

AFFORDABLE HOUSING THROUGH COMMUNITY BASED DESIGN ON OAHU

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## ABSTRACT

There is an expected housing shortage of 50,000 units in Hawai'i. 40% of these are set to be affordable, targeting an income range of 80% of area median income and below. As the least affordable location in the United States, Hawai'i's affordability is only expected to worsen. This study puts forward an architectural strategy to put more affordable housing on the market and fill a portion of the affordable housing void.

The investigation applies mixed methods research including interviews, case studies, and historical research. The interview subjects included real estate developers, architects, politicians, social workers and leaders of organizations that are critical to creating affordable housing in Hawai'i. From this, the author strives to determine the DNA of the two most critical drivers that will form the basis of how to successfully achieve an effective affordable housing project in Hawai'i.

The first driver is the process of creating a collective and collaborative design body to execute the project. The construction of this process includes both the determination of the players involved as well as the contribution that each person or organization can potentially make.

The second driver is product based. It is a framework that begins to establish the important touch points that affordable housing projects in Hawai'i should address. The resulting product of the combination of these touch points is what this doctoral study strives to analyze and propose as an effective solution to a new and necessary housing typology in Hawai'i.

This doctoral study attempts to differentiate itself by creating a symbiotic system based on three key pillars: the community, the profession, and the politicians. This symbiotic system fails to succeed with the omission of anyone of these pillars. In effect, it demands intimate collaboration between these three players. The omission of any one group leads to a less effective and less deliverable affordable housing product in Hawai'i. Three design projects undertaken by the author as part of a larger group in the interest of this doctoral study will demonstrate clearly how the above statement can be substantiated.



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## DEFINITIONS

**Affordable Housing:** Housing for which the occupant(s) is/are paying no more than 30 percent of his or her income for gross housing costs, including utilities<sup>1</sup>. There is no fixed value for what constitutes affordable housing; however, in this study it will be used for individuals that are at or below 80% of the median income level in a particular area.

**Low Income Housing Tax Credit (LIHTC):** These are government sanctioned tax credits that can be sold at approximately 95% of value, and used by a third party entity, reducing the third party tax at a dollar for dollar reduction. The Tax Reform Act of 1986 created the Low Income Housing Tax Credit (LIHTC) program. This act helped to support housing targeted at lower income families. To qualify for credits, a project must have a specific proportion of its units set aside for lower income households with the rents on (HUD 2015b)(HUD 2015b)a project is a function of development cost (excluding land), the proportion of units that are set aside, and the credit rate (which varies based on development method and whether other federal subsidies are used). Credits are provided for a period of ten years.

**Capitalization Rate (Cap Rate):** The ratio between the net operating income (NOI) produced by an asset and its capital cost (the original price paid to buy the asset) or alternatively its current market value. Real estate investors, real estate appraisers and commercial real estate lenders use capitalization rates (cap rates) to determine the value of commercial real estate.<sup>2</sup>

**Affordability Index:** A measure of a population's ability to afford to purchase a particular item, such as a house, indexed to the population's income. An affordability index uses the value of 100 to represent the position of someone earning a population's median income, with values above 100 indicating that an item is less likely to be affordable and values below 100 indicating that an item is more likely to be affordable.

**Fair Market Rents (FMRs):** A rent estimate that is calculated by HUD, as well as by other governmental institutions, of the open market rental amount of a dwelling to determine

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1. "Resources." Retrieved Feb 3, 2015, 2015, from [http://www.huduser.org/portal/glossary/glossary\\_a.html](http://www.huduser.org/portal/glossary/glossary_a.html).

2. "Investopedia." Capitalization Rate Definition. Retrieved Feb 22, 2014, from <http://www.investopedia.com/terms/c/capitalizationrate.asp>.

how much of the rent is covered by the government for those tenants who are part of Section 8.<sup>3</sup> Each year, the federal government looks at the rents being charged for privately owned apartments in different communities, and the costs of utilities (heat, electricity, etc.) in these communities. The "fair market rents" are an estimate of the average gross rents (rent plus utilities) for medium-quality apartments of different sizes in a particular community. The recipients receive a subsidy equal to the difference between the gross rent and 30% of their incomes.<sup>4</sup>

Collective Efficacy: ability of members of a community to control the behavior of individuals and groups in the community.<sup>5</sup> Control of people's behavior allows community residents to create a safe and orderly environment. Collective efficacy involves residents monitoring children playing in public areas, acting to prevent truancy and street corner "hanging" by teenagers, and confronting individuals who exploit or disturb public spaces.

Accessory Dwelling Unit: A room or set of rooms in a single-family home or in a separate structure, located in a single-family zone that has been designed or configured to be used as a separate dwelling unit and has been established by permit.

Community Based Design: a design method that enables individuals or organizations to collectively participate and generate ideas to the improvement of the their own environment.

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3. "Fair Market Value Definition." *U.S. Housing and Urban Development*. N.p., n.d. Web. 03 May 2014.

4. Beck, Paula. 1996. "Fighting Section 8 Discrimination: The Fair Housing Act's New Frontier." *Harv. CR-CLL Rev.* 31:155.

5 Sampson, Robert. J., Stephen. W. Raudenbush, and Felton Earls. 1997. [1] "Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy."

## Introduction

Affordable housing involves a number of complexities, requiring knowledge of several different disciplines to understand the problem. There is no single solution to affordable housing, but many solutions that must come together to improve the situation. This defines the action plan: implementing a broad range of strategies to fit the vast problem before us. It is critical to determine where the efforts should be focused in order to accomplish the biggest gain towards a permanent solution.

We are at a time of necessary change: the value systems within society have shifted, the traditional family has broken down, and we continue to build in an antiquated style, using methods that are decades old. Costs of housing are only increasing with little hope for low income earners to get a foothold into the real estate market. As lifestyles have changed, so has the expectation of what a home should do. It is necessary to rethink affordable housing strategies and models in order to address these changes.

Affordable housing obstacles exist on different scales: an urban scale, a community scale, and a human scale, and each of these scales have logistical issues that must be considered when working toward a solution. The question is - where to begin? The urban planner is tasked with considering how affordable housing can seamlessly fit into an existing community, the adequacy of the utility capacity, and the proximity to typical amenities such as grocery stores and public transportation. Also to be assessed is the long-range viability of affordable housing and how this viability will be affected by larger planning strategies. At the community scale, the considerations pertain to aesthetics, neighborhood, and cultural acceptance. The layout of the building is also critical as this can affect the community and users. On a smaller scale, consideration of the functionality of spaces so that the users feel comfortable and safe is a necessity.

The local government is concerned with the level of involvement required, financially and otherwise. In terms of economics, where does the money come from? Public funding? Or private? Can these projects only happen on state lands where long-term land leases are negotiated? In terms of infrastructure, where is the most appropriate place to build sewer systems, water systems, and storm systems that are able to accommodate such growth? The complexity of tackling such an issue leaves the problem in a stagnant

state with no individual or organization spearheading the work towards a solution. There are ample solutions for what "should" be done from a physical building standpoint; however, the execution of affordable housing projects and assemblage of the right team needs appropriate attention.

What is the role of the architectural community to affordable housing? Does the affordable housing solution fall on the shoulders of architects? This study assesses how these issues can be addressed so that affordable housing projects can be pushed forward by a carefully designed team of experts who, collectively, contain a broad range of knowledge concerning affordable housing.

Considering the changing times and the rising costs of housing as well as changing societal values, it is inconceivable that the same construction methods and dwelling styles from decades ago are still being used; given such changes previously mentioned, there is a need to build accordingly. Therefore, the goals of this study are to define a course of action which can be taken to add more affordable housing to the market by: defining the team that has the expertise to bring such projects to fruition; responding to the changing needs and values of the users; and highlighting architectural strategies that can reduce costs and cultivate a sense of community connection and pride.

Through discussions with local community leaders, consensus reality is that we are in an affordable housing crisis. At the same time, there has never been such political and community spirit to make the necessary changes that will improve the affordable housing shortage in the market. There is an opportunity now for us to accomplish what could never before be accomplished. As Winston Churchill stated, "Don't let a good crisis go to waste".

## **Doctoral study Research**

A mixed method of research was selected for the design of this study, as the complexity of the problem is so broad that it cannot be addressed by one method alone. The combination of qualitative and quantitative approaches provides a broad understanding to the problems and yields a well-founded set of design guidelines. The statistical analysis, or quantitative information gathered, looks into general trends that affect all housing



projects. The qualitative information was obtained through analyzing the formation and execution of projects as well as interviews with local community leaders who are actively involved in affordable housing creation and advocacy. This research was conducted over the past twelve months for the purpose of this doctoral study. The information gathered focuses on the constraints of affordable housing and the creation of the team intended to overcome such barriers.

A total of fourteen interviews were conducted over a period of twelve months. The format of the interview was structured around a series of questions which examined the interviewees' perspectives on affordable housing both qualitatively and quantitatively. Each participant was required to authorize a consent form approved by The University of Hawai'i. Interviewees consisted of five architects, one sociologist, one politician, two government agency employees, two leaders of non-profit affordable housing advocacy groups, one affordable housing developer, one Hawaiian cultural designer, and one social worker. (See Appendix A)

## **Doctorate Project Organization**

This document has been organized to study and test ideas of producing affordable housing through community based design groups. With that in mind, there are two parts of the design. Part one, the design of the team or individuals that have the expertise to advance such a project, is termed "the how". Part two, the design of the architectural features that are necessary to be incorporated in such projects, is termed "the what".

Chapter 1, Background Research, provides a background analysis of affordable housing in Hawai'i, the overall lack of affordability, trends in housing, and shifts in the value systems within society. This background outlines the need for affordable housing and the need for its execution to be done in a responsible, efficient, educated way.

Chapter 2, Drivers/Constraints/Consideration, indicates what touch points should be addressed when building affordable housing.

Chapter 3, Case Study Research, shows examples of how strategies can overcome

affordable housing constraints and addresses changing value systems within our communities.

Chapter 4, Research and Design, assesses three projects in terms of their focus on assembling the critical team players needed in order to accomplish the end goal of building affordable housing. This chapter also determines the critical attributes that are needed to push a project forward beyond building and regulatory constraints.

Chapter 5, Design, provides a breakdown of architectural design components that can improve affordability while addressing user needs and encouraging neighborhood cohesion.

# Chapter 1

## 1.0 Affordable Housing in Hawai'i

### WHAT DO WE MEAN BY HOUSING AFFORDABILITY?

Affordable housing is a crucial component for the vitality of our communities because it helps sustain employment and ensures a healthy economic climate. Affordable housing is for households that pay no more than 30% of their annual income for rent. When families pay more than 30%, they are "cost burdened and may have difficulty affording necessities such as food, clothing, transportation and medical care."<sup>6</sup> Contrary to what many people might believe, affordable housing caters to the needs of a wide range of people. Many of these people work regular jobs that may not pay a proportionate amount of income in comparison to the high costs of living, jobs such as restaurant workers, teachers, nurses, and entry-level fire fighters, all of which serve the community<sup>7</sup>. Recognizing the impact that affordable housing has on our community, it becomes fundamental to consider the issues affecting this form of housing in order to improve the quality of our lives and the surrounding environment.

### Housing Affordability Measures

Linneman and Megbolugbe note that the "precise definition of housing affordability is at best ambiguous"<sup>8</sup> but how affordability is defined can have important policy consequences. The National Association of Realtors (NAR) produces a well-known housing affordability index (HAI) that compares the median income of a family to the amount of income necessary to qualify for a mortgage on a median-valued existing

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5. . "Affordable Housing." Retrieved Feb 21, 2014, from [http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/comm\\_planning/affordablehousing/](http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/affordablehousing/).

7. Tom Jones, *Good Neighbors: Affordable Family Housing* (McGraw-Hill Professional Publishing, 1995).

7. Peter D Linneman and Isaac F Megbolugbe, "Housing Affordability: Myth or Reality?," *Urban studies* 29, no. 3-4 (1992).

house. An index value of 100.0 means that a family with the median income has exactly enough income to qualify for a mortgage on a median-priced home. An index above 100.0 signifies that a family earning the median income has more than enough income to qualify for a mortgage loan on a median-priced home, assuming a 20% down payment. For example, a composite HAI of 120.0 means a family earning the median family income has 120% of the income necessary to qualify for a conventional loan covering 80% of a median-priced existing single-family home.<sup>9</sup> An increase in the HAI, then, shows that this family is more able to afford the median-priced home.

There are multiple indices for measuring housing affordability. Some measures of housing affordability are based on whether or not a household can qualify for a mortgage<sup>10</sup> because without a mortgage as leverage, it would not be possible to purchase a house. Twelve housing affordability indices for both renters and homeowners are reported in Figure 1. Each index is defined by or describes its primary focus. This paper will use the NAR index, as it is the most commonly used by counseling practitioners, industry practitioners, and local policy decision makers.

Different affordability indices can yield different estimates of magnitude and distribution. It is important to keep in mind that the affordability index is only a benchmark. On one end of the spectrum is affordable housing, while on the other end is unaffordable housing; it is difficult to pin-point exactly where to draw the line of affordability.

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<sup>9</sup> National Association of Realtors, "Affordability Index," Retrieved Jan 22, 2014, from <http://www.realtor.org/topics/housing-affordability-index/methodology>

<sup>10</sup> Ibid.

Housing affordability index	Proponent of index	Description
NAR Housing Affordability Index	National Association of Realtors	Ability of median-income family to buy median-priced home
Variant Housing Affordability Index	Local Realtors	Percentage of households that can afford to purchase a median-priced home
NAHB-Wells Fargo Housing Opportunity Index	National Association of Home Builders and Wells Fargo	Percentage of homes affordable to median-income family
HUD Guideline	HUD	Housing affordable if no more than 30% of gross monthly income spent on total housing costs
Housing Wage	National Low-Income Housing Coalition	The hourly wage needed to afford the Fair Market Rent in a given area
HR 3899 Definition of Housing Affordability	American Homeownership Act of 1998	Similar to NAHB except uses 150% of median income rather than only median income
Affordability Measure by MSA	EPA	Used to measure change in affordability due to increase in compliance costs associated with effluent regulation
Price Index of New One-Family Sold	US Bureau of the Census	Measures changes over time in the sale price of new single-family houses with the same characteristics
Federal Home Loan Bank of Atlanta Lower-Income Housing Affordability Index		Ability of lower-income households to qualify for mortgage on a modestly-priced home
Shelter Poverty	Stone (1993)	Maximum amount available for housing depends on household size and income
Quality Adjusted Measure		Compute number of households for which 30% would not cover cost of housing
Supply of Affordable Housing Units		Share of vacancy rates for units deemed affordable according to the Fair Market Rent
Housing Affordability Mismatch		Ratio of housing units potentially affordable to households of a certain income to number of households in that income range

**Figure 1: List of Housing Affordability Indices**

Source: Jewkes, Melanie D, and Lucy M Delgadillo. "Weaknesses of Housing Affordability Indices Used by Practitioners." *Journal of Financial Counseling and Planning* 21, no. 1 (2010).

## National Comparison of Honolulu

Based solely on Hawai'i's geographic location, one can intuitively understand that prices in Hawai'i are going to be higher than on the mainland. In order to fully understand the severity of the cost discrepancies on a national basis we look at three different comparisons: cost of living; income versus rent; and an affordable housing index. Each of these comparisons rely on similar data; therefore, while one cost comparison may give ample information as to where Honolulu sits relative to other cities, looking closer at each comparison gives further insight to the degree differences.

The first analysis, shown in Figure 2, shows the cost-of-living comparison of Hawai'i as compared to other states. This total considers the general cost of living in each state, including food, housing, and transportation costs. A closer look at Figure 2 shows that Hawai'i is at the bottom of all the states in terms of cost-of-living and accentuates the severity of Hawai'i's housing situation: the numbers show that Hawai'i's cost-of-living is significantly worse than states such as Alaska and New York, states that are expected to be as expensive.

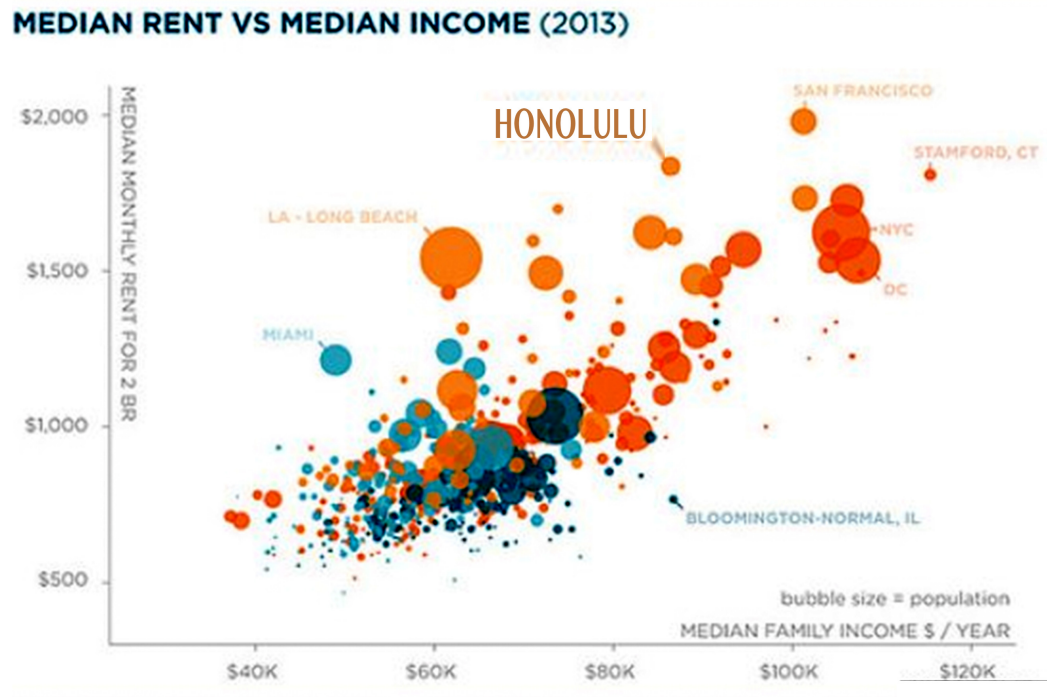
2014 Annual Average Cost of Living								
State	Rank	Index	Grocery	Housing	Utilities	Transportation	Heath	Misc.
Mississippi	1	86.9	91.0	72.5	86.1	94.2	91.7	94.6
Tennessee	2	89.3	93.2	77.3	91.0	93.6	89.8	96.0
Idaho	3	90.2	93.1	75.7	86.6	103.9	99.9	96.3
Indiana	4	90.4	93.4	79.9	94.3	98.6	95.1	93.2
Oklahoma	5	90.8	94.2	79.7	93.9	94.1	95.7	96.2
Kentucky	6	91.0	93.1	78.2	98.4	98.5	92.2	95.9
Michigan	7	91.8	94.2	80.6	96.3	99.5	94.8	95.7
Nebraska	8	92.0	97.0	82.6	96.9	95.5	99.4	94.1
Kansas	9	92.0	94.5	82.5	97.7	93.9	97.1	96.1
Alabama	10	92.0	100.2	79.0	100.8	93.6	87.3	97.2
Utah	11	92.2	97.7	86.1	89.3	97.8	91.5	93.9
Arkansas	12	92.2	94.4	83.3	97.6	89.6	88.3	99.0
New Mexico	13	92.4	95.4	77.7	89.0	101.2	97.5	100.9
Iowa	14	92.6	94.0	87.8	93.1	95.9	96.6	94.2
Texas	15	92.8	90.7	86.2	93.4	96.3	94.9	97.8
Georgia	16	92.9	101.9	80.9	95.0	97.4	96.1	96.8
Wyoming	18	93.6	98.1	95.1	99.0	90.6	98.7	88.9
Ohio	19	94.1	99.7	83.1	99.1	100.6	96.6	97.0
Louisiana	20	95.0	98.2	90.2	93.3	97.3	95.1	97.5
South Carolina	21	95.8	105.6	83.1	105.2	93.5	99.0	100.0
Illinois	22	96.1	96.6	93.0	96.6	104.2	100.7	94.8
North Carolina	23	96.5	102.5	85.9	99.7	98.5	105.4	100.2
West Virginia	24	96.9	95.7	94.7	93.0	101.6	96.8	99.0
Virginia	25	97.0	96.4	93.3	103.7	93.2	98.6	99.7
Wisconsin	26	97.5	98.9	90.3	101.5	101.5	110.6	98.7
Florida	27	99.8	104.1	95.5	101.2	103.0	98.5	100.2
Arizona	28	100.2	100.9	101.1	96.6	100.7	101.9	100.0
North Dakota	29	100.7	102.9	102.9	89.4	102.6	108.7	99.7
Montana	30	100.8	102.0	113.2	88.0	92.5	105.9	96.1
Colorado	31	101.3	97.2	109.4	90.8	101.8	104.3	98.7
Minnesota	32	101.5	105.4	97.1	89.4	101.8	103.9	107.2
Nevada	33	101.6	108.8	96.9	86.1	106.1	98.6	106.4
Pennsylvania	34	102.1	103.0	99.2	107.9	102.6	95.2	103.2
South Dakota	35	102.3	111.3	113.5	89.9	91.0	95.0	97.7
Washington	36	103.2	100.1	107.8	86.3	107.2	114.2	103.0
Delaware	37	104.8	108.2	97.1	113.0	103.7	101.4	108.5
Maine	38	110.1	96.9	122.1	89.5	109.8	119.0	110.8
New Hampshire	39	115.6	97.9	128.1	124.5	99.1	118.1	115.5
Maryland	40	118.9	108.9	171.9	100.6	102.8	90.8	92.6
Vermont	41	119.0	106.4	143.4	122.9	109.2	107.5	107.2
Rhode Island	42	122.4	106.7	135.3	124.8	104.5	118.9	124.6
Massachusetts	43	123.5	104.7	140.9	126.1	114.7	118.7	119.5
Oregon	44	125.1	114.4	160.9	90.8	111.7	114.3	116.2
New Jersey	45	126.7	106.3	165.1	114.3	108.3	106.6	115.7
California	46	128.7	114.5	175.7	113.4	113.8	110.5	106.7
Alaska	47	133.2	129.1	149.5	159.6	112.9	145.3	118.1
New York	48	133.3	109.8	191.7	106.1	112.0	104.4	113.1
District of Columbia	49	141.6	110.2	246.4	96.9	104.4	96.4	98.2
Connecticut	50	145.2	117.1	208.4	127.7	118.5	110.7	122.7
Hawaii	51	164.0	157.1	210.3	238.4	125.8	113.5	123.5
Grand Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0

Figure 2: Average Annual Cost of Living by State

Source: 2014. "Cost of Living Data Series 2014 Annual Average." Missouri Department of Economic Development Accessed Dec 28, 2014. [http://www.missourieconomy.org/indicators/cost\\_of\\_living/index.stm](http://www.missourieconomy.org/indicators/cost_of_living/index.stm).

Figure 2 shows the median rent versus median income comparison. This comparison shows Honolulu standing ahead significantly from other cities in the nation in terms of

higher rent versus median income with only San Francisco having a higher two-bedroom median rental rate



**Figure 3: Median Rent vs. Median Income, 2013**

Source: "Cost of Living Data Series 2014 Annual Average," Missouri Department of Economic Development. Retrieved Dec 28, 2014, from [http://www.missourieconomy.org/indicators/cost\\_of\\_living/index](http://www.missourieconomy.org/indicators/cost_of_living/index)

Figure 3 also shows an interesting comparison in terms of the relationship of rent to monthly income. For overall affordability to remain consistent between cities, a linear relationship must be maintained between the rental cost and income, meaning, as average rents increase so does the average income. This linear relationship is the proven case in many cities; for example, New York City in Figure 3 illustrates an equally high average income to match the high rental prices. Honolulu and San Francisco are both outliers from that linear relationship, with their comparison of income to rental prices indicating an especially unaffordable scenario. Considering those individuals who are below the 100% area median income (AMI) range, a larger percentage of income is required to obtain an average rental accommodation in Honolulu.

The third statistical set, the Affordability Index (Figure4), an obvious indication of Honolulu's drastic difference, relative to other cities, is shown. This measure remains far



above one-hundred nationally, as it has for the last decade and a half. Of the 175 cities in the affordability index, Honolulu has the lowest affordability index of any city, with numbers well below one-hundred. This calculation assumes a down payment of 20% of the home price and it assumes a qualifying ratio of 25%. This means that anyone's monthly principle and interest payment cannot exceed 25% of the median family monthly income.

**National Association of REALTORS®**  
**Affordability Index of Existing Single-Family Homes for Metropolitan Areas**

Metropolitan Area	2011	2012	2013
Honolulu, HI	68.1	74.0	65.0
Anaheim-Santa Ana-Irvine, CA	81.5	84.8	67.9
San Jose-Sunnyvale-Santa Clara, CA	87.9	88.3	68.0
New York-Wayne-White Plains, NY-NJ	72.0	80.4	72.4
Los Angeles-Long Beach-Santa Ana, CA	96.8	103.0	77.8
San Diego-Carlsbad-San Marcos, CA	96.6	101.4	81.5
Bridgeport-Stamford-Norwalk, CT	134.0	147.4	137.4
Denver-Aurora, CO	163.0	169.6	142.2
Eugene-Springfield, OR	N/A	N/A	143.1
Charleston-North Charleston, SC	154.6	162.3	145.4
Washington-Arlington-Alexandria, DC-VA-MD-WV	161.7	166.1	145.8
Atlantic City, NJ	150.0	163.6	162.3
Baltimore-Towson, MD	178.7	233.0	172.7
Tucson, AZ	205.9	210.7	172.8
Orlando, FL	215.8	233.2	177.9
Cape Coral-Fort Myers, FL	277.4	241.0	181.9
Richmond, VA	191.6	205.3	182.8
Tallahassee, FL	222.9	240.5	196.2
Albany-Schenectady-Troy, NY	198.7	221.0	201.2
Panama City-Lynn Haven-Panama City Beach, FL	N/A	221.6	201.9
Gainesville, FL	216.6	234.6	203.6
Tampa-St. Petersburg-Clearwater, FL	220.7	236.0	209.1
Huntsville, AL	198.3	231.5	211.4
Port St. Lucie, FL	N/A	238.2	215.7
Greensboro-High Point, NC	219.0	231.8	219.1
Little Rock-N. Little Rock, AR	227.7	245.5	228.3
Deltona-Daytona Beach-Ormond Beach, FL	241.6	253.2	228.8
Norwich-New London, CT	226.1	249.4	236.1
Amarillo, TX	243.2	237.6	238.4
Lexington-Fayette, KY	240.4	255.2	245.3
Gulfport-Biloxi, MS	239.8	277.5	246.7
Erie, PA	248.8	289.1	254.9
Green Bay, WI	249.0	272.4	263.7
Cumberland, MD-WV	299.4	287.5	275.4
Rochester, NY	275.5	291.8	276.3
Fond du Lac, WI	288.3	306.1	294.0
Elmira, NY	301.5	322.3	297.0
Springfield, IL	292.0	329.7	309.9
Lansing-E.Lansing, MI	407.3	404.3	326.9
Rockford, IL	299.0	378.9	336.2
Toledo, OH	370.9	418.3	363.8
Youngstown-Warren-Boardman, OH-PA	N/A	396.1	364.2
Decatur, IL	358.0	358.2	391.0

**Figure 4: Affordability Index of Existing Single Family**

Source: "Affordability Index." National Association of Realtors, Accessed Jan 22, 2014. <http://www.realtor.org/topics/housing-affordability-index/methodology>.

Considering the homeless population is also relevant to this analysis, as many individuals are pushed into homelessness due to the lack of affordable housing. The homeless population is tracked annually, and each year the statistic on homelessness continues to worsen: on Oahu, the homeless count in 2014 was 4,712 individuals.<sup>11</sup> The homelessness count is used solely as a comparison indicator to other states as to how Hawai'i ranks, on a per capita basis; Hawai'i continues to have the worst homeless problem in the nation. Much of the homeless population is in need of social assistance programs to deal with a number of issues; however, a huge homeless population, made up of fully functioning members of society, exists who could benefit from affordable housing. Of the 4,712 homeless individuals accounted for on Oahu, 32.7% are working either full- or part-time.<sup>12</sup> Additionally, there are individuals unaccounted for in that population that are considered the "hidden homeless"; this group is difficult to quantify as they are fully functioning members of society who may choose to live in their cars or frequently move between friends' houses, choosing to do so to avoid a majority of their income going to rent.

The affordable housing crisis has become a major issue; the high cost of living, combined with the state's high percentage of service-oriented employment, and limited resources, results in unaffordable housing for many individuals and families. Overcrowding and substandard living conditions are major problems for many families unable to afford decent living accommodations; even in these problematic rental scenarios, which might be assumed to be more affordable, rent is still financially holding families down.

