtyard	522
Total		1952

Fig 22. House N Program Tabulation. By author..

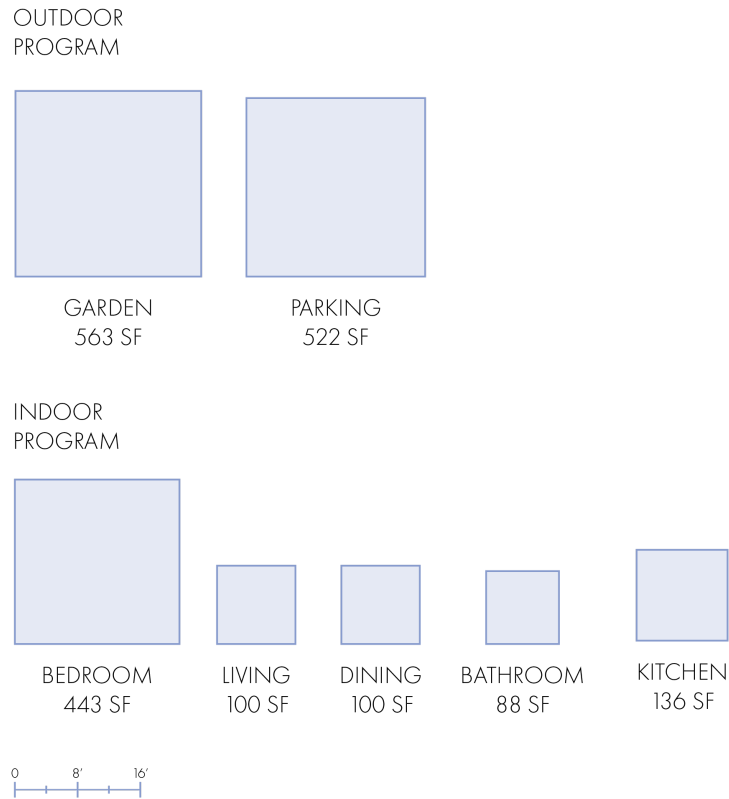


Fig 23. House N Program Elements. By author..

The graduation of privacy is another key element of the proposed program. House N does this by layering walls, with zones nested inside each other. With the narrowness of rowhouses, this is unlikely to work at the individual home scale. However, the proposed joining of several rowhouses into one multifamily building could utilize this strategy. This strategy could also be transformed to full back walls at the front facade, creating multiple zones of semi enclosed private green space as an alternative to a front yard. Overall, House N was useful as a way to examine a different spatial arrangement for a home, as well as exploring how cultural values of privacy can shape space.

Program Proposal

The four main program categories were created by observing the ways in which the built environment breaks down in vacant areas. These exist on all scales, from city scale to detail scale. This section will describe the issues faced in vacant regions and how this thesis aims to address them.

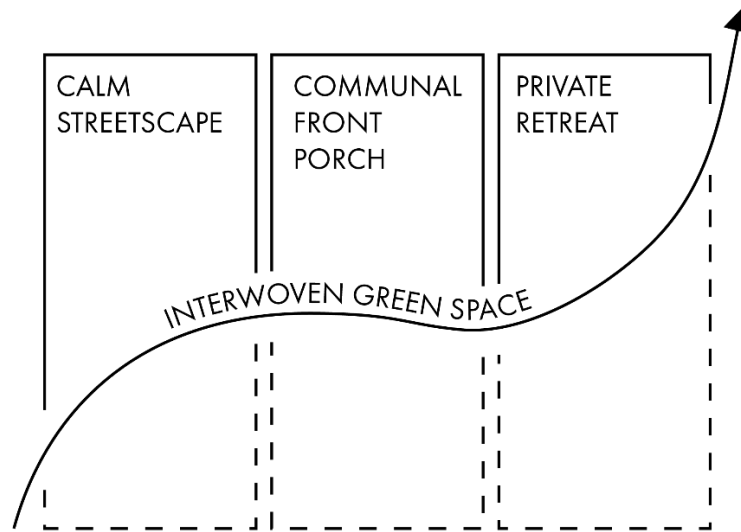


Fig 24. Program Zones. By author.

At the neighborhood level, the traffic in vacant regions is generally very fast. One driver of this is the wide streets and limited sidewalk protection creating a negative pedestrian experience. This creates a lack of pedestrians, which in turn makes automobile drivers feel as if they can drive at faster speeds, feeding a cycle of fast traffic. To remediate this, this thesis proposes redesigning the streetscape by including traffic calming elements as well as elements for an enjoyable pedestrian experience.

Secondly, this thesis proposes the idea of a ‘Communal Front Porch’ which is at a block scale for community interaction. Vacant neighborhoods lack a sense of community- crime often spikes, leaving neighbors suspicious of each other. A communal front porch fosters connection

and trust. This element will include seating, green space, and should be semi protected from the street edge, leading to a slightly more private sense of space than the street scape. At its core, this is both an occupiable interstitial space between the street and the private home, as well as a casual meeting place.

At the most private element, this thesis proposes residential units called the ‘private retreat’. These units must be protected from the street noise to create a feeling of safety and privacy while also having light, green space, and air flow. The residential program components were approached by identifying typical elements which could be broken down into typical sizes. This is based on the idea of a common module to place into each vacant home, to create a less expensive way to approach the most construction heavy portions of vacant building rehabilitation. These portions are the stair, kitchen, and bathroom, due to the structural, mechanical, and plumbing loads. By creating a common module with the stair, and stacking the kitchen and bathroom, one can streamline the design process for each individual home, and apply the more flexible living spaces around it. This creates design options based around the position of the core module.

To determine sizing for each typical residential room, I investigated minimum room square footages. I determined that this thesis would use common room sizes for five (5) residential elements. These are the master bedroom, bedroom, full bathroom, kitchen, and stair. Bedroom 1, a typical bedroom is 8’-0” by 10’-0”, totaling 80 square feet. This room is defined as a minimum of 10 feet tall. However, this is flexible to fit in the existing homes, some of which have tall ceilings. Bedroom 2, a master bedroom, is 10’-0” by 12’-0”, or 120 square feet. The Bathroom is 5’-0” by 8’-0”, or 40 square feet. It is a minimum of 8 feet tall, to give additional ceiling depth for any mechanical requirements. The kitchen is 12’-0” by 8’-0”, or 96 square feet.

The staircase is a total of 6'-8" wide, to account for two (2) 40" wide sets of stringers. The proposed module is 11'-6" tall, which may be adjusted to accommodate taller ceiling heights in rowhouses with usable floor structural systems. These are the basic building blocks for the residential program.

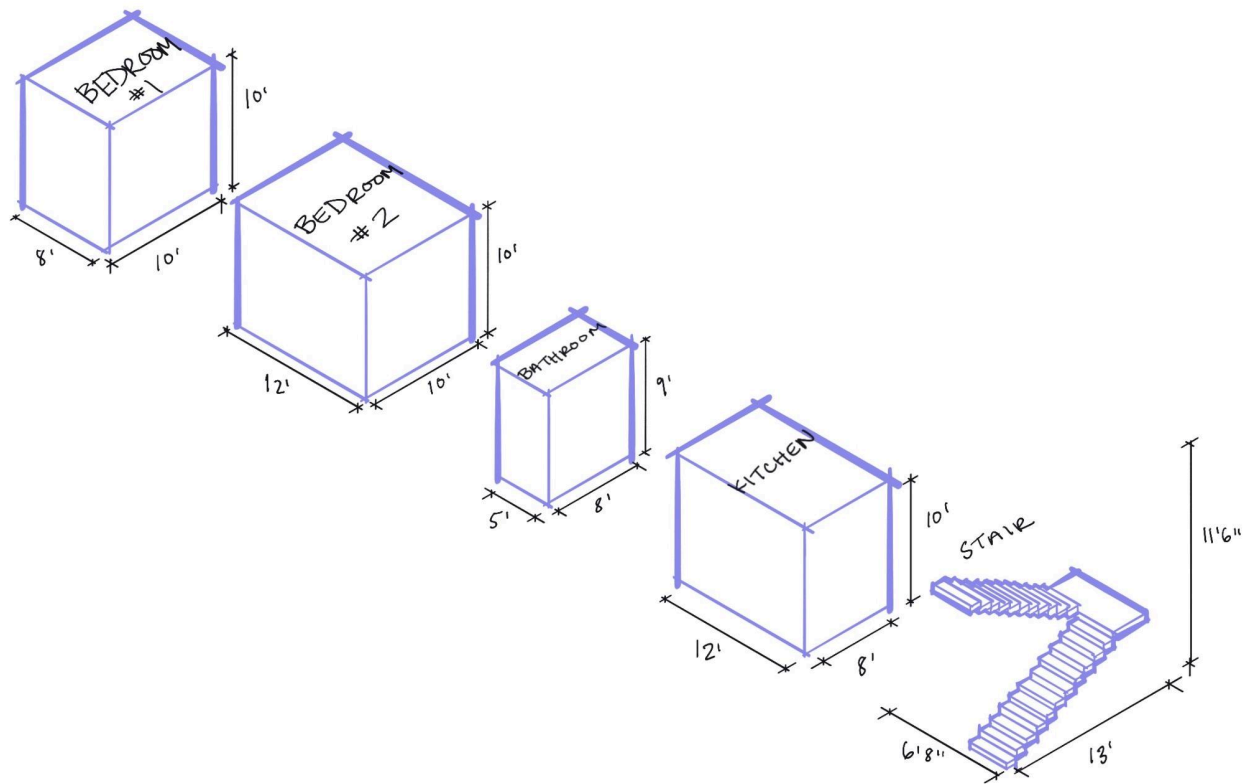


Fig. 25. Program Building Blocks. By the author.

Lastly, this thesis proposes a core component and principle of Interwoven Green Space. In many vacant regions of Baltimore, there are no parks or maintained green spaces due to the lack of investment and tax base. However, there are many empty, overgrown lots where rowhouses were demolished. This creates a sense of disrepair in the neighborhood. Additionally, studies on biophilia find that enhanced access to nature is beneficial to people's mood and

emotional wellbeing. To address this, this thesis proposes green spaces at varying scales throughout the site. At the street level, this is a green median. At the block scale, this includes street trees and adapting empty, demolished lots to small communal gardens and pocket parks. At the building level, this may include semi enclosed courtyards and green balconies.

Conclusion

The program for this thesis is defined by the desire to revitalize the traditional rowhouse fabric into residential zones which are more conducive to modern living. House N exemplifies modern residential design by reorienting program zones to suggest new ways of living and interacting with the street edge. Its atypical courtyard space creates interaction with green space everyday for residents, and invites passersby to look inside. While the footprint differs from Baltimore rowhouses, the concepts can apply and adapt to encourage biophilic design. The proposed program zones: Calm Streetscape, Communal Front Porch, Private Retreat, and Interwoven Green Space combine to create a purpose and direction for adapting rowhouses.

Chapter 6: Site Selection and Analysis

Site Selection Abstract

Baltimore was a driver for this project, although the same issue exists across other cities in the US. Therefore, all sites considered were in Baltimore. With the goal of creating a systematic intervention, certain criteria must be met by the site in order to ensure it was reflective of the typical conditions of neighborhoods with high vacancy in Baltimore. These criteria were:

- Located in an urban environment
- A historically underserved area
- Existing historic row homes
- Over 30% vacancy of the block
- On the border between an area of high and low vacancy
- Proximity to commercial zones
- Access to amenities or community anchors
- Demographics representative of the city

It was important to be in a historically underserved area because this thesis provides an alternative to the historic cycle of demolishing buildings used by minorities or impoverished peoples. By proposing alternative development, this thesis creates a new way to support those communities, and preserve their history. By selecting a site on the border between an area of high and low vacancy, this block could strengthen the surrounding area, and draw the stable region further. Proximity to commercial zones will allow for economic growth: more residents will

mean more demand for retail, and more jobs for residents. Access to some amenities or community anchors, similar to the comments for commercial zones, will ensure that neighborhood growth will be supported by current infrastructure for shopping, commuting, and walkability. Demographics representative of the city will ensure this proposal meets the needs of the majority of Baltimore, and the design could be replicated across the city.

