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HOUSING INDETERMINACY: Responsive Design for Diverse and Changing Households

Mark Sousa
Syracuse University

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Mark Sousa

Primary Adviser | Tim Stenson
Secondary Adviser | Liz Kamell

SYRACUSE UNIVERSITY SCHOOL OF ARCHITECTURE
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CONTENTION

EXISTING housing stock is no longer capable of properly accommodating today's population.[1] In many cities across the United States, housing reflects the outdated ideals and demographics of the early to mid-20th century. Organizational rigidity and spatial specificity has hindered the ability of these dwellings to adapt to different conditions, leading to a lack of maintenance and, in some cases, obsolescence. This mismatch between housing and household type forces occupants to live in spaces unsuitable to their needs in homes that may be inefficient, unaffordable or lacking an organization relevant to the particular group of inhabitants it houses. The nation is faced with a housing crisis resulting from the proliferation of the detached suburban home—an inherently unsustainable typology rooted in the ideals of the American Dream. The predominance of the traditional patriarchal family is quickly declining as a result of increased female independence, divorce, smaller household sizes and an aging population. Contemporary lifestyles often lead to the division of traditional families, an increase in geographic movement and a change in living patterns.[2]

In order to accommodate a diverse and rapidly changing household type, housing must be of a responsive nature and capable of adapting to the different needs of today's population and the unknown needs of the future. This necessitates an acknowledgment of the increase in non-traditional households, ie. single-headed families, single women, elderly couples, etc. In this context, responsive architecture can be defined as the ability of a building to adapt and respond to the needs of its occupants ie. income, household size, urban attitude. Responsive includes the qualities of adaptability, affordability and efficiency. This may be achieved through adaptable design. Adaptable buildings are not necessarily, or solely, comprised of 'moving parts,' but also layouts or systems that allow for future programmatic changes (the unknown). Along with the ability to house different socio-economic groups, adaptable architecture also has financial and sustainability benefits for occupants and developers.[3] Modularity is an important aspect of adaptability because of its capacity to use generic, systematic design to achieve specific solutions.

Housing is innately generic in that it is a universal necessity that responds to basic human needs common to everyone. Similarly, rapid change in housing demographics is also a universal issue. In this sense, the design of responsive housing may involve a widely applicable system of modularity. This may allow design solutions advanced by this thesis to be relevant at the scale of the housing crisis. However, all generic solutions require specificity to site in order to test how or whether the housing relates to local context. This project will use Syracuse, New York as a testing ground for flexible, high-density housing. While the use of Syracuse as a site is relatively arbitrary, it will serve to provide design constraints, thus legitimizing the project as a possible real-world solution. The selection of Syracuse as a specific site for this design project also demands that attention be paid not only to physical site characteristics, regional climate, and local culture, but also to

Previous research and precedents provide a strong foundation for the testing of this contention. Using flexibility for architectural housing design as an innovative method to solve the housing crisis is an idea that has been in existence for at least the last century. The Modern architect's fascination with technology and mass-production led to a vast number of experimental housing projects in the early 20th century. Le Corbusier, Walter Gropius, Buckminster Fuller and many more all produced inventive designs. The latter half of the century marked another surge of interest, both in flexible designs for slum or disaster relief housing as well as adaptability for small, economic homes for a rapidly urbanizing world.[3] Past designs have led to innovative and sometimes beautiful housing solutions, but rarely used the power of adaptability to house a diverse group a residents in a single project. I will critically analyze the successes and failures of built works and develop sets of requirements—both spatial and programmatic—for the project in Syracuse. Precedents will be studied for their attitudes toward affordability and efficiency, adaptability and urban character. Infill Housing by Koning Eizenberg, the Water Villas by UN Studio, Uberbauung Hellmutstrasse by ADP Architektur and House 194X by SOM will all be analyzed.

This claim can initially be tested through research of the challenges associated with mixed-household developments, specifically the design challenges. By carefully analyzing the needs of the specific socio-economic groups in Syracuse, it will be possible to determine the wide range of living requirements necessary for the proposed housing project. There is a wealth of knowledge concerning the architectural manifestation of social theories and ideas. This works hand-in-hand with a study of changing household types in the United States. Observing and analyzing past trends and the degree to which past housing has responded to evolving demands is critical to understanding the status quo and future trends.

Great attention must also be paid to the current land use/zoning restrictions, government policies and social norms of the city of Syracuse. These are external, large-scale planning factors that should be considered by architects with aspirations of social change seeking to positively affect neighborhoods and communities. By accessing the wealth of information available to Syracuse University concerning the city's urban dynamics, and having easy access to the proposed site, it will be possible to determine how a responsive housing project may work within the city. Current policies must also be put into context with major historical causes. This can be achieved by researching the urban history of the American city in relationship to housing policy and other public policy shifts.

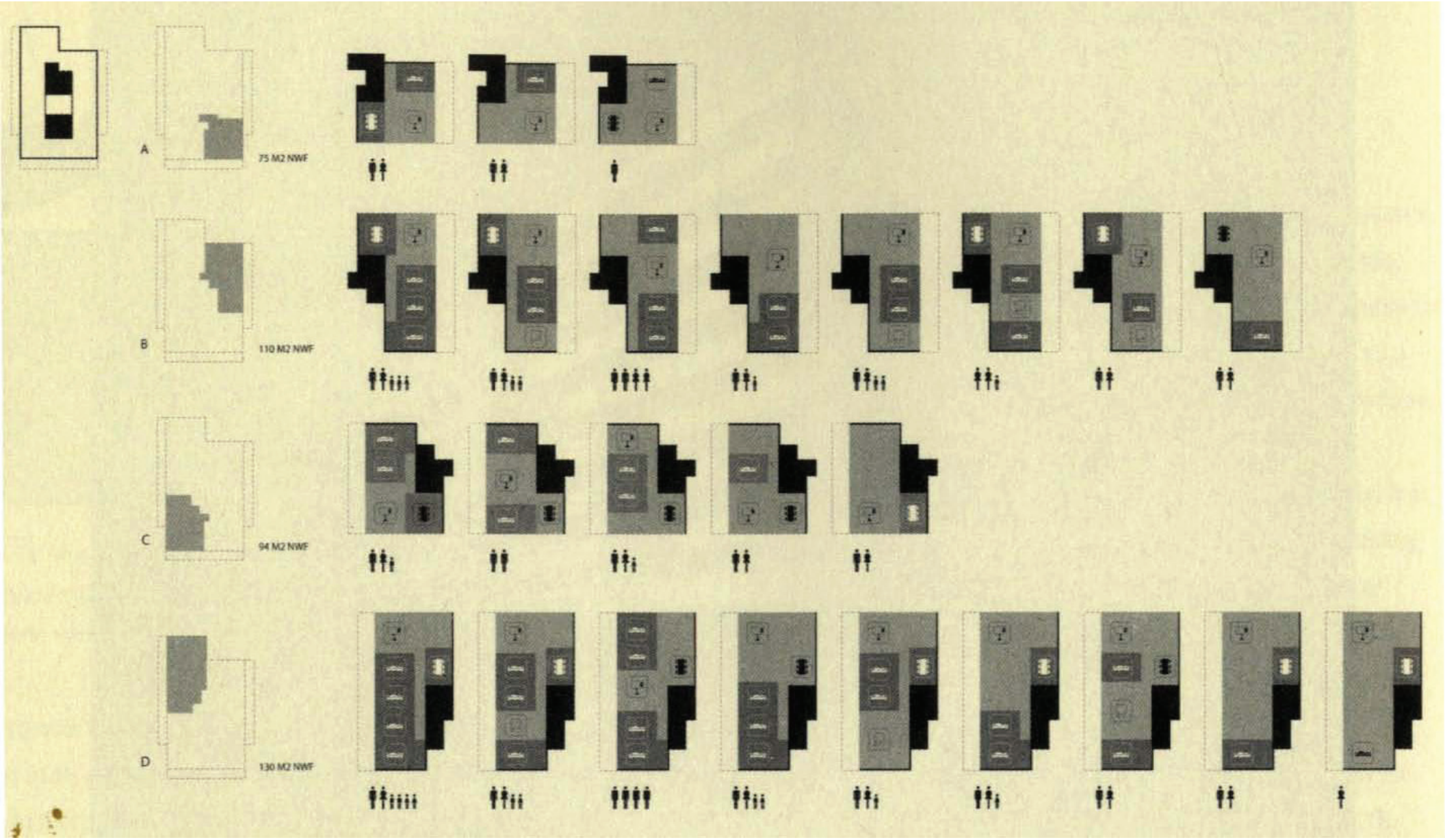
The final project phase will consist of a design project for mixed-household, responsive (affordable, efficient, adaptable, contextual) housing in Syracuse, New York. The aim of this design is to prove that an architectural intervention informed by my research can house multiple types of occu-

pants simultaneously and allow for future adaptability. Architectural diagrams, drawings and renderings will indicate whether an intervention of this kind can be successful in this specific context, and whether the proposed generic design solutions can be implemented at a wider scale. This project should contribute to the existing rhetoric and body of work associated with architecture's continuous desire to improve living spaces through the built environment.

This project hopes to create a new outlook on the future of housing design. Ray Forrest wrote, "The pace of demographic change need not be that dynamic to outpace the capacity of markets or states to provide appropriate dwellings in appropriate locations. […] Dwelling placement or adaptation is always likely to lag."[2] The preceding statement reflects the belief that housing is static and rigid, and that dwelling replacement or major structural adaptation is necessary to accommodate a continually evolving population. On the contrary, **responsive housing can release significant pressure on housing systems by anticipating change and providing a lower cost alternative. The development of mixed-household dwellings leads to increased socio-economic diversity, thus increasing the potential for healthy, vibrant communities.[2]**

1. STEINFELD, Edward. Inclusive Housing: A Pattern Book: Design for Diversity and Equality. New York: W.W. Norton and Co., 2010.
2. FORREST, Ray and James Lee. Housing and Social Change: East-West Perspective. London: Routledge, 2003.
3. SCHNEIDER, Tatjana and Jeremy Till. Flexible Housing. Oxford: Architectural Press, 2007.
4. TILL, Jeremy. "Flexible Housing: The Means to the End." Architectural Research Quarterly 9, no. 3/4 (2005): 287-296. Accessed September 26, 2012. http://www.jeremytill.net/Article_files/flexible_arq_2.pdf.

Fig. 1
EM2N ARCHITECT
Siedlung Hegianwandweg - Plan with 25 different scenarios, 2003
Pg. 146, *Flexible Housing*, 1st edition
Oxford: Architectural Press, 2007


A
75 M2 NWF
B
110 M2 NWF
C
94 M2 NWF
D
130 M2 NWF

CHANGING DEMOGRAPHICS

+

UNRESPONSIVE HOUSING STOCK

(inefficient, unaffordable, unadaptable, contextually inappropriate**)**

CRITIQUE OF TRADITIONAL DETACHED HOME / SUBURBIA

STUDY OF CHANGING HOUSE-HOLD MAKEUPS

WHAT MAKES HOUSING AFFORDABLE, EFFICIENT, ADAPTABLE?

CONTEXTUALIZE RESPONSIVE HOUSING IN DANFORTH NEIGHBORHOOD

RESPONSIVE HOUSING

AFFORDABILITY
EFFICIENCY
ADAPTABILITY

Addition / Subtraction
Modularity
Core and Systems
Transformable Partitions
Neutral Functionality
Excess Space

Minimize Stairs
Accessibility for Disabled
Private Access to Ground Floor
Children-friendly Design
Location - Access to Services

Space Reduction
Ceiling Height Reduction
Neutral, Multi-functionality
Square Layouts
Fewer Walls - ext., int.
Wood Frame Construction
Standard Size Framing/Structure
Modularity

Building Scale
Density
Setbacks / Lots
Urban Attitude
Cultural Appropriateness

A poorly maintained Danforth neighborhood home serving as an example of deficient, unaffordable, inflexible housing

AMERICAN HOUSING

“There is an allusion of happiness associated with traditional ways of living.” - Krokfors

HISTORY OF AMERICAN HOUSING REGULATION

The issue of housing policy first arrived during the 1930s in response to a lack of government regulation of housing. Conditions in many urban areas across the United States were appalling during the nineteenth century. New York City was the quintessential example of a city in desperate need of housing regulation. Initially, policy centered around redevelopment--typically slum clearance (Plunz). Public housing projects also rose to prominence after the 1930s. By the 1950s, the public came to associate government housing projects with the large, superblock towers conceived by Le Corbusier. Projects like Pruitt-Igoe in St. Louis became icons of modern housing (especially after Pruitt-Igoe's demolition in the mid-1970s).

The proliferation of the American suburban home can be linked directly to housing policy. As early as the New Deal of 1940-42, the U.S. government was subsidizing middle-class housing. This increased the appeal of the 'garden city' or suburban neighborhood. The Housing Act of 1949 was a landmark expansion of the federal government's role in housing finance. It had serious effects on mortgage payments and was partially responsible for the proliferation of post-war suburbs. Large mass-produced suburbs like Levittown, New York became possible because of housing industrialization and the transformative effect of the automobile. The Federal Aid Highway Act of 1956, signed into law by Dwight Eisenhower, led to the construction of the interstate highway system and thus further contributed to an increase in suburban development.

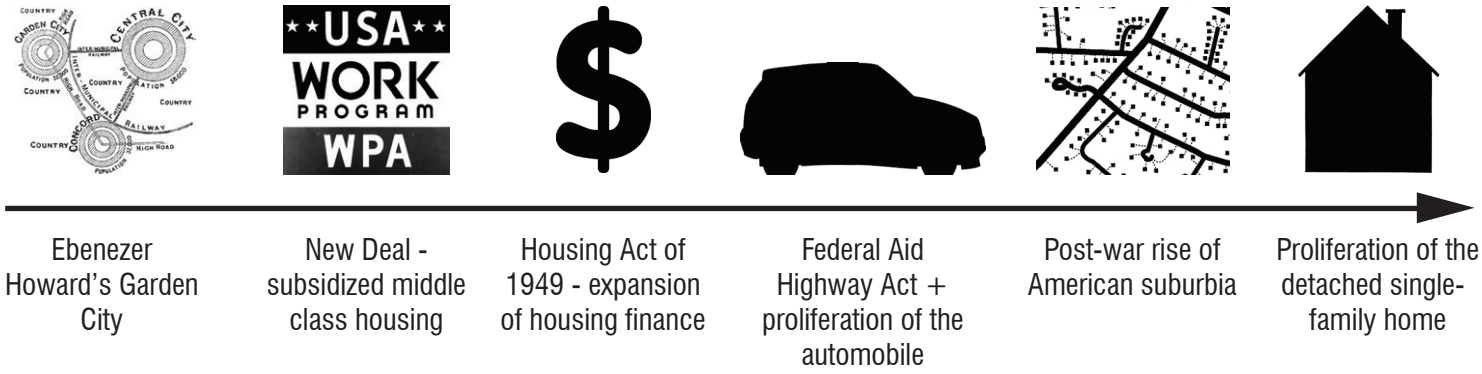


Fig. 2
Levittown - Aerial View 6.
1947
Levittowners.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

In 1965, the Department of Housing and Urban Development was upgraded to cabinet-level within the U.S. government. The department is responsible for numerous landmark acts that have shaped American housing up to today. Most recently, HUD has placed renewed emphasis on social concerns and inclusivity. Adams has written “as a weapon of social exclusion, housing normally works extremely well” (Fraser and Nelson). Since the 1990s on, mixed-income developments have largely been seen as the solution to the growing concern of social exclusion. As a response, HUD formed the HOPE IV program in 1992, made into a law in 1998. HOPE IV aimed to revitalize some of the worst public housing projects by converting them into mixed-use developments (MIDs) or demolishing them and building anew. New construction focused on smaller scale buildings because large apartments were “believed to be unhealthy for human occupation” (Fraser and Nelson).

The HOPE IV program received strong support for the following reasons: a promise to “reduce social problems related to concentrated poverty,” addressment of severely distressed housing units, positive influence on cities and the “creation of an environment that allows other poverty amelioration strategies to be successful” (Fraser and Nelson). The success of HOPE IV initiatives largely relied on the convenience / attractiveness of a site, good management of the differing needs between the public and private sectors and a critical mass of higher income residents (Fraser and Nelson). It was discovered that MIDs had positive outcomes when they:

1) created and solidified social networks
2) introduced behavioral modeling
3) created a form of social control
4) enhanced the political economy of the community

Conclusively, recent HUD programs have highlighted a need for community and social service programs, resident participation and client inclusion in the decision making process. The most difficult obstacle to overcome during redevelopment is the avoidance of displacing existing residents.

CONTEMPORARY HOUSING AND SOCIAL THEORY

Contemporary housing and social theorists generally agree that a rapid change in demographics has placed serious strain on housing markets (Lee and Forrest). Some of the **most pressing social issues associated with housing include:**

1) Sustainable development
2) Social exclusion and inequality
3) Economic instability
4) Diversity and social fragmentation
5) Constantly changing role of state involvement (Forrest)

Increasingly diverse households are often blamed on "economic migrants," or people who are willing to move or break apart from their family in order to find adequate work (Forrest). These economic migrants are a manifestation of a rapidly globalizing world. Interestingly, an increased interconnectedness between nations / corporations has led to an increased disconnectedness between households.
The decline of the traditional patriarchal family is very apparent. Its causes include:

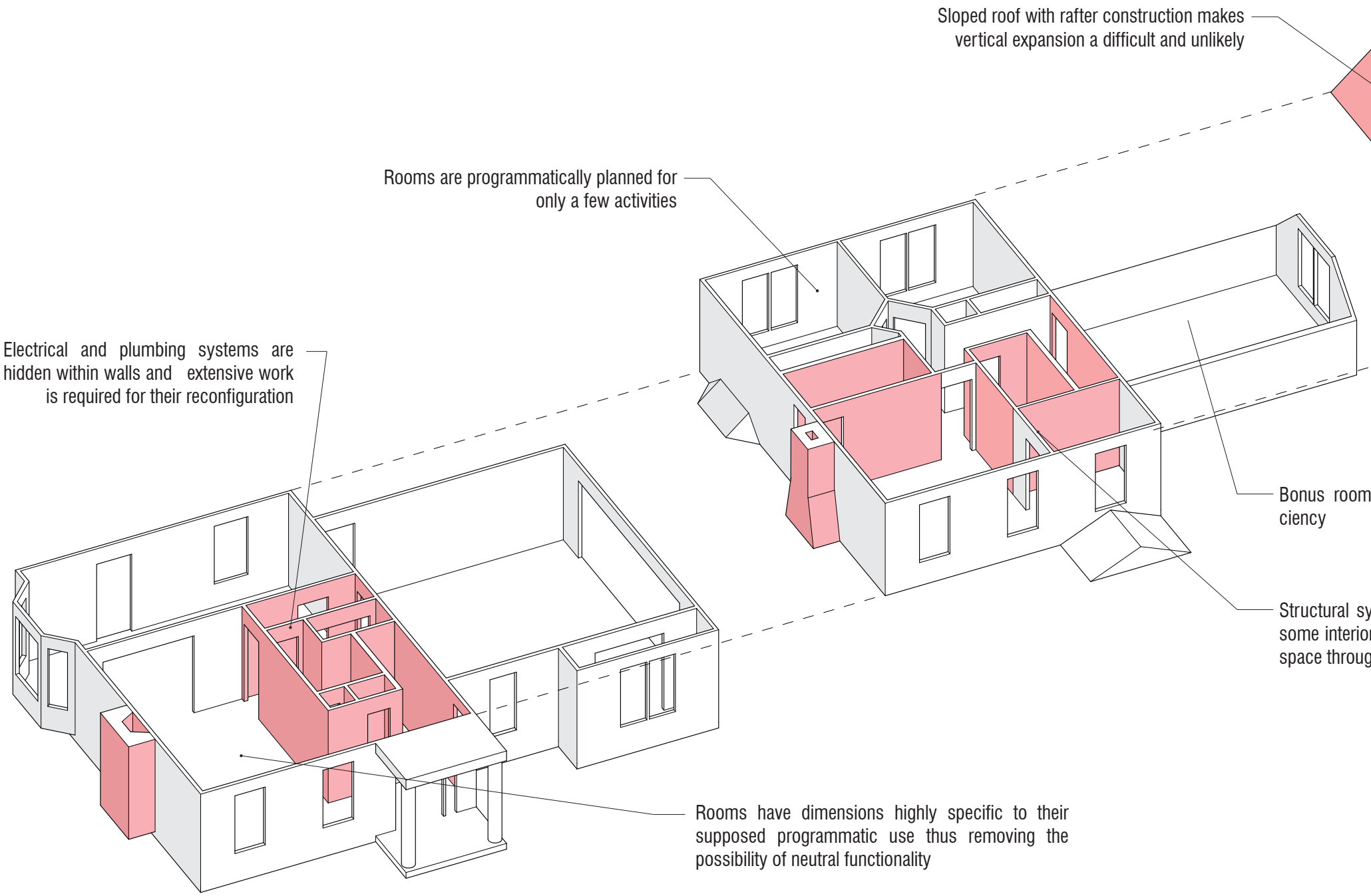
1) Increase in female independence
2) Rapid aging of population
3) Increase in divorce
4) Decrease in the power of state and religion (Forrest)

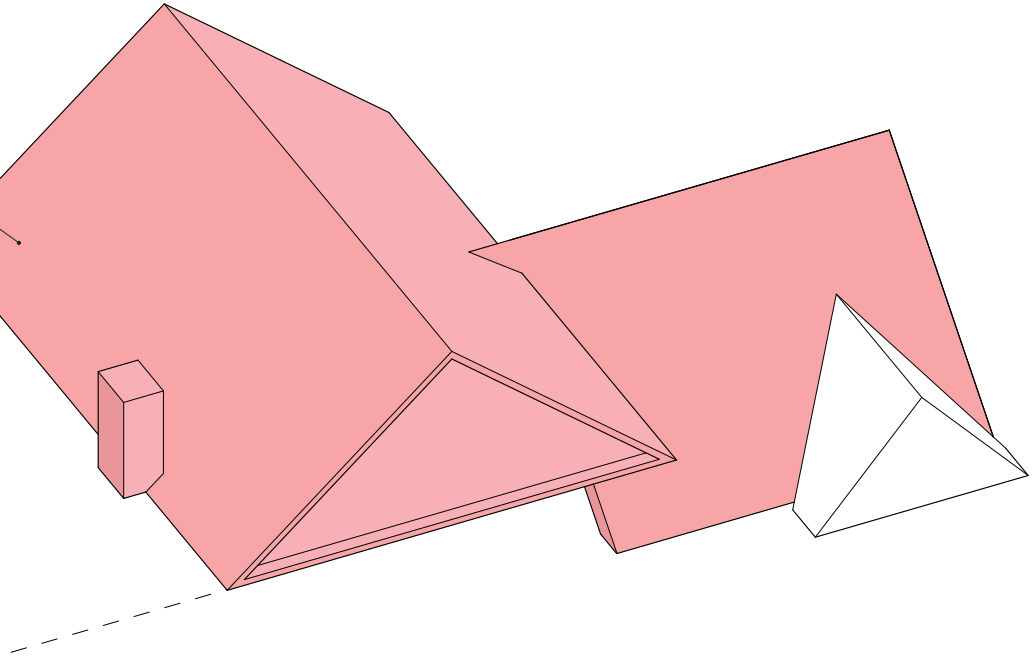
Single households are on the rise largely because:

1) People live alone for longer
2) Increase in relationship breakdowns
3) Increase in life expectancy (Forrest)

Women have been particularly affected by these trends. Part of the solution to these changes in demographics lies in the adoption of a multiculturalist approach to policies. There must be a greater involvement of minority groups in regenerative housing projects.

THE TRADITIONAL AMERICAN HOME
INADAPTABILITY





epitomizes excess space and ineffi-

ystem is linked with exterior walls and
r walls making it difficult to reconfigure
gh wall movement or removal

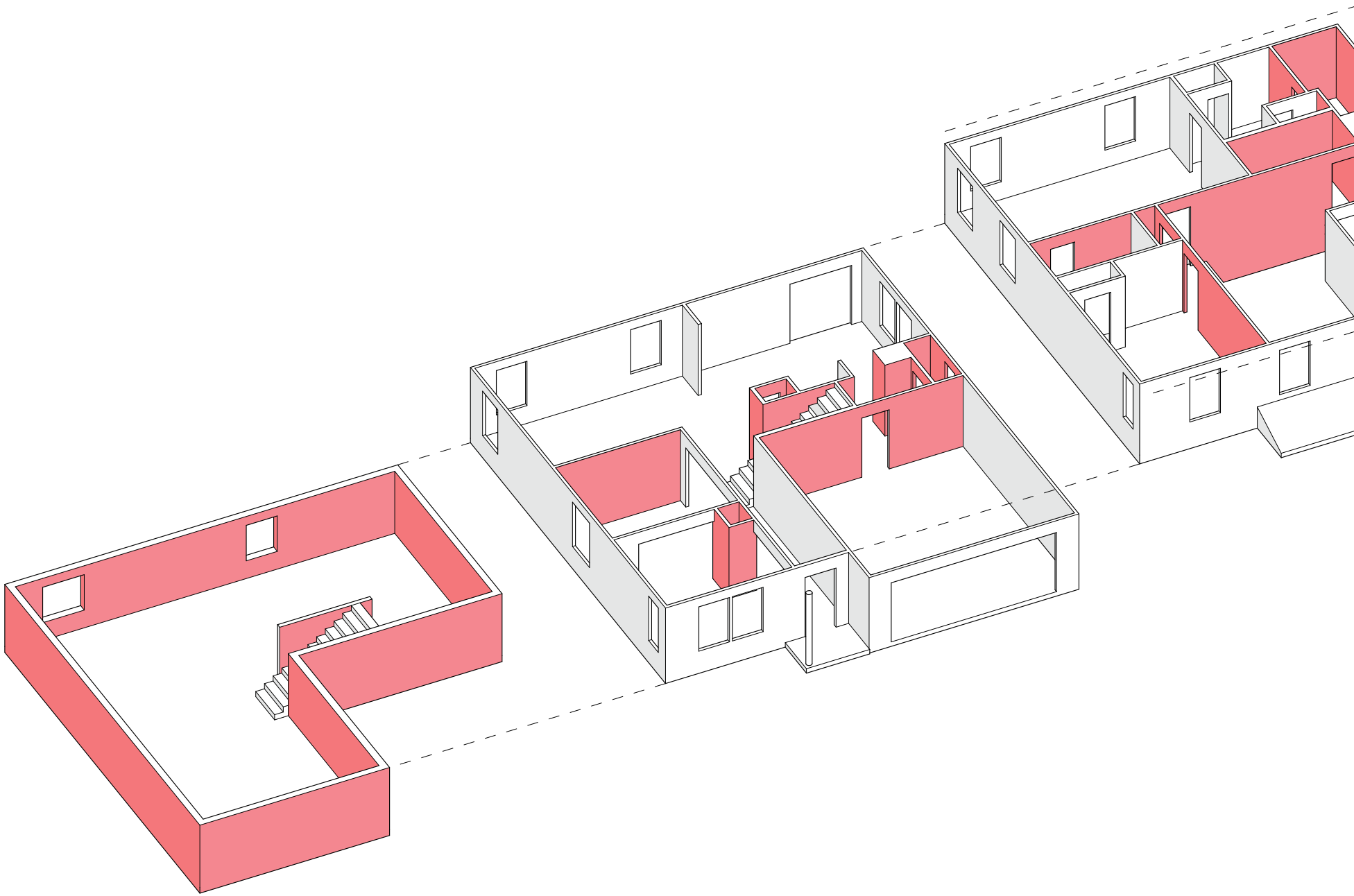
Auburn Chase is a detached single-family model home designed by Fox Fun Plans. It is available in central New York for an estimated $140,000. Features of the home include 3 bedrooms, 2.5 bathrooms and 1,568 sf. Its plan features a typical, rigidly designed spatial layout with a formal living and dining room, master bedroom, walk-in closets, brick fireplace, front porch and two car garage. Its design is entirely determined by market and consumer demand. Its target household type is the nuclear family and its design demands a suburban context.

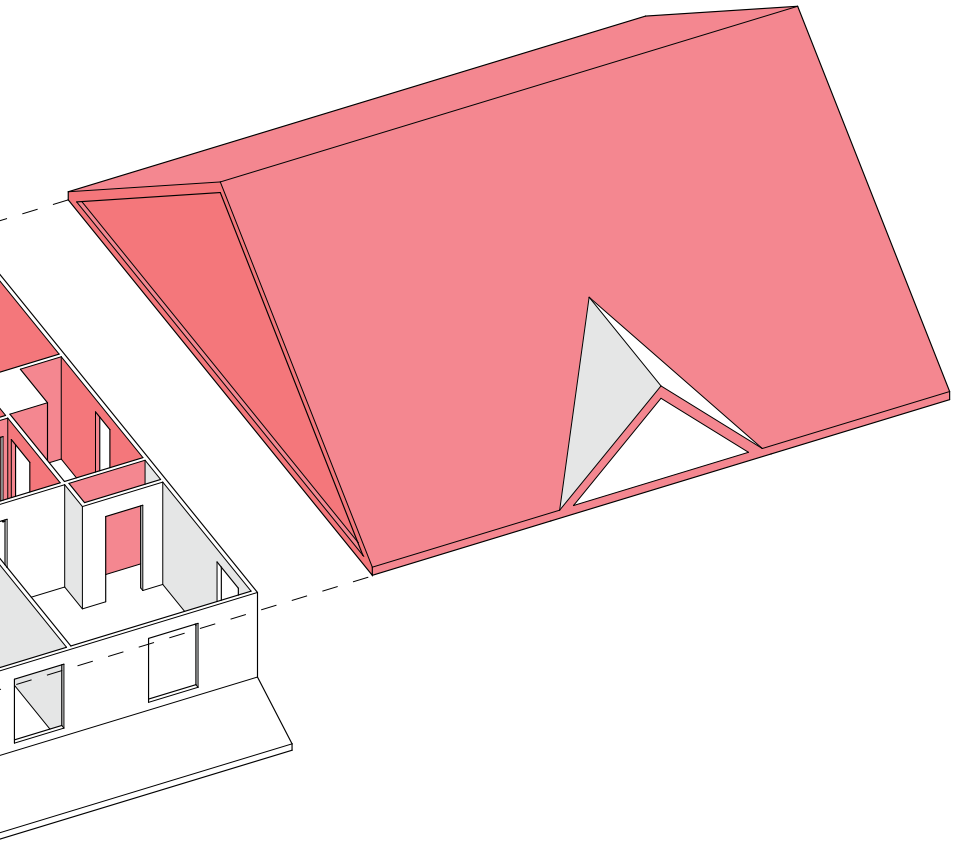
This home is an impractical and inappropriate dwelling type for the Danforth neighborhood of Syracuse. The estimated $140,000 listing price is well above the budget of Danforth residents whose household income averages $37,780. Danforth's unemployment rate sits at 20% and the percetage of people living in poverty is 44.8% (US Census Data). In terms of household makeup, 78% of dwellings house families but only 24% of those families feature a nuclear makeup. Female-headed families and single householders comprise a significant portion of the neighborhoods population. *Auburn Chase* would be oversized and overpriced and its target demographic fails to match with that of the neighborhood.

"AUBURN CHASE"

(Plan Source: Fox House Plans
<http://www.foxhouseplans.com/details.php?prodId=31&category=16>)

THE TRADITIONAL AMERICAN HOME
EFFICIENCY AND AFFORDABILITY





The Milan is a detached single-family model home designed by Ryan Homes. It is available in central New York for an estimated $190,000. Features of the home include 4 bedrooms, 2 bathrooms, 2,528 sf and 100% energy star certification. Its plan features a typical, rigidly designed spatial layout with a formal living and dining room, open kitchen with breakfast bar, walk-in closets and two car garage. Its design is entirely determined by market and consumer demand. Its target household type is the nuclear family and its design demands a suburban context.

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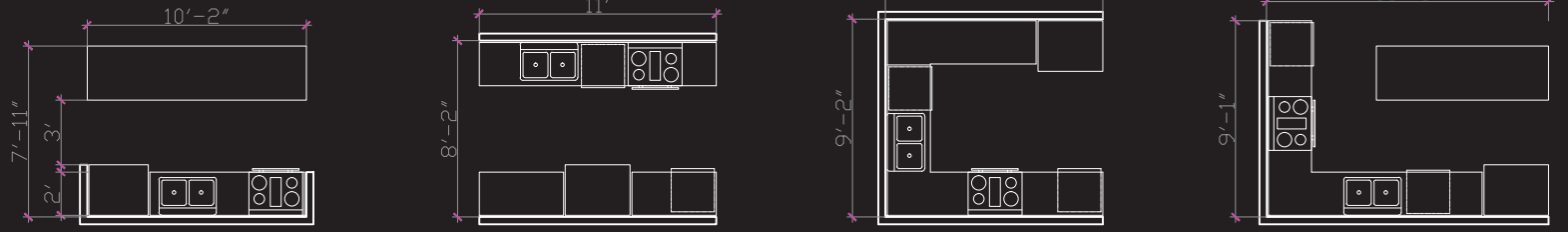
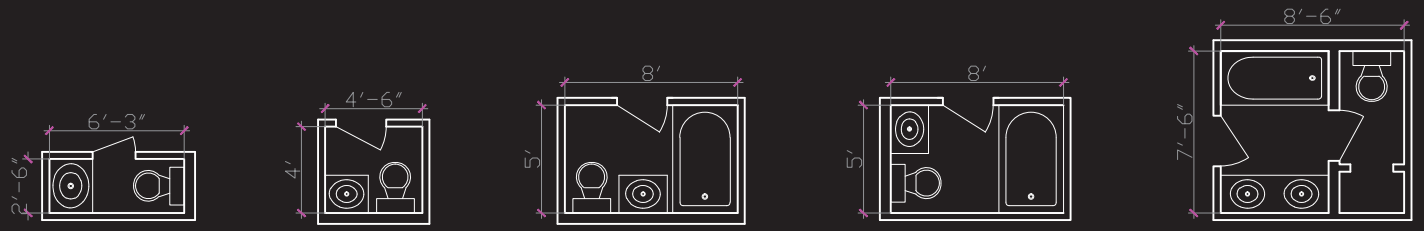
"THE MILAN"

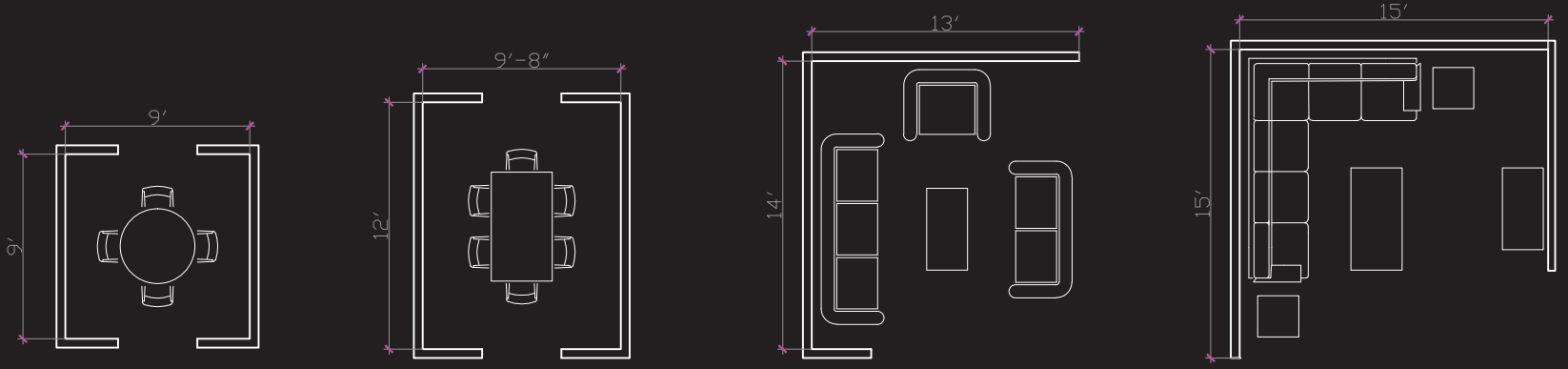
(Plan Source: Ryan Homes
<http://www.ryanhomes.com/find-your-home/our-homes/single-family/milan/mln00>)



Kitchen

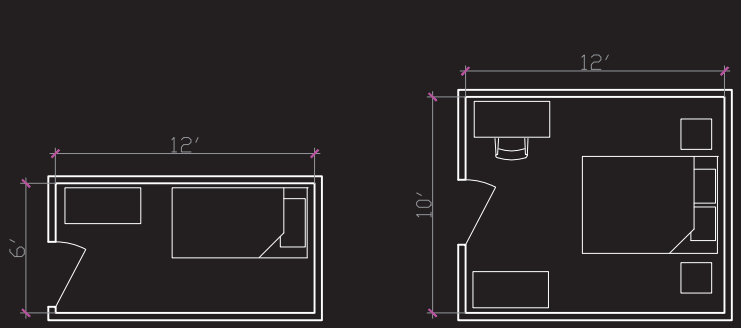


Bathroom



Dining

Living



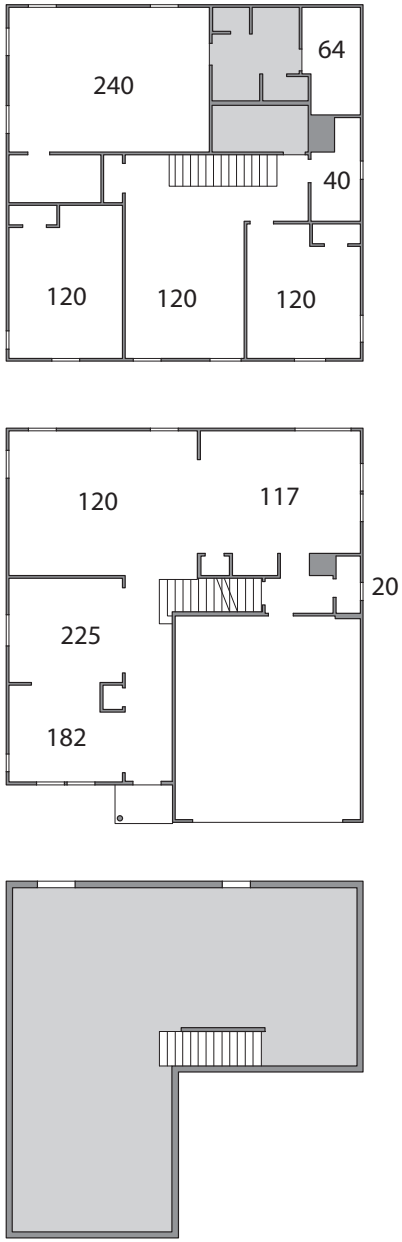
Bedroom

This ‘kit of parts’ represents efficient room sizes for a standard home program. To the right, two traditional homes are resized based on this kit of parts. This emphasizes the drastic inefficiency of the typical suburba home.