According to The University of Hawai'i Economic Research Organization (UHERO), the demand for affordable housing is rising faster than supply.<sup>13</sup> On a national basis, Honolulu is one of the most imbalanced and unaffordable housing markets in the country. As the fourth most expensive metropolitan market in the nation, the median Oahu home sold for \$675,000<sup>14</sup> in 2014, approximately 10 times Honolulu's median income.

Comparing Honolulu's home prices with those of cities with similar median family incomes reveals a great discrepancy between Honolulu's ratio of home prices to income.

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11. Department of Human Services The State of Hawaii, Homeless Programs Office, "Statewide Homeless Point-in-Time Count 2014 Methodology and Results," (2014).

12. Realtors, Honolulu Board of. 2014. "HiCentral " Accessed May 20, 2014. [www.hicentral.com](http://www.hicentral.com).

13. Hawaii, University of, and UHERO Economic Research Organization. 2014. "Can the Median Household afford the Median Home on Oahu?".

14. Realtors, Honolulu Board of. 2014. "HiCentral " Accessed May 20, 2014. [www.hicentral.com](http://www.hicentral.com).

Looking at a range of cities, using four comparison points, the median family income ranges from a high of \$85,927 in San Jose to \$43,457 in Toledo. Toledo has the home price-to-income ratio at the opposite end of the extreme range from Honolulu.

Comparing Honolulu to San Francisco, the prices are proportionately higher; however, the affordability rate is lower due to the cost of living difference in Honolulu. The cost of living is 88% higher than the national average; groceries cost 55% more than the national average; and utilities cost 67% more.<sup>15</sup>

#### **Median Income vs. Single-Family Homes for Metropolitan Areas**

<b>Metropolitan Area</b>	<b>Median Income</b>	<b>Median House Price</b>	<b>House Price/Income</b>	<b>Affordability Index</b>
Honolulu, HI	\$66,639.0	\$628,000.0	9.5	67.6
Anaheim-Santa Ana-Irvine, CA	\$71,957.0	\$539,100.0	7.5	67.8
San Jose-Sunnyvale-Santa Clara, CA	\$85,927.0	\$636,800.0	7.4	70.1
San Francisco-Oakland-Fremont, CA	\$77,693.0	\$742,500.0	9.5	72.6
Seattle-Tacoma-Bellevue, WA	\$67,900.0	\$324,400.0	4.8	130.2
Phoenix-Mesa-Scottsdale, AZ	\$52,589.0	\$147,800.0	2.8	179.5
Atlanta-Sandy Springs-Marietta, GA	\$56,024.0	\$101,300.0	1.8	251.8
Toledo, OH	\$43,457.0	\$80,300.0	1.8	395.4

\*All areas are metropolitan statistical areas (MSA) as defined by the US Office of Management and Budget though in some areas an exact match is not possible from the available data. MSAs include the named central city and surrounding areas and may not match local reporting due to differences in specification.  
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#### **Figure 5: Median Income vs. Single-Family Homes for Metropolitan Areas**

Source: "Affordability Index." National Association of Realtors, Accessed Jan 22, 2014. <http://www.realtor.org/topics/housing-affordability-index/methodology>.

For those looking to purchase in Honolulu, the problem gets increasingly worse since any minor percentage increase in Hawai'i home pricing would mean that many people would be priced out of the housing market. For many years, a 10% increase in home prices has occurred; such an increase in 2015 would mean an increase of approximately \$75,000, making house purchasing or renting impossible. Orange County, CA, shares a similar housing and financial struggle as Honolulu. It has a similar median income and home price level. However, since Orange County is part of the greater Los Angeles area, where these figures are much more favorable, Orange County gives buyers an option to live more cheaply within a relatively short commuting distance.

Each year, the area median income level is established, providing a gauge for accommodations. Officials allocating state funds use this to measure the affordability of

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<sup>15</sup>. Ibid.

projects. Officials in city and county permitting use this gauge to trigger architecture guidelines and for new developments required to meet affordable housing criteria. In 2014, the AMI was \$82,600 for a four person household. See Figure 6 for the breakdown of income levels for Honolulu County. In order to correlate the income level within a rental range, HUD provides the breakdown shown in Figure 11.

#### Honolulu County Median Income By Family Size

AMI, by HUD, 2014 \$ 82,600

Fam Size	1 PERSON	2 PERSON	3 PERSON	4 PERSON	5 PERSON	6 PERSON	7 PERSON	8 PERSON
Multiplier	0.7	0.8	0.9	1	1.08	1.16	1.24	1.32
10%	\$5,782	\$6,608	\$7,434	\$8,260	\$8,921	\$9,582	\$10,242	\$10,903
20%	\$11,564	\$13,216	\$14,868	\$16,520	\$17,842	\$19,163	\$20,485	\$21,806
30%	\$17,346	\$19,824	\$22,302	\$24,780	\$26,762	\$28,745	\$30,727	\$32,710
40%	\$23,128	\$26,432	\$29,736	\$33,040	\$35,683	\$38,326	\$40,970	\$43,613
50%	\$28,910	\$33,040	\$37,170	\$41,300	\$44,604	\$47,908	\$51,212	\$54,516
60%	\$34,692	\$39,648	\$44,604	\$49,560	\$53,525	\$57,490	\$61,454	\$65,419
70%	\$40,474	\$46,256	\$52,038	\$57,820	\$62,446	\$67,071	\$71,697	\$76,322
80%	\$46,256	\$52,864	\$59,472	\$66,080	\$71,366	\$76,653	\$81,939	\$87,226
90%	\$52,038	\$59,472	\$66,906	\$74,340	\$80,287	\$86,234	\$92,182	\$98,129
100%	\$57,820	\$66,080	\$74,340	\$82,600	\$89,208	\$95,816	\$102,424	\$109,032
110%	\$63,602	\$72,688	\$81,774	\$90,860	\$98,129	\$105,398	\$112,666	\$119,935
120%	\$69,384	\$79,296	\$89,208	\$99,120	\$107,050	\$114,979	\$122,909	\$130,838
130%	\$75,166	\$85,904	\$96,642	\$107,380	\$115,970	\$124,561	\$133,151	\$141,742
140%	\$80,948	\$92,512	\$104,076	\$115,640	\$124,891	\$134,142	\$143,394	\$152,645

**Figure 6: Honolulu County Income By Family Size**

Source: HUD. "Fy 2014 Income Limits Documentation System." Accessed Dec 19, 2014.

<http://www.huduser.org/portal/datasets/il/il2014/2014summary.odn>.

With the lack of affordable rentals and homes, lower-income families are forced to compete with higher-income families who have been edged out of the "for sale" market and into the rental market. As the price of rentals and/or homes increases and the supply diminishes, those with the ability to bid for what is available get the best units and consequently push the rest down the chain to lesser quality housing alternatives. At the bottom, those with no options are left homeless.

## Down Payments

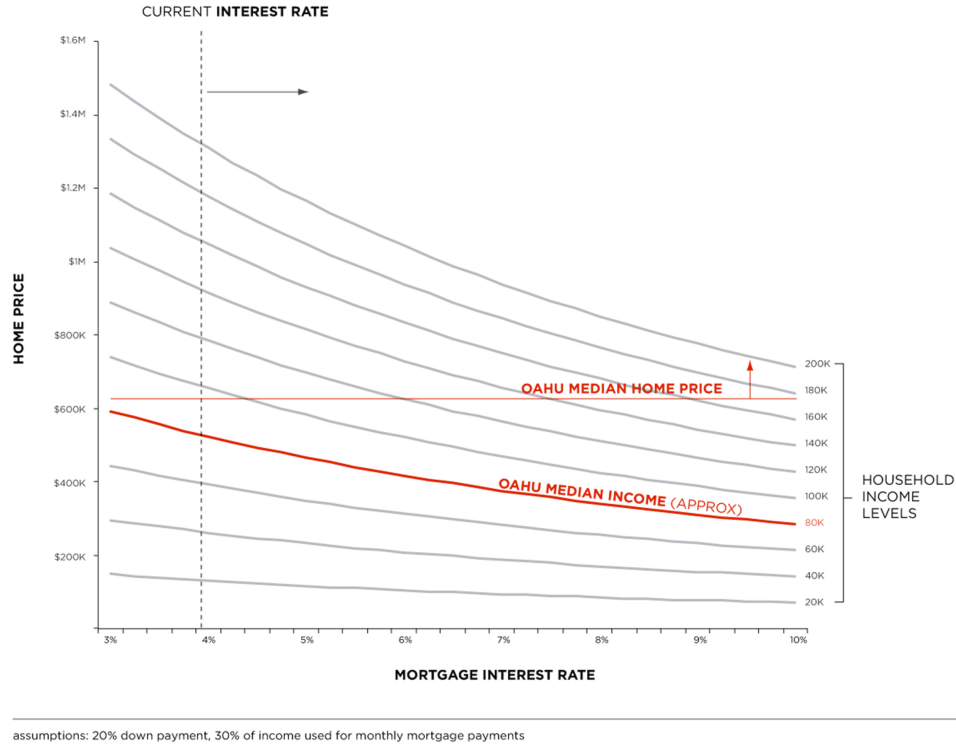
For those wishing to purchase an affordable housing dwelling, there are programs that offer assistance with making the down payment. These subsidy programs, combined

with government policies, act to improve affordability; however, work by Jones (1989) and Linneman and Wachter (1989) implies that these policies would be insufficient to deal with the real affordability problems facing many households. They have found that down payment requirements have a significant impact on the ability of many households to buy a home. While lower interest rates may reduce the income necessary to purchase a home, they do not directly reduce the down payment requirements. As a consequence, the levels and growth rates of savings and incomes, in addition to house prices and interest rates, all contribute to housing affordability.

## **City and County Affordable Housing Requirements**

The 2014 HUD-determined Honolulu area median income (AMI) for a family of four was set at \$82,600.00. Under the existing City and County of Honolulu regulations, the Affordable Housing program generally requires that 30% of a residential development must be priced “affordably” for those that are below 120% of the median income, with 10% being affordable to those earning 80% or less of the AMI. Any interest rate hike would be reflected in the amount they could afford. Figure 7 shows a typical housing scenario on Oahu where the median home price correlates with a salary. As home prices continue to rise, the ability to purchase is reduced, however Figure 7 shows how an increase in interest rates would worsen the situation creating a large spread between the two red lines.

## RESIDENTIAL REAL ESTATE FINANCING BY INCOME LEVEL & INTEREST RATE



**Figure 7: Oahu Residential Real Estate**

Source: UHERO, <http://www.uhero.Hawaii.edu/>.

## Forecasting Hawai'i's Changing Affordability

In April 2014, UHERO published a Hawai'i Construction Forecast Report forecasting real estate changes to come. Single-family home prices on Oahu were expected to increase consistently in the coming 2-3 years.<sup>16</sup> To compound the affordability challenges for working families, mortgage rates are expected to creep up. “As rates and prices rise, affordability will begin to erode, although healthier family incomes will moderate this impact.”<sup>17</sup>

The Comparative Construction Cost Index tackles the bid cost of construction in each city, which includes, in addition to costs of labor and materials, general contractor and

16. UHERO.

17. UHERO, <http://www.uhero.Hawaii.edu/>.

subcontractor overhead costs and fees (profit).<sup>18</sup> For many years, Hawai'i has had close to the highest construction cost index in the country. With the high labor force demand, 2014 Hawai'i construction costs escalated at a rate of more than 2% per quarter while the national average topped out at 1.66%, making development costs that much further out of reach. Figure 8 shows how the construction costs jumped in Honolulu in 2013 relative to other cities. Given this extreme jump, there is a necessity to build using minimal labor.

This data provides a clear argument for an alternative construction method that minimizes onsite labor, mitigating the risk of construction cost escalations. Looking at other building methods, a number of viable options that have been utilized internationally as well as locally could be adopted.

City	July 2014	October 2014	% Change
• Boston	18,667	18,982	1.63%
• Chicago	18,040	18,293	1.40%
• Denver	12,419	12,546	1.03%
• Honolulu	20,858	21,445	2.81%
• Las Vegas	12,205	12,319	0.93%
• Los Angeles	16,475	16,833	2.18%
• New York	22,072	22,384	1.42%
• Phoenix	12,478	12,608	1.04%
• Portland	12,960	13,249	2.23%
• San Francisco	18,239	18,665	2.33%
• Seattle	14,408	14,577	1.18%
• Washington, DC	17,479	17,788	1.77%

**Figure 8: Comparative Construction Cost Index**

Source: USA Report, Quarterly Construction Cost Report, Rider Levett Bucknall. "Rider Digest." (2014): 21.

## CURRENT NEEDS IN HAWAI'I

According to a 2014 projection study by the Hawai'i Housing Finance and Development Corporation (HHFDC), Honolulu needs 14,000 affordable housing rental units by 2020 to

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18. Rider Levett Bucknall Ltd, "Rider Digest," (2014).

meet the population's demand.<sup>19</sup> The percent of AMI is based on \$82,600 for a family of four. Figure 9 shows housing needs versus the actual amount fulfilled. The bracket of housing for 30-50% AMI is in high demand and will be difficult to accommodate. The affordable housing need lies primarily in the rental housing market, therefore our focus should be on perpetually affordable housing projects.

<b>Projected Rental Housing Need, 2014-2020</b>						
% Median Income	Honolulu	Maui	Hawaii	Kauai	State	%
30%	4,076	1,377	2,355	330	8,138	19%
50%	3,808	1,402	2,017	221	7,448	17%
60%	2,415	748	1,003	462	4,629	11%
80%	3,710	1,330	1,657	312	7,009	16%
Sub-total	14,008	4,857	7,033	1,325	27,224	62%
<b>Projected First-Time Homebuyer Need, 2014-2020</b>						
% Median Income	Honolulu	Maui	Hawaii	Kauai	State	
80-100%	3,217	1,087	1,422	526	6,252	14%
100-120%	2,950	956	1,292	433	5,631	13%
120-140%	2,448	890	924	361	4,623	11%
Sub-total	8,615	2,933	3,638	1,320	16,506	38%
<b>TOTAL Affordable</b>	<b>22,624</b>	<b>7,790</b>	<b>10,671</b>	<b>2,645</b>	<b>43,730</b>	<b>100%</b>
<b>Projected Market Housing, 2014-2020</b>						
<b>Market</b>	<b>8,573</b>	<b>6,204</b>	<b>4,041</b>	<b>1,555</b>	<b>20,373</b>	
<b>TOTAL</b>	<b>31,197</b>	<b>13,994</b>	<b>14,712</b>	<b>4,200</b>	<b>64,103</b>	

**Figure 9: 2011-2016 Housing Needs by County**

Source: Hawaii Housing Finance and Development Corporation, Rental Housing Study 2014 Update, Accessed Feb 20, 2015, <http://dbedt.hawaii.gov/hhfdc/resources/reports/>

Figure 9 shows the huge need for housing in Honolulu to serve both the rental market and the for-sale market. This data also reinforces the fact that a diversity of housing developments must be provided to serve the broad range of users in need. The majority of the need is in the 80% and below AMI strictly for the rental market.

19. Hawai'i Housing Finance and Development Corporation (HHFDC).



# Chapter 2

## 2.0 Drivers/Constraints/Considerations

### The Perfect Storm

A perfect storm is brewing that presents an opportunity to rethink and reshape the way we design, build and live, a shift to more compact, mixed-use, walkable neighborhoods. One aspect of this storm is dramatically changing demographics; another, the increasing cost of housing; a third, the increasing market for walking, biking, and accessible transit. Traditional housing models cannot withstand this storm; the need for change is imminent.

In order to introduce any new housing into our community, we must understand and address the existing road blocks to progress. Based on political meetings, community involvement, and interviews with leaders in the community, the following considerations should be carefully assessed to ensure progress happens:

1. Building. Assessing the potential users, recognizing a shift in demographics.
2. Neighborhood acceptance. Ways to overcome community rejection.
3. Long-term management. Encouraging social cohesion within the community.
4. Cost. Working within budget.
5. User needs. Addressing the size and flexibility of individual spaces.

### Shifts in Society

With the overall goal providing affordable housing, it is necessary to understand the needs and values of the end-user. Careful consideration of the future needs of this group is necessary since the project is for future users, both decades and generations to come. Over such a time horizon, there are inevitable economic swings, cost-of-living changes, and interest rate hikes that will occur. What we may consider affordable now may not be affordable in the future.

Looking at societal transformations that have occurred in recent years can provide insight into how we should build our buildings. An understanding exists that the traditional family is less and less common and that lifestyles have changed while technology continues to advance; this results in a change of expectations of our homes, that they will do more than just provide shelter. Existing depletion of natural resources results in the need for better use of these materials. Do-It-Yourself skills can provide an opportunity for individuals to acquire a cheaper property and add labor equity themselves. While it may not be possible to accommodate for all these changes, these points should be carefully considered in building responsibly.

For the past century, the "American Dream" was to find the perfect house in the suburbs in which to raise a family. Urban sprawl evidences this as well as statistical data that shows that the overall miles travelled per household annually jumped by 60% over the forty years leading up to 2009.<sup>20</sup> However, census data now reveals a shift: after fifty years of outward migration, people are starting to move in the other direction.<sup>21</sup> Population growth in outer suburbs dramatically slowed from 2010 to 2011, increasing by only 0.4%. At the same time, cities and identified inner suburbs grew twice as fast, marking the first time in twenty years that city growth surpassed that of suburbs. Although this is partly due to the recent housing crisis, this is the first time since the invention of the automobile that our outward migration pattern has reversed.<sup>22</sup>

Home valuations have inverted in the wake of the great recession. Relatively speaking, houses have held their value better in cities than suburbs, opposite from previous trends. Typical economic dips during the recession resulted in urban home prices losing their value. For example, in Philadelphia in the early 1990s, home prices in the urban center fell 34% while prices in the suburbs only dropped 14%; in the recent downturn, the opposite happened, suburban prices falling 33% while homes in downtown fell only 20%.<sup>23</sup> This pattern is proving to be consistent throughout the nation. Housing that is

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20. Adella Santos et al., "Summary of Travel Trends: 2009 National Household Travel Survey," (2011).

25. Alan Walks, "15 Post-Automobility?," *Driving Cities, Driving Inequality, Driving Politics: The Urban Political Economy and Ecology of Automobility: Driving Cities, Driving Inequality, Driving Politics* (2014).

26. Ibid.

23. Leigh Gallagher, *The End of the Suburbs: Where the American Dream Is Moving* (Penguin, 2013).

located in walkable districts tends to maintain a more consistent value through economic swings.<sup>24</sup>

Construction activity in urban versus suburban areas has also shifted in favor of urban centers. In New York City in the early 1990s, 7% of residential building permits were in the city limits while ten times that amount existed in the suburban fringe. Again, this statistic has flipped, although it does include the economic downturn; by 2008, residential building permits made up 7% of the whole versus inner city permits which made up more than 70%. This same trend is seen in other cities across the nation. Despite the fact that the economy has come back in recent years, there are still prolonged signs of a higher demand for urban development.<sup>25</sup>

Densely populated urban neighborhoods were originally thought to be poverty-stricken and dangerous, but recent studies by the Brookings Institution have shown a shift to more poverty-stricken suburbs and safer urban centers. As of 2010, a record 15.3 million suburban residents were living below the poverty line in the larger metropolitan areas, up 11.5% from the year prior.<sup>26</sup> The crime rate has been following this trend as well. Although crime is still higher in urban centers, there is data showing that homicides are falling sharply in cities and rising in suburbs.<sup>27</sup>

Cities are resurgent: wealth is rushing back into cities; real estate prices are increasing; development is advancing; and once slum-like neighborhoods are being gentrified. Retailers are following this trend as well; many of the large big box stores, such as Walmart and Target, are now opening small-scale neighborhood market stores in order to capitalize on this urban market.

The Oahu Transit Oriented Development (TOD) strategies are largely based on the developments in San Francisco. Peter Calthorpe, a San Francisco based architect and urban planner, who pioneered the notion of Transit Oriented Development, has said that

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24. Joe Cortright, "Walking the Walk: How Walkability Raises Home Values in Us Cities," (2009).

25. John V Thomas, *Residential Construction Trends in America's Metropolitan Regions* (DIANE Publishing, 2010).

26. Elizabeth Kneebone and Alan Berube, *Confronting Suburban Poverty in America* (Brookings Institution Press, 2013).

27. Gallagher, *The End of the Suburbs: Where the American Dream Is Moving*.

the traditional households' "day has passed". The statistics are proof of this demographic shift; only half of adults in the U.S. are married, down from 75% in 1960.<sup>28</sup> Families with children used to make up more than half of U.S. households; by 2025, they will represent just 25%.<sup>29</sup>

There are big differences in the value system of baby boomers and millennials, millennials being those born between 1977 and 1995. This shift in values is pronounced by the statistics based around millennials' vehicle use. Only 43 percent of all 16- and 17-year-old Americans were licensed in 2002, the last year for which statistics were available, according to the Federal Highway Administration and U.S. Census Bureau. In 1992, that figure was nearly 52%.<sup>30</sup> In 2015, the population of millennials will surpass that of the baby boomer generation.<sup>31</sup> The majority of millennials live with their parents; however, when they leave home, 77% of them will prefer to live in an urban area.<sup>32</sup> Adding to this urban migration is the retiring baby boomer generation: 75% of them say they want to live in mixed-age and mixed-use community on retirement.<sup>33</sup> With the aging baby boomer population on the decline and the shifting values of the millennials, there is an expected surplus of large lot houses that millennials have no desire to fill. One study from The University of Utah indicated that by 2020 there will be forty-million large lot homes in surplus.<sup>34</sup>

In recent years, there has been a new level of acceptability to the idea of sharing housing; with this comes varying degrees of interaction, all of which are widely accepted,

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28. Paul Taylor, "The Decline of Marriage and Rise of New Families," *Pew Research Center. A* (2010).

29. Arthur C Nelson, "Leadership in a New Era: Comment on "Planning Leadership in a New Era"," *Journal of the American Planning Association* 72, no. 4 (2006).

30. Federal Highways Administration, "The Next Generation of Travel: Research, Analysis and Scenario Development," Retrieved February 20, 2015, 2015, from [http://www.fhwa.dot.gov/policy/otps/nextgen\\_finalreport.cfm](http://www.fhwa.dot.gov/policy/otps/nextgen_finalreport.cfm)

31. Neil Howe and William Strauss, *Millennials Rising: The Next Great Generation* (Vintage, 2009).

32. Paul Joseph McAndrew, "Student-Driven Change: Analysis of Livemove Bydesign Experiential Learning Project and Community Impact," (2013).

33. Gallagher, *The End of the Suburbs: Where the American Dream Is Moving*.

34. Arthur C Nelson, "The Mass Market for Suburban Low-Density Development Is Over," *The Urban Lawyer* 44 (2012).

particularly among millennials. Many companies have cropped up to capitalize on this, a few examples being:

- Zipcar – A car-share company that, through placement of cars throughout urban neighborhoods, creates the viable option to not own a vehicle.
- Uber Taxi – Allows individual vehicle owners the ability to function as a taxi.
- Couchsurfing – Online network of free accommodations in strangers' homes.
- Airbnb – Allows individuals to rent out a portion of their house on a nightly basis.

The sudden popularity of these companies is an indication of not only the willingness to have these social interactions but the “want” to have these experiences. It is a testament to human nature and the need for interaction. The potential for this to change the way we live is enormous, as people become more “wired” to the internet while seeking and encouraging a different way of living.

## Community Acceptance

Another challenge faced by affordable housing developments, and the other major barrier to production of housing for lower income households, is NIMBY, the acronym for “not in my back yard.” NIMBY is a form of housing discrimination in which residents of particular neighborhoods object to the sight of affordable housing in or near their neighborhoods, and local officials collude by denying permits or other required actions to the affordable housing developer. NIMBY is usually overlooked since it is not illegally discriminatory, unlike objections based on the low-income status of future residents, but is often a channel for racial or other forms of discrimination. NIMBY can be fought by arguing federal fair housing laws; however, this is likely a difficult, time-consuming battle requiring well-funded advocates and government officials.

The role of affordable housing on an urban scale must be considered with the same approach that Jensen takes with her Five Dimensions of Social Cohesion. (See Figure 10) On the urban scale, we consider how the rest of the community will relate and accept such a project. Resistance to change is inevitable, particularly with social housing developments. In order to best overcome NIMBY, we must first understand the nature of

the typical opposition arguments, the factors that determine community attitudes, and the range of alternative strategies.<sup>35</sup>

Typical NIMBY concerns:

- Depreciating in property values: the most common concern, the idea being that low-budget construction combined with a poorly maintained building will have an overall negative effect on the community.
- Light pollution: buildings that have security lighting or interior lighting may cause a change in the surrounding neighborhood from pre-development conditions.
- Noise pollution: typically not an issue in residential developments, in higher density communities, an increase in traffic and general residential noise could be a concern.
- Visual blight: concern about the neighborhood's character and the risk of altering it.
- Loss of sense of community: many people value the social character of their neighborhood and are concerned about damaging community cohesion.
- Strain on public resources and schools: as new groups move into communities, there may be a need for additional school facilities.
- Disproportionate benefit to non-locals: when a project appears to benefit others that are not present. Common in the case of rental properties when the owner is absent.
- Increases in crime: usually a concern to neighborhoods when low-income, low-skill workers and racial minorities move in.

When members of a neighborhood speak out against affordable housing, one concern is that the character of the neighborhood will be affected as well as that property values will be lowered. Neighborhoods form their own identity and residents have the right to be concerned about losing that identity. Speaking out against unpopular projects is a testament of pride and concern that individuals have for their community. If the residents of a particular neighborhood can be shown that affordable housing would fit seamlessly into their neighborhood while also aligning with its core values and architectural aesthetics, NIMBY will diminish. This is where architectural design can serve to balance the community's needs.

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35. Michael Dear, "Understanding and Overcoming the Nimby Syndrome," *Journal of the American Planning Association* 58, no. 3 (1992).

The National Low Income Housing Coalition outlines strategies to overcome community opposition to affordable housing. They indicate methods to navigate political opposition to affordable housing. Four approaches are taken to overcoming community acceptance: 1) educating elected officials; 2) garnering allies from a broad range of interests within the community such as businesses, clergy, and social service agencies; 3) addressing all legitimate neighborhood and community oppositions; 4) expanding legal protections for affordable housing.

Many recent affordable housing projects have been successful with overcoming community acceptance by using architectural strategies such as the use of bright colors and creating overall aesthetically-pleasing buildings, as well as addressing safety. This approach is different than that of creating the dark, depressing, institutional-looking affordable housing buildings of the past. These new buildings show that through careful design, value can be added to a community by the creation of a building that is sensitive to the concerns of the existing community members.

These buildings should be well designed inside and out as this can ensure they will be better maintained by the tenants and appreciated by the community. In order to push the project over the threshold to gain community acceptance to such an extent that the project gets built, addressing NIMBY concerns may be the deciding factor.

## Collective Efficacy /Cohesion

Collective efficacy is defined as social cohesion among neighbors combined with their willingness to intervene on behalf of the common good. Collective efficacy or social cohesion results from interdependence, loyalty, and solidarity within a community. Community collective efficacy is related to the success of affordable housing as it pertains to: 1) community spirit among tenants within the project; and 2) the surrounding neighborhood. Analysis of each area creates strategies that can encourage collective efficacy on both levels.

The "defensible space theory" is from architect and city planner Oscar Newman. His theory is based on crime prevention and neighborhood safety. Newman's theory points

out that higher crime rates exist in high-rise apartment buildings, related to physical detachment to the communal street space. Sadly, the principles leading to a defensible space are often the exact opposite of what many neighborhoods have incorporated to make people think they are safer and happier. Features such as gates and fences may have the perception of security; however, in some cases they may encourage crime. "It is all about empowering individuals to make their own street and homes safer"<sup>36</sup>, states Newman. "The crime problem facing urban America will not be answered through increased force or firepower".<sup>37</sup> Newman's principles spawn an entire new approach to security, called "crime prevention through environmental design". While many crime prevention strategies take into account the physical environment, such as site distances and transparent fences, Newman writes "it's up to the individuals to take control and make the neighborhood more defensible in small and large ways".<sup>38</sup>

Robert Sampson, a sociologist focusing on community collective efficacy, points out that there are additional advantages to a cohesive community that are difficult to measure, all of which add to the community's "social capital". He indicates the importance of perceptions within the neighborhood; these perceptions matter, as they can portray a sense of order or disorder.<sup>39</sup> Also, collective action within a community and the degree of trust engendered by the same bring added value. Sampson also points ways to infuse collective efficacy into a community. As we become a society of "high connectivity", intuitively we equate this to becoming further disconnected within the community; however, the opposite actually occurs as those that are more "connected" online are more connected to the community.<sup>40</sup> Utilization of cultural and social mechanisms within

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36. Oscar Newman and National Institute of Law Enforcement and Criminal Justice., *Design Guidelines for Creating Defensible Space* (Washington: National Institute of Law Enforcement and Criminal Justice, Law Enforcement Assistance Administration, U.S. Dept. of Justice : for sale by the Supt. of Docs., U.S. Govt. Print. Off., 1976).