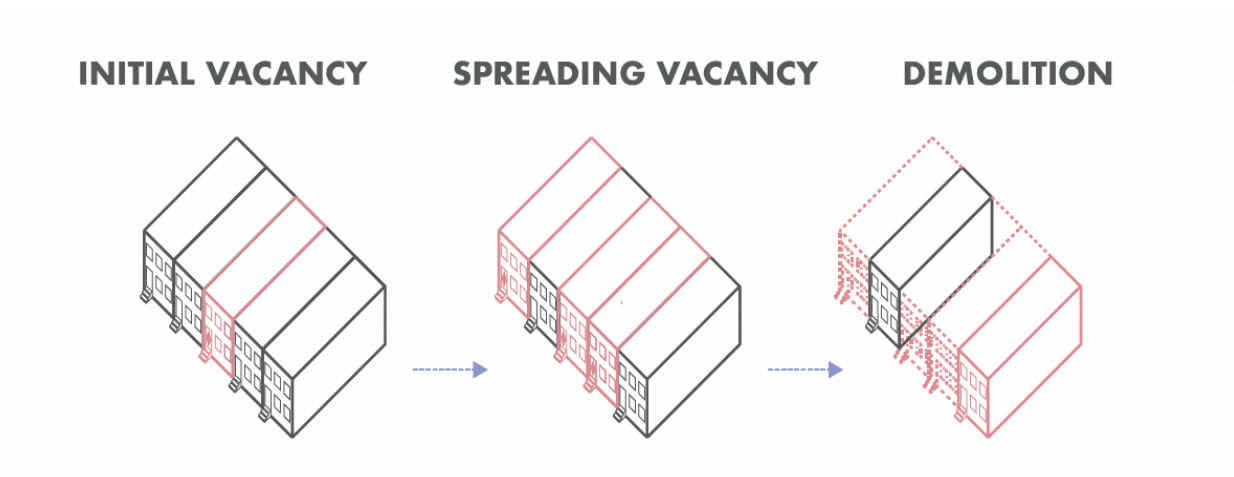


Fig. 26: Spreading Vacancy. By Author.

Selected Site Analysis

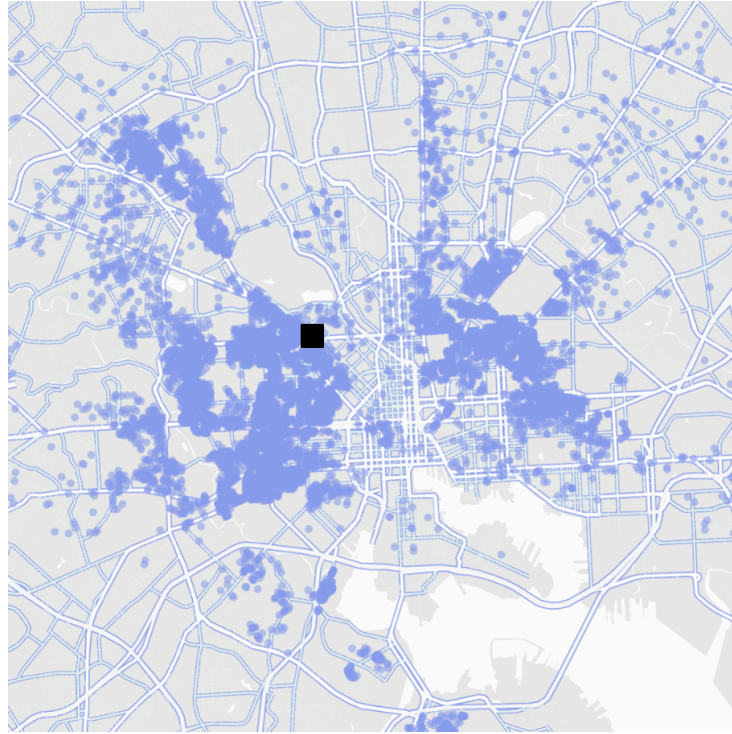


Fig. 27: Context Map. By Author.

The selected site meeting these criteria is within the neighborhood of Penn North, Baltimore. This neighborhood is in the northwest part of the city. The site specifically is the row houses on either side of Druid Hill Avenue, 2000 block. This site sits within the Pennsylvania Ave Black Arts District, which recognizes the neighborhood's historic value and contribution during the 1950s, when it was a center for jazz music. It was historically redlined, and has struggled with unemployment, vacancy, and drug use in recent decades. Historically, this neighborhood was part of Baltimore County and was inhabited by German immigrants before

being annexed by Baltimore City in 1888. It is culturally significant now as it was the site of Freddie Gray's murder in 2015, which spurred national protests.



Fig. 28: Context Map of Neighborhood. By Author.

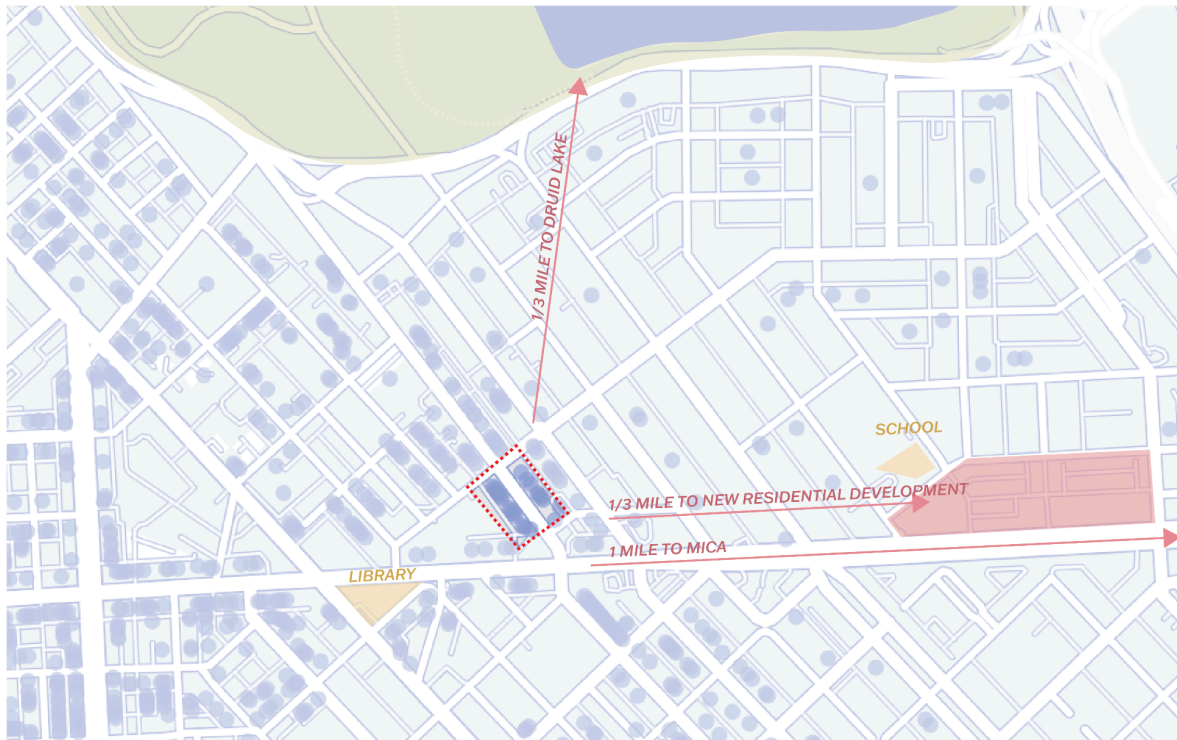


Fig. 29: Amenities Map. By Author.

The neighborhood contains some existing commercial zones on Pennsylvania Avenue and North Avenue, though shops are in disrepair. These streets are also the main busways in the area. Amenities nearby include access to Druid Lake, a small lake with a large park and trails and Penn Station, the main Amtrak station in Baltimore. Additionally, it is near MICA and Johns Hopkins University, as well as close to an Enoch Pratt Public Library Branch. Social amenities include the historic Arch Social Club, a Black social club.

The site was also chosen because it borders Reservoir Hill, a neighborhood which suffered from vacancy but has recently received city funds and developer investment. This has led to a reduction in vacancy. This site also sits within several city initiative zones: Impact Investment Area, which provides funds and incentives to developers, Vacancy Reduction Priority

Geography, which provides public and private funding to community organizations to acquire row houses. Lastly, it sits next to a Community Development Zone, which helps neighborhood revitalization through tax incentives, grants, and private investments.

Documentation



Fig. 30: Existing Site Plan. By Author.

The site has a 45% vacancy rate, leading to be classified as struggling by Baltimore City. There are 3 main subsets of rowhouses on this block: flat facades, facades with front porches, and swell front facades. Most are Italianate rowhouses, dated to about 1900.



Fig. 31: Druid Hill Ave Facades, West Side. By Author.



Fig. 32: Druid Hill Ave Facades, East Side. By Author.

The typical plot size is 15x80 feet, while the average house is 15x50. They are almost all 2 story, with a few 3 story houses on the corners. The average square footage is 1200 to 1,530. This leads to a homogeneity in housing type; if families want to upsize or downsize, they are forced to leave the neighborhood due to a lack of options. Based on this, the community needs

are in more variations in housing size and type, as well as more thriving commercial zones. The existing houses can be honored by being reused to serve the new residents of the neighborhood, creating opportunities to continue to build history on top of the existing, rather than demolishing and creating completely new. This creates a space that is unique and can draw tourism, while primarily serving the local community through buildings they recognize.

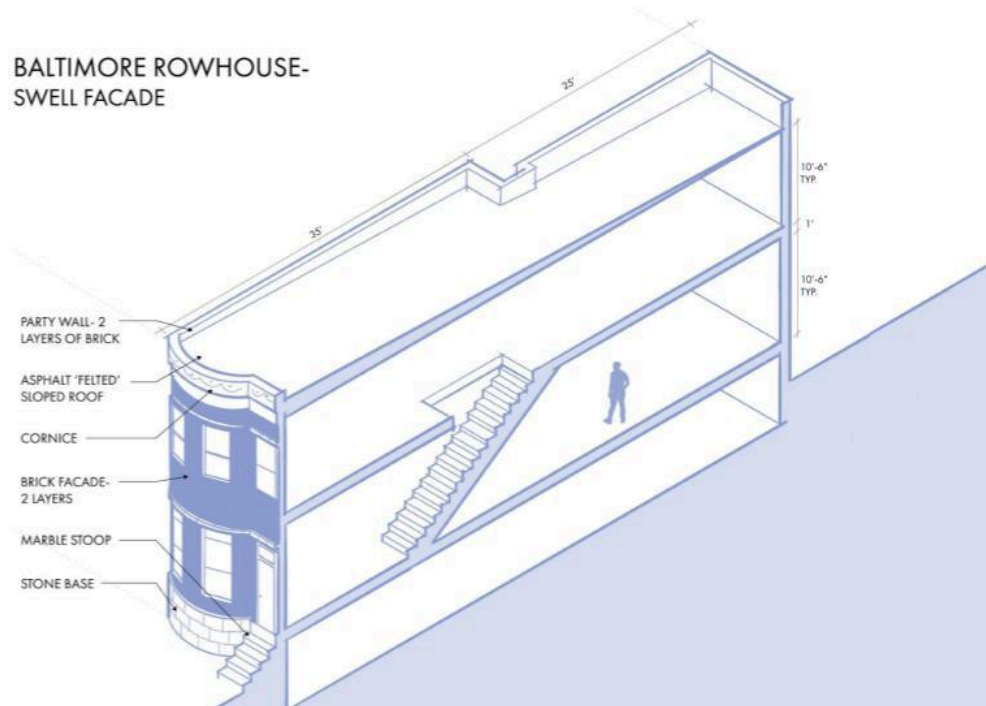


Fig. 33: Typical Swell Front Row House. By Author.

Looking more deeply into the site, we can also examine the typical Baltimore rowhouse, noting the semi-standard dimensions as well as typical historic elements. These elements include the double layer of brick for the facade and party walls, an intricate carved cornice, marble stoop, and for some houses, a stone base. These elements typically have survived the years, and therefore are the elements that will be prioritized for preservation in design. These elements also create the iconic Baltimore city fabric, with street walls of brick. The stair is also typically a straight stair parallel to the party wall, with tall risers that are not to today's code, creating an

issue for new design. Another notable condition is the rear wall. This enclosing wall is frequently modified on houses in order to add an addition, and many houses in Penn North have more modern siding additions on the rear which are deteriorated. For this thesis, these will not be considered historic.