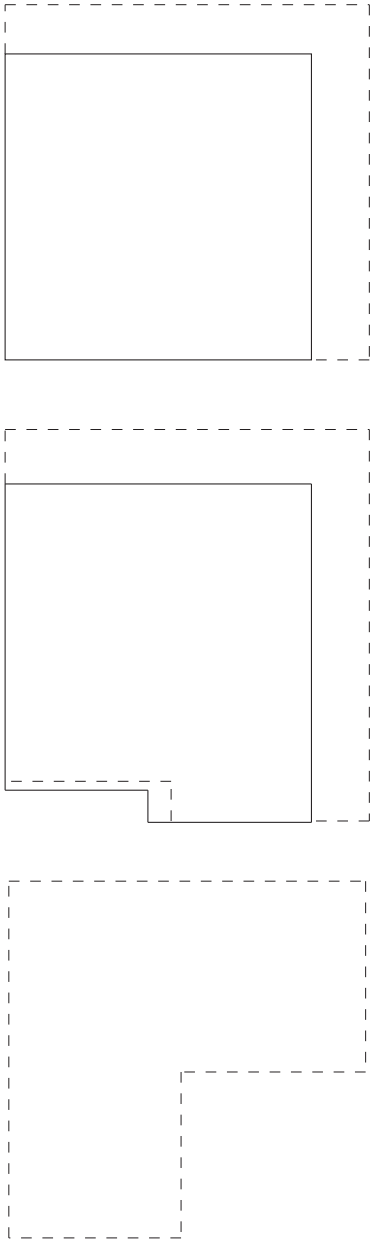
Efficient sf. = 1,368
+137 (10% circ.)
+137 (10% storage)

Total efficient sf. = 1,645
Actual sf. = 2,528
Surplus = 883

Actual Floor Plans



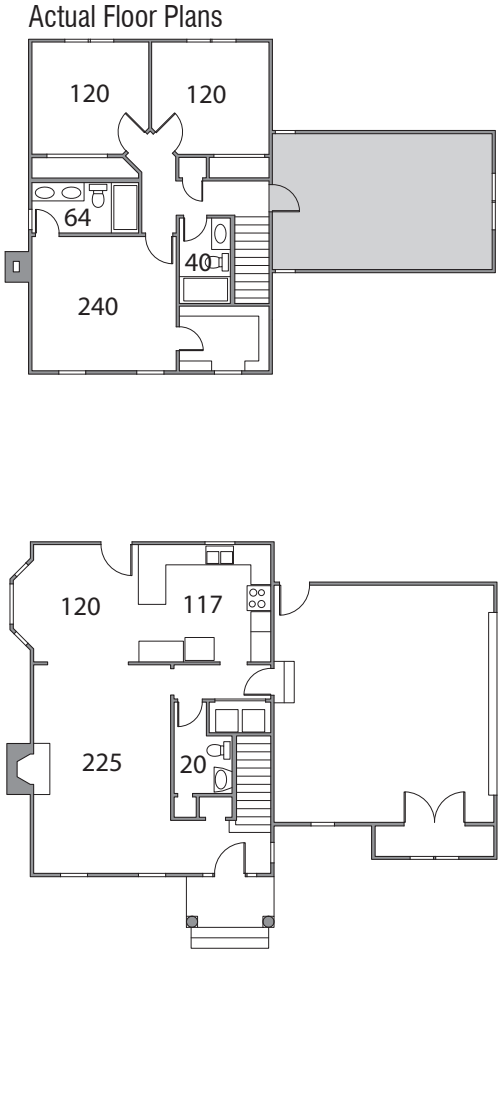
Efficient Floor Plans



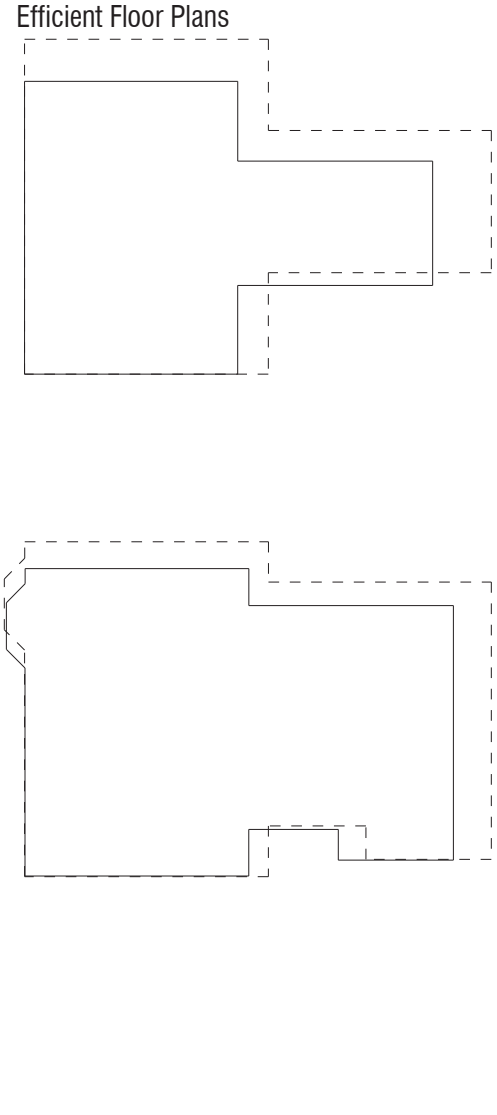
Efficient sf. = 1,066
+107 (10% circ.)
+107 (10% storage)

Total efficient sf. = 1,280
Actual sf. = 1,568
Surplus = 288

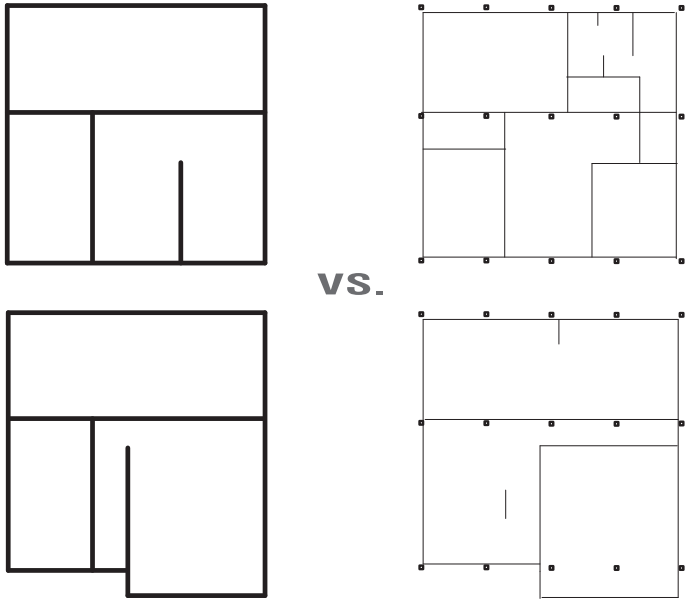
Actual Floor Plans



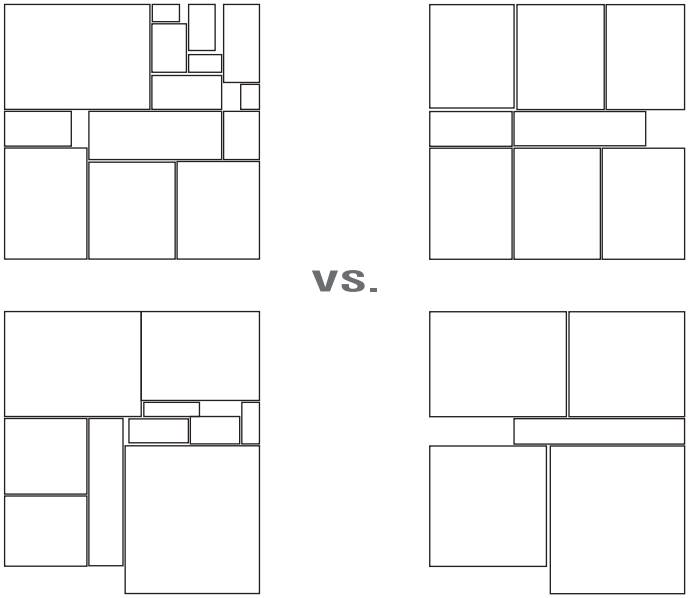
Efficient Floor Plans



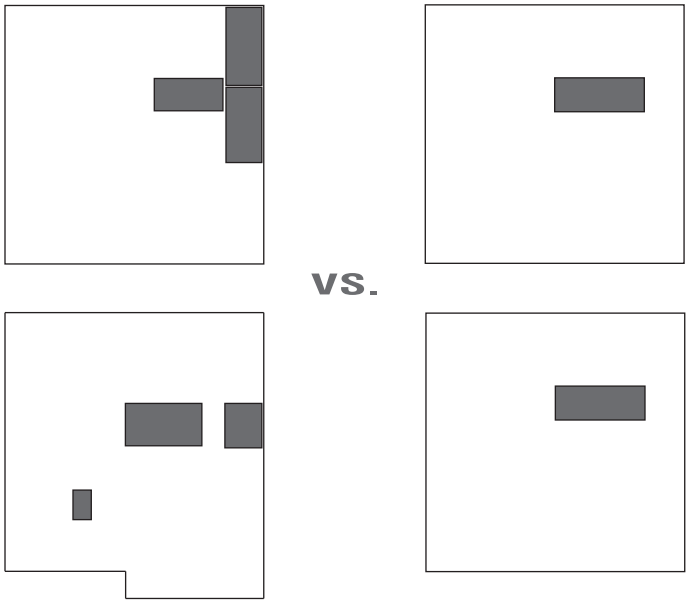
LOAD-BEARING COMPONENTS



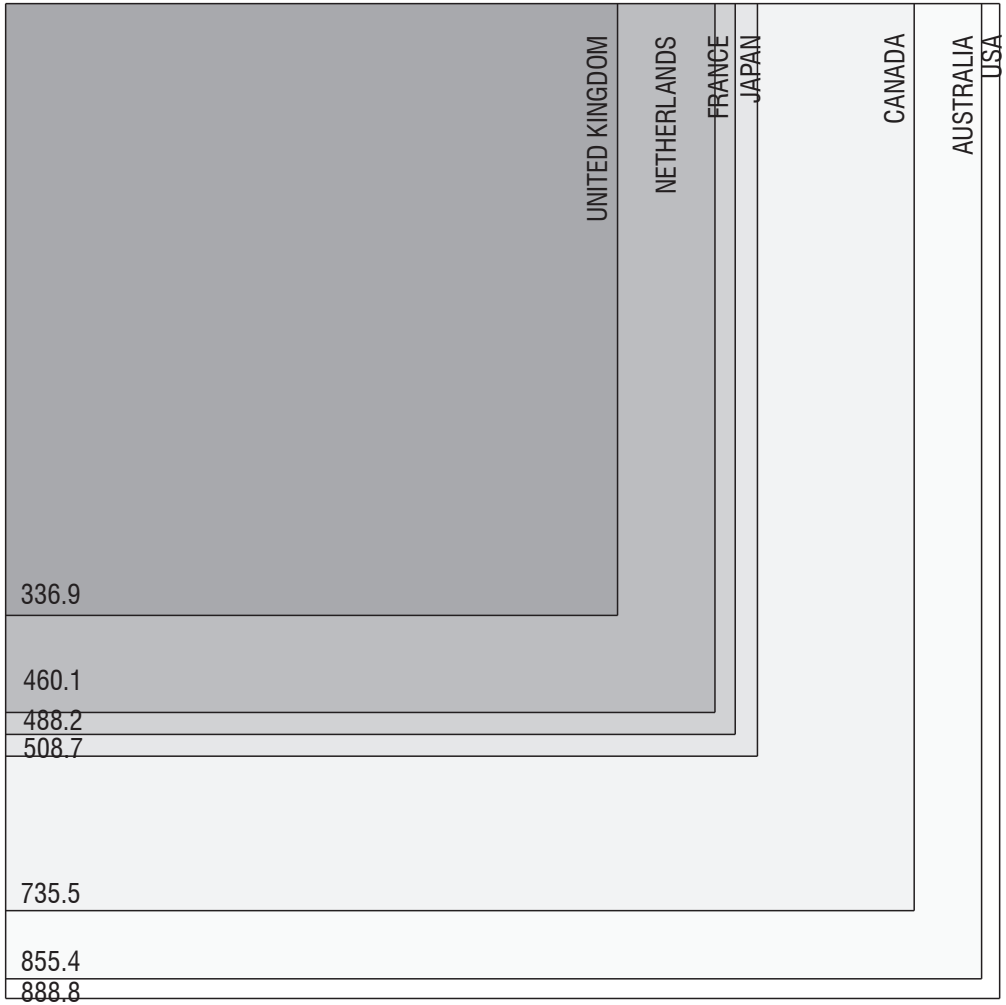
SPATIAL ORGANIZATION



CORE ELEMENTS



WORLD HOUSING DATA



AVERAGE HOUSE SIZE (per person)(sf)

A HISTORY OF ADAPTABLE HOUSING

“Versitile is the house: just like men, flexible yet solid.” - Bruno Taut

1929: Second CIAM Congress in Frankfurt pushes for a reduction in living space through efficiency and flexibility

1927: Completion of Wiessenhofsiedlung in Stuttgart featured new efficient housing designs, some with flexible elements, particularly Mies Van der Rohe's block.

1914-1922: Le Corbusier designs a series of mass-produced housing including Maison Domino, Maison Voisin and Maison Citrohan

1940s (early): Increase in popularity of industrialized housing in the United States

1942: 'The New House 194X' featured flexible housing designs by several prominent architects in an issue of Architectural Forum.

1969: Giancarlo de Carlo
ment for user-need base
lecture "Architecture's
brings awareness to the i
mations imposed by the us

1960s(late): A growing
schemes show an interest
erment and participatory d
known as democratization
ization of the design proce

1961: John Habraken's se
ports: an alternative to
revolutionizes flexible des
sizing a separation of
construction

WORLD WAR I

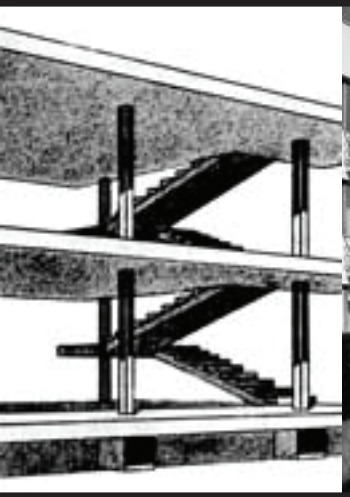
1920

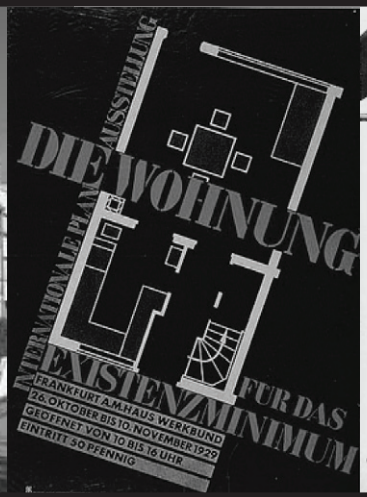
1930

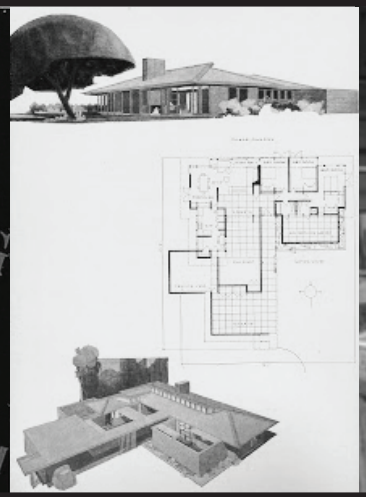
1940

WORLD WAR II

1950







MILESTONES IN ADAPTABLE DESIGN
1910-PRESENT

makes an argu-
d design in his
People." This
dea of transfor-
ser post-design.

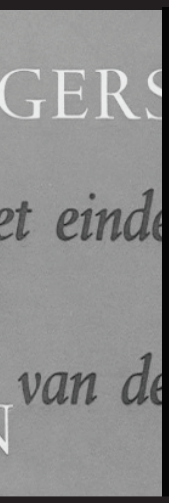
g number of
in user empow-
lesign. This was
and decentral-
ss

minal text "Sup-
mass housing"
sign by empha-
elements in

1970s: Revitalized interest in modular design still continues to the present day particularly in European nations like Germany, the Netherlands and Spain.

1990s: A significant amount of attention is drawn toward disaster relief housing. This typology inherently calls for a system of modularity and is often quite flexible and innovative.

1960 1970 1980 1990 2000






THE MODERN ERA

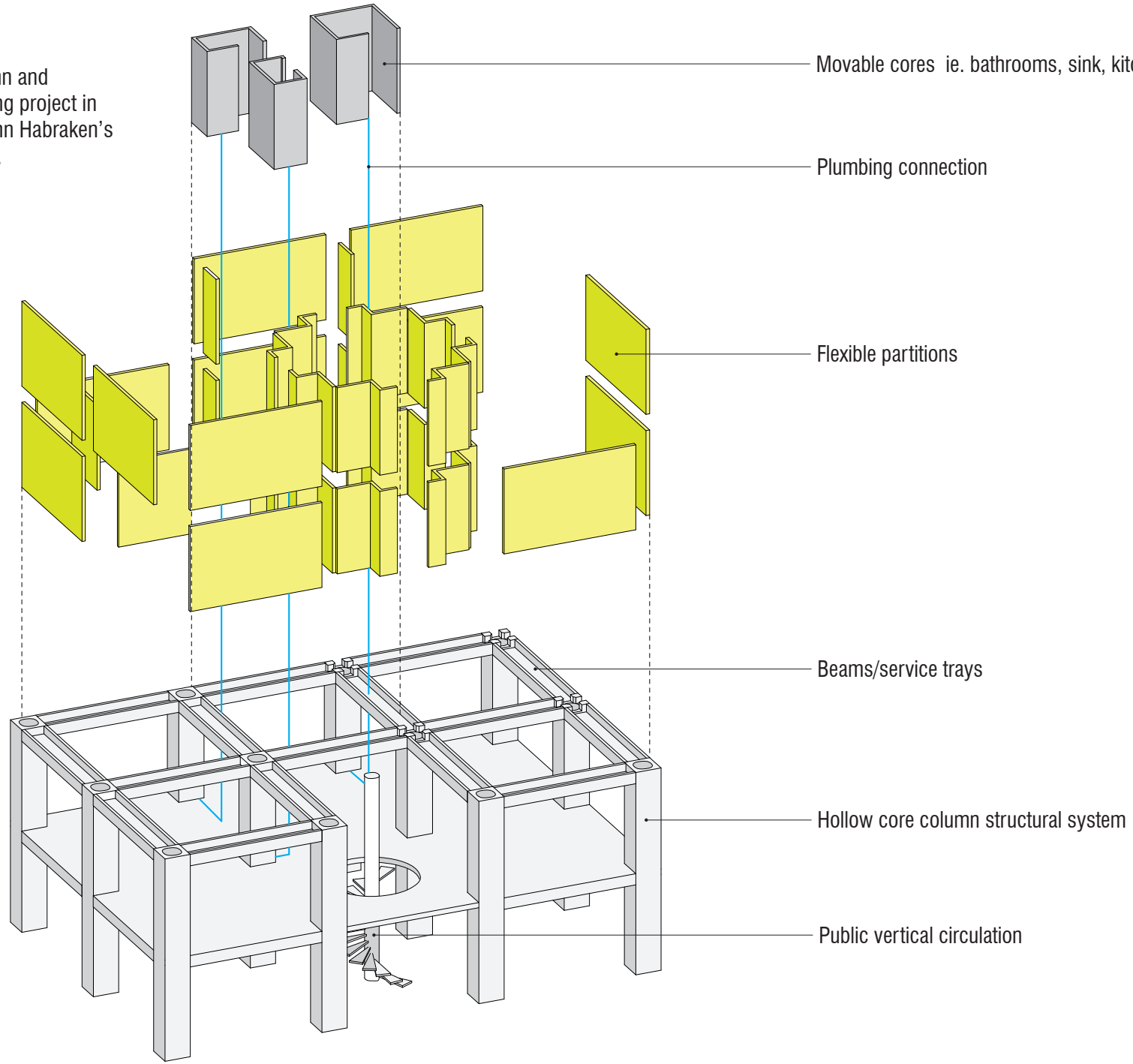
The turn of the twentieth century and the introduction of modern architecture placed new values at the forefront of architecture. There was a revived interest in social involvement and human comfort. Demands of modern life led to increased spatial movement of people and a smaller household size. People were constantly migrating--part of an ever-changing, rapidly industrializing world. Architects sought to respond to these new human conditions by allowing occupants to have more control over their built environment--particularly in the home. Le Corbusier, Walter Gropius and Buckminster Fuller all attempted to use new design theories and technologies to design for rapidly evolving households. Examples of built works with an interest in adaptability include Weissenhofsiedlung in Germany and Corbusier's mass-produced housing including the Maison Voisin and Maison Citrohan.

The second World War only heightened the architect's interest in designing for change (Schneider). Mass-produced, industrialized housing became more prominent in the United States. In 1942, the "New House 194X" competition called for the involvement of numerous renowned architects in the design for revolutionary housing. Many of the entries, including SOM's house, featured adaptability as the primary design solution. Modular design was now a possibility and its potential was beginning to be tapped.

The 1960s were a time of great social change in the Western World and ideas of empowerment and democracy permeated the field of architecture. A growing number of housing projects and competitions showed an interest in participatory design. This process placed emphasis on the client and users rather than the architect. In most cases, a client's preferences would have a direct influence in the design process (Schneider). While user participation does not necessarily involve flexible design, many architects chose to incorporate flexible spaces and elements into their work. In 1969, John Habraken revolutionized adaptable design through his publication "Supports: an alternative to mass housing" by arguing for the separation of elements in construction. This shifted mass-production's focus from the home as a combination of spaces to the home as a combination of mass-produced systems ie. wood frame structure, plumbing, etc.

Today's most innovative adaptable housing projects can be seen in the numerous designs for disaster relief housing and temporary shelter. These structures are inherently flexible because they are required to adapt to unknown and changing conditions (Schneider). Prior to a disaster, it is not known what types of people and families will be in need. Thus, these temporary shelters are important examples of contemporary flexibility.

Exploded axonometric of Kohn and Maurios' Les Marelles housing project in France (1975) illustrating John Habraken's new theory of flexible design.



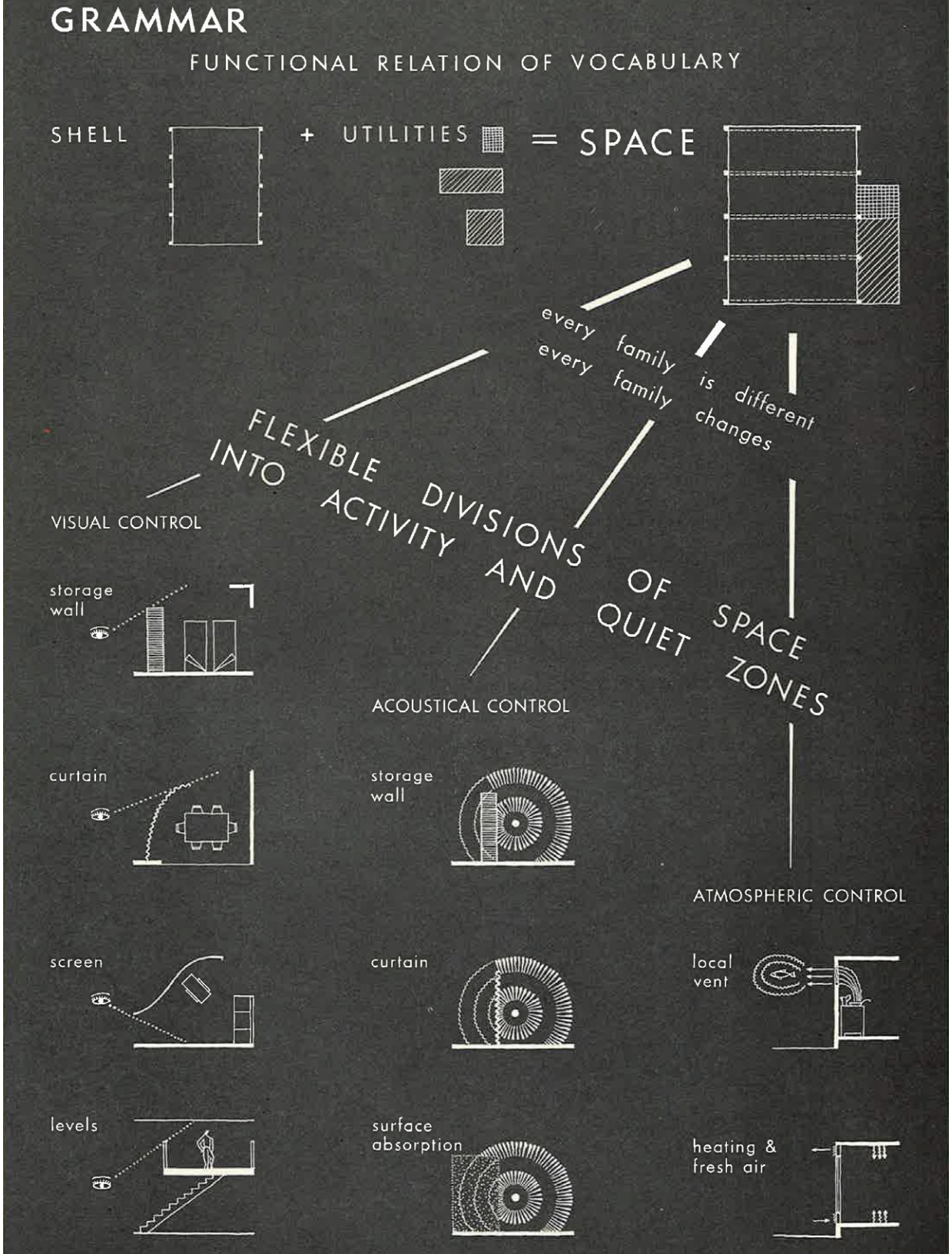
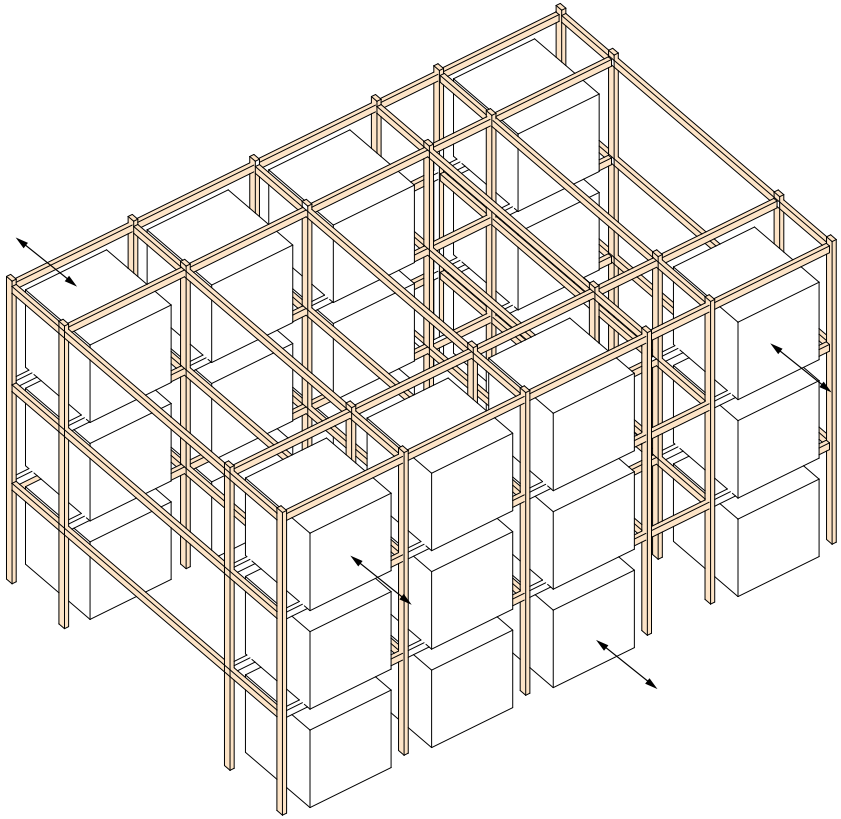
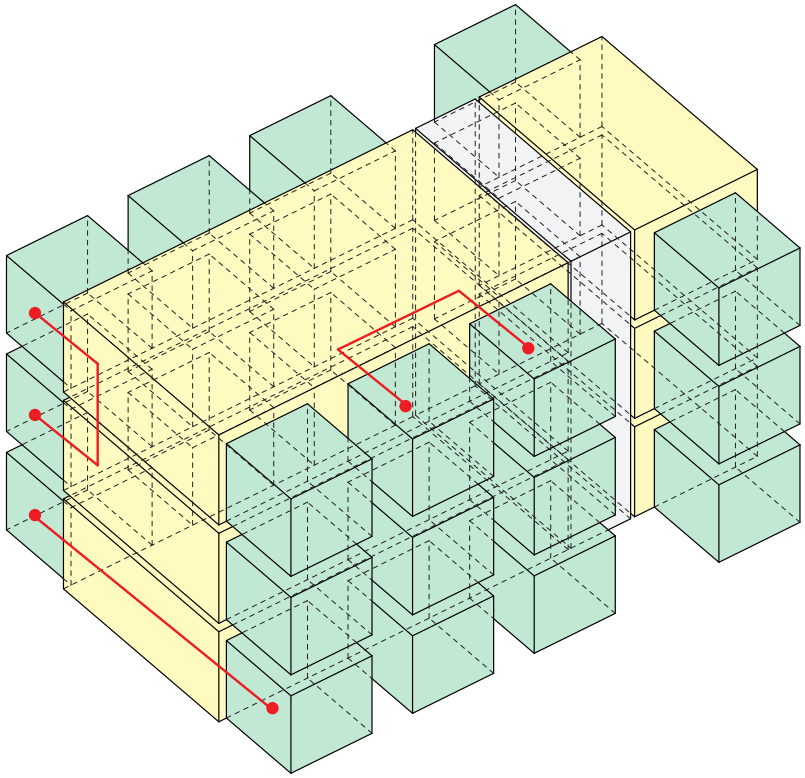


Fig. 3
"Grammar" - The New House 194X
Skidmore, Owings and Merrill.
1942
pg. 108, "The New House 194X." The Architecture Forum.
September 1942





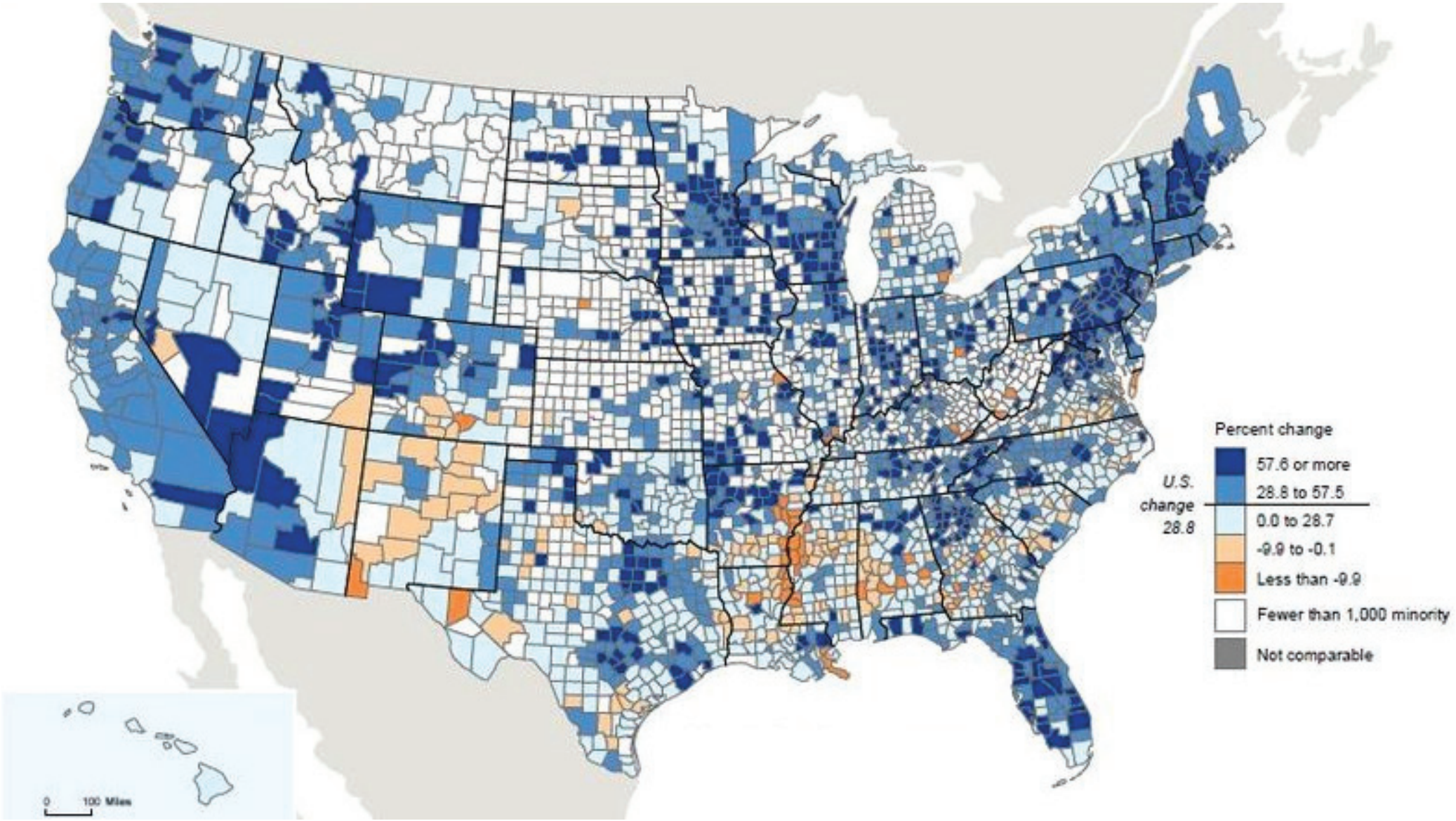
Diagrams of the contemporary adaptable project domino.21 by J.M. Reyes (2004)

EVOLVING DEMOGRAPHICS, HOUSEHOLD TYPES

“Housing professionals must make a concerted effort to investigate the needs and resources of a much more diverse household population if they wish to take advantage of, rather than suffer from changes in, the demographic context.”

- Martha Farnsworth Riche

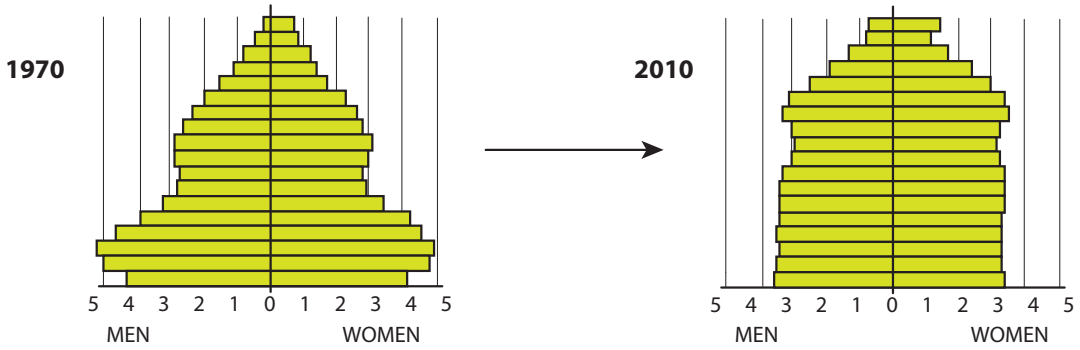
Percent Change of Minority Population



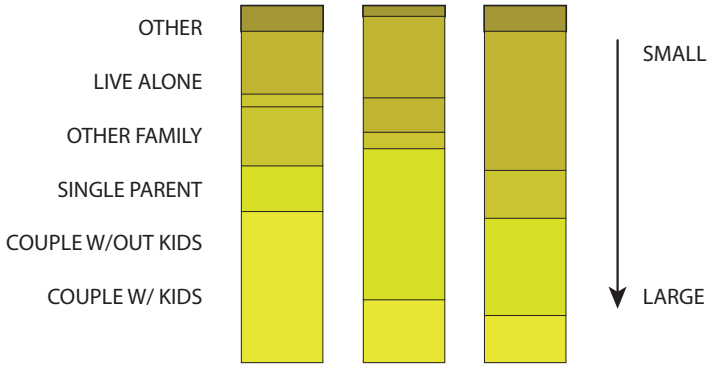
(Map and Source Data: US Census Bureau <http://blogs.census.gov/2011/03/24/race-and-hispanic-origin-and-the-2010-census/>)

FUNDAMENTAL SHIFTS IN U.S. DEMOGRAPHICS:

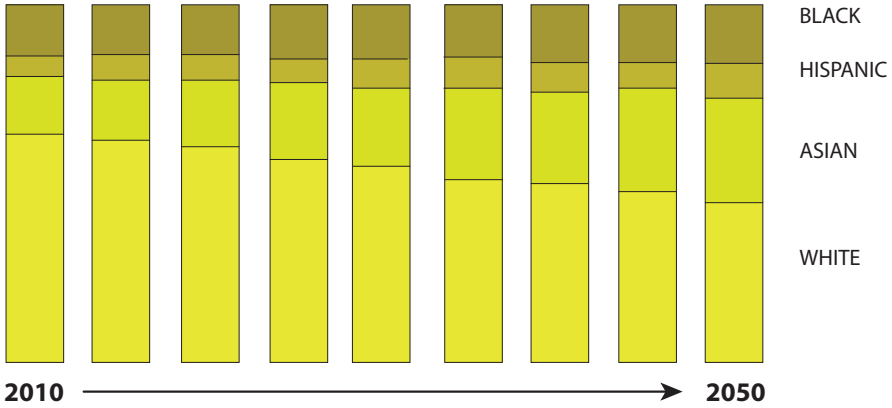
1. Increase in the Middle-aged and Elderly



2. Shrinking Household Size



3. Increase in Minorities and Non-traditional Households



RESULTING AFFECTS ON HOUSEHOLD

Increase in female independence
Increase in elderly homes
Increase in single parents

Decrease in average household size
Decrease in nuclear family

NATIONAL TRENDS

Changes in demographics and household structure will reshape housing demands in the twenty-first century. In the past, trends in demographics have largely been ignored by housing professionals when it comes to design and policy. Martha Farnsworth Riche outlines the argument for stronger attention paid toward these trends. She argues there are three shifts in U.S. demographics that will have a significant impact on housing needs:

1) Increase in middle-aged and elderly
2) Shrinking household size
3) Increase in minorities and non-traditional households (Farnsworth)

While these are very commons trends throughout the nation, they are not necessarily occurring everywhere. Areas that are most likely to see these changes are those that are urban. Rural counties may in fact see the opposite. Nevertheless, on average, the changes require significant changes in design methods. Syracuse, as an urban area, is a strong example. In conclusion, Farnsworth offers advice to housing professional on how to deal with changing population:

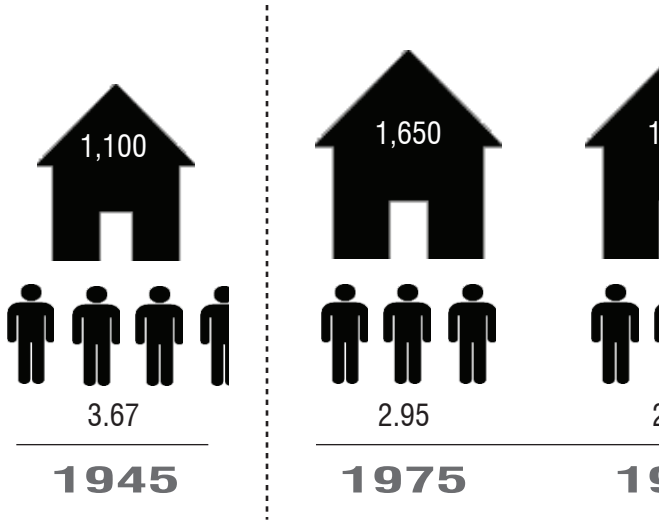
1) "Discover what growing household segments really want from housing" (Farnsworth Riche 144). Along with demographics, housing preferences are changing as well. It is imperative to pay attention to the desires of these increasing populations. For example, post-child families will have different values than those still raising children.

2) "Investigate household composition for each minority group." Designers of the past largely ignored the housing requirements and/or preferences of these groups simply because they were not significant. White nuclear families were the predominant households of the past, but today's minority families are mostly comprised of extended families or disconnected families ie. single-women headed households (Farnsworth Riche 144).

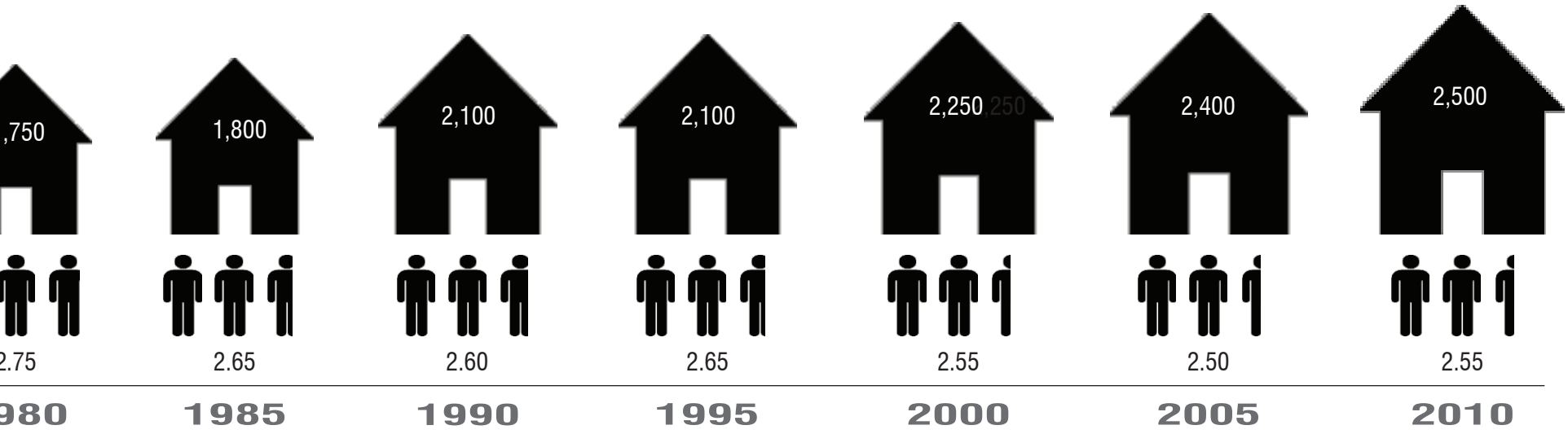
3) "Develop an understanding of the relationship between household income and household composition." Traditional families typically have higher incomes and therefore different needs than, for example, single-headed female households. (Farnsworth Riche 145). It is important to recognize these distinctions.

Shrinking Household Size VS. Increas

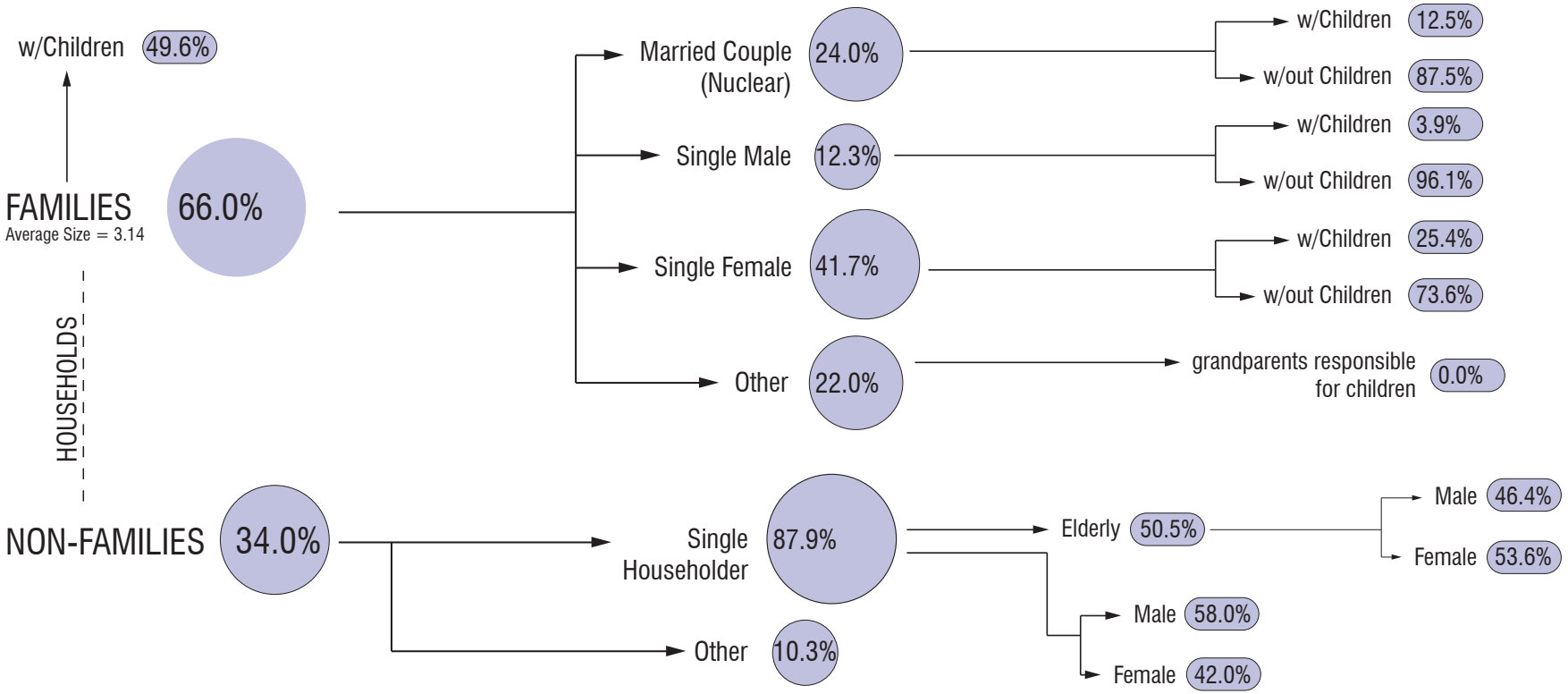
(Data Source: US Census Data)



sing Home Size



UNITED STATES DEMOGRAPHICS, 2010



AGE: 0-18 40.8% ----► Households w/ children under 18 47.0%

19-64 46.1%

65+ 13.1% ------► Households w/ adults over 65 30.4%

LOCATION OF HOME 1 YEAR PRIOR:

Same 83.4%

Different 16.6% → Different State 3.2%

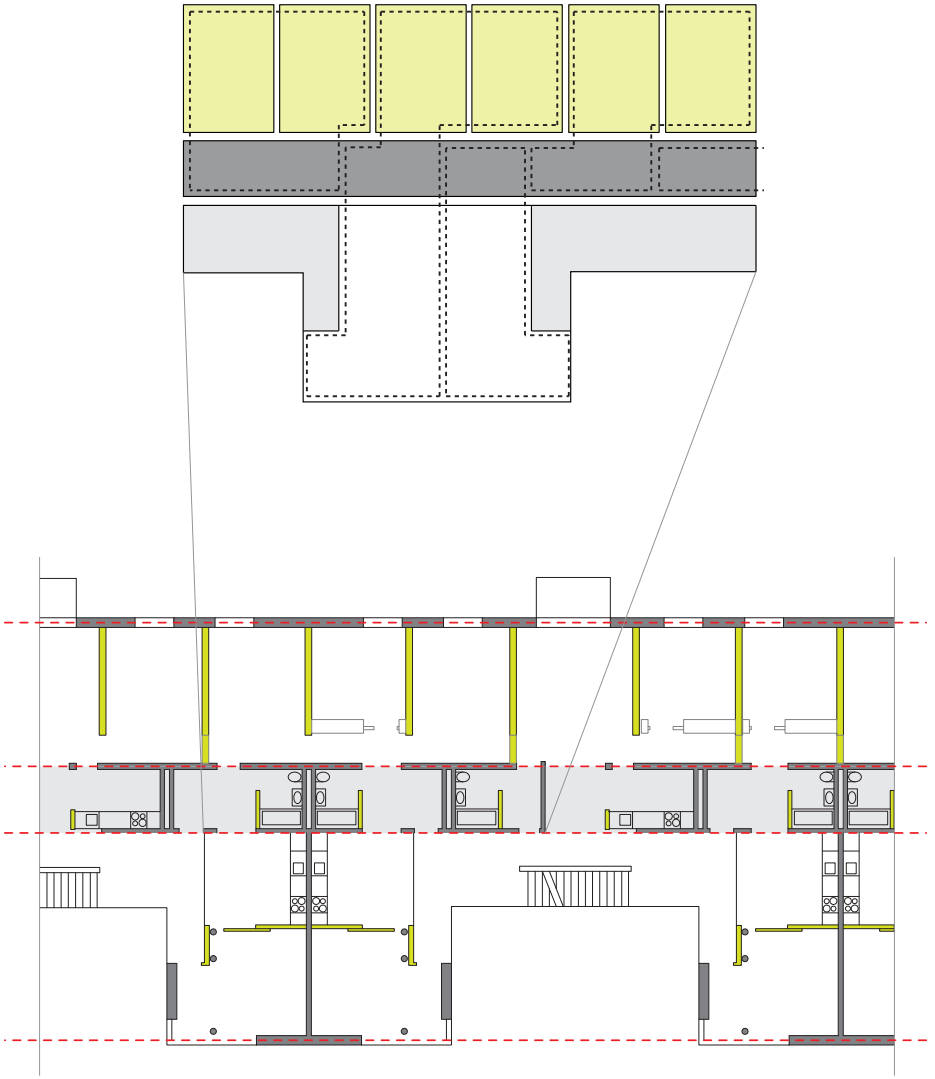
Different 16.6% → Abroad 0.0%

(Data Source: US Census Data)

DIVERSE ACCOMMODATION AND INCLUSIVITY

Zurich, Switzerland

UBERBAUUNG HELLMUTSTRASSE ADP ARCHITEKTUR (1991)



Dwelling Units	30+
Unit Types	one room apts.
	multi-room apts.
	studio apts.
TARGET GROUPS	Families
	Couples
	Singles
	Middle-, high-income

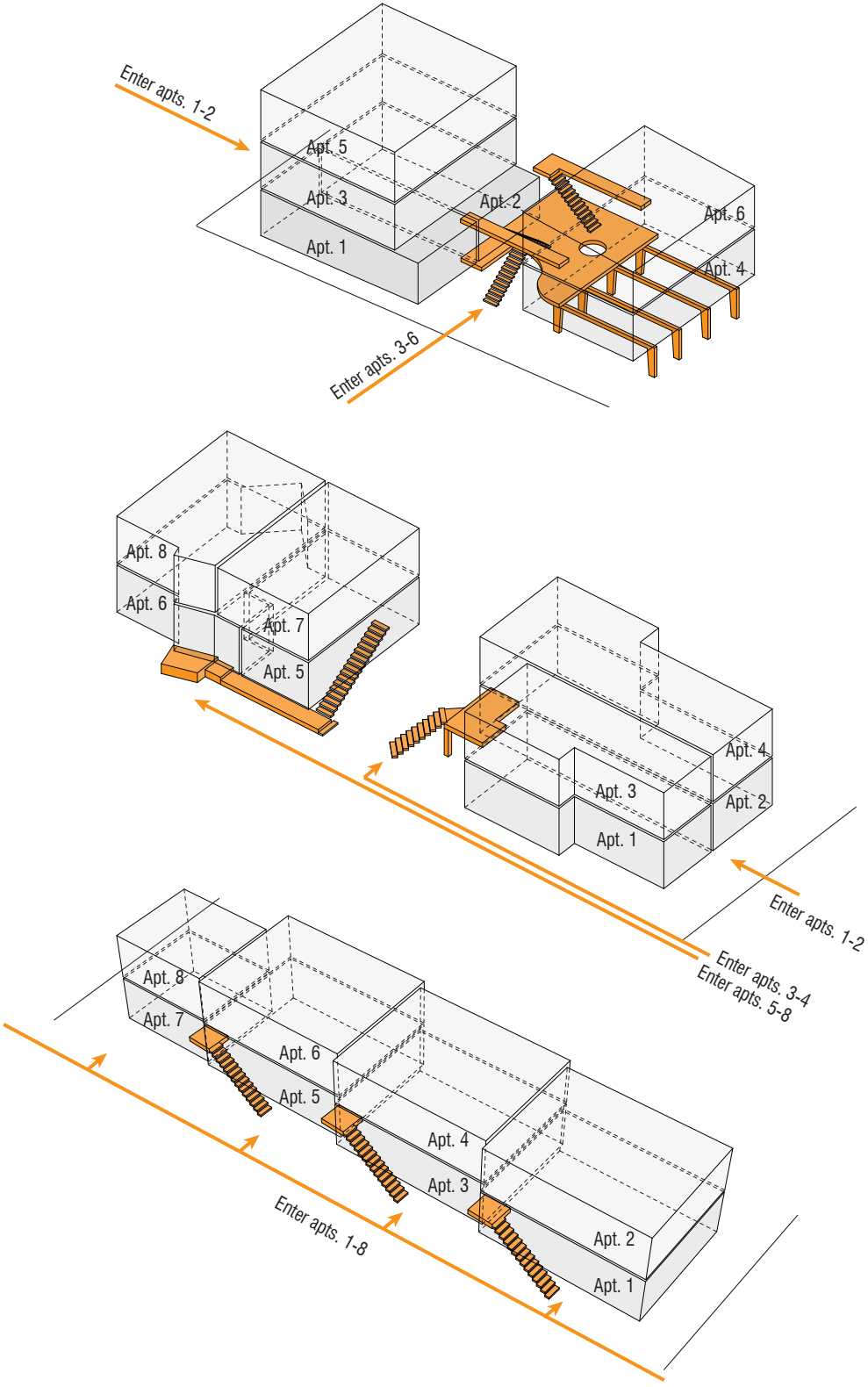

Shared stairwell
Additional living space/studio apt. option
Movable partitions
Flexible, unprogrammed space
Utility core

Santa Monica, California

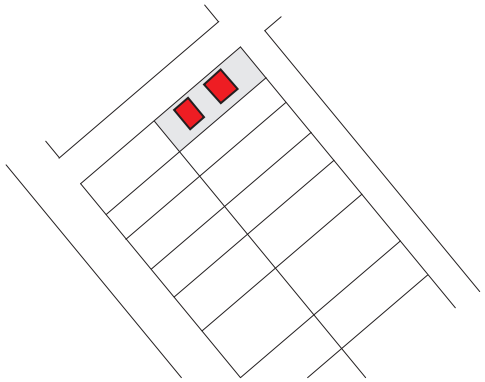
INFILL HOUSING KONING EIZENBERG (1987)

An infill strategy was employed for Koning Eizenberg's affordable housing project in Santa Monica, California. Distribution of the project on multiple sites ensured that public resistance was minimum. Initially, the architects envisioned a modular design system in which similar units could be inserted into different lot conditions. However, the extreme variety of sites and constraints made it necessary for each lot to have a unique layout.

