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Re-Defining the "Cookie-Cutter" Development: Designing the Home Through Adjustable Architecture

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**RE-DEFINING THE “COOKIE-CUTTER” DEVELOPMENT:
DESIGNING THE HOME THROUGH ADJUSTABLE ARCHITECTURE**

A Thesis Presented

By

ALEXANDER L. KOSLOW

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

MASTER OF ARCHITECTURE

May 2012

Architecture + Design

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ABSTRACT

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MAY 2012

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Directed by: Professor Joseph Krupczynski

This thesis seeks to explore the architectural transformation of residential space for changes and adjustments as we find our lifestyles altering. With the understanding that change is often unpredictable, we must be prepared for adaptations to new and revised living environments. Change appears in many ways: marriage or cohabitation, having children, empty nesting, aging, caring for elder family members, illness, and death. Too often we design our homes for the present, with little thought of future needs. Universal and adjustable design must become an everyday part of an architect's repertoire when embarking on new projects with their clients. Even architects, working on “cookie cutter” projects, must bring a more sustainable approach to their designs. Taking a closer look on said “cookie cutter” projects, adjustable design must start from a broader spectrum, beyond the site, focusing on the development as a whole and its connection with its infrastructure. Within a community, camaraderie and conversation are major factors in the success of a residential development. The central focus of this paper will be the architectural adjustability of the home.

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CHAPTER 1

PRINCIPLES OF SUSTAINABILITY

1.1 Introduction

Sustainability, within the realm of architecture, has officially become the new black! It is however, not just fashionable, but timeless. It will serve us well for generations to come and help us to maintain a cop-esthetic relationship with our environment, our personal surroundings, and the people with whom we associate. To sustain, is to maintain, to “endure without giving way or yielding, to be the support of, as in a structure.”¹ It is the capability “of being continued with minimal long-term effect on the environment.”² Thus, the architect’s goals, from the moment of conception to the delivery of a project, is to make it enduring, versatile, adaptable, flexible, usable, and transferable. “Going green”, the new catch phrase for sustainability, has opened the public’s eyes to the challenges of living as one with the earth. As architects, it is our job and responsibility to do our part to help maintain the fragile eco-system we live in with the needs and desires of our clients, by delivering the most sustainably efficient product we can. This paper will explore those options in the course of discussing the history of residential/program layout, changes experienced throughout life, an analysis of precedent studies, and a proposal for solution, as it pertains to adjustable architecture.

¹ “Sustain,” *The American College Dictionary*, 1964 ed.

² “Sustainable,” *The Free Dictionary*, 5 May 2011 <<http://www.thefreedictionary.com/sustainable>>.

The previously mentioned “goals” of the architect is to make architecture enduring, versatile, adaptable, flexible, usable, and transferable while maintaining a solid and safe anchor (structure). These specifications should be the leading concepts by which architects design and construct. However, when most individuals think of “sustainability” they think only of products and systems used during and after construction such as the lumber used, types of insulation, Photo Voltaics, and passive systems, to name a few. When most imagine sustainable design, science and technology are typically at the forefront of their minds. As architects, we tend to design sustainably through the products we use and the types of systems we put in place. Rarely, do even we consider flexibility of space when contemplating sustainability. This has to change. In order for structures to withstand the changes of time, they must be able to adapt to the changing needs of their inhabitants so they do not become obsolete and “throw away” commodities. Embracing this concept is the only way for the architectural community to ensure the longevity and sustainability of its projects, especially for the ever changing home. These spaces must be versatile enough to accommodate their users every day needs, while at the same time, anticipating their future requirements and possible restrictions.

1.2 The Building and Endless Change

After graduating from Stanford University, with a degree in Biology, Stewart Brand joined the U.S. Army for active duty. During his two year

enlistment, he worked as a photojournalist out of the Pentagon. His strong artistic, photographic, and social interests lead to studying design at San Francisco Art Institute and photography at San Francisco State.³

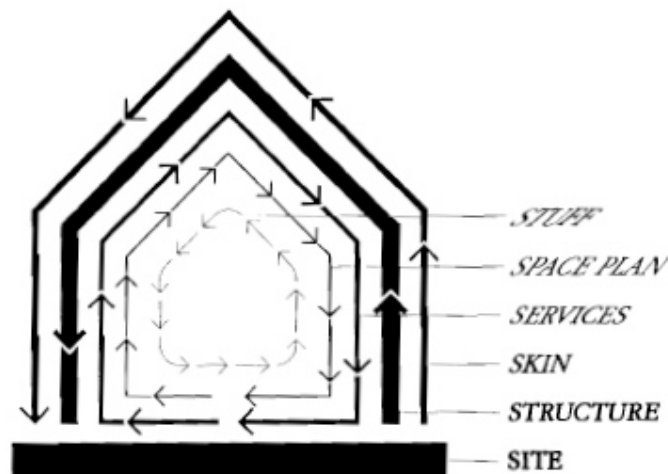
In his early 30's Brand began to publish papers concerning ecological issues, and became the founder of his most recognizable publication, *The Whole Earth Catalog*, an American counterculture catalog, published from 1968 to 1972.⁴ Supplementary to his various foundations and publications, Brand produced a plethora of written works, some of which included a focus in architecture. An ecologist and author/editor, an outsider to the discipline of architecture, he has strong feelings regarding this topic, triggering great discussion and enlightenment from his words. *How Buildings Learn: What Happens After They're Built*, is one of his most praised pieces of literature within the architectural and design communities. Throughout this text, Brand writes in a hip, management-theory style which is filled with acronyms and alliteration. He banters his way into real insights about the nature of change in buildings that so often seem permanent.

Brand discusses his basic theory in an early chapter, "Shearing Layers." He states that any building is indeed a hierarchy of pieces, each immanently changing at different rates. He refers to these as the "Six S's;" site, structure, skin, services, space plan, and stuff. The "Six S's" are explained as follows: the "Site is eternal"; the "Structural life ranges from 30 to 300 years (but few buildings

³ Stewart Brand, "Bio," Stewart Brand, Jan 2011 (Web) 7 May 2011 <http://web.me.com/stewartbrand/SB_homepage/Bio.html>.

⁴ Brand "Bio".

make it past 60, for other reasons)”; the skin “now change[s] every 20 years or so, to keep up with fashion or technology”; the services, “the working guts...wear out or obsolesce every 7 to 15 years”; the space plan, “the interior layout...[for] commercial space can change every 3 years or so; exceptionally quiet homes might wait 30 years”; and the innermost layer, stuff, “twitch around daily to monthly.”⁵



SHEARING LAYERS OF CHANGE.
Because of the different rates of change of its components, a building is always tearing itself apart.

Figure 1: Shearing Layers of Change

One component Brand does not discuss, which I feel is a pivotal key and the most significant “S”, is *Self*. Although the “Six S’s” depend on the individual for these changes to occur, it is important to discuss and highlight *Self* as its own component. One’s personality and persona are continuously evolving. They are the rationale that motivates change, that translates into the change we see in our

⁵ Stewart Brand, *How Buildings Learn: What Happens After They’re Built* (New York: Penguin Books, 1995) 13.

buildings. This will be further discussed in Chapter 4: Programming For Life Adjustments.

It seems as if Brand beams with joy as he berates and criticizes architects for designing buildings as sculptural objects, unable to move, adapt, or even change with time. They are perfect in their moment of construction, but upon completion, they become obsolete. The following quote is an example of the unadaptability Brand refers to when not considering the future and the natural changes that take place in our daily lives.

In the end, the most valuable thing I learned was that I could let my house go. When my life changed, and I outgrew at last my need for a one-woman incubator, I put my house on the market and sold it within a few months. Some friends could not believe I could part with the house I had worked so hard to create. But others, who knew me best, understood that I could leave it because it was no longer useful to me, and that there would in time be another house that was more useful to my growing and changing life.⁶

In this sense, architecture resembles the current electronics industry. As quickly as products (i.e. phones, televisions, computers, etc.) are being placed on the shelves, they become obsolete to even the products placed there the following day or even a few hours after. This constant evolution is described as “an illusion.” He continues, “[t]he old church is torn down, lovely as it is, because the parishioners have gone and no other use can be found for it. The old factory, the plainest of buildings, keeps being revived: first for a collection of light industries, then for artists’ studios, then for offices (with boutiques and a restaurant on the

⁶ Paul Rocheleau, June Sprigg, *Shaker Built: The Form and Function of Shaker Architecture* (New York: The Monacelli Press, 1994) 7.

ground floor), and something else is bound to follow”.⁷ What is built today is passé tomorrow.

The only difference between architecture and the electronics industry is the reason behind why they become obsolete. The electronics industry is constantly foreseeing the future. Those responsible are always analyzing what is to come, developing new technologies, and answering the questions of tomorrow instead of today. They focus on straying from what is expected, diverging from a linear path. Something becomes “obsolete”, in the electronic industry, not because it is old and out-dated, but because what shows up tomorrow has already been designed for the future. What was placed on the shelf yesterday, has already been superseded. Architecture, on the other hand, becomes “obsolete” because it follows a more linear path, typically a trend, which we refer to as programming. When that trend fades, so does the architecture. Brand provides a response to this: scenario planning.

Programming is the process that takes place in conversation between architect and client to discover the client’s need and desires, with a brief and narrow look into the future. Scenario planning accomplishes that very same task, but instead of progressing in a linear manner, it ebbs and flows and branches out, taking into consideration multiple future possibilities. “[W]here a plan is based on prediction, a strategy is designed to encompass unforeseeably changing conditions. A good strategy ensures that, no matter what happens, you

⁷ Stewart Brand, *How Buildings Learn: What Happens After They’re Built* (New York: Penguin Books, 1995) 2.

always have maneuvering room.”⁸ For example, Brand relays a typical situation: “We’ll wire the whole building with fiberoptic cable so we’ll be ahead of the game when broadband technology comes on line. (Then office technology veers toward wireless instead).⁹ Scenario planning would have already taken this possibility into consideration. Architects often use a program of brief, detailing the wishes of the potential users. But these tend to focus on what users want now. Too specific and short-term. Scenario planning avoids this.¹⁰

The process of scenario planning is as follows:

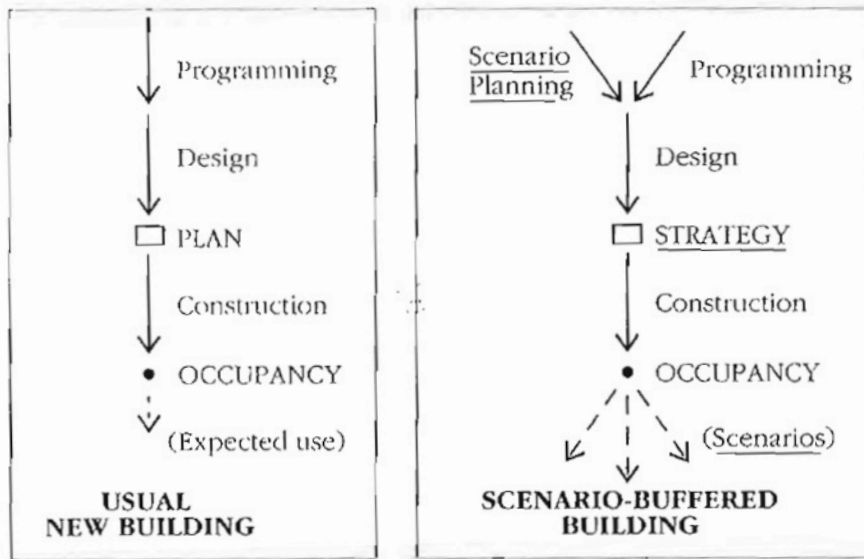
- Gather consensus expectations about the future from major players
- Day one
 - Identify focal issue or decision
 - Explore driving forces
 - Identify most important and uncertain forces
 - Identify basic plot lines of scenarios
 - Should be both plausible and shocking
 - Think the unthinkable
- Day two
 - Adjust scenarios
 - Name them
 - 2-5 scenarios
 - Ignore probability
 - Devise a strategy for the focal issue/decision that is viable in all scenarios
 - Identify leading indicators that will show which scenarios (if any) will come to pass.¹¹

⁸ Brand 178.

⁹ Brand 181.