37. Oscar Newman, *Defensible Space* (Macmillan New York, 1972).

38. Oscar Newman, Rutgers University. Center for Urban Policy Research., and United States. Department of Housing and Urban Development. Office of Policy Development and Research., *Creating Defensible Space* (Washington, D.C.: U.S. Dept. of Housing and Urban Development, Office of Policy Development and Research, 1996).

39. Robert J Sampson, "How Does Community Context Matter? Social Mechanisms and the Explanation of Crime Rates," *The explanation of crime: Context, mechanisms, and development* (2006).

40. Ibid.

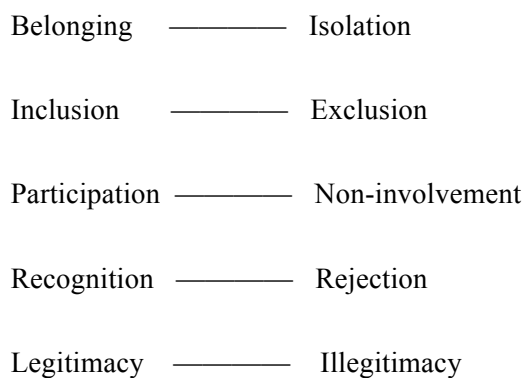


communities increases the sense of presence and ownership of different common spaces that give members of the community an opportunity to interact.

There is an ever present need in Hawai'i to bring the local culture into the architecture. Traditional houses were arranged according to common space. This common space was a place for people to come together, to do most of their daily living, an integral part of traditional Hawaiian living for bonding and social exchange.<sup>41</sup> In modern-day Hawai'i, the common space is often the garage, or a lanai serving as a place for people to come together. Within today's local culture, garages or other similar indoor/outdoor spaces can be considered the hub for social and cultural life, providing not only a gathering area for family and friends but also a connection to the neighborhood.

Prof. Jane Jensen, a theorist who has analyzed the concepts of social cohesion and attempted to develop indicators based on this conceptualization, states that the degree of social cohesion in society can be characterized by where it ranks on the sliding scale illustrated on the next page. Human nature is to seek out social circles to find a sense of belonging, as this scale shows.

### **Jensen's Five Dimensions of Social Cohesion**



**Figure 10: Five Dimensions of Social Cohesion**

*Source:* Mapping Social Cohesion: The State of Canadian Research.

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41. William Tufts Brigham, *The Ancient Hawaiian House*, vol. 2 (Bishop Museum Press, 1908).

Although difficult to measure, each of these theorists highlights the importance of community and cultural connectivity. Architectural design is critically important for giving affordable housing communities the opportunities for this needed social interaction. Giving individuals a sense of pride and ownership in the community has indirect benefits as well, such as positively effecting building maintenance costs, management issues, and security. The success of affordable housing fitting into communities largely depends on collective efficacy fostered within these unique spaces. The architectural solution is to create physical spaces to allow for community connectivity to happen.

On an urban scale, individuals see this social cohesion take place all the time. Parks, community coffee shops, or the beach can serve as spaces where a sense of belonging can be developed. New to Honolulu is the community work-space and community gathering space in Kak‘ako, which provides more of an opportunity for social exchange resulting in a greater contribution to the overall community cohesion.

Communities have a variety of opportunities to promote social and cultural cohesion. Ultimately, the resulting outcome is individuals who feel included in the life of their communities. If they do not, the opposite may happen: they may feel excluded, posing a threat to the cohesion of that society or community. The legitimacy of the social structure, as established by constitution, rule of law, or tradition, largely dictates the degree of participation by individuals within the society.<sup>42</sup> Without this legitimacy, the buy-in from individuals will be lost which can have negative consequences on social cohesion.

## Finances – Building Within Means

Construction budgets for affordable housing are based on available rent income. First, we consider the area median income (AMI) range of 50 to 60% for an individual. This is a common target for affordable housing developments as this income range triggers the possibility of additional funding. Through back calculation from an individual's annual

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42. Jeannotte, M Sharon. 2008. "Shared spaces: Social and economic returns on investment in cultural infrastructure." Under construction: The state of cultural infrastructure in Canada, Vancouver: Centre of Expertise on Culture and Communities, Simon Fraser University.

salary, we can approximate how much one person can afford and use this as a basis for how much an individual unit should cost to build.

<u>Area</u>	<u>\$97,900</u>	<u>Studio</u>	<u>1 Bedroom</u>	<u>2 Bedroom</u>	<u>3 Bedroom</u>	<u>4 Bedroom</u>
<b>HONOLULU COUNTY</b>						
30% of Median		\$513	\$550	\$661	\$763	\$851
50% of Median		\$857	\$918	\$1,102	\$1,273	\$1,420
60% of Median		\$1,029	\$1,102	\$1,323	\$1,527	\$1,704
80% of Median		\$1,371	\$1,468	\$1,762	\$2,036	\$2,271
100% of Median		\$1,715	\$1,837	\$2,205	\$2,546	\$2,840
120% of Median		\$2,058	\$2,204	\$2,646	\$3,055	\$3,408
140% of Median		\$2,401	\$2,572	\$3,087	\$3,564	\$3,976

**Figure 11: Affordable Rent Guidelines, 2013**

Affordability rents are based on 30% of income (including utilities).

Source: HUD. "FY 2014 Income Limits Documentation System." <http://www.huduser.org/portal/datasets/il/il2014/2014summary.odn>.

For an individual at 50% AMI, the monthly rent, according to Figure 11, is \$857. This is based on the definition of “affordable”, spending no more than 30% of one’s income on housing. On an annual basis this is \$10,284, the amount that pays for accommodations.

In the case of a for-profit developer building a new building to then hold and rent out, the amount of revenue collected would not make it a worthwhile investment. Based on information acquired from a construction cost estimator, cost of construction in the range of \$100,000 would be an acceptable estimate for the construction of a small studio dwelling. Considering that there would be a large variation in land cost as well as site work and soft costs, we can only use this number as an approximation. According to those that were interviewed, an approximation for these items would be in the range of \$50,000 leaving approximately \$50,000 for construction. Quite often affordable housing benchmarks are measured against shipping container dwellings, which are expected to cost between \$30,000 and \$50,000. From those interviewed, costs of this type of construction would be in the range of \$200 to \$300 per square foot. In the case of a \$50,000 dwelling built at \$250 per square foot, the approximate allowable size that can be provided while building within means is 200 sq ft. Such a project is almost impossible to manage financially without the assistance of grant money. Regardless of these figures or where the money is coming from, there is always a goal of "as cheap as possible" work. We must assess the individual elements of our housing needs and find solutions

that do not require spectacular amounts of government input: doing more with less will help us find improved cost-efficient affordable housing solutions.

## Housing Flexibility

A conflict exists between the ever-changing nature of peoples' lives and the homes in which they choose to live. These changes are not only over a long-term period, they can also happen on a day-to-day basis. Altering a dwelling layout by removing partitions or building new ones is complicated and costly; people would rather change their own habits or move rather than undertake such involved work.<sup>43</sup> Should our homes dictate our habits? Our homes should strive to "achieve a close fit between the evolving space needs of occupants and their homes".<sup>44</sup> During the lifecycle of a typical North American wood frame home, eight different households, each with its own unique characteristics, will reside in the dwelling.<sup>45</sup>

Flexibility of space is more a concern now than ever. Families are transforming: the traditional family, formerly the bulk of American households, is now very different. Families are aging, changing, and are atypical in nature. Preparing for old age, men and women are now living longer, and as such the retirement years are not only extended but the need and want for individuals to stay in one place is increasing. Not just obtaining housing but obtaining "appropriate" housing is the most important issue for this elderly demographic. Accommodating for new technologies is difficult to design for; however, future-proofing our buildings requires leaving them open to the ability to incorporate these systems. Flexibility of space may accommodate affording in stages: particularly important for affordable housing projects as it may allow individuals to gain a foothold in the real estate market by buying something smaller and more affordable and later having the option to add to it, which would allow the home to grow as wealth grows.

Professor Avi Friedman, an author writing on affordable housing, categorized the opportunities to achieving flexibility in housing into four components.

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43. Avi Friedman, *The Adaptable House : Designing Homes for Change* (New York: McGraw-Hill, 2002).

44. Ibid.

45. Ibid.

These four components are:

1. Manipulation of volumes
2. Spatial arrangement
3. Growth and division
4. Manipulation of subcomponents<sup>46</sup>

### **Manipulation of Volumes**

Manipulating volumes is a manifestation of dwelling adaptability, which could mean combining several floors to make a larger unit, then dividing it at a later stage. A single-family dwelling on several levels, for example, can become homes for several households, each on a single level or part of one. In order for such a process to occur, the designer must consider in advance elements that could limit future conversion, such as the location of circulation areas and utilities. Changes to space volume could also require alteration of the building envelope which, as a result, would change its appearance.

### **Spatial Arrangement**

A range of design strategies can allow adaptability of space within a home's space volume prior to or following occupancy. One of these strategies, for example, is to propose a room that can accommodate multiple uses, such as a living room, an office, or a bedroom. Another manifestation of adaptability would be the accommodation of an elderly person who may be confined to a wheelchair and require special interior arrangements. The entire layout, for example, could be modified to create a suite within the home for an around-the-clock personal nurse; adaptive adjustment of the dining part of the kitchen could also occur. Adapting spaces can also be achieved by using furnishings. The initial design could anticipate such a process by creating appropriate dimensions for storage spaces. A hide-a-bed, for example, can turn a living room into a bedroom. A set of bookshelves can serve as the divider between the living and dining spaces in one large room.

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46. Ibid.

### **Growth and Division**

Design that considers expansion beyond the dwelling (add-on) or growth into a space within the perimeter of the original volume (add-in) is another form of adaptability. This process could also be reversed and a large home could be divided to form two dwelling units. On a smaller scale, expansion could take place within the space itself. Taking advantage of unused area under a staircase or enclosing an alcove and turning it into a room is also a form of expansion. The added space needs to be designed to function along with the existing one. In the event of a division, the new spaces need to be designed to function independently. The designer must pay attention to issues such as natural light and circulation between the old area and the addition, among other considerations.

### **Manipulation of Subcomponents**

Subcomponents are the elements that are fitted into the house once the structure has been erected, prior to the closing of the horizontal and vertical surfaces. Recent advances in information technology, for example, have introduced additional and different kinds of subcomponents into homes. These can be electrical or computer wiring, heating and ventilation ducts, kitchen and bathroom fixtures, and prefabricated façade elements. The useful life of many such components is often shorter than the life of the house's structure; as such they require replacement when the part is obsolete. Designing for adaptability would permit easy access and replacement when the subcomponents needed repair or upgrading.

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## **Design Drivers**

In the design of affordable housing, we consider each of the five touch points already identified to begin to form a list of design drivers, summarized below:

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47. Ibid.

1. Shift in demographics. This informs the design from the expectations of the user. The new generation of users tend to be accepting of smaller dwellings, with little to no parking. Technologically connected, this group also expects to be socially connected with neighbors and the community.
2. Neighborhood NIMBY. Use of color, appropriate material, and attention to aesthetic details is critical.
3. Social cohesion. The use of common space, both with neighbors and the community, adds to the social cohesion. Incorporation of additional opportunities to further social interaction is advantageous.
4. Cost. Since cost is not expected to change, doing more with less is necessary but still limiting. Smaller construction is the only way to reduce cost to end-users.
5. Flexibility of space. Incorporation of multipurpose space through various furniture and building strategies is required. This is complementary to the cost restriction and the need to have smaller spaces become more functional.

Looking at these touch points, obviously there is a great deal of complexity to each point; no one profession can fully provide the depth of understanding needed in all areas of an affordable housing project. This indicates that there are many areas of expertise required in such a project and the need to incorporate a diverse group of experts is imperative. This then becomes possibly the most important design driver of all: to incorporate other experts to contribute to the understanding of the complexities of an affordable housing project.

Each affordable housing site is different, with a different context, advantages and disadvantages, and design drivers. A further benefit of incorporating a diverse group within the design process is the ability to thoroughly identify additional design drivers that may be local only to that area.

The ability to consider all of the touch points for an affordable housing project will allow a synergistic additional value to be added, as each of the points are directly and indirectly

related. An example of this would be providing a more attractive building that would be more easily accepted by the community while generating a sense of pride in the residents. This relationship between the needs of individuals, community acceptance, and finding the correct balance in an affordable housing project is secured by finding the best value for individuals and the community.



# Chapter 3

## 3.0 Housing Models

Careful consideration of user needs indicates that the typical housing models on Oahu do not work to increase the stock of affordable housing. The following precedent studies look at other local and national affordable housing projects to indicate strategies that could be incorporated into similar projects: first, by looking at traditional housing models and the amenities that are provided; then, through an analysis of the precedent studies that shows how each project solves a specific goal.

## 3.1 Traditional Housing Models

### Walk-Up Apartments

These mid-sized developments of two- to three-story apartment buildings, usually with single-loaded corridors, are prevalent on Oahu. The existing concept consists of exterior corridors typically surrounded by outdoor landscaping or patios in which residents typically enter the apartment from a common stairwell or lanai. This housing concept can provide affordable housing to families and/or individuals on a variety of scales, ranging from ten to sixty units. It is ideal for low-income workforce housing, but can also be adapted to limited on-site service models that serve populations such as seniors, and people with moderate support needs. The first floor usually has parking and minimal units, units that are accessible to people with disabilities. This concept is commonly utilized throughout Hawai'i.

## Walk-Up Apartments



**Figure 12: Moiliili, Honolulu**

*Source:* Author

Walk-up apartments are ideal rentals as they are efficient with very little maintenance required. They are typically concrete masonry units (CMUs), and are simple in their construction. Considering this housing typology purely from an economic perspective, they make the most sense for builders. There are no amenities, the parking is usually an extra cost, electricity, and the tenants usually pay the utilities. For the tenant however, the overall value is very poor. The air circulation is poor, the views are usually non-existent, and the natural light is minimal. As such the jealousy windows are almost always open, making privacy and noise-pollution from neighbors an issue.

These buildings are hot. Some neighborhoods that are lined with these types of buildings, most of which are entirely hardscape, suffer from the heat island effect. This can boost the temperature in the immediate area by several degrees. In the summer months, the CMU blocks worsen the problem by radiating heat throughout the night; escaping the heat can only be done through use of air-conditioning units.

The most attractive features of these units are that they provide the very basic living needs: a kitchen, bathroom, private laundry, parking, and private bedroom space.

## Single-Family Home Clusters

Many communities are accustomed to single-family residences. This type of development has followed no standard set of best practices, and can be costly. Development of replicable models that minimize cost can help meet growing needs for affordable housing among low-income families, independent seniors, and others. In some cases conventional or modular construction may be applicable. Project features such as efficient small designs and minimized infrastructure needs can help ensure cost-efficiency.

In some circumstances, this model fits; however, for Honolulu the land prices are too high to warrant using such a model. Although this is an option for a family well over the AMI level, it can also be a starting point from which affordable housing costs can deviate while offering as many of the same amenities as a standard single-family home.

### Typical Single-Family Development



**Figure 13 Tract Housing Mililani, Oahu**

*Source:* Author

## Apartment Housing Projects

In cities where the goal was strictly to house the poor in as little space as possible, city planners favored building high-rise towers. Often dull in color and containing very “cookie cutter” type units, these projects became places of crime to the point of being overwhelming for tenants. In many cities, “projects” still exist but building conceptualization has shifted from building large-scale housing developments to

providing financial assistance to families to rent apartments in the private housing market.

#### **Apartment Highrise, Kuhio Park Terrace**



**Figure 14 Kuhio Park Terrace**

Source: Digital Image. Available from: Flickr, <https://www.flickr.com/photos/kanuhawaii/3615804800/> (accessed March 7, 2015)

The Kuhio Park Terrace project originally consisted of hundreds of apartments in various states of disrepair: elevators that weren't working, rat infestation, and water leaks were just part of the problem. The overarching goal of redevelopment was the larger urban advantage, the ability to help hundreds if not thousands of people through rejuvenation of this area. This required consultation with community services, resulting in the provision of appropriate space for delivering the services needed. Reaching out to community members was critical: there were two years of interviewing and the establishment of relationships with seventeen local services. A central agency was assigned to coordinate the efforts and provide ongoing feedback on residents' well-being due to earlier public housing project concerns.

In 1972, there was a study of public housing projects; this study consisted of buildings with different architectural designs that housed the same types of residents. It was reported that crime rates in high-rise buildings (those with more than six stories) were much greater than in low-rise buildings (with six or fewer stories).<sup>48</sup> The taller the building, the higher the crime rate. It was found that most crimes took place not in the

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<sup>48</sup> Newman, *Defensible Space*.

individual apartments but in the public spaces of the buildings, including parking lots, entrances, hallways, stairways, and elevators.

This change in crime rate was attributed to a number of things. High-rise buildings have higher crime rates because they foster anonymity. Placed far above the ground, residents are likely to feel detached from their surroundings, whereas lower buildings encourage a greater sense of community and allow people to know their neighbors and to keep an eye on public spaces, informally “defending” their community. In light of such findings, and the generally dismal quality of life in early public housing projects, public housing soon became defined as a social problem. The consequences were sometimes explosive.<sup>49</sup> Current building practices take these factors into consideration to provide the safest living conditions possible for residents.

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49. Macionis, J.J. 2012. Social Problems: Pearson Education, Limited.

## 3.2 Non-Traditional Housing Models

It is difficult to definitively draw a line between “non-traditional” and “traditional” housing models. For the purpose of this document, non-traditional housing models are those that step out of time-period construction norms. Some of these models may no longer be considered “non-traditional” or “unusual”, a testament to how public perception has changed in the last decade.

### Accessory Dwelling Units (ADU)

ADU units: a new term on Oahu, these dwellings fall under different rules than more traditional Ohana housing in Hawai‘I. ADU’s have become part of the redefinition of suburbs. ADU’s can offer lower-income dwelling within a neighborhood. They can provide a subsidy to home owners, while increasing the tax base for the local government. The city can also benefit through increased land tax revenues; however, Ohana dwellings are only permitted on certain lots. The argument for the city to be more lenient with the permitting of ADU’s is founded on the basis that there are so many units burdening the existing infrastructure while the city goes without collecting appropriate land taxes from home owners who are breaking zoning regulations and benefiting from both rental income and lower taxes.

### Ohana Housing, Waimea



**Figure 15: Waimea Town, Hawai‘i**

*Source:* Digital Image. Available from: Flickr, <https://www.flickr.com/photos/kanuhawaii/3615804800/> (accessed March 7, 2015)

Popping up throughout other cities in North America, these houses are thought to be one solution to the growing affordability and population density problems in suburbs. Compact dwellings located in backyards bring a number of restrictions to building construction. On the mainland, these were initially thought to be too small, undesirable housing options, but that attitude quickly changed. These structures became so widely accepted that the attraction to this type of living resulted in high enough demand that prices were forced higher, out of the affordable range.

## Micro-Apartment Complexes

Microapartments typically range from 100- to 350- sq ft and have a focus on design quality, walkability, access to transit, creative use of space, and, often, shared amenities such as kitchens, lounges, and dining spaces. This new version of the older concept of single room occupancy (SRO) offers alternatives for independent individuals. The closest dwelling type that Hawai'i has to offer is the dormitory style of living.

### Example 1 – Microapartment



**Figure 16, Mike Gidora Place, Victoria**

Source: Mike Gidora Place, 2013, Bellwether Housing, April 2, 2014 <http://commongroundwa.org/organization/NHMI-cost-efficient-models>

This is a four-story, mixed-use development created by the Victoria Cool Aid Society. The project serves low-income individuals, many of whom have their rent subsidized. The ground floor of the facility contains commercial space, and the three top floors contain a combination of “small suites” and one-bedroom apartments. The project’s 45 units are affordable (rents start as low as \$325) because of the small suite designs. These suites contain a main floor with a three-piece bathroom, full kitchen, and a loft bedroom. Design features such as the loft and a fold-down counter/table make the rooms feel larger.



## Example 2 – Microapartment



**Figure 17, aPodments, Seattle**

Source: aPodments, 2013, Bellwether Housing, April 2, 2014 <http://commongroundwa.org/organization/NHMI-cost-efficient-models>

In Seattle, these microapartments are trademarked under the term “aPodments”. A 43 unit complex can sit on a standard residential sized lot where, traditionally, a small single-family dwelling would have been. Ranging in size from 90- to 168-sq ft, each unit has a single bed, table, chair, and refrigerator. Although there has been some resistance from surrounding neighborhoods, the demand to keep producing these structures continues. As of early 2014, there were plans to build fifty more buildings similar to this one in the Seattle area.

## Modular Scattered Site Apartments

“Modular” is a construction method, not a type of housing. Modular housing is manufactured under controlled conditions in a factory. These modules are then transported by flatbed truck to the site of the future building, where they are assembled. Modular housing can come in many different shapes and sizes. Each module may or may not be a complete housing unit. The modules can be customized to accommodate a wide variety of designs, including multi-story, multi-family apartment buildings. The result can be essentially indistinguishable from conventional on-site construction. The conventional multi-family apartment building is one example, while others may include individual homes or small apartment clusters suitable for urban-infill lots.

Full kitchens intended for sharing are located on the first floor, doubling as a common space. The property only has six parking spaces as tenants are not expected to have cars since bus lines connect downtown with other transportation lines.

### Example 1 – Modular



**Figure 18, Star Apartments, Los Angeles**

Source: Star Apartments, 2013, Bellwether Housing, April 2, 2014 <http://commongroundwa.org/organization/NHMI-cost-efficient-models>

The Star Apartments, a 95,000-sq ft, 102 unit apartment complex, will incorporate an existing one-story structure slated to house retail shops and support services for both residents and the larger community. Above this podium, prefabricated apartments will be stacked to define recreational spaces and courtyards, making it the first modularly constructed, multi-unit residential building in Los Angeles.

It will include units for formerly homeless people. The prefabrication cost is \$55,000 per unit from the factory, and the project's total development cost is \$38 million. The hard costs of this project are 17% lower than a recent comparable conventionally-constructed project by the same owner who believes another 20% can be cut from their next modular project.

## Example 2 – Modular



**Figure 19, The Inhabit Concept, Seattle**

Source: Inhabit Modular Apartments 2008, Accessed April 2, 2014, [http://mithun.com/projects/project\\_detail/inhabit\\_modular/](http://mithun.com/projects/project_detail/inhabit_modular/)

This demonstration building sits on a rooftop, showing an alternative use for this space. The prototype is a stacked two-apartment building, but the modules are intended to be grouped in various combinations, or potentially much larger construction developments. The scalability of The Inhabit Concept allows flexibility in function and integration within neighborhoods. Potential applications of this flexibility may include clustered scattered-site developments on several lots within a given community.

This model may be useful for low-income workforce housing, or owner-operators may have a support service professional stationed in one of the units for supportive housing. Projects can be brought to scale and/or developed incrementally over time by adding more lots to a cluster. Alternately, they can be grouped into a larger apartment building. The ability to be easily replicated can ensure cost-effectiveness over time within different affordable-housing developments. This project illustrates that larger modules allow for a more incrementally adaptable structure.

## Structural Insulated Panels

A variation on modular housing is Structural Insulated Panels (SIP) construction. Structural Insulated Panels are manufactured in a factory and are assembled on site. They can be a substitute for conventional construction practices for walls, floors, and roofs. SIPs are typically made of plywood with foam insulation sandwiched in between, and are considered to be structurally strong and highly energy efficient. They have some of the same pros and cons as modular housing, though generally somewhat less of each. SIP construction can be thought of as a hybrid between modular and on-site construction.

SIP construction has the benefits of controlled factory manufacture. This reduces on-site assembly/construction labor and time, as well as the risks associated with weather exposure, and can be highly sustainable as an end product. As a newer and less familiar approach to construction, it may complicate contractor selection and work, as well as county permitting. Cost of material for this method of construction is typically higher however the lower labor costs results in overall cost savings.

### Example – Structurally Insulated Panels



**Figure 20, Sarann Knight Apartments, Nevada**

Source: Sarann Knight First Floor. 2011, Bringing Multifamily Housing Quality and Affordability ...yet Energy Efficiency. April 3, 2014, <http://blog.premiersips.com/2011/01/14/bringing-multifamily-housing-quality-and-affordability-yet-energy-efficiency/>

Sarann Knight Apartments is an 82 unit family housing project is comprised of 850-sq ft two-bedroom apartments aimed at 40% AMI rent levels. The total development cost was

\$14 million, or \$171,000/unit. Units such as these can be constructed quickly, this four-story building was assembled in thirty days.

An additional advantage of using a SIP system is the high level of insulation. This project saves 60% on heating and cooling costs, and the owner sees improved durability over other, earlier, conventionally constructed projects. The agency sees the real benefits: lower energy costs with the higher R value, greater durability, higher quality construction since each panel is of a high factory quality, and time savings upon constructing..

## Kit-of-Parts Construction

### Example – Kit-of-Parts



**Figure 21, WikiHouse, London**

Source: The Story So Far, Accessed May 2, 2014, <http://wikihouserio.cc/the-story-so-far/>

WikiHouse is an open source construction drawing set created by a community of designers around the world. This set is open to anyone to download off the internet. The idea is that this simple structure can be built anywhere in the world by anyone. It comes with all the appropriate information so that all of the components can be digitally fabricated. The structure fits together in such a way that no tools are required. A kit-of-parts is cut out by a machine; from these parts, modules are made. Ultimately, these modules fit together to make a complete structure.

Local people or even the occupants themselves can construct the structure. Individuals have the ability to construct their own house, increasing a sense of pride, connection and ownership.

## Modified Mobile Homes

While they have seen considerable improvements in durability, energy-efficiency, and, arguably, aesthetic values, mobile homes do not enjoy a favorable reputation in the housing development community. New thinking has been focused on renewing this pervasive housing model by exploring the possibilities of renovating aging and deteriorated mobile homes.

There are many benefits to upgrading typical trailers. Many of them already exist, which saves on materials and other up-front costs. And, there are spaces for them virtually everywhere, especially in rural areas, so that more similarly-sized units can be built or adapted. The degree of each remodel will depend upon the initial state of each unit. Like most architectural adaptive-reuse solutions, working with the conditions at hand is critical.

### Trailer Wrap, Boulder



**Figure 22: Old and New, Remodeled Mobile Home**

Source: Trailer Wrap, 2013, Bellwether Housing, April 2, 2014 <http://commongroundwa.org/organization/NHMI-cost-efficient-models>

This concept starts with a dilapidated old trailer unit and "wrapping" it to create a reinvented modern, livable dwelling that is updated to better relate to residential building types. The project began with a donation of an old 1960s-era mobile home unit to The University of Colorado.

The old original unit had little left to salvage. This student lead project from The University of Colorado renovated the structure, keeping as much as possible. The usable

material would otherwise be part of landfill waste, this effort could then double the useful material, such as the steel frame. This project proved that the traditional attitude toward mobile homes can be changed; architectural design can completely change a space as well as the perception of objects that were once very negatively viewed.



## Shipping Container Construction

In Hawai'i, a trade deficit with Asian countries has led to a large surplus of unused shipping containers, most of which get shipped away empty. These containers are strong and durable, and can be converted to housing. They are further desirable due to the fact that containers have strict standards to be seaworthy. Once a container is deemed unworthy for shipping usage, it may have many years left to be used for housing. Like modular housing, these containers can be stacked to create multi-unit complexes and even bunkhouses. At present, however, stacked multi-unit container construction, while intriguing, has technical and cost hurdles.

Retrofitted ones offer several models of viable low-cost housing and shelter. A variety of models, both stacked and individual, are summarized below.

### Example 1 – Shipping Containers



**Figure 23, Keetwonen, Amsterdam**

Source: Koene, Ton, Modular Buildings, May 14, 2014, [http://environment.nationalgeographic.com/environment/sustainable-earth/pictures-amsterdam-shipping-container-homes/#/rio-20-un-climate-conference-shipping-container-homes-exterior\\_54411\\_600x450.jpg](http://environment.nationalgeographic.com/environment/sustainable-earth/pictures-amsterdam-shipping-container-homes/#/rio-20-un-climate-conference-shipping-container-homes-exterior_54411_600x450.jpg)

Container housing is particularly popular in the Netherlands, although this wasn't always the case. A modular design firm based in the Netherlands is the biggest container-based housing developer in the world.

Built for temporary student housing, the Keetwonen apartments, seen above, consist of 1,000 units that are arranged in blocks, creating a new community that includes a café, supermarket, office space, and even a sports area.

Each unit comes with its own bathroom, kitchen, and balcony, separate sleeping and study spaces, and large windows that provide daylight and a view. Heating is from a central natural gas boiler system with hot water supplied by individual hot water tanks. The project was built in 2006; construction cost was \$32,000 per unit and \$90 per sq ft.

Affordability is easily achieved with such large projects using containers as they are ideal in certain geographic locations and economic situations.