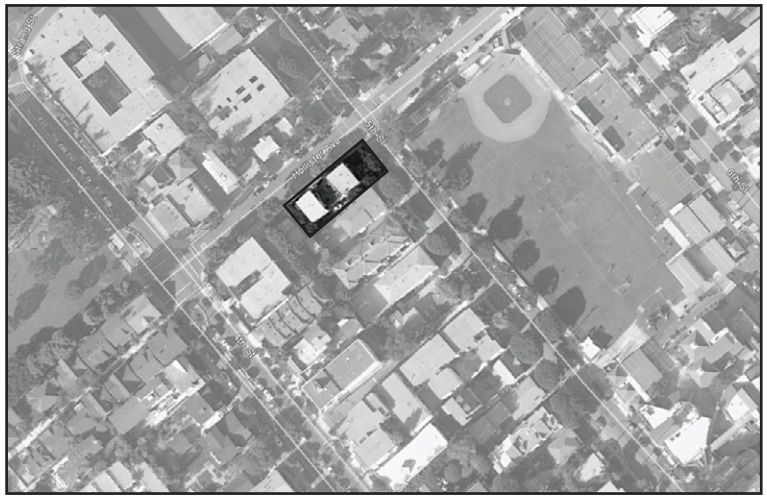
Housing on Fifth Street represents a typical corner condition, while the other two sites sit mid-block. This Santa Monica neighborhood is similar to the Danforth neighborhood of Syracuse in that both are moderately dense conditions of suburbanism with Santa Monica being slightly more urban.This project is an examplar of a new take on detached housing and housing for low-income residents.



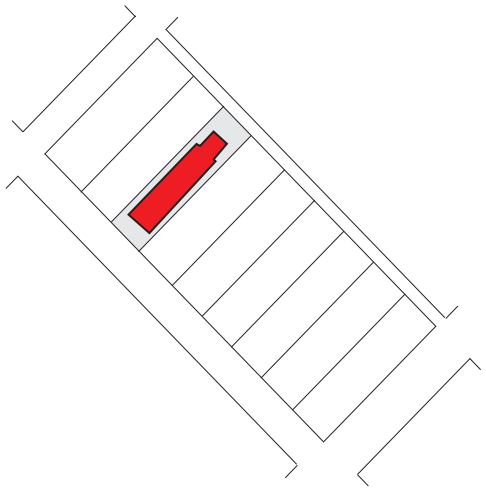
Corner condition
Multi-unit
Two buildings
Half-block depth
40’ site width



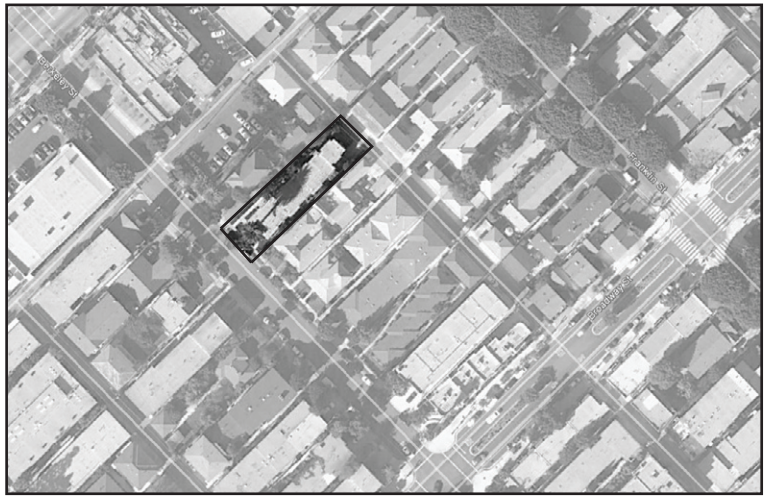
FIFTH STREET



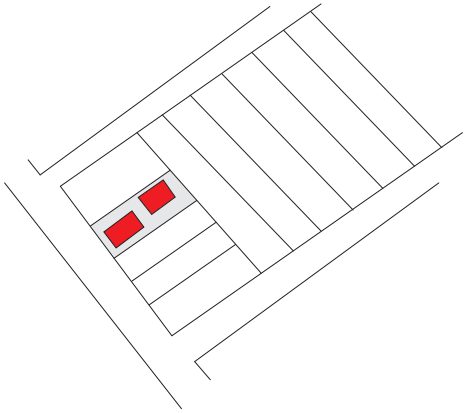
Mid-block condition
Multi-unit
Single buildings
Through-block depth
35’ site width



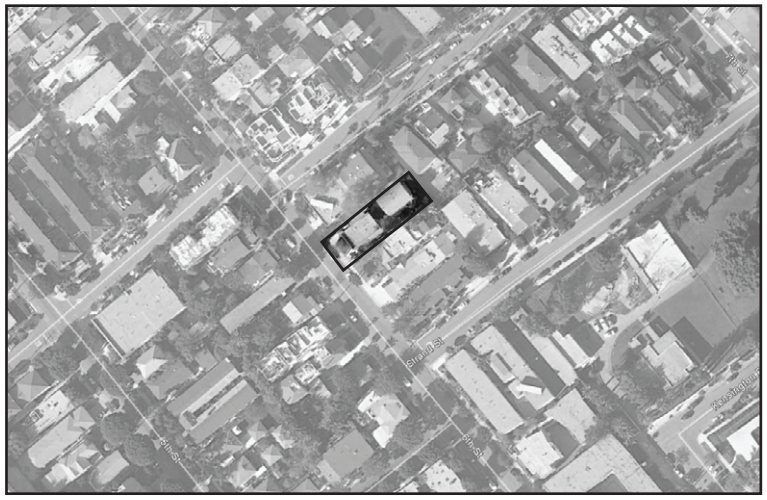
BERKELEY STREET



Short-edge condition
Multi-unit
Two buildings
Half-block depth
40’ site width

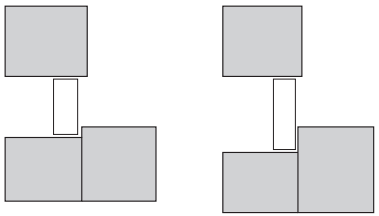


SIXTH STREET

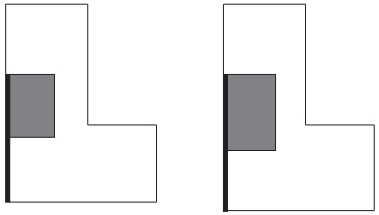


Neu-Ulm, Germany

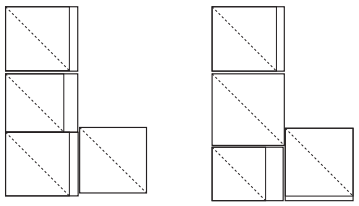
WOHNSIEDLUNG G.A.S.-SAHNER (2000)



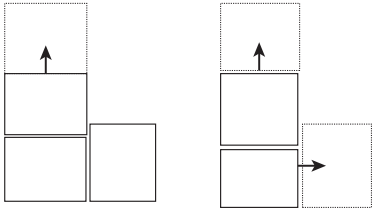
NEUTRAL FUNCTIONALITY



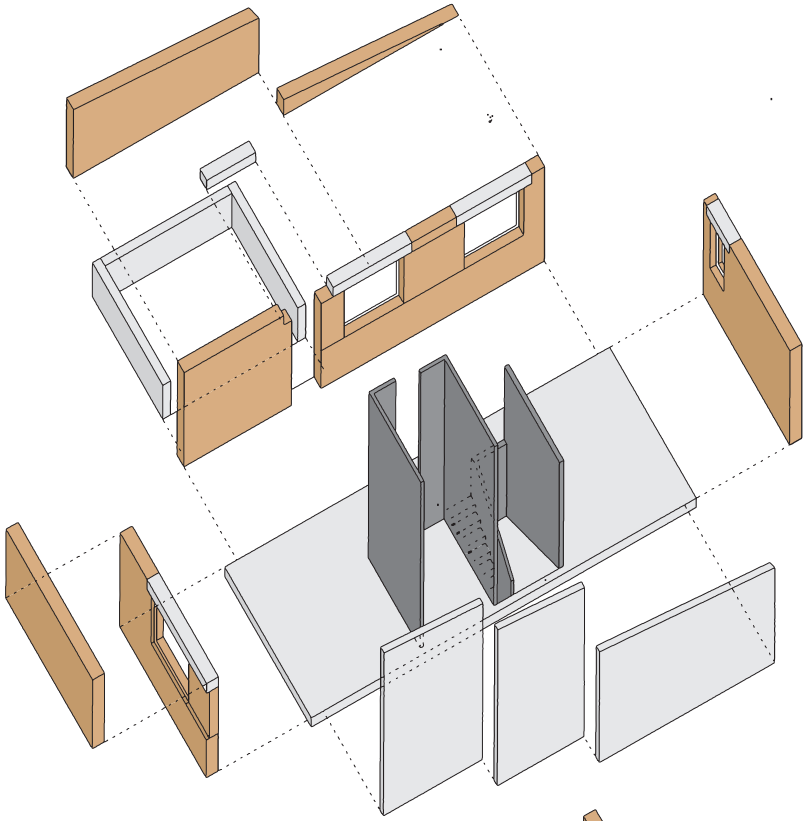
CORE AND SERVICES

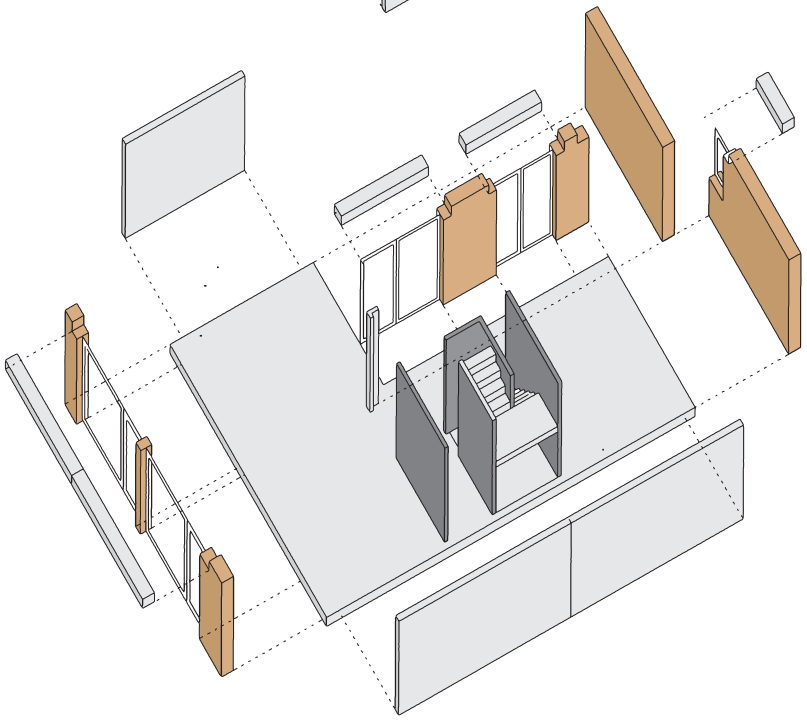


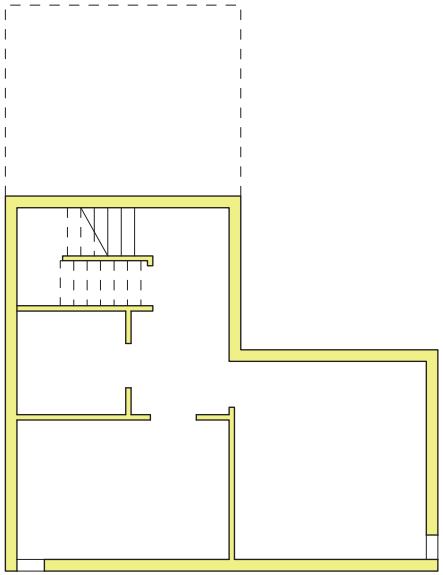
SQUARE FORM

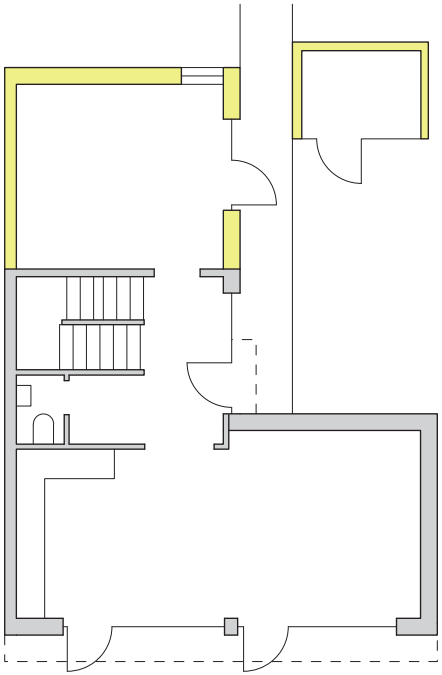


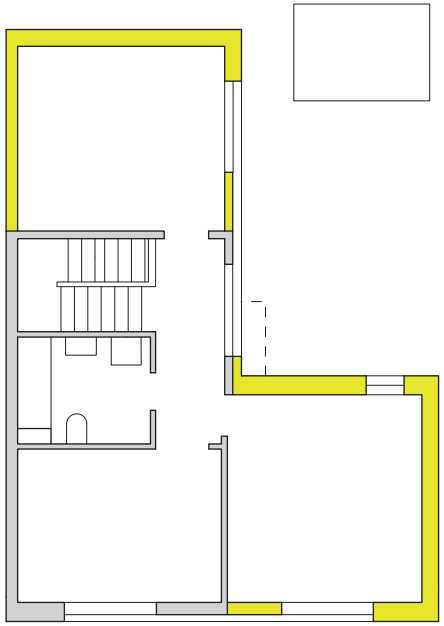
ADDITION / SUBTRACTION

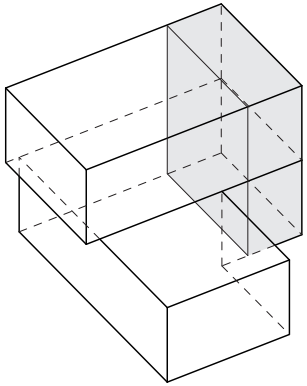


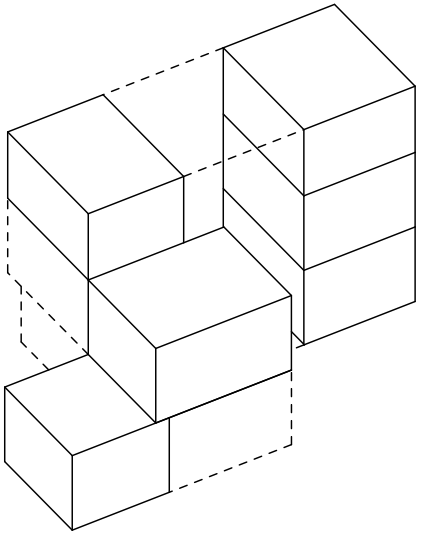


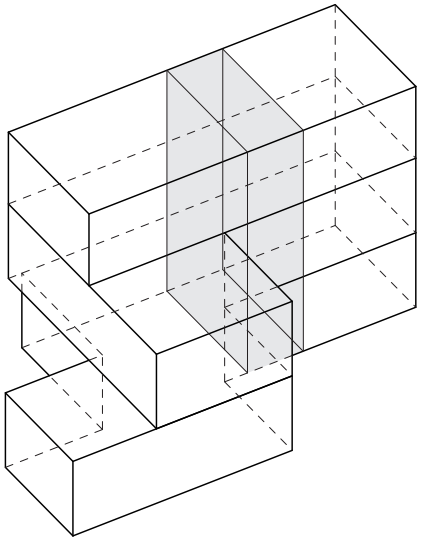












BASIC VOLUME

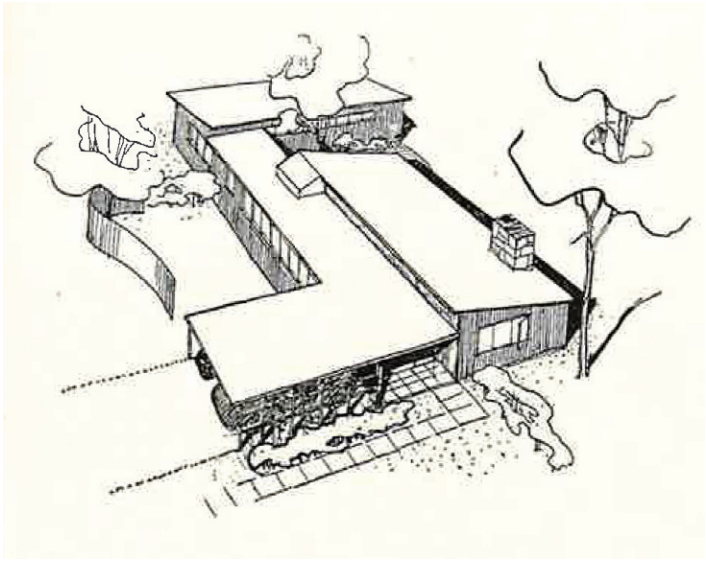
POSSIBLE ADDITIONS

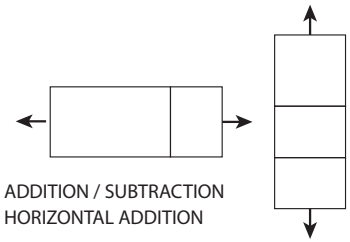
MAXIMUM VOLUME

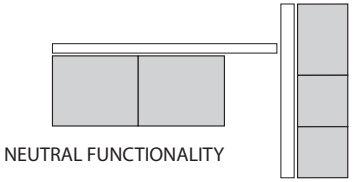
Concept

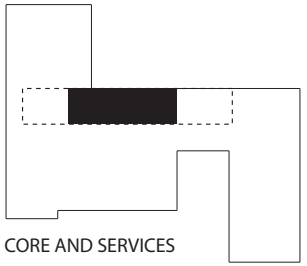
THE NEW HOUSE 194X

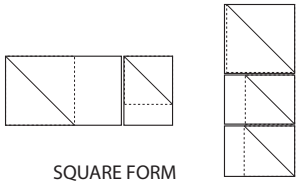
STONE, SHARP, WALBRIDGE (1942)

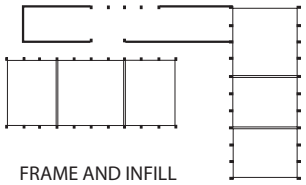


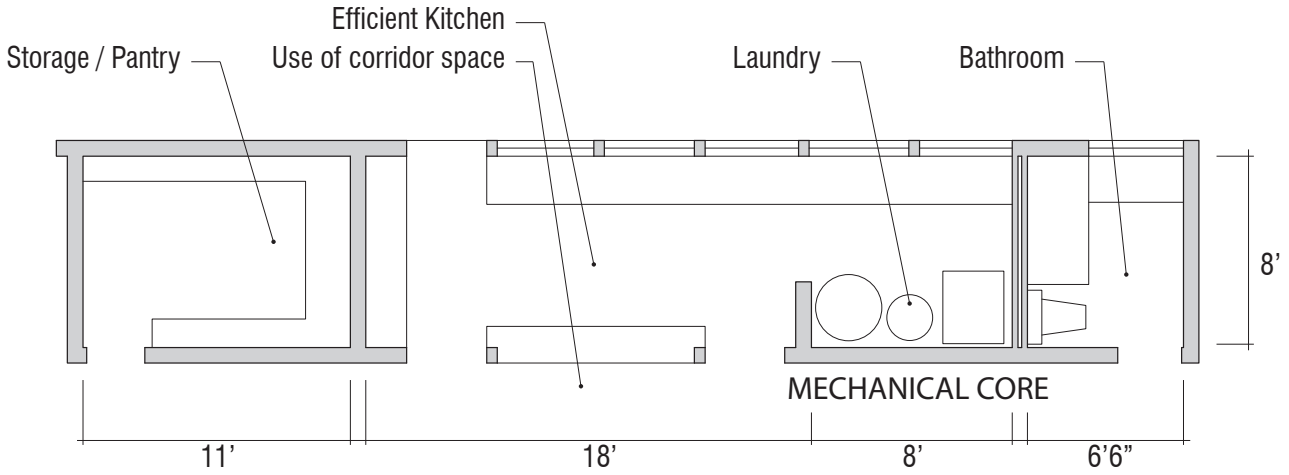


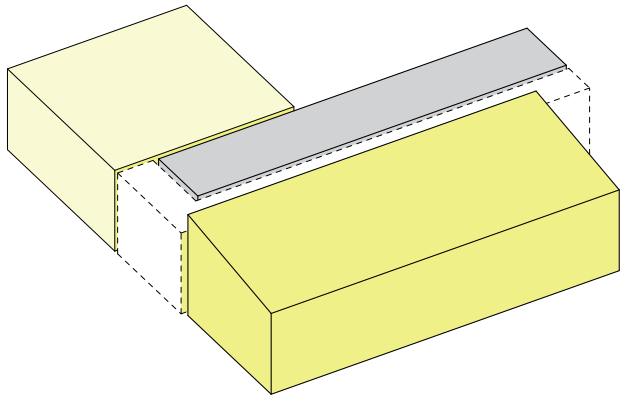


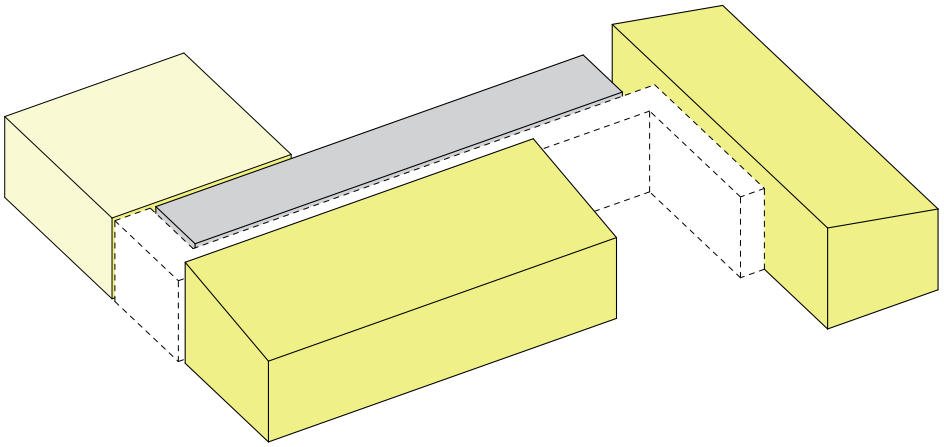


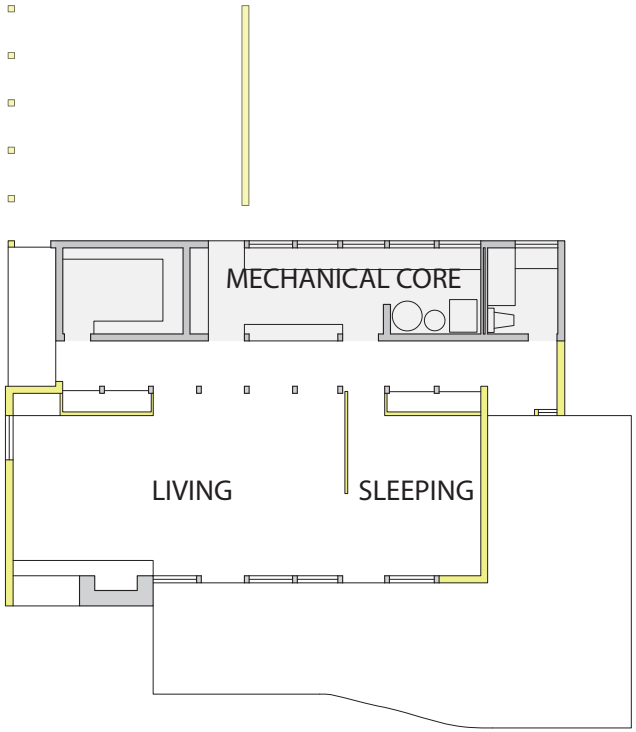


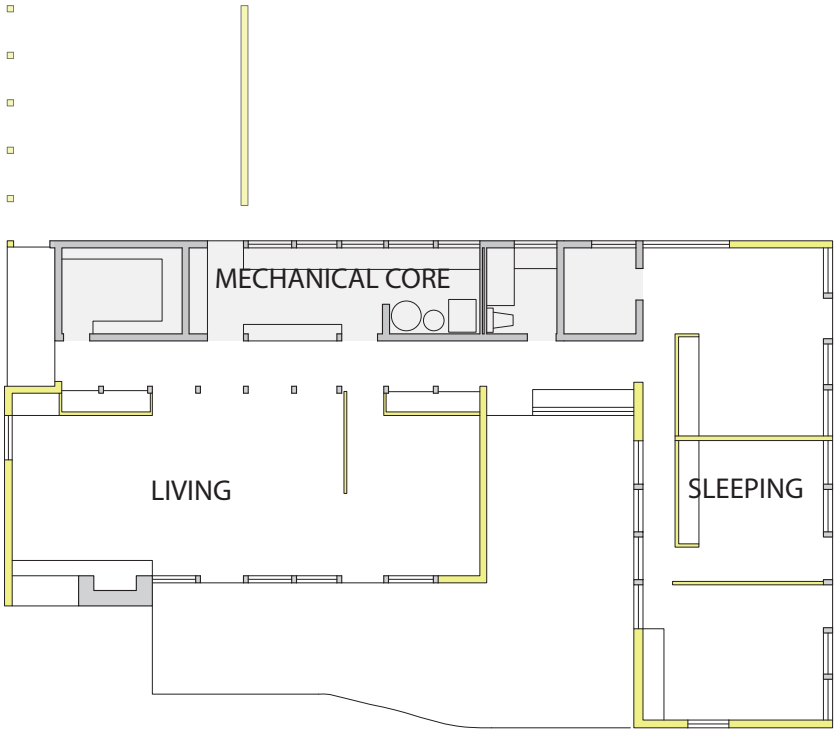






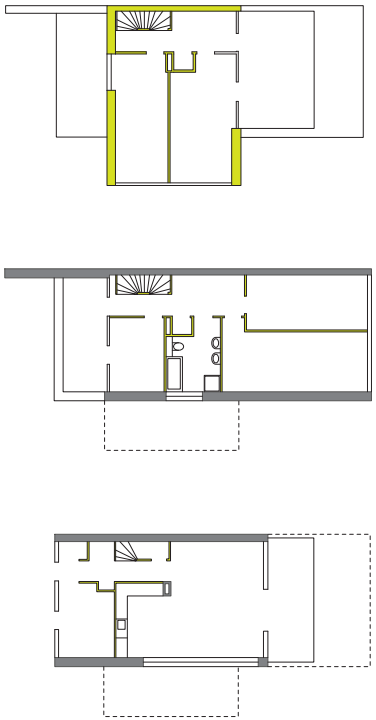


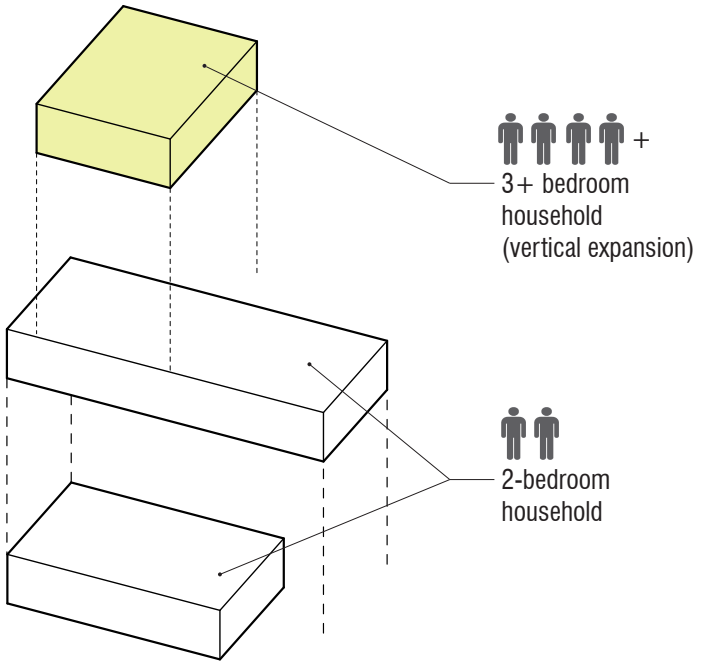

MECHANICAL CORE
LIVING
SLEEPING

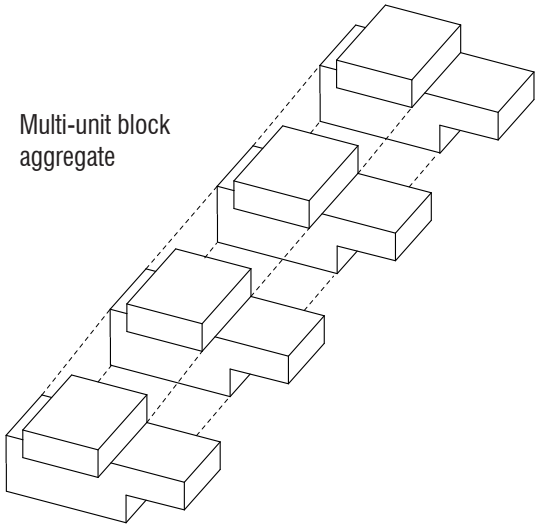

MECHANICAL CORE
LIVING
SLEEPING

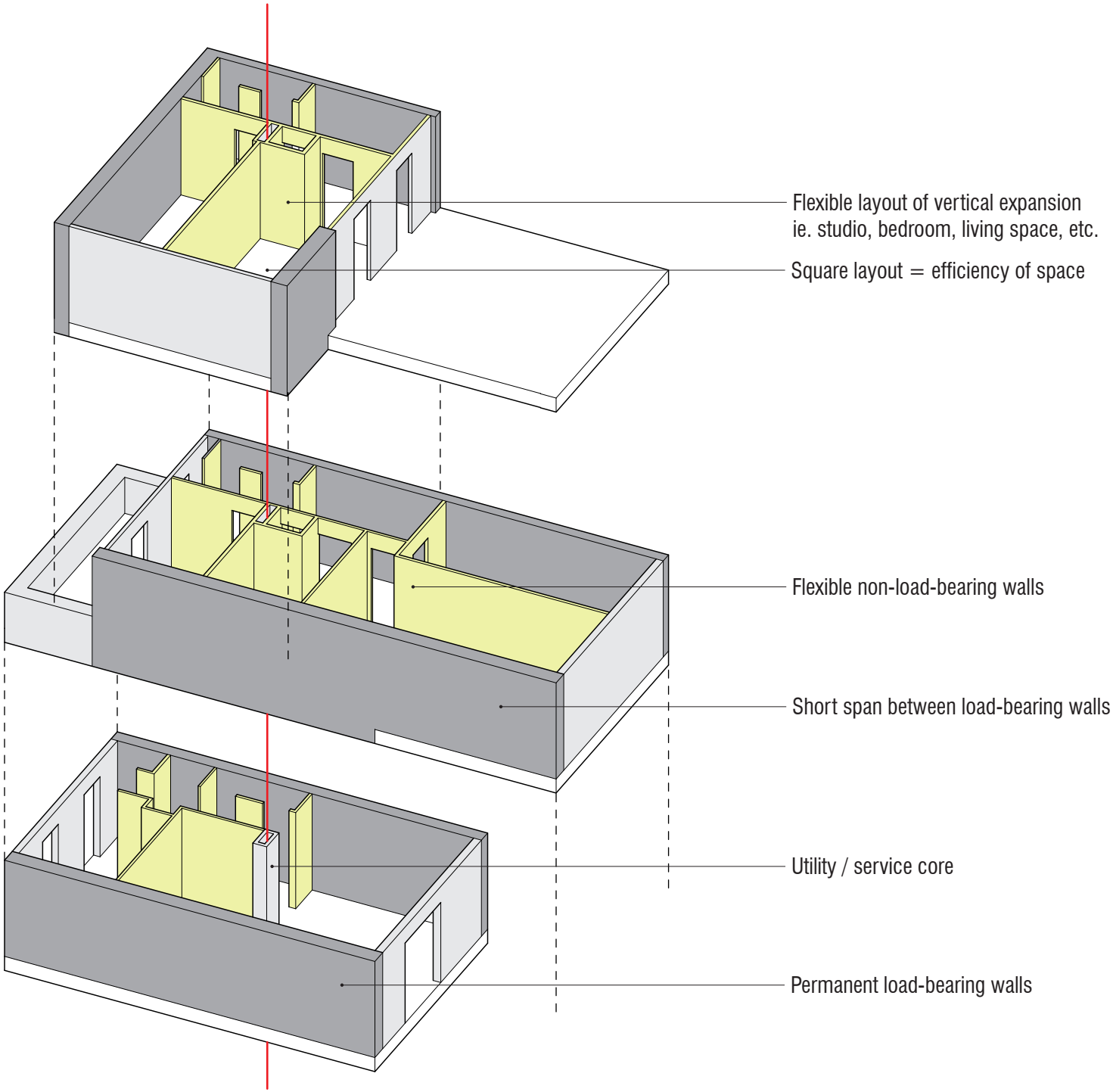
Almere, Netherlands

WATER VILLAS **UN STUDIO (2001)**








Flexible layout of vertical expansion
ie. studio, bedroom, living space, etc.
Square layout = efficiency of space
Flexible non-load-bearing walls
Short span between load-bearing walls
Utility / service core
Permanent load-bearing walls

METHODS: RESPONSIVE DESIGN

“The notion of literal adaptability presents problems when it is translated from the realm of the ideal into that of the real...” - Alan Colquhoun

FLEXIBLE CONSTRUCTION PRINCIPLES

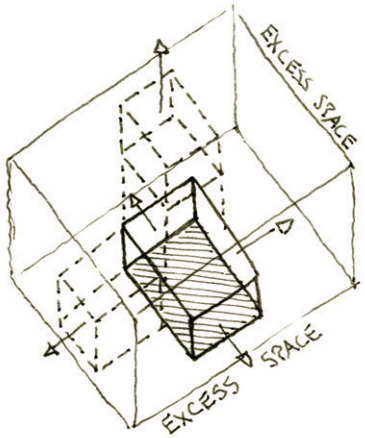
"The philosophy behind the notion of flexibility is that the requirements of modern life are so complex and changeable that any attempt on the part of the designer to anticipate them results in a building which is unsuited to its function and represents, as it were, a 'false conciousness' of the society in which he operates." - Alan Colquhoun

To understand the methods and techniques required of flexible design, one must first be aware of what creates inflexible build ings. In the most reductive sense, inflexible construction is the result of three components: the inflexible wall, the inflexible roof and inflexible services/systems. Wall systems become difficult to alter when they are loadbearing and particularly when they are of cavity wall construction which is not easy to open. When interior walls are loadbearing and spaces are designed to a specific size and program, reconfiguration requires attention to the structural system. Other walls or partitions are inflex ible simply because of their solidity and immobility in both the short-term and long-term. Expanding vertically is frequently hindered by the construction of the typical roof, supported with trussed rafters. Services like plumbing and electricity usually buried behind walls, hidden from view or inserted through framework that makes reworking their configuration nearly impos sible (Schneider 164).

Fig. x
Construction of domino.21 in Madrid, Spain designed by J.M. Reyes and students from Universidad-Empresa.
2005
pg. 17, "La experiencia [domino.21] in volucro a la madera." Boletin de Informacion Tecnica. 2005

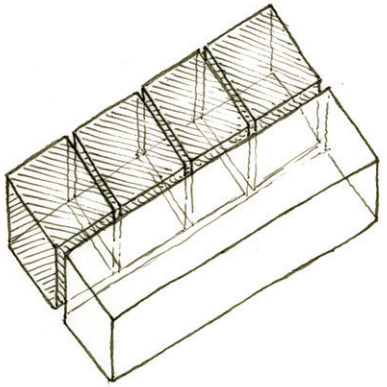
VERTICAL / HORIZONTAL ADDITION

Perhaps the most basic principle of flexibility is the ability for spaces to increase and decrease as needed. **This potential should be explored in the design phase** rather than post-construction in order to allow for simple alterations to structural and service systems. In some cases, space outside housing units may be allocated solely for expansion. This incorporation of "slack space" actively invites future changes (Schneider 185).



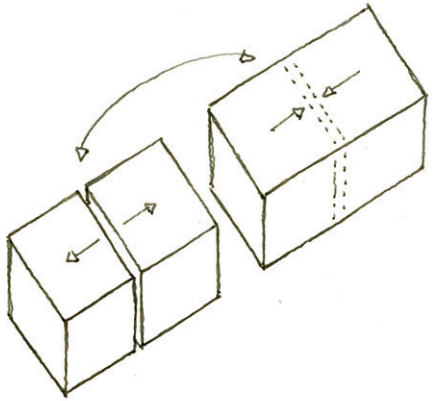
NEUTRAL FUNCTIONALITY

Avoiding labeling rooms or programming them for specific uses enables occupants to redefine spaces over time. Typically this strategy involves designing a number of **rooms at a similar scale** thus giving no clear indication of their intended use. Although this may mean providing slightly more or less space than is standard for any given room, for example a living room, occupants are more likely to experiment and use spaces for a variety of traditionally unrelated activities.



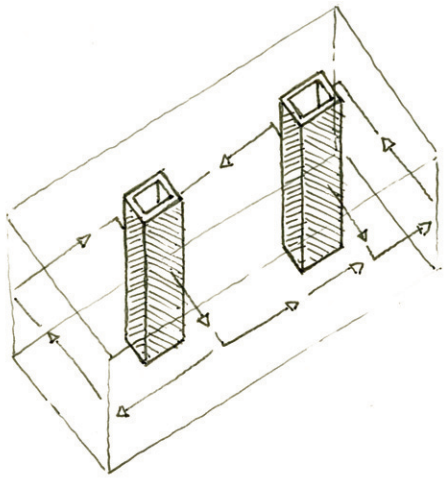
JOINING & DIVISION

Joining and dividing spaces is critical for both single-family dwellings and multi-dwelling buildings. It allows for expansion and contraction of space as well as the ability for rooms to 'change ownership' in the case of multi-dwelling housing. This method need not be limited to the horizontal plane and projects that are **flexible in three dimensions typically offer the most options for adaptability**.



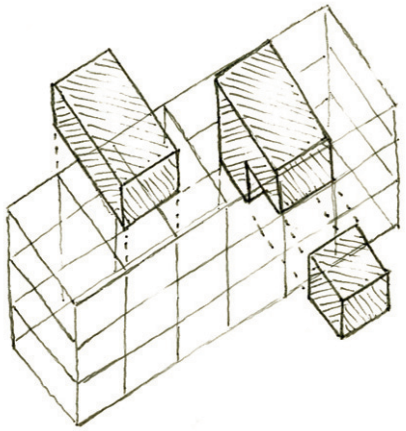
CORE VS SERVICE DISTRIBUTION

Location of the core is a critical element in determining the flexibility of a building. It is the most permanent of all components therefore it requires a position that allows it not to be intrusive to living space. **The core is directly linked to service distribution.** Services should be configured in such a manner that they are organized near more permanent elements (like structure) while still maintaining the ability to be easily altered in the future.