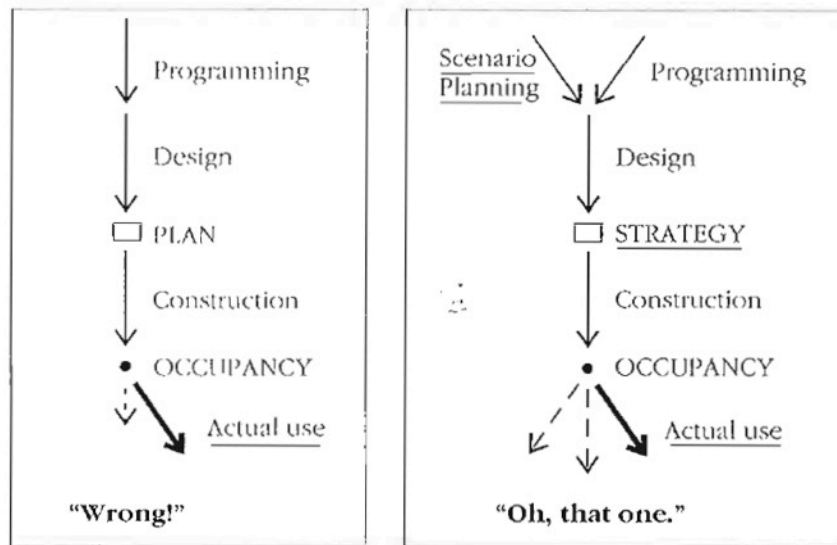
¹⁰ Brand 178-181.

¹¹ Brand 181-183.



SCENARIO PLANNING leads to a more versatile building. It takes advantage of the information developed by programming (detailed querying of building users) and offsets the major limitations of programming (over specificity to immediate desires). The building is treated as a strategy rather than just a plan.

Figure 2: Programming vs. Scenario Planning



SCENARIO PLANNING reduces the likelihood of being pushed around by a building obdurately clinging to a future that never happened. It reduces surprise in a good way. When something untoward happens, the building is ready for it.

Figure 3: Programming vs. Scenario Planning in Use

Brand continues on to discuss prototypical strategies for building designers. He states;

Some can be borrowed directly from chess players: “Favour moves that increase options; shy from moves that end well but require cutting off choices; work from strong positions that have many adjoining strong positions.” More specific to buildings: overbuild Structures so that heavier floor loads or extra stories can be handled later; provide excess Services capacity; go for oversize (“loose fit”) rather than undersize. Separate high-and-low-volatility areas and design them differently. Work with shapes and materials that can grow easily, both interior and exterior.¹²

These strategies suggest a spatially diverse design to be the most logical. With this type of design, use-adjustments become far easier to make, allowing those that occupy the space to move around more easily. This design method is rather valuable, largely for medium to small size rooms. These size rooms accommodate the widest range of uses, thus a spatially diverse design permits the greatest flexibility. For example, bedrooms merging to become a larger space such as an exercise, office, or craft room. Or perhaps a large living room becoming multiple smaller spaces to accommodate guests for short periods.

Brand also recommends, “[w]hen in doubt, add storage...closets, cabinets, shelving and deep storage -- attics, basements, unfinished rooms without windows. What begins as storage can always become something else, and if it doesn’t there’s never enough storage anyway.”¹³

¹² Brand 186.

¹³ Brand 186.

Having a narrative with our co-existing massive structures in lieu of a static connection, according to Brand, is deemed crucial and is his central and existential theme throughout the text. He also believes that habitation should always be active and purposeful. “Age plus adaptivity is what makes a building come to be loved. The building learns from its occupants, and they learn from it.”¹⁴

In keeping with Brand’s philosophy, an architect’s job must be all encompassing. The finished product can no longer just be a “pretty” end result. From beginning to end, it must be our responsibility to be accountable; to provide our clients with eco-sustainable creations that include adaptability and longevity of space, all the while incorporating sustainable products. This is more easily achieved when designing office and retail space (restaurants excluded) when compared to residential space simply because of the more intricate roles kitchens play in a residential environment. Kitchens and restrooms are the most remodeled rooms in a home. They are also the only rooms in which all building trades are included, thus, remodeling them can be quite costly. In 2004, homeowners spent \$148.95 billion on home improvements.¹⁵ Kitchen renovations were among the most popular. “More is spent on changing existing buildings than on building new.”¹⁶

¹⁴ Brand 23.

¹⁵ “Kitchen Renovation Trends,” *Lendingtree* (Web) 17 Aug 2011 <<http://www.lendingtree.com/smartborrower/home-renovation/remodeling-ideas/kitchen-renovation-trends/>>.

¹⁶ Stewart Brand, *How Buildings Learn: What Happens After They’re Built* (New York: Penguin Books, 1995) 5.

CHAPTER 2

FUNDAMENTAL BACKGROUND OF HOME DESIGN

Fire has always been an integral part in providing heat, light, and sustenance for the family. As a result the “kitchen” has always been, and still remains, the focal point of the home. Therefore, it is not unusual for the design of a new structure to evolve around the kitchen.

2.1 History of the Kitchen

The kitchen's long and developing history that began with the knowledge of how to control fire in the wilderness hundreds of thousands of years ago, to the modern and futuristic kitchens of today, all possess(ed) their own set of problems. From having to maintain fire, outdoors, in all types of weather, to the conundrum of whether to make the kitchen part of the home, to the sustainable predicaments we face today, the kitchen remains an integral part of daily life.

Dating back approximately 80,000 years, when the Neanderthal Man mastered the art of making fire, realizing that he needed to provide shelter for that fire, did the idea of “the kitchen” emerge. It was not until the early 1300's, when the Renaissance took hold in Italy, that much thought was put into the concept of the kitchen as a room, a place for preparing meals, and how that space should relate to the rest of the living space of the home. Two contradictory theories emerged rather quickly - “a concept of integration that defined the

kitchen as a space for living and a concept of separation that attempted as far as possible to cut off the practical, functional cooking and working area from the rest of the house.”¹⁷ Thus, since its conception, there have been many theories about kitchens and their practical implications.

The Greek concept of oikos - an ancient Greek equivalent of a household, house, or family¹⁸ - “included ‘both the house itself as an architectural entity ... and also the running of a house, i.e. the household, and finally the social organization living within the house, i.e. the family’”; the kitchen is contained within the house.¹⁹ “[F]or many centuries the [Greek] kitchen was the only room, or at least the main room in societies that were structured mainly around agriculture. They lived and worked, ate and slept in the narrow area around the fireplace. People and animals lived under one roof.”²⁰ It was in this environment that all domestic work was shared upon by all the members of a common household.



Figure 4: Illustration of Greek Kitchen

¹⁷ Rita Mielke, *The Kitchen: History, Culture, Design* (Berlin: Feierabend Verlag OHG, 2004) 12.

¹⁸ “Oikos,” *Babylon Translation*, 28 Jul. 2011 <<http://www.babylon.com/define/105/Greek-Dictionary.html>>.

¹⁹ Rita Mielke, *The Kitchen: History, Culture, Design* (Berlin: Feierabend Verlag OHG, 2004) 13.

²⁰ Mielke 12.

Like the Greeks, the ancient Romans were also sumptuous eaters. Typically meals were large spectacles in the form of banquets and feasts. The meals were prepared by a team of professional cooks in a kitchen, completely separated from the dining room. "...[T]his kind of separation of the kitchen was the exception and was confined to the privileged strata of society until well into the 15th century."²¹ The majority of Roman society could only dream of that type of luxury. "They had to make do with a primitive hearth, if they had any fireplace at all, or get their *puls* - a simple porridge - and their bread from one of the many local cookshops."²²



Figure 5: Illustration of Roman Kitchen

²¹ Mielke 13.

²² Mielke 13.

Many well established societies witnessed a multitude of changes during the Renaissance, including the growth of the upper class and the formation of an entirely new middle class. With the tremendous growth of privileged members of society, kitchens began to pop up in homes all around the cities and villages. This new middle class was now able to enjoy the luxuries they had only once dreamed of. However, the “proper” placement of the kitchen in relation to the rest of the home was still a very individual choice. Societies, such as the Greeks welcomed the smells and the socialization that the kitchen brought to the home. The Italians however, found themselves displeased by the odors and noises, as well as the smoke and fumes from the fire. Andrea Palladio, an Italian architect, believed “[b]ecause of the heat of the fire, the smoke and soot, the strong smells, and loud noises...the kitchen area [was considered] as one of the inferior, unpleasant parts of a house.”²³ His recommendation was for the kitchen location to be in a “remote spot, if possible even in the cellar.”²⁴ Detached or not, the rise of ‘mainstream’ kitchens brought a social distinction.

First, it separated the peasants’ and later the workers’ kitchens, which remained more or less attached to the ‘one-room’ concept until the 20th century, from the decentralized kitchens of the middle and upper classes. Second, it led to a distinction in the internal domestic area between the master of the house and his family, who usually gave the whole kitchen wing a wide berth, and the kitchen staff, who were permitted to enter their master’s rooms only in order to serve the meals.²⁵

²³ Mielke 13.

²⁴ Mielke 13.

²⁵ Mielke 13.

The importance of the kitchen within the family structure quite dramatically became a very important and complex issue. For many it remained a room of purpose. For others, it became the heart of the home, and remains so today. It is a place of production and friendly gathering, where people find comfort and want to be comfortable. A multipurpose, user-friendly space, the kitchen must become the pioneer “structure” within the home to lead the way to durability. This is why a kitchen's layout is paramount to its success of longevity.

2.2 The Structure of Home Design

Single family homes, particularly custom built homes, are more “flexible” than the “cookie-cutter” home. When designing a custom built home, it is the architect's job to research the client's lifestyle and needs. It is important to evaluate the age and gender of the client(s) and if they live a formal or informal lifestyle. This includes examining their family life, number of family members, number of pets, and special needs, if any. It is also essential to identify the client's goals and expectations, and their wish-list in comparison to their actual needs. Determine what specific activities will occur within each room of the home and tailor the space plan to accommodate these needs. Allocate square footage where it is needed most and do not assume that every house has to include the same “expected” set of rooms. Other considerations are budget and if resale will factor into the design approach.

Unlike the custom built home, “cookie-cutter” homes do not provide this “flexible” process. When individuals buy into a “cookie-cutter” development, the only flexibility they have, is the choice of which model home they desire. Other flexible options would be upgrades of cabinetry, counter tops, wall color, and flooring. Although the custom built home still requires a renovation or remodel to yield the changes one desires, it maintains the flexibility of the users current needs. “Cookie-cutter” homes make transitioning from one stage of life to another, more of a challenge. Residential programming, which will be explained and discussed in Chapter 5, will help to provide a solution to this issue.

CHAPTER 3

ADJUSTABLE ARCHITECTURE

3.1 Gary Chang

Gary Chang, an architect local to Hong Kong, is widely known for his research and design on reconfigurable living spaces. Like most architects, Chang's experiences growing up have shaped his interests and designs. Although all architects experiences differ from one another, Chang's exposure and understanding of small and cramped spaces has had a unique impact in his interest to create highly adaptable and highly functional living and working arenas. Not uncommon in Chinese culture, Chang lived with his parents well into his adulthood, along with his younger sisters as well as an additional tenant. The noteworthy component to this typical scenario -- a 344 square foot apartment. To Chang, when designing and creating, every inch is a commodity. His fixation with space led to the design of projects such as the Suitcase House Hotel and even his own residence, which he refers to as the "Domestic Transformer".

Suitcase House Hotel, located in Beijing, is, programmatically, a hotel, meeting space, and private residence. "The dwelling represents a stacking of strata."²⁶ The top stratum adopts a "non-hierarchical layout with the help of mobile elements provided by the envelope, it transforms itself readily according to the nature of the activities, number of inhabitants, and personal preferences

²⁶ Gary Chang, "Unfolding the Mechanics of Domestic (P)leisure," Gary Chang, 2002 (Web) 19 Aug 2011 <<http://www.archphoto.it/IMAGES/garychang/chang.htm>>.

for degrees of enclosure and privacy.”²⁷ “The bottom stratum acts as a container for dedicated spaces.”²⁸ Aside from the basic chambers of bedroom and bathroom (four in total), kitchen and storage, there are rooms for specific use and mode: dining room, library, study, lounge, meditation chamber (with glazed floor looking down to the valley below), music chamber, and a fully equipped sauna.²⁹ At first glance, the metamorphic volume appears deprived of furnishings or partitions, but is, in fact, fully equipped. Any, and all, of these spaces can be opened at will with a simple draw of a pull-ring, creating endless arrangements for living. The raised panels serve as dividers against the open floor plan, allowing the individual, a few steps down into the raised panel, to be in a completely different space. This exceptional design turns the usual concept of the home upside down, diversifying the functionality of a typical residence beyond its normal application.