Chapter 7: Conceptual Testing of the Thesis

Introduction

To begin, this thesis set certain values to guide the design process. These values are: keeping all owners in place, and building exclusively on vacant properties and lots. This maintains the existing historic houses and sets a clear boundary for the intervention site. These values were discovered through testing of various approaches, and examining their individual pros and cons, all with the goal of revitalizing a neighborhood with respect for its past. In reading about Baltimore's Whole Block approach to vacancy, this testing must have rules which can apply to many buildings, as opposed to focusing on one.

BENEFITS OF ADAPTIVE REUSE:



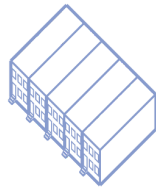
SUSTAINABILITY



PRESERVING COMMUNITIES



SENSE OF OWNERSHIP



**RETAINING BALTIMORE'S
ICONIC CITY FABRIC**



**ADAPTABLE FOR DIFFERENT
HOUSING TYPES**

Fig 34: Benefits of Adaptive Reuse. By author.

Conceptual Approaches

Approach One is a minimal intervention, which values the existing history and maintaining the character of the neighborhood. This approach keeps the existing owners and builds according to the existing plot lines, making it more realistic to be built. Approach Two is a medium intervention which assumes control of some backyards of owner occupied buildings, and combines some lots into a single, creating larger buildings within. Lastly, Approach Three is an intensive intervention, valuing the possibility of what can be, and creating new models of living in the neighborhood. This approach would assume control of all properties in the block, demolishing as needed for design, proposing new buildings in empty lots, build above existing buildings, create new spaces like courtyards or parks within the block, and change housing typologies. This thesis pursued Approach One, in order to create a design that fits within the neighborhood, and could reasonably be replicated in other blocks without needing to assume control of the entire neighborhood.

Introduction to Shape Grammar

This thesis explored the framework of *shape grammar*, defined as a systematic, rule-driven method that produces designs by transforming and manipulating geometric forms. It is a vocabulary of shapes and a set of transformation rules of the form. These rules are visual plan elements that are in reaction to each other. This was used historically by architects like Palladio, who defined an architectural language through explicit rules and exemplary designs. The term was coined by George Stiny in 1975.

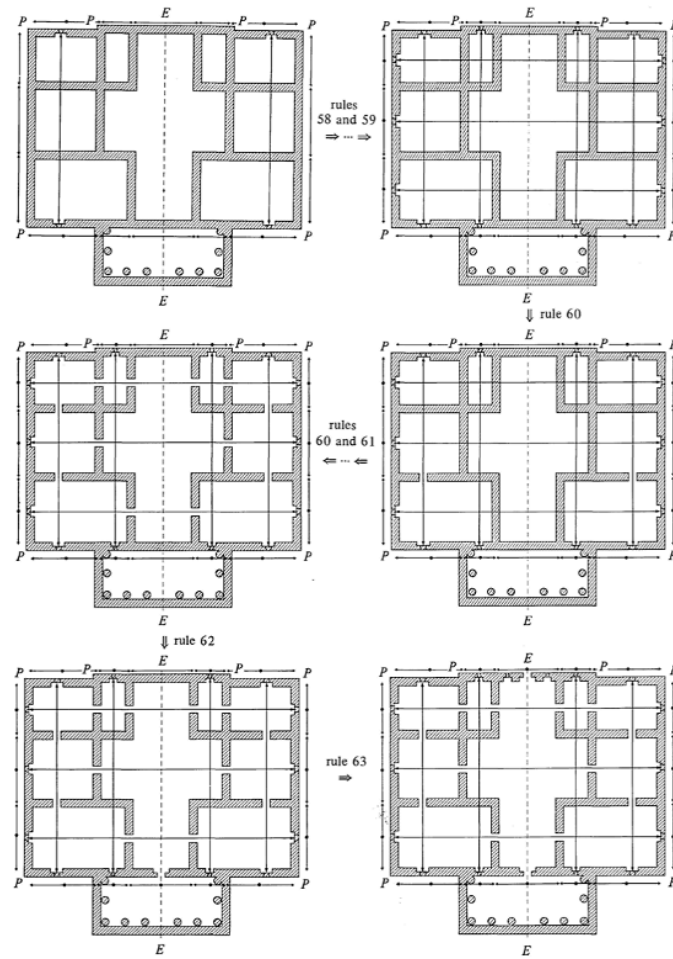


Fig 35: *Stiny, G. & Mitchell, W. J. Environment and Planning B: Planning and Design, 5(1), 5–18.*

This idea is additionally used by Álvaro Siza, who used rules to create design principles that allowed each house in a social housing compound to be tailored to its occupants while remaining part of a coherent whole.

Derivation of New Design

Malagueira - Alvaro Siza Vieira

Stage 1: Define 1st floor

Step 1.1: Start floor

Step 1.2: Locate functional zones

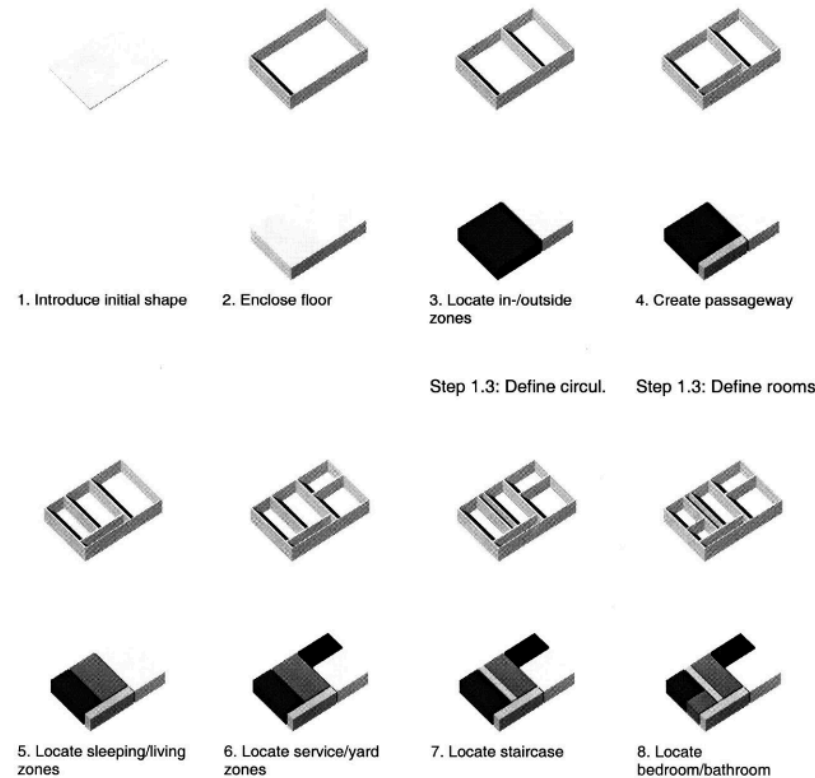


Fig 36: Duarte, J. P. (2005).

For this thesis, the rigid constraints of the row house shell are a benefit in regards to shape grammar. We can standardize the dimensions of the house, and create rules which apply to all of them, allowing for a range of housing variations.

Shape Grammar Development

To develop this thesis's shape grammar, the dimensions and typical layout of many row house precedents were studied. The typical dimensions are about 14x50, so other precedents of a

similar size were studied to examine their spatial qualities. The defining characteristics were found to be the stair orientation and kitchen location, which defined circulation. The Baltimore row house has a parallel stair and rear kitchen, creating a large front room.

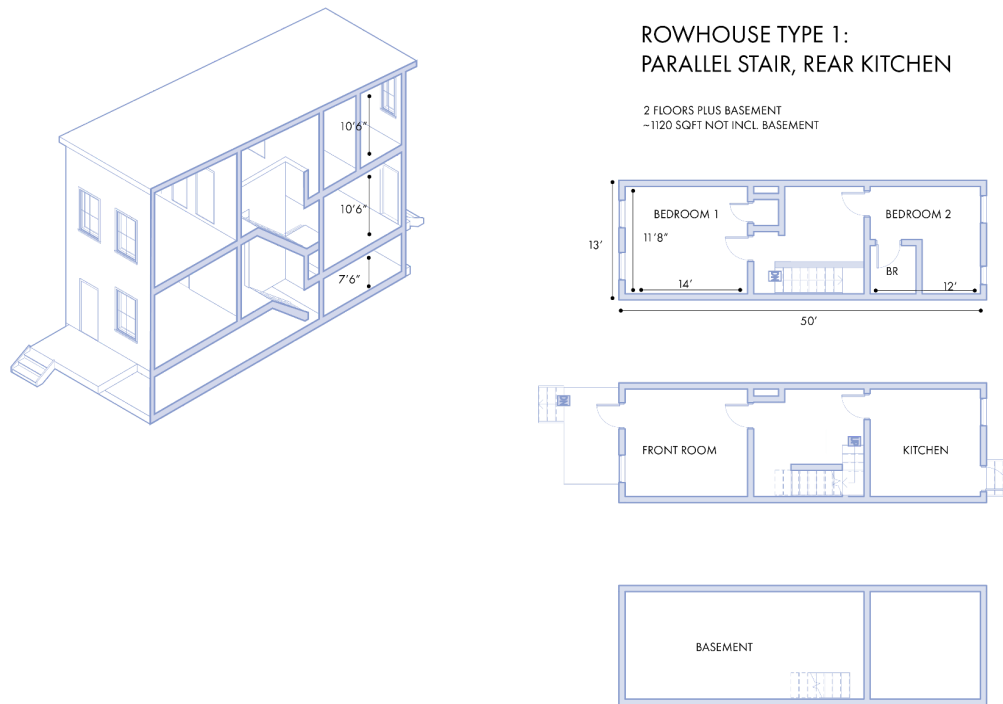


Fig 37: Baltimore Row House. By author.

The next house studied was the rowhouses of Halen Estate in Switzerland, by Atelier 5. These were built in the 1960s as a utopian housing complex, which stepped down a large hill. They have a stair perpendicular to the party wall, and a front kitchen, creating a large gathering space in the rear of the house.

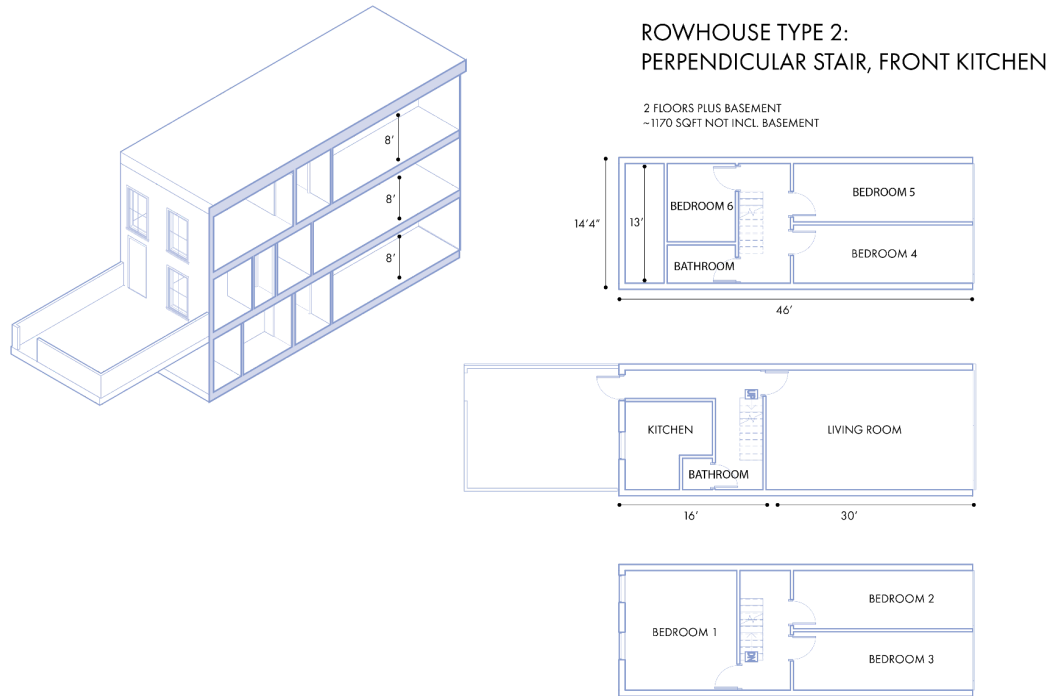


Fig 38: Halen Estate. By author.