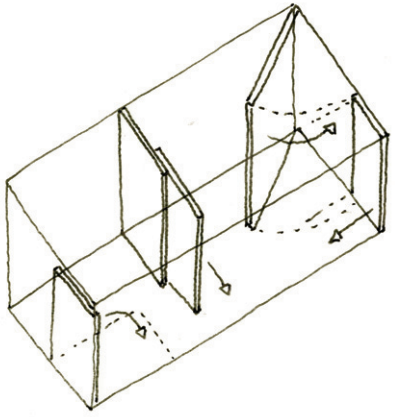
FRAME SYSTEM & INFILL

Frames are responsible for providing the support of a structure and a skeleton for the attachment of services. **The frame should not overdetermine the spatial infill** of a project and partitions, services and external walls should all be separate. “Although the word frame suggests a column and beam construction, the generic principle of the frame can be adapted across wall-based constructional systems, as long a one keeps a **separation between the permanent structural elements and the flexible infills elements**” (Schneider 192).



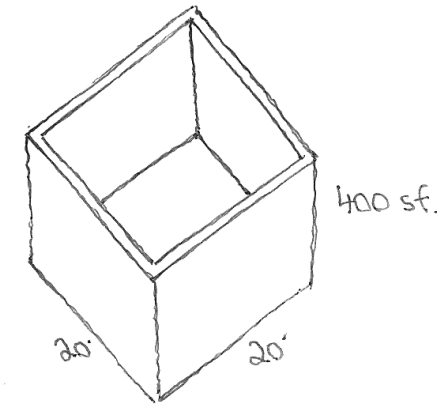
TRANSFORMABLE / EXCHANGEABLE PARTITIONS

Moveable partitions inherently fall into the category of ‘hard flexibility.’ While it is the most common approach to flexibility it can also be the **most limiting**. Generally speaking, these partitions are most successful when paired with other methods of flexible design. (Schneider 190). Nevertheless, elements like sliding doors and screens can greatly **increase the spatial configurations** of a home and allow rooms to be used for numerous different uses.



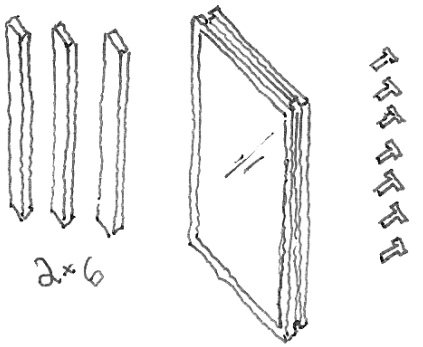
FORM

An efficient form is perhaps the most important early design criteria for affordable design. By nature, **square volumes** provide the most amount of interior space for the least amount of wall space. In other words, one can get the **most amount of square footage for low-cost wall construction**. Square volumes also allow for simple configurations of space and the potential for additions.



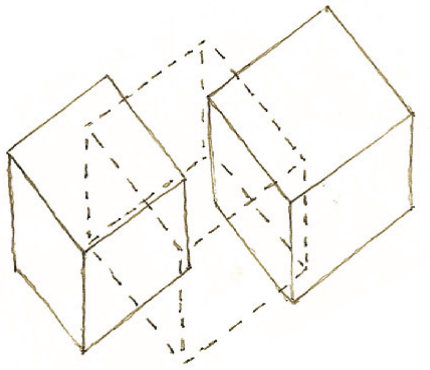
STANDARIZATION

Standarization of all building components limits the cost of costruction. This involves anything from standard size windows and doors to typical 2x6 wood frame construction. Customization in construction, material and components can drastically increase costs. Generally, wood framing no longer than 2x6 and materials like asphalt shingles, painted sheetrock and plywood are affordable components.



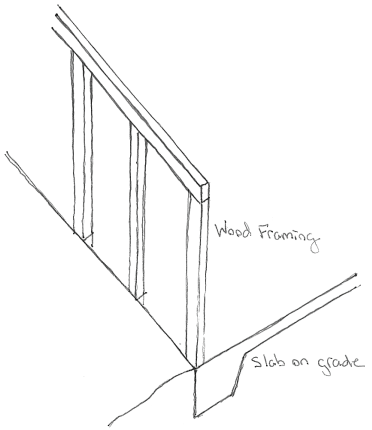
MULTI-FUNCTIONALITY

The flexibility of spaces and their ability to be used for **multiple household functions** allows for a more efficient home. If cooking, dining and living can be performed in the same space, the overall size of a home can be limited significantly. This method relies on **careful consideration of program configuration** and creativity on the architect's part. While it may not be common to do laundry in the same space one cooks dinner, for instance, this may cut down on overall building costs.



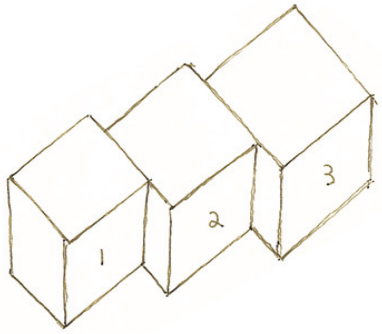
CONSTRUCTION TYPE

While generic methods of building construction can lead to the standardization of materials and components, they can also **reduce labor costs**. For example, wood frame construction is popular in the United States and the majority skilled laborers are comfortable with it. Similarly, **limiting the amount of concrete and steel components** keeps costs down. The most affordable homes are slab on grade with perimeter footings. This foundation is simple to pour and has no superfolous cellar space.



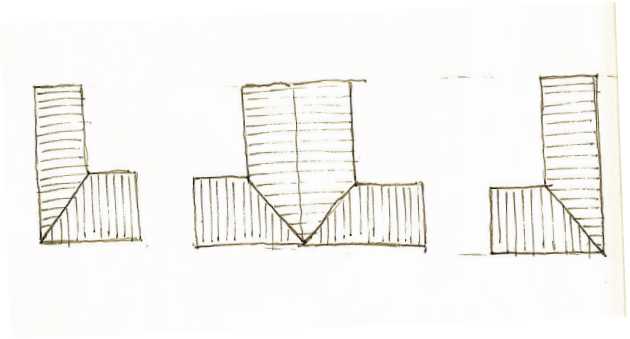
MULTI-UNIT

Detached homes may be popular among Americans, but they are inherently **inefficient and more expensive than multi-unit dwellings**. The sharing of wall space and other programmatic necessities reduces construction costs. Challenges of multi-unit dwellings are associated with the construction of identity. Most Americans desire individuality and ownership in housing.

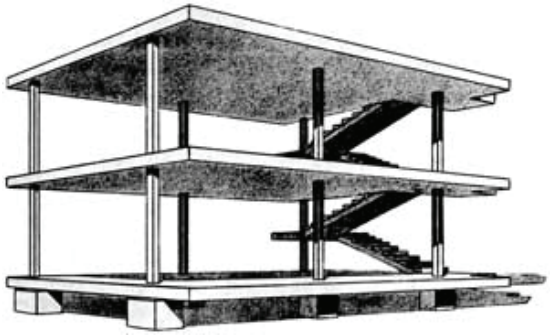


RECURRENCE

Recurrence of building type in large developments allows for a standarization of components and an efficiency of labor. Homes with **consistent rooflines and foundations** (the most expensive portions of a home) are easier and cheaper to build. Interior walls layouts may change because they are simple and fast to construct, but large members of a roof system or foundation shapes should be standardized.



SOFT FLEXIBILITY INDETERMINACY



*Tactics which allow for indeterminacy
*User adapts plan according to needs
*Designer works in background as 'facilitator'
*Demands more space and some redundancy
*Relaxed approach to technology

Soft flexibility is based on the idea that a less controlling design strategy allows for more control on the user's end. This typically results in plans and forms that are malleable and lack specific boundaries. This approach is generally more difficult for the architects as it requires them to work in the background as a facilitator. In terms of technology, soft design enables housing to "unfold in a manner not completely controlled by the foreground of construction techniques" (Schneider 8).

Soft architecture "awaits the imprint of an identity. For better or worse, it invites you to remake it, to consolidate it into a shape you can live in" (Raban).

HARD FLEXIBILITY SPECIFICITY

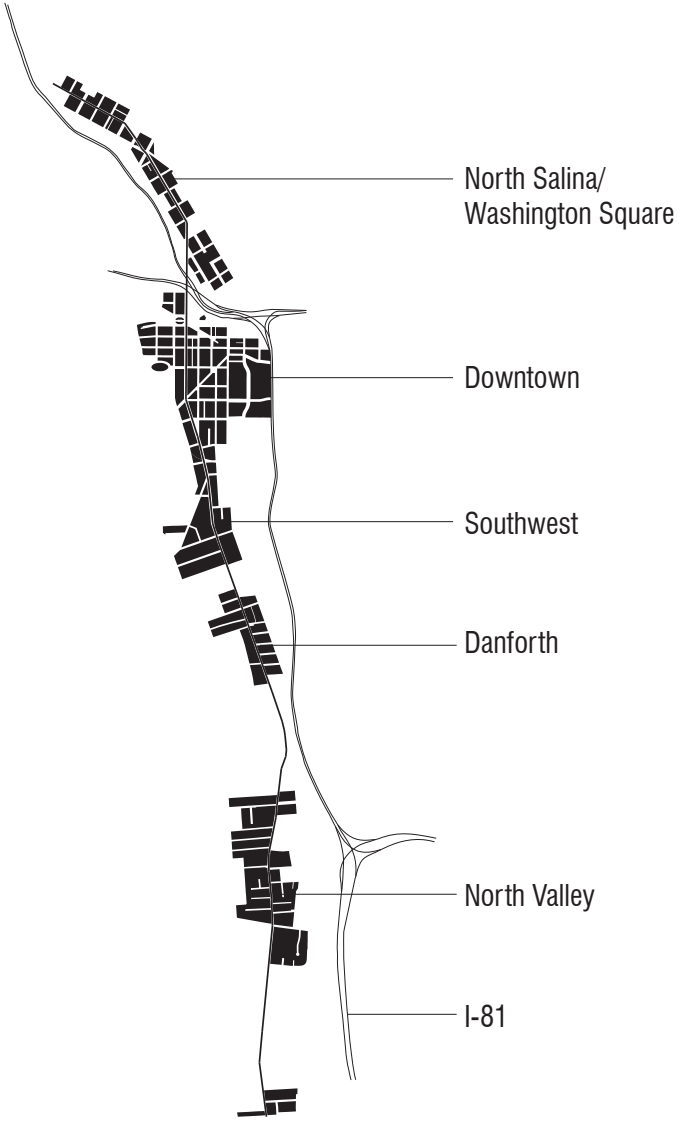
*Elements specifically determine multiple uses
*Designer works in the foreground
*Determination of spatial use over time
*Employed where space is at a premium
*Common approach of architects

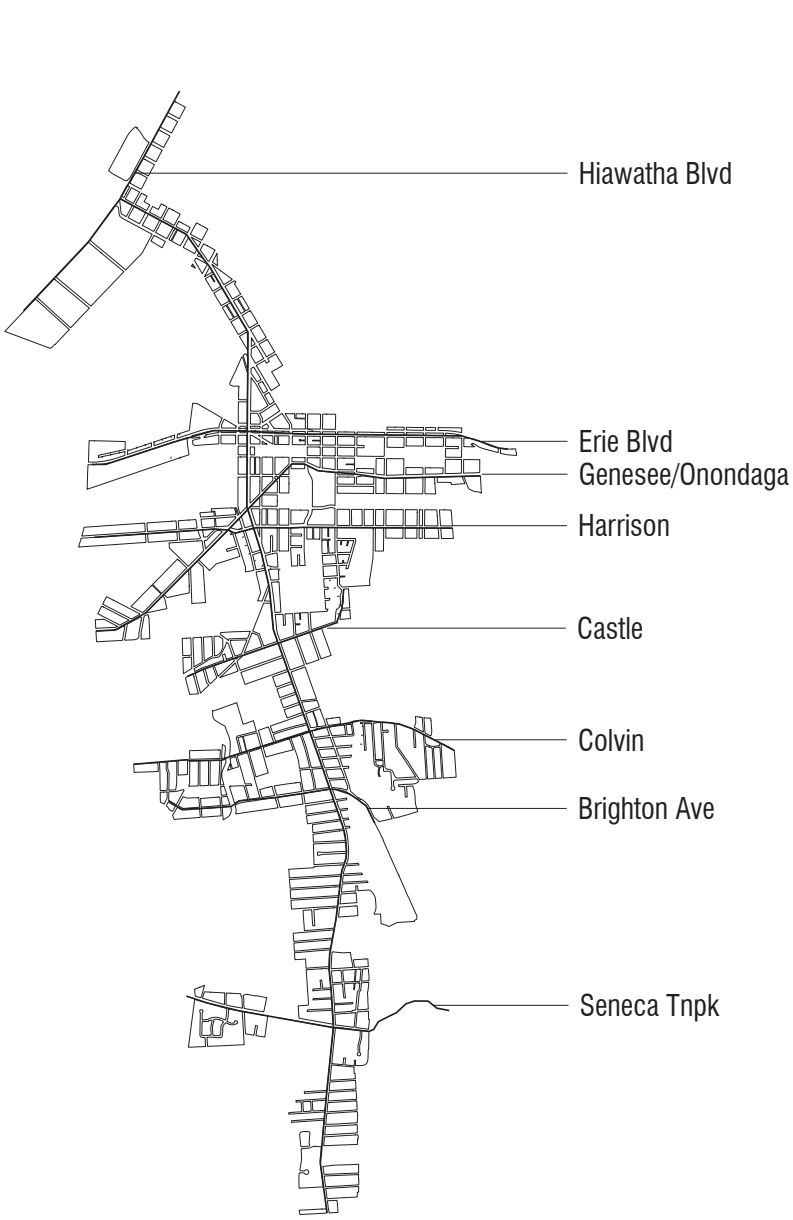
Hard flexibility is a highly determinate way to design adaptable spaces. The architect has more control over the design process and attempts to predict that way that spaces will be used over time. Common components of flexible design include moveable/sliding partitions and doors and transformable furniture. Hard technologies specifically account for transformability ie. modular systems.

The categories of hard and soft flexibility are not mutually exclusive and frequently, hard systems allows for soft, indeterminate methods to work.

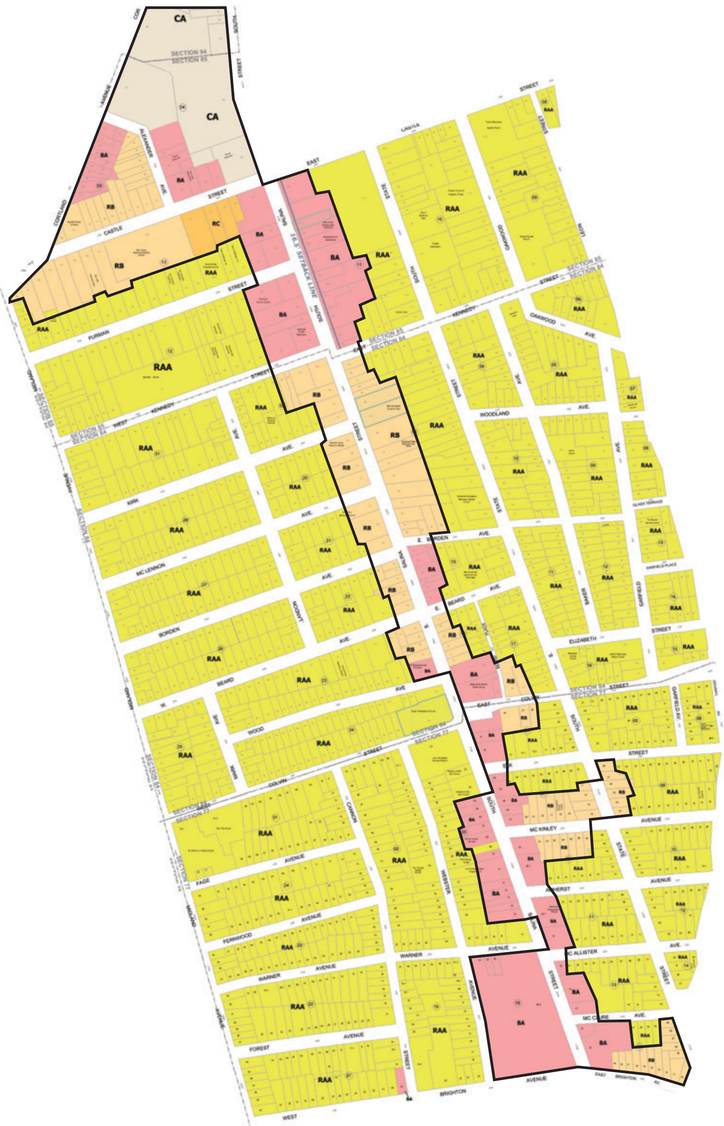
DANFORTH NEIGHBORHOOD
SYRACUSE, NEW YORK

Syracuse Vacant Property - Residential (2005)




Hiawatha Blvd
Erie Blvd
Genesee/Onondaga
Harrison
Castle
Colvin
Brighton Ave
Seneca Tnpk

Danforth Vacant Property (2011)



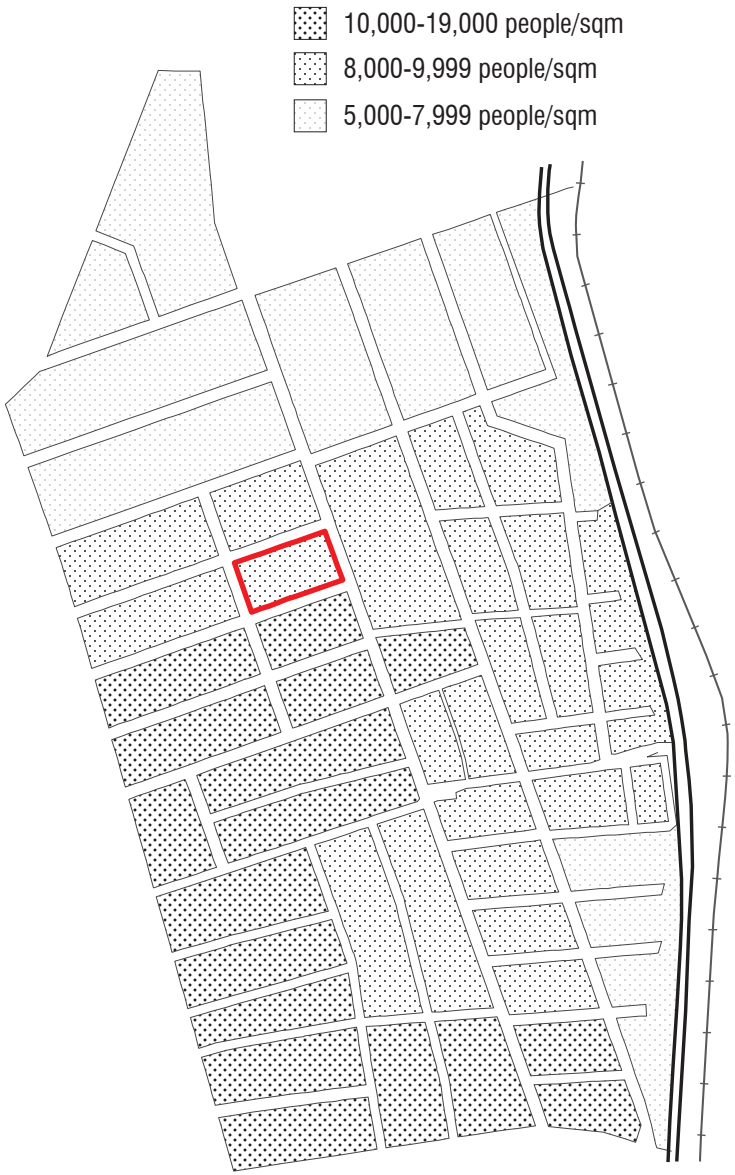
SOUTHSIDE ZONING

RESIDENTIAL DISTRICT, CLASS AA:
*Small sized lots with one- or two-family dwellings at a moderate density
*Amenities and characteristics associated with low-density residential developments
*Permitted uses: one- or two-family dwellings, churches/schools, private swimming pools, municipal buildings, firehouses, public golf courses, day care centers, private garages
*Front setback of 20’, side yard of at least 4’, min. rear yard of 20’ or 15% of lot depth
*Max. structural coverage of 30%, max. parking coverage of 35%
*Density requirements: 4000 sf min. for single-family and 2000 sf min. for each dwelling of multi-family
*No height limitations

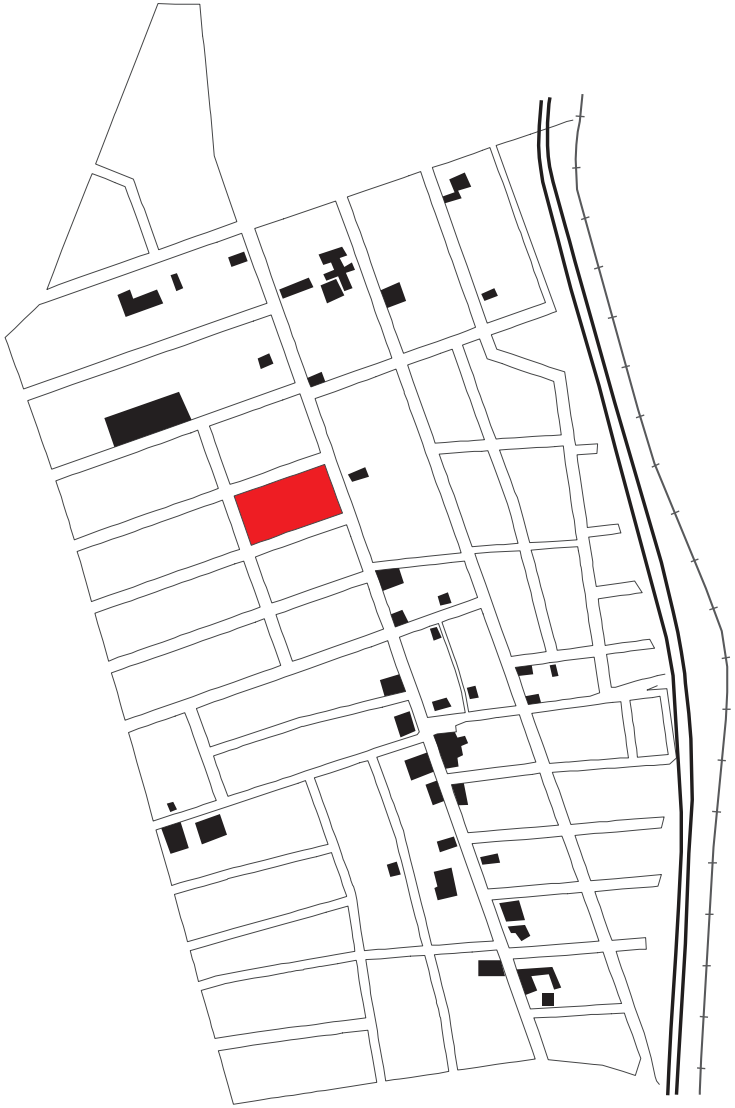
RESIDENTIAL DISTRICT, CLASS B:
*High density development for single- and multi-family dwellings
*Permitted uses: single- and two-family dwellings, multi-building and planned developments, churches/schools, private swimming pools, municipal buildings, firehouses, multi-family dwellings and apartment houses, university buildings, hospitals, institutions, parking
*Min. front setback of 10’, min. side yard of 4’, min. rear yard of 20’ or 15% lot depth
*Max. structural coverage of 30% for one- and two-family dwellings, 40% for other uses
*Density requirements: 4000 sf min. for single-family, 3000 sf min. for each family of two-family dwellings, 1000 sf min. for each family of multi-dwelling buildings

LOCAL BUSINESS DISTRICT, CLASS B:
*Intensive land development for mixed-residential, retail, service and certain industrial uses
*Permitted uses: local retail and service stores, office buildings, hotels, motels, banks, studios, galleries, public buildings, restaurants, community centers, bakeries, laundries, etc.
*Single to multi-dwelling residential buildings
*Specific requirements for adjoining buildings and frontage
*Maximum of 100% building coverage except for single-family dwellings
*Density requirements: 1000 sf min. for each family of multi-dwelling buildings

(Source Data: City of Syracuse Zoning Atlas
<http://www.syracuse.ny.us/Zoning_Atlas.aspx?ekmensel=9050e624_65_0_1680_12>)

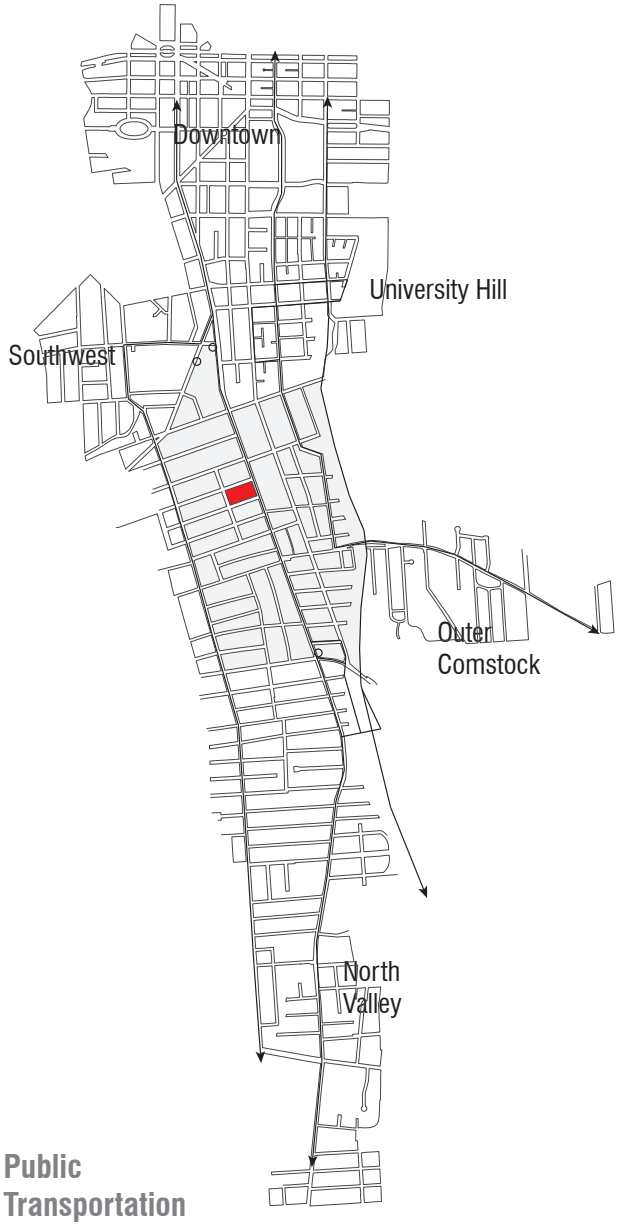


Danforth Population Density (2010)

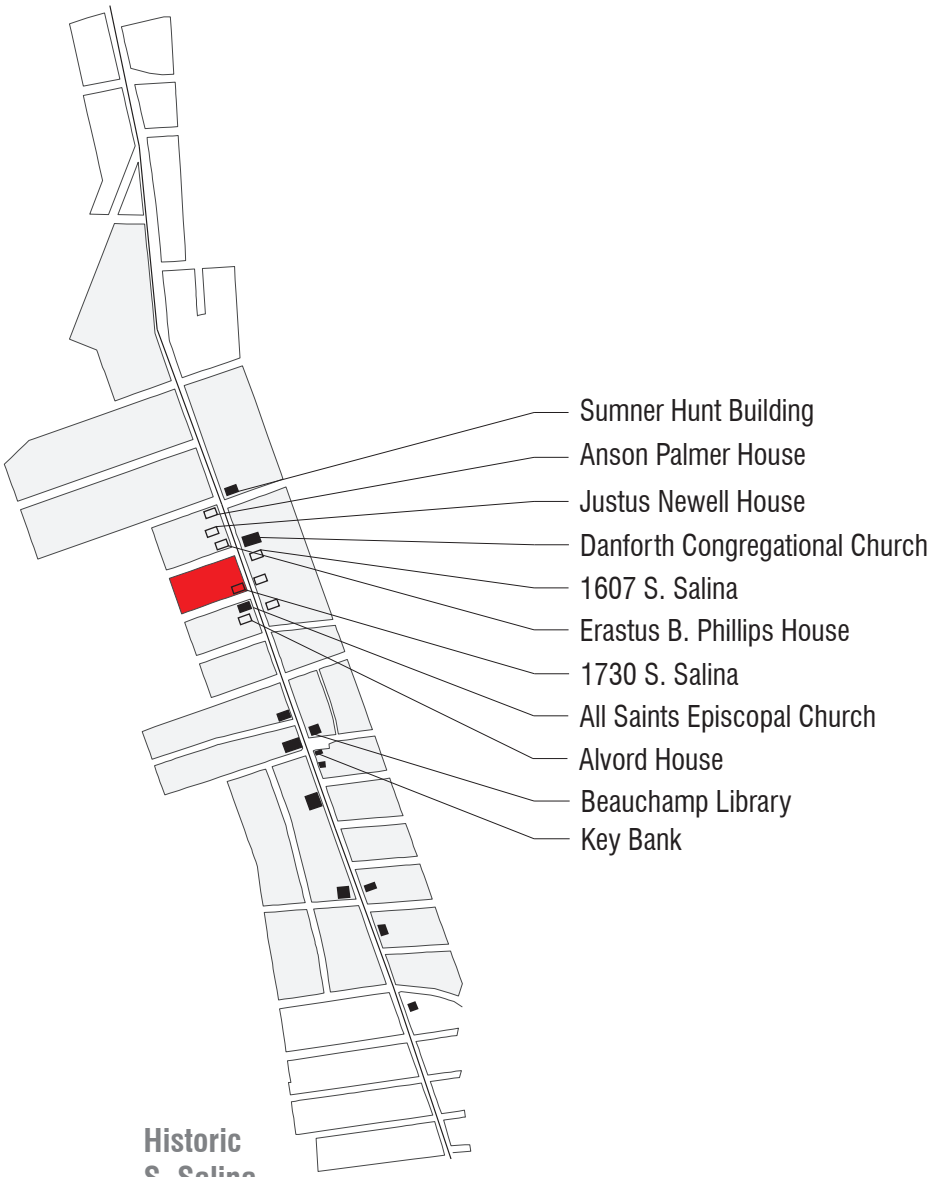


Neighborhood Services
Local businesses, markets, schools, churches, community centers, libraries, etc.

(Source Data: Maxwell School, Syracuse Community Geography
<http://www.communitygeography.org/index.php/downloadable-maps/list-downloadable-maps#Southside>)

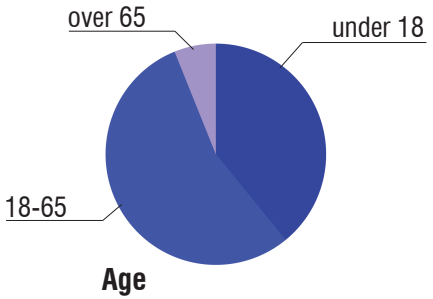


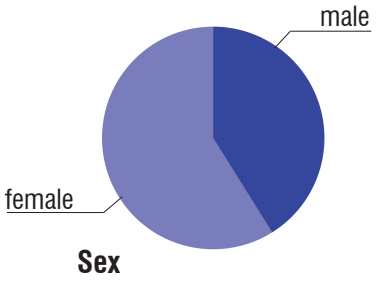
Public Transportation

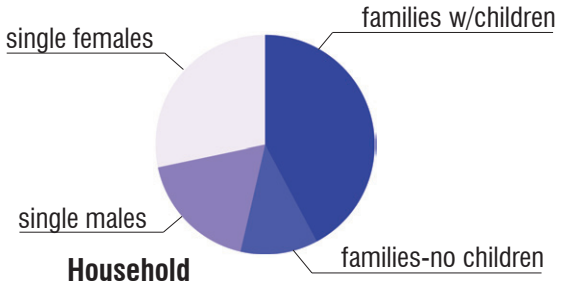


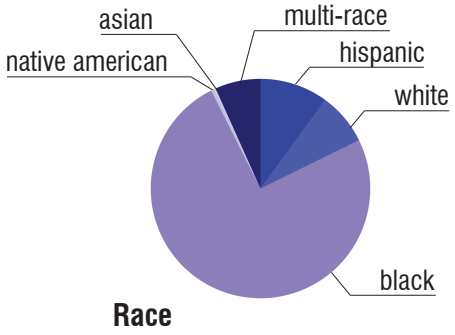
Historic S. Salina

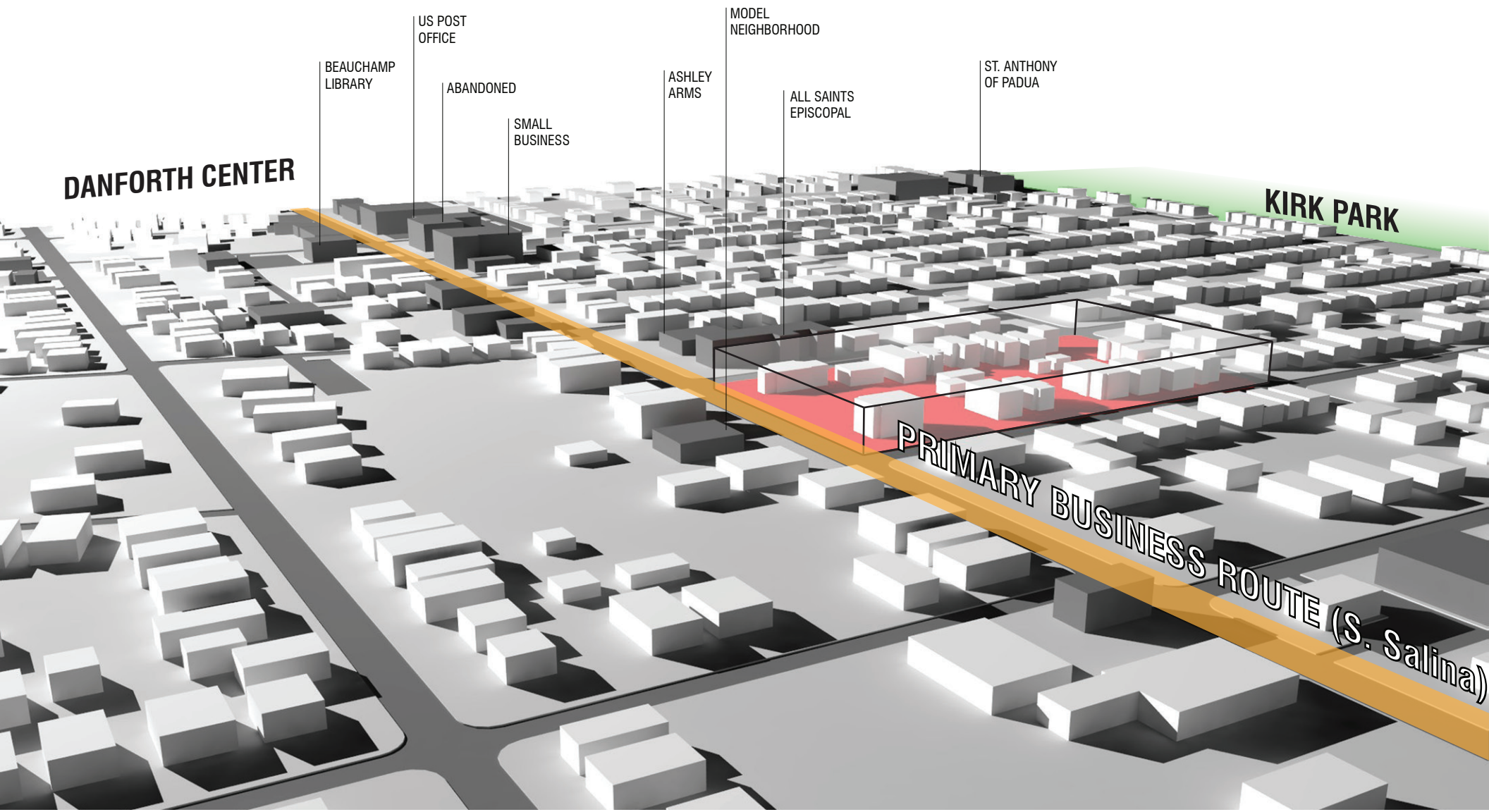
CITY QUICK DATA	SYRACUSE	USA
Population	145,170	
under 5	7.0%	6.5%
under 18	23.0%	23.7%
over 65	10.6%	13.3%
females	52.3%	50.8%
white	56.0%	78.1%
black	29.5%	13.1%
native am.	1.1%	1.2%
asian	5.5%	5.0%
hispanic	8.3%	16.7%
multi-race	5.1%	2.3%
Living in same house >1 yr	71.4%	84.2%
Foreign born	10.3%	12.7%
Non-english spoken at home	15.6%	20.1%
High school graduates	80.6%	85.0%
Bachelors or higher	25.6%	27.9%
Home ownership	41.2%	66.6%
% of units in multi-unit structure	58.4%	
Median value of owner occupied units	$83,400	$188,400
Households	56,445	
Persons per household	2.35	2.59
Per capita income	$17,866	$27,334
Median Household Income	$30,891	$51,914
Persons below poverty level	31.1%	13.8%
Density (persons/sq.mile)	5,796.8	

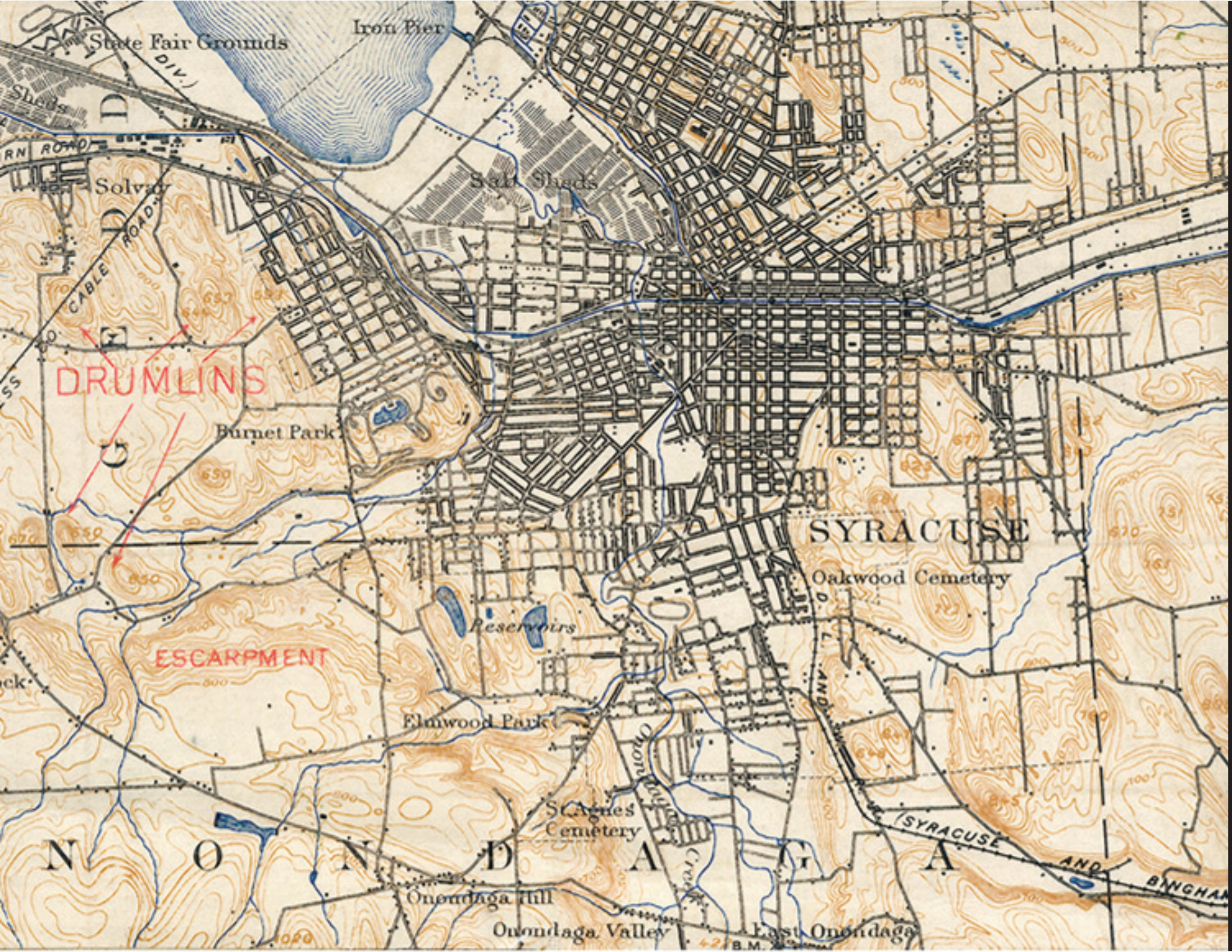









DANFORTH CENTER
BEAUCHAMP LIBRARY
US POST OFFICE
ABANDONED
SMALL BUSINESS
ASHLEY ARMS
MODEL NEIGHBORHOOD
ALL SAINTS EPISCOPAL
ST. ANTHONY OF PADUA
KIRK PARK
PRIMARY BUSINESS ROUTE (S. Salina)


State Fair Grounds
Iron Pier
Sheds
Solvay
Salt Sheds
CABLE ROAD
DRUMLINS
Burnet Park
SYRACUSE
Oakwood Cemetery
Reservoirs
ESCARPMENT
Elmwood Park
St. Agnes Cemetery
ONONDAGA
Onondaga Hill
Onondaga Valley
East Onondaga
SYRACUSE AND

DANFORTH: HISTORY

The land on which the city present city of Syracuse, NY rests was originally inhabited by the Onondagas, one of the five Native American tribes of the Iroquios Federation. Settlement of the city began during the late 18th century with the village earning its current name in 1824. The following year marked the opening of the Erie Canal which allowed for transportation connections to areas across New York state, including New York City. During the mid-19th century, Syracuse experienced rapid growth associated with its development as an important salt producer and industrial center. While salt production declined after the Civil War, manufacturing remained a vital part of the economy up until the early 1970s. The city's population had reached its peak of 221,000 by 1950 (citation). Since then, population has continued to decline although the metropolitan area remains stable.

The Danforth Neighborhood - today marked by U.S. census tract 53 - began its history as an important village along the region's north-south thoroughfare just south of downtown Syracuse. It is centered upon South Salina Street, which was, in the 19th century, the route of the Syracuse and Onondaga Railway as well as a major horse-car line (citation). The Village of Danforth was incorporated in 1874 and the following one hundred years saw the area develop as a popular neighborhood for middle-class residents - in a way, Syracuse's first suburb. However, the construction of I-81 greatly diminished Danforth's importance as South Salina no longer acted as the regions primary north-south thoroughfare.

Currently, Danforth is notable as one of several poverty-stricken neighborhoods in Syracuse. It contains a high percentage of minorities, particularly African-Americans. Existing poverty combined with the recent recession and associated collapse of the housing bubble has resulted in a significant number of vacant lots. According to 2010 U.S. census data, of the 696 total housing units, 21.3% remain vacant. Nearly 80% of these structures were constructed before 1950, most of them detached 1 or 2 unit homes. Comparatively, 70% of residents have moved into the neighborhood since 2000, highlighting the rapidly changing demographic and household type of these homes and the inadequacy of current housing stock (citation). The current housing crisis along with residents' inability and lack of motivation to maintain homes irrelevant to their needs has caused the structures to fall into disrepair.

Therefore, this neighborhood acts as an appropriate area to test a flexible, modular housing system. The three sites chosen in Danforth represent different conditions, thus testing the design's ability to adable to unique site conditions as well as different users.