Figure 6: Suitcase House Hotel Bathroom

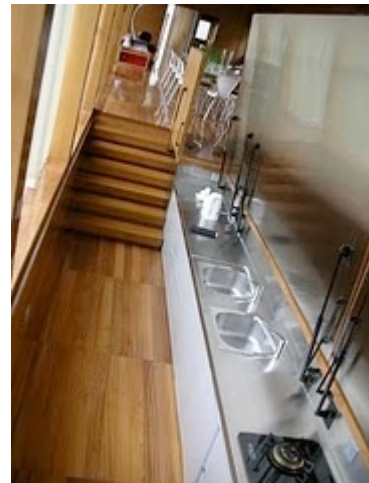


Figure 7: Suitcase House Hotel Kitchen

²⁷ Chang “Unfolding”.

²⁸ Chang “Unfolding”.

²⁹ Chang “Unfolding”.

A significant portion of the experience of the Suitcase House Hotel is the interaction with the surrounding nature. Chang achieved this mostly through the repeated glass doors and windows. A significant percentage of the structure cantilevers over the stream below, which is highlighted through glass flooring within this area. This emphasizes the interior/exterior integration, allowing the mind to wander into the forest, beyond the walls of the structure.



Figure 8: Suitcase House Hotel Glass Floor



Figure 9: Suitcase House Hotel Exterior

Chang's conscious decision to produce a streamline shape and design allows for a comfortable, non-overpowering, contrast to the free forms of the natural surroundings. "I decided to represent this through the Cabin also as I believe it is an excellent way of attracting attention to the building. Instead of having an over the top structure which screams desperately for attention, why not play with differences of form to stand out?"³⁰ The use of wood for the material palette allows for a symphonic harmony for its environment.

³⁰ Mariana, "Architectural Design 3 - Project 1, Suitcase House," (Push-Button Publishing, Mar 2010) 6 May, 2011 <<http://thesuitcasehouse.blogspot.com/>>.

The programmatic layouts of private and public spaces have been separated to allow for uninterrupted activity. Chang believes in the importance of variety. He uses sliding doors to allow for the inter-connection of rooms, encouraging the creation of a multi-dimensional environment.



Figure 10: Suitcase House Hotel Social Space

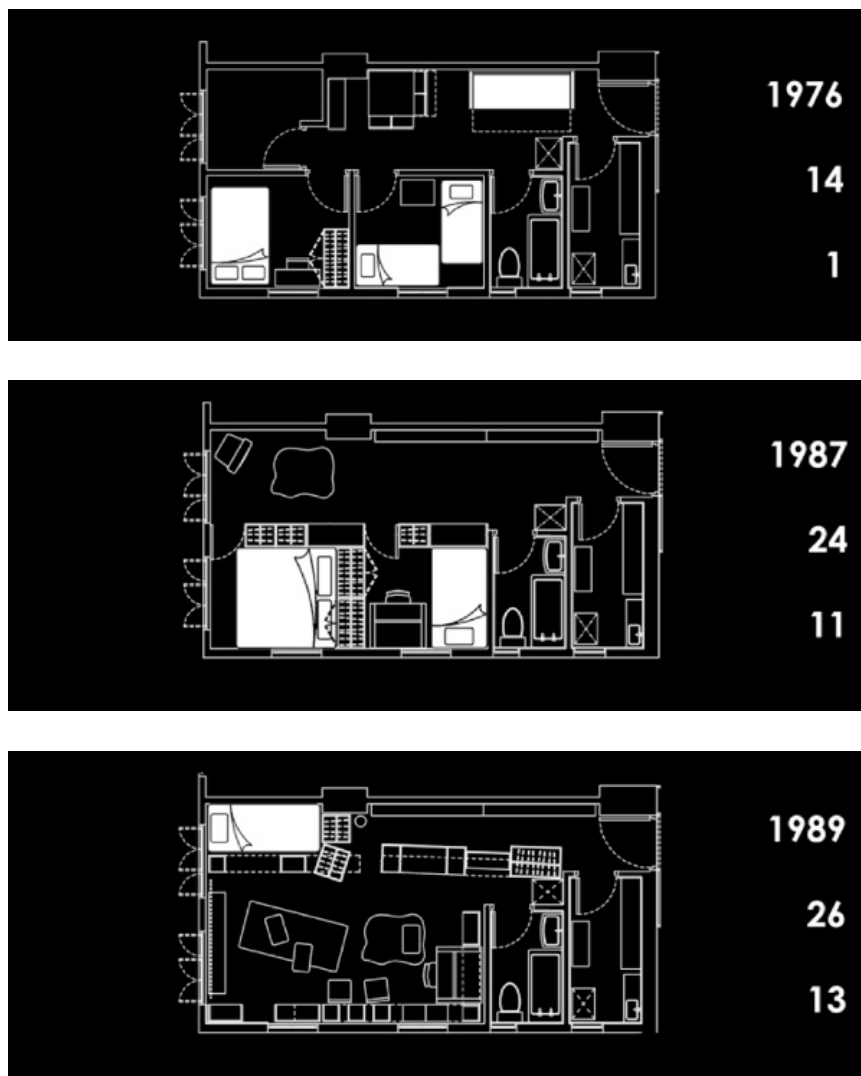


Figure 11: Suitcase House Hotel Natural Interior

“Domestic Transformer,” located in Hong Kong, is truly Chang’s masterpiece. This 344 square foot (32 sqm) apartment, yes, the same apartment Chang grew up in, is fully equipped with moving walls and panels. These wall units, suspended from steel tracks bolted into the ceiling, allow Chang to rearrange the tiny apartment into 24 different rooms. As they are shifted, Chang can enjoy any facet of a large custom home such as a kitchen, library, laundry room, dressing room, lounge with a hammock, an enclosed dining area, a wet bar, and entertainment room. Yes, one must live quite neatly, an environment we should all strive for, to allow for the constant moving of walls and transformation of space. Do we not owe it to ourselves to live in a clean and sustainable

environment? His design is truly the definition of sustainability. As Chang says, “we have to find ways to live together in very small spaces.”³¹

The transformation from the original floor plan to its current state, took a series of renovations. Chang started this process in 1979 and finished in 2006. Each step of the way was a learning curve and obviously did not satisfy Chang’s yearning for maximizing space. This series of images communicates the changes made:



³¹ “A Tiny Apartment Transforms into 24 Rooms,” *YouTube* (Web) 17 Jul 2011 <<http://www.youtube.com/watch?v=Lg9qnWg9kak>>.



Figure 12: Domestic Transformer Plan Evolution

3.2 Michael Jantzen

Internationally known artist/designer, Michael Jantzen studied fine arts and multi-media at Southern Illinois University at Edwardsville and Washington University in St. Louis. He gained notoriety through gallery shows, generating national recognition through magazine and newspaper articles. As time progressed, Jantzen became increasingly interested in architecture and design. He explored different approaches to design “through the construction of several small experimental hand-built houses and other structures.”³² These works

³² “Michael Jantzen,” *arcspace*, 2003 (Web) 22 Aug 2011 <<http://www.arcspace.com/architects/jantzen/bio.html>>.

shifted his attention from structural design to examining the possibilities of utilizing alternative energy systems in architecture.

“The M-House project, a modular, relocatable, environmentally responsive, alternative housing system”³³ began in 1999 and was completed in 2000. In order to understand the M-House, one must understand Jantzen’s “M-vironments”. “Relocated M-vironments are made of a wide variety of manipulatable components that can be connected in many different ways to a matrix of modular support frames. The frames can be assembled and disassembled in different ways to accommodate a wide range of changing needs.”³⁴ The M-House, which is made from the M-vironment system, is comprised of “a series of rectangular panels that are attached with hinges to an open space frame grid of seven interlocking cubes.”

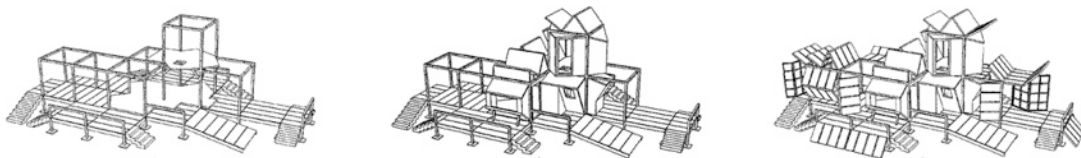


Figure 13: M-House Series

The orientation of the panels vary in their movement based off of the location of the hinges: vertical or horizontal. The hinges allow the panels to either fold into

³³ Jantzen

³⁴ “Michael Jantzen, M-vironments, M-House,” *arcspace*, 2003 (Web) 22 Aug 2011 <<http://www.arcspace.com/architects/jantzen/>>.

or out of the frame, performing various functions. These functions rely on the type of panel: insulated or non-insulated. The insulated paneling can contain windows and/or doors. They can completely enclose a space, allowing that space to be heated and cooled. The non-insulated paneling surround open platforms, moving in or out to provide protection against the sun, wind, and rain. Some of the non-insulated paneling unfold, creating places to sit, sleep, work, or eat.



Figure 14: M-House Semi-Enclosed Exterior Space



Figure 15: M-House Interior Space

The truly unique aspects of the M-House; all of the components are interchangeable and the paneling can be increased or decreased not only in numbers, but in size and shape as well. The entire structure is supported by adjustable legs and load bearing foot pads. This eliminates the requirement for a foundation, thus allowing for a variety of terrain variations.

3.3 Tom Kundig

Partner at Olsen Kundig Architects, Tom Kundig is widely known for his designs, deeply rooted in the culture of landscape. Growing up in the high desert of Idaho and Washington, similar to many Pacific North-westerners, Kundig's relationship to nature was strengthened through outdoor activities such as mountaineering and rock climbing.³⁵ Kundig himself, in reference to his design approach, states, "Perhaps because of my upbringing, I have more of an elemental feel for material and details. My buildings are intended to age and move and weather."³⁶

Other than nature, movement is a quintessential component to Kundig's most recognizable residential projects. Delta Shelter is the result of a commission for a remote cabin located in eastern Washington. The owner requested for the refuge to adapt at his presence; opening when in use and sealing off in times of disuse or inclement weather conditions. The cube comes to life through a hand driven mechanical system, opening or closing the exterior steel shutters.

³⁵ Brian Fichtner, "Architect Tom Kundig," *Cool Hunting*, 2008 (Web) 25 Aug 2011 <<http://www.coolhunting.com/culture/tom-kundig-arch.php>>.

³⁶ Fichtner



Figure 16: Delta Shelter “Open” vs. “Closed”



Figure 17: Delta Shelter Mechanical System

Shadowboxx, located in San Juan Islands, Washington, is a more conventional profile with oversized portals. The idea of oversized portals is slowly emerging as a new Kundig trademark. The front windows of the home, which face the water, can be concealed by a series of floor to ceiling doors, protecting the home from island winds as well as a security measure when the owner is away. He extends the notion of oversized portals to the roof of the bathhouse, insinuating the feeling of soaking in the ocean, far from a roof covered shelter.



Figure 18: Shadowboxx Front Windows



Figure 19: Shadowboxx Bathhouse

3.4 Tezuka Architects

Established in 1994 by Takaharu and Yui Tezuka, Tezuka Architects, located in Tokyo, Japan, have received countless awards for their work, specifically in the residential field. A husband and wife team, they explore the concepts of historical Japanese architecture and incorporate them into their modern designs.

The Cloister House, a courtyard house, is a low, horizontal home, structured around an inner courtyard. The courtyard is defined as the only independent room of the home, yet it is still an extension of internal space for the home. This unique, no column design allows for the inhabitants to shift the “stuff” of their home creating any type of indoor / outdoor living they desire.