### **Example 2 – Shipping Containers**



**Figure 24, Laurus Wing, Canberra**

Source: Australian National University, Laurus Wing, <http://www.quicksmarthomes.com/applications/student-housing/australian-national-university.aspx>

The six-story Laurus Wing is an extension to Canberra University's Ursula Hall dormitory, and features 186 units as well as additional spaces including a common room, laundry, and bike storage. Each self-contained unit has individual bathroom and kitchen facilities, workspace with internet access, and a balcony. Six months after the container modules were ordered, the building opened, far quicker than a traditionally built structure.

The Australian company that designed the modules originally planned to use existing containers, but found that the necessary modifications would be too costly. A construction firm representative found they could manufacture purpose-built containerized modules in China cheaper and more carbon-efficiently than modifying

existing containers in Australia.<sup>50</sup>

A Chinese company sent fitted-out modules to Australia on ships, stacked as containers generally are. The containers were then transported 200 miles by truck from Sydney to Canberra, and were then configured—as many as eighteen a day—to create the first two stages of the six-story facility. For the third and final stage of the project, the Australian contractor made modules itself at its Queensland facility and brought them 750 miles to the campus in Canberra. The total development cost for Laurus Wing was \$15 million, with a unit cost of \$81,000 or \$230 per sq ft.

Cost per square foot is not the only reason for building with containers. The low energy expenditure needed to produce such structures is considered as well as the need for flexibility and reusability.

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<sup>50</sup> Bellwether Housing, "Cost-Efficient Housing Models," Retrieved March, 2014, from <http://commongroundwa.org/organization/NHMI-cost-efficient-models>

### Example 3 – Shipping Containers



**Figure 25, Por Fin, Nuestra Casa, Tijuana**

Source: Recycling of Shipping Containers, March 2, 2014, <http://www.mazine.ws/blog/por-fin-nuestra-casa-pfnc-project-recycling-shipping-containers-homes>

This container was built by a Texas-based social enterprise dedicated to raising the standard of living for families who currently reside in dangerous or substandard conditions. The housing prototype utilizes surplus shipping containers, which serve as the basic building block. Despite the fact that the containers go through an extensive conversion process to make them into a home, a unit with a full kitchen and bathroom can be built for less than \$15,000.

#### Example 4 – Shipping Containers



**Figure 26, Bunkhouse Concept**

Source: *Bunkhouse Concept*, 2013, Bellwether Housing, April 2, 2014 <http://commongroundwa.org/organization/NHMI-cost-efficient-models>

Bunkhouses can be made from 40'x12'x12' shipping containers that can fit 8-12 people. Depending on the specific configuration of each bunkhouse, the cost range per container is from \$25,000 to \$90,000. Several factors drive up cost, including whether each house has a bathroom, ADA compliance, local municipal building codes, and site-specific issues. A basic unit without a bathroom can cost \$85 to \$125 per sq ft., cheaper than traditional constructions.<sup>52</sup> These costs do not include the fees for transporting the factory-made units from California, an estimated \$2000 per unit for a trip to Hawai'i.

Smaller square footage is an acceptable way to achieve a lower cost per unit, especially for temporary-workforce living units, where smaller, flexible furniture design can make a big difference in very compact spaces.

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<sup>52</sup> Housing, "Cost-Efficient Housing Models". Retrieved March, 2014, from <http://commongroundwa.org/organization/NHMI-cost-efficient-models>

## Flexible Housing

This concept comes from Canada. Small homes with simple designs are built in locations where land is relatively inexpensive, typically urban-infill locations. They are typically high-density buildings, reminiscent of the row house neighborhoods typical in East Coast cities. While this is not a very new concept, what is different is that they are constructed with features allowing future expansion or rearrangement of building space. For instance, a typical flexible house might not originally have the upper floors partitioned and built. As the homeowner's need for space and financial resources increase, they may turn the partitioned space into another bedroom, a larger living area, or maybe a home office, hence the "flexible" nature of the building.

### Example 1 - Flexible Housing



**Figure 27, The Grow Home, Montreal**

Source: Friedman, Avi, Grow Home, <http://thetyee.ca/News/2011/09/30/Avi-Friedman/>

The Grow Home is a three-story townhouse that is 14-ft wide and contains approximately 1,000-sq ft of space. The Grow Home begins with a small living room, dining room/kitchen, bathroom, and one or two small bedrooms on the second floor. At the time of purchase, the Grow Home's upper floors are not partitioned. As the homeowner's need for space and financial resources increase, they can progressively complete the house in whatever way they choose since the unpartitioned space can be changed over time as the owners' wealth increases.

The Grow Home was developed in the 1990's by The School of Architecture at McGill University in Quebec, and a prototype was built in 1990. It is designed to be able to add spaces, or to finish unfinished spaces over time, as the needs of the household change and as budget permits. Montreal's first Grow Homes sold in 1991 for \$75,900. At the time, an average market home cost \$149,900.<sup>53</sup>

Flexible spaces have several benefits, including economic and environmental; they offer owner flexibility to capitalize on Do-It-Yourself sweat equity, allowing for a cheaper product, and enabling families to enter into the housing market.

### Example 2 – Flexible Housing



**Figure 28, The Convertible House, Vancouver**

Source: *The Convertible House*, 2013, Bellwether Housing, April 2, 2014 <http://commongroundwa.org/organization/NHMI-cost-efficient-models>

The Convertible House was designed in response to the unaffordable housing situation in Vancouver and attempts to maximize a residential lot. The key feature of this house is that it has a secondary suite in place on the second floor. The exterior matches the architectural style of Vancouver. It is considered “Flex Housing” as opposed to “Grow Housing,” a concept more geared toward changing uses than growth. The exterior of The Convertible House maintains the appearance of a single-family house. Inside the foyer, there are separate entrances to the main dwelling and the secondary suite. The 925-sq ft

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53. AVI.

main dwelling on the ground floor is a one-bedroom unit plus den with a bathroom, kitchen, eating area, laundry facilities, and living room.

The 763-sq ft secondary suite contains a kitchen/eating area, bathroom, and laundry facilities, and can contain one or two bedrooms depending on the occupant's needs. The Convertible House also contains a 430-sq ft dry-walled basement.

As the needs of the homeowners change, so can The Convertible House. The homeowners can convert the second floor into additional bedrooms as their family expands. Then, as all the children leave home, the second floor can be converted back into a rental space, thereby generating monthly income.

The Convertible House costs an additional \$10,500 more in construction costs to include the secondary suite. However, the prospect of rental income allows the qualifying purchase income to be lowered from \$84,800 to \$58,800 (31%).<sup>54</sup>

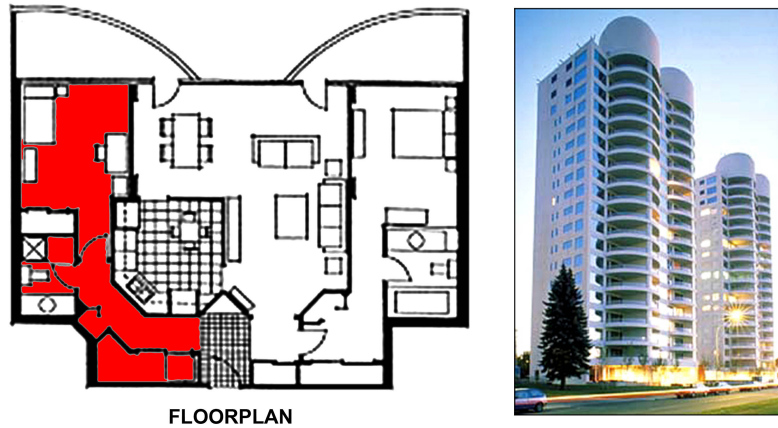
This is beneficial from a community acceptance perspective, as the neighborhood appearance does not change; in tandem with community acceptance, accommodating for increased density by building higher developments is achieved.

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54. CMHC.



### Example 3 – Flexible Housing



**Figure 29, Riverwind Towers, Edmonton**

Source: Riverwind, Accessed May 4, 2014, <http://flickrhivemind.net/Tags/saskatchewanandrive,sky/Interesting>.

This flexible condominium has been built in Edmonton and is nineteen stories in height. Each tower contains fifty-seven apartments—three per floor. The main flexibility feature is the introduction of the “mingle suite” where people who may or may not be related share a common living space. The mingle-unit bedrooms are on either side of a central area that contains the dining room, kitchen, and living room. The bedrooms remain private spaces, with separate bathrooms and balconies.

As seen in the preceding examples, flexible living spaces offer a potential rental revenue stream, therefore contributing to the long range affordability of a dwelling.

## 3.21 Social Housing

These housing models are types that include an additional level of services to occupants. These are not necessarily chosen for the fact that they offer these services, but due to the fact that these services are combined with a unique living arrangement either in the physical dwelling or tied-in with the emotional support provided.

### Warehouse-Based Shelters

Several service centers across the U.S. operate shelters and transitional housing units in giant warehouse spaces. Potential obstacles to local implementation of this model include availability of comparable facilities, the willingness of providers to operate such models, and the acceptability of this model to homeless individuals and families. Local implementation would require heating and insulation, which would add capital requirements and cost to the development of these shelters.

#### Example – Warehouse-Based



**Figure 30, Waianae Civic Center, Honolulu**

Source: Shimabukuro, Maile, Accessed May 3, 2014, [http://maile45.blogspot.com/2009\\_03\\_01\\_archive.html](http://maile45.blogspot.com/2009_03_01_archive.html)

Waianae Civic Center is operated by non-profit organization U.S.VETS, Inc., and provides services to both veteran and non-veteran men and women, families, and children. It began serving the Hawai'i homeless population in March of 2007, utilizing an inflatable dome structure as the sleeping hall. Showers, bathrooms, and a dining hall

are all located outside in adjacent buildings. The showers and bathrooms are mobile units. Waianae currently serves 300 men, women, and children each day.

## Free-Standing Transitional Housing

This is transitional housing, owned and operated by the Hawai'i Community Development Authority for individuals who have struggled with drug abuse and homelessness. There are thirty units, and at any one time they can accommodate fifty-two to fifty-four families, over 225 individuals a year. The standalone buildings are simply constructed; single-wall construction with a post-and-peer foundation.

### Example – Free-Standing Transitional



**Figure 31: Weinberg Village, Efficient Stand-Alone Homes**

Source: Holomua Na 'Ohana, Accessed March 2, 2015, [www.holomuanaohana.org](http://www.holomuanaohana.org).

Key architectural features contribute to the success of Weinberg Village. The overall architectural style fits into the context of Waimanalo; buildings look like typical single-family houses opposed to an obviously low income community. The buildings are simple and no more or less than what families need; each unit has a private room, a bathroom, and a full kitchen. There are large common spaces for people to come together, and there are open grassy areas and a large park for children. A major part of the success of this project is the collaborative culture that is part of the community. There is policy of no drugs and alcohol onsite, and neighbors support each other in their struggles.

## Carrel Transitional Housing

Carrels, or semi-private housing cubicles, provide a low-cost alternative to traditional mass shelters by offering homeless individuals independence, personal space, and a secure base to transition to permanent housing. Washington, D.C., has examples of this unique method of sharing space; a replicable model would help disseminate it to other communities.

### Example – Carrel Transitioning



**Figure 32, Next Step Shelter, Honolulu**

Source: Yamamoto, Gregory, Honolulu Advertiser, *Next Step Shelter*, <http://the.honoluluadvertiser.com/article/2007/Feb/25/In/photos.html>

Next Step Shelter is a 200-person shelter in a section of a marine warehouse owned by the State of Hawai'i and located on a pier in downtown Honolulu. The operations and support services are delivered by partner non-profit organizations. Residents sleep in carrels with 6-foot partitions; the tops are covered over with tarps and the carrels can be opened and closed with curtains.

Residents must leave each morning and are welcomed back each afternoon. The shelter has lockers for storage of personal items during the day, and a small commissary for the purchase of toiletries and other sundries. Free parking is available, as many residents have cars to get them to and from work. Sobriety is expected on premises, though it is not a one-strike policy.

Both this and the previous site provide a range of services tailored to the needs of homeless populations, including case management, medical and behavioral health care services (onsite and referral), job training, parenting classes, childcare, meals, and other services.

Communal living is culturally and historically prevalent among the Native Hawaiian and Pacific Islander populations. Packing so many people into one large room without any solid interior walls can create stress. However, societal norms regarding privacy and interdependence support this style of accommodation, as people struggle to gain a modicum of self-sufficiency through employment.

There is a gap in the housing market, illustrated by the fact that such places are operating at maximum capacity. Given a cheaper living alternative, many individuals choose cheaper over space, comfort, and convenience.

## **Permanent Supportive Housing Studios**

There are excellent examples of supportive housing provided to formerly homeless or other at-risk individuals through traditional efficiency apartments. Facilities typically include between twenty-five and eighty fully-equipped units in the range of 350-500-sq ft, along with on-site services and other common spaces. Replicable concepts and designs can be developed to standardize one or more types of this model.

### Example – Permanent Supportive Studios



**Figure 33, La Casa, Washington, D.C.**

Source: Studio Twenty Seven Architecture, 'La Casa', <http://www.archdaily.com/199267/la-casa-permanent-supportive-housing-studio-twenty-seven-architecture-leo-a-daly/6-262/>.

This project is a series of small studio apartments that allow individuals to stay on a long-term basis. This development was built to be rented and perpetually provide easy use for supportive housing.

The cost to tax payers of having individuals living on the streets is estimated at \$40,000 per person per year.<sup>55</sup> An area with similar issues as Honolulu, Washington, D.C, has decided to spend that money up front in order to help people get off the street and out of drug abuse.

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<sup>55</sup> HUD, "Fy 2014 Income Limits Documentation System," Retrieved January 31, 2015, from <http://www.huduser.org/portal/datasets/il/il2014/2014summary.odn>; *ibid.*

## Social Infrastructure

### Example – Social



**Figure 34, Hina Mauka**

Source: Hina Mauka. , Accessed May 4, 2014 <http://treatment-facilities.healthgrove.com/1/3223/Hina-Mauka-Teen-Care>

This is a treatment center in Honolulu that focuses on youth who have substance abuse problems. They provide substance abuse treatment and counseling services. The programs offered are designed specifically for adolescents, since when selecting a facility, struggling individuals must consider their target populations; the better the fit, the better the results. Like Delancey Street Foundation, where residents assist other residents, Hina Mauka has a hierarchy such that those who have been in the program the longest assist others who have recently arrived. This creates a group within the building that is bound together with common goals. They have a high success rate, attributed to the culture that the staff and youth create together. Only in recent years have they become vocal about their model since they incorporate an unconventional and sometimes lenient approach with their guests. After they were able to provide sufficient proof of their successful model, this unconventional program became fully appreciated.



## Preservation of Existing Affordable Rental Housing

### Example – Existing Affordable Rental



**Figure 35, Kukui Garden Apartments**

Source: EAH Housing, Kukui Gardens Celebrates 40th Anniversary, Accessed March 6, 2014, EAH, <http://www.eahhousing.org/>.

In Hawai'i, typical affordable housing sales have a ten-year affordability restriction. If a family has purchased an affordable housing unit and chooses to sell it prior to that ten-year commitment, a portion of their profit, based on the number of years they have lived in the unit, will be paid to the state agency that originally funded the project. However, at the end of ten years, the family can choose to sell the unit at market rate. The unit is then lost to the affordable housing market forever. Every year, there are affordable units with ten-year restrictions that expire.

The most interesting aspect of the Kukui Garden Apartments project is how it's been preserved as affordable housing by its close knit community. While the project was in the process of being sold to a "for-profit" development firm, the long-time tenants became concerned that gentrification would price them all out of their homes. They took their concerns to local politicians who then launched a petition for funding to ultimately keep a large portion of the project "affordable" forever. Non-profit housing developers EAH of Hawai'i and Devine & Gong of San Francisco each took over half of the Kukui Garden Apartments in 2006. Amazingly, this tenant-driven movement was able to acquire enough government funding to significantly upgrade 389 residential units.

# Chapter 4

## 4.0 Design Projects

This chapter begins the Design Exploration section of this doctoral study. The design work of three (3) projects is put forth that are unique and original to their design teams: ‘OPIHI, LIFT, and COOKE STREET. The projects in their entirety are in production over a twelve-month span from 2014-2015. The author has either led or participated in each design project with the specific intent of applying his findings towards the results in doctoral study.

Successful Affordable Housing on Oahu can be achieved following two critical Design Paths shaped by the determination of (1) the PROCESS by which one will procure the project, and (2) the criteria to be considered for the PRODUCT that is being created. Determining the unique DNA of these two key drivers, Process and Product, is the challenge and the contribution of this doctoral study.

PROCESS (section A) describes the components of a collective and collaborative team and their specific contributions to the project. This is the "HOW", the process achieved.

PRODUCT (section B) is a framework, resulting from the previous chapter's research and design explorations, that begins to establish important touch points in architecture's relationship to affordable housing on Oahu. The utilization of combinations of these touch points into a tangible housing product, as described in this doctoral study, sparks the creation of a new and necessary housing typology for Oahu. This is the "WHAT", the resulting design.

While the idea of creating a specific design process and successful resulting product is in no way extraordinary, this doctoral study attempts to differentiate itself by introducing a new symbiotic approach to design. As in any ecosystem, if one player fails to contribute and perform, the entire mechanism fails. The crucial players in the successful delivery of these three projects include: (1) the COMMUNITY; (2) the PROFESSION; and (3) the GOVERNMENTAL BODY. In the Design Research presented in the chapter, all three

players made key contributions and relied heavily on the other two players for support. The omission of any one of these contributors would have led to the failure of a project. An unexpected and fascinating discovery, noted across the various projects, lies in the inter-changing dynamics and relationship of these three players. Like musical chairs, they changed places and sometimes assumed one another's roles. In effect, community based design, as it relates to affordable housing on Oahu, demands intimate and flexible collaboration between private practitioners, public bodies, and community representatives. Without such collaboration, a less effective and less deliverable product will often be the result.

The three design exercises undertaken in the course of this doctoral study are briefly outlined below, with a more detailed presentation of each in the following paragraphs. Each project contrasts greatly with the others. This has proved valuable to understanding the Process and Product models from diverse perspectives.

## Community-Based Design

Community-based design (CBD) is a collaborative method that enables a broad range of individuals to each bring unique skill sets to a group with the purpose of serving the greater community. Often, CBD follows two models. The first model is the university driven design studio project, whereby students and professors work with a community organization to develop strategies or plans to fulfill a need. The second model is one that is facilitated by non-profit organizations who commission architects to design proposals that fill community needs. Through interviews with individuals, attendance at community meetings, and the analysis of past successful affordable housing projects, it is clear that there is an active CBD spirit in Hawai'i. Although this terminology is not typically used in Hawai'i, "Community-Based Design" is a suitable label for many local collaborative efforts. There is a serendipitous nature about how such projects come together, often spurred by neighbors getting together to speak with their political representative or with political leaders attempting to generate some momentum in the community. Ultimately, there is a team that is formed, comprised largely of volunteers committed to moving a project forward. The author led and engaged in the three Design Projects, 'Opihi, Lift, and Cooke Street, to gain first-hand knowledge about the realities and details involved in executing CBD.

## 4.1 Design Section A

### DESIGN PROJECT 01: 'Opihi Affordable Housing

#### AUTHOR's ROLE and CONTRIBUTION:

Design Team Creator and Leader, Creation of Volunteer Group (DESIGN INNOVATION GROUP), Main Point of Contact between Design Team and Governmental Agencies

**BASIS OF DESIGN:** Microhousing Prototype Units that can be clustered or stacked into integrated Villages. The units are designed to be located in any number of sites, but are fixed to the site upon installation.

**PROJECT BRIEF:** 135-square foot basic housing unit with integrated kitchen and bathrooms. Up to 80-sq ft of attached outdoor decking.

**TARGET USERS:** Low to Median Income singles, couples, students, parent and child.

**COMMUNITY BASED DESIGN METHODOLOGY:** Collaboration and donated time from The University of Hawai'i School of Architecture Design Innovation Group students and professors (community), Senator Chun-Oakland (government), Office of Housing Executive Director (government), Various Architects from Group 70 and Architects Hawai'i (profession).

#### PREMISE:

'Opihi in nature is a small but formidable sea creature that clings to the surface of rocks. It resists the pounding of waves, abuse of sand and sea filigree, and heat of the harsh sun to remain in place. Nature has created the perfect compact sea animal and has left nothing to waste. In a similar spirit, 'Opihi, in affordable housing terms, is a Microunit prototype that is also robust in nature despite its relatively small appearance.

#### PROCESS:

##### A: PROJECT DESCRIPTION

This is an affordable housing prototype project that is funded by a legislative bill under Senator Chun-Oakland to provide funds for construction of a full scale microhousing

model. A student led effort of the Design Innovation Group from The University of Hawai'i School of Architecture, the prototype model is intended to be on display on state lands for the public to experience how smaller dwelling can be comfortable and affordable. The target user group is the 30% to 50% AMI range.

#### B: CREATION OF THE DESIGN TEAM:

A perfect example of community-based design, this project was a result of collaboration between politicians, students, and professionals, all coming together with a common goal. The players involved, who all volunteered their time, included a group of students, two professors, a senator who worked aggressively to get the project funded through a legislative bill, and architects who have interest in microhousing. The architects involved were from the two largest architectural firms in Hawai'i, which is a testament to the collaborative nature of such a project. This was an opportunity to give something back to the community, with many ways to assist in the design, construction, and management. At the peak of the design there were fifteen to twenty people involved in the project in different capacities.

The combination of people involved was critical in pushing the project forward; there was political backing, architectural design, and construction cost estimating. Additionally, there was community feedback from police, social workers, and the general public. This primary trio of groups involved was the key to the project's success; each group had their own connections and knowledge that furthered the project.

#### PRODUCT:

##### A: KEY DESIGN DRIVERS

There are a few notable architectural elements. The primary structure is on a hexagon base system; this is done so that as units are clustered, a honeycomb pattern forms and an increased rigidity is achieved as units are multiplied. Bi-fold doors on either side allow for natural ventilation and allow the small, 135-sq ft space to feel more open. The unit is small and light enough to be easily moved and anchored temporarily or permanently.

##### B: DESIGN PROPOSAL:

Application of the design drivers

List of drawings

#### ANALYSIS OF DESIGN TEAM:

The project was started by opening a communication line between politicians and the architectural community. The idea of creating a prototype came from a suggestion by a government employee that was in a position to allocate funds for such a project. It was deemed valuable to the community to show a physical idea of affordable housing, as well as to display the ideas of the politicians, students, and professionals involved.

The contributions of each group of individuals involved went beyond the narrow scope of their professional title. While the architects focused on the architecture and the political leaders focused on policies and allocating funds, collaboration resulted in overlapping roles and ideas that were not restricted to each individual position. Politicians and community members began to engage further with the architecture, coming up with architectural suggestions that were helpful.

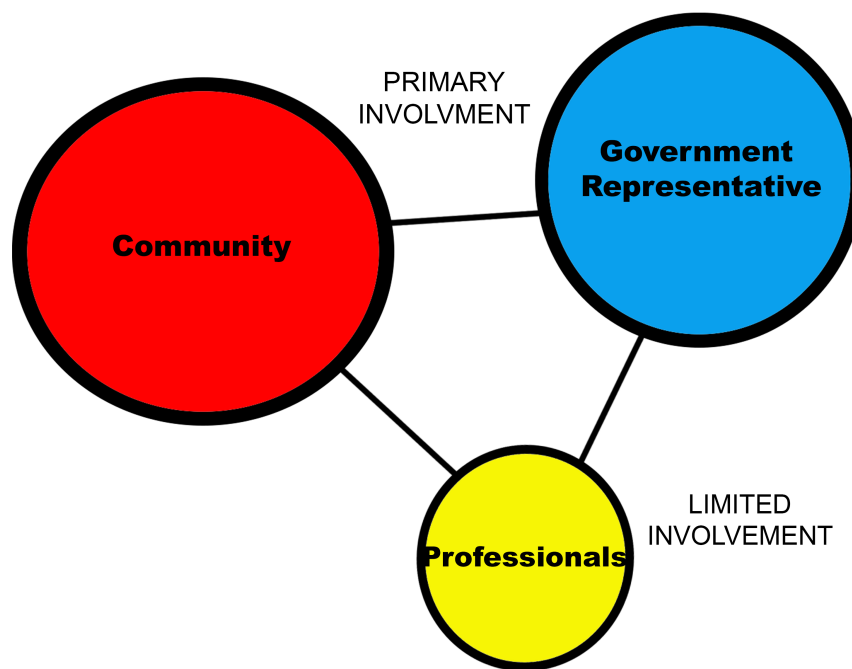
The functionality of the 'Opihi design team was as a collaborative spirit, driven by the idea of producing something for the community. The interchange between the students, the professionals, the community, and the politicians developed a synergistic working relationship that allowed for the project to flourish. There was an overwhelming desire for each group to participate with one another as the students were excited to present to the community and the community responded positively to their efforts. The collaborative spirit maintained the individual's interest in the project; there was an infectious excitement among the groups. There was a common shared focus on benefitting the community; this resulted in unification between individuals and ultimately a richer, more valuable end result.

The unique aspect of how this group functioned was that each individual as well as the larger group entities all assumed a mutable role between designers, project managers, and community liaisons; as a role became vacant, that gap would be instantly filled. The sense of trust within the project team was evident as areas of expertise and project roles became interchangeable.

One issue that had to be confronted was the lack of a consistent construction contractor expert available; this issue became apparent due to limited professional building experience within the group. There was an underestimated amount of effort that was

required to not only build such a project but to procure the materials and assemble a cost estimate. A valuable realization at this stage was the understanding that the loss of any one key player within such a project would result in the failure to build. Figure 36 depicts the level of involvement among groups. Limited involvement on the professionals' part impacted the scheduling.

The end result of the project is a finalized set of construction drawings, funding of \$30,000 in place for construction costs, and a project schedule to complete the build by June 2015.



**Figure 36: Key Player in 'Opihi Project.**

All groups helped advance the project; however, the lack of architectural professionals involved resulted in negative impacts to the schedule.

## DESIGN PROJECT 02: “LIFT”— BUS CONVERSION

**BASIS OF DESIGN:** Adaptive reuse of seventy-five donated city and county buses into mobile sleeping and sanitary facilities for people moving from living on the streets to transitional and affordable housing.

**PROJECT BRIEF:** Converted single and split-level full-size buses into seven unit sleeping shelters, or two full-service showering and washroom units. Rebranding of the Bus into Lift Buses with graphic shrink wrapping and green walls for vertical gardens. The sleeping shelter can be turned into an art rehabilitation bus.

**TARGET USERS:** Homeless community, transitional singles, and families.

**COMMUNITY BASED DESIGN METHODOLOGY:** Local businesses (community), The Honolulu Museum of Art, The University of Hawai'i School of Architecture students, Office of Housing Executive Director and the Mayor's office (government), City and County of Honolulu (government), Various architects from Group 70 and Omizu Architecture (profession), Swinterton Builders (profession), Local artists (community)

**PREMISE:**

To offered dignity and unlock opportunity for those experiencing homelessness by providing a safe place to sleep and bathe without being judged.

**PROCESS:**

**A: PROJECT DESCRIPTION**

In 2014, up to seventy-five used buses became available to the city. This project is modeled after the Lava Mae Project in San Francisco where city buses are being converted to wash facilities. The goal is to convert the buses to accommodate for the homeless, providing temporary shelter. From the city's Housing Director, adequate funding was available for the approximately \$60,000 per conversion. The full-sized buses can accommodate for seven beds and the smaller handy buses can accommodate for a family of four. Additionally, some of the larger buses can be adapted to function as wash facilities, with two larger three-piece bathrooms. The buses are intended to serve



several communities and utilize existing public park washroom facilities for water and sanitary plumbing connections.

#### B: CREATION OF THE DESIGN TEAM:

The city's Director of Housing, who also assembled the Design Team, initiated the project. The team was completely volunteer-based, consisting of professionals, a contractor, and students. This collaboration brought companies together that typically would not partner together; architectural firms collaborated, as well as an artist and printing company. Within the team, there were political connections, and the leadership role was transient while remaining proactive.

#### PRODUCT:

##### A: KEY DESIGN DRIVERS

The notable elements are fold-up (Murphy) beds, a raised panel flooring system to provide for space for electrical and plumbing as well as storage, which also creates a new flat surface opposed to removing and replacing the old existing flooring. Also included is a roof vent system and a simple privacy curtain. The team worked collaboratively and was able to show value in the product.