Fig. x
O.D. VON ENGELN
Map of Syracuse
1919
pg. 42
"The Tully glacial series"
New York State Museum Bulletin.
nos. 227-228
Albany : University of the State of New York
Nov.-Dec. 1919

DANFORTH NEIGHBORHOOD, SYRACUSE: CENSUS TRACT 53

EXISTING DEMOGRAPHICS

HOUSEHOLDS

FAMILIES 78.0%
Average Size = 3.82
- w/Children 42.9%
- Married Couple (Nuclear) 24.0%
  - w/Children 12.5%
  - w/out Children 87.5%
- Single Male 12.3%
  - w/Children 3.9%
  - w/out Children 96.1%
- Single Female 41.7%
  - w/Children 25.4%
  - w/out Children 73.6%
- Other 22.0%
  - grandparents responsible for children 0.0%

NON-FAMILIES 22.0%
- Single Householder 87.9%
  - Elderly 50.5%
    - Male 46.4%
    - Female 53.6%
  - Male 58.0%
  - Female 42.0%
- Other 10.3%

AGE:
- 0-18 40.8% ----> Households w/ children under 18 47.0%
- 19-64 46.1%
- 65+ 13.1% -----> Households w/ adults over 65 30.4%

LOCATION OF HOME 1 YEAR PRIOR:
- Same 83.4%
- Different 16.6%
  - New York State 96.8%
  - Different State 3.2%
  - Abroad 0.0%

= potential target demographic

EXISTING HOUSING STOCK

TOTAL UNITS = **696**

Vacant 21.3% → for rent 35.1%

Occupied 78.7% → w/ mortgage /clear 27.0%

UNITS IN STRUCTURE:
- 1 unit detached **24.3%**
- 1 unit attached 0.0%
- 2 units **43.3%**
- 3-4 units 11.8%
- 5-9 units 2.6%
- 10-19 units 4.3%
- 20+ units 9.5%
- mobile home 4.3%

TOTAL ROOMS:
- 1 5.4%
- 2 0.0%
- 3 3.9%
- 4 17.9%
- 5 16.6%
- 6 32.9%
- 7 7.4%
- 8 7.1%
- 9+ 8.8%

BEDROOMS:
- 0 5.4%
- 1 5.9%
- 2 29.4%
- 3 40.2%
- 4 10.2%
- 5+ 8.9%

UNDESIRABL
Vacancy is no market/econo and poorly ma

CHANGING FAMI
The Danforth neigh primarily of 1 or 2 u before the 1940s. T with the nuclear fan many families head without children) ar

OVERSIZED HOUSING
With over 19 percent of re maximum 10 percent of 0 are generally failing to acc household size. Danforth housing size of 3.2 perso of oversize housing consi home features 6 rooms ar

ELDERLY
With an outdated housing the Danforth neighborhoo significant elderly populat live at home.

RAPID CHANGE
16.6 percent of residents hood within the past year the past 10 years. With a demographics are changi housing now in place is n this change.

ILITY

ot only indicative of a poor omy but also a rigid, out-of-date aintained housing stock.

LY TYPES

borhood is comprised unit detached homes built These homes were designed mily as the target group. Today, ded by single women (many re a mismatch for the existing

esidents living alone and a 0 or 1 bedroom homes, units commodate for a decreasing neighborhood's average ns strengthens the argument idering the area's average nd 3 bedrooms.

stock and lack of flexibility, ods is ill-suited to house a tion, specifically those who

have moved in the neighbor- (2010), and 70 percent within quick turnover of residents, ng constantly. The rigid ot capable of accommodating

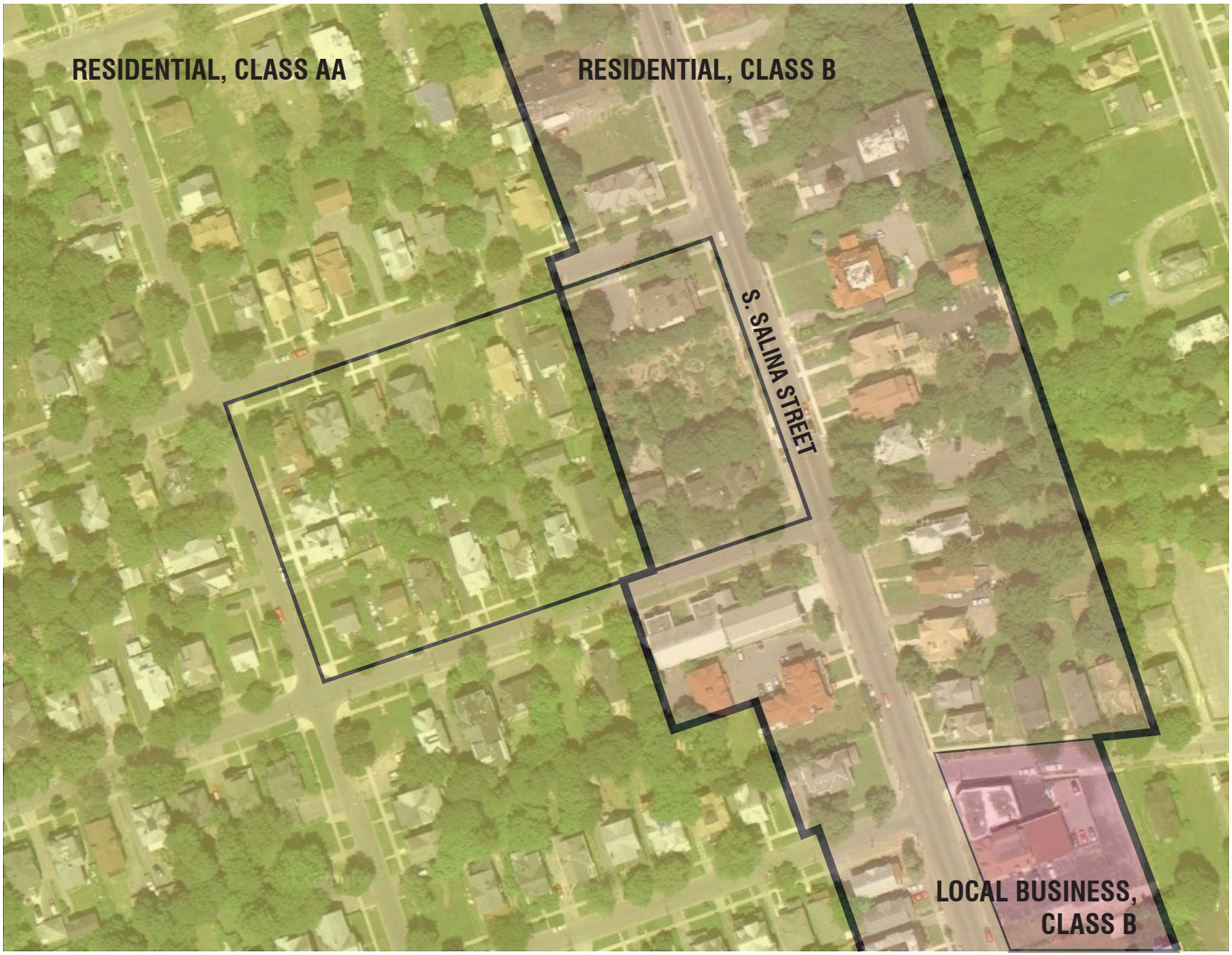
ASSOCIATED ISSUES

Poor housing conditions typical of the Danforth Neighborhood.

SITE LOCATION

(Map Source: Google Earth)

SITE ZONING



(Map Source: Google Earth)

EXISTING HOUSING STOCK

Location: S-1
Type: Multi-family detached
Condition: Good

Location: S-2
Type: Multi-family detached
Condition: Good

Location: S-3
Type: Multi-family detached
Condition: Good

Location: S-4
Type: Multi-family detached
Condition: Partially Vacant

Location: S-5
Type: Multi-family detached
Condition: Good

Location: N-2
Type: Single-family detached
Condition: Good

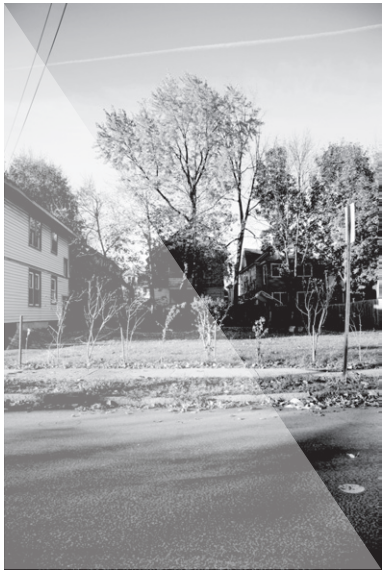
Location: N-3
Type: Multi-family detached
Condition: Good-Poor

Location: N-4
Type: Single-family detached
Condition: Poor / Vacant

Location: N-5
Type: Vacant Lot
Condition: Vacant

Location: N-6
Type: Multi-family detached
Condition: Good

Location: S-6
Type: Single-family detached
Condition: Poor / Vacant



Location: S-7
Type: Vacant Lot
Condition: Vacant

Location: W-1
Type: Single-family detached
Condition: Poor

Location: W-2
Type: Multi-family detached
Condition: Poor

Location: N-1
Type: Single-family detached
Condition: Good

Location: N-7
Type: Multi-family detached
Condition: Good

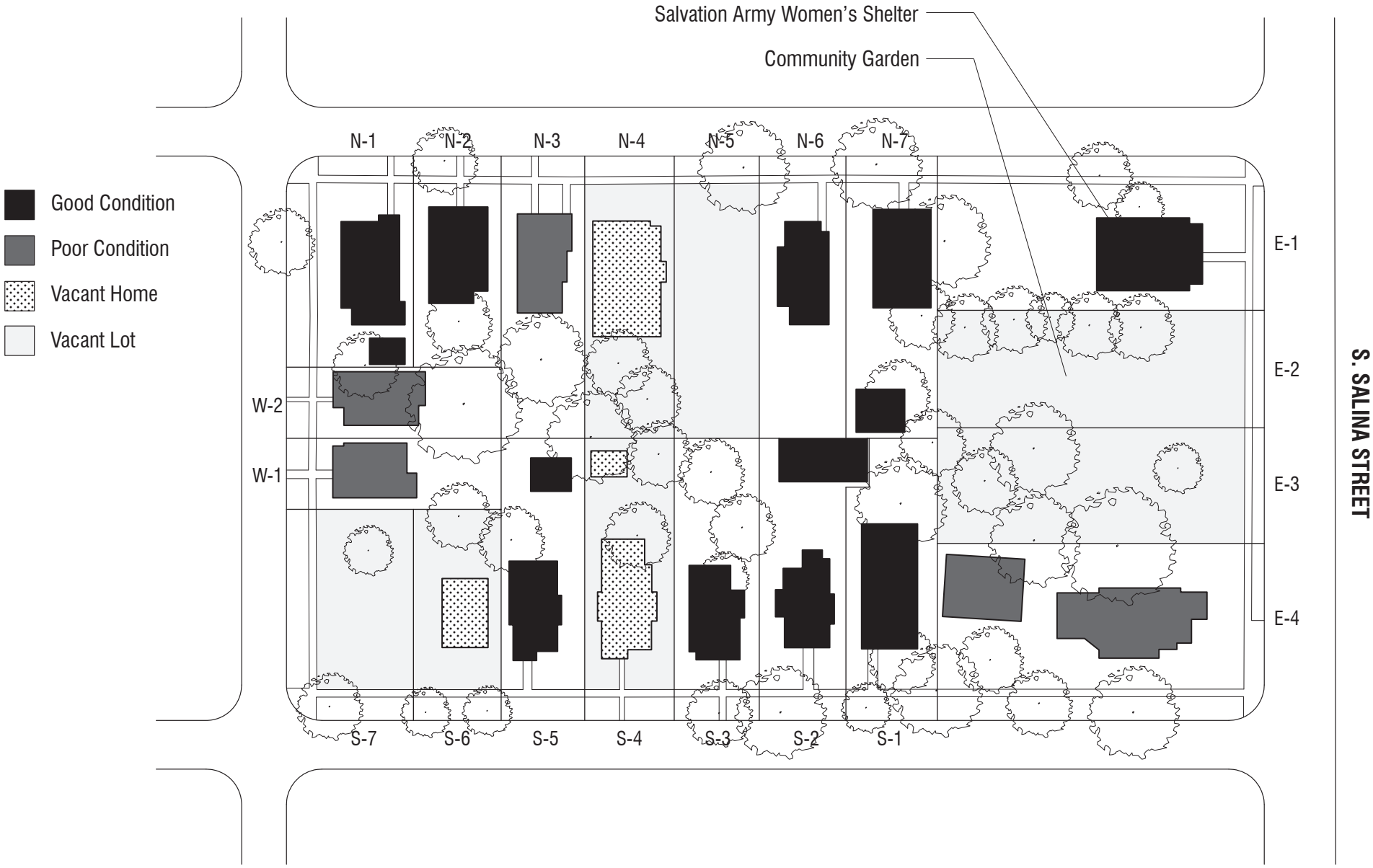
Location: E-1
Type: Multi-family detached (shelter)
Condition: Good

Location: E-2
Type: Vacant Lot
Condition: Vacant

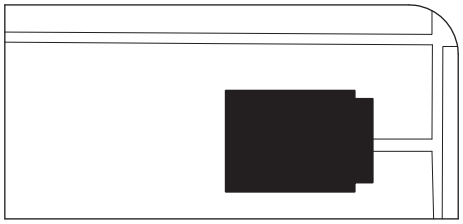
Location: E-3
Type: Vacant Lot
Condition: Vacant

Location: E-4
Type: Single-family detache
Condition: Poor

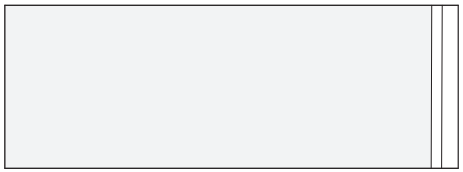
CURRENT HOUSE CONDITIONS



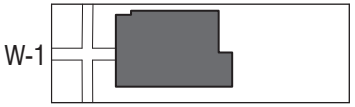
LARGE CORNER LOT
PRIMARY STREET



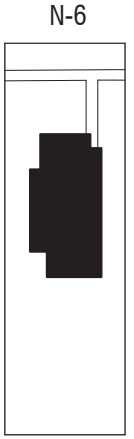
LARGE ‘SLOT’ LOT
PRIMARY STREET



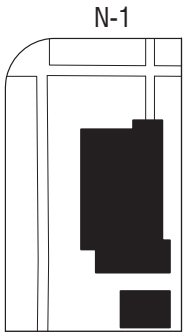
SMALL ‘SLOT’ LOT
SECONDARY STREET



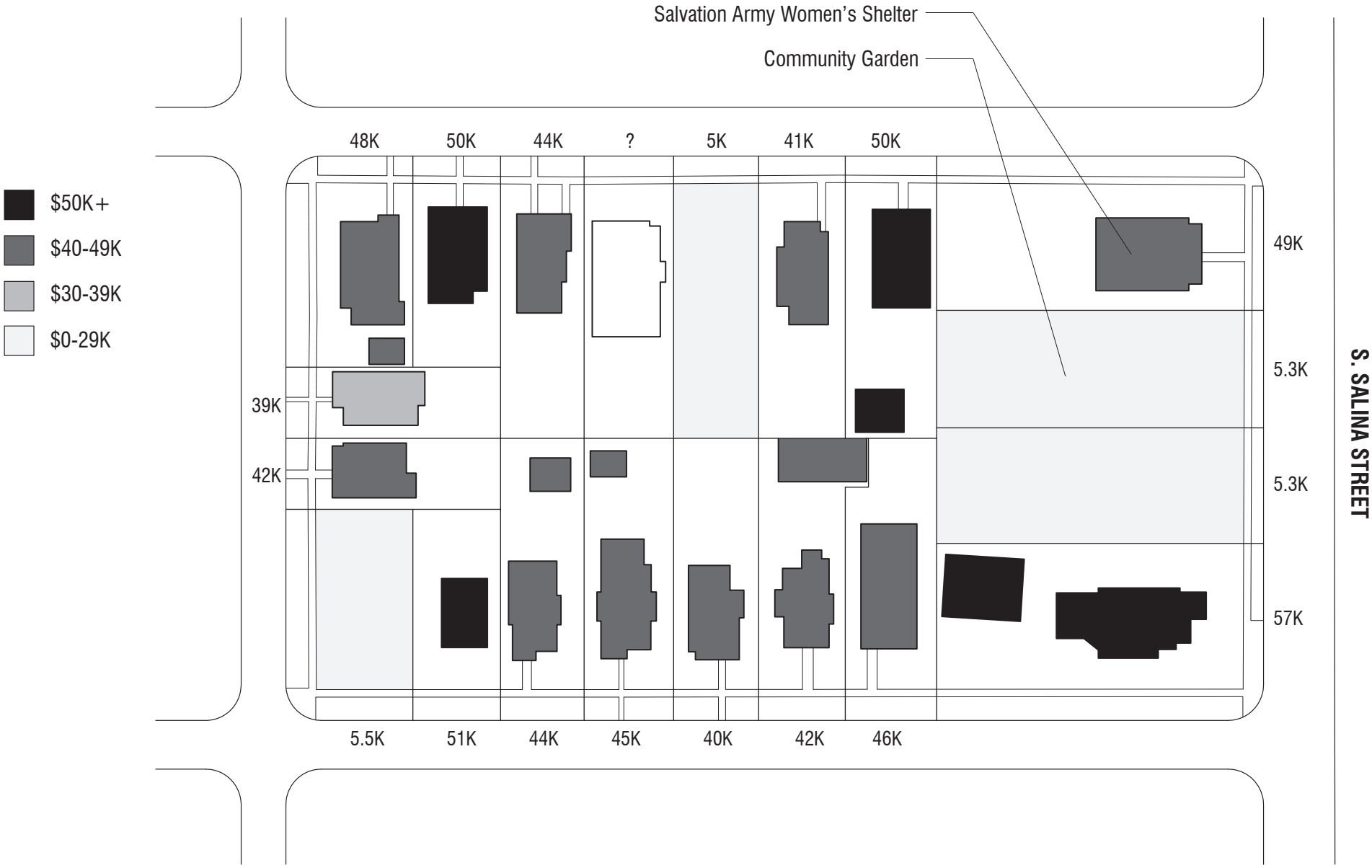
LONG ‘SLOT’ LOT
SECONDARY STREET



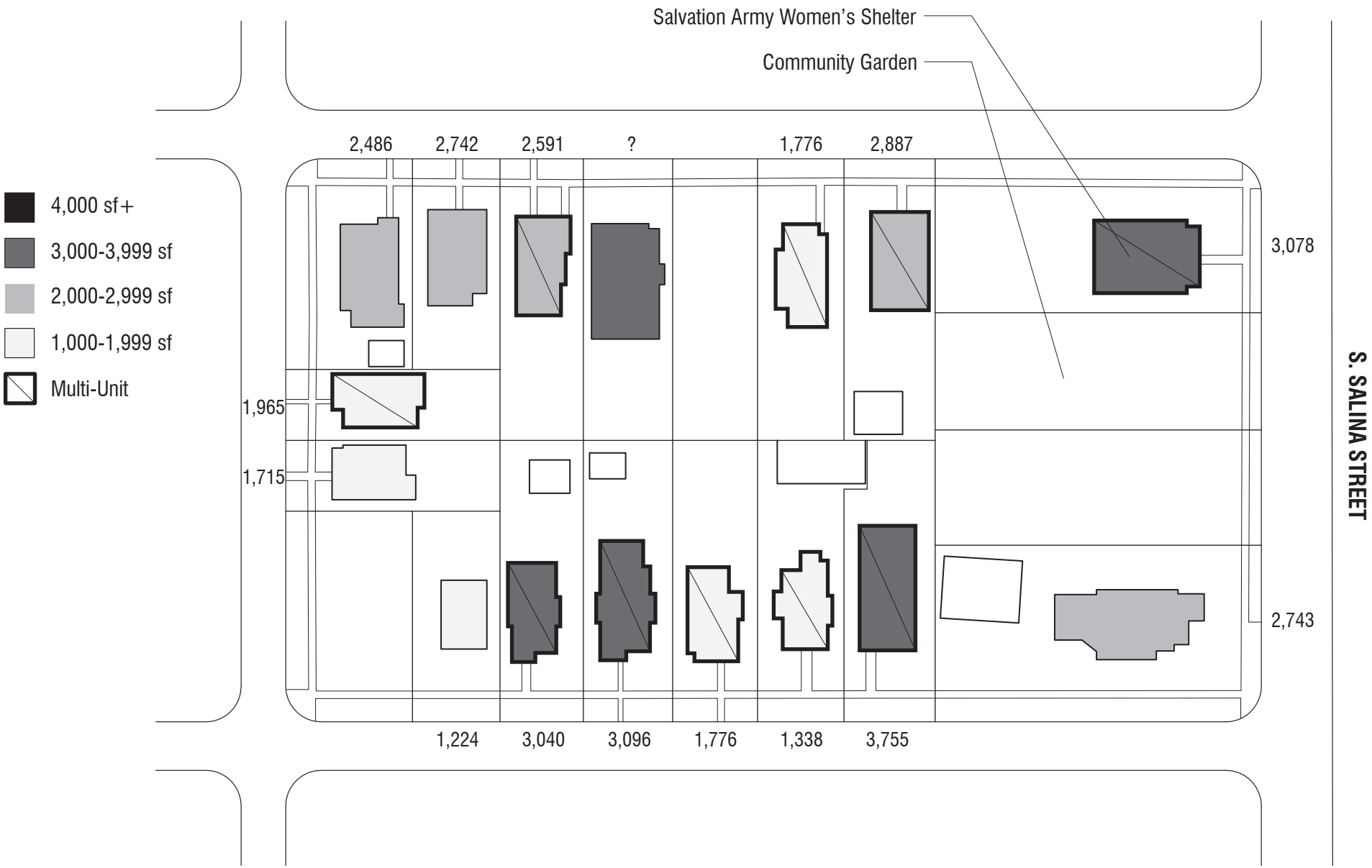
MEDIUM CORNER LOT
SECONDARY STREET



CURRENT HOME VALUES



SQUARE FOOTAGE



DANFORTH SUBURBAN CHARACTERISTICS

Average Lot Size = 7,413 sf
Possible F.A.R. (as is) = .29
Possible Pop. Density (as is) = 12,964 people/sqm

DECREASING AVERAGE LOT SIZE

10,125 sf
1976

14,680 sf
1990

12,870 sf
1998

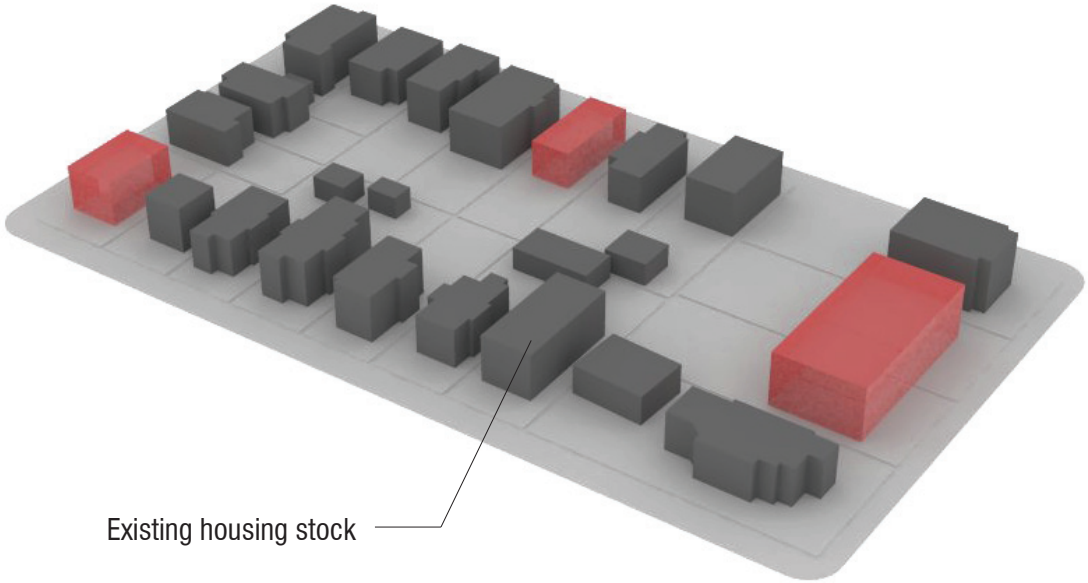
8,750 sf
2010

7,500 sf
2012
(est)

REDEVELOPMENT STRATEGIES

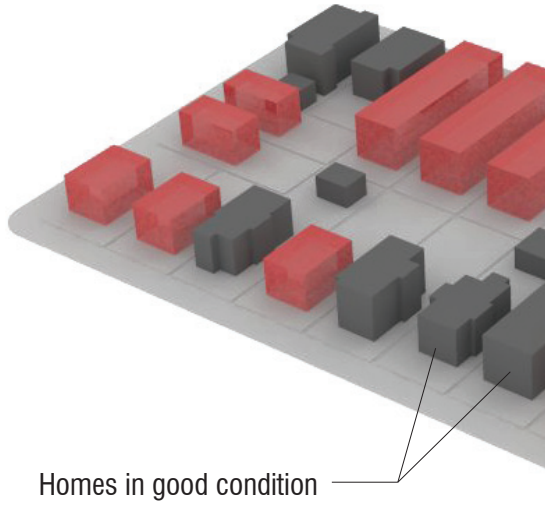
VACANCY INFILL

Insert new housing into vacant lots only.



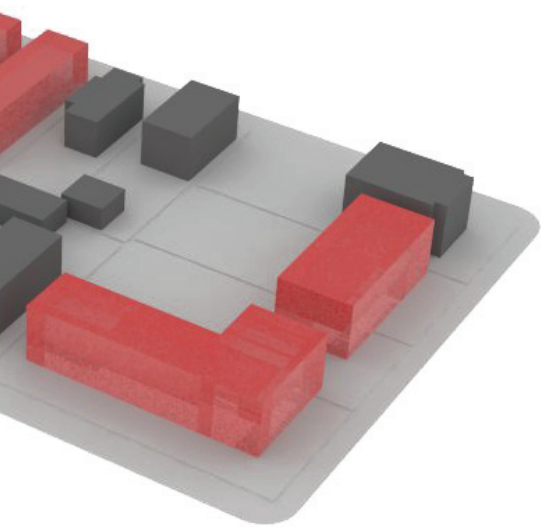
SELECTIVE D

Demolish homes in very po
on these lots as w



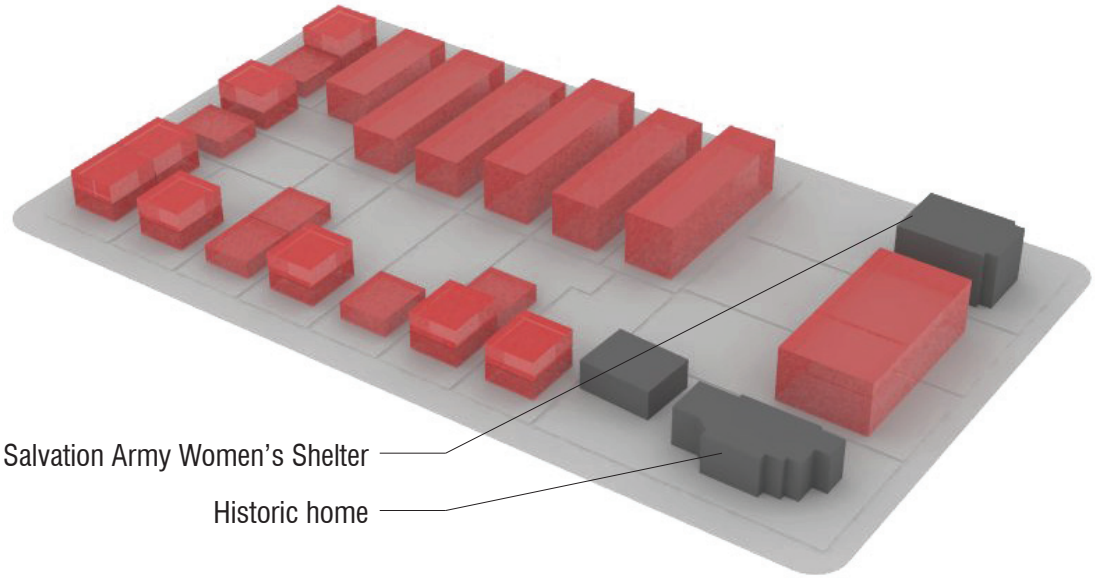
DEMOLITION

or condition. Place housing
ell as vacant lots.



COMPLETE REDEVELOPMENT

Demolish entire place except the women's shelter and historic home at corner site. Fill lots with new types of housing.



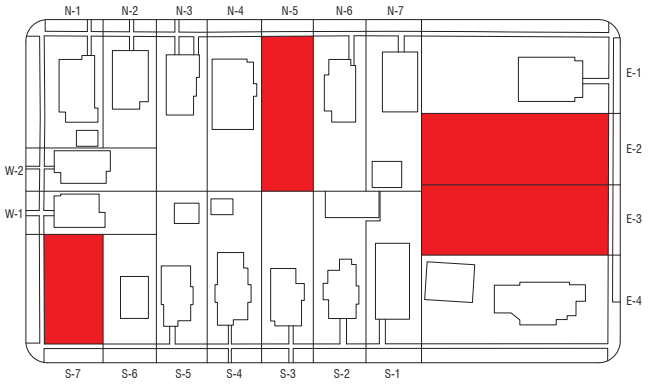
PROGRAMMING THE SITE AND DESIGN SPECULATION

Danforth Neighborhood, Syracuse, New York

Target Demographic for Danforth

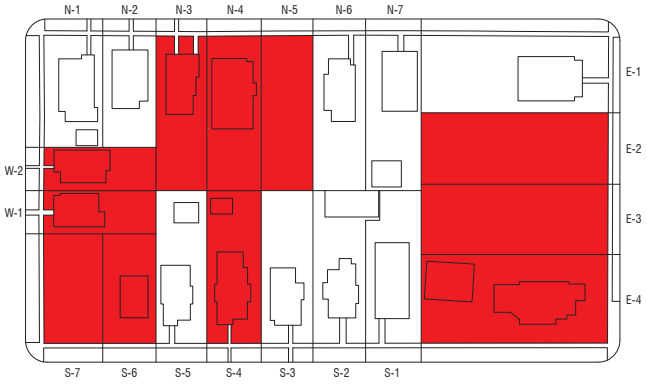
Site Programming

Strategy 1:
Vacancy Infill



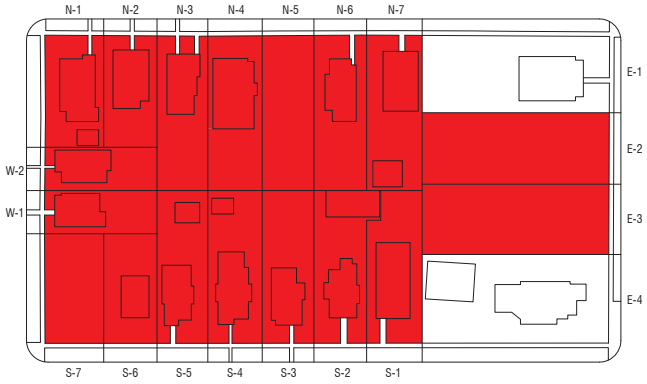
- Single-family detached homes
  - Nuclear / extended family
  - Single-headed family
- Apartment building
  - Single Elderly
  - Singles
  - Couples

Strategy 2:
Selective Demolition



- Single-family detached homes
  - Nuclear / extended family
  - Single-headed family
- Multi-family detached homes
  - Nuclear / extended family
  - Single-headed family
  - Couples
- Apartment building
  - Single Elderly
  - Singles
  - Couples

Strategy 3:
Complete Redevelopment



- Single-family detached homes
  - Nuclear / extended family
  - Single-headed family
- Multi-family detached homes
  - Nuclear / extended family
  - Single-headed family
  - Couples
- Apartment building
  - Single Elderly
  - Singles
  - Couples

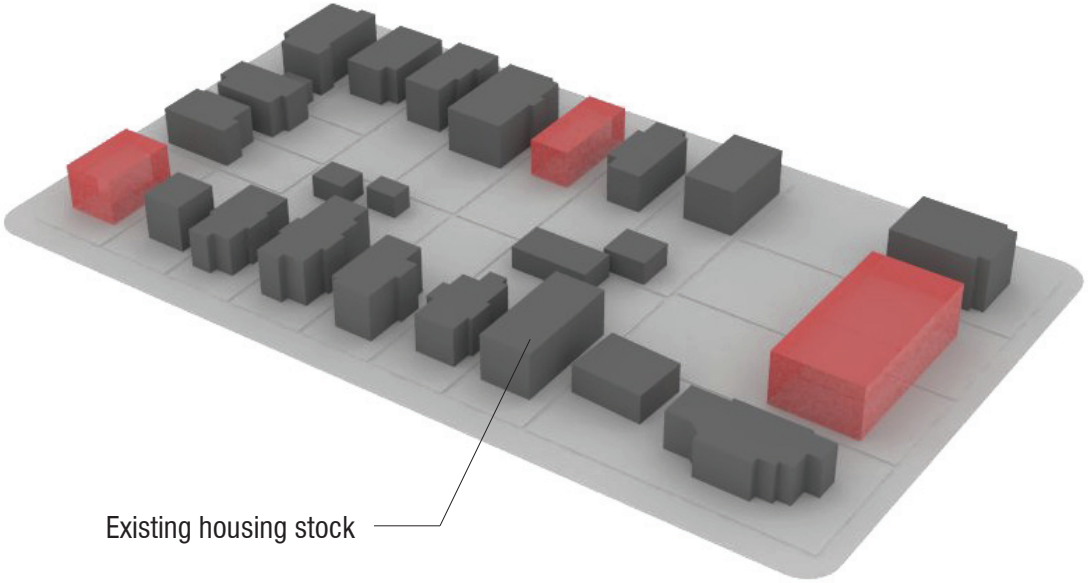
		Selected Household Types					
Common Household Activities		SINGLE ELDERLY	SINGLE	NUCLEAR / EXTENDED	SINGLE-HEADED	COUPLES	Associated Spaces
	Cook	X	X	X	X	X	Kitchen
	Eat	X	X	X	X	X	Living, Kitchen, Dining, Deck/Patio
	Gather			X	X		Living, Dining, Kitchen, Rec./Bonus, Deck/Patio
	Play			X	X		Living, Dining, Bedroom, Yard, Deck/Patio
	Read	X	X	X	X	X	Living, Study, Rec./Bonus, Bedroom
	Storage	X	X	X	X	X	Kitchen, Bedroom, Garage, Storage
	Entertain		X	X	X	X	Living, Dining, Kitchen, Rec./Bonus, Deck/Patio
	Television	X	X	X	X	X	Living, Rec./Bonus, Bedroom
	Computer		X	X	X	X	Living, Dining, Study, Rec./Bonus, Bedroom
	Child Care			X	X		Living, Kitchen, Rec./Bonus, Bedroom, Bathroom
	Work / Study		X	X	X	X	Living, Dining, Study, Bedroom
	Laundry	X		X	X	X	Laundry, Bathroom
	Sleep	X	X	X	X	X	Living, Bedroom
	Hygiene	X	X	X	X	X	Bathroom
	Housework	X	X	X	X	X	Kitchen, Bathroom, Garage, Storage
	Yardwork			X	X		Yard
	Pets	X	X	X	X	X	Living, Rec./Bonus, Yard, Deck/Patio
	Vehicles		X	X	X	X	Garage
	Fitness		X	X	X	X	Living, Rec./Bonus, Garage, Yard

Strategy	Building Type	Demographic	Amount	Units	Total Units	Est. Residents	Unit SF
1:INFILL	**Single-Detached**	Nuclear / Extended Family, Single-headed Family	**2**	1	2	9	1400-2000
	Apartment Building	Single Elderly, Singles, Couples	**1**	~20	20	30	400 1BR, 600 2BR
						TOTAL=39	13,400
2: SELECTIVE	**Single-Detached**	Nuclear / Extended Family, Single-headed Family	**4**	1	4	18	1400-2000
	Multi-Unit Detached	Nuclear / Extended Family, Single-headed Family, Couples	**4**	2-4	12	36	1400-2000, 800 2BR
	Apartment Building	Single Elderly, Singles, Couples	**1**	~30	30	60	400 1BR, 600 2BR
						TOTAL=114	38,600
3: COMPLETE	**Single-Detached**	Nuclear / Extended Family, Single-headed Family	**11**	1	11	50	1400-2000
	Multi-Unit Detached	Nuclear / Extended Family, Single-headed Family, Couples	**5**	2-4	15	45	1400-2000, 800 2BR
	Apartment Building	Single Elderly, Singles, Couples	**1**	~20	20	30	400 1BR, 600 2BR
						TOTAL=125	49,700

REDEVELOPMENT STRATEGIES

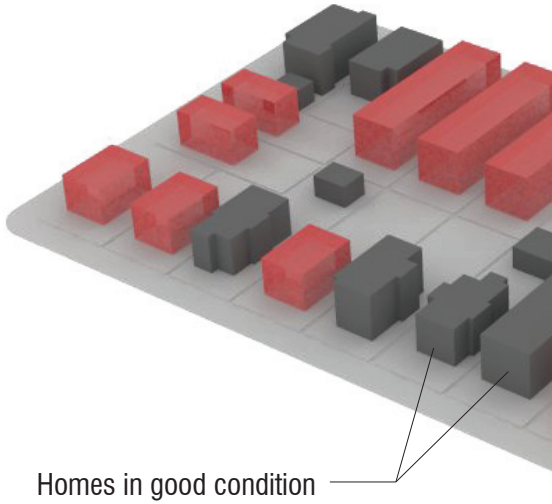
VACANCY INFILL

Insert new housing into vacant lots only.



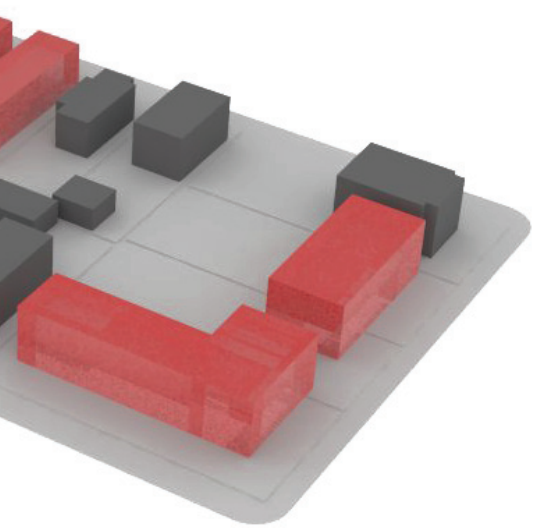
SELECTIVE D

Demolish homes in very poo
on these lots as we



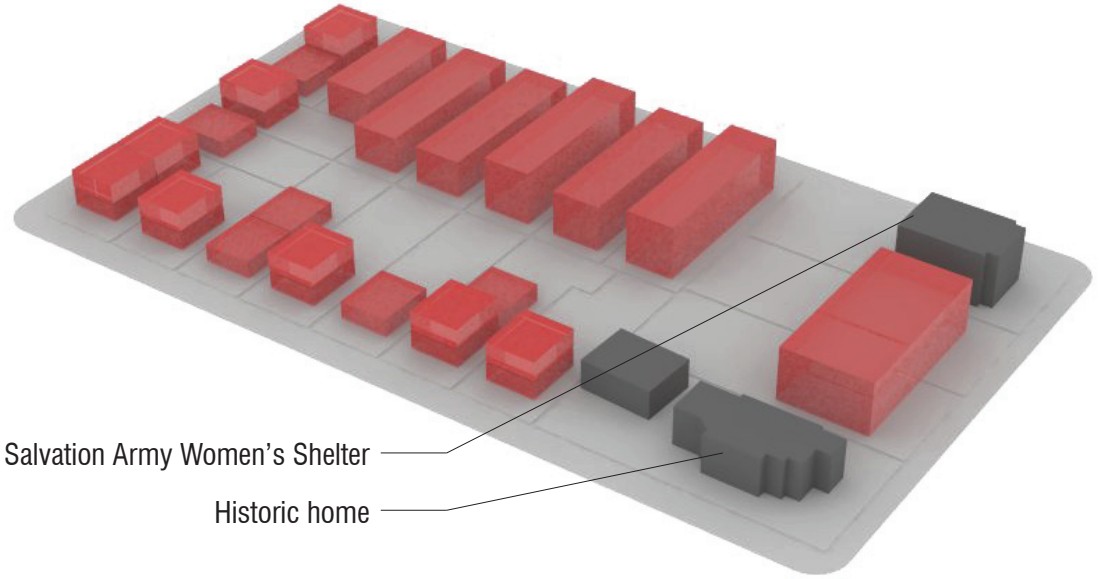
EMOLITION

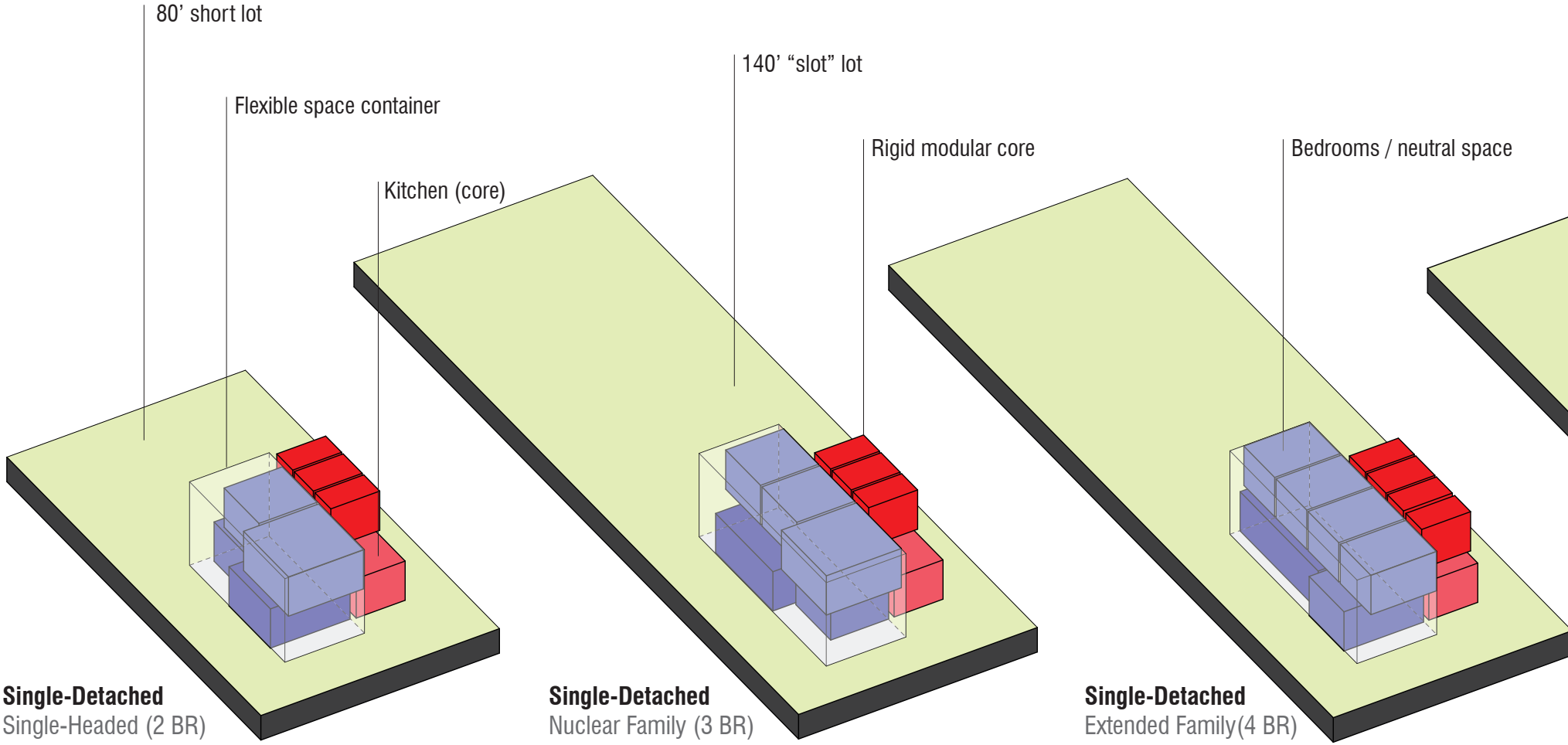
or condition. Place housing
ell as vacant lots.