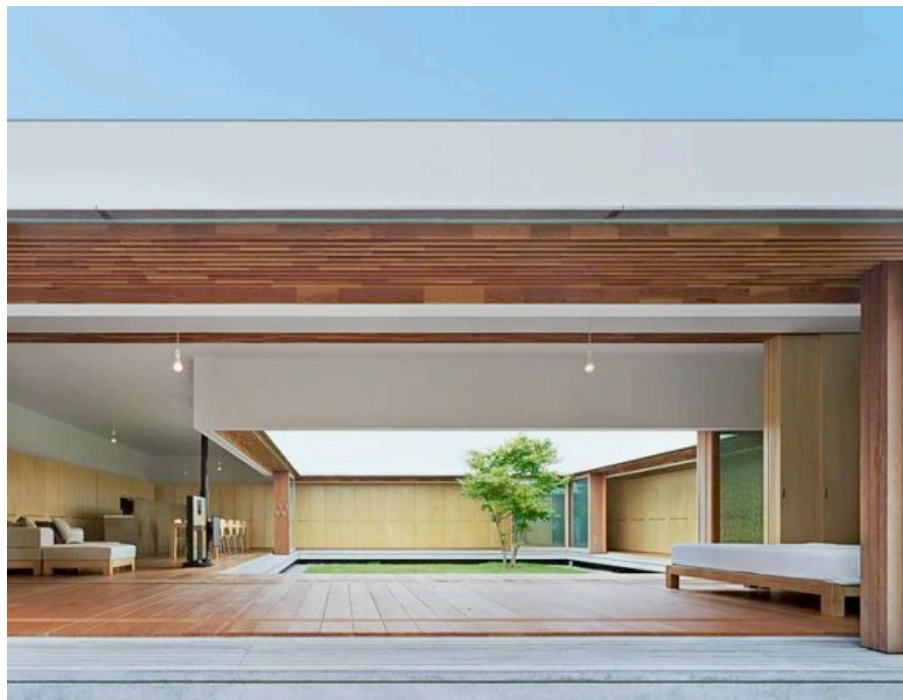


Figure 20: Cloister House View Toward Interior Courtyard

Located in Kanagawa, Japan, the Umbrella House is “[a] house with the structure like an umbrella.”³⁷ The roof extends beyond the livable space, protecting the inhabitants from the elements above while generating the effect of bringing the outdoors into the home. The architects continue, “[t]here are only four columns to support the cantilever. There is a small courtyard [in] the center where [the] family doesn’t need to worry about privacy. The louvered sliding doors allow air to be ventilated [throughout the home, and] in any weather condition.”³⁸



Figure 21: Umbrella House Open Facade

³⁷ Katsuhisa Kida, *Umbrella House*, 2011 (Web) 4 Mar 2012 <<http://en.51arch.com/2011/12/tezuka-architects-umbrella-house/>>.

³⁸ Kida.

CHAPTER 4

PROGRAMING FOR LIFE ADJUSTMENTS

Adjustable architecture, generic enough in nature to accommodate any inhabitant, at any stage in the cycle of life, must take into consideration “life” itself. The success of this process; visiting the multifaceted components of daily living, for all ages, is the “deal maker” for adjustable architecture. It is the one component that provides the architectural community with a solid basis from which to build and customize sustainable homes.

4.1 Marriage and Cohabitation

Taking that next step in a relationship; marriage or cohabitation is the precipice for a series of changes for all parties involved. Besides the relocation of one or both, each individual also comes bearing all of their belongings. In order to accommodate this mass influx of possessions, either a weeding out process must commence, moving into a new space, or a combination of both must occur. No matter the path chosen, it is highly likely that the individuals will not build a new home during this first reconstruction phase of their relationship. For this reason, they are limited to the spaces that already exist. It may be difficult to accommodate all of their possessions.

4.2 Introduction of Children

It is not uncommon for families to have a room designated for a child other than their bedroom; the “playroom” or “game room.” Although this room may maintain the same name throughout the years, the types of activities that take place here are likely to vary based on age. As children grow, the use of the room changes until such time it is no longer needed as a juvenile area. Once again, the homeowner is left with a designated space that is no longer needed for its previous designation. Obvious physical barriers (i.e. walls with or without plumbing) however, leave the homeowner limited in the scope of rededicating the space for other uses. Flexible, sustainable design would take these changes into consideration long before the changes themselves ever took place.

4.3 Empty Nesting

After raising children, through their teenage years, many parents begin to contemplate the departure of their children from their home. The child’s developing independence can be as much a source of pride as it is conflict. For some it is a welcome relief, for others a source of anxiety.

Many parents, women in particular, can develop “Empty Nest Syndrome”. This term is the name given to a psychological condition where the individual has an over-abundance of feelings; sadness and loss once their child, or children, ultimately leave home. Overcoming these feelings can take any duration of time,

but most have found preoccupying themselves with other activities leads to a faster “recovery”. Many parents have longed to partake in many activities but never had the time to pursue them - until now. Empty nesting usually results in one of two scenarios. Moving to accommodate a new lifestyle, which includes just two individuals versus multiple people sharing one space or, as mentioned previously, remodeling the existing space to accommodate new needs.

Walking past an empty room on a day to day basis in combination with newly found hobbies can lead to a “remodel” of that space. Unfortunately, the program inside that room is limited to the four walls creating that room.

4.4 Aging-in-Place

“Older adults, as well as advocates on their behalf, express a strong preference for aging in place. Much research confirms that most people over the age of fifty-five want to remain in familiar surroundings rather than move to alternative housing. To live more comfortably, those older adults who have the means can redesign and reequip their homes to accommodate the physical changes associated with aging.”³⁹

The concept of aging-in-place, today, is no longer a hankering consideration for the those entering their retirement age as it has been in the past. Those deemed “Baby Boomers” will continue to reside in the homes they raised their families in. The alternative, aging homes, are becoming less and

³⁹ “Living Arrangements of the Older Population,” *Encyclopededia.com*, 2008 (Web) 15 Jul 2011 <<http://www.encyclopedia.com/doc/1G2-3077900009.html>>

less popular as stepping outside one's comfort zone and the loss of independence is a frightening possibility. "Much research confirms that most people over the age of fifty-five want to remain in familiar surroundings rather than move to alternative housing."⁴⁰ That being said, as individuals age, their activities, family composition, health, and financial resources alter. Despite aging in their home, loss of independence is still a large probability so certain modifications must be made. These "after market" alterations can be quite costly and even impossible to put in place.

"In designers' endeavors to create sanctuaries, the mission is simple: Get to know as much as you can about your clients and how they see their future."⁴¹ As designers, this crucial element can help in determining what key features to include as well as omit. There are however, qualities which all homes can embrace no matter the future possibilities of variables.

Anticipating the increase in the older population in the coming years, some real estate developers are manufacturing houses designed to meet the needs of older adults and prolong their ability to live independently. These houses feature accommodations such as nonskid flooring, walls strong enough to support the mounting of grab bars, outlets at convenient heights, levers instead of knobs on doors and plumbing fixtures, and doors and hallways wide enough to allow wheelchair access.⁴²

As we age, changes occur. Loss of eye sight and balance are two of the leading problems elderly individuals must cope with. "In her article, 'Using Color as a Therapeutic Tool,' Margaret P. Calkins, Ph.D., says that as people age they

⁴⁰ Barbara Wexler, *Growing Old in America* (Texas: Cengage Gale, 2008) 50.

⁴¹ Drue Lawlor and Michael A. Thomas, *Residential Design for Aging in Place* (New Jersey: John Wiley & Sons Inc., 2008) 17.

⁴² Barbara Wexler, *Growing Old in America* (Texas: Cengage Gale, 2008) 50.

not only become more sensitive to glare, but they also require three times the amount of light to see as well as those who are younger.”⁴³ Implementing the proper lighting throughout a home, a combination of both natural and artificial, can easily be part of the initial design and is essential for the latter years in life.

Falling in one’s own home, especially at an elderly age, can cause many physical injuries which can lead to emotional injuries. A few simple features to aid in the loss of balance is to include non-slick flooring, zero plane (non-raised) thresholds, and inserting carpets into the floor to maintain a level walking plane. On exterior doors, slotted floor drains can be added to help protect against the elements. Adding to the probability of falling are boundaries and obstacles. “One thing that has remained consistent in home building and design...is a lack of foresight as to how to eliminate barriers within houses that impede the personal freedom of residents.”⁴⁴

Barriers are “something material that blocks or is intended to block passage.”⁴⁵ There are barriers all throughout residences in the form of walls, chairs, couches, tables, and anything else that impedes movement from one location to another. Minimizing these barriers is critical, especially in locations such as the bedroom to the bathroom. It is not uncommon for elderly individuals to, more frequently, relieve their bladders in the midst of the night. “Designers should design spaces and arrange furniture so the bed is close enough to a

⁴³ Drue Lawlor and Michael A. Thomas, *Residential Design for Aging in Place* (New Jersey: John Wiley & Sons Inc., 2008) 68.

⁴⁴ Lawlor 60.

⁴⁵ “Barriers,” *Merriam Webster*, 22 Aug 2011 <<http://www.merriam-webster.com/dictionary/barrier>>.

bathroom for the client to get there and back quickly and without encountering obstacles, such as furniture or extra doorways, or without having to trek especially long distances.”⁴⁶

4.5 Caring for Elderly Family Members

The process of caring for an aging family member is multi-dimensional. When physical or mental changes start to become apparent, the first step is to evaluate these changes to help determine what alternative adaptations must be made to their physical surroundings. The severity of symptoms, physical and mental, are typically gauged by the ability to perform everyday tasks: Activities of Daily Living (ADL's) and Instrumental Activities of Daily Living (IADL's). ADL's are basic, self-care tasks such as reading, bathing, dressing, eating, walking, and using the restroom. IADL's are more complex tasks such as shopping, driving, using a telephone, preparing meals, taking medications, and managing finances.

Getting around, mainly in the home, becomes more laborious the older one gets. Using a cane, walker, crutches, or even a wheelchair quite often possibly become necessities for aging individuals. Modifications to the home, if not already made, must be made at this time. Replacing thick area rugs or carpets with a flatter surface, adding railings to walls and lowering sink heights (particularly in the bathrooms) are only a few examples of such modifications.

The loss of vision and reaction time deteriorate with age, causing a considerable

⁴⁶ Drue Lawlor and Michael A. Thomas, *Residential Design for Aging in Place* (New Jersey: John Wiley & Sons Inc., 2008) 83.

reduction of independence. It is important to sensitively discuss this issue with the aging family member, but also to stand firm in this significant situation. The likelihood of injuring themselves or others is quite substantial.⁴⁷

4.6 Illness

Home health care, when applicable, is a great alternative to a long hospital stay. Not only is it usually less expensive and more convenient, but it is just as effective as the care given in a hospital. “The goal of home health care is to treat an illness or injury. Home health care helps you get better, regain your independence, and become as self-sufficient as possible.”⁴⁸

Most bedrooms are not equipped with adequate space to allow for a hospital bed (if necessary), medical machinery, or even therapy equipment. This is where flexible design becomes a key factor in home health care. Flexibility within a home allows for individuals to stay put throughout their illness and recovery process with little attention paid to how this will be accomplished. Flexible design, allows changes to take place with little or no stress, especially during stressful situations. It also allows for things to return to “normal” if and when the time presents itself. Temporary illness does not have to mean permanent changes.

⁴⁷ Forever Families.

⁴⁸ United States, “What is Home Health Care?” *Medicare* (Web) 25 Aug 2011 <<http://www.medicare.gov/homehealthcompare/About/GettingCare/WhatIsHomeHealthCare.aspx?AspxAutoDetectCookieSupport=1>>.

CHAPTER 5

PROPOSAL

Throughout the above research process, one question remained apparent: “Why should we conform to our buildings instead of our buildings conforming to us?” As humans we are continuously evolving, always requiring adaptability of the space around us. If our buildings are unable to evolve with us, they become road-blocks, barriers to the advancement of our lives.

In order to cope with this notion of road-blocks; renovations, remodels, or even minor adjustments become the remedy. According to the United States Census Bureau’s “Survey of Residential Alterations and Repairs,” U.S. remodeling costs were 142.9 billion dollars in 1999. They have continuously increased since then, reaching 226.4 billion dollars in 2007. The Census Bureau ceased use of this survey in 2007, but due to the estimated expenditures in 2011 they are reinstating the survey in 2012. The Bureau estimated the 2011 expenditures to be 240 billion dollars.⁴⁹ If our homes were able to evolve more easily, this money could then be spent on other, more sustainable necessities.

⁴⁹ “Survey of Residential Alterations and Repairs,” U.S. Census Bureau (Web) 18 Feb 2012 <http://www.census.gov/construction/c50/table_s3.pdf>.

5.1 Site

The selected location to demonstrate my findings and implement a solution to the above mentioned problems is the master planned community of, The Villages at Rancho El Dorado, in Maricopa, Arizona.

Maricopa, although part of the Phoenix metropolitan area, is located thirty-five miles due south of the city limits of Phoenix. According to the United States Census Bureau, the population of Maricopa grew 4,081% from the year 2000 to 2010.⁵⁰ This influx of 42,442 individuals caused rapid growth of “cookie-cutter” developments. Unfortunately, Maricopa is inundated by these developments, as noticed from the image below.



Figure 22: Location of Maricopa in Relationship to Phoenix

⁵⁰ “Maricopa (city), Arizona,” *U.S Census Bureau (Web)* 16 Feb 2012 <<http://quickfacts.census.gov/qfd/states/04/0444410.html>>.