##### B: DESIGN PROPOSAL:

Application of the design drivers

List of drawings

#### ANALYSIS OF DESIGN TEAM:

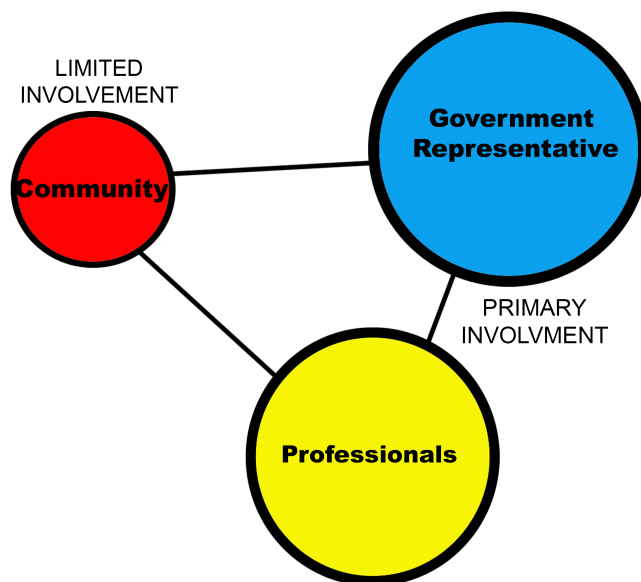
The project began due to a community political leader approaching design professionals that were interested in doing community oriented work. Since there was a significant amount of work, other professionals were asked to join in to collaborate. As additional professional knowledge was required, different professionals were asked to assist.

Since different professionals were required, this meant careful project management was needed so as to maximize on volunteer time. There were architects involved, contractors, and city employees. While each individual had a role, needed work was spread thin throughout the group and required transient involvement, particularly in the position of project management.

Design was done collaboratively, while the renderings and construction drawings were done individually. This worked very well as all players involved participated in the design and therefore felt a sense of ownership and pride in their work. The partnering of firms that do not normally collaborate together resulted in the production of high-quality designs; a great deal of effort was invested. Although the individuals were driven by the idea of producing a design for the community, there was also a drive to produce quality records that could become an opportunity for future businesses.

The critical interactive players in this group were a government representative, professional architect, and contractor, and each worked collaboratively to produce the end product. The elimination of any of these players would have resulted in the project dissolving. There was a varying degree of involvement (Figure 37) from each of the group members; although each was present enough to allow the project to continue, there was a noticeable void when any one player needed to make a smaller contribution.

The end result of this collaboration is an action plan to convert two buses in 2015 to temporary sleeping units. There is a set of completed construction drawings and final renderings in order to advance this project politically and physically.



**Figure 37: Key Player in "Lift" Project.**

Lacking community, in this case contractor involvement, resulted in issues with pushing the project forward.

## DESIGN PROJECT 03: Cooke Street Microhousing

**BASIS OF DESIGN:** New Build Affordable-Housing Apartment Building on Cooke Street with communal roof gardens and terraces.

**PROJECT BRIEF:** 90 units at 310-sq ft per unit, traditional steel frame and poured concrete construction, community and housing office spaces at the ground level.

**TARGET USERS:** Couples and singles, parent and child, students, elderly.

**COMMUNITY BASED DESIGN METHODOLOGY:** HCDA (government), Hewit Contractors (community), Group 70 architects (community), Local artists (community)

### PREMISE:

Initiated by The Hawai'i Community Development Authority (HCDA), the project was a response to a recognized need for lower-cost housing options that allows people with low- to moderate-income and limited-housing needs to live in a desirable mixed-use neighborhood with access to transit.

### PROCESS:

#### A: PROJECT DESCRIPTION

Kaka'ako will undergo huge changes in the coming years. Since a majority of that development is currently targeting a wealthy foreign market, there is pressure on the development of affordable housing.

#### B: CREATION OF THE DESIGN TEAM

HCDA came out with a request for proposals in late 2014 in order to build approximately 60 to 80 microhousing units on a 10,000-square foot lot on the Mauka side of Kaka'ako on Cooke Street. The RFP requires the entrance of a team that consists of a developer and an architect. Part of the RFP requirements are that individual teams are responsible for raising the capital for that area. This requires the developer to know exactly where funding might come from. Developers who are experts in acquiring financing are imperative to have on the team.

Although this was a more traditional project, it ultimately turned into a community-based design project. There was a great deal of volunteer time spent among the developer, architects, and contractor. There was an obvious synergy between those involved; while this is difficult to gauge, there is unquestionably an eventual benefit of synergistic relationships on a team.

#### PRODUCT:

##### A: KEY DESIGN DRIVERS

Creation of a small, practical spaces.

##### B: DESIGN PROPOSAL

Application of the design drivers

List of drawings

#### ANALYSIS OF DESIGN TEAM:

This project took shape from the need in Kaka’ako to offer affordable housing. The Hawai’i Community Development Authority made a 10,000 square foot lot available for an affordable housing development team to assume the property under a long-term land lease. HCDA issued a request for proposals for affordable microhousing apartments to be built within stringent design criteria. This community-based Design Team was initially put together to respond to this project. This is very similar to the way a traditional development project is formed as in both there is a request for proposals from an owner that may or may not work collaboratively with the team.

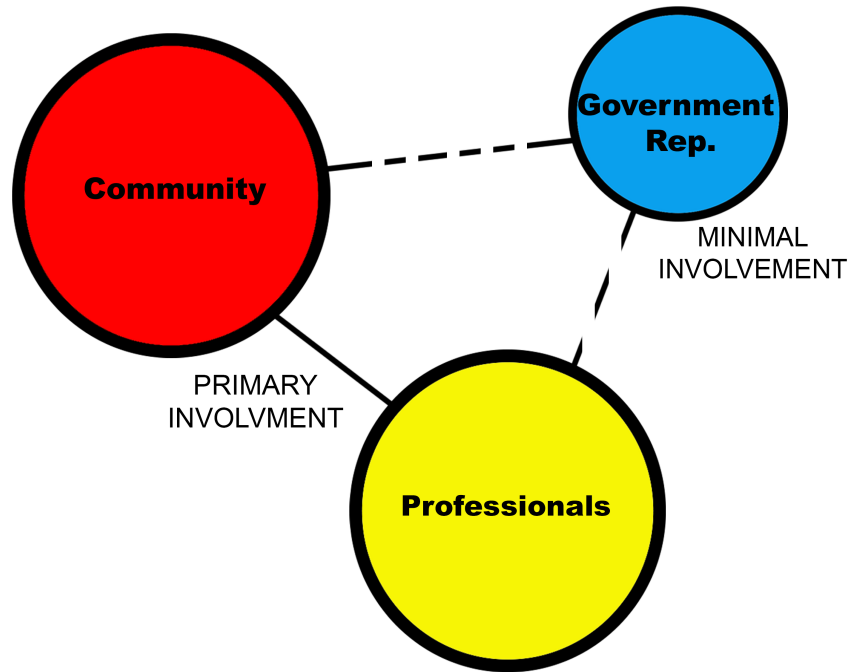
Initially, this project would not have been deemed a "community-based design" project. The community spirit began when the non-profit developer, several architects, a contractor, and an artist all came together and realized the potential community benefits of such a project. All had a realization that economic payment was not necessary since the opportunity to be involved in giving something back to the community was ample reward. There were a number of people involved but this project was treated as a "filler" project, resulting in efforts that were thinly spread across the project. Similar to the other two projects, individuals worked collaboratively and stretched beyond their roles to fill any voids in the project.

Each member in the group participated in the design process, including the non-profit developer and the contractors. The community-based spirit was further enhanced by incorporating a native Hawaiian artist into the group.

The key element in bringing this group of people together was a focus on the individual users, on the community, and on cultural ties; this became evident in the final product that was developed. This resulted in a more developed design that had added value for the community and the end-users while maintaining a balanced budget.

The interaction among the players involved was flawed due to the lack of connection between the community-based design group and the HCDA. Their role of strictly making the land available was imperative; however, the lack of collaboration was overcompensated for by strategizing how to win HCDA's approval. Although all the key groups were in place, the level of involvement differed for each. (Figure 38) This detracted from the efforts and creativity of all and kept these efforts from being fully realized.

At the time of writing, the teams' efforts had been presented to HCDA and the physical design was not especially liked. Due to the spirit of the Design Team and their depth of expertise, the team was asked to resubmit a different design more in line with what HCDA would like to see.



**Figure 38: Key Player in Cooke Street Project.**  
Minimal interaction with government agency yielded negative results.

In interest of this doctoral study, real projects were used as testing grounds for affordable housing projects intended on later coming to fruition. With the understanding that no two projects are alike, a look at three different projects revealed similar project team requirements. A closer look at these three projects shows that there are common traits among them from which we can deduce ideas about: 1) the building of a community-based Design Team; 2) the roles and responsibilities within the team; and 3) the end results of using this type of community-based design project delivery.

Understanding that individuals will be involved for more than one reason is necessary. Most people will be involved to be a part of giving back to the community; however, there are additional advantages that the project can provide to individuals, and understanding and fully disseminating this component is critical in recruiting the team. The criteria for selecting individuals are largely based on establishing a common set of values, selfless in nature and community-driven. Each project has the ability to offer a benefit to individuals for their contribution.

From being involved in such projects individuals can benefit from:

- Making new community connections on a political or business level.

- Gaining experience in a different type of work that one would typically not be exposed to.
- Exposure benefits, such as crediting within projects, i.e. advertisement.
- The "feel-good" personal satisfaction of being involved.

These are secondary benefits that individuals can gain and these should be made clear to those that are being asked to participate.

## Proposed – Design of Collaborative Team

The three projects analyzed have common traits throughout that are critical to the success of community-based design. They all encompassed a great collaborative spirit across a diverse group of individuals that were not only knowledgeable in their fields but passionate about working to improve the community. The key ingredient to each of the projects was grouping government official (s), individual or group, with professionals while utilizing the gifts of other select members of the community.

- The professionals: architects, engineers, and planners. This is a group with a broad base of experience, all experts in their specific fields.
- The government official(s), individual or group: a necessary political component to the team as this individual or group provides the connection to others members of the community and political leaders. This role brings with it the knowledge of government policies, and can be the source of funding.
- Community refers to a wide range of critical roles: individuals that fill critical roles in community-based design. These may include contractors, artists, individual professionals, and local non-profit organizations.

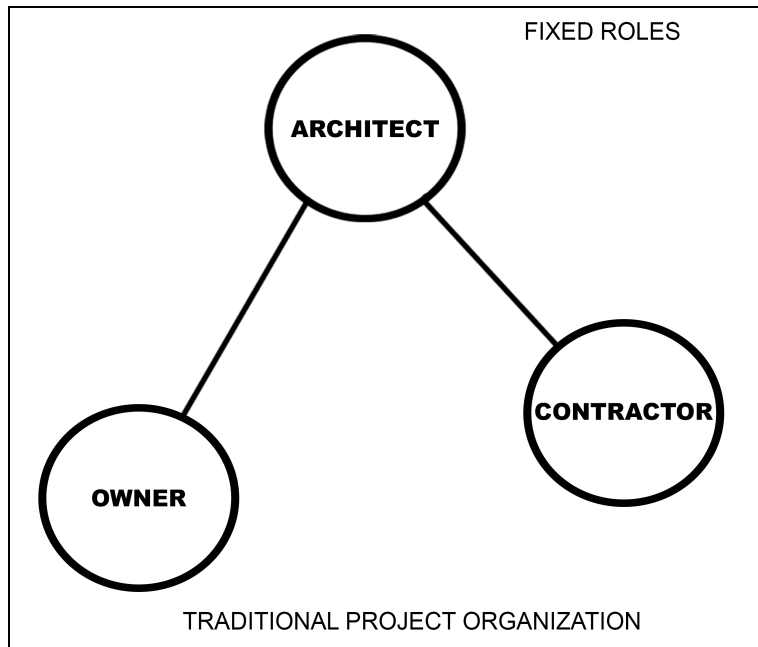


Figure 39: Participants in Traditional Project Organization

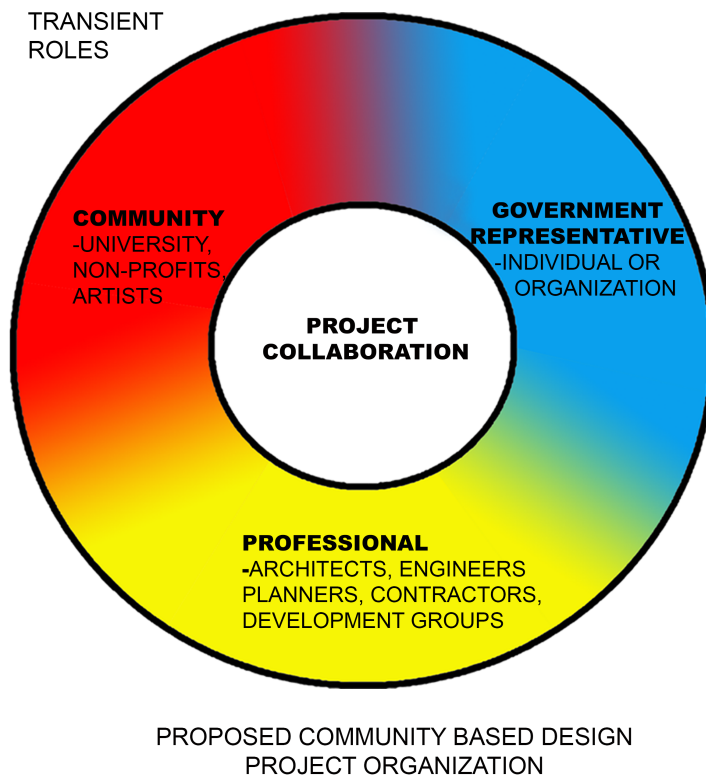


Figure 40: Critical Participants and Transient Roles in Community Based Design



## Result of Community-Based Design

How are affordable housing projects unique from other projects? There is a need to build cheaper housing and is a need to consider the users, but in Hawai'i there is also a need to add value through cultural and community cohesion. This reinforces the need to utilize the community-based design approach to building affordable housing. The benefits of such projects are consistent with what typical housing projects lack; the collaborative nature of community-based design can reach beyond the design and into the project itself.

Community-based design projects find an advantage by working collaboratively with government agencies, therefore increasing the likelihood of the project being built. Also, such an approach can result in a cheaper product due to donated time by professionals, reduced material costs, and non-union labor. The largest added benefit is a more well thought out, thorough project that is more valuable to the community.

It is far more successful when the collective team is driven by priorities other than pure profit. The spirit of the project, especially when based in some sense of improving the human condition, becomes an effective driver of the design's delivery.

# CHAPTER 5

## Design Drivers

This Chapter demonstrates the creation of a community based design affordable housing product that is directly derived from the design drivers explored in the previous chapters. This design is based on analysis applied at a broad range of scales. At the largest scale, an urban analysis is done in order to find the most ideal site. On the smaller scales is the building massing, the layout of the floorplan, and the smaller architecture features that allow the interior space planning to be most efficient.

Before considering the design process, a holistic look at the design drivers gained in the previous chapters is necessary. Typical affordable housing design criteria is limited to relatively fewer design goals, primarily to keep costs as low as possible. The design criteria in this study places far more importance on the quality of the space created and the holistic experience presented to the user. When designing predominantly on cost-efficiency, much of the human related architectural elements are lost, resulting in a number of negative traits that are difficult to measure due to their qualitative nature.

From the previous chapters, common design drivers incorporated into many types of affordable housing buildings are:

- Incorporation of natural light, this allows users to capitalize on a better quality of light while reducing electrical consumption; the benefits of this design driver are environmental as well as qualitative.
- Use of natural ventilation, this is especially critical in Hawai'i since air conditioning units use huge amounts of electricity and the air quality is also improved in naturally ventilated spaces. Also, avoiding the use of air-conditioning saves on initial cost, operational cost, the minimization of sound, and the reduction or elimination of unsightly air-conditioning units.
- Consideration of end users, in affordable housing, this is done by starting with considering the bare minimum requirements individuals need, often disregarding quality of space.

- Counter-NIMBY, must be handled initially, before the design of the project, in order to gain community favor of the project. This can be done by careful use of color, choice of material, and architectural features that are appropriate in that area.
- Use of common space, is typically considered on a quantitative basis, not a qualitative basis, and can be improved by careful space planning consideration that are intimately tied to user-needs.

## Proposed Atypical Design Drivers

After analysis of the previous chapters and the creation of new criteria for design, unique design drivers, not traditionally considered predominant in affordable housing design, were extracted. See appendix E for application of these design drivers.

Proposed design drivers are:

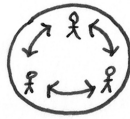
- Overlapping of Shared or Common Space, to be provided on different scales. Smaller common spaces to encourage more intimate interaction with neighbors and larger areas to provide an opportunity for a larger group to gather.
- The Chameleon Effect, this pertains to programmatic space being able to shift and accommodate for different and changing user needs. This can be done with moveable wall panels or multi-purpose furniture that can change function, such as a murphy bed.
- Adaptability to Site Conditions, finding a design that works on different sites, one that can be mass-produced to bring down the building cost, helps produce more affordable housing units.
- Creating a sense of "Home", this relies heavily on the qualitative aspects of the architecture. Elements such as materials chosen, use of an ideal color, and decorative elements all contribute to an improved space.
- Individualized User-driven Design, this is the idea that the users' needs come first, offering architectural strategies that respond to individual's lives such as bike storage, herb garden growing areas, the ability to entertain guests, and flexibility of spaces.
- Use of Memories, Stories, this is the idea that there is a cultural tie or a tie to place that resonates within the building. Users occupying this space are able to

identify and see value in the connection of their dwelling with the obvious cultural tie to place.

- Introduction of Mid-terior Spaces, this places importance on the transitional quality of indoor to outdoor spaces that can enhance the spacious quality and flexibility of smaller living units.
- Neighborhood Connectivity, provides visual site-lines to the street encouraging an emotional connection to the community.

## Components of Proposed Design Approach

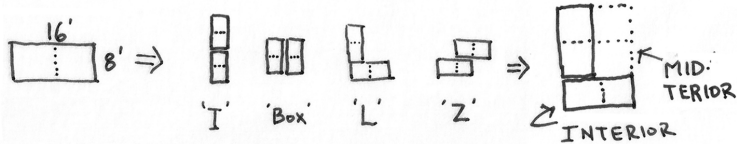
1. Design Team



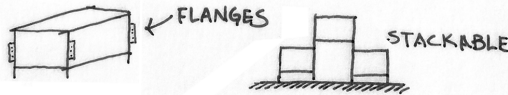
2. Site Selection



3. Modular Unit



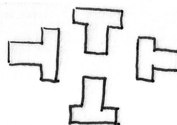
4. FRAME/CONNECTING



5. Kit-of-Parts



6. Configurations



7. Vertical Configurations



8. Construction & Design



Figure 41: Outline of Design Approach

## Design Team

As stated in chapter 4, the selection of key individuals is the most important part of the process as there is the necessity for a collaborative knowledgeable group to come together. From the interviews conducted as part of this study, the majority of the interviewees were in favor of participating in a community-based design group. However, there was an overwhelming lack of understanding of how to begin. Among those that were interested in participating were a high-level politician, and number of architects, and a cost and construction expert. This shows that there is plenty of collective community spirit that can be called upon. The recognition and process of bringing these individuals together is the missing link and one of the goals of this study.

## Site Selection

As part of this study an analysis of 22 different sites in Honolulu that are potential affordable housing locations. The study has been done with consideration of the "Housing Oahu: Island Wide Housing Strategy", see Below, as well as the Honolulu Area Rapid Transit plan. The criteria for selecting the sites were, proximity to the proposed future transit rail line in order to decrease the need for car ownership and related transportation costs, and proximity to existing infrastructure such as healthcare and shopping facilities and the site being unused or under utilized in an urban area.

Figure 42 shows an image of the areas in Honolulu that were assessed as potential sites. These areas were broken down by the following criteria:

1. areas within existing infrastructure
2. coastal industrial areas
3. urban infill areas
4. miscellaneous areas

The proposed Honolulu Area Rapid Transit (HART) plan line is shown, as well as existing services that are critical for an affordable housing development.

This study (Figure 42) has been presented to a number of politicians at the state level and to the general public. One of the sites has been identified by a small group of community leaders and state employees to be particularly appropriate for an affordable housing project. The site is close to neighborhood amenities and sits between two future rail stations. The site is also state owned

and is in a designated low income area. For this reason, this site will be used to display a hypothetical affordable housing project. Figure 43 shows the lot locations with dimensions of 120' wide and 160' deep , which were used in the final design proposal in this chapter.

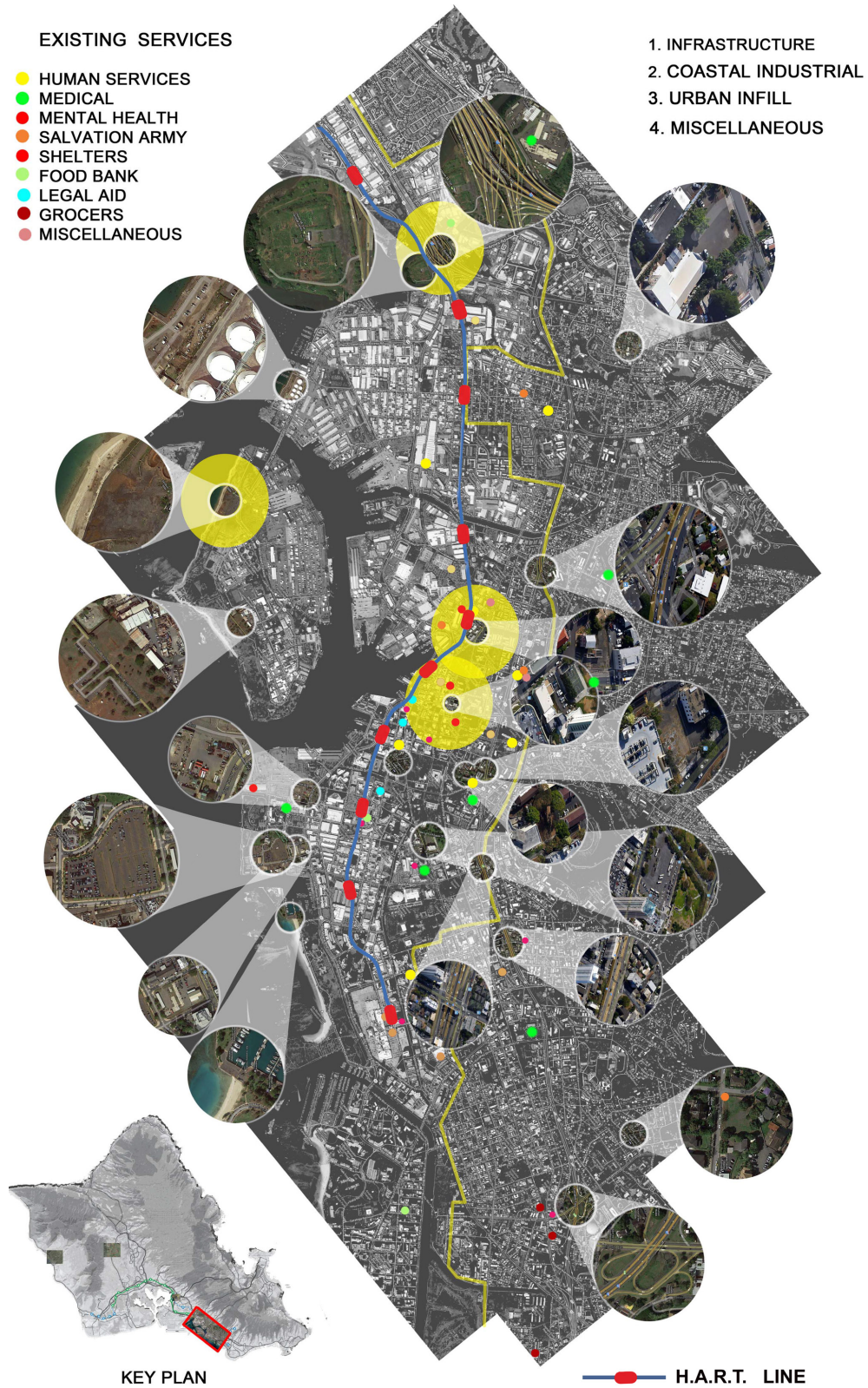
#### **Honolulu Strategic Action Plan: Major Initiatives**

1. Increase Workforce Housing Inventory
  - Adopt new Islandwide Affordable Housing Requirements to require longer affordability period at lower income levels in more projects.
  - Increase affordable housing production and adopt benchmarks.
2. Increase Low-Income and Homeless Housing Options
  - Acquire, develop, rehabilitate, and lease Housing First units.
  - Leverage existing HUD funding to implement projects and to better coordinate and target homeless services.
3. Invest in Better Neighborhoods
  - Develop affordable and workforce housing in mixed-use, mixed-income catalytic TOD projects, using public-private partnerships.
  - Adopt a housing finance toolkit with incentives to stimulate private investment.
  - Rehabilitate existing housing and invest in neighborhood infrastructure.
4. Update Policies and Regulations to Promote Housing Production
  - Adopt Neighborhood TOD Plans and update ordinances, zoning and parking requirements to make it easier to build mixed-use projects near rail stations.
  - Expand zoning for multi-family, ohana and accessory dwelling units (ADUs) for affordable rental housing.
  - Revise housing construction standards and building codes.
5. Coordinate Implementation and Measure Progress
  - Establish a strategic development office to fast-track implementation.
  - Track production and inventory of affordable housing.<sup>56</sup>

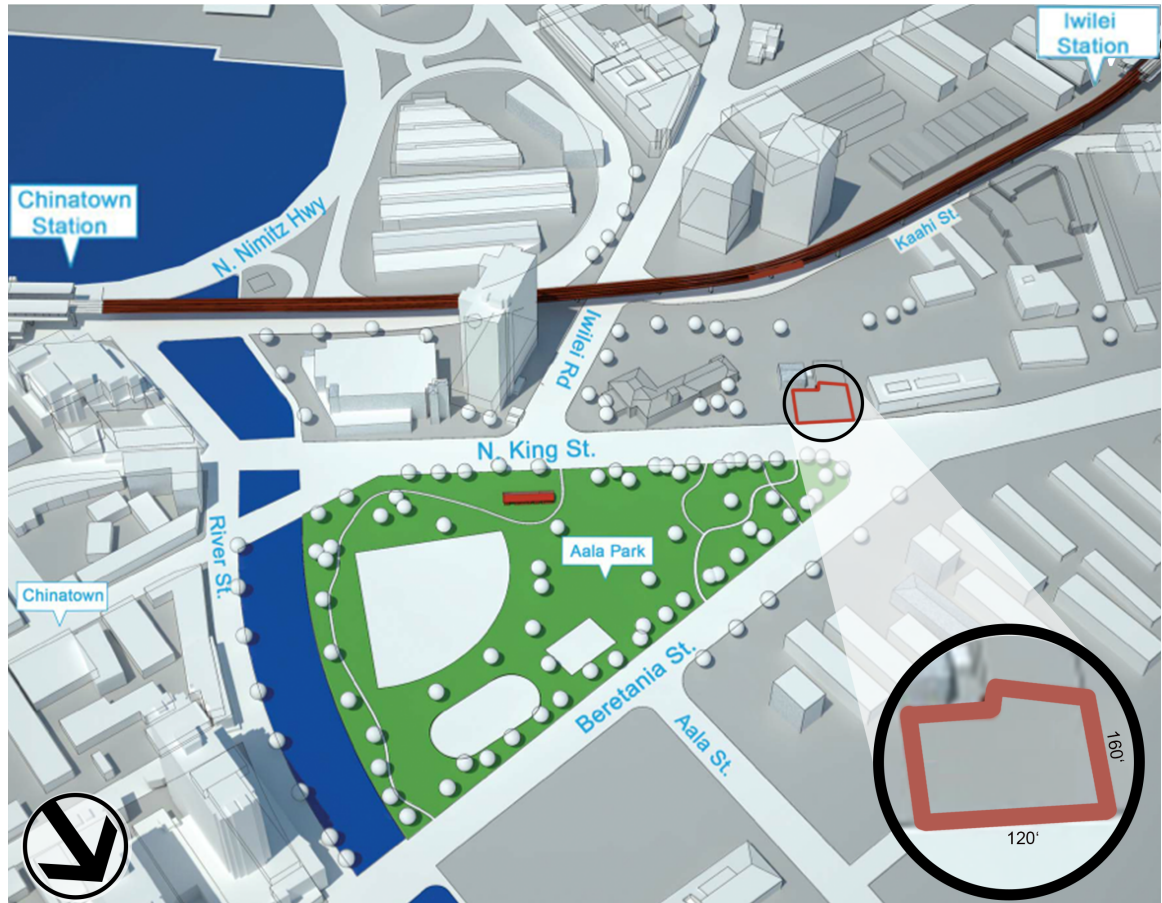
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<sup>56</sup> "Housing Oahu: Islandwide Housing Strategy." edited by City and County of Honolulu, 2: 2014, 2014.





**Figure 42: Study of Potential Affordable Housing Sites in central Honolulu.**  
Proximity to Future HART stations (shown in red) is critical.