The next rowhouse was Azuma House, by Tadao Ando, built in 1976. This house has a parallel stair, rear kitchen, and introduces a new program element of an outdoor courtyard.

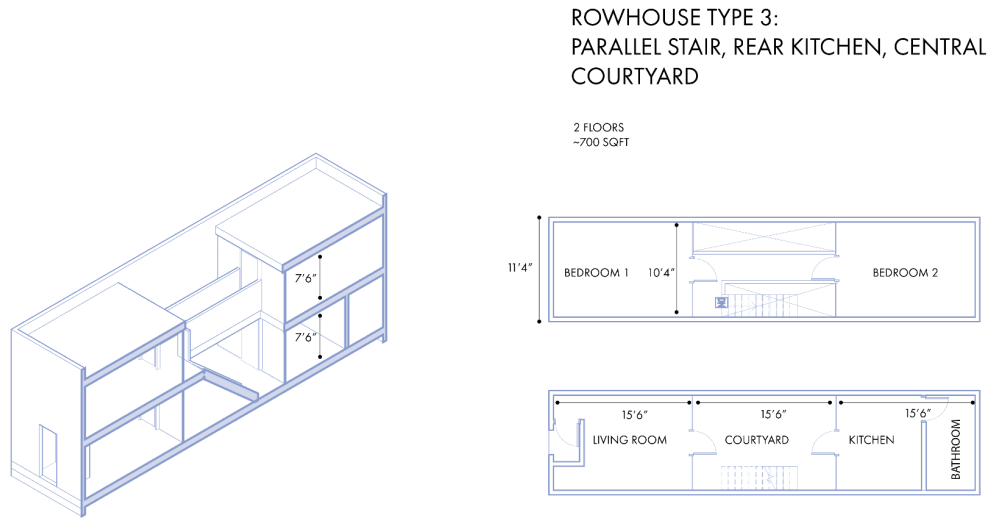


Fig 39: Azuma House. By author.

In researching these, one can note that all three houses have a tripartite scheme: each has three main plan zones, which vary in program usage to create different spatial conditions.

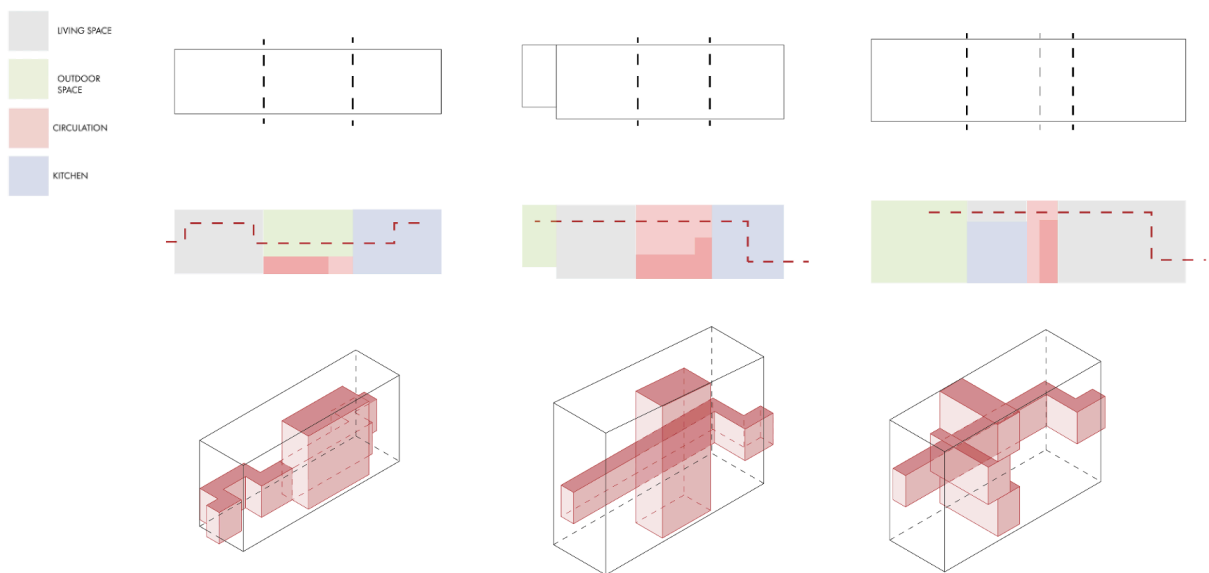


Fig 40: Tripartite Schemes. By author.

So, to create this thesis's shape grammar, we apply the tripartite scheme to the Baltimore row house. This creates a common footprint with three modules. We also standardize the length of the house by removing the rear wall and proposing a new exterior wall, replacing the existing modern siding. This creates an adaptable shell, so each row house can be turned into different housing types depending on need. This then grants us the opportunity to develop individual module plans, hereafter called 'rules' that can be placed in any third of the scheme. Each rowhouse is additionally given a courtyard, in order to introduce biophilic design. This provides green space that can become either a shared, public space for neighbors to gather, or a private green space that acts as an oasis from the city.

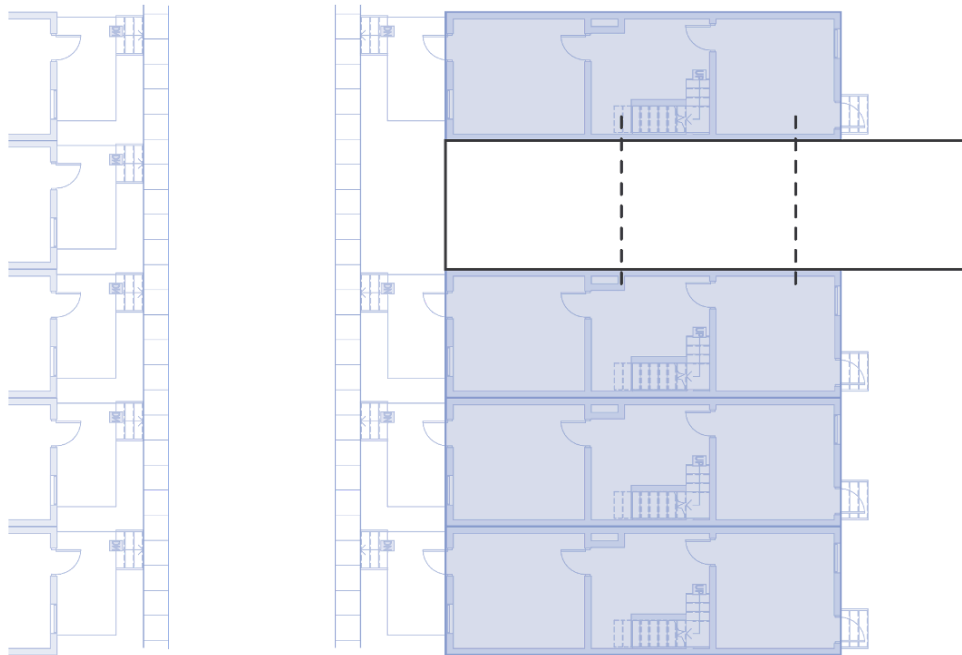


Fig 41: Parti Development. By author.

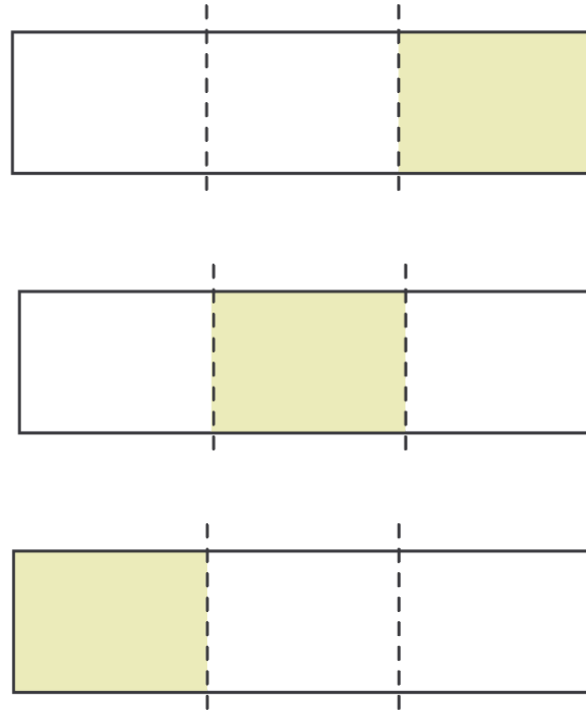


Fig 42: Parti. By author.

Development of Rules

The rules in this thesis were developed from program requirements and circulation needs. This was tested through iterating floor plans and noting common geometries that could work in tandem. These were then narrowed down to twenty one rules, broken into the categories of ‘Circulation-Based Rules’, ‘Plumbing-Based Rules’, and ‘Partition-Based Rules.’

CIRCULATION-BASED RULES

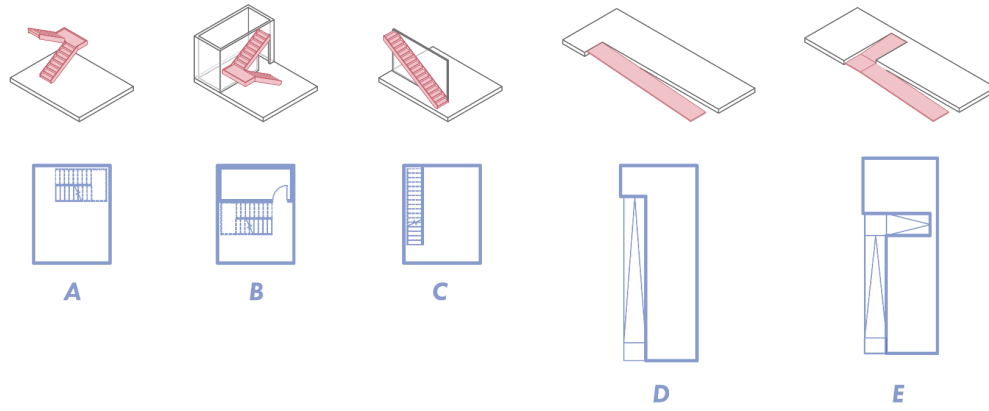


Fig 43: Circulation-Based Rules. By author.

PLUMBING-BASED RULES

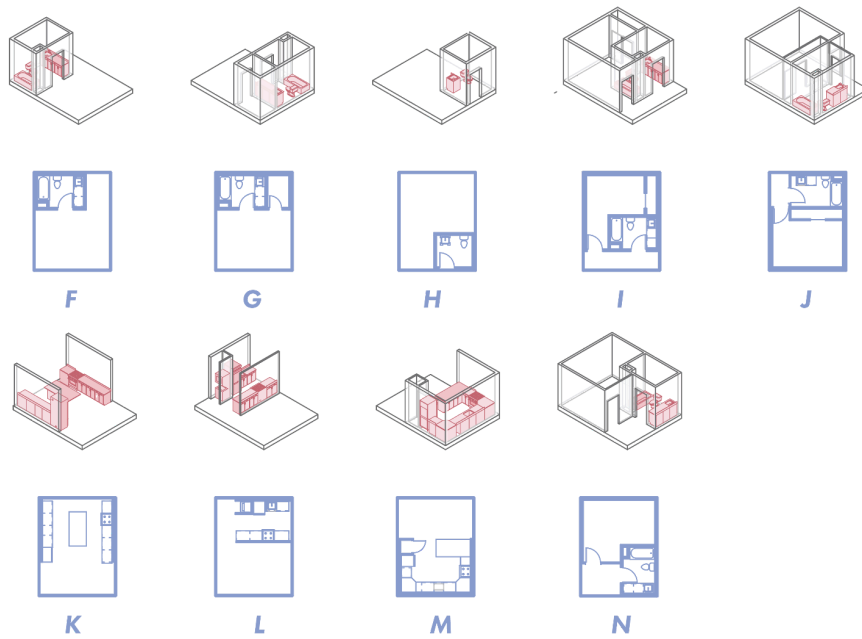


Fig 44: Plumbing-Based Rules. By author.