Figure 23: Location of The Villages at Rancho El Dorado in Relationship to Maricopa

Not only are they unsustainable and impersonal, but they are extremely compact, placing four and a quarter lots per acre. For the purposes of this project I have honed in on a single community within the development. The current community is comprised of 125 lots each maximizing its built, occupiable space. The neighborhood is extremely cramped and contains minimal outdoor livable space.



Figure 24: Community of Focus

5.2 Development and Infrastructure

When designing a residential development, sustainably, one must begin from the ground up. The layout and design of the community are critical to the layout and design of the infrastructure. Infrastructure (water, sewer, storm water retention, storm water sewer, and dry utilities) is not only one of the largest money guzzlers for constructing a development, but can be the leading factor in sustainable design.

The Villages at Rancho El Dorado, like most developments across the country contain the main infrastructure lines under the roadways throughout the development. From there, the individual lots tap into the these main lines gaining access to these amenities. In the case of The Villages at Rancho El Dorado, this would be 1,585 lots to be exact. With the current development infrastructure costs at \$9,350,513.50, each individual lot costs approximately \$6,000. This large sum of money, if reduced, could benefit the development in a more sustainable way such as introducing solar panels or a community wide water re-use system.

The first step to reducing these infrastructure costs would be to redesign the layout of the development, minimizing the overall length of the main infrastructure lines. It is within these lines where the bulk of the infrastructure costs lie. Re-designing the roadways and lot layout for the entire development is critical to the project at large, however, for the scope of this thesis, I did not delve into these changes. The next step to the infrastructure cutbacks is to reduce the

tertiary lines by half. By eliminating the set-backs and property lines, the developer is able to bring two homes together to share a single “core wall.” This “core wall” would contain all the necessary amenities for a home to tap into.

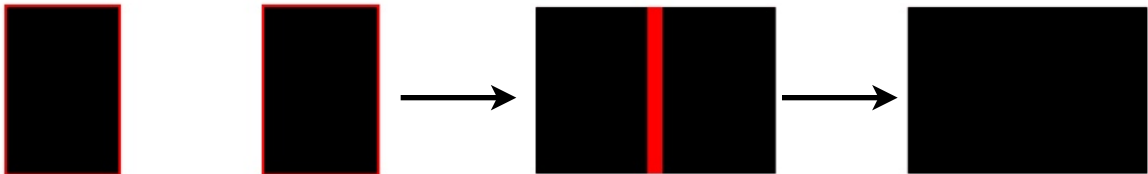


Figure 25: Representation of the Duplex

Additionally, by bringing two homes together, on every other property line, an additional seven homes could be added to the immediate community. Through a simple calculation, it is estimated that an additional eighty-eight homes can be added to the entire development. With all of the above components in place, it is approximated that the infrastructure costs would be reduced by \$2,000,000, thus reducing the lot cost to \$4,000. This is a substantial reduction; releasing funds that can be used more wisely in the overall development.

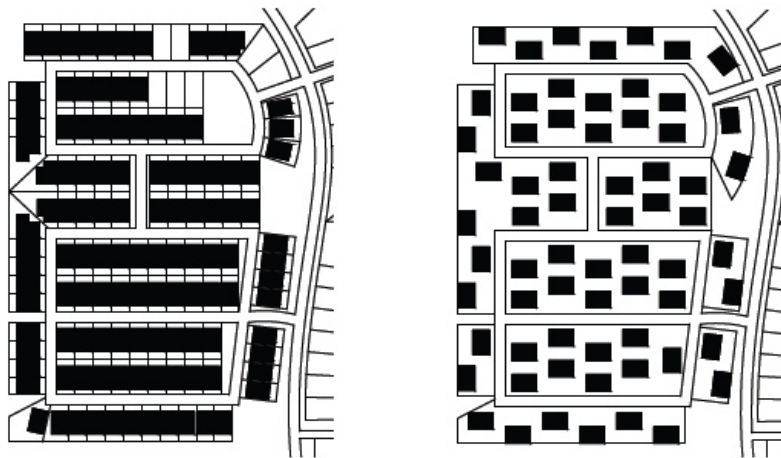


Figure 26: Current vs. Proposed

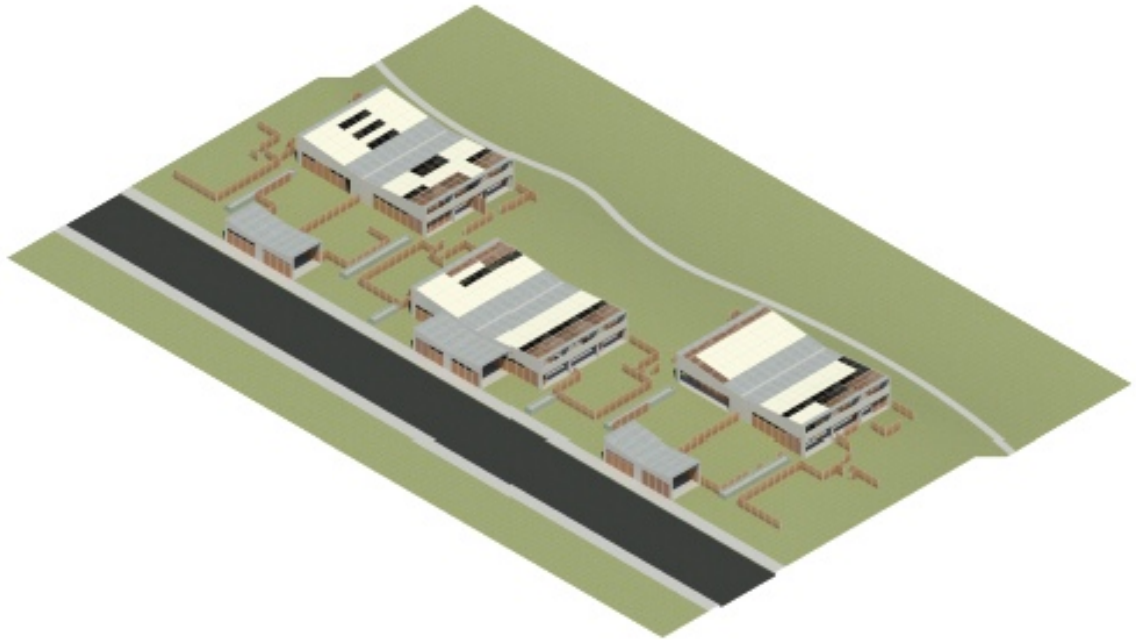


Figure 27: Site Axonometric

5.3 Dedicated Open Space

Throughout Arizona, open spaces such as greenways, parks, or playgrounds are required in residential communities. Roughly 22% of these communities are entwined with these spaces. Of the current 9,200 square miles that is Maricopa, 2,000 are dedicated open space. Unfortunately, they are rarely well maintained, few people use them, and some are even difficult to access.

It is important for these open spaces to exist, because without them, our cities would become concrete jungles lacking refuge. Sadly, these spaces typically exist where there is “left over” land. They are usually an afterthought, inserted without order and coherence.

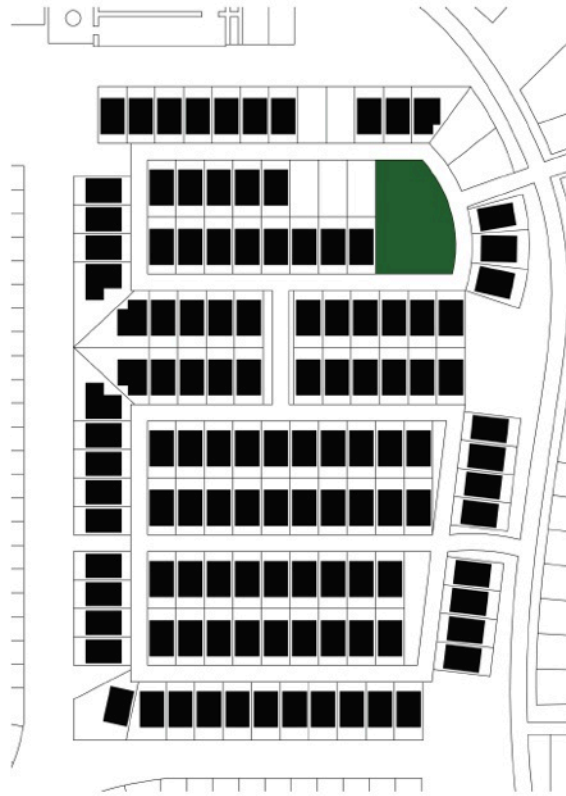


Figure 28: Location of Dedicated Open Space



Figure 29: Current Dedicated Open Space

If these open spaces are a requirement, then why not bring them directly to the homes themselves? By offsetting the “duplexes,” shifting between the front edge and back edge of the lots, every four homes has a shared open space, allowing for immediate and direct connection. Not only would these spaces be better utilized, but will most likely be better maintained, and produce a greater sense of pride throughout the community.

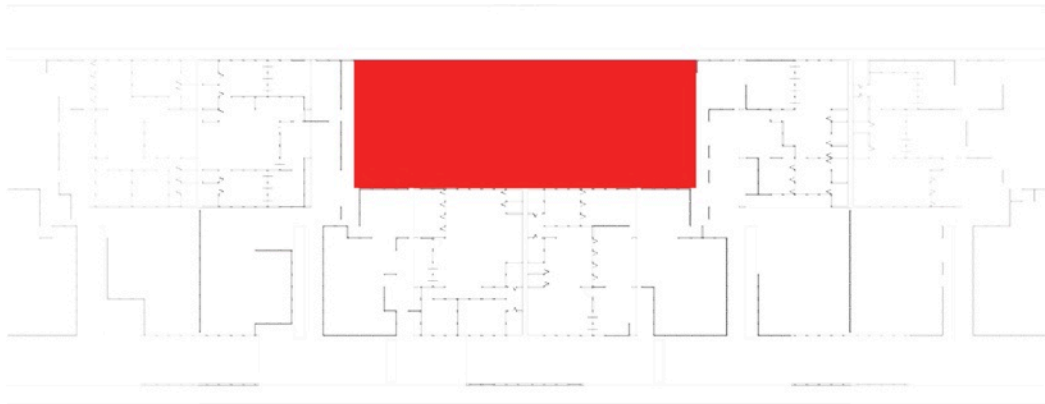


Figure 30: Open Space Brought Back to the Homes

5.4 The Adjustable, Sustainable Home

As architects, we are always taught to design under the rule that form should always follow function. The design of the home began with looking at the “duplex” as a single unit. A desire to create an eco-friendly design led to the butterfly roof for rain catchment; the most logical way to retain the largest volume of water while permitting the greatest amount of natural light into the home. It also allows for the illusion of more space in a 1,000 square foot home.