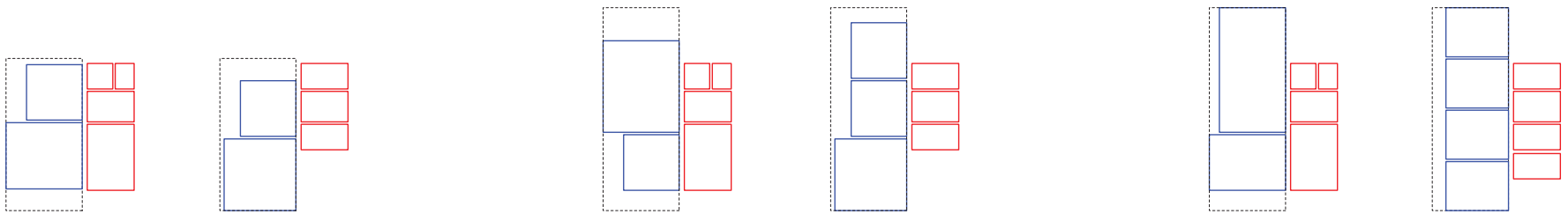


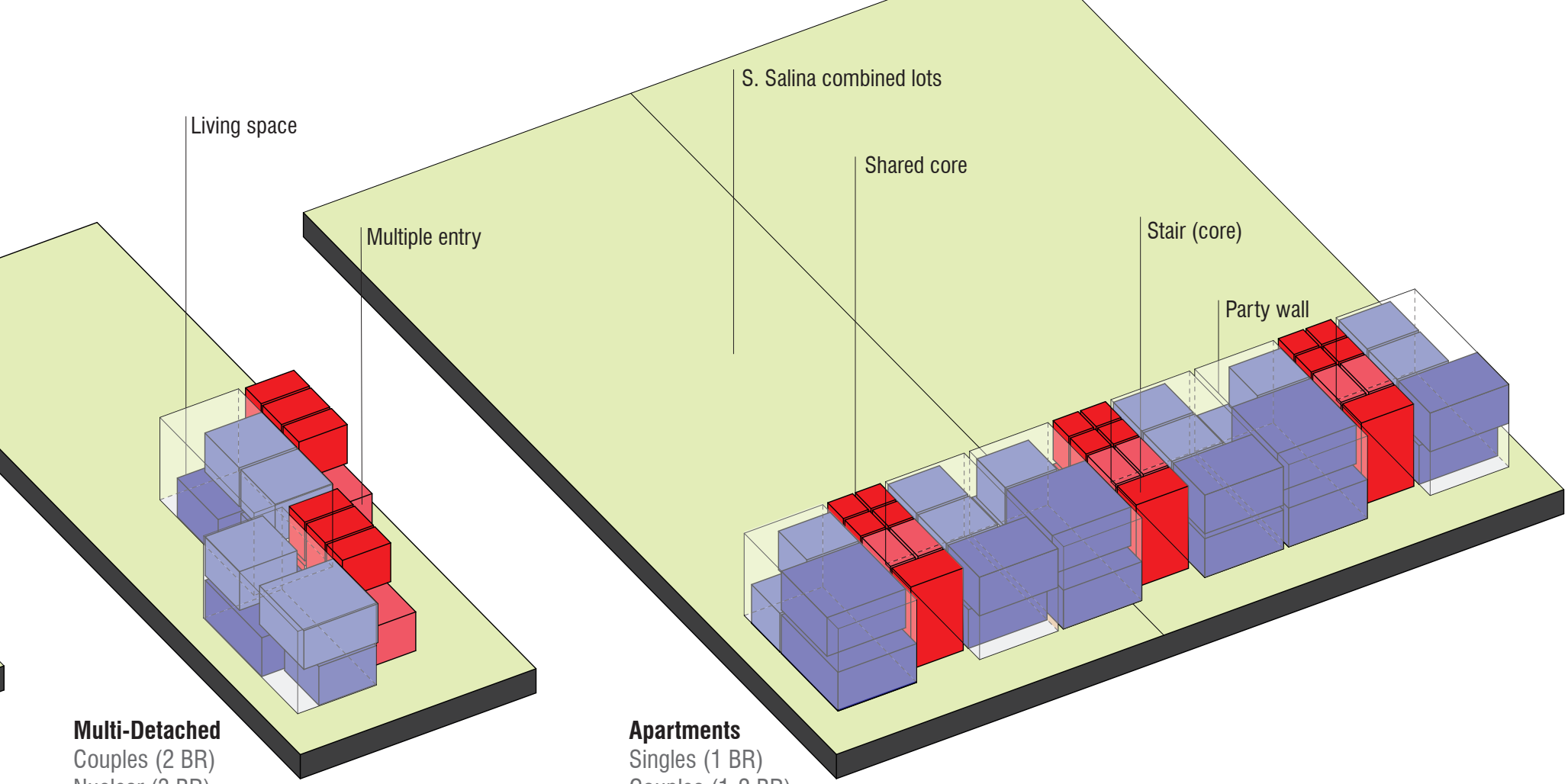
COMPLETE REDEVELOPMENT

Demolish entire block except the women's shelter and historic home at corner site. Fill lots with new types of housing.



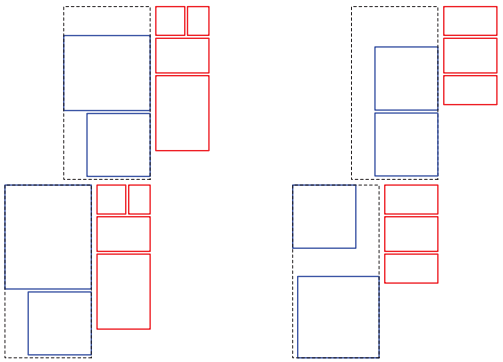

80’ short lot
Flexible space container
Kitchen (core)
140’ “slot” lot
Rigid modular core
Bedrooms / neutral space
Single-Detached
Single-Headed (2 BR)
Single-Detached
Nuclear Family (3 BR)
Single-Detached
Extended Family(4 BR)

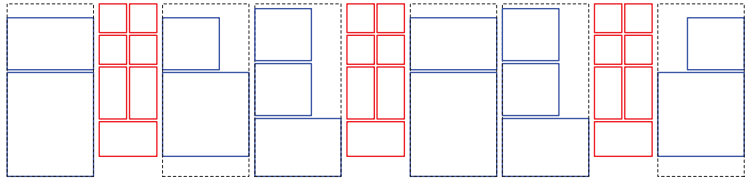




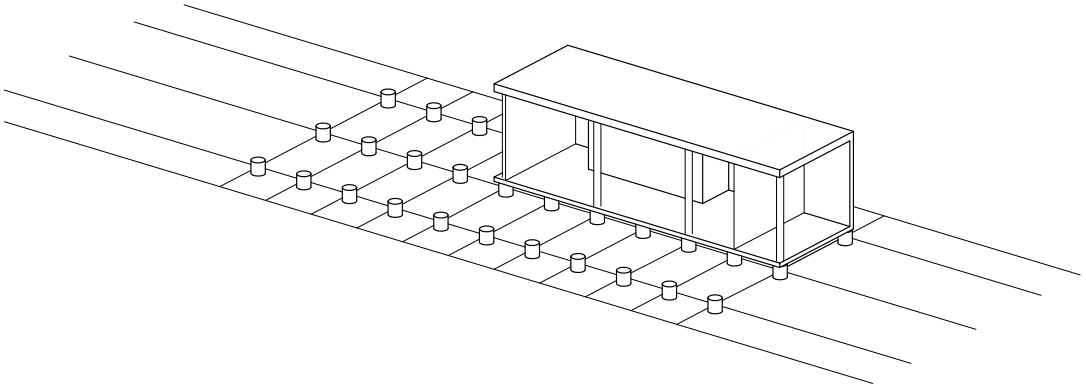
Multi-Detached
Couples (2 BR)
Nuclear (3 BR)

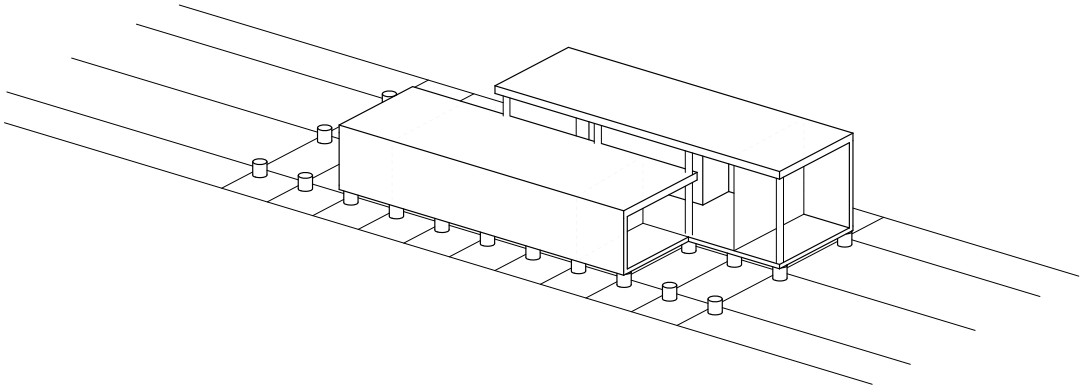
Apartments
Singles (1 BR)
Couples (1-2 BR)
Single Elderly (1 BR)

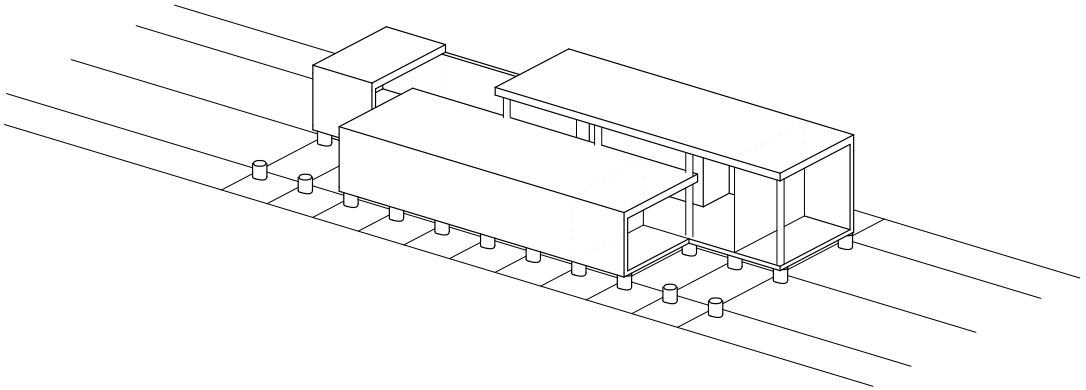


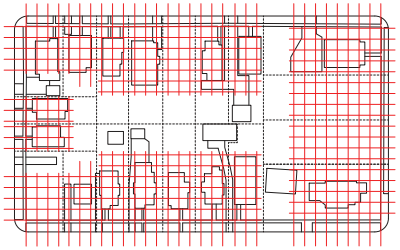


SITE GRID SCHEME

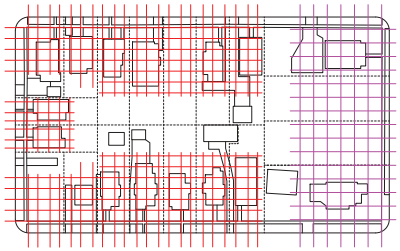




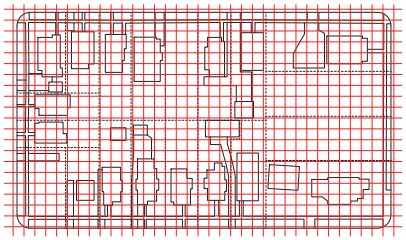




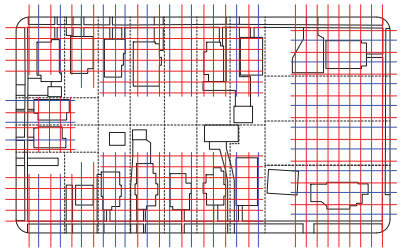
RESTRICTED BY ZONING



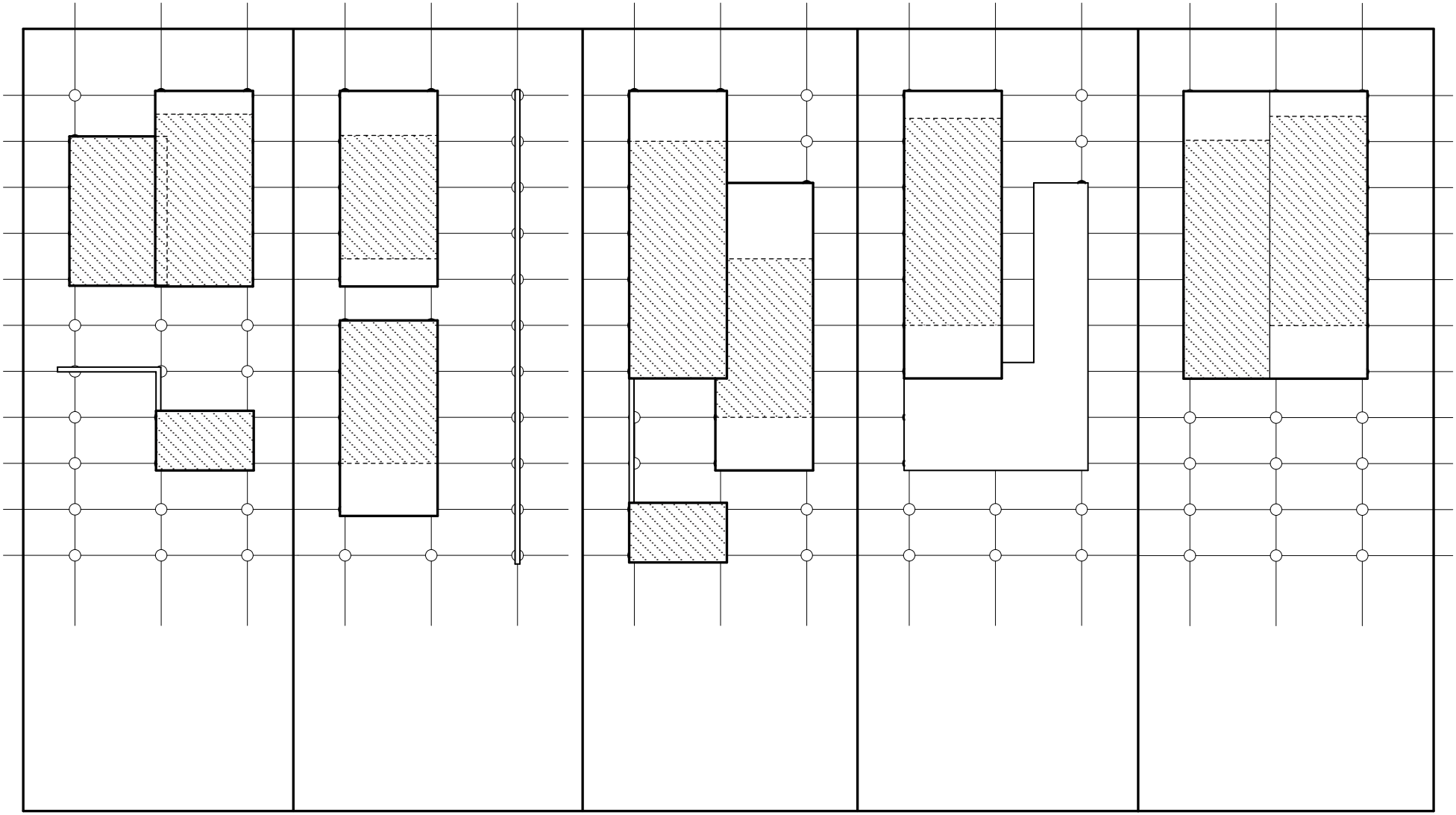
SCALED FOR PROGRAM:
COMMERCIAL VS. RESIDENTIAL



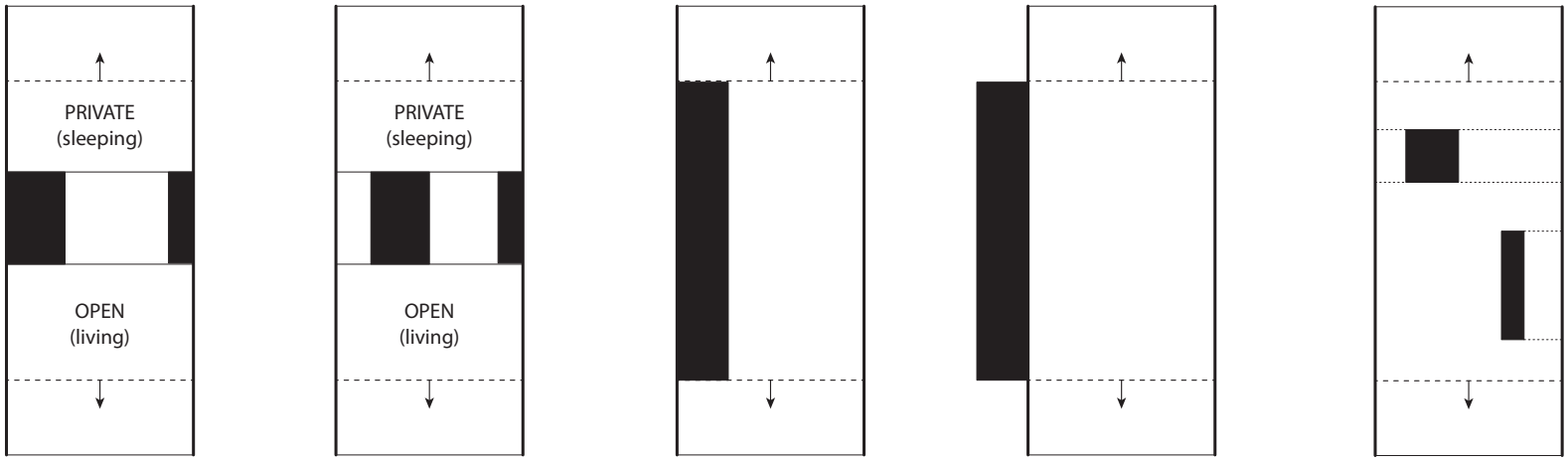
STANDARD GRID

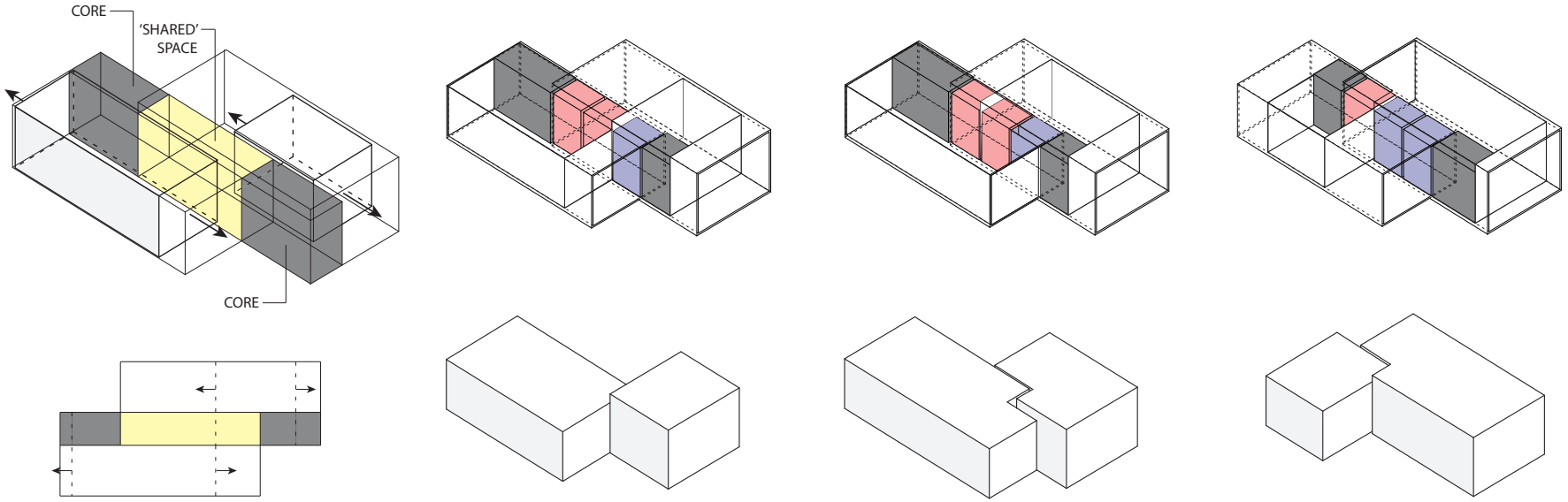


SHIFTED TO ALLOW DIFFERENT
'STRUCTURAL BAY' SIZES

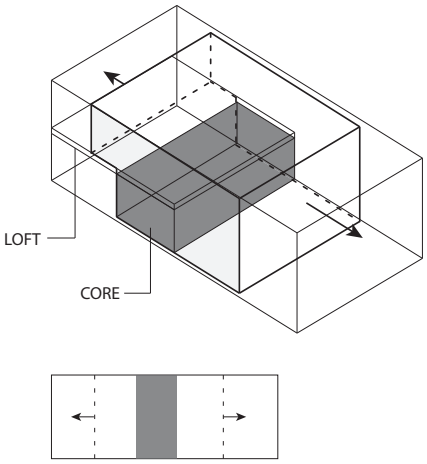


‘SHELL’ SCHEME

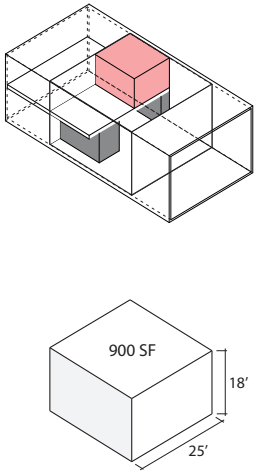




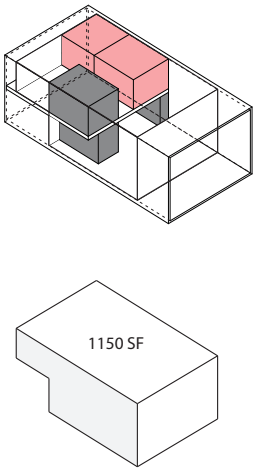
TWO FAMILY, ‘SHARED’ SPACE



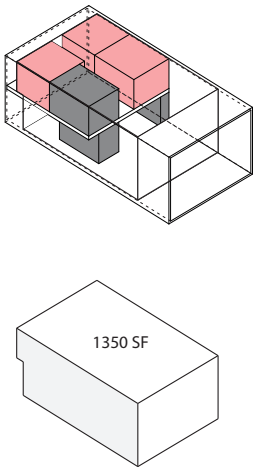
CENTRAL CORE W/ LOFT



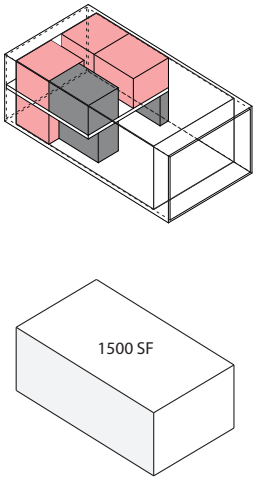
1 BR: COUPLE



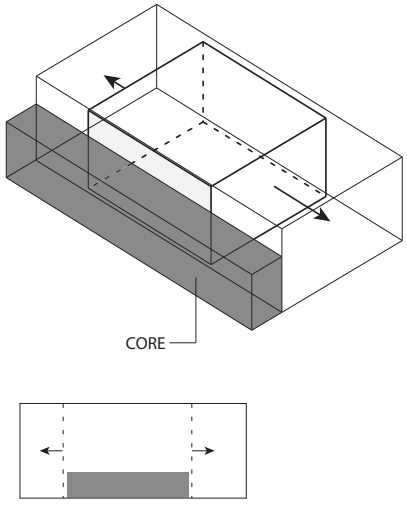
2 BR: COUPLE + CHILD



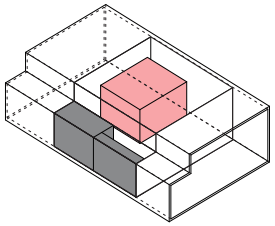
3 BR: COUPLE + 2 CHILDREN

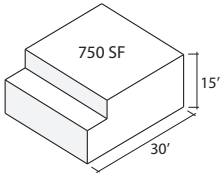


4 BR: COUPLE + 2 CHILDREN + GRANDPARENT

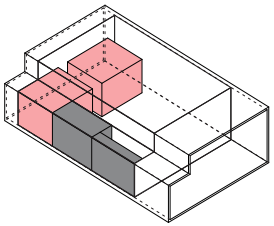


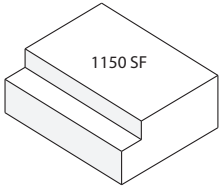
LINEAR CORE ,
SEPARATED FLEX SPACE



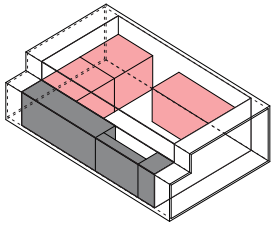


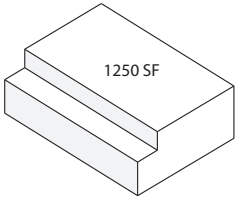
1 BR: COUPLE



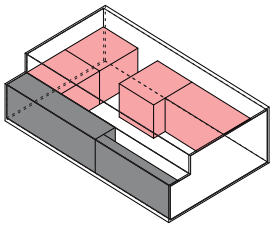


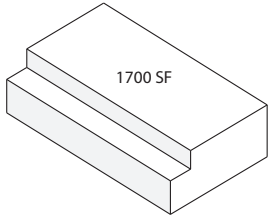
2 BR: COUPLE + CHILD





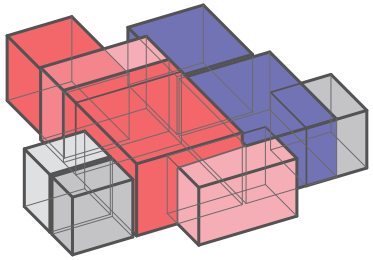
3 BR: COUPLE + 2 CHILDREN



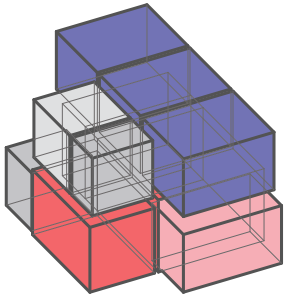


4 BR: COUPLE + 2 CHILDREN + GRANDPARENT

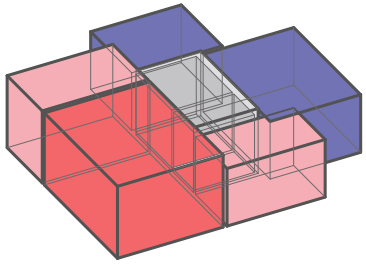
Mulit-Functionality,
Overlapping Space



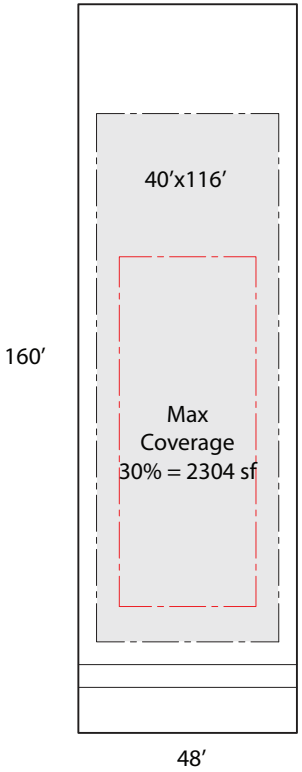
Peripheral Core



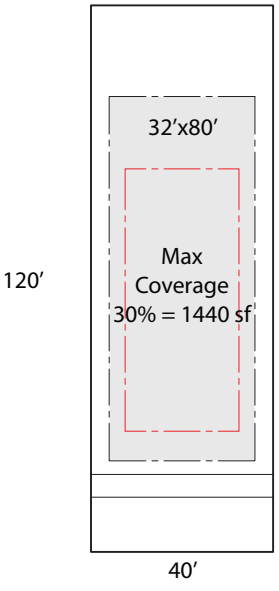
Central Core



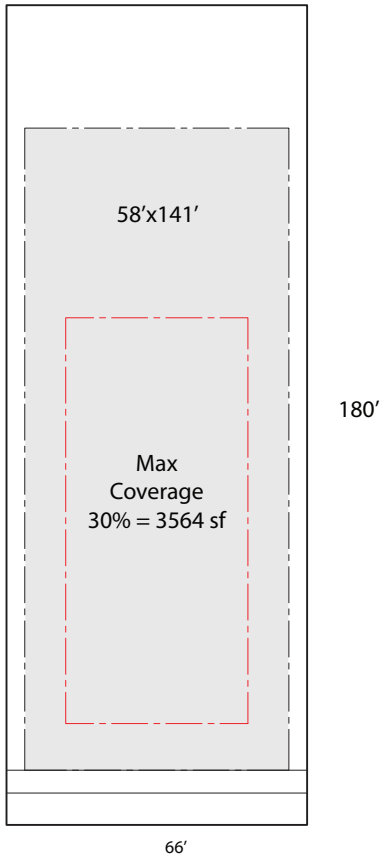
R-CLASS AA
N-3 to N-7
S-1 to S-5

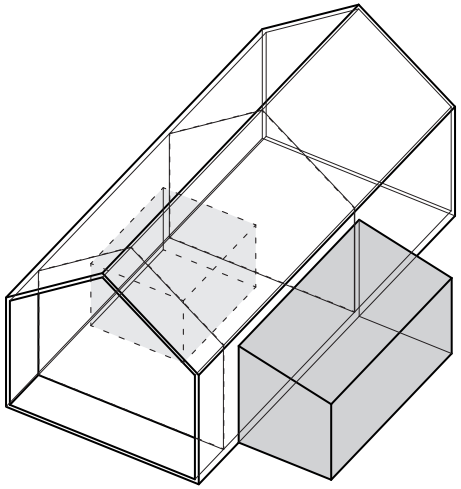


R-CLASS AA
N-1, N-2
S-6, S7
W-1, W-2

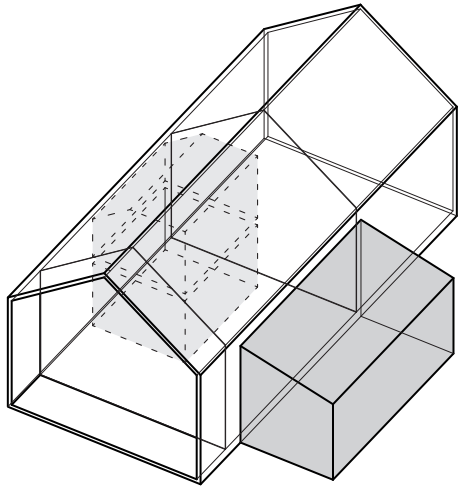


R-CLASS B
E-1 to E-4

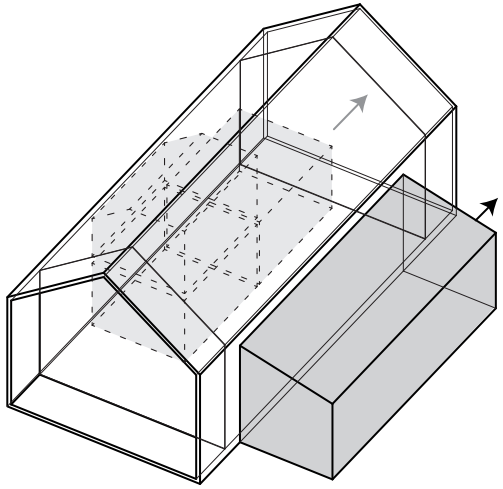




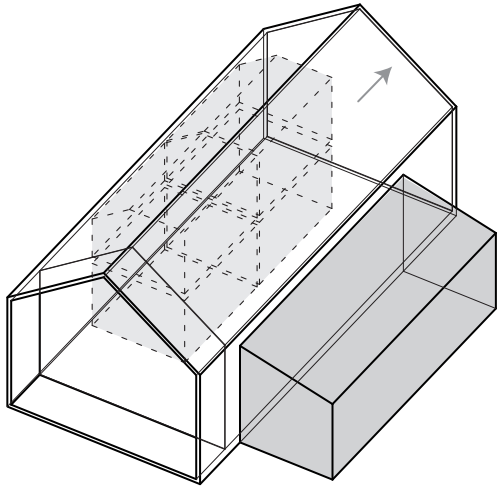
STAGE 1



STAGE 2

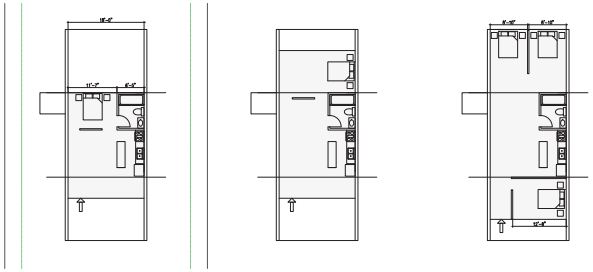


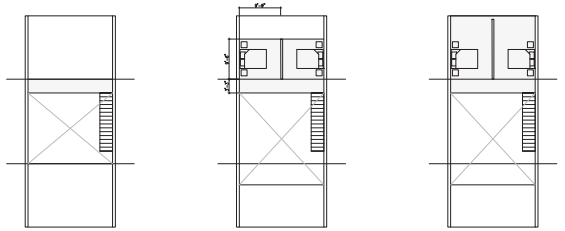
STAGE 3



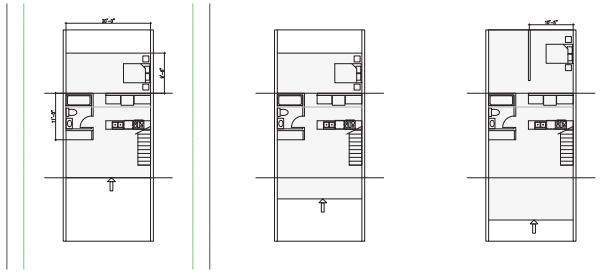
STAGE 4

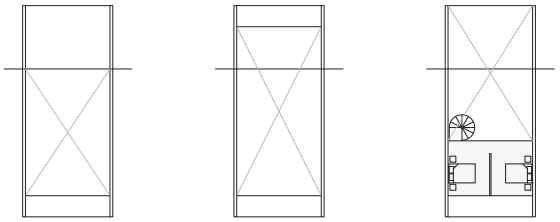
LAYOUT 1:
18’ Width
450-820 sf
Single floor

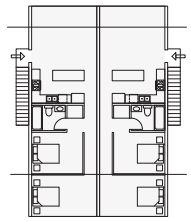




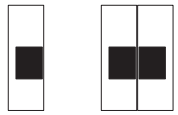
LAYOUT 2:
20’ Width
590-1270 sf
1-2 Floors



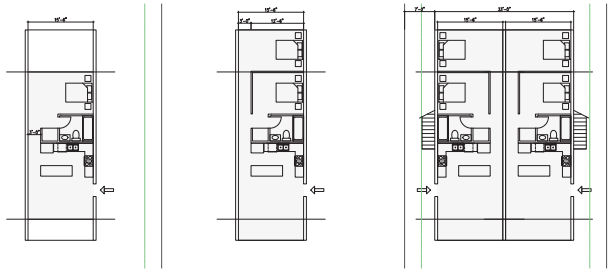




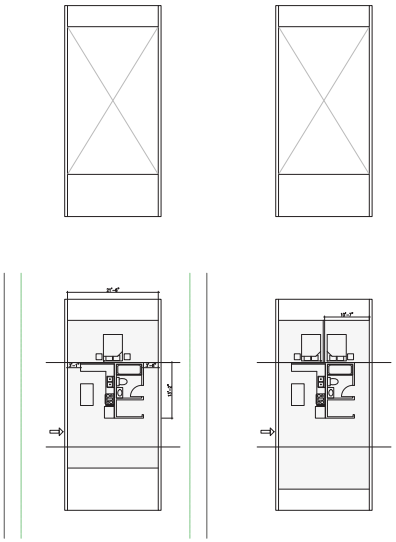
LAYOUT 3:
20’ Width
600-1160 sf
1-2 Floors



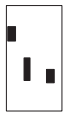
LAYOUT 4:
15’-6” Width
540-780 sf
Single floor



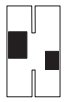
LAYOUT 5:
21′-6″ Width



LAYOUT 6:
18′ Width



LAYOUT 7:
25′Width



LAYOUT 8:
24′-6″ Width

DESIGN SOLUTION

SITE STRATEGY ONE

VACANCY INFILL

SCALE: 1/25" = 1' - 0"

Insert new housing into vacant lots only

SITE STRATEGY TWO

SELECTIVE DEMOLITION

SCALE: 1/25" = 1' - 0"

Demolish homes in very poor condition. Place housing on these lots as well as vacant lots.

SITE STRATEGY THREE

SELECTIVE DEMOLITION (16' span)

SCALE: 1/25" = 1' - 0"

New homes feature smaller width of 16'

SITE STRATEGY FOUR

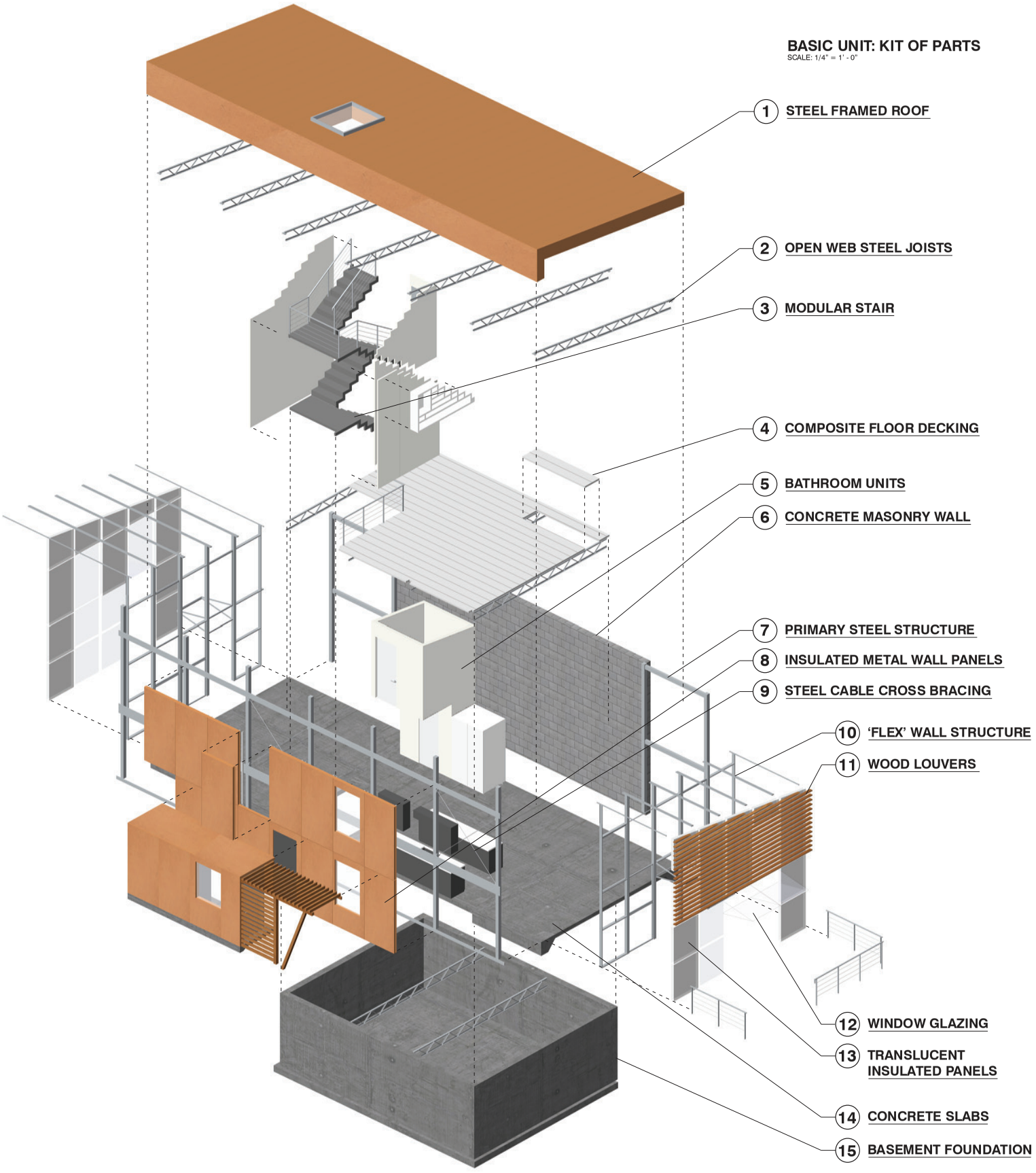
COMPLETE REDEVELOPMENT

SCALE: 1/25" = 1' - 0"

Demolish entire block excluding the women's shelter and historic home at corner site. Fill lots with new housing types.