**Figure 43: Site Selection.**

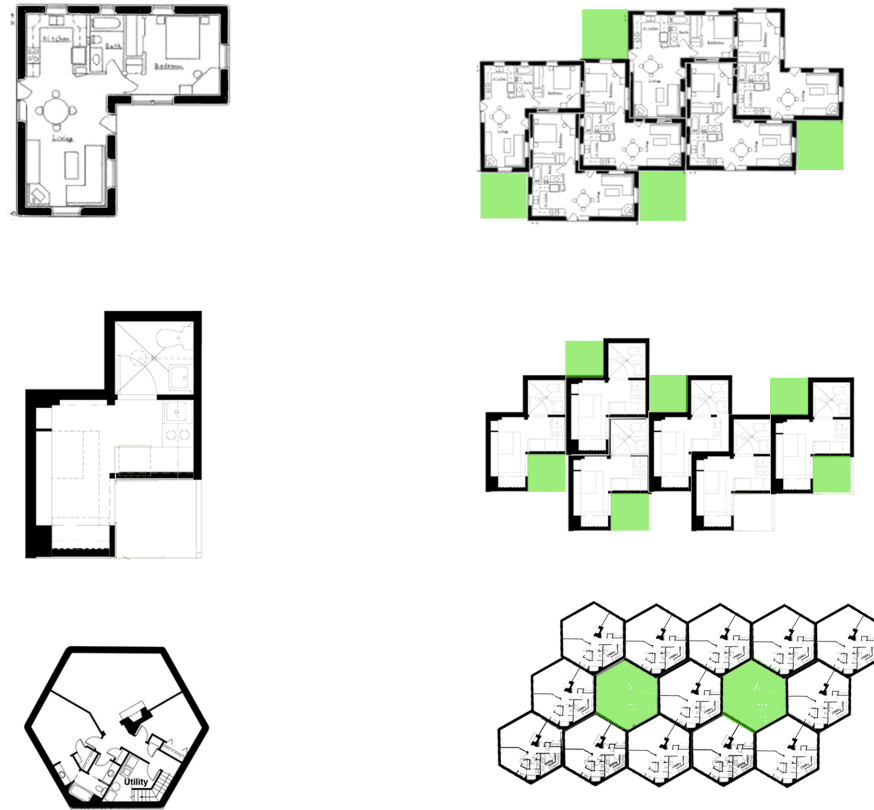
Most probable site to build based on government feedback. Walking distance to Chinatown and Iwilei HART Stations.

## Modular unit

From Chapter 3, there is an understanding of the many benefits that come from designing with shipping containers such as cost saving, ease of site construction, and adaptability. For this design, the base modular unit of a shipping container is used to capitalize on these benefits. In addition, the design also strives to offer a larger degree of flexibility and an improved quality of space and flexibility. The geometrical configuration of the module directly influences the building's construction potential, the shape of chosen spaces, and how the common spaces fit together. With cost in mind, it is imperative to create a simple shape for the purpose of mass producing components and minimizing specialty parts. The factor that initially drove the creation of the base module shape, the "L" configuration, was the balance between cost, aesthetics, and quality of space. Since one of the primary design drivers is the creation of common and shared overlapping space, one must consider the potential for these spaces to interplay in a variety of



potential building configurations. The following diagrams show how this can be accomplished using different of geometrical approaches:



**Figure 44: Communal Shared Space.**

Creating communal shared space can be done with any shape of repetitive modular unit with the goal to encourage community interaction.

In selecting the appropriate modular unit, consideration must also be made to the equal need for both communal space and private space. Maximizing on the outdoor usable space is critical in order to reduce square footage costs as well as to provide naturally ventilated private or shared spaces. The intermediate space between internally closed spaces and open outdoor space will be referred to as ‘mid-terior’ spaces (see Figure 45). It can be screened off and used as part of overall living area with the goal of perceptually increasing the size and flexibility of smaller living units.

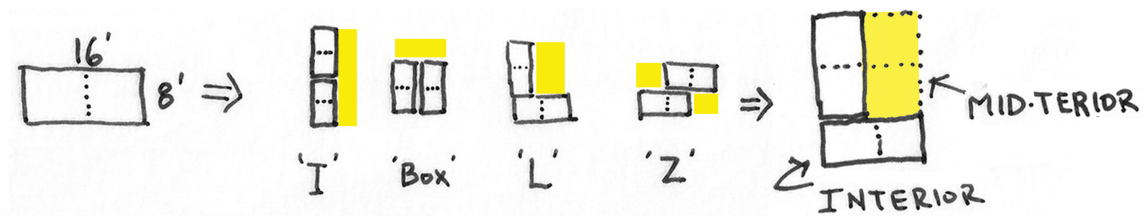
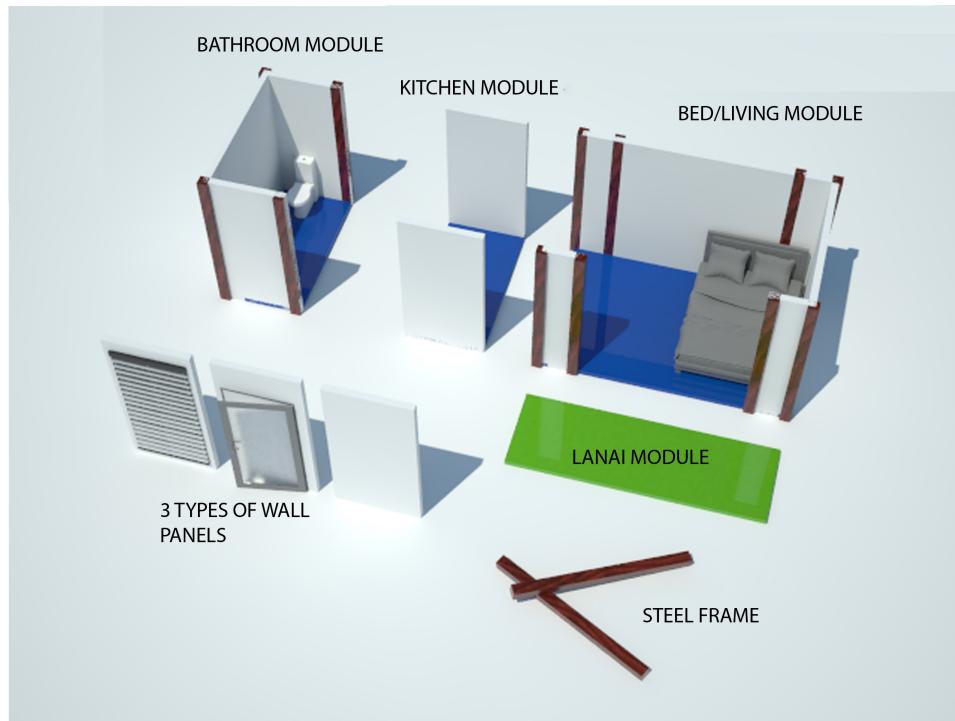


Figure 45: Configurations of a 16x8' Module

The different shapes shown above are the “I”, “L”, “Z” and “Box” all of which are 256 ft.<sup>2</sup>. Using construction components in 8' segments helps to reduce construction cost and material waste while providing a small but adequate room width. For this design proposal the L-shaped unit was chosen to show potential floor plan layouts. See Unit Floor plan in Appendix E. The use of adaptable furniture such as Murphy beds or fold-down tables allows for maximum flexibility within the floor plan. The “L” shape create a natural mid-terior area that increases the flexibility options within the unit. The L-shape is especially appropriate for clustering units since there is a possibility to cluster or interlock and create additional interstitial space. Any of these shapes can function in a cluster or as a stand alone unit. Appendix E shows different clustering as well as a standalone unit.

## Frame and Components

For the purpose of most urban scenarios, there is a need for vertical stacking. Vertical stacking can be done such that individual units can be shifted or removed to provide a common space and a connection to the neighborhood. The ability for a frame to lock together at different points, will increase the possible clustering configurations. The steel fame is equipped with flanges to be used as connection points within the frame, eliminating the need for the modules to be connected together in alignment. The clustering of modules horizontally and vertically can be staggered and shifted such that lanai spaces and interior open spaces can be created.



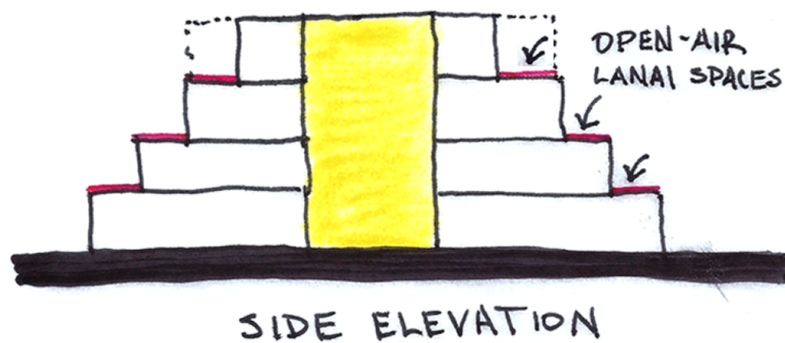
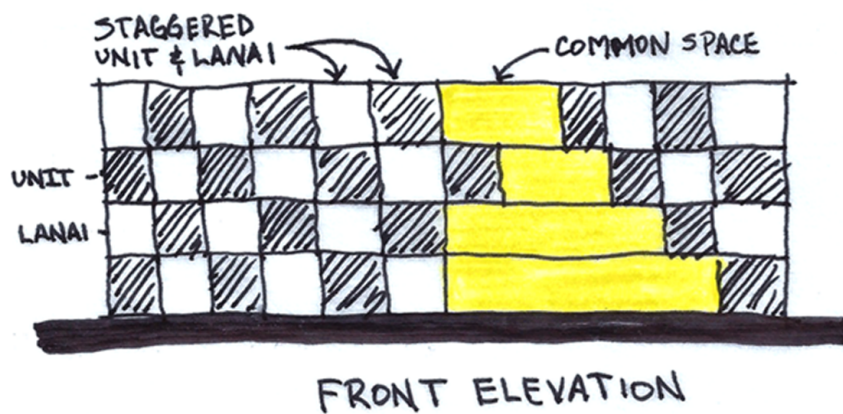
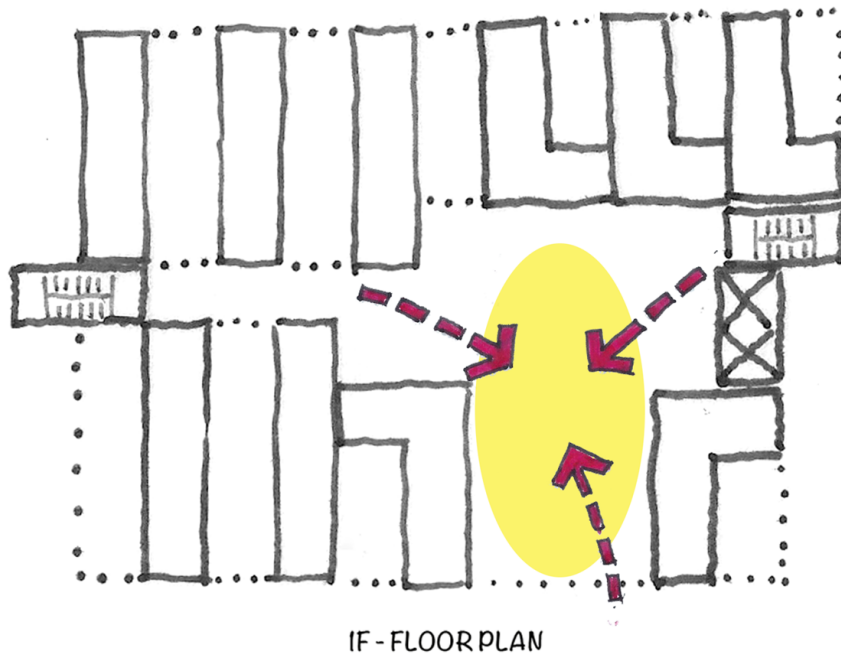
**Figure 46: Kit-of-Parts Construction**

The use of a super-frame and unitized system allows for factory built items to be easily assembled on site. This results in significant cost savings, avoiding union labor rates and, finally, ending up with a factory built quality kit-of-parts. Appendix E shows the basic steel modular frame that is the overall structure of the units. In order to meet current fire codes, intumescent paint would be required to cover the exposed steel frame.

## Floor Layouts

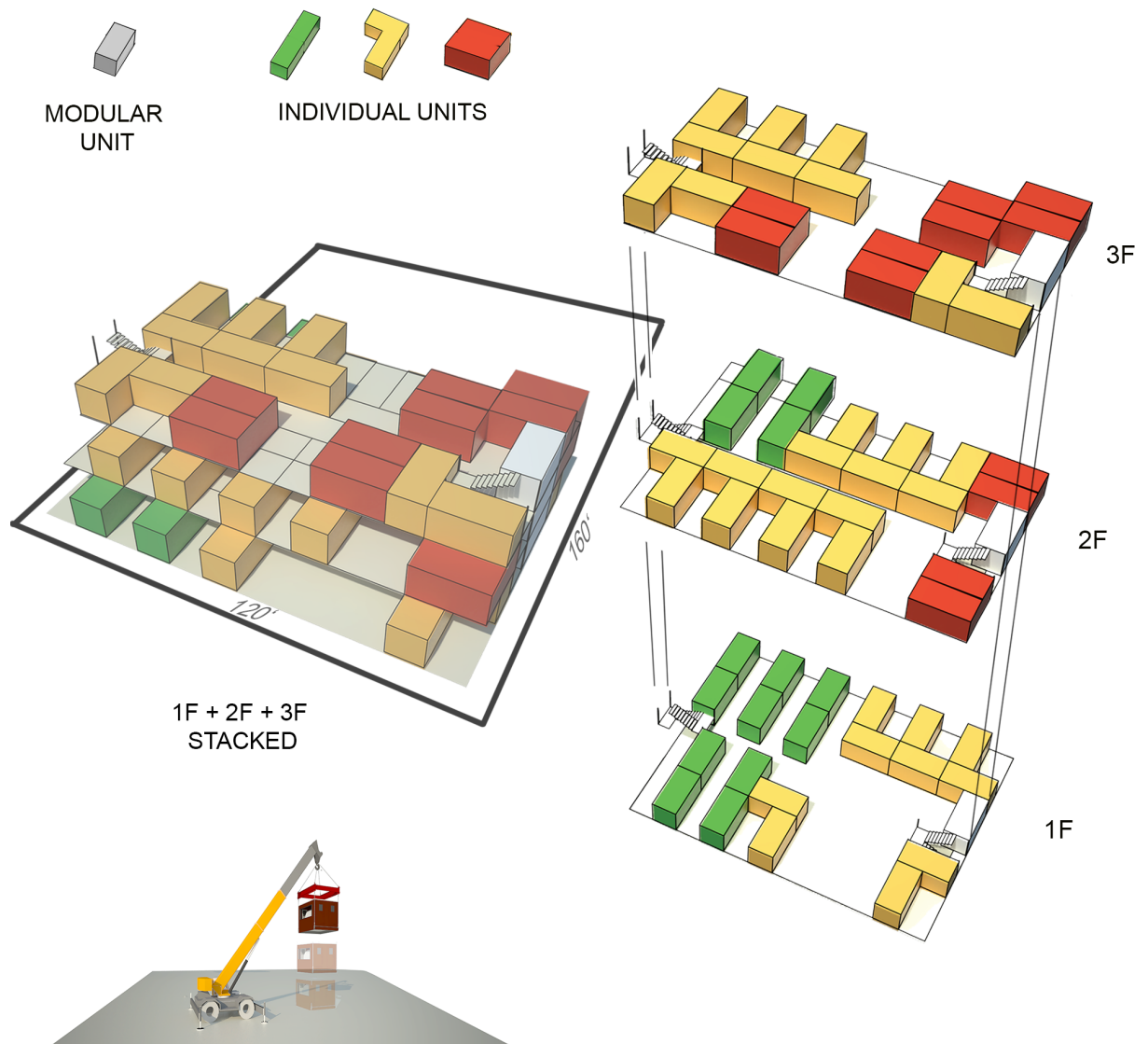
Clustering the modular units can be done in such a way that efficiency is maintained while a common space is provided in order to enhance the community connectivity. Staggering the unit provides additional intermediate space that can be used as common or private space. For this design proposal a medium density layout is used, see Figures 47 and 48. Additional two examples are provided in Appendix E show two different layouts, one that can be utilized in a higher density stacking scenario and the second for a village-like layout where there is only horizontal clustering. Each of the layouts provides common space within the circulation that encourages community interaction. Connection to the exterior within the clustering is maintained for visual connection, light and ventilation. Structural floor panels are used to fill in void spaces

between units. The vertical stacking is done in a way that minimizes the use of structural floor panels, such as staggering the units vertically so that upper level units can function as a ceiling for the void space below.



**Figure 47: High Density Mid-Rise Floor Plan.**  
Ample communal space is provided within primary circulation path.

## Building Layout and Design



**Figure 48: Stacking of Modulary Unit.**

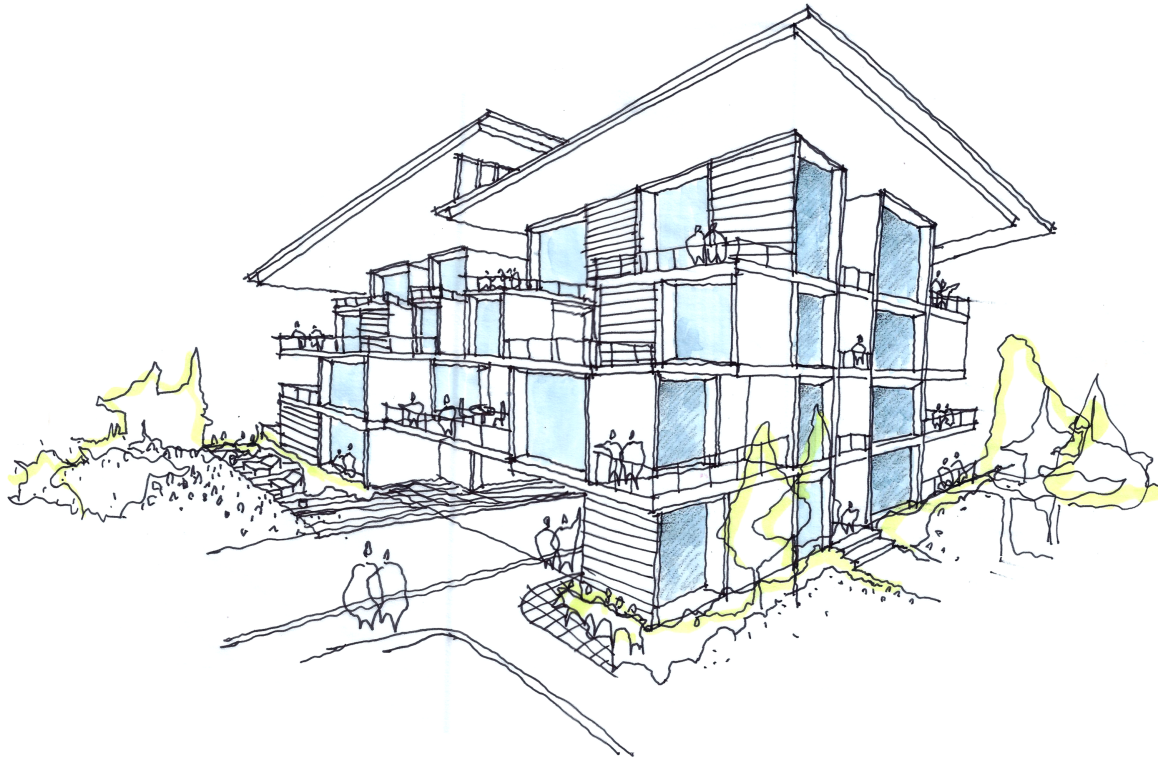
The void spaces between units provide an opportunity to better use natural daylight and ventilation into areas that can be useful programmatic spaces.

The building layout consists of a variety of individual unit shapes that interlock or stand alone. Laying out the units such that there are gaps between them allows for larger "free" spaces that can be used for common space or private mid-terior spaces. As the building is stacked it is advantageous to offset the upper floor with the lower floor units thereby creating a roof over the lower level gaps. Figure 48: Stacking of Modulary Unit.shows a



'wedding cake' type of stacking, each successive floor uses the lower floor for lanai space. In addition, each of the units have combination of covered and uncovered lanai spaces, and there is ample common space along each floors for easy and ample circulation corridors to be located. The overall width and depth of the building fits within the lot setbacks and there is open space in the rear yard for a small area for parking, bicycle storage and additional community garden space.

In this layout, there are three different individual units, "I", "L", and "Box" shapes. All three units are a total of 256 ft.<sup>2</sup>. The breaking down of the shapes can easily happen with changing of wall panels to suit changing needs. This allows for maximum flexibility for individuals that are seeking to change the size of their accommodations. Alternatively, this approach could be linked to financial constraints where rentals can be based on a cost per square foot. The ability to individualize a unit also adds to one's connection to their dwelling, creating a personalized sense of "home".



**Figure 49: Proposed Building Unit Layout**

## Synopsis/Further Research

This study begins with an analysis of the affordable housing stock on Oahu and the overall lack of affordability in Hawai'i. The questions: Who are the users? and What are their needs?, Are analyzed in Chapters 2 and 3. Approximate price points are determined for the creation of affordable housing utilizing a modular construction method to realize cost savings. A comprehensive analysis on the demographic shifts in society is undertaken, that indicates an overall change in the values in the next generation of users. Determining the basic needs of the users is then combined with an analysis of how these needs fit into the larger community and long-term benefits of both the community and users.

Omitted from this study is the element of cultural resonance as it relates to community cohesion. Determining architectural elements that can best encourage community cohesion while being equally respectful of the cultural and historical importance of the site and design influences would be a valuable future addition to the information presented. A detailed analysis of materials used for modular construction in Hawai'i, including sourcing of materials and the carbon footprint associated with the various options, would further the applicability of the study as well.

This study seeks to define the path to creating affordable housing on Oahu that encourages community cohesion and is created through a community-based design process. First, the community-based design group is established through selection of professionals in the community. The individuals and organizations throughout the community are a vast resource, this study provides a path to link the necessary bodies of knowledge to collectively advance affordable housing projects. Second, establishing the architectural product guidelines that this the community-based design group can use in its design. These guidelines provide a argument to utilizing certain construction methods and floor plan layouts that place a greater value on the qualitative needs of the users.

The need for an evolution of the traditional affordable housing design model on Oahu, based heavily on unit efficiency and economics, is urgent. The model that this study puts forth is based predominantly on user-driven, modular-based, and (most critically) unique collective professional and community partnership arrangement driven design processes. Under this umbrella, a new balance can be found between large scale urban growth goals, housing economics, immediate community concerns, and the qualitative needs of the future occupants. The three design projects undertaken during the duration of this study demonstrate that community based design groups, comprised of appropriate combinations of experienced professionals and community interest advocates, are able to strike this appropriate balance and advance such critical and necessary efforts on Oahu.



## Appendix A

### Interview Participants

A background summary of each participant is provided that provides in detail their individual demographic and experience profile, as well as relationship to the study. Each participant was given a number and initials to maintain confidentiality.

Participant 01 – Architect.

FO is in his late 60s, holds several degrees in architecture and planning, and is well traveled and versed in affordable housing. He has been the president of a major architecture firm in Hawai'i and focuses his work on community improvement.

Participant 02 – Architect.

CH is in his late 30s and has practiced in Hawai'i for fifteen years. Having done his own studies on affordable housing, he proved to be an excellent resource.

Participant 03 – Architect.

TY is in his late 60s and has practiced architecture all over the world in four different languages. He is a hybrid architect and business graduate and has done previous studies on affordable housing and aging in place.

Participant 04 – Architect.

BB is in his late 50s and is a past president of a major architecture firm in Hawai'i. He actively participates in community efforts including affordable housing design projects.

Participant 05 – Architect.

RS is in his late 30s and has a great deal of experience in building in Hawai'i affordably. He has also participated in community-based designs.

Participant 06 – Sociologist.

JJ is a professor of sociology and has a clear understanding of neighborhood and sociological trends that affect housing.

Participant 07 – State Senator

SS is in her mid-50s and has been in politics her entire career. She is a state senator and directs a great deal of effort toward community-based design.

Participant 08 – Government employee.

BB is in his mid-30s and has a well-rounded background of public service as well as an education in architecture. He is very knowledgeable in government and community efforts to increase affordable housing.

Participant 09 – Government employee.

JH is in his early 30s and works with the Mayor's Office. He is very knowledgeable on affordable housing efforts.

Participant 10 – Non-profit Organization Leader.

VV has run a major non-profit organization in Hawai'i for several years and due to his efforts, advancements in affordable housing have taken place.

Participant 11 – Non-profit Organization Leader.

JJ is part of a non-profit organization in Hawai'i and has been a voice for affordable housing advocacy.

Participant 12 – Affordable Housing Developer.

DD is in his late 40s and is president of a well-known affordable housing development and management company in Hawai'i. He has a clear understanding of the finances involved and the available funds for affordable housing.

Participant 13 – Hawaiian Cultural Designer.

KC is a designer in his early 50s who focuses on incorporation of Hawaiian culture into artwork.

Participant 14 – Social Worker.

ME is in her early 30s and works in a social service center for individuals with mental and drug abuse issues. She is a community advocate to providing affordable housing combined with social services.

**University of Hawaii**

**Consent to Participate in Research Project:** *Affordable Housing Hawai'i*

My name is Russell Wozniak. I am a graduate student at the University of Hawaii at Manoa School of Architecture. The focus of my studies is Affordable Housing in Hawai'i and as part of that I am conducting a research study in order to collect information. The purpose of my project is to compile affordable housing ideas that can be implemented to add housing inventory to Hawai'i. I am asking you to participate because your experience in the community and knowledge of affordable housing.

**Benefits and Risks:** There will be no direct benefit to you for participating in this interview. The results of this project may help improve the career development of me other students involved and may enhance the connection between the School of Architecture and community member like you. I believe there is little risk to you in participating in this research project. If you are uncomfortable answering any of the questions, feel free to skip the question, you may also stop the interview and/or withdraw from the project altogether.

**Activities:** In this session you will be asked your opinion on affordable housing relating to architectural components, constructability and community acceptability. Your comments will be recorded through my note taking.

**Privacy and Confidentiality:** I will keep all information in a safe place. Only my University of Hawaii advisor and I will have access to the information. Other agencies that have legal permission have the right to review research records. The University of Hawaii Human Studies Program has the right to review research records for this study. When I report the results of my research project, I will not use your name. I will not use any other personal identifying information that can identify you. I will use pseudonyms (fake names) and report my findings in a way that protects your privacy and confidentiality to the extent allowed by law.

**Voluntary Participation:** Your participation in this project is completely voluntary. You may stop participating at any time. If you stop being in the study, there will be no penalty or loss to you.

**Questions:** If you have any questions about this study, please call or email me at (808) 276-2588, [rwoz@hawaii.edu](mailto:rwoz@hawaii.edu). You may also contact my adviser, Dr. David Rockwood, at [rockwood@hawaii.edu](mailto:rockwood@hawaii.edu). If you have questions about your rights as a research participant, you may contact the UH Human Studies Program at 808.956.5007 or [uhirb@hawaii.edu](mailto:uhirb@hawaii.edu).

If you agree to participate in this project, please sign and date this signature page and return it to me:

Please keep the section above for your records.

**Signature(s) for Consent:**

I give permission to join the research project entitled, *Affordable Housing Hawaii*

Please initial next to either “Yes” or “No” to the following:

\_\_\_\_\_ Yes      \_\_\_\_\_ No      I consent to be audio-recorded for the interview portion of  
this research.

☐ Yes      ☐ No      I give permission to allow the investigator to use my real name to be used for the publication of this research

**Name of Participant (Print):**

**Participant's Signature:** \_\_\_\_\_

**Signature of the Person Obtaining Consent:**

Date: \_\_\_\_\_

**University of Hawaii at Manoa School of Architecture**

*Affordable Housing Hawaii*

*Questions to Participants.*

- 1) What Architectural features do you feel would help in affordable housing in Hawai'i?
- 2) What size per individual for a dwelling do you feel is an appropriate balance between cost and comfort for affordable housing in Hawai'i?
- 3) What Architectural features do you feel is important in order to mitigate NIMBY (Not In My Backyard) issues in Hawai'i?
- 4) What changes do you feel could be made within the community to add affordable housing to the market?
- 5) What strategies (from small scale space saving to large scale master planning) do you feel could be implemented that would help the affordable housing issue in Hawai'i?