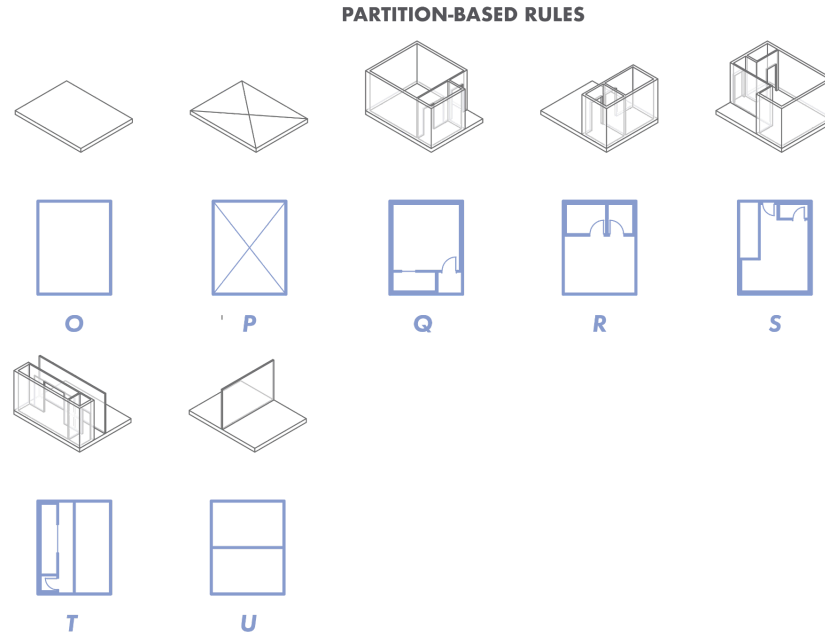


Fig 45: Partition-Based Rules. By author.

These rules can then apply to create a variety of rowhouse schemes, including combining multiple adjacent rowhouses into different unit configurations.

Creating Plans Using Rules

Finally, we can now follow and create plans using this system. Following the diagrams below, we can follow the development of the plan. Firstly, the location of the courtyard is selected.

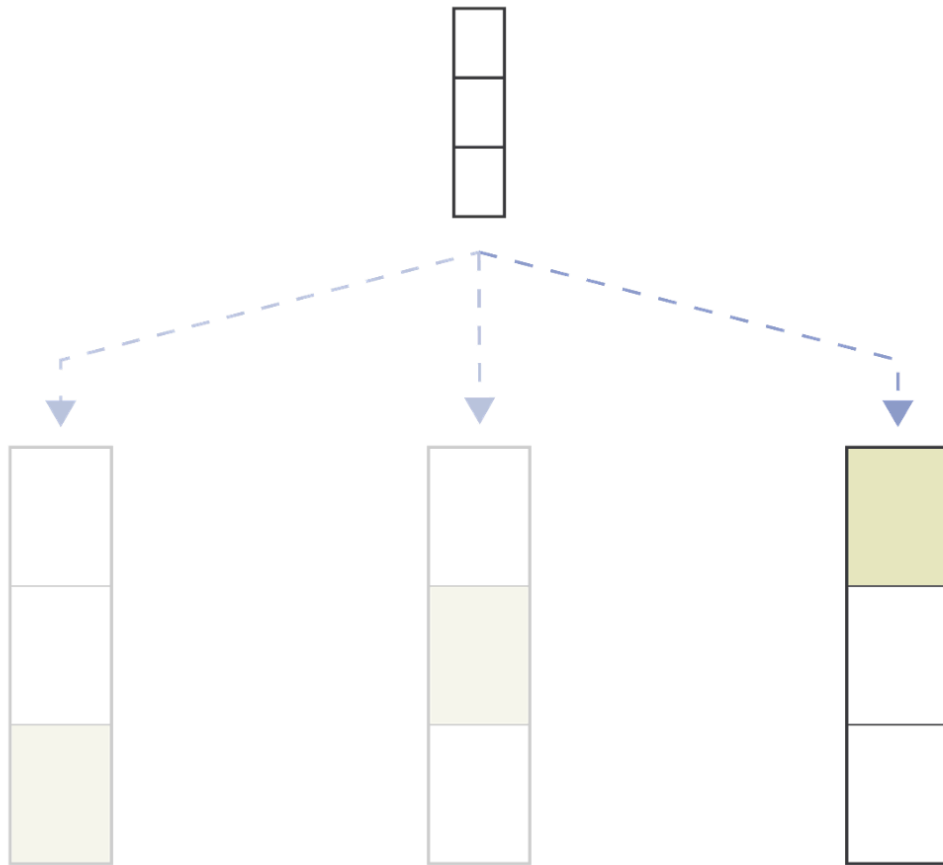


Fig 46: Plan Development Step 1. By author.

Next, a circulation based rule is applied. It can fit in any of the thirds of the plan, but certain arrangements work better than others architecturally. For example, in this case, the straight run stair doesn't fit well in the rear module, as it leaves a short landing and forces an immediate turn from the rear wall. For this reason, this option is eliminated, and one of the others is selected for the plan.

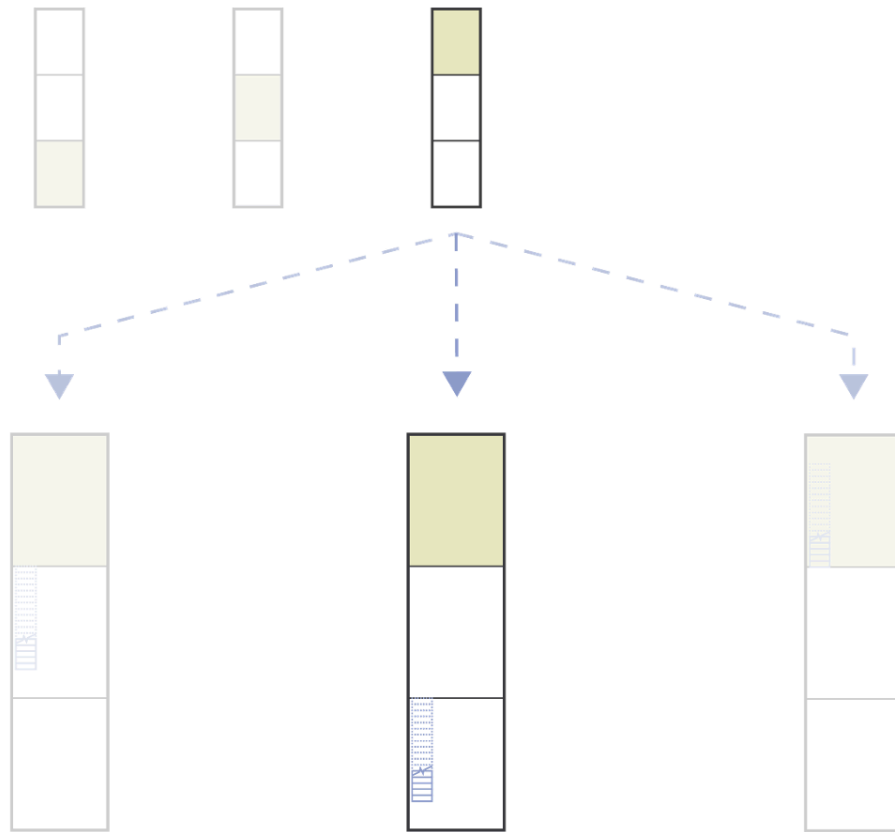


Fig 47: Plan Development Step 2. By author.

After this, we can apply the plumbing and partition based rules in order to create first floor plan options. The plumbing is the most set part of the house- outside of this, residents can customize the house to their own needs, using the partition based rules to create their desired number of bedrooms or office spaces.

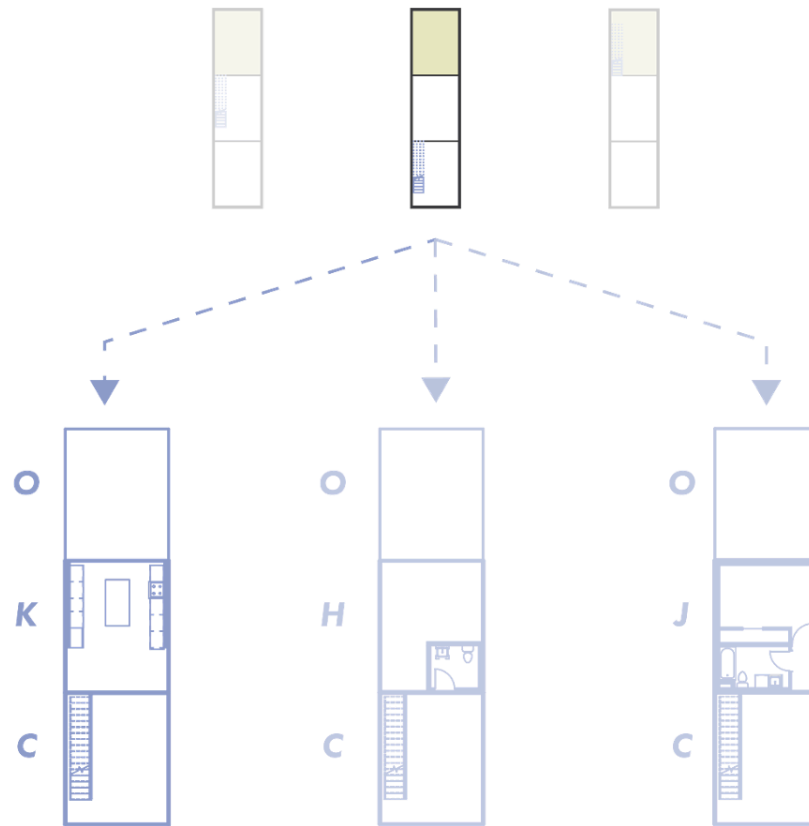


Fig 48: Plan Development Step 3. By author.

Next, after selecting the first floor, we can then apply other rules to create a second floor plan based on the needs of the resident.

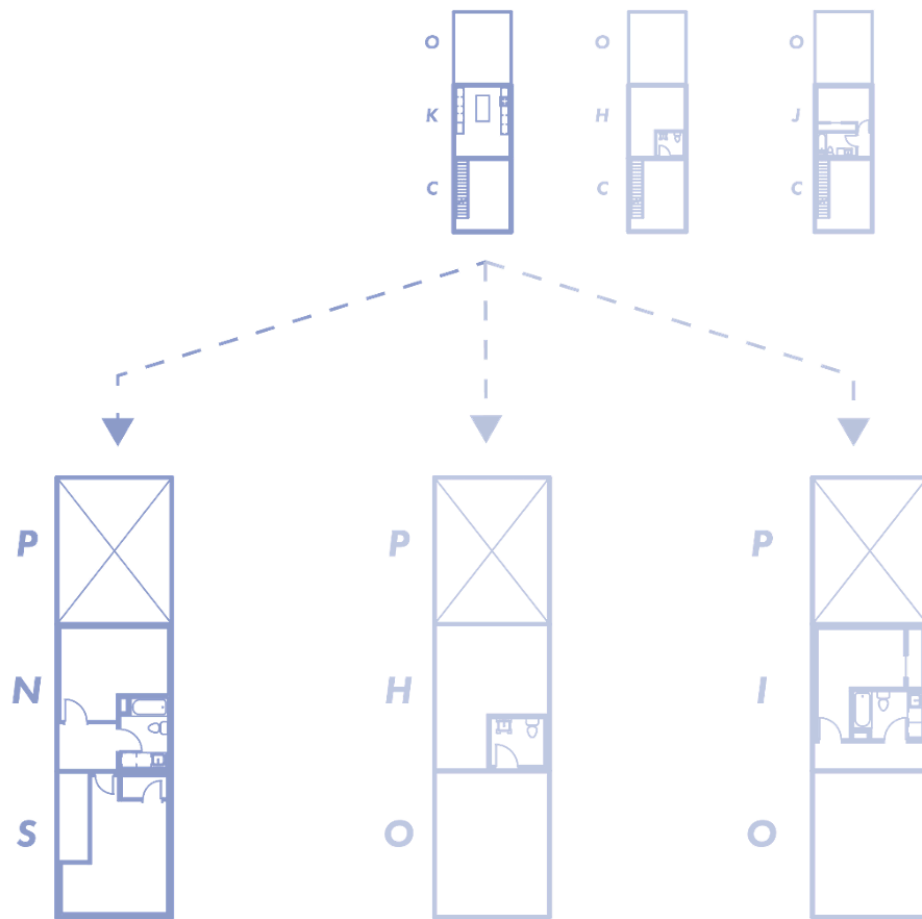


Fig 49: Plan Development Step 4. By author.