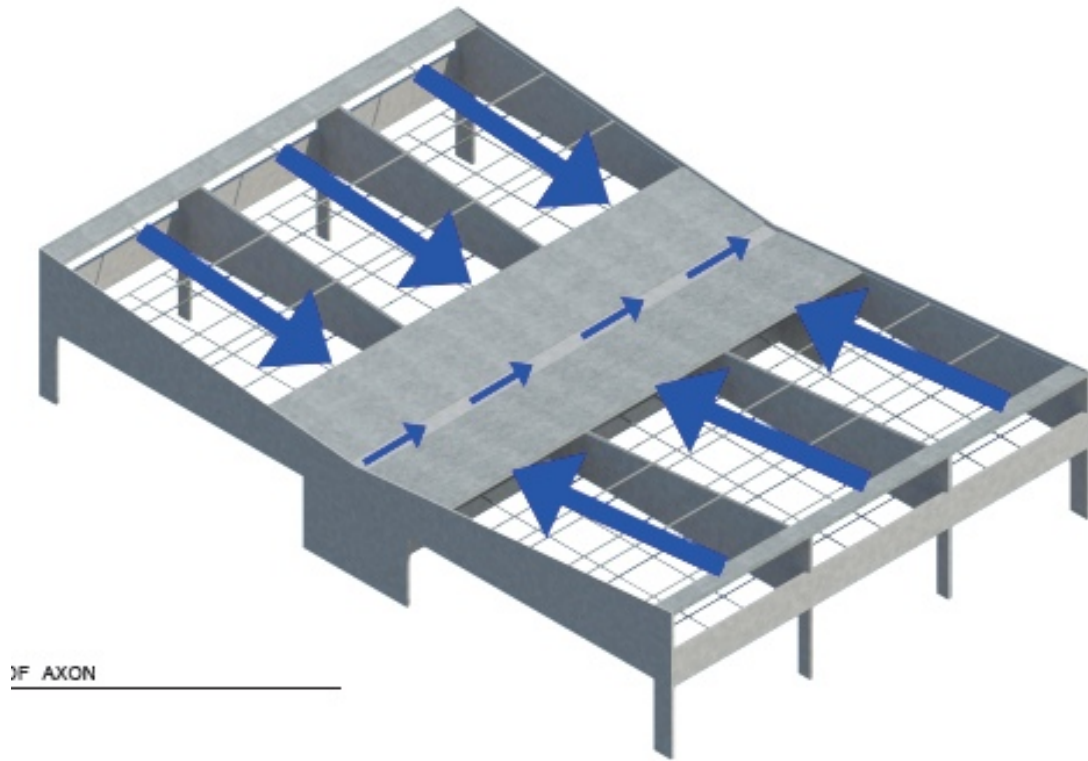


Figure 31: Butterfly Roof System and Flow of Water



Figure 32: Section of Core Wall Showing Flow of Water into Underground Cistern

Beginning with the floor, slab on grade, level with the surrounding land, allows for an easy transition from exterior to interior and vice-a-versa for individuals to move about. This lack of elevation change is extremely important for certain stages of life; aging-in-place, caring for elderly family members, and illness. The floor also contains, on a four foot - six inch (4' 6") grid, a spring loaded, female end of a floor lock. The core wall, two feet thick, divides the "duplex," creating two individual units. The core wall also aids in structural support for the load bearing walls and stands twelve feet tall. The four load bearing walls, spanning the length of the "duplex," are void from ground level to eight feet tall to accommodate an open floor plan required for flexible design. The top of the structural walls is profiled to support the butterfly roof (12' in the center where they connect to the core wall and 16' at either end) . At the ceiling level, eight feet above ground plane, exists a track. This track, in the same form as the one in the floor and supported by the load bearing walls, supports the post and wall panel system. The roof, previously discussed, also contains a track system to house roof panels. Both the post and wall system, and the roof panels will be explained below.

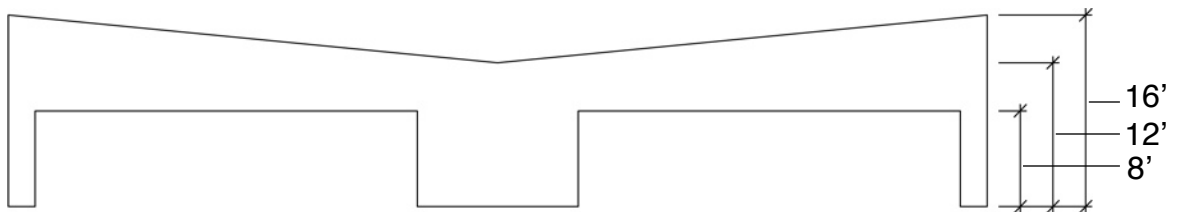


Figure 33: Structural Wall Height Dimensions

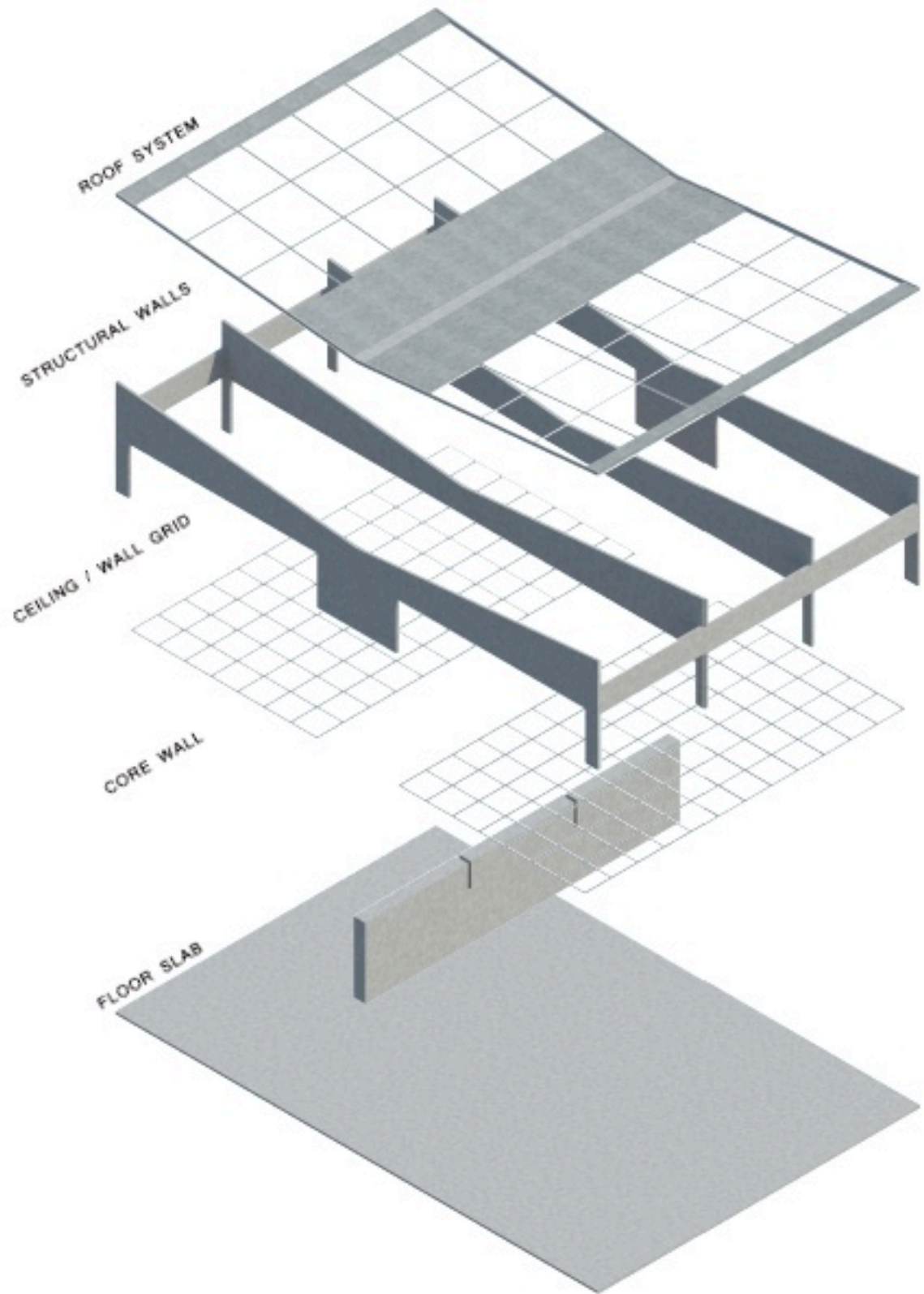


Figure 34: Exploded Depiction of Structural System

The post and wall panel system is truly where the flexibility of the home exists. The post, a 6" x 6" x 8' hollow steel beam, connects to the ceiling track and locks to the floor, becoming the structural support for the wall panel. Connected to the top of the post is a multi-directional sliding wheel, allowing for the post to travel in any rhythm through the track system. Built into the bottom of the post is the male end of the floor lock, easily manipulated by the user. The center of the four sides of the post, spanning six feet in length, is the female end of a tongue and groove system. The wall panel, 4' x 8' in dimension, which includes a one inch metal frame, contains the male end of the tongue and groove system. The wall panel connects to the post in this location, and is locked in place by the addition of another post on the opposing side of the wall panel.

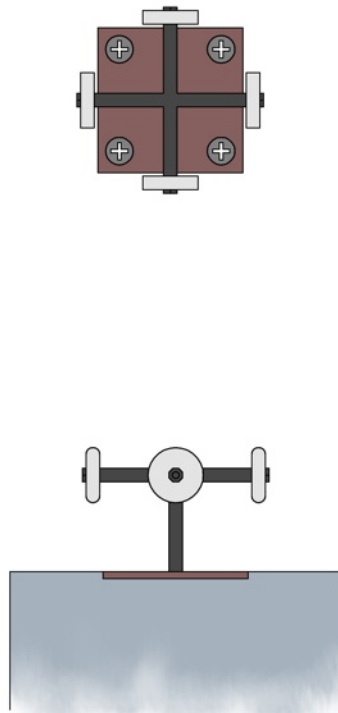


Figure 35: Multi-Directional Sliding Wheel

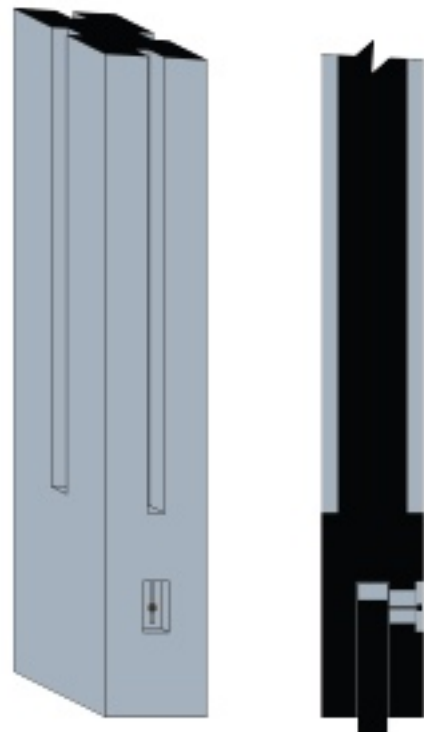


Figure 36: Post Axon and Section Showing Floor Lock and Groove

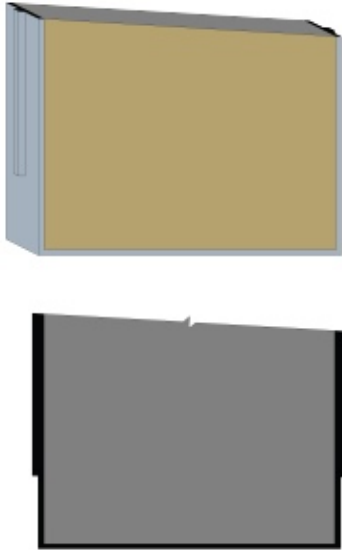


Figure 37: Panel Axon and Section Showing Tongue

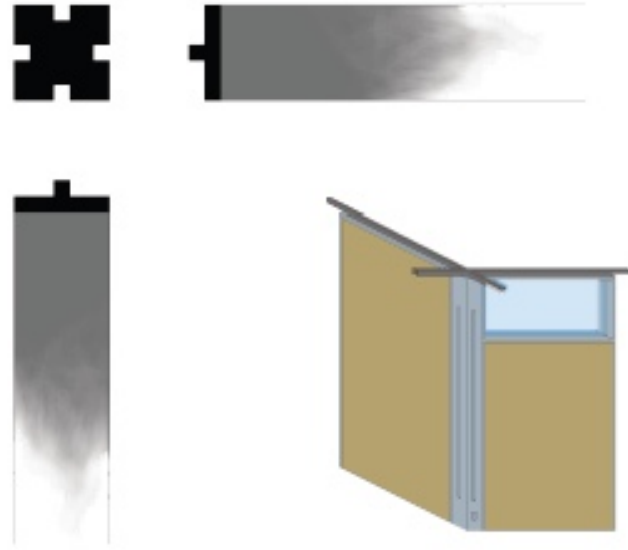


Figure 38: Plan and Axon Showing Post and Wall Panel Connection

The process of moving a panel from one location to another is quite simple. The first step is to release the floor lock from one of the posts. Once the post is free, it can be slid along the track and out of the way. At this point, the wall panel is no longer locked in place, and can be moved to its desired location. After moving the panel and placing it in its new location, adjacent to an already locked post, the free post can be slid against the panel and fastened in place.