BASIC UNIT: KIT OF PARTS

SCALE: 1/4" = 1' - 0"



1. STEEL FRAMED ROOF
   Standing metal seam roof
   50' x 20'-9"

2. OPEN WEB STEEL JOISTS *
   K Series common web
   14K3 for 20' spans, 12K1 for 16' spans
   Weight: 6 pounds/linear ft or 115.8 pounds total

3. MODULAR STAIR *
   Prefabricated steel and wood switchback stair
   6'-6" x 8'-6"

4. COMPOSITE DECKING *
   Wood plastic composite floor decking
   8' span between steel joist structure

5. BATHROOM UNITS *
   Wood stud, drywall construction

6. CONCRETE MASONRY WALL
   Standard 16" x 8" x 8" blocks

7. PRIMARY STEEL STRUCTURE
   Rectangular structural steel tubing
   Columns: 4 1/2" x 4 1/2"
   Horizontal bracing / mounting piece for wall panels

8. INSULATED METAL WALL PANELS *
   MetlSpan architectural wall panels
   Weathered metals series finish
   4' x 8' panels, 3" thickness, R-value of 21

9. STEEL CABLE CROSS BRACING

10. 'FLEX' WALL STRUCTURE *
    Light-gauge steel structure
    Track system allows structure to slide
    Locks into place at 8' intervals

11. WOOD LOUVERS
    Located on south facing 'flex' wall structure

12. WINDOW GLAZING *
    Glazing at ground level opens along vertical track

13. TRANSLUCENT INSULATED PANELS *
    4' x 3' Kalwall translucent panels
    4" thickness, R-value of up to 20

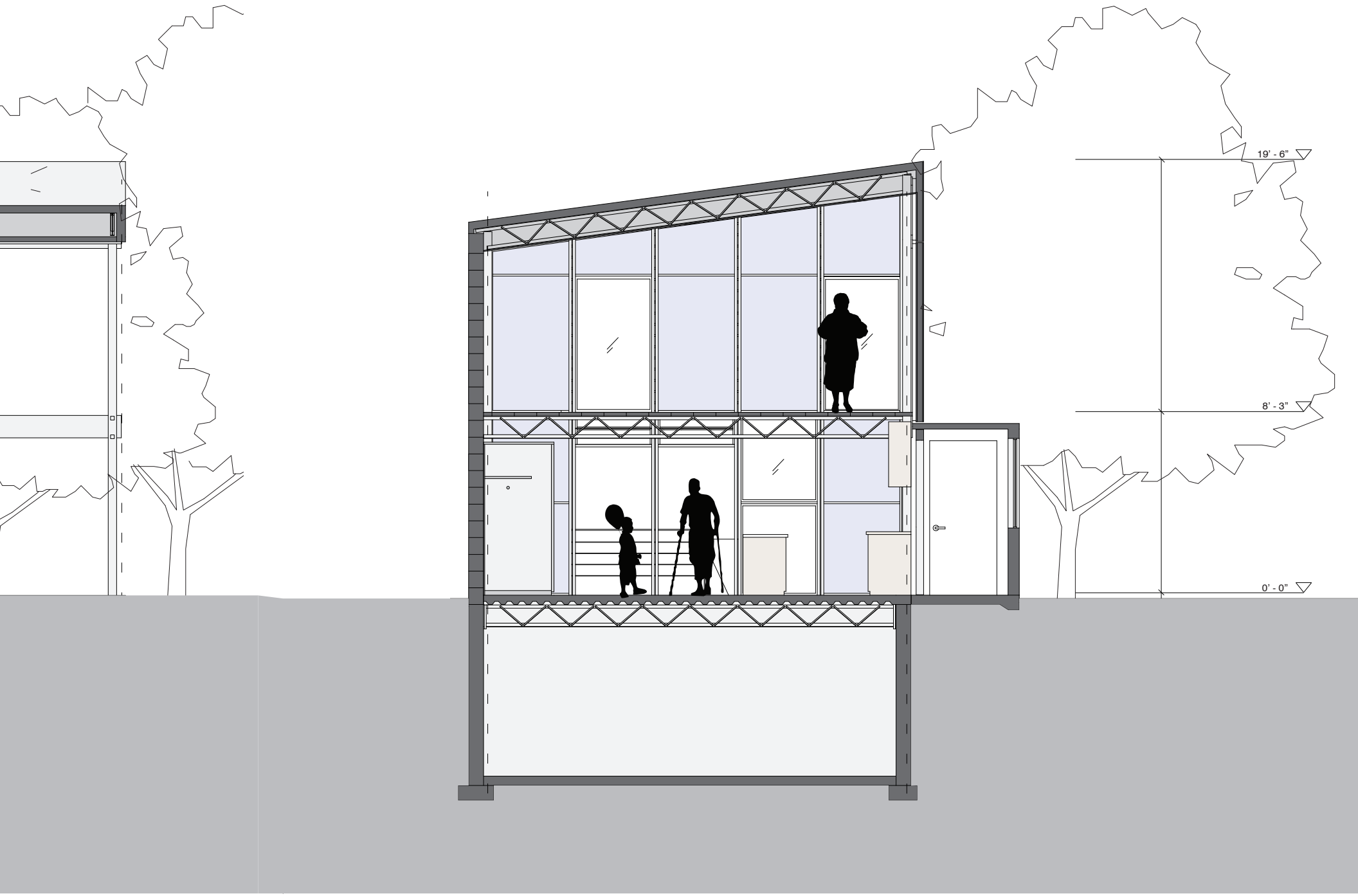
14. CONCRETE SLABS
    Within basic unit: Poured concrete + steel decking
    Outside basic unit: Slab on grade
    8' wide segments

15. BASEMENT FOUNDATION

** Flexible component - may be added, removed or altered to allow for changes in living space*

SECTION A

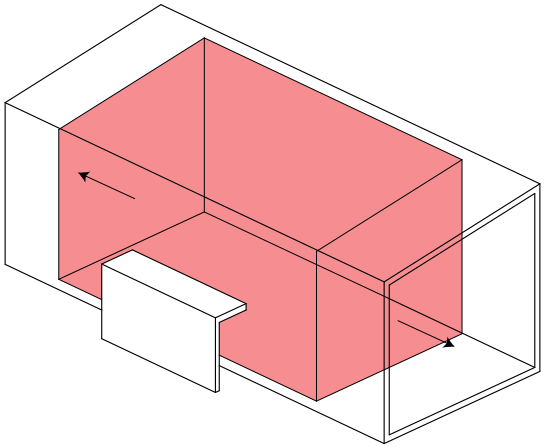
SCALE: 1/4" = 1' - 0"



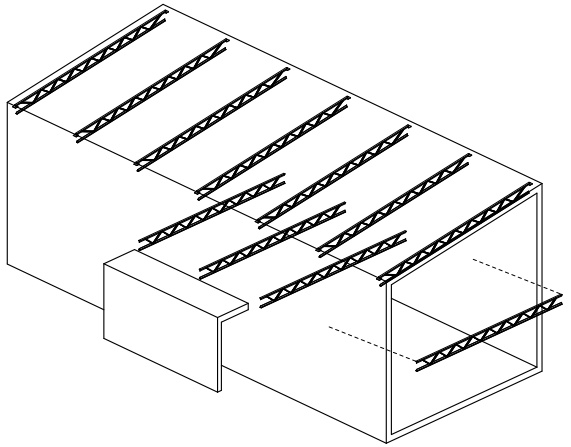
SECTION B

SCALE: 1/4" = 1' - 0"

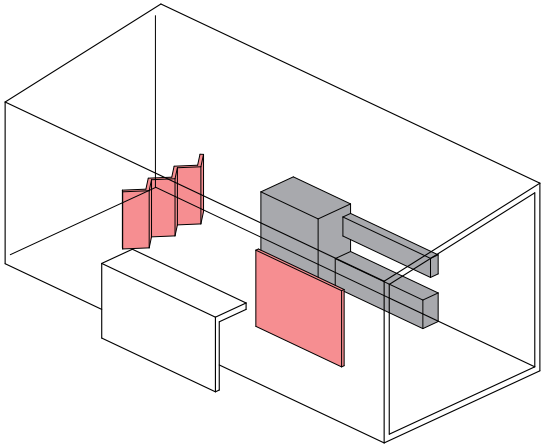
PERFORMANCE DIAGRAMS



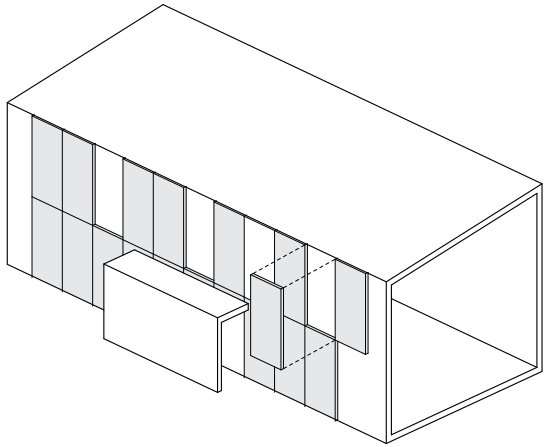
SHELL + ENCLOSURE



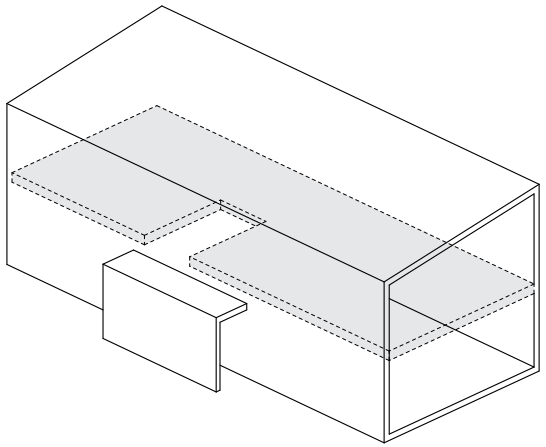
STRUCTURE



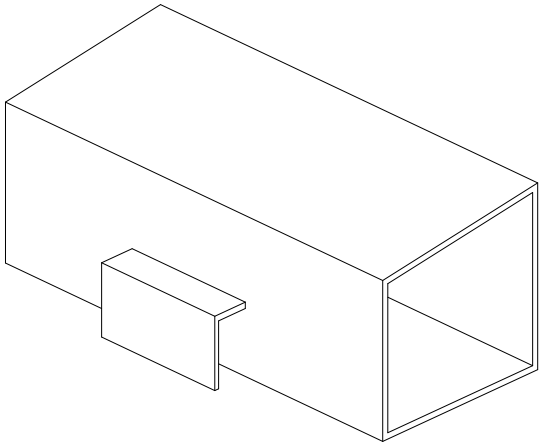
INTERIOR ARRANGEMENT



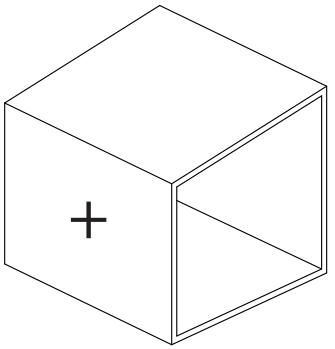
ENCLOSURE

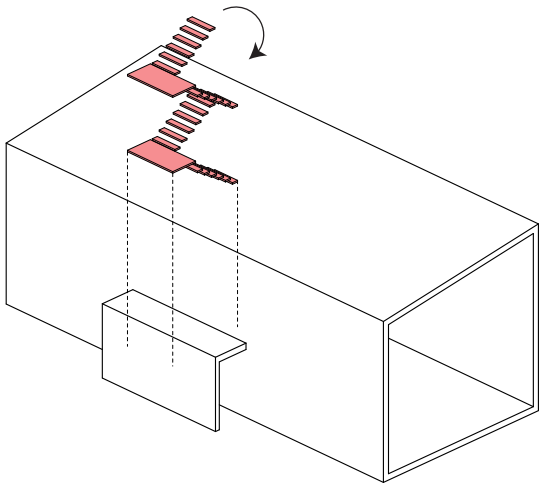


SECOND FLOOR

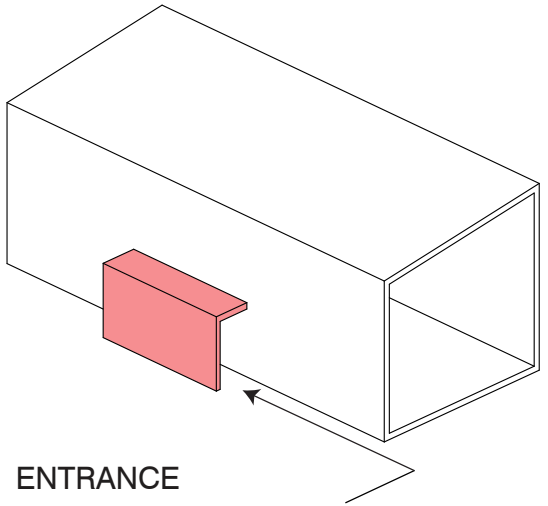


STUDIO APT / GARAGE

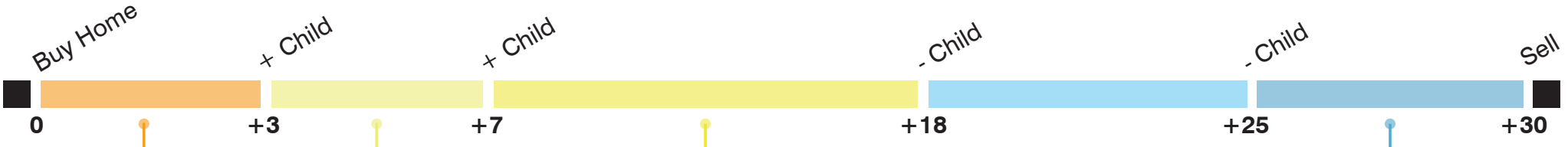




MODULAR STAIR



ENTRANCE



1

COUPLE

Mean Family Income:
$44,953
Median Male Earnings (full):
$47,550
Median Female Earnings (full):
$22,150

EST. HOUSEHOLD INCOME:
$40,000/yr
3,333/month

2

COUPLE + CHILD

Mean Family Income:
$44,953
Median Male Earnings (full):
$47,550
Median Female Earnings (full):
$22,150

EST. HOUSEHOLD INCOME:
$50,000/yr
4,167/month

3

COUPLE + TWO CHILDREN

Mean Family Income:
$44,953
Median Male Earnings (full):
$47,550
Median Female Earnings (full):
$22,150

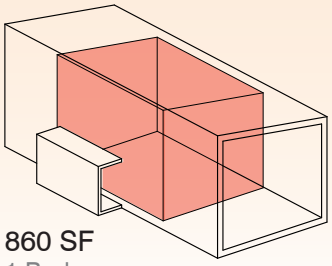
EST. HOUSEHOLD INCOME:
$60,000/yr
5,000/month

COUPLE

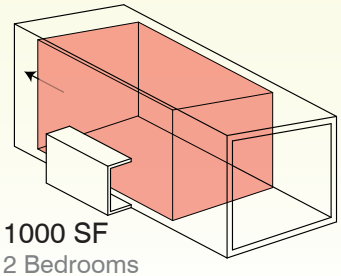
Mean Family Income:
$44,953
Median Female Earnings (full):
$22,150

EST. HOUSEHOLD INCOME:
$35,000/yr
2,916/month

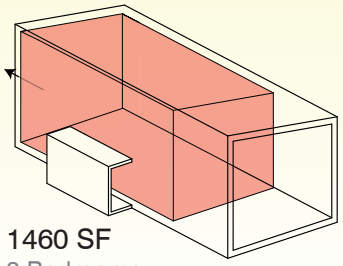
PROPOSED HOME



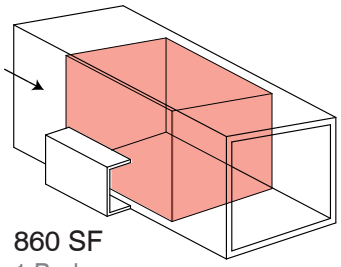
860 SF
1 Bedroom



1000 SF
2 Bedrooms



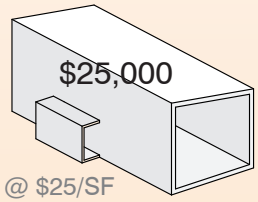
1460 SF
3 Bedrooms



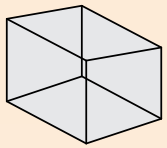
860 SF
1 Bedroom

COUPLE

SHELL



LIVING SPACE



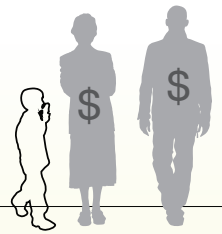
Mortgage Amount:
86,000
30 year, fixed interest
3.50%

PAYMENT:
$386/month

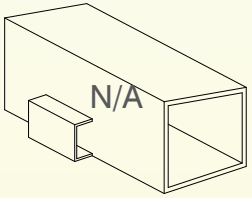
PERCENTAGE OF INCOME:
11.50%

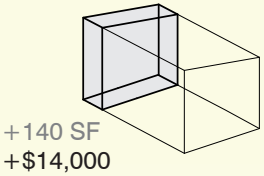
Possible Rent Income (Studio Apt.):
$350/month

Payment - Rent Income:
$36/month



COUPLE + CHILD





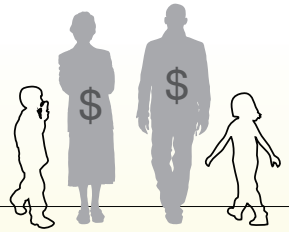
Mortgage Amount:
$81,000+$14,000 ($100,000)
30 year, fixed interest
3.50%

PAYMENT:
$427/month

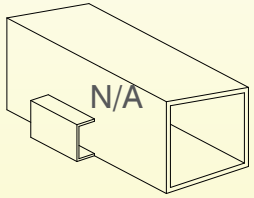
PERCENTAGE OF INCOME:
10.20%

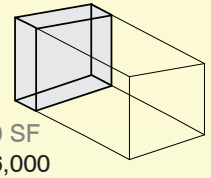
Possible Rent Income (Studio Apt.):
$350/month

Payment - Rent Income:
$77/month



COUPLE + TWO CHILDREN





Mortgage Amount:
$88,000+$46,000 ($146,000)
30 year, fixed interest
3.50%

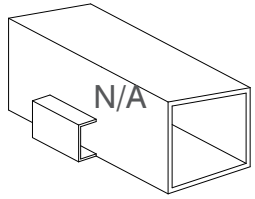
PAYMENT:
$602/month

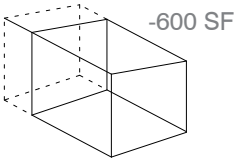
PERCENTAGE OF INCOME:
12.00%

Possible Rent Income (Studio Apt.):
$350/month

Payment - Rent Income:
$252/month

COUPLE





Mortgage Amount:
$68,000 ($146,000)
30 year, fixed interest
3.50%

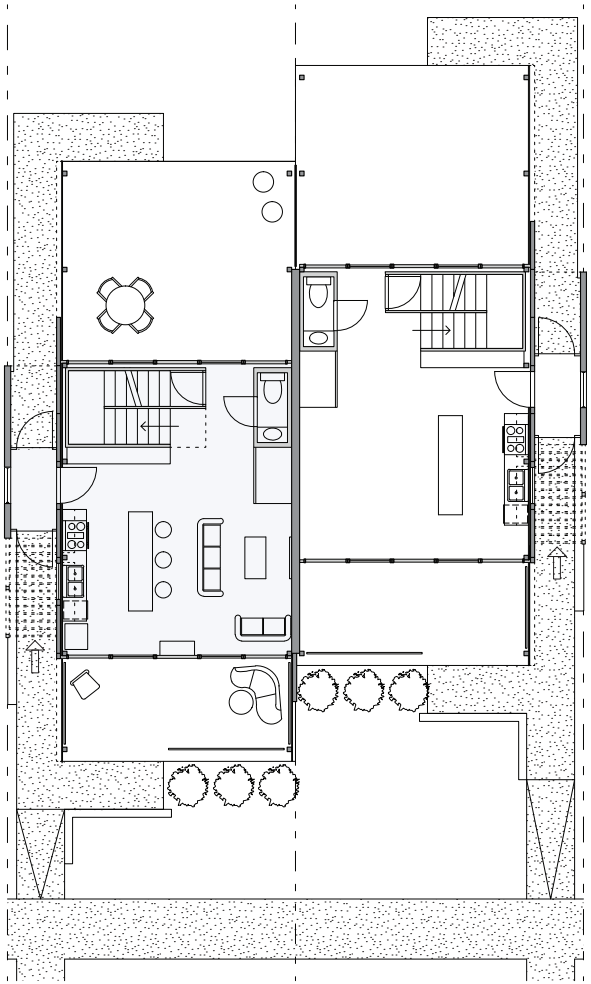
PAYMENT:
$602/month

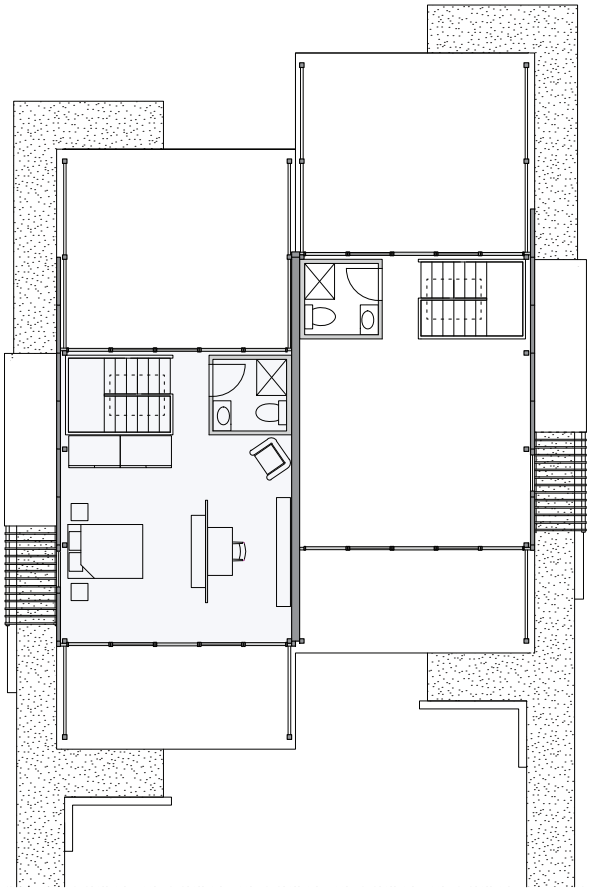
PERCENTAGE OF INCOME:
20.60%

Possible Rent Income (Studio Apt.):
$350/month

Payment - Rent Income:
$252/month

BASIC UNIT (ALL SCENARIOS)





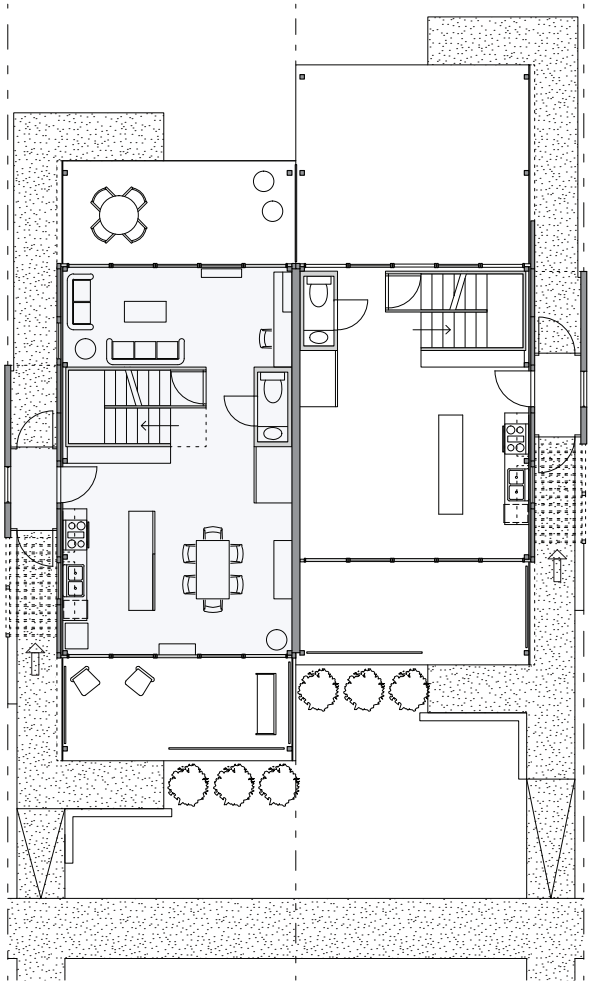
SECOND FLOOR

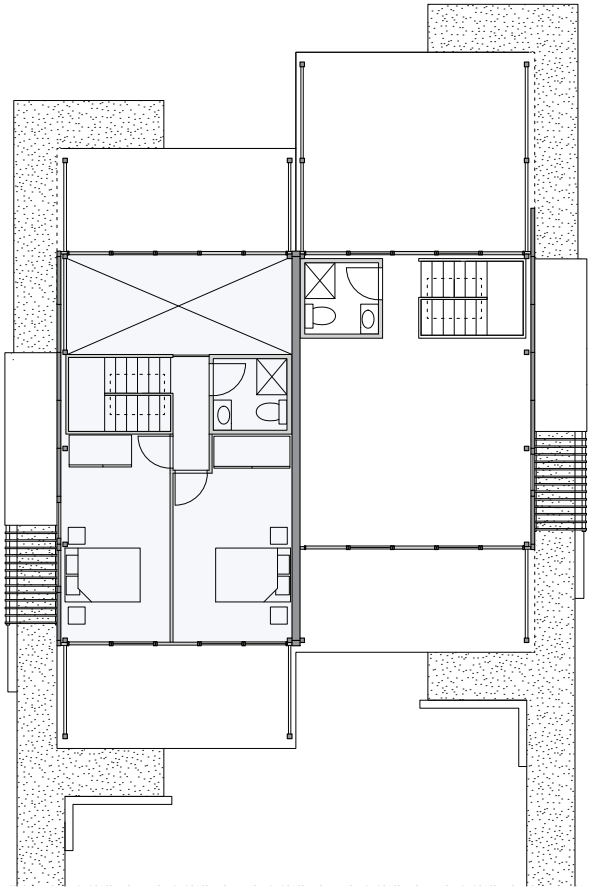
PHASE ONE

SCALE: 1/8” = 1’ - 0”

GROUND FLOOR

SCENARIO ONE

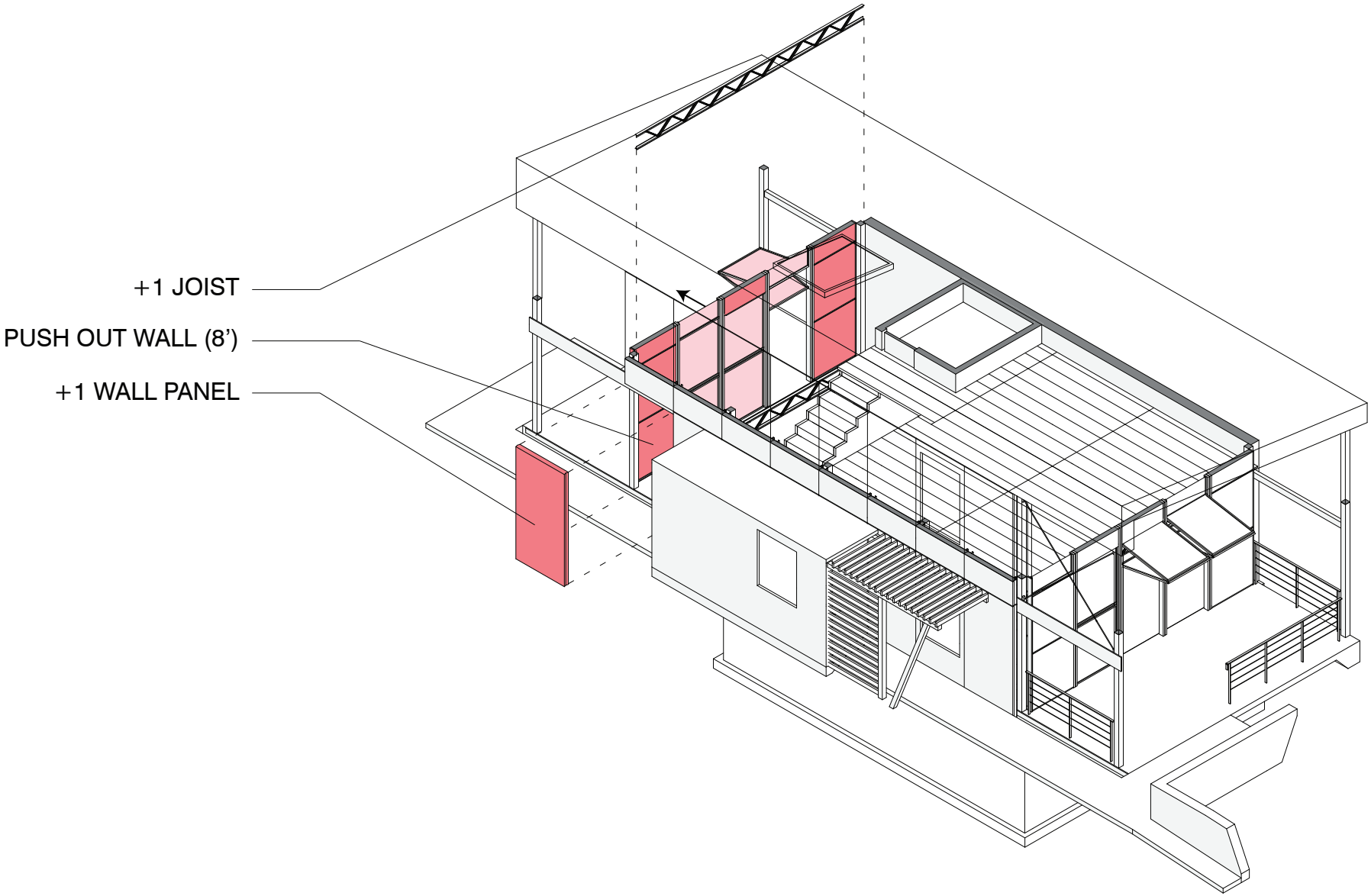


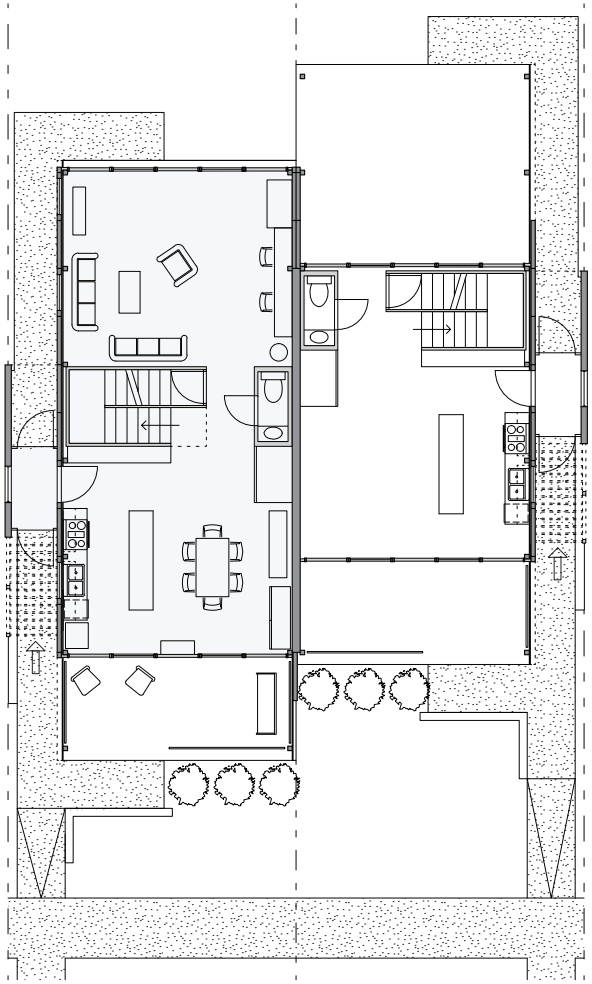


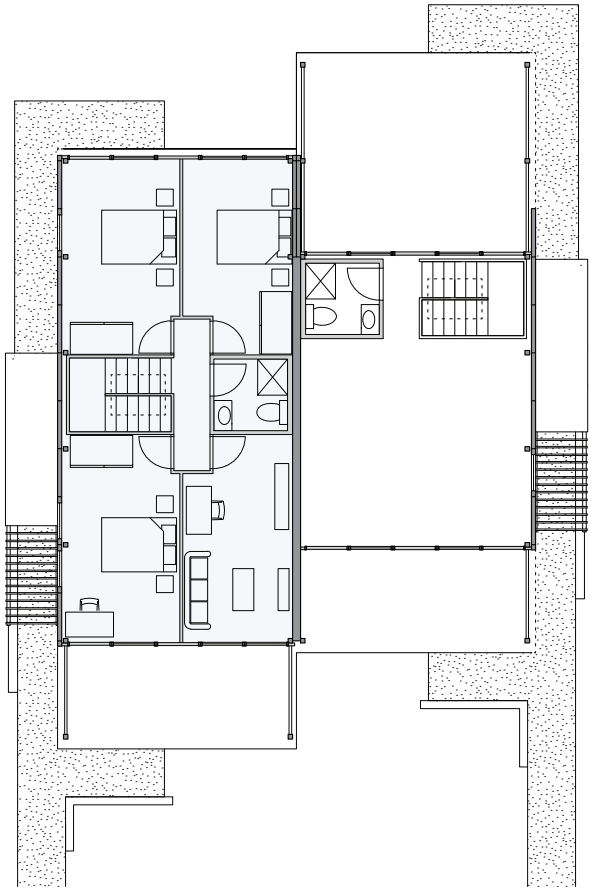
SECOND FLOOR

PHASE TWO

GROUND FLOOR


+1 JOIST
PUSH OUT WALL (8')
+1 WALL PANEL

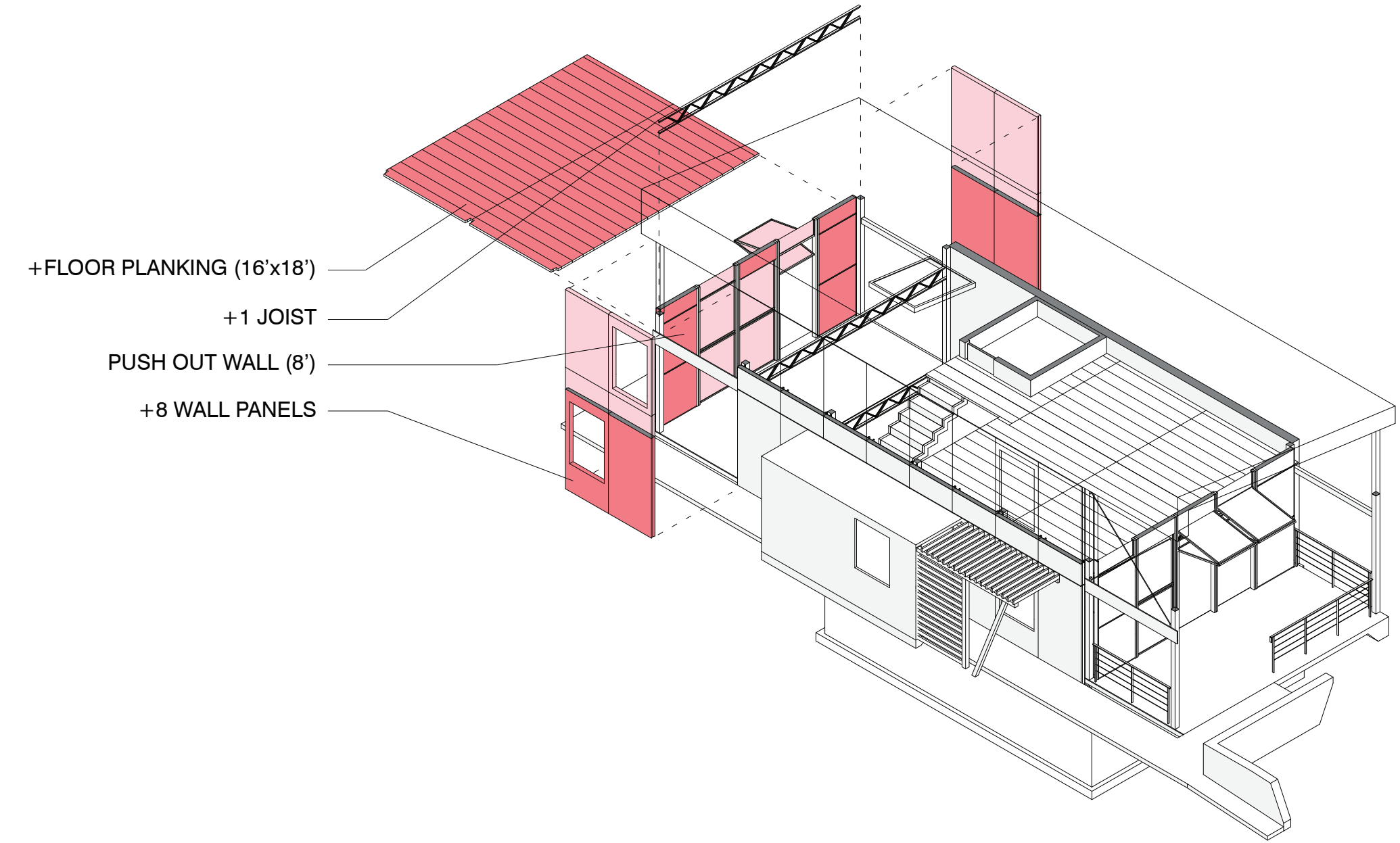


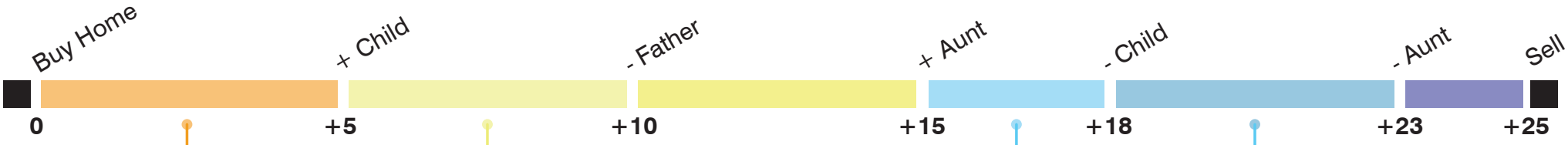


SECOND FLOOR

PHASE THREE

GROUND FLOOR


+FLOOR PLANKING (16’x18’)
+1 JOIST
PUSH OUT WALL (8’)
+8 WALL PANELS



1

2

3

COUPLE

Mean Family Income:
$44,953
Median Male Earnings (full):
$47,550
Median Female Earnings (full):
$22,150

EST. HOUSEHOLD INCOME:
$50,000/yr
4,167/month

COUPLE + CHILD

Mean Family Income:
$44,953
Median Male Earnings (full):
$47,550
Median Female Earnings (full):
$22,150

EST. HOUSEHOLD INCOME:
$50,000/yr
4,167/month

SINGLE MOTHER + CHILD + DISABLED AUNT

Median Female Earnings (full):
$22,150

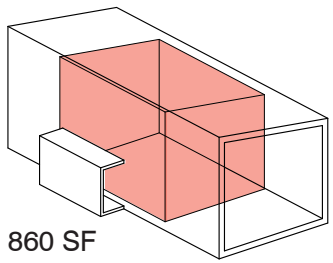
EST. HOUSEHOLD INCOME:
$25,000/yr
2,083/month

SINGLE MOTHER + DISABLED AUNT (ret.)

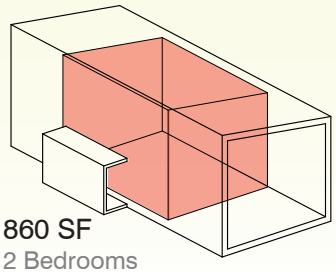
Median Female Earnings (full):
$22,150
Mean Retirement Income:
$9,840

EST. HOUSEHOLD INCOME:
$35,000/yr
2,916/month

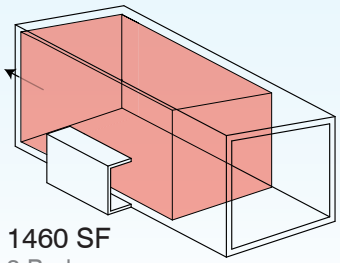
PROPOSED HOME



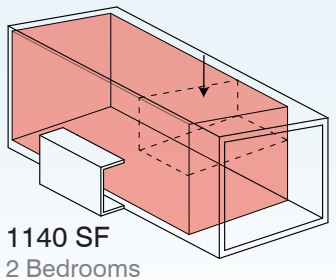
860 SF
1 Bedroom



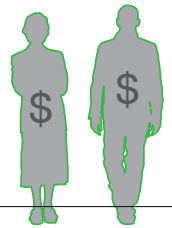
860 SF
2 Bedrooms



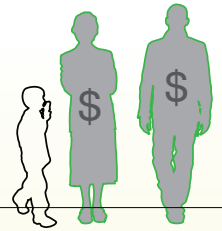
1460 SF
3 Bedrooms



1140 SF
2 Bedrooms



1



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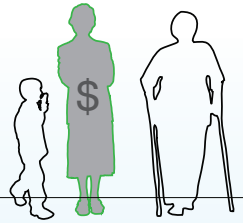

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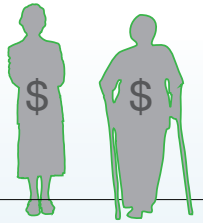
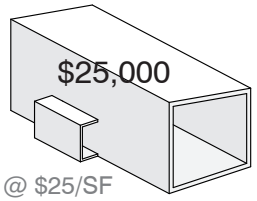
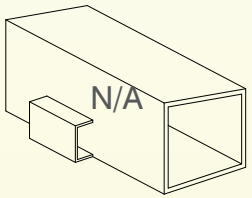
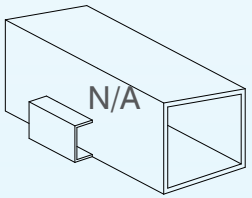
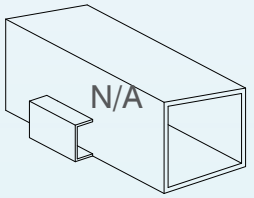
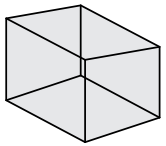
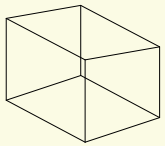
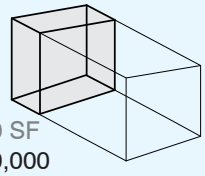
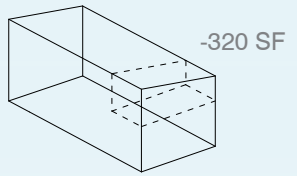
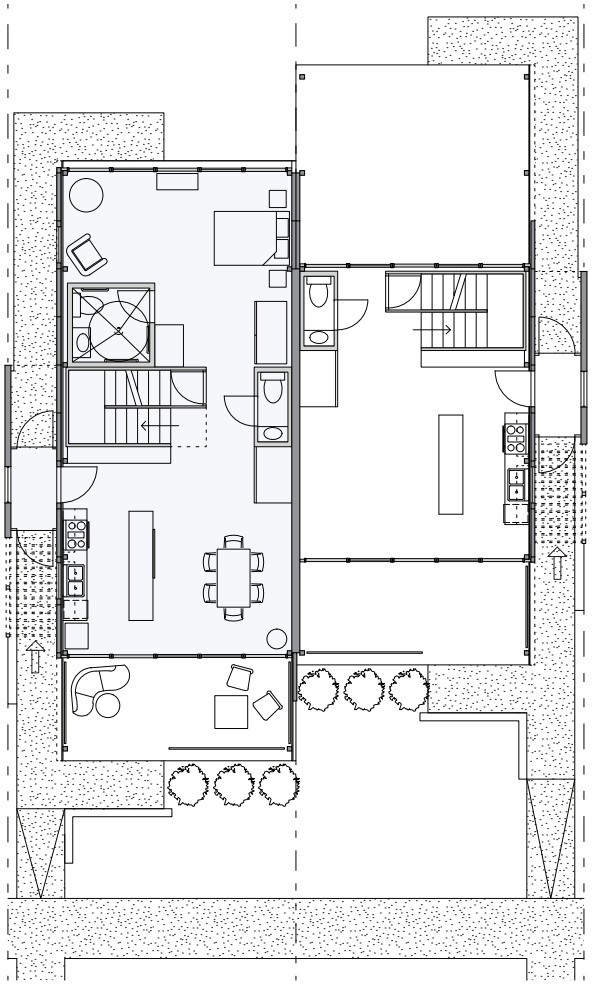
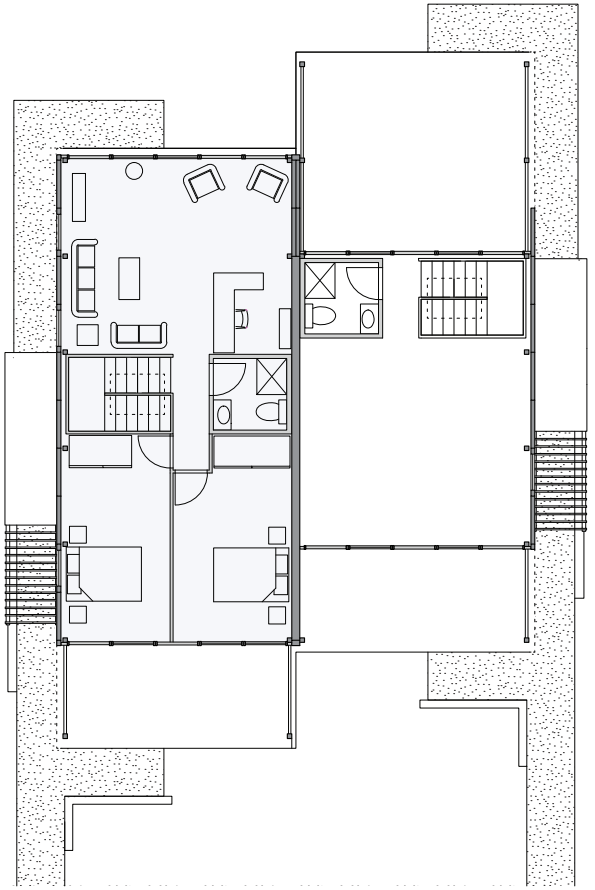


	COUPLE	COUPLE + CHILD	SINGLE MOTHER + CHILD + DISABLED AUNT	SINGLE MOTHER + DISABLED AUNT (ret.)
SHELL				
LIVING SPACE				
Mortgage Amount:	$86,000 30 year, fixed interest 3.50%	$78,000 ($86,000) 30 year, fixed interest 3.50%	$58,000+$60,000 ($146,000) 30 year, fixed interest 3.50%	$111,000 ($146,000) 30 year, fixed interest 3.50%
PAYMENT:	**$386/month**	**$386/month**	**$530/month**	**$530/month**
PERCENTAGE OF INCOME:	**9.30%**	**9.30%**	**25.50%**	**18.20%**
Possible Rent Income (Studio Apt.):	$350/month	$350/month	$350/month	$350/month
Payment - Rent Income:	**$36/month**	**$36/month**	**$180/month**	**$180/month**