Using these rules, we can then fully develop a set of plans.



Fig 50: Plan Development Step 5. By author.

By applying this system, using all twenty one rules, a single rowhouse has 630 unique plan options. Combining two rowhouses leads to 15,120 plan options. Combining three row houses has 64,350 plan options. Applying this system emphasizes biophilic design, variety in housing type, and preservation of the existing historic structures. By creating a variety of plan options, we can rebuild vacant neighborhoods to be thriving, diverse, and resilient communities for both existing and future residents.

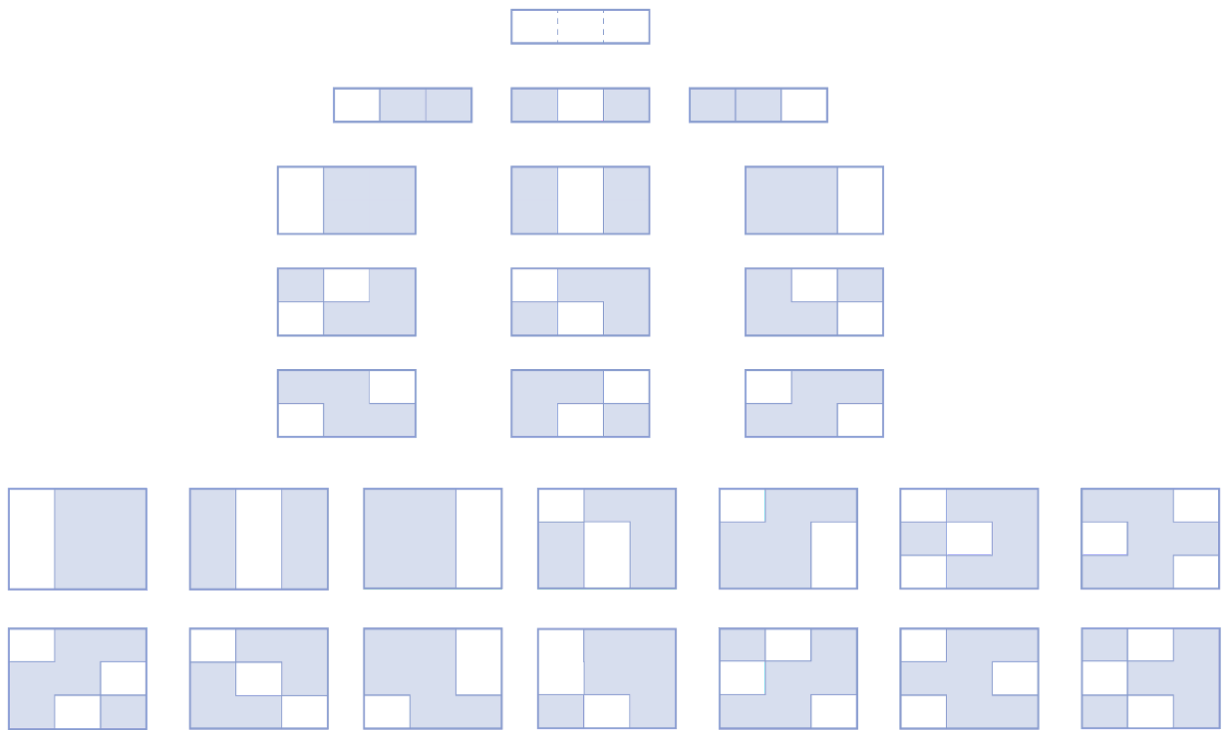


Fig 51: Plan Courtyard Options. By author.

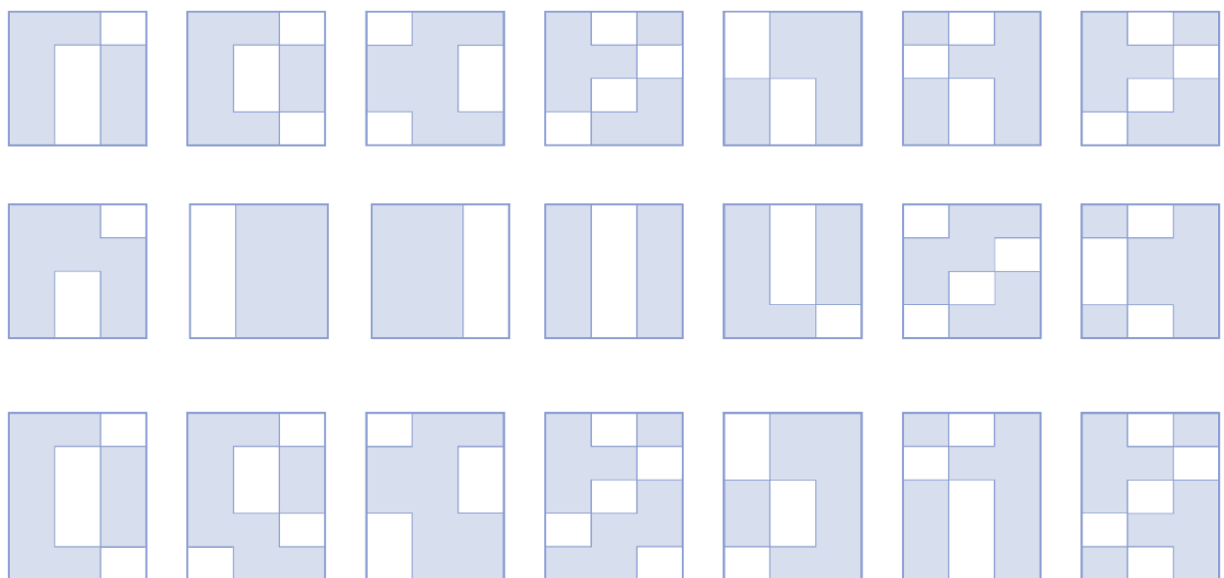


Fig 52: Plan Courtyard Options 2. By author.

Chapter 8: Conclusion: Thesis Design Solution

Introduction

In order to test the shape grammar system, this thesis explored six rowhouse case study designs. These designs are comprised of single rowhouses, two rowhouses combined, three rowhouses combined, and four rowhouses combined. The specific typological solutions were determined by the community needs, emphasizing the introduction of smaller units for student and young professional renters, larger units for families, and commercial spaces for revenue and jobs in the neighborhood. Each design retains the existing historic masonry facades and demising party walls, while creating fully new spaces within. Overall, these case studies exemplify how diversity in housing is possible in Baltimore without destroying the past, but instead building on top of the beautiful history that exists.

Site Plan

The proposal also addresses the site by making adjustments to the street conditions. The road is narrowed from two to one lane, on a one way street, leaving one lane of parallel parking on either side. There is additionally a bioswale zone separating the street traffic from the sidewalk, containing trees and plants to absorb water and shade and cool the street. This creates a more pleasant pedestrian experience and encourages walking in the neighborhood. Lastly, the sidewalk is widened to five feet wide.



Fig 53: Proposed Site Plan. By author.



Fig 54: Site Section. By author.



Fig 55: Overall Perspective. By author.

Case Study Houses

House A

House A is a single rowhouse broken into two one-bedroom apartments, with a front courtyard for gathering and relaxation. The design also features a new blue-painted galvanized steel structure to support the existing historic masonry walls. The front facade now acts as a layer of separation from the street, rather than envelope enclosure. Therefore, the window openings are secured with new steel cables and planting boxes to prevent entry through the windows. The stair is within the courtyard, giving extra space to the interior of the units and creating a more

European style apartment building. The courtyard includes a green roof style floor, allowing for grass and plants to be grown within.

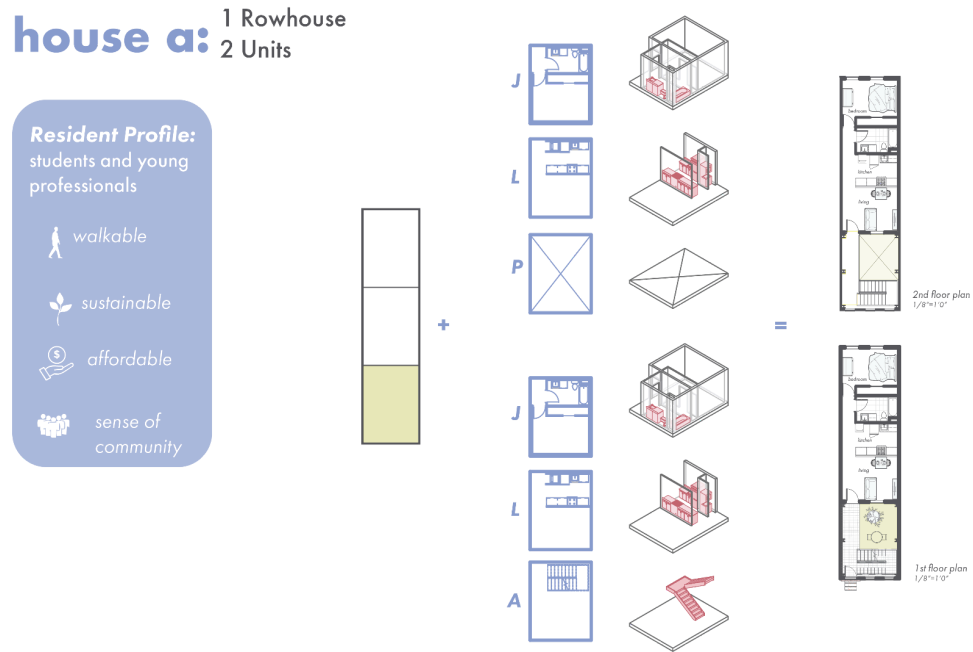


Fig 56: House A Plans. By author.

house a: 1 Rowhouse 2 Units

Resident Profile:
students and young professionals

walkable

sustainable

affordable

sense of community

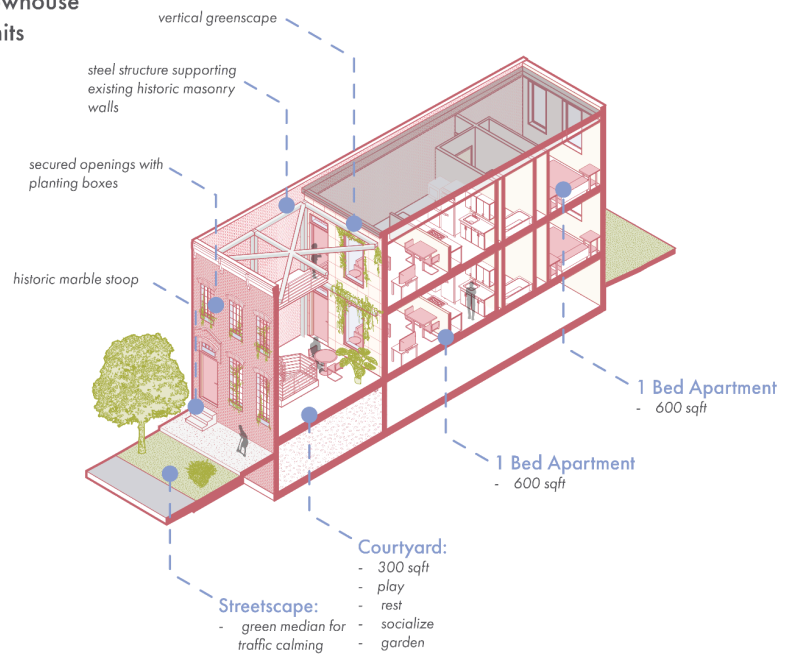


Fig 57: House A Axonometric. By author.



Fig 58: House A Perspective. By author.

House B

House B is two rowhouses combined into a single, multigenerational unit. This unit has a front and rear courtyard and two entrances for privacy. The first floor contains the large, shared kitchen and dining area, as well as a one bedroom unit. The second floor contains three additional bedrooms and a second living area. This plan creates opportunities for togetherness and privacy, allowing all family members to feel comfortable in their home.