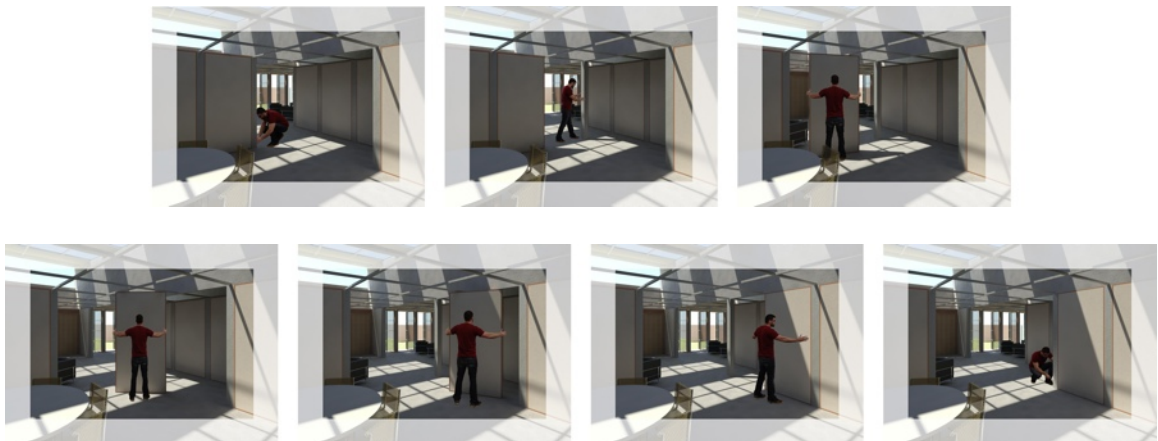


Figure 39: Process of Moving Wall Panels

The current design only contains ten wall panel types: solid insulated, solid insulated with louvers, louvers, solid insulated with glass, glass, glass accordion door, glass pivoting door, solid interior non-insulated, wood accordion door, and solid insulated with front door. There are fewer options in the roof panels: glass plus louvers, louvers, solid insulated plus louvers, glass, solid insulated plus glass, and solid insulated. The number and type of panels used for the home are left up to the user.

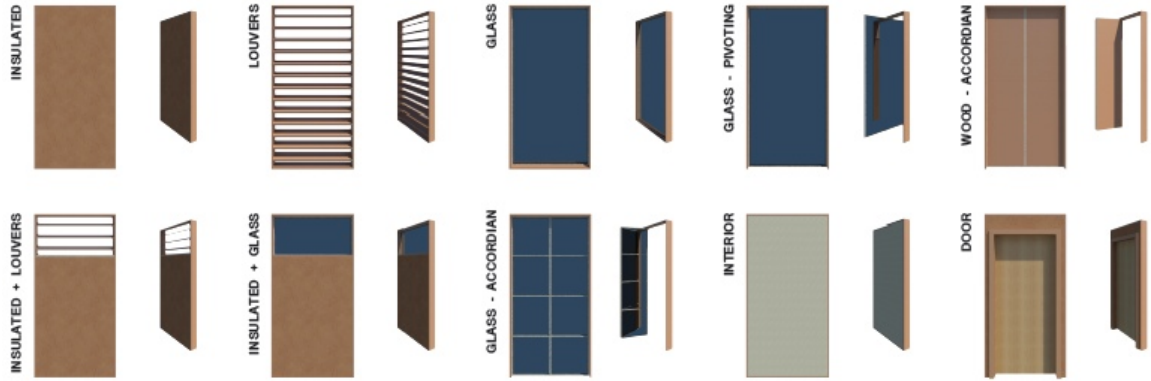


Figure 40: Wall Panel Types



Figure 41: Roof Panel Types

In the process of designing potential floor plans, it was necessary to zoom out from the individual unit and focus on a combined six units.

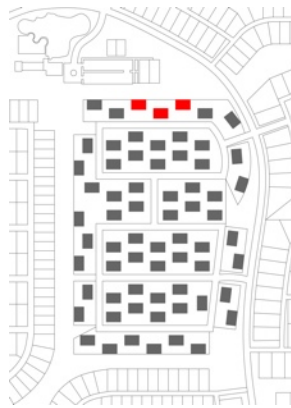


Figure 42: Six Units of Focus

Pulling from the concepts of traditional Japanese Courtyard Homes, maintaining layers of privacy from the street to the bedroom was a must. As one progresses from the street, they enter a single arrival point, highlighted by a planter and adjacent to the home's private outdoor space. For the "duplexes" at the front of the lots, this entry point is nestled between the home and the private outdoor space. This private outdoor space acts as the first layer of privacy for the home.



Figure 43: Exterior Vignette

As one continues, they enter into a smaller progression of outdoor spaces. Eventually this leads to the covered exterior spaces of the home; those spaces on the exterior of the home but still contained within the floor slab. Finally, they cross the threshold to the interior. The process for the “duplexes” at the front of the lots is the same, while the second stage; the progression into smaller exterior spaces, is not as defined.



Figure 44: Interior Vignette

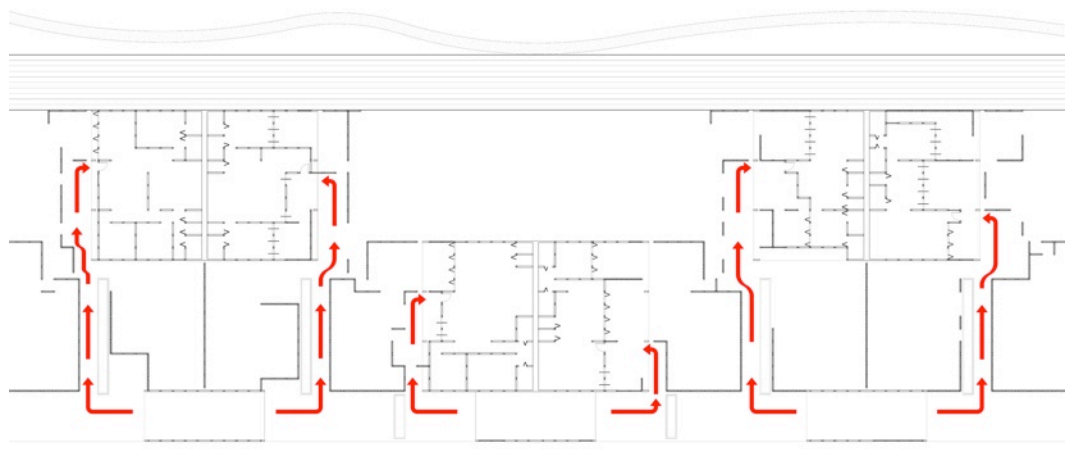


Figure 45: Movement Diagram

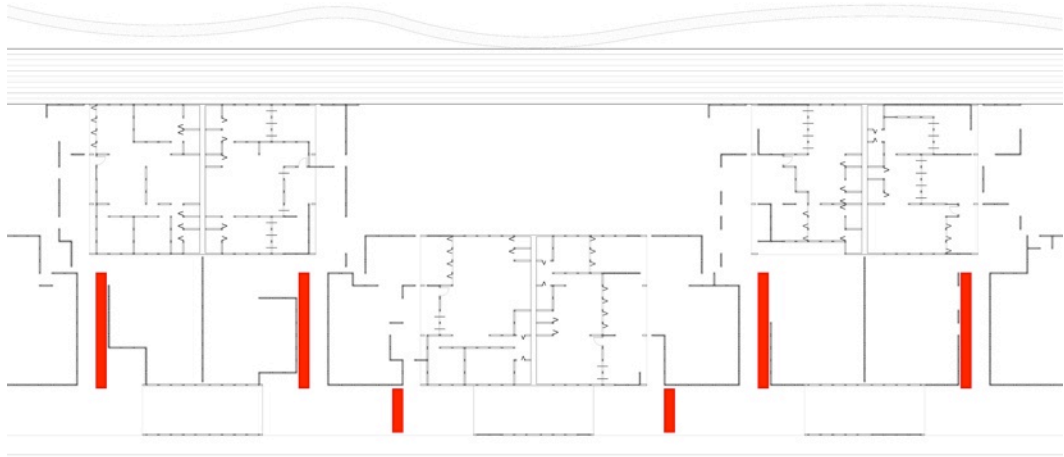


Figure 46: Planters

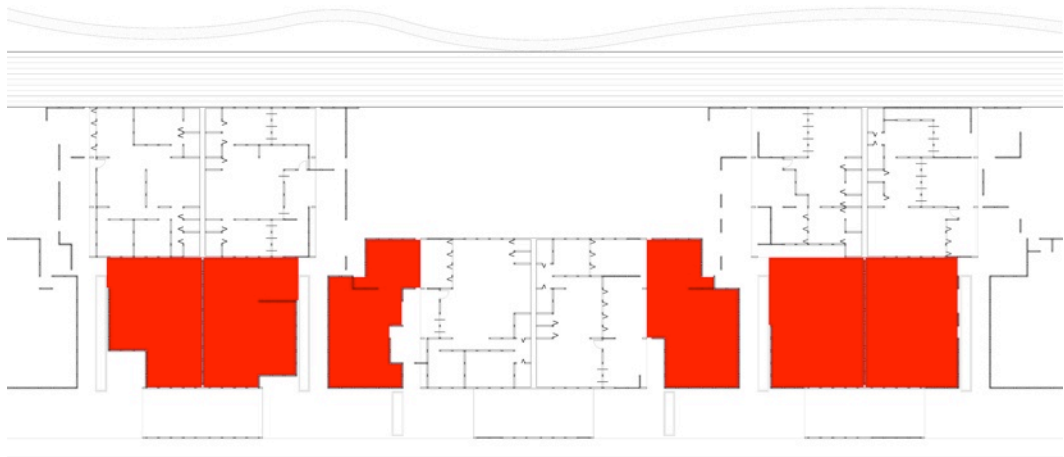


Figure 47: Private Outdoor Spaces

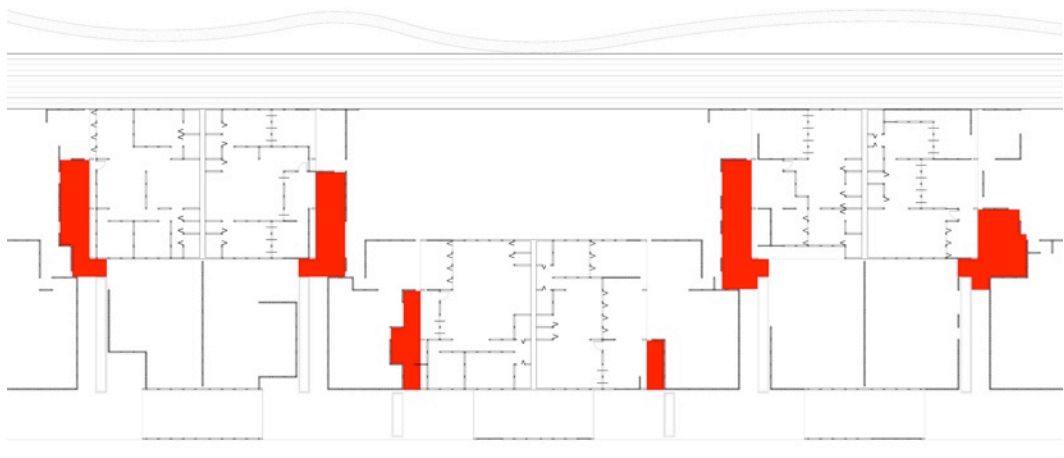


Figure 48: Smaller Outdoor Spaces

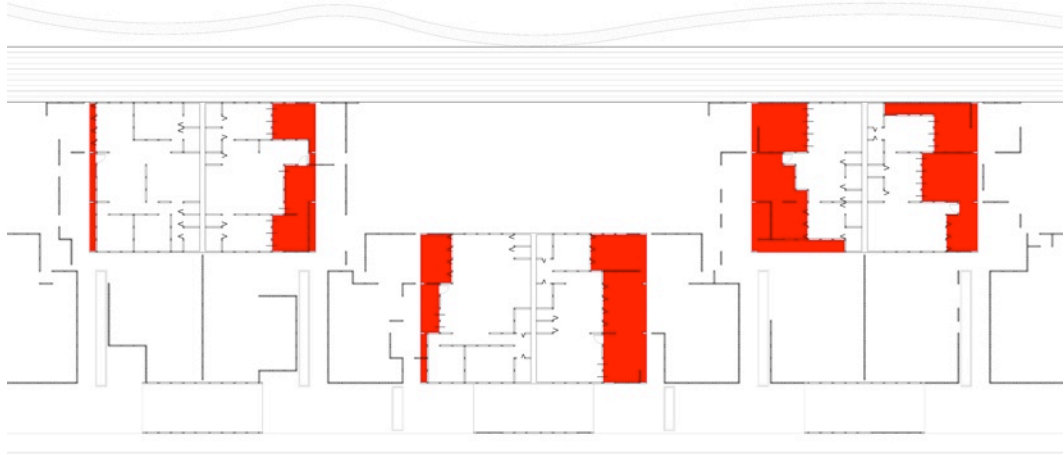


Figure 49: Covered Exterior Spaces



Figure 50: Interior Spaces

The open floor plan and simple post and wall panel system, allows for ultimate flexibility, permitting the user to alter their home as their needs change. The following six floor plans represent the needs of individuals during different stages of life. They will be broken down by “duplex,” moving from left to right.