SCENARIO TWO



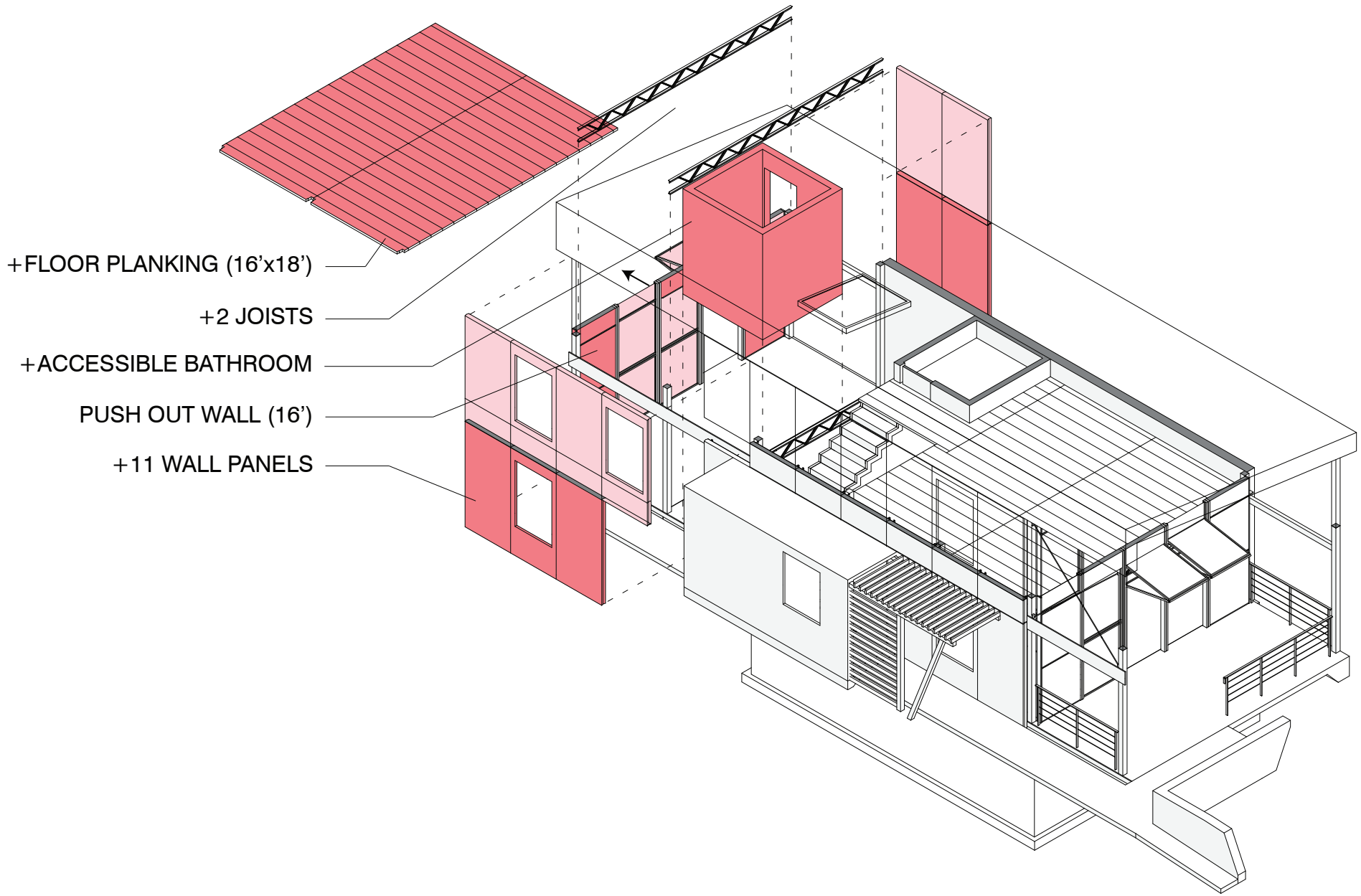


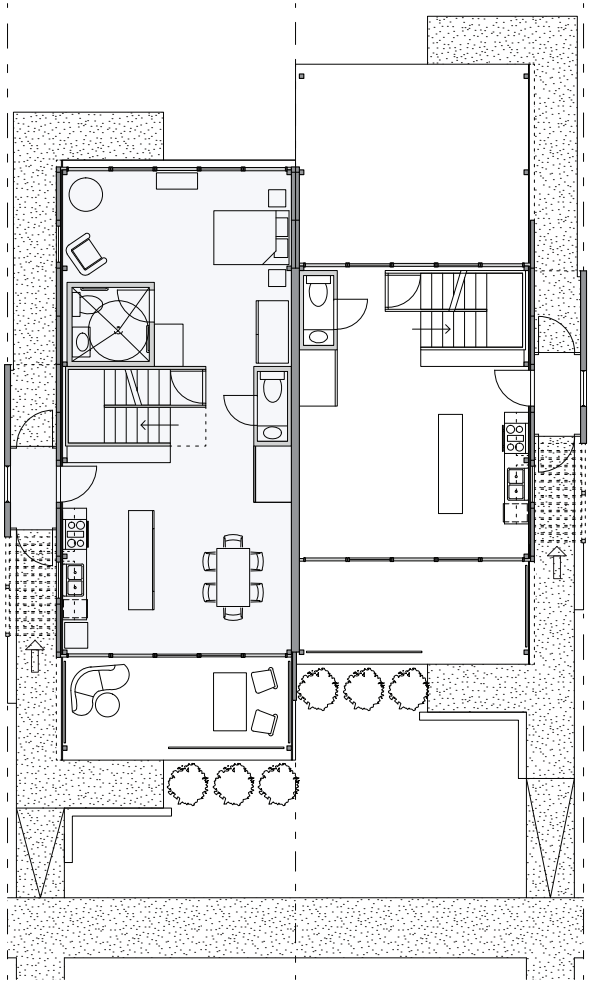
SECOND FLOOR

PHASE TWO

SCALE: 1/8” = 1’ - 0”

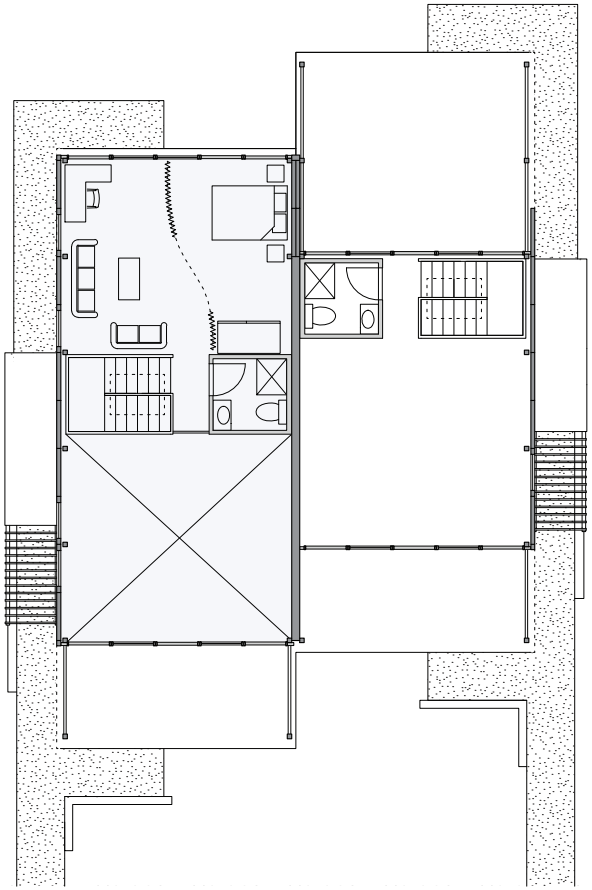
GROUND FLOOR


+FLOOR PLANKING (16'x18')
+2 JOISTS
+ACCESSIBLE BATHROOM
PUSH OUT WALL (16')
+11 WALL PANELS

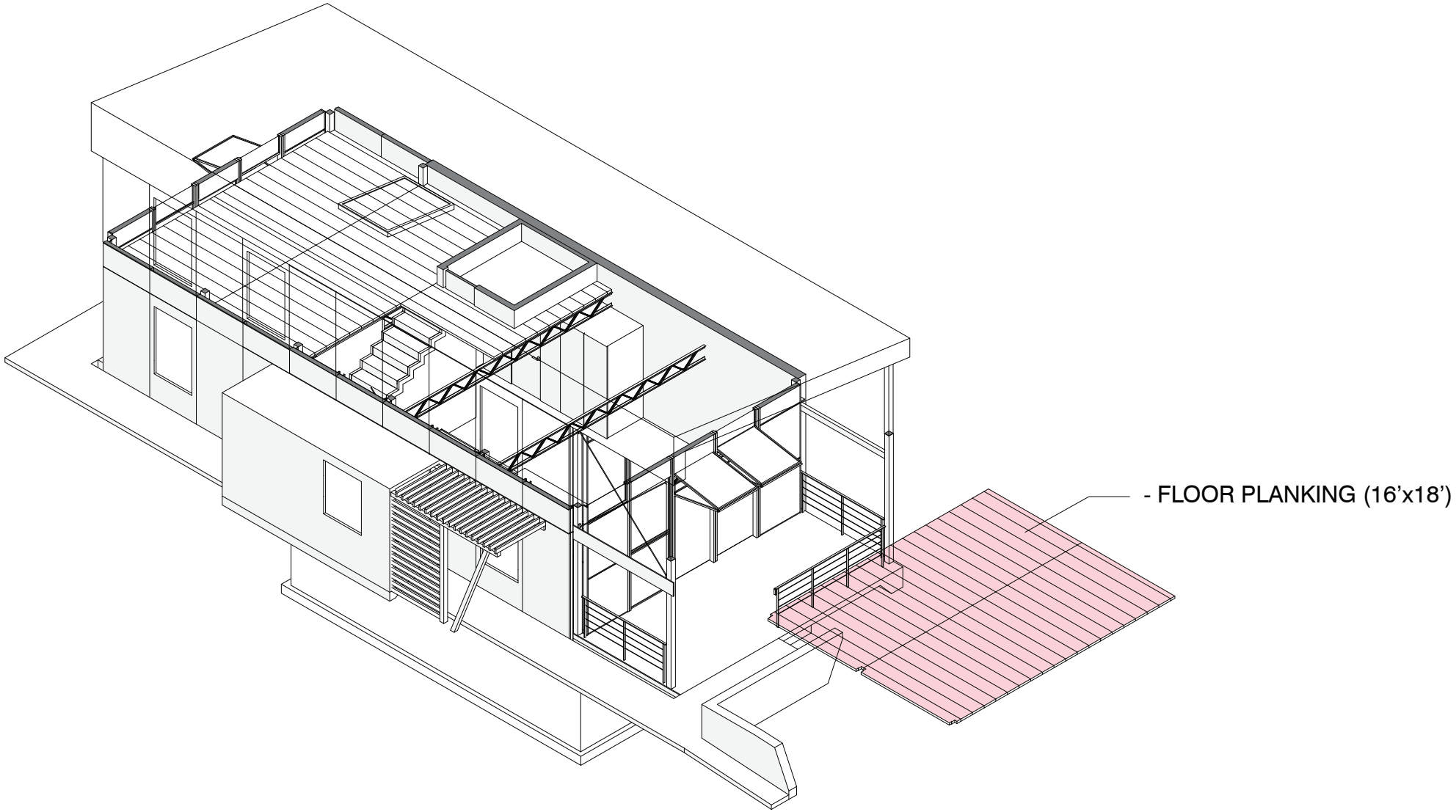


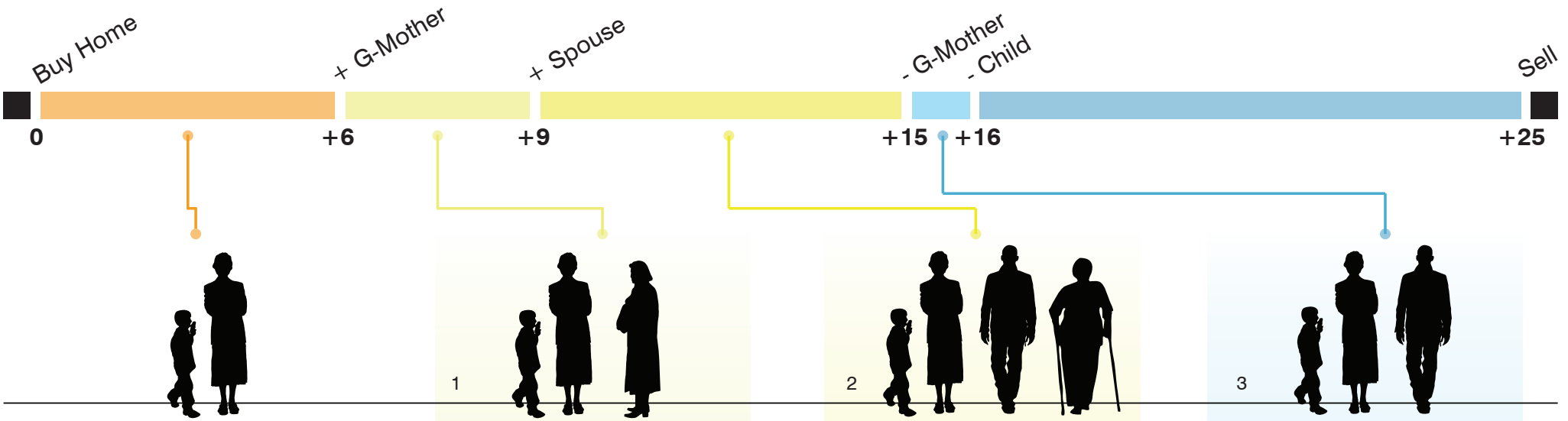
PHASE THREE

GROUND FLOOR



SECOND FLOOR


- FLOOR PLANKING (16’x18’)



MOTHER + CHILD

Mean Family Income:
$44,953
Median Female Earnings (full):
$22,150
Mean Retirement Income:
$9,840

EST. HOUSEHOLD INCOME:
$25,000/yr
2,083/month

MOTHER + CHILD + GRANDMOTHER

Mean Family Income:
$44,953
Median Female Earnings (full):
$22,150
Mean Retirement Income:
$9,840

EST. HOUSEHOLD INCOME:
$35,000/yr
2,916/month

MOTHER + SPOUSE + CHILD + DISABLED GRANDMOTHER

Mean Family Income:
$44,953
Median Male Earnings (full):
$47,550
Median Female Earnings (full):
$22,150

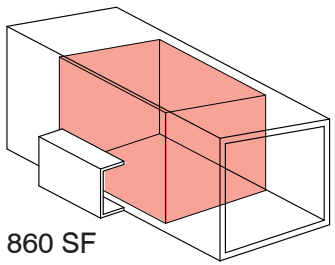
EST. HOUSEHOLD INCOME:
$60,000/yr
5,000/month

MOTHER + SPOUSE + CHILD THREE RENTERS

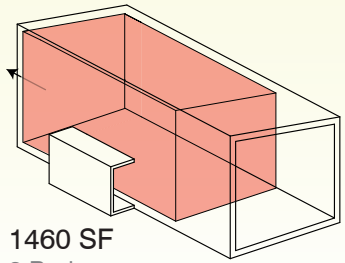
Mean Family Income:
$44,953
Median Male Earnings (full):
$47,550
Median Female Earnings (full):
$22,150

EST. HOUSEHOLD INCOME:
$50,000/yr
4,166/month

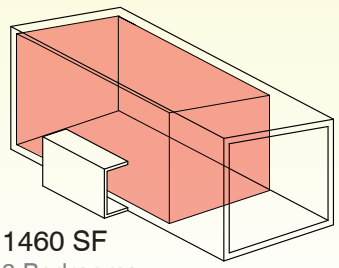
PROPOSED HOME



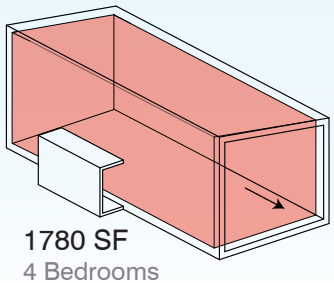
860 SF
2 Bedrooms



1460 SF
3 Bedrooms

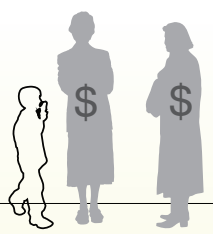


1460 SF
3 Bedrooms



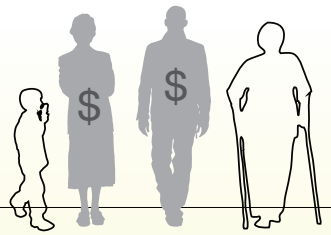
1780 SF
4 Bedrooms

MOTHER + CHILD



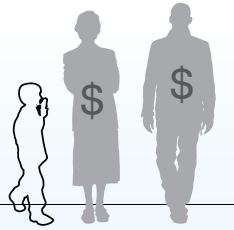
1

MOTHER + CHILD + GRANDMOTHER



2

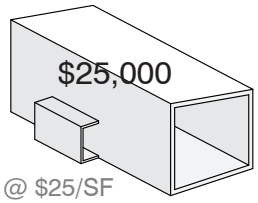
MOTHER + SPOUSE + CHILD + DISABLED GRANDMOTHER



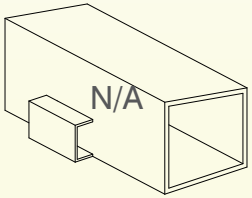
3

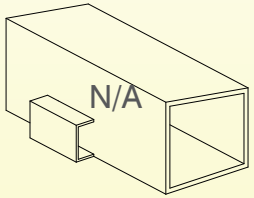
MOTHER + SPOUSE + CHILD
THREE RENTERS

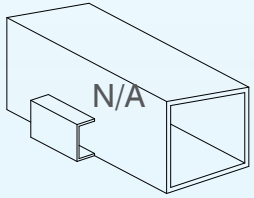
SHELL



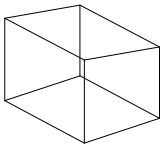
@ $25/SF

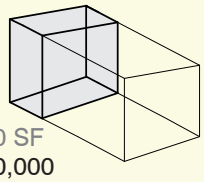




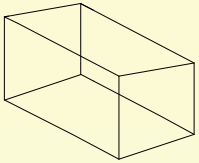


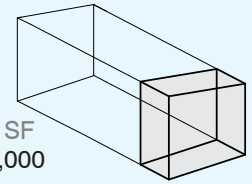
LIVING SPACE





+600 SF
+$60,000





+320 SF
+$32,000

Mortgage Amount:
86,000
30 year, fixed interest
3.50%

PAYMENT:
$386/month

PERCENTAGE OF INCOME:
11.50%

Possible Rent Income (Studio Apt.):
$350/month

Payment - Rent Income:
$36/month

Mortgage Amount:
$76,000+$60,000 ($146,000)
30 year, fixed interest
3.50%

PAYMENT:
$610/month

PERCENTAGE OF INCOME:
20.90%

Possible Rent Income (Studio Apt.):
$350/month

Payment - Rent Income:
$260/month

Mortgage Amount:
$128,000 ($146,000)
30 year, fixed interest
3.50%

PAYMENT:
$575/month

PERCENTAGE OF INCOME:
11.50%

Possible Rent Income (Studio Apt.):
$350/month

Payment - Rent Income:
$225/month

Mortgage Amount:
$110,000+$32,000 ($178,000)
30 year, fixed interest
3.50%

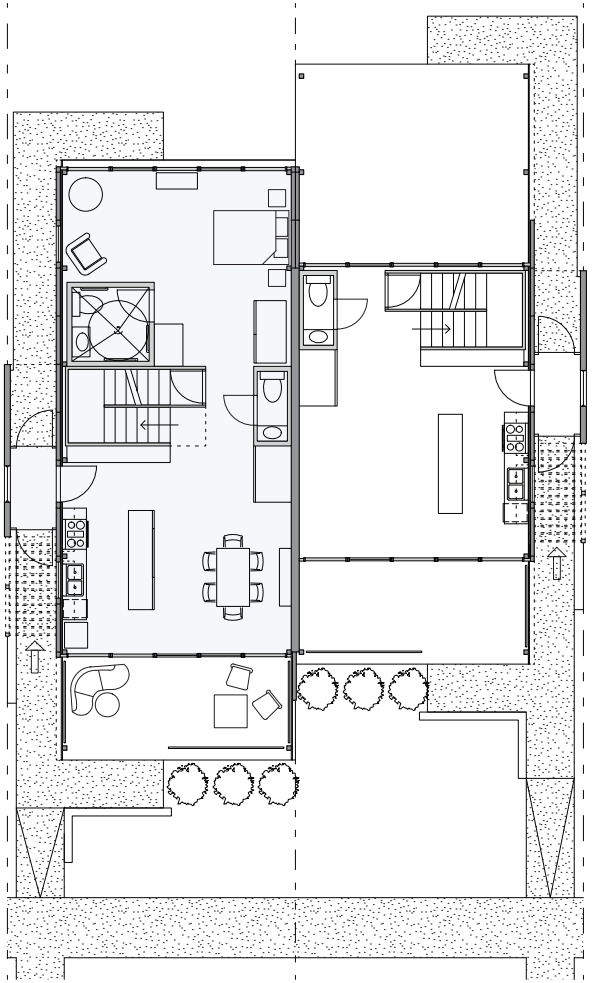
PAYMENT:
$638/month

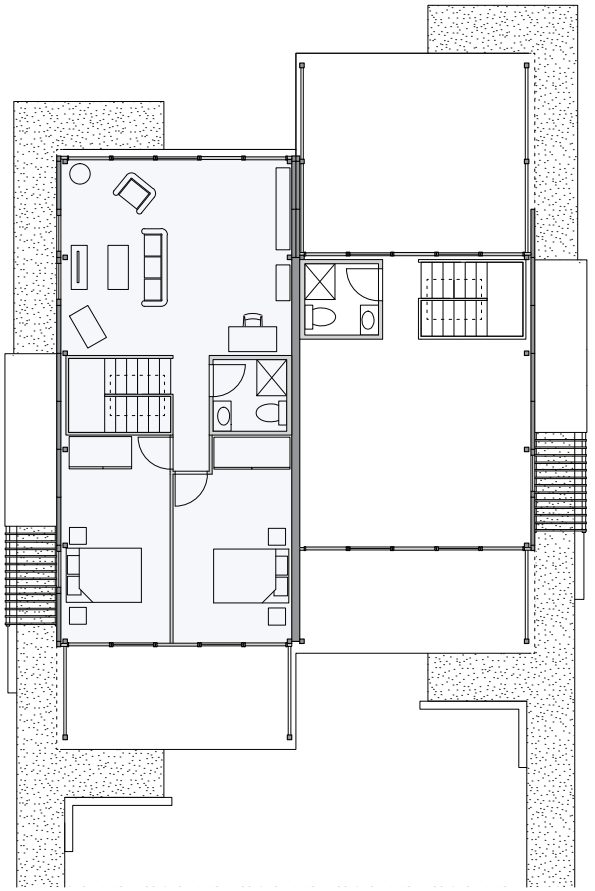
PERCENTAGE OF INCOME:
15.30%

Possible Rent Income (Studio+2nd):
$350+$500/month

Payment - Rent Income:
$-212/month

SCENARIO THREE



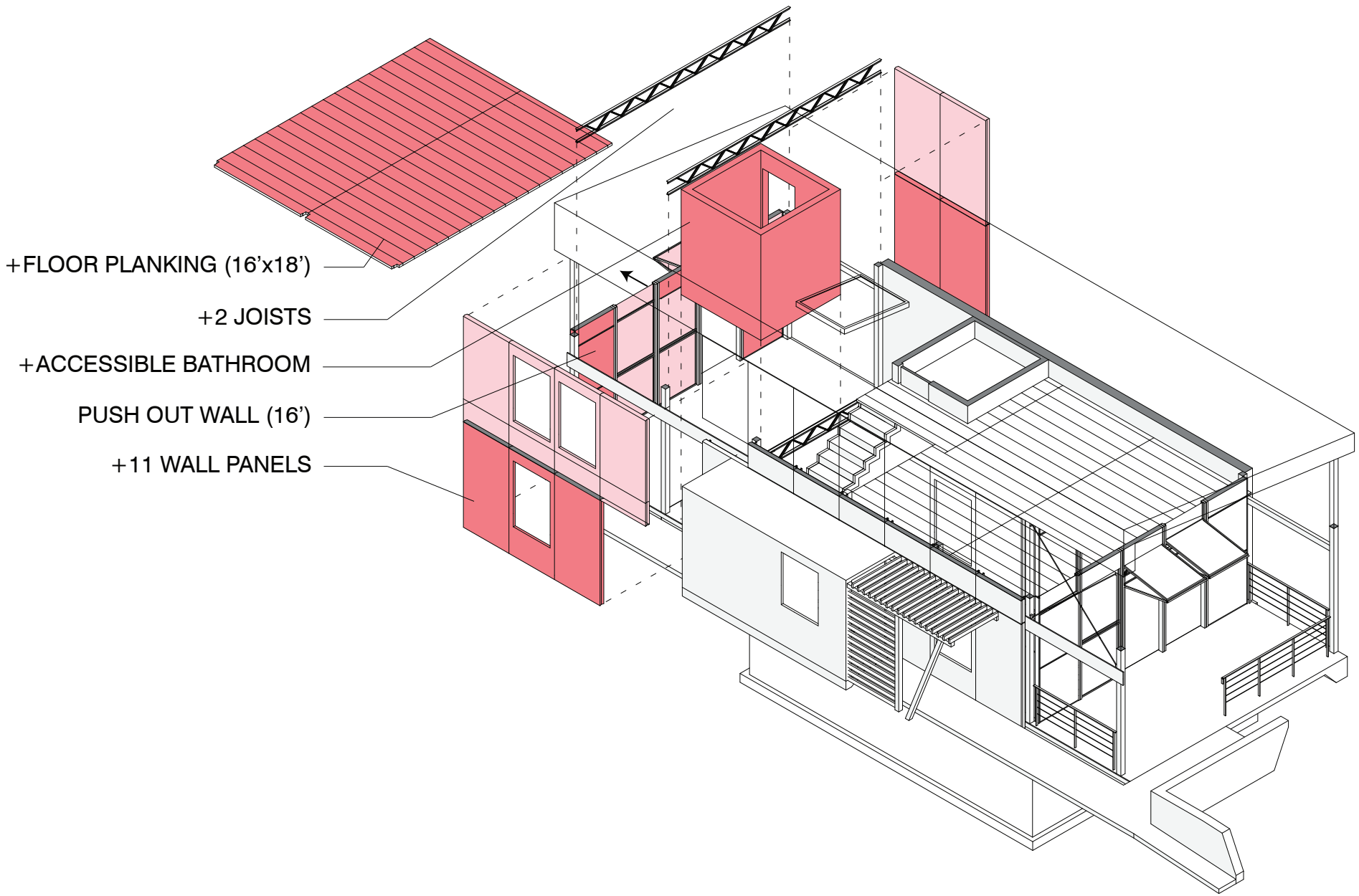


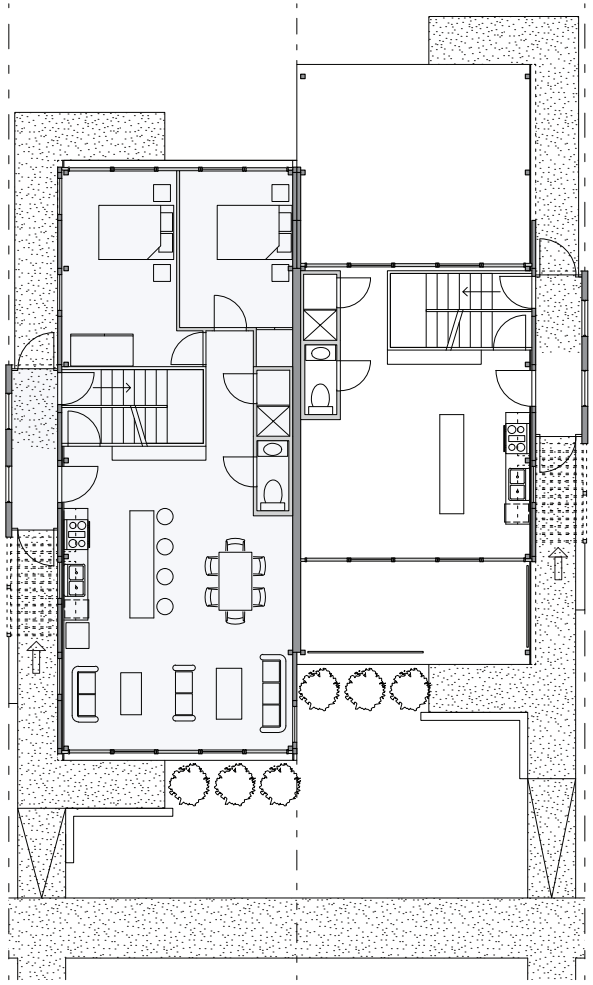
SECOND FLOOR

PHASE TWO

SCALE: 1/8” = 1’ - 0”

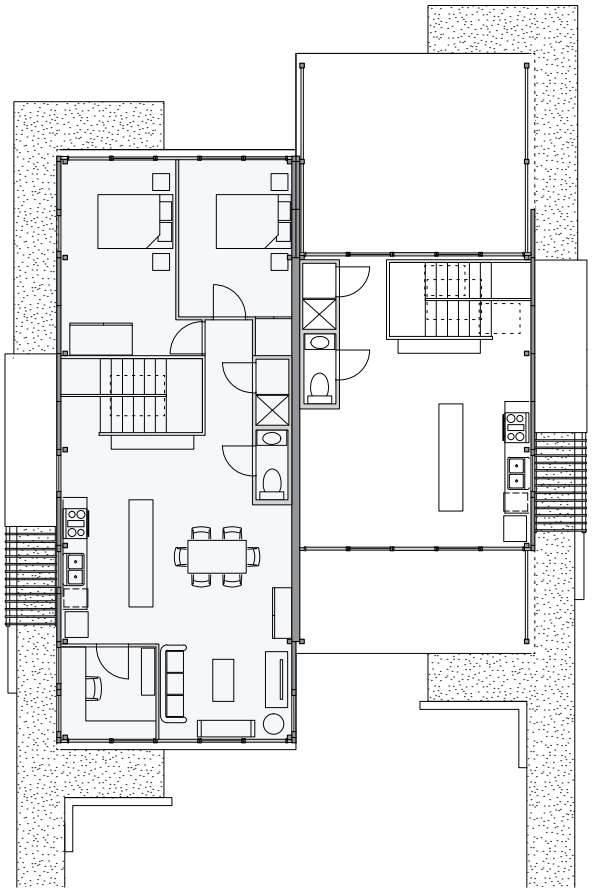
GROUND FLOOR


+FLOOR PLANKING (16'x18')
+2 JOISTS
+ACCESSIBLE BATHROOM
PUSH OUT WALL (16')
+11 WALL PANELS

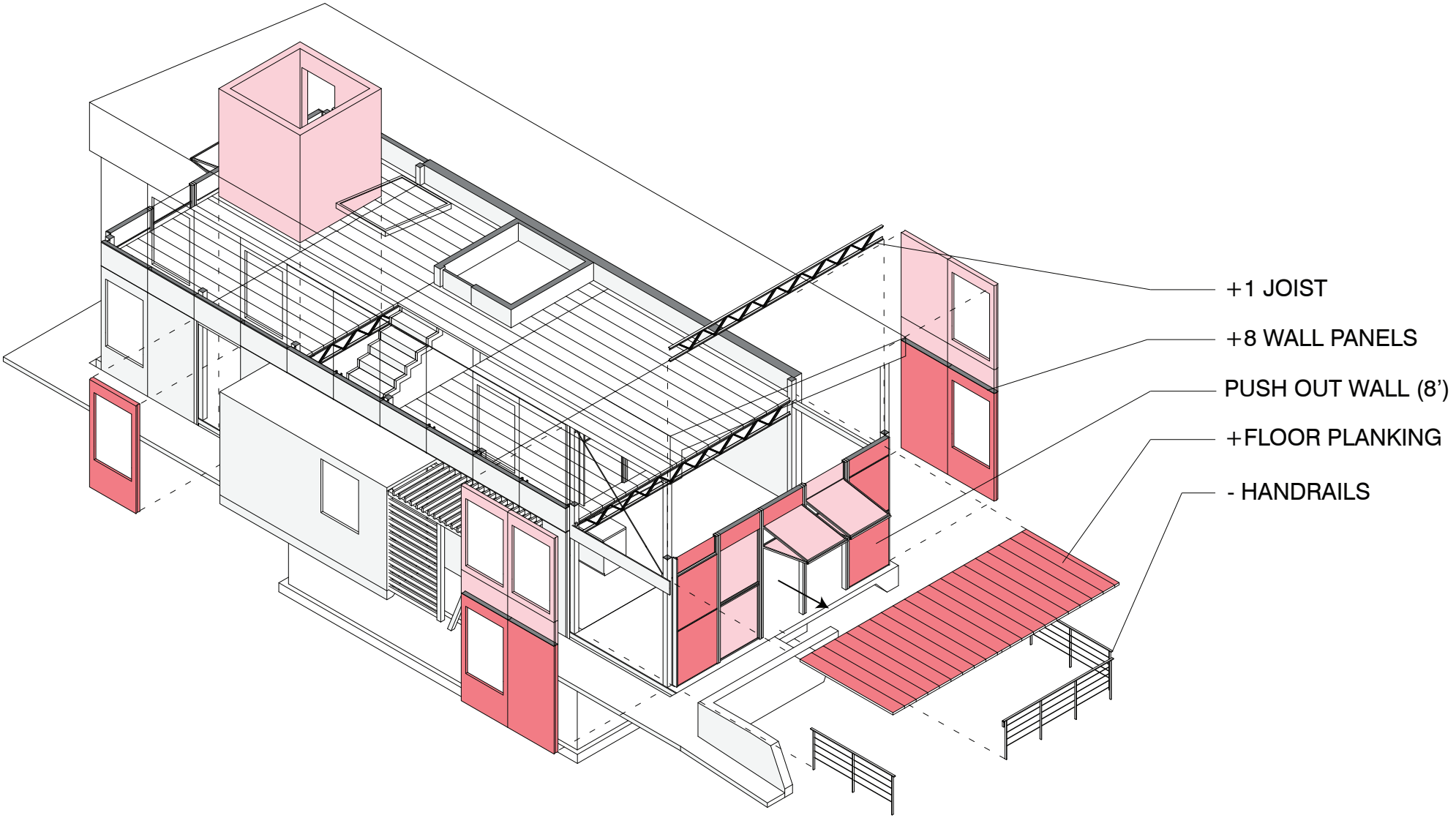


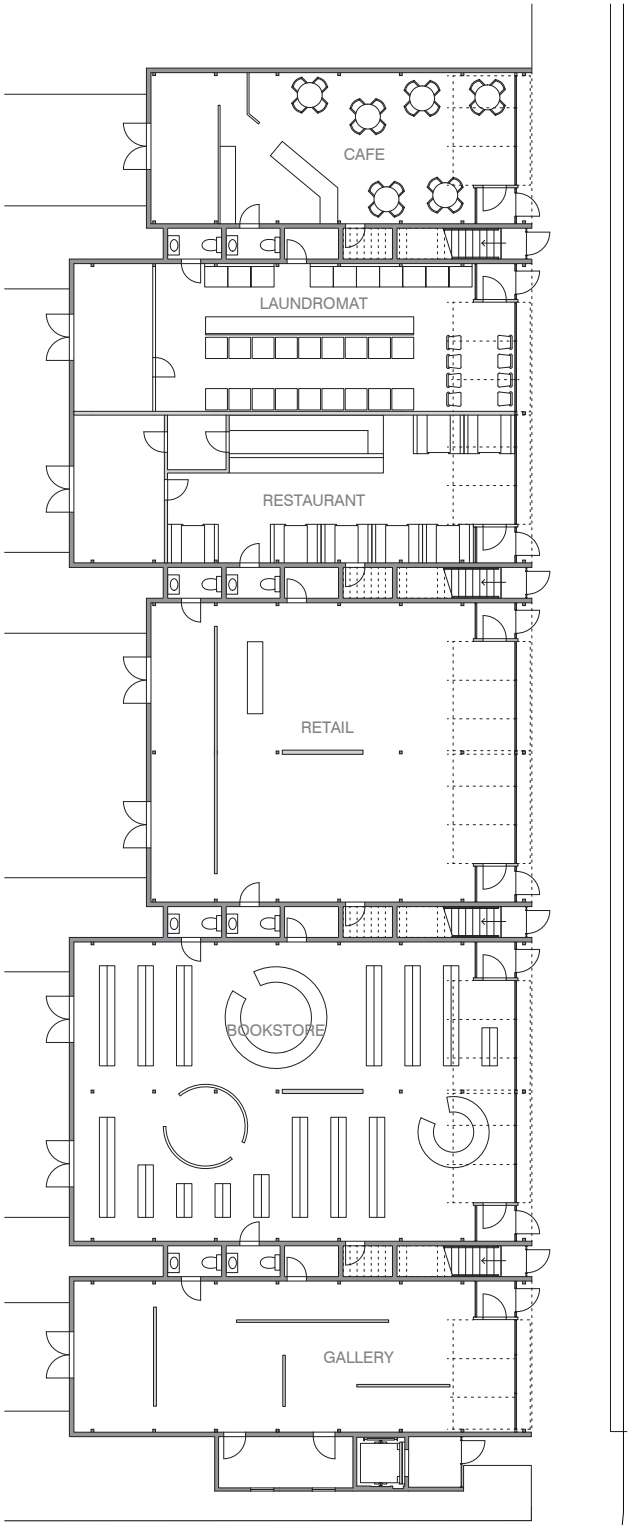
PHASE THREE

GROUND FLOOR

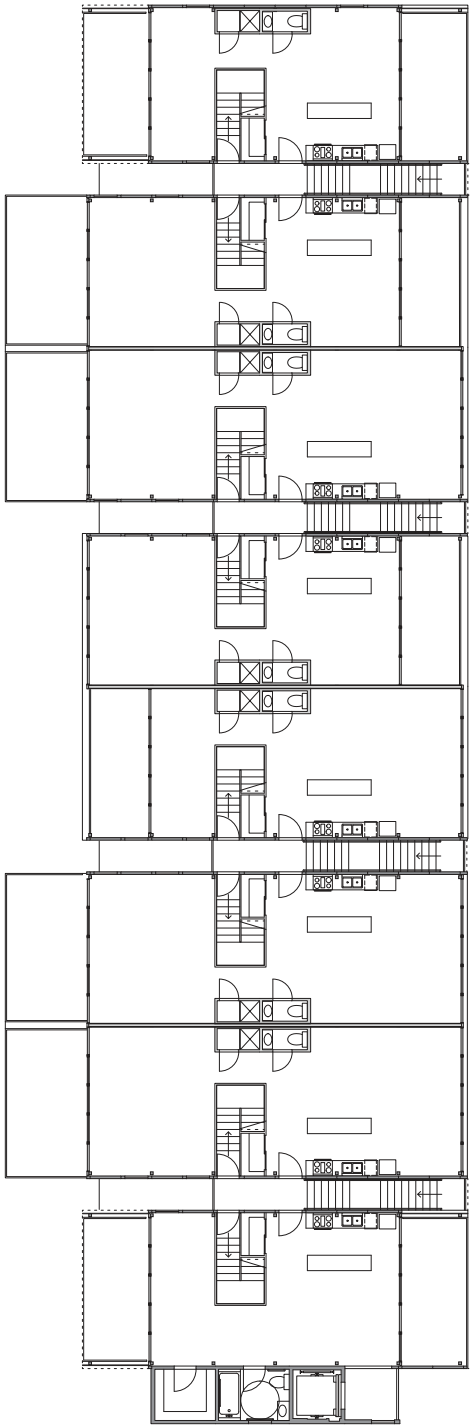


SECOND FLOOR

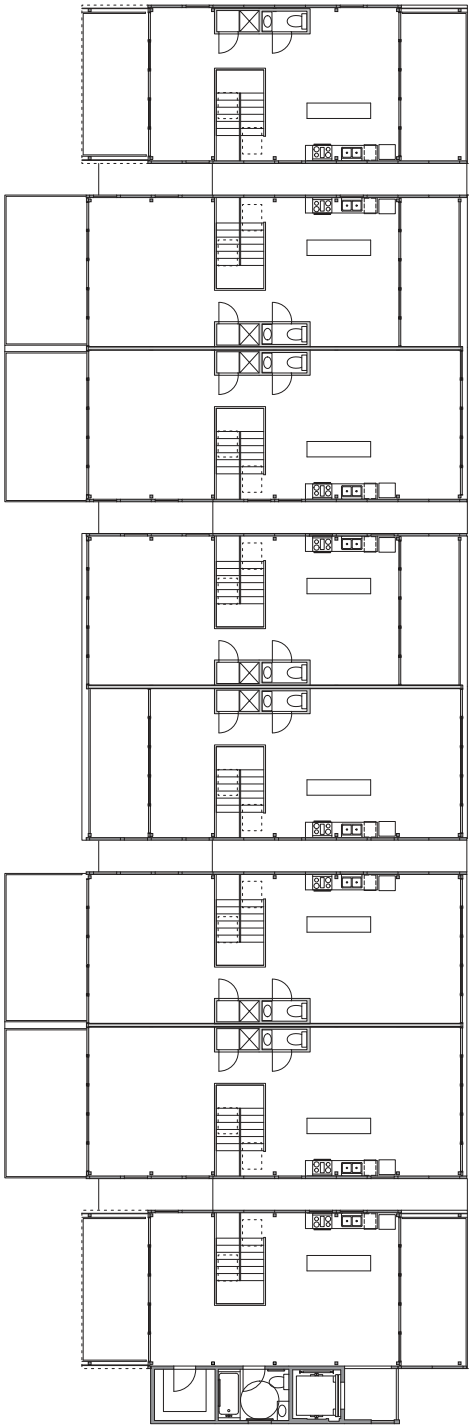

+1 JOIST
+8 WALL PANELS
PUSH OUT WALL (8')
+FLOOR PLANKING
- HANDRAILS



GROUND FLOOR: COMMERCIAL SPACE



SECOND FLOOR: APARTMENTS

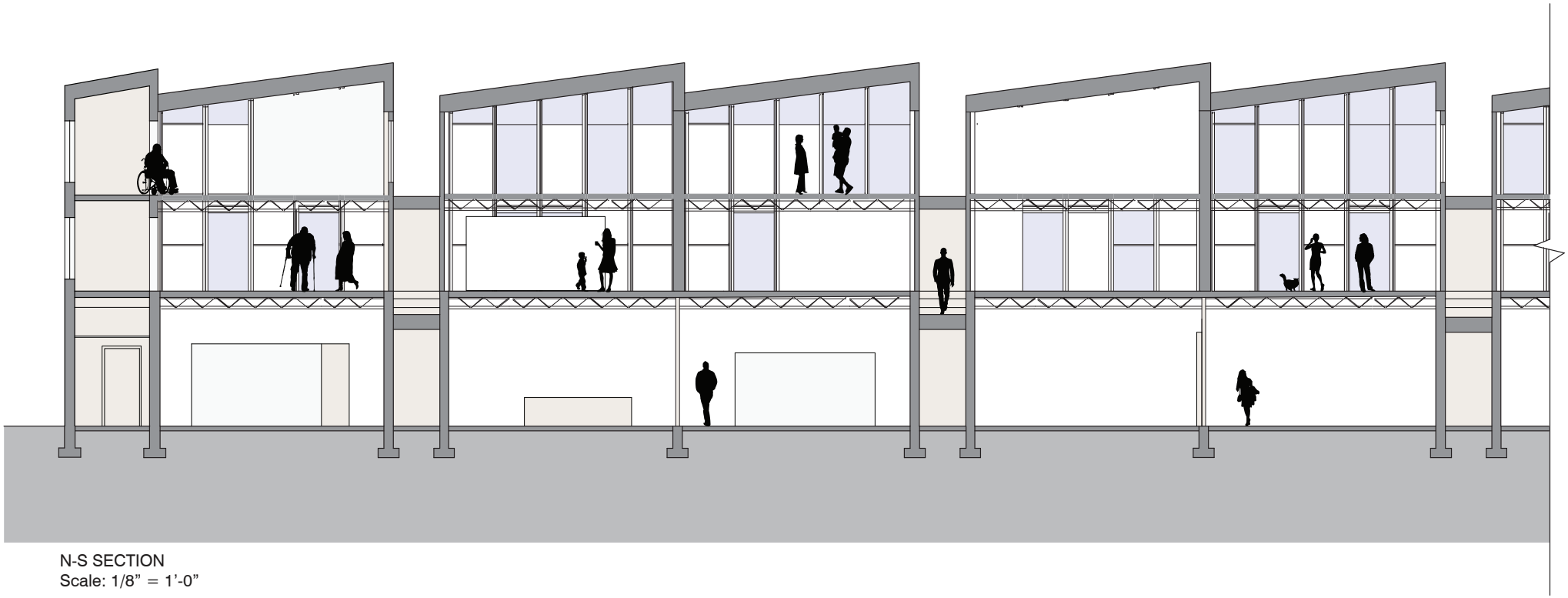


THIRD FLOOR: APARTMENTS

S. SALINA APARTMENTS

ALL SITE STRATEGIES

SCALE: 1/16” = 1’ - 0”



N-S SECTION

Scale: 1/8” = 1’-0”

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