Fig 59: House B Plans. By author.

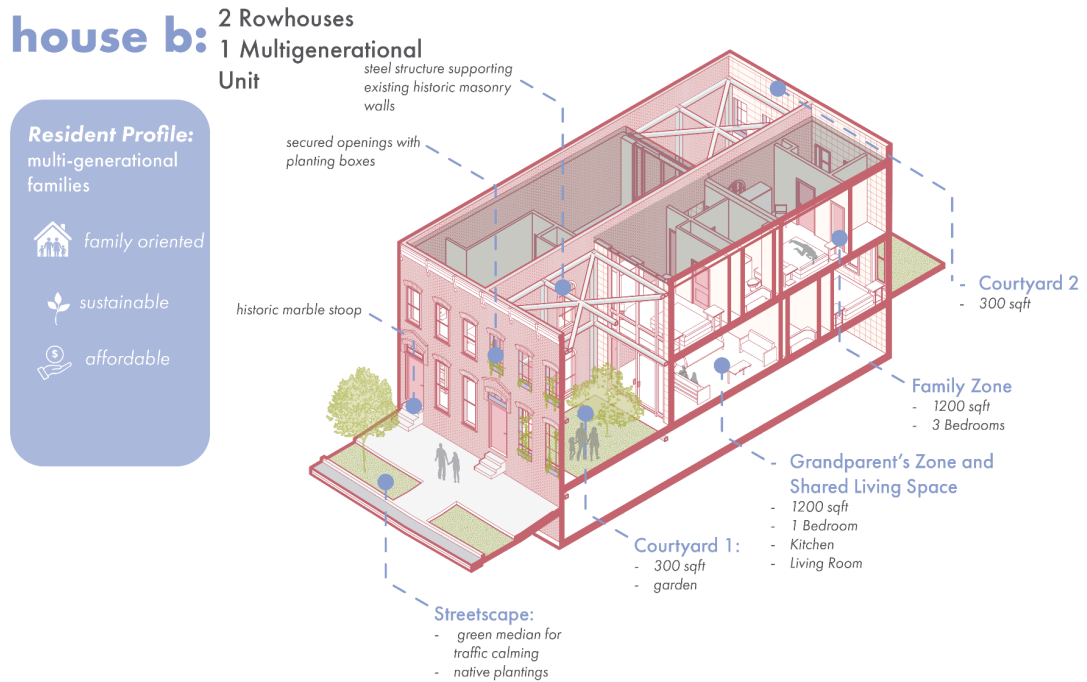


Fig 60: House B Axonometric. By author.

House C

House C is four rowhouses combined to create four residential units and two commercial units. The commercial units are on either side of the large, public courtyard and act as community anchors. They are flexible and may contain retail, office space, or restaurant space to engage the community, encourage gathering, and provide jobs and revenue. The apartments range in size from 600, 900, and 1200 square feet to create options for different needs. The second floor contains one and two bedroom apartments while the added, new construction third floor contains one bedroom apartments with large outdoor terraces. These create eyes on the street, as well as a sense of hierarchy for this building, denoting it as commercial. The large courtyard can host community events as well as being a space for relaxation. Additionally, a ramp is added as a means of ADA access into the courtyard and commercial spaces, addressing the typical accessibility issue faced by rowhouse commercial units.

house c:

4 Rowhouses
4 Residential Units
2 Commercial Units

Resident Profile:
young professionals

walkable

sustainable

affordable

sense of community



Fig 61: House C Plans. By author.

house c:

4 Rowhouses
4 Residential Units
2 Commercial Units

Resident Profile:
young professionals

walkable

sustainable

affordable

sense of community

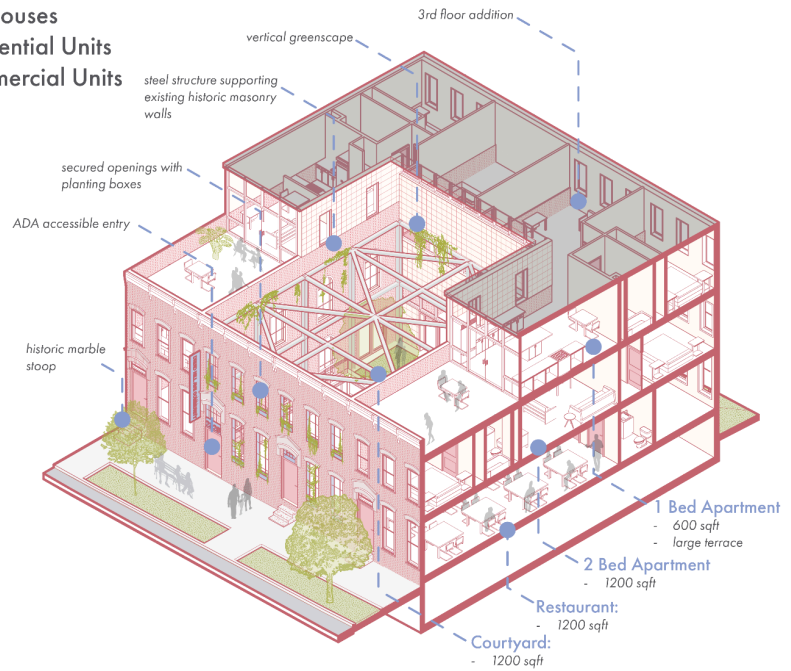


Fig 62: House C Axonometric. By author.



Fig 63: House C Section Perspective. By author.



Fig 64: House C Cafe Perspective. By author.

House D

House D is a single rowhouse and single unit, totalling 1200 square feet, making it ideal for young professionals or small families. Its rear courtyard creates a safe space for children to play, while preserving the swell front facade and fitting into the neighborhood.

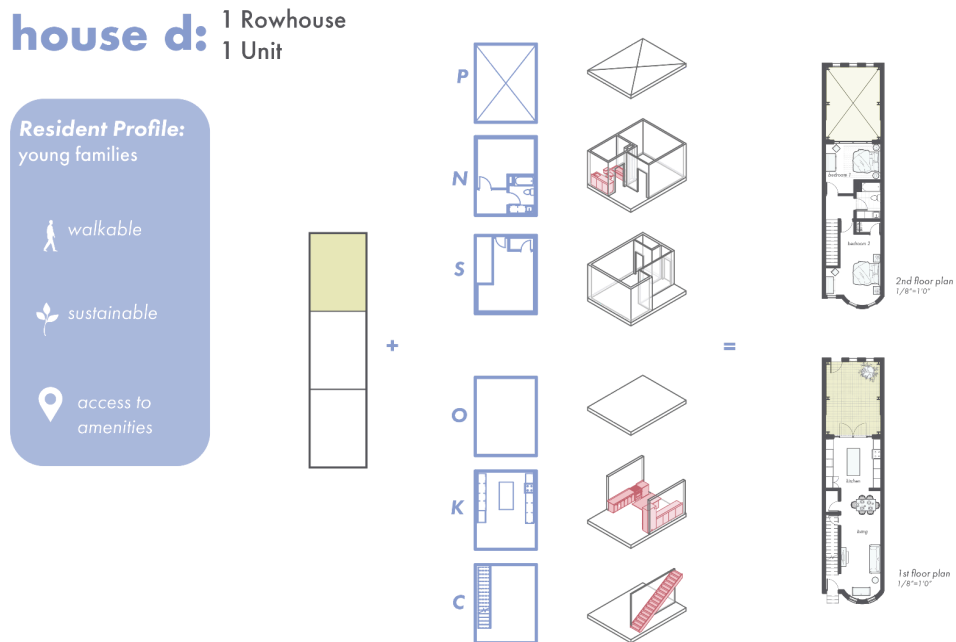


Fig 65: House D Plans. By author.

house d: 1 Rowhouse 1 Unit

Resident Profile: young families



walkable



sustainable



access to
amenities

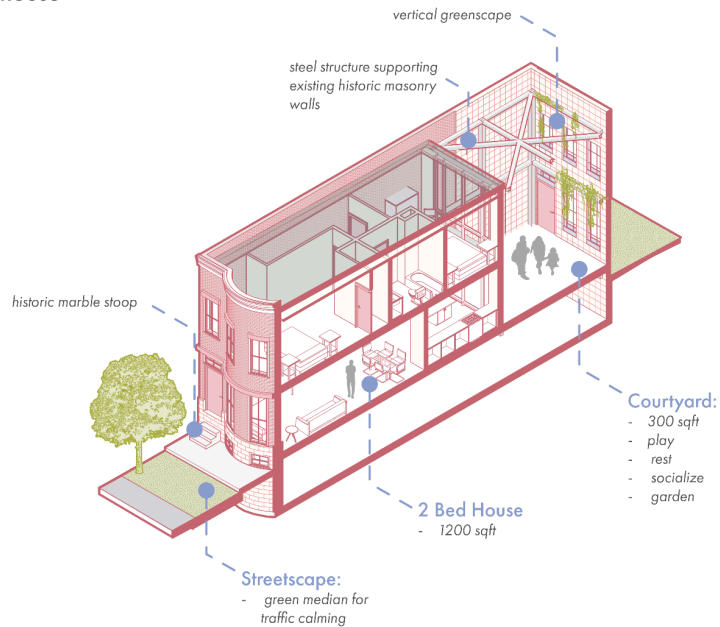


Fig 66: House D Axonometric. By author.

House E

House E is two rowhouses combined into one unit, making it ideal for large families who would not otherwise have large enough living options in Penn North. The courtyard is in the center of the house, creating a central light filled space around which all other program elements flow. This plan also has two entrances, allowing for a separate entrance for a retail or office space within the home. Overall, this plan creates space for a large family to thrive in the community.

house e: 2 Rowhouses 1 Unit

Resident Profile:
large families

 walkable

 sustainable

 room to grow



Fig 67: House E Plans. By author.

house e: 2 Rowhouses 1 Unit

Resident Profile:
large families

 walkable

 sustainable

 room to grow

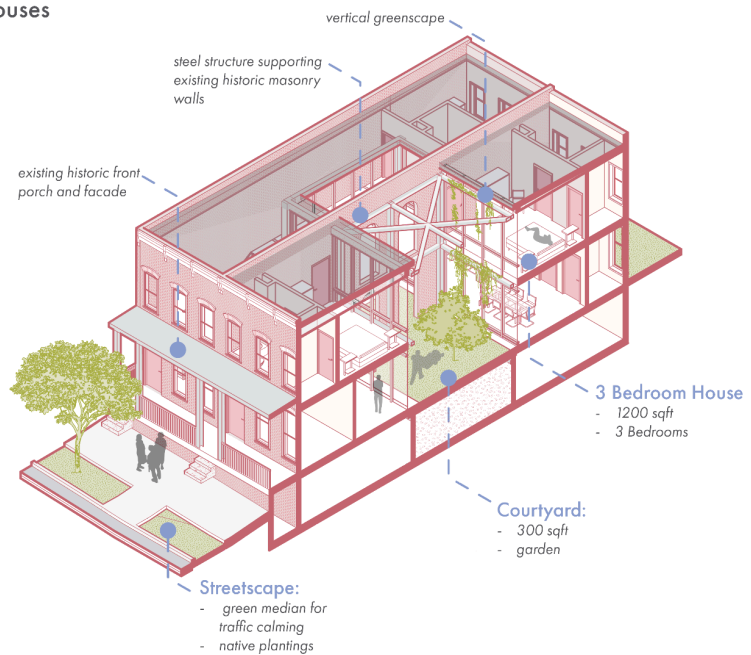


Fig 68: House E Axonometric. By author.



Fig 69: House E Perspective. By author.