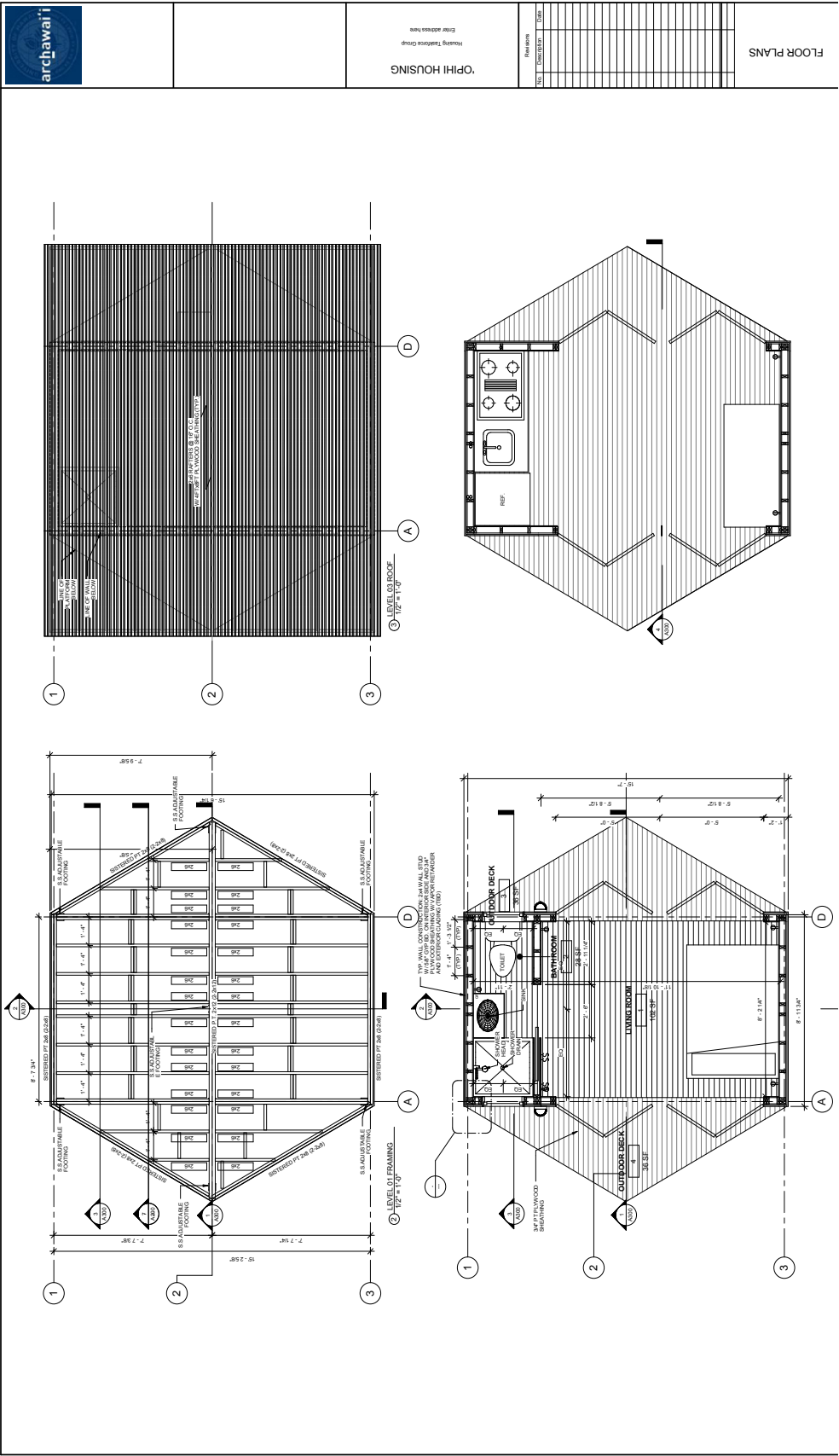
Appendix B



<b>DESIGN PROJECT 01:</b> <b>‘Opihi Affordable Housing</b> <b>Appendix B</b>	Description:  BI-FOLD DOORS ON EITHER SIDE CLEAR STORY WINDOWS, HARDY-BOARD SIDING, STICK FRAME CONSTRUCTION ON ADJUSTABLE FOOTINGS.	Design and Drawings by: Dane Teves Salma Aref Mighty Binonwangan Russell Wozniak

[illegible]

Appendix B



Design and Drawings by:

Dane Teves  
Salma Aref  
Mighty Binonwangan  
Russell Wozniak

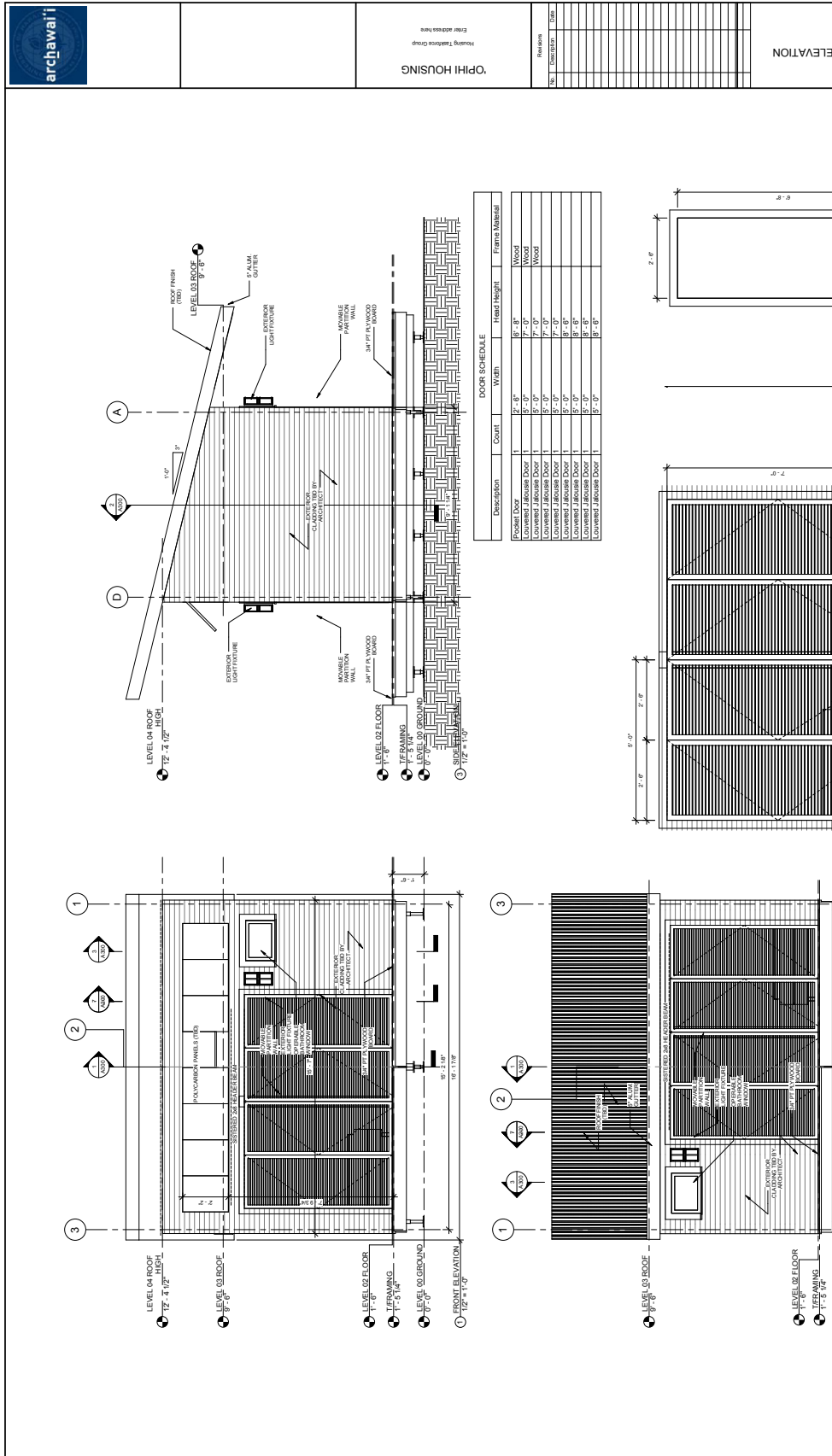
Description: FLOOR FRAMING PLAN, ROOF FRAMING PLAN, FLOOR PLAN OF PRIMARY UNIT, FLOOR PLAN OF KITCHEN UNIT.

DESIGN PROJECT 01:  
'Opihi Affordable Housing'  
Appendix B





## Appendix B



**Design and Drawings by:**  
Dane Teves  
Salma Aref  
Mighty Binonwangan  
Russell Wozniak

**Description:**

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**ELEVATIONS. DOOR SCHEDULE.**

# DESIGN PROJECT 01: 'Opihi Affordable Housing Appendix B

## Appendix B

**SECTION 1**

**SECTION 2**

**SECTION 3**

**REVISIONS**

No.	Description	Date
1	Issue for Review	10/10/2023
2	Issue for Review	10/10/2023
3	Issue for Review	10/10/2023
4	Issue for Review	10/10/2023
5	Issue for Review	10/10/2023
6	Issue for Review	10/10/2023
7	Issue for Review	10/10/2023
8	Issue for Review	10/10/2023
9	Issue for Review	10/10/2023
10	Issue for Review	10/10/2023

**OPIHI HOUSING**

Resolving Architects Group

4800 10th Avenue, Suite 100, San Francisco, CA 94103

**Design and Drawings by:**

Dane Teves  
Salma Aref  
Mighty Binonwangan  
Russell Wozniak

**SECTION VIEWS.**

**DESCRIPTION:**

**DESIGN PROJECT 01:**

**'Opihi Affordable Housing**

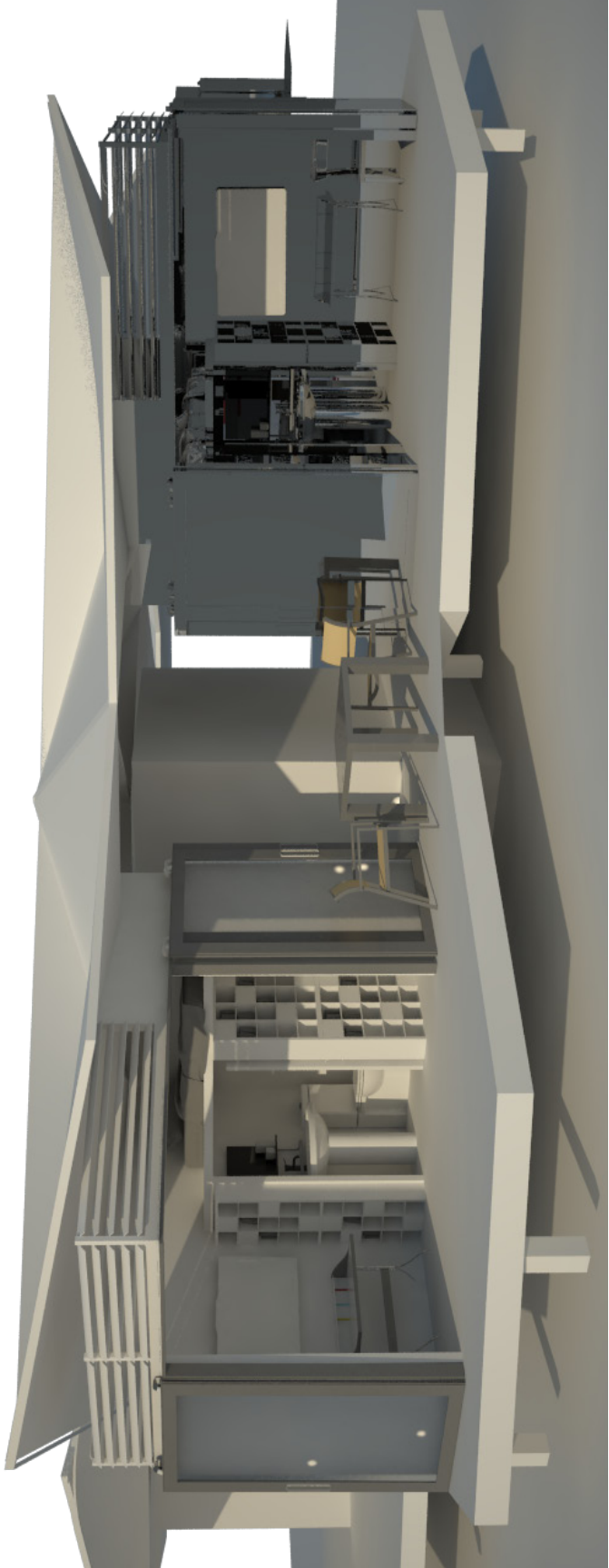
**Appendix B**

Appendix B



<b>DESIGN PROJECT 01:</b> <b>'Opihi Affordable Housing</b> <b>Appendix B</b>	Description: EARLIER DESIGN ITERATION USED IN PRESENTATION TO THE GEN- ERAL PUBLIC. TWO UNITS ARE SHOWN ADJACENT TO EACH OTHER AND SHARED COMMON SPACE IS PROVIDED BETWEEN.	Design and Drawings by: Dane Teves Salma Aref Mighty Binonwangan Russell Wozniak

Appendix B



<b>DESIGN PROJECT 01:</b> <b>'Opihi Affordable Housing</b> <b>Appendix B</b>	Description:	EARLIER DESIGN ITERATION. TWO SETS OF SLIDING DOORS ALLOW FOR UNIT CORNER TO DISAPPEAR. ELEVATED LOFT BED ON THE INTERIOR WAS ELIMINATED DUE TO USE YOUR NEEDS TO HAVE A FLOOR LEVEL MURPHY BED.	Design and Drawings by: Dane Teves Salma Aref Mighty Binonwangan Russell Wozniak

## Appendix C



### DESIGN PROJECT 02: "Lift" - Bus Conversion

#### Appendix C

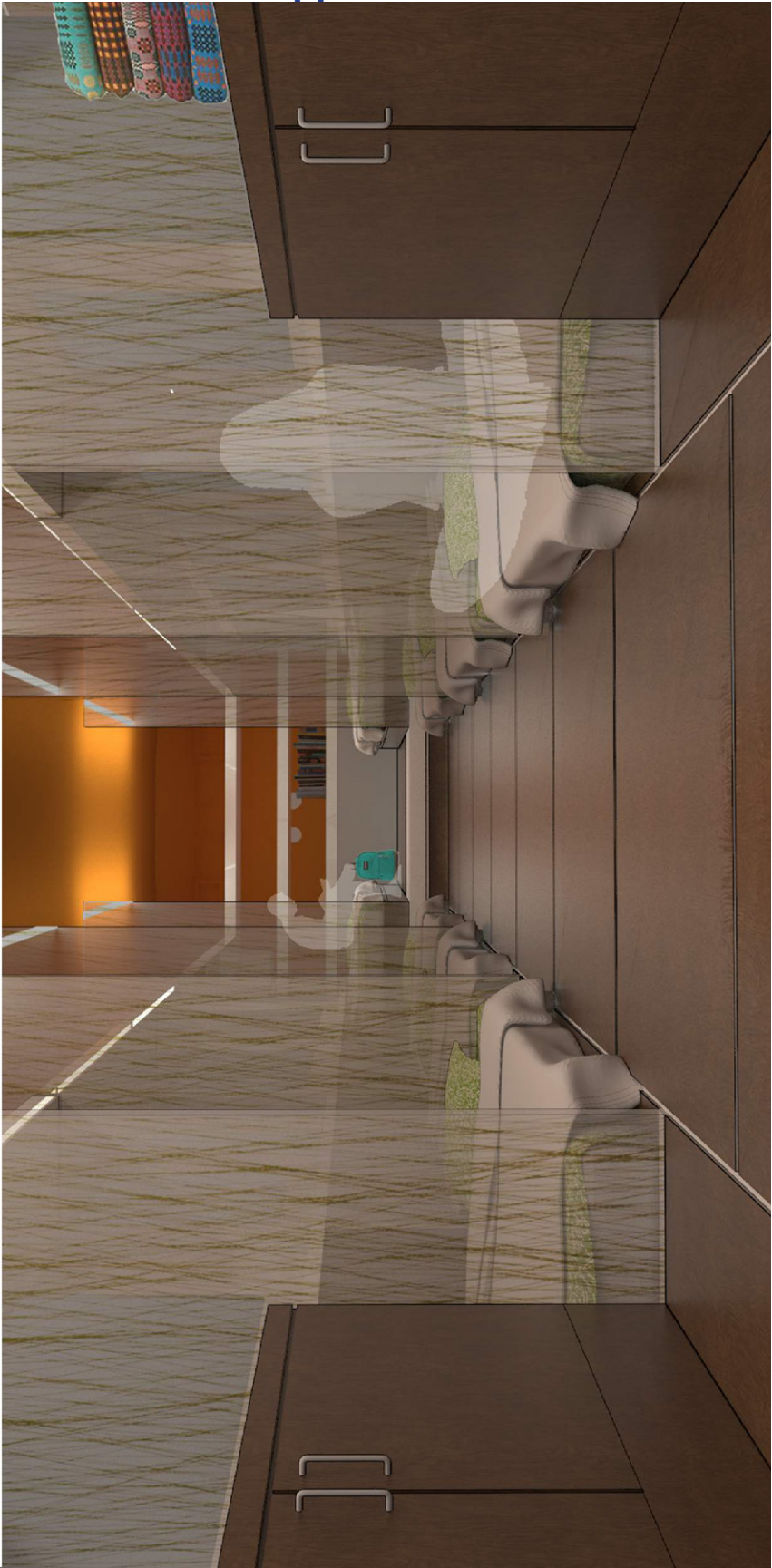
Description: LIFT BUS CONVERSION. BRANDED BUS TO SHOW A RECOGNIZABLE COMMUNITY ELEMENT.

Design and Drawings by:

Reid Omizu  
Ryan Sullivan  
Jun Yang  
Russell Wozniak



Appendix C



Description: SEVEN BEDS CAN BE OUTFITTED IN ONE FULL SIZE BUS. PENALIZED FLOORING CAN CREATE A NEW EXPENSIVE SURFACE.

Design and Drawings by:

Reid Omizu  
Ryan Sullivan  
Jun Yang  
Russell Wozniak

DESIGN PROJECT 02:  
"Lift" - Bus Conversion  
Appendix C

Appendix C



DESIGN PROJECT 02: "Lift" - Bus Conversion Appendix C		Description: LIFT BUS TITLE PAGE	Design and Drawings by: Reid Omizu Ryan Sullivan Jun Yang Russell Wozniak



# Appendix C

01

NEED A  
LIFT?

problem + user statement

LIFT

aspires to transform peoples lives by providing a means towards permanent housing through re-imagining bus infrastructure as mechanisms for hygiene, learning, recreation, resting, and obtaining services.



<div>DESIGN PROJECT 02: “Lift” - Bus Conversion</div> <div>Appendix C</div>	<div>Description: NEED A LIFT? LIFT ASPIRES TO TRANSFORM PEOPLES LIVES BY PROVIDING A MEANS TOWARDS PERMANENT HOUSING THROUGH REIMAGINING BUS INFRASTRUCTURE AS MECHANISMS FOR HYGIENE, LEARNING, RE-CREATING, RESTING AND OBTAINING SERVICES.</div> <div>Design and Drawings by: Reid Omizu Ryan Sullivan Jun Yang Russell Wozniak</div>
---	---

## Appendix C



<b>DESIGN PROJECT 02:</b> <b>“Lift” - Bus Conversion</b>		Description: WHAT IF A BUS COULD BE MORE THAN JUST A BUS?	Design and Drawings by: Reid Omizu Ryan Sullivan Jun Yang Russell Wozniak
<b>Appendix C</b>			

Appendix C



<p><b>DESIGN PROJECT 02:</b>  <b>“Lift” - Bus Conversion</b></p>	<p>Description: A BUS COULD BE A PART OF THE COMMUNITY.</p>	<p>Design and Drawings by:  Reid Omizu  Ryan Sullivan  Jun Yang  Russell Wozniak</p>
<p><b>Appendix C</b></p>		

## Appendix C



<b>DESIGN PROJECT 02:</b> <b>"Lift" - Bus Conversion</b>	Description: A BUS COULD BE TRANSFORMED TO PROVIDE SCHOOLING, FURTHER COMMUNITY BENEFITS.	Design and Drawings by: Reid Omizu Ryan Sullivan Jun Yang Russell Wozniak
<b>Appendix C</b>		

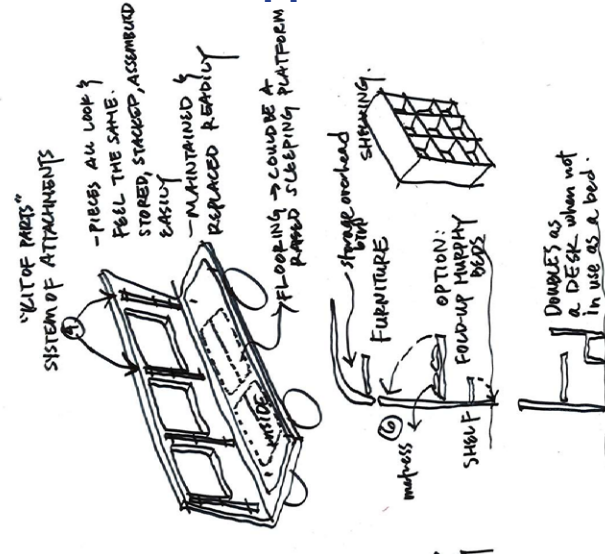
# 02

## "ADAPTABILITY"

elements + process

Adaptability could be devised to bring the most flexibility to the design solution, allowing a multitude of spaces to be created.

## Appendix C



## DESIGN PROJECT 02: "Lift" - Bus Conversion

### Appendix C

Description: ADAPTABILITY. THIS IS NECESSARY TO BRING THE MOST FLEXIBILITY TO THE DESIGN SOLUTION, IN SUCH A SMALL AREA MULTIPURPOSE SPACES ARE NEEDED, SUCH AS A DESK THAT CONVERTS INTO A BED.

Design and Drawings by:

Reid Omizu

Ryan Sullivan

Jun Yang

Russell Wozniak



03

“SYSTEM OF ATTACHMENTS”

elements + process

A “kit of parts” system of attachments could be incorporated with wall rails on a grid system to allow for multiple space configurations. Fold down beds, bookshelves, and tables could be configured in multiple layouts, allowing for maximum flexibility throughout the space.



Appendix C

<div>DESIGN PROJECT 02:</div> <div>“Lift” - Bus Conversion</div> <div>Appendix C</div>	<div>Description: KIT OF PARTS SYSTEM TO ASSIST IN SIMPLE CONVERSION RESULTING IN MULTI PURPOSED SPACES.</div>	
	<div>Design and Drawings by:</div> <div>Reid Omizu</div> <div>Ryan Sullivan</div> <div>Jun Yang</div> <div>Russell Wozniak</div>	

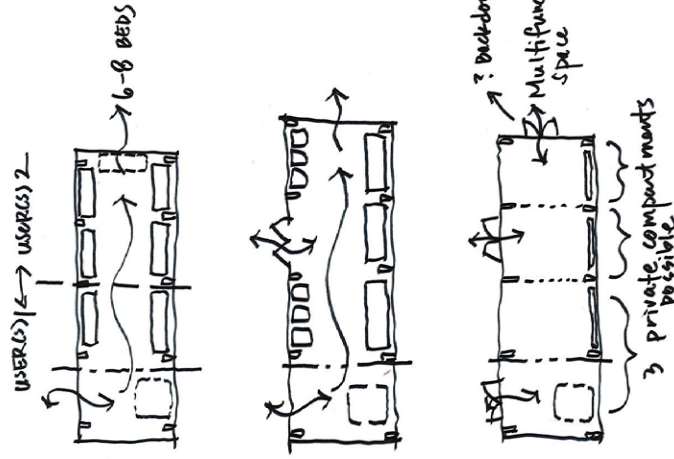
# 04

## "FLEXIBLE PLANS"

elements + process

Spaces could be configured based on immediate needs to house a multitude of user types. Several individuals can share the space one day while a family could use the space the next day.

## Appendix C



### DESIGN PROJECT 02: "Lift" - Bus Conversion

#### Appendix C

Description: OPTIONS FOR FLEXIBLE FLOORPLANS ARE AVAILABLE WITH THE KIT OF PARTS SYSTEM.

Design and Drawings by:

Reid Omizu

Ryan Sullivan

Jun Yang

Russell Wozniak

05

"MULTI PURPOSE SPACE"

elements + process

During the day the space can be reconfigured to provide services to the public. Some examples are daycare, barbershop, meeting hall, and classroom space.



Appendix C

<div> <div>DESIGN PROJECT 02:</div> <div>"Lift" - Bus Conversion</div> </div>	<div>Description: MULTIPURPOSE SPACES. DURING THE DAY THE SPACE CAN BE RE-CONFIGURED TO PROVIDE SERVICES TO THE PUBLIC.</div>	<div>Design and Drawings by:</div> <div> <div>Reid Omizu</div> <div>Ryan Sullivan</div> <div>Jun Yang</div> <div>Russell Wozniak</div> </div>
<div>Appendix C</div>		



06

“RAISED FLOORING PLATFORM”

elements + process

A series of raised floor tiles could be incorporated to allow beds and storage to be integrated right into the floor of the space. Beds could be covered up during the day to open the space up for daytime activities.



Appendix C

<div> <div>DESIGN PROJECT 02:</div> <div>“Lift” - Bus Conversion</div> <div>Appendix C</div> </div>	<div> <div>Description:</div> <div>RAISED FLOORING SYSTEM. THIS ALLOWS FOR MECHANICAL, ELECTRICAL AND PLUMBING SERVICES TO GO IN THE FLOOR BUT ALSO ALLOWS FOR STORAGE.</div> </div>	
	<div> <div>Design and Drawings by:</div> <div> <div>Reid Omizu</div> <div>Ryan Sullivan</div> <div>Jun Yang</div> <div>Russell Wozniak</div> </div> </div>	

08

"GREEN WALL"

elements + process

A removable green wall system could be incorporated onto the sides of the bus that would serve as passive solar shading or an edible herb garden.

Appendix C



<b>DESIGN PROJECT 02:</b> <b>"Lift" - Bus Conversion</b> <b>Appendix C</b>	Description: GREENWALL. A MODULAR GREENWALL SYSTEM CAN BE USED ON THE SIDE OF THE BUS TO SERVE AS PASSIVE SHADING AND AN EDIBLE HERB GARDEN.	Design and Drawings by: Reid Omizu Ryan Sullivan Jun Yang Russell Wozniak

# Appendix C

09

"GRAPHIC WRAPPING"

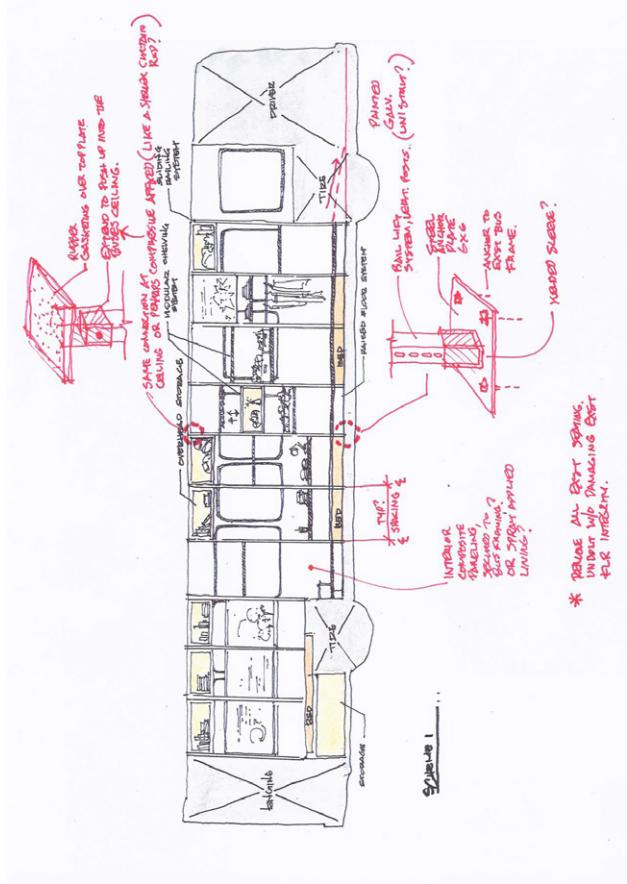
elements + process

Vibrant and expressive colors, and branding could envelope the bus. The bus could become an iconic symbol, an object of ART, a public improvement.



<b>DESIGN PROJECT 02:</b> <b>"Lift" - Bus Conversion</b> <b>Appendix C</b>	Description: GRAPHIC WRAPPING PROVIDES A VIBRANT RECOGNIZABLE BRAND FOR THE BUS.	Design and Drawings by: Reid Omizu Ryan Sullivan Jun Yang Russell Wozniak

## Appendix C



## Appendix C

## MATERIAL.

Reid Omizu

Ryan Sullivan

Jun Yang

Russell Wozniak

The diagram illustrates the electrical layout of a building, divided into three main sections: A (Floor Plan), B (Equipment Room), and C (Cable Management).

- Section A (Floor Plan):** Shows the building's footprint with various rooms labeled: "ENTRY", "RECEPTION AREA", "OFFICE", "CONFERENCE ROOM", "RESTROOM", "KITCHEN", "BATH", "BEDROOM", "LIVING ROOM", "DINING ROOM", "PATIO", "GARAGE", "POOL", "TENNIS COURT", "GOLF COURSE". It also shows "ELECTRICAL PANELS" and "TELEPHONE EQUIPMENT". Red dashed lines indicate cable paths.
- Section B (Equipment Room):** Shows the location of "ELECTRICAL EQUIPMENT" and "TELEPHONE EQUIPMENT". It includes a note: "EQUIPMENT SHOULD BE LOCATED IN THIS ROOM".
- Section C (Cable Management):** Shows the routing of cables from the equipment room to the restrooms. It includes notes: "CABLES TO RESTROOMS", "CABLES TO ENTRY", "CABLES TO RECEPTION AREA", "CABLES TO OFFICE", "CABLES TO CONFERENCE ROOM", "CABLES TO KITCHEN", "CABLES TO BATH", "CABLES TO BEDROOM", "CABLES TO LIVING ROOM", "CABLES TO DINING ROOM", "CABLES TO PATIO", "CABLES TO GARAGE", "CABLES TO POOL", "CABLES TO TENNIS COURT", "CABLES TO GOLF COURSE".

Additional annotations include:

- "FLOOR PLAN WITH ELECTRICAL SYSTEM"
- "ELECTRICAL SYSTEM"
- "TELEPHONE SYSTEM"
- "CABLE ROUTES"
- "EQUIPMENT ROOM"
- "RESTROOMS"
- "ENTRY"
- "RECEPTION AREA"
- "OFFICE"
- "CONFERENCE ROOM"
- "KITCHEN"
- "BATH"
- "BEDROOM"
- "LIVING ROOM"
- "DINING ROOM"
- "PATIO"
- "GARAGE"
- "POOL"
- "TENNIS COURT"
- "GOLF COURSE"

**Description: SCHEMATIC CONSTRUCTION FLOOR PLAN.**

**Design and Drawings by:**  
Reid Omizu  
Ryan Sullivan  
Jun Yang  
Russell Wozniak



12

"PRODUCTS"

elements + process

1 - Bison Pedestal System

2 - Bison Wood deck tiles or Trespa tiles

3 - Unistrut System with Arakawa modular shelving system

4 - Tuff coat system below raised floor for easy cleaning

5 - Cot or mattress in floor system

6 - Vinyl vehicle wrap on outside of bus (Honblue)

Appendix C



<div>DESIGN PROJECT 02:</div> <div>"Lift" - Bus Conversion</div> <div>Appendix C</div>	Description: UTILIZATION OF RAISED FLOORING ALLOWS FOR IN-FLOOR STORAGE. OVERHEAD SHELVING MAXIMIZES STORAGE SPACE.	
	Design and Drawings by: Reid Omizu Ryan Sullivan Jun Yang Russell Wozniak	



IDEA GENERATION | FEB.4.2015

DESIGN PROJECT 02: "Lift" - Bus Conversion		Description: COMMUNITY BASED DESIGN TO ASSIST THE HOMELESS POPULATION.	Design and Drawings by: Reid Omzu Ryan Sullivan Jun Yang Russell Wozniak
Appendix C			

# LIFT - BUS ALTERATION

HONOLULU, O'AHU, HAWAII  
re-imagining bus infrastructure for temporary  
shelter | hygiene | services | learning | recreation  
  
For  
City & County of Honolulu, Office of Housing

PRE-FINAL CONSTRUCTION SET  
FEBRUARY 04, 2015

<div>GROUP 70 INTERNATIONAL 6025 Baitoa Street, 5th Floor Honolulu, HI 96821 Tel: 808-523-5888 www.group70int.com</div>	<div>OMZU architecture inc 1022 Pensacola Street, 4th Fl Honolulu, HI 96813 Tel: 808-721-4287 www.omzuarch.com</div>	<div>LIFT City &amp; County of Honolulu - Office of Housing</div>	<div>Pre-final Design</div>	<div>T1 1 of 6</div>

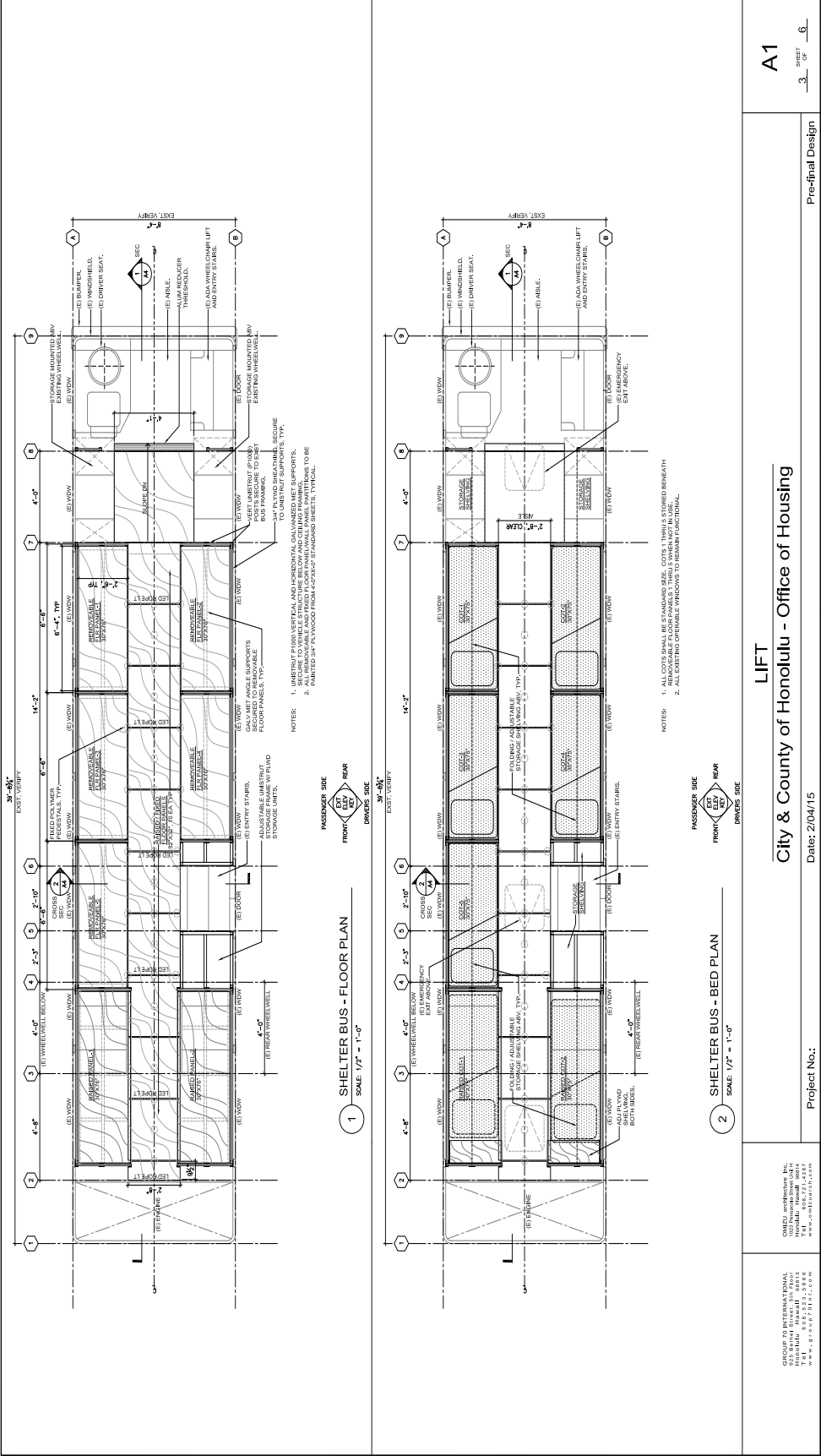
<div>DESIGN PROJECT 02: "Lift" - Bus Conversion</div>	<div>Description: LIFT BUS ALTERATION CONSTRUCTION DRAWINGS</div>	<div>Design and Drawings by: Reid Omizu Ryan Sullivan Jun Yang Russell Wozniak</div>



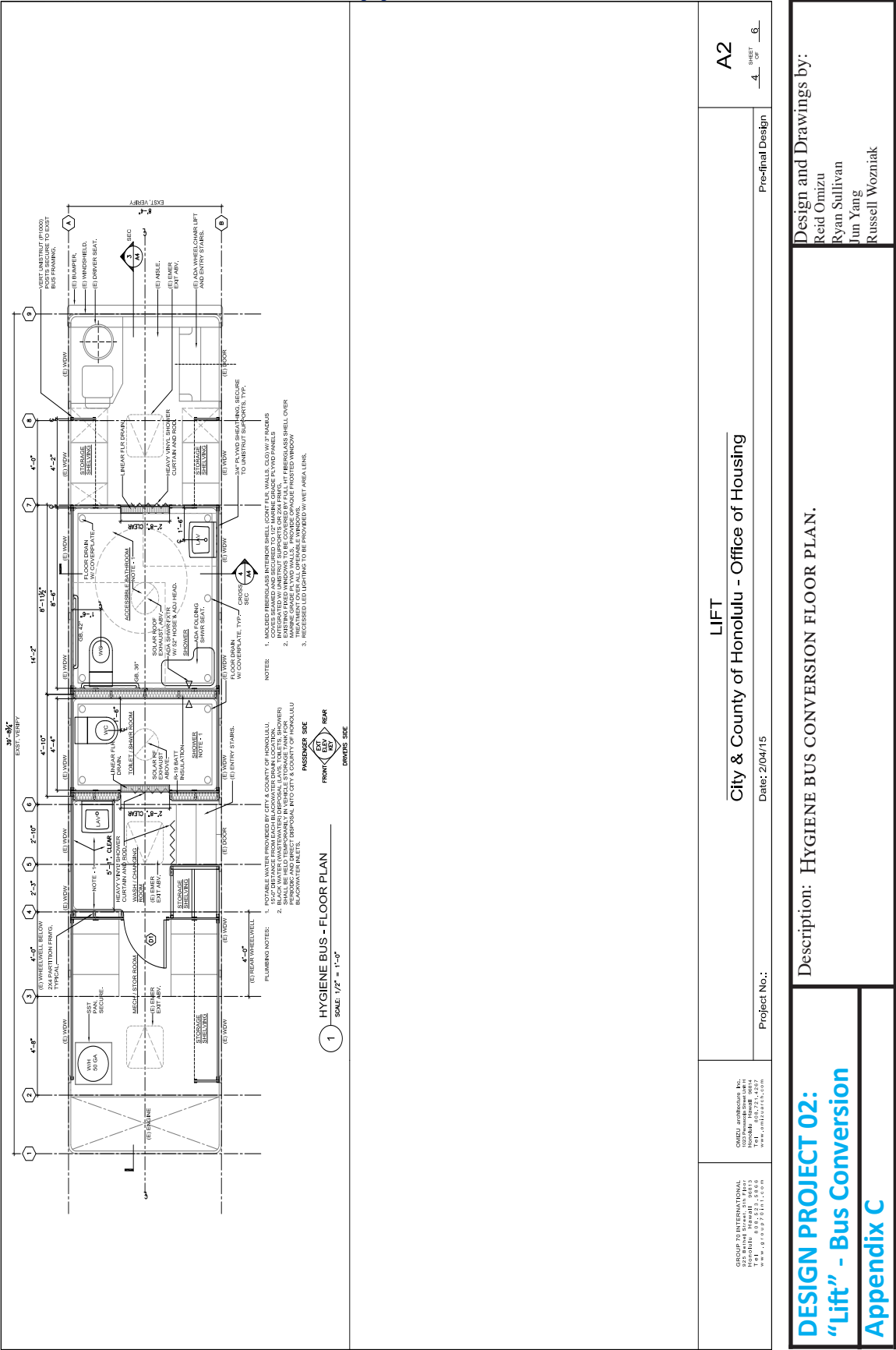
## DESIGN PROJECT 02: “Lift” - Bus Conversion

### Appendix C

Appendix C



Appendix C



## 142

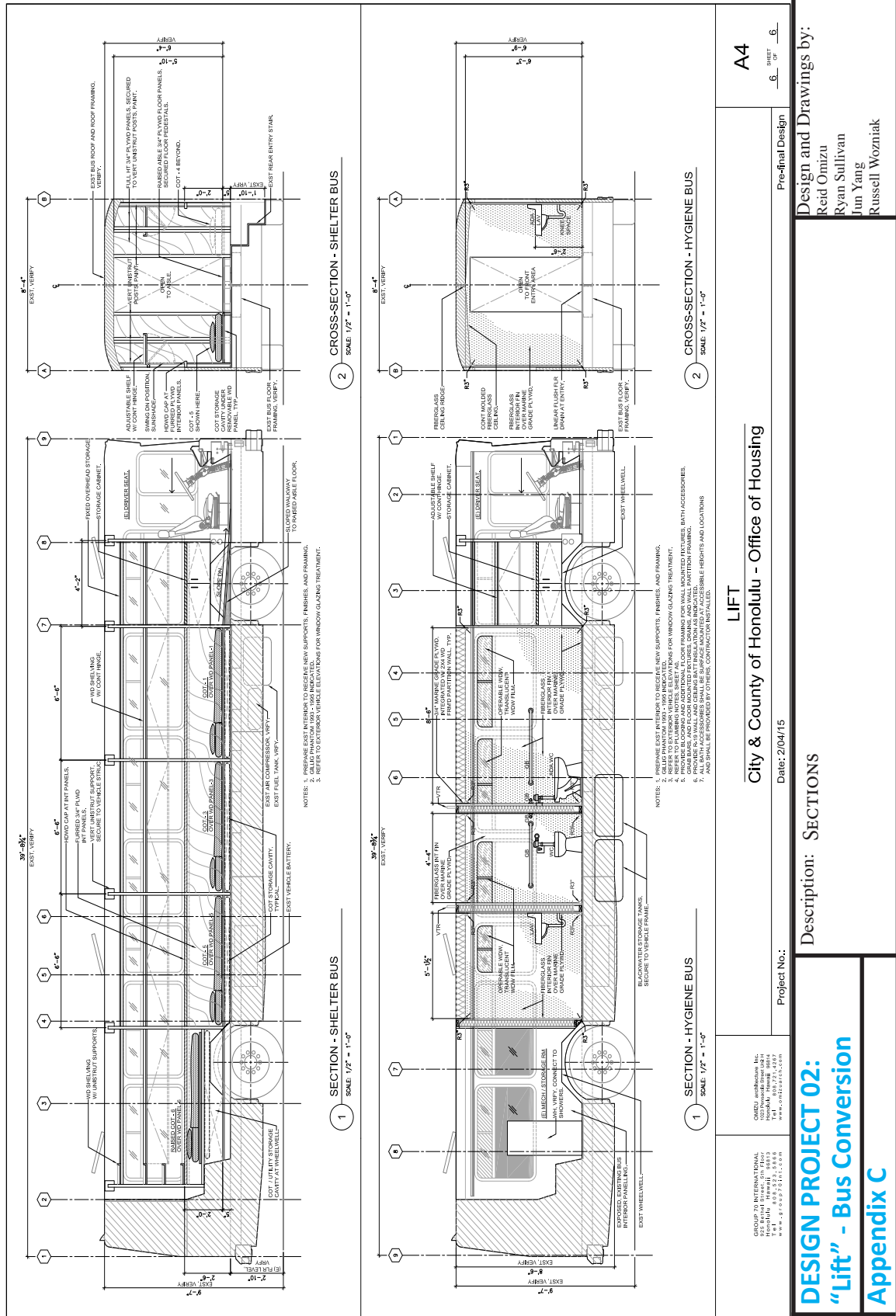


Description: ELEVATIONS

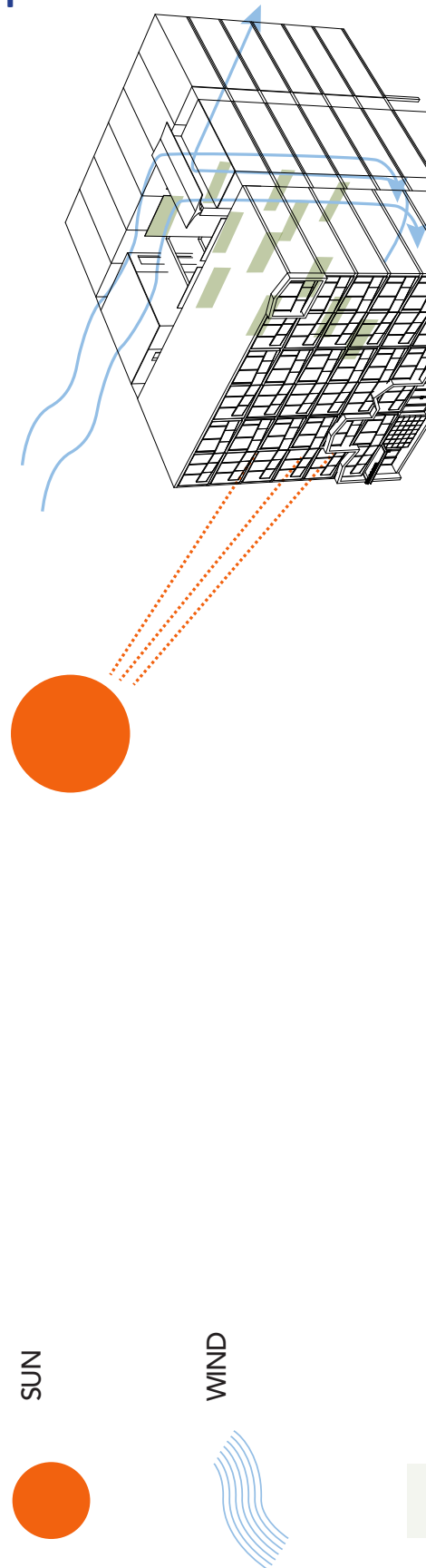
**Design and Drawings by:**

Reid Omizu  
Ryan Sullivan  
Jun Yang  
Russell Wozniak

# Appendix C



## Appendix D



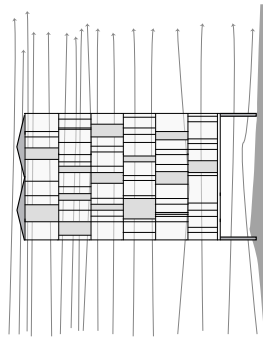
DESIGN PROJECT 03: Cooke St. Micro-Housing Appendix D	
Description: SUSTAINABLE CONSIDERATIONS FOR THE 69 UNIT COURTYARD BUILDING. CONSIDERATION FOR BLOCKING THE SUN AND DRAWING AIR CIRCULATION IN TO CENTER COURTYARD VIA A "WIND SCOOP".	
Design and Drawings by: Mutual Housing Inc. Hawai'i Group 70 International Inc.	



**A HOME THAT WORKS FOR YOU**  
 Architectural Passive  
 Design Features

**CAPTURING WIND**

Taller buildings can utilize the stronger winds that move higher above the earth's surface.

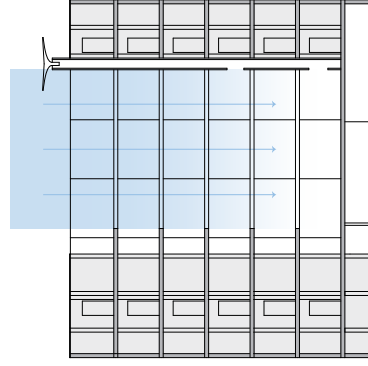
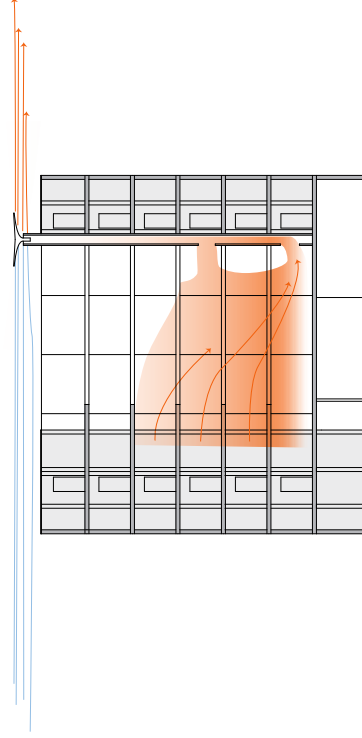


A wind scoop will be able to catch wind that flows above the building to lower the overall building temperature, creating a more comfortable living environment.

**COMMUNITY GARDENS**



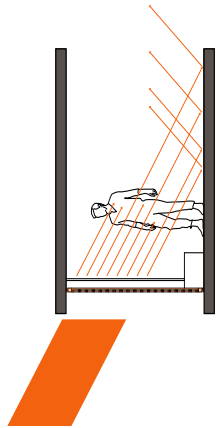
**Appendix D**



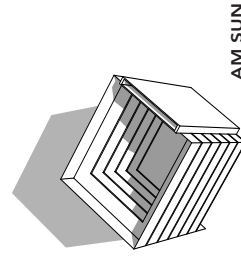
<b>DESIGN PROJECT 03:</b> <b>Cooke St. Micro-Housing</b>	Description: SUSTAINABLE FEATURES INCLUDING COMMUNITY GARDEN SPACE AND PASSIVE VENTILATION.	Design and Drawings by: Mutual Housing Inc. Hawai'i Group 70 International Inc.
<b>Appendix D</b>		

## A HOME THAT SHIELDS

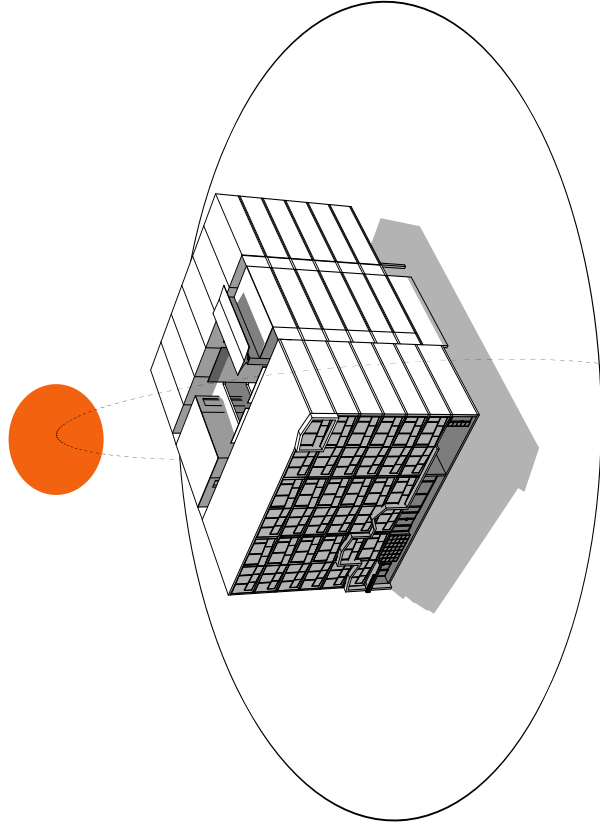
Solar Shading



Overhangs created by the angled walls provide passive shading to the interior of the units keeping the residents cooler.



Courtyard Solar Analysis

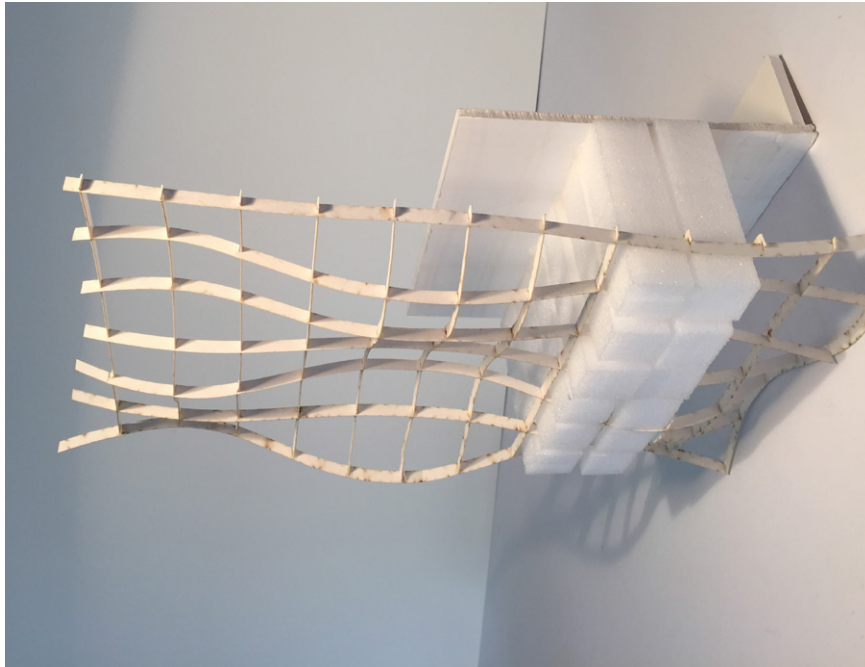


## Appendix D

<b>DESIGN PROJECT 03:</b> <b>Cooke St. Micro-Housing</b>	<b>Description:</b> SUN STUDY TO SHOW THAT ADEQUATE SUNLIGHT WILL REACH CENTRAL COURTYARD YET MIDDAY SUN WILL BE BLOCKED.	Design and Drawings by: Mutual Housing Inc. Hawai'i Group 70 International Inc.
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## Appendix D



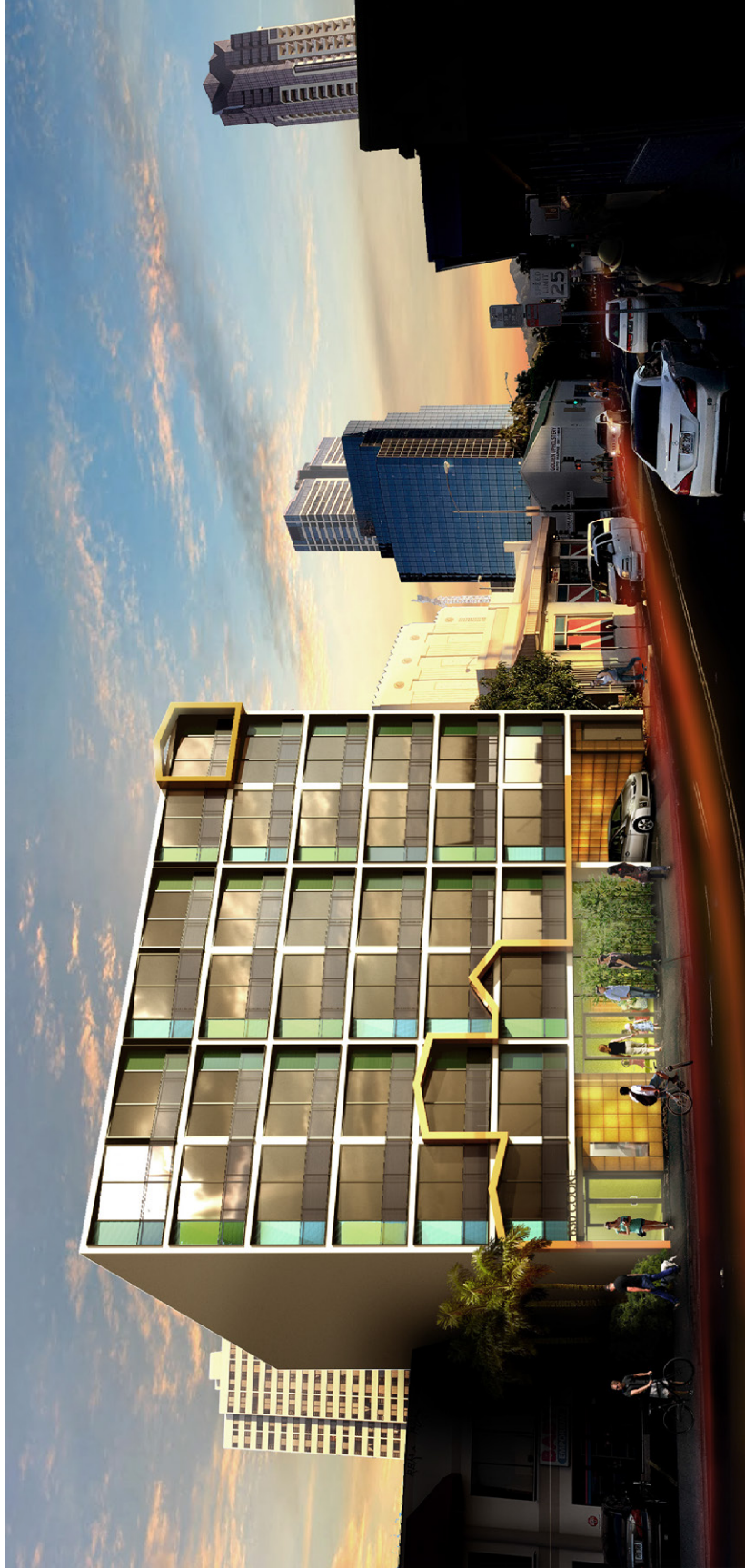
### DESIGN PROJECT 03:

**Cooke St. Micro-Housing**

**Appendix D**

Description: STUDY MODELS WORKING TOWARD A SCHEME THAT RESONATES WITH THE NEIGHBORHOOD.

Design and Drawings by:  
Mutual Housing Inc. Hawai'i  
Group 70 International Inc.



## Appendix D