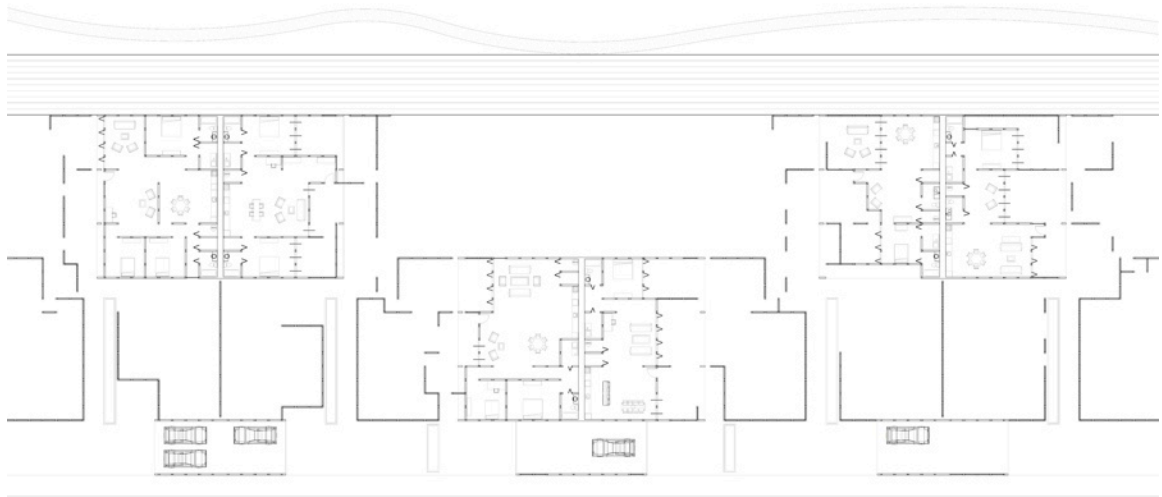


Figure 51: Six Floor Plans

The west side of “duplex 1” is a three bedroom unit. The exterior walls of the home are brought entirely to the edges, maximizing the interior space. This home is designed to accommodate a family with two children. The east side of “duplex 1” is a dual master layout. This floor plan is suggested for a variety of possibilities; a single user or couple plus a guest room, roommates, or a single user or couple taking care of an elderly family member. No matter the situation, both bedrooms have their own patios, partially concealed from the rest of the home.

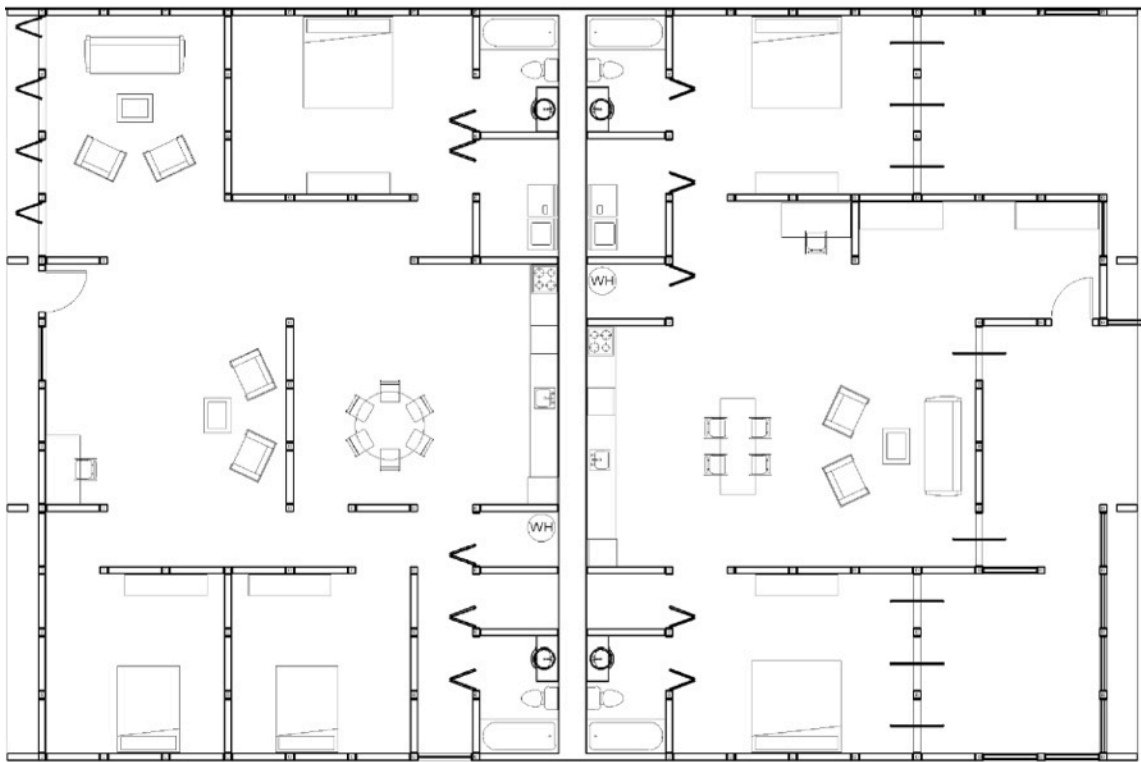


Figure 52: Duplex 1

The west side of “duplex 2” is a two bedroom unit. This arrangement is designed for a family with a single child. The openness, of the remainder of the home, allows for easy maneuverability of “space plan” and “stuff”. The east side of “duplex 2,” a single bedroom unit, is intended to maximize the concept of living both indoors and outdoors, making a small home live larger. Every programatic element has its own connection to outdoor space.

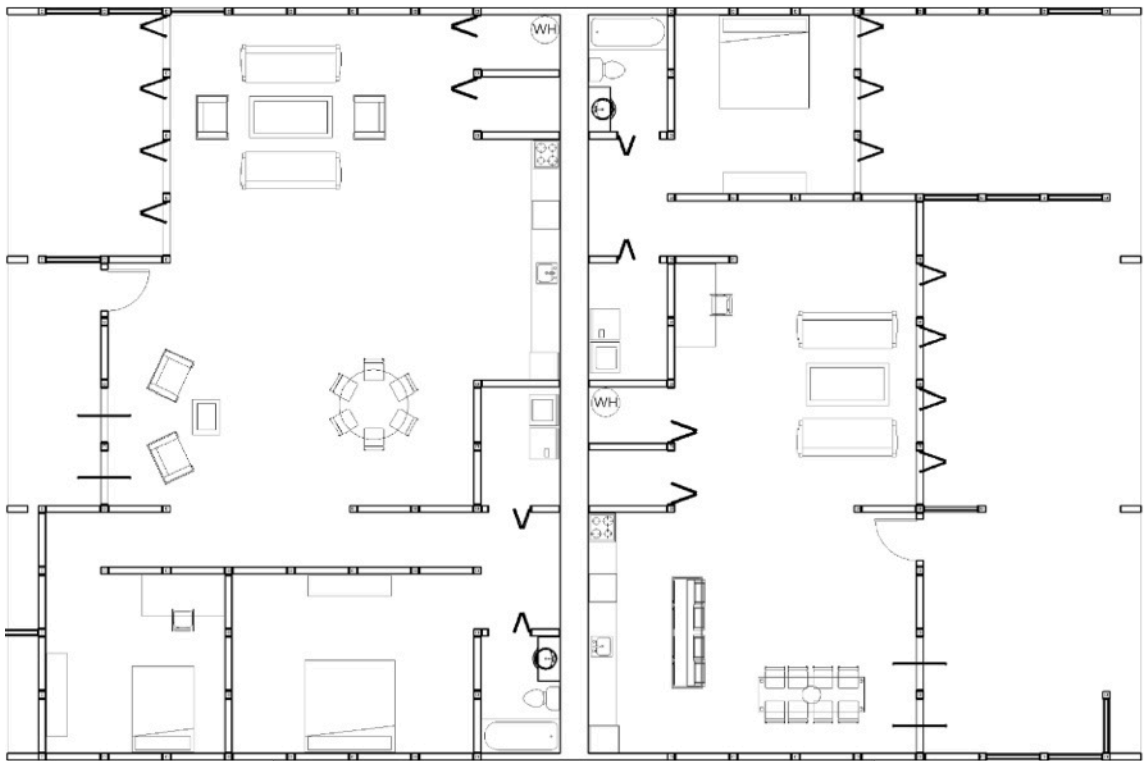


Figure 53: Duplex 2

“Duplex 3” contains two single bedroom units, highly promoting the indoor / outdoor living environment, similarly to the east unit in “duplex 2.” The west unit represents the home of a single individual, whereas the east unit represents the home of a couple. Both units clearly show how the exterior of the home does not have to reach to the edge of the floor slab.

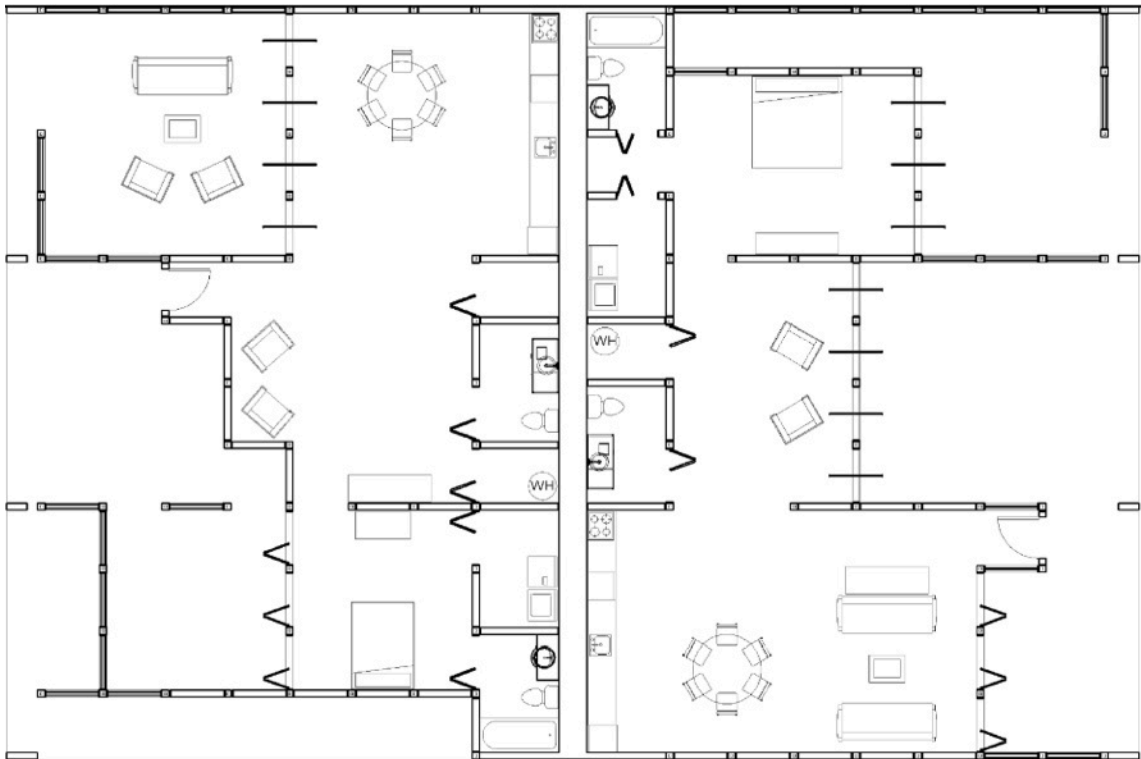


Figure 54: Duplex 3

Throughout all six units the shape and size of the interior spaces, in association with the covered exterior spaces, can vary based on the needs of the individual users. Similarly, the skin of the “duplexes,” although structurally concrete in material, can be individualized in color and texture.

Human adaptation is essential to the continuing transformation of our world so that we can maintain an eco-friendly, sustainable relationship with the environment, still keeping focus on our likes and needs for easy, everyday living. Without this, we find ourselves running in circles, always playing catch-up. The built environment is no different. As Stewart Brand notes the flaws in our buildings and programming, his “Six S’s” and scenario planning, so should we. There are many architects, today, implementing the ideas of flexible, adjustable design. Unfortunately, their concepts are still limited and not accessible in all price ranges. If our buildings are able to evolve as our needs evolve, without having to waste energy and materials through renovations and remodels, we will have yet another way of saying “we live in a more sustainable world.”

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