House F

House F is three rowhouses combined into two residential units and two commercial units. This building also creates a large, shared courtyard flanked by commercial units, encouraging community engagement. The apartments above are 600 and 900 square feet, making them ideal for young professionals who want access to amenities.

house f:

3 Rowhouses
2 Units, 2 Commercial Units

Resident Profile:
students and young professionals



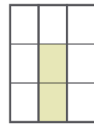
walkable



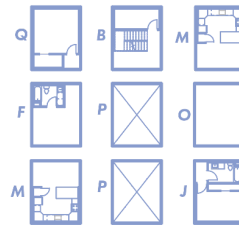
sustainable



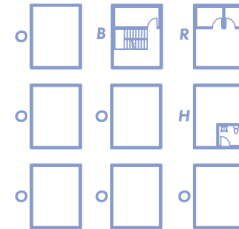
access to amenities



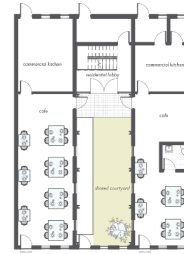
+



=



2nd floor plan
1/8"=1'0"



1st floor plan
1/8"=1'0"

Fig 70: House F Plans. By author.

house f:

3 Rowhouses
2 Units, 2 Commercial Units

Resident Profile:
students and young professionals



walkable



sustainable



access to amenities

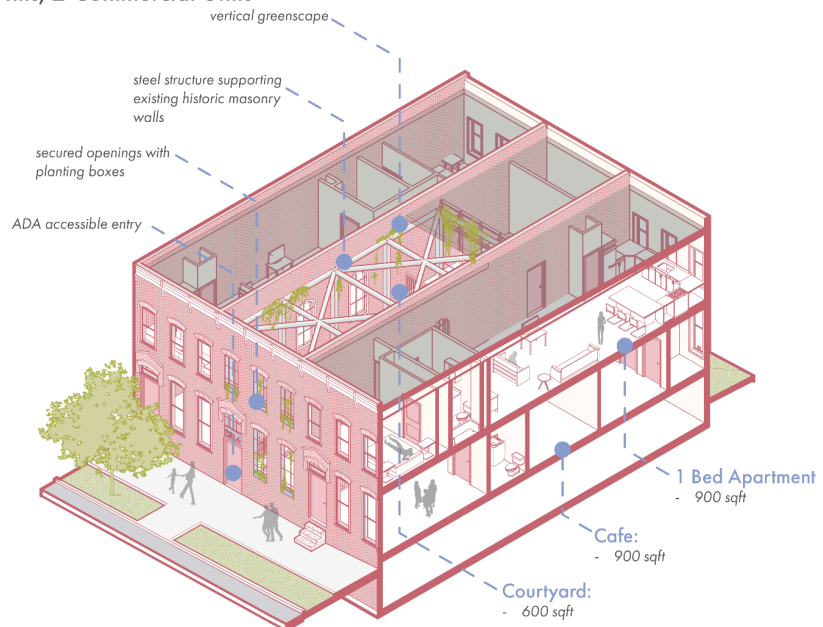


Fig 71: House F Axonometric. By author.

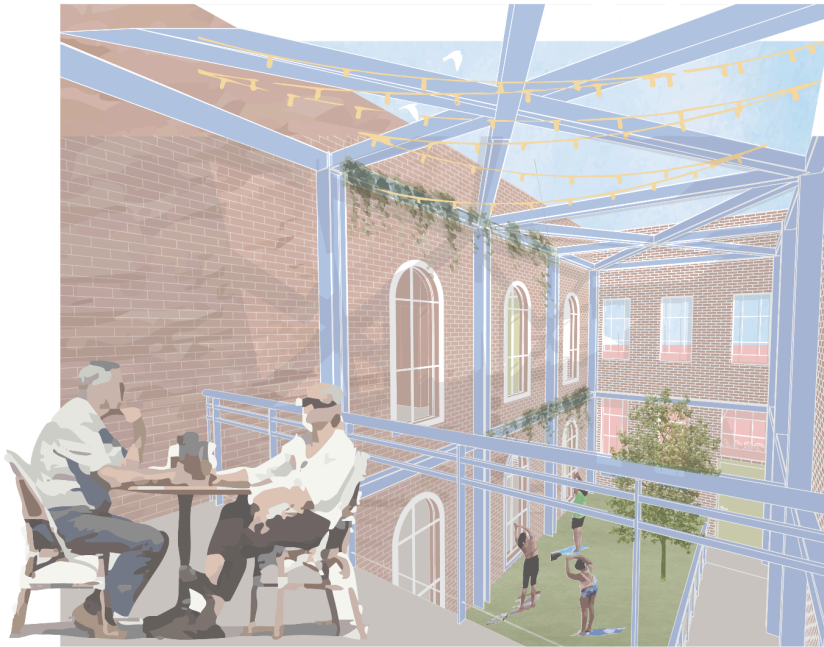


Fig 72: House F Perspective. By author.

Details

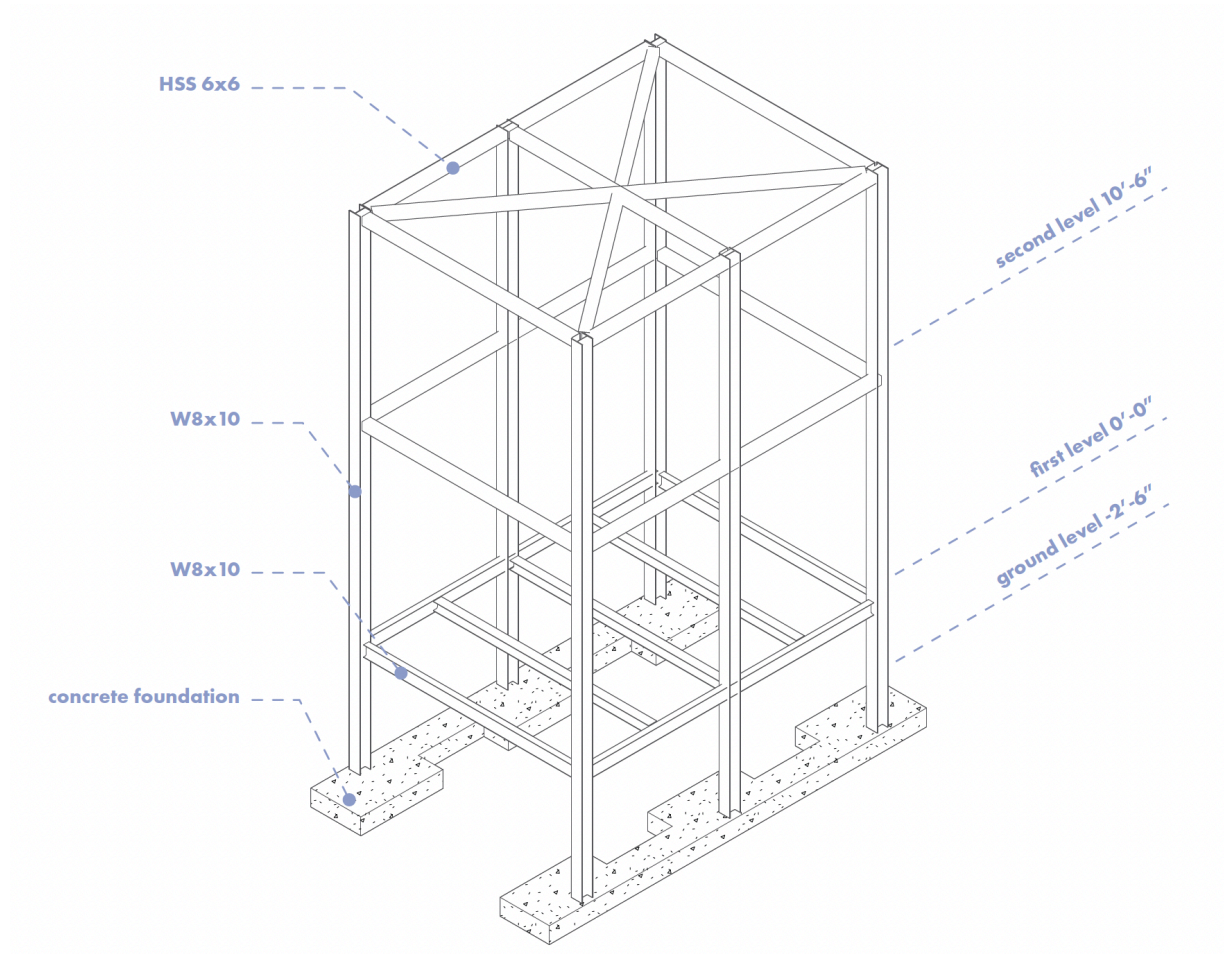


Fig 73: Structure. By author.

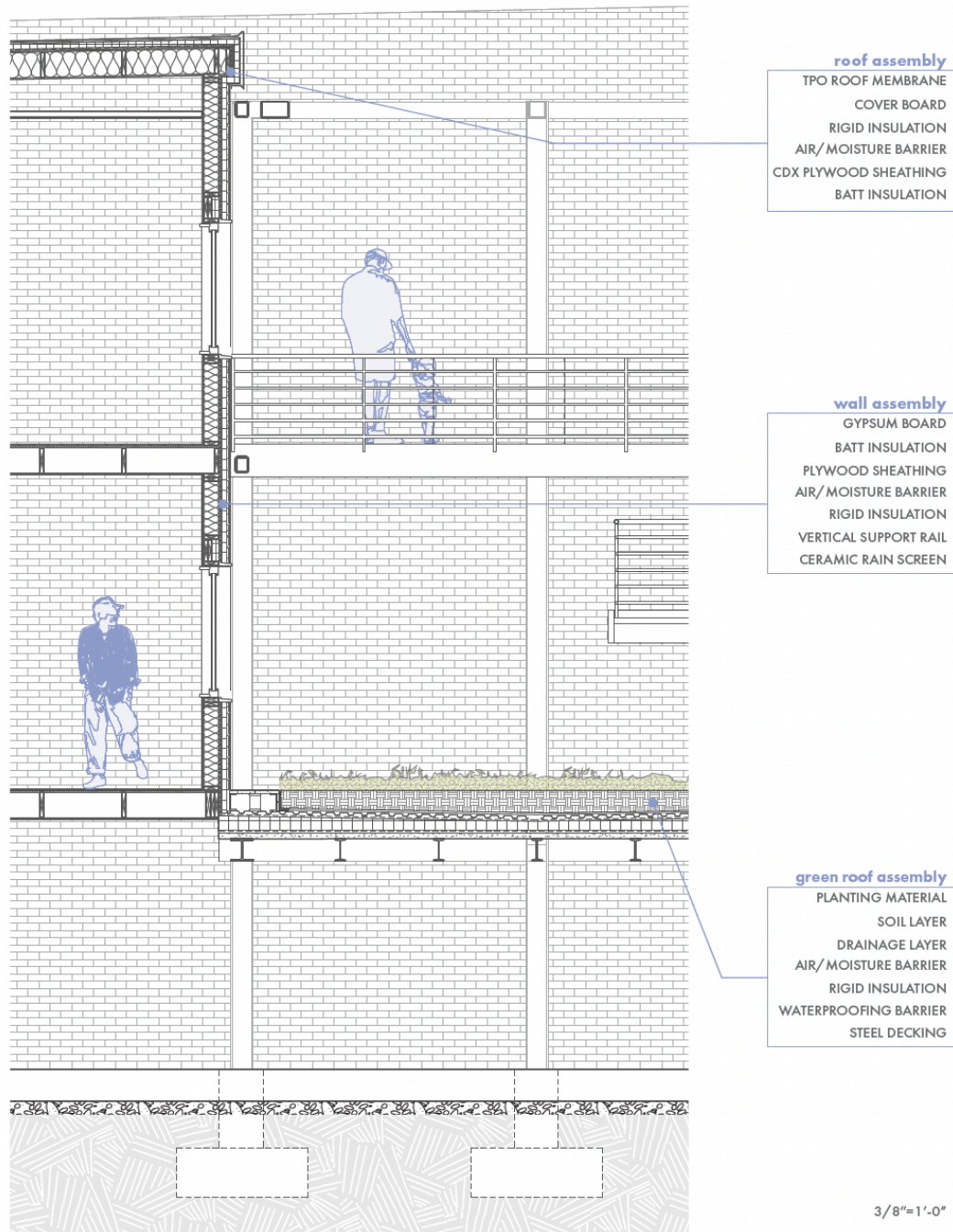


Fig 74: Wall Section. By author.

Conclusion

Overall, this thesis demonstrates the hidden potential of historic rowhouses in Baltimore and other declined cities. The history and character of the houses can be repurposed, using their rigid structure, to new life serving the modern needs of twenty first century residents. By using shape grammar to create a kit of parts, architects can design custom homes to serve individual families' needs and strengthen the city. This system proposes a way to diversify housing and introduce new commercial and gathering spaces, creating diverse, vibrant, and resilient communities informed by their history.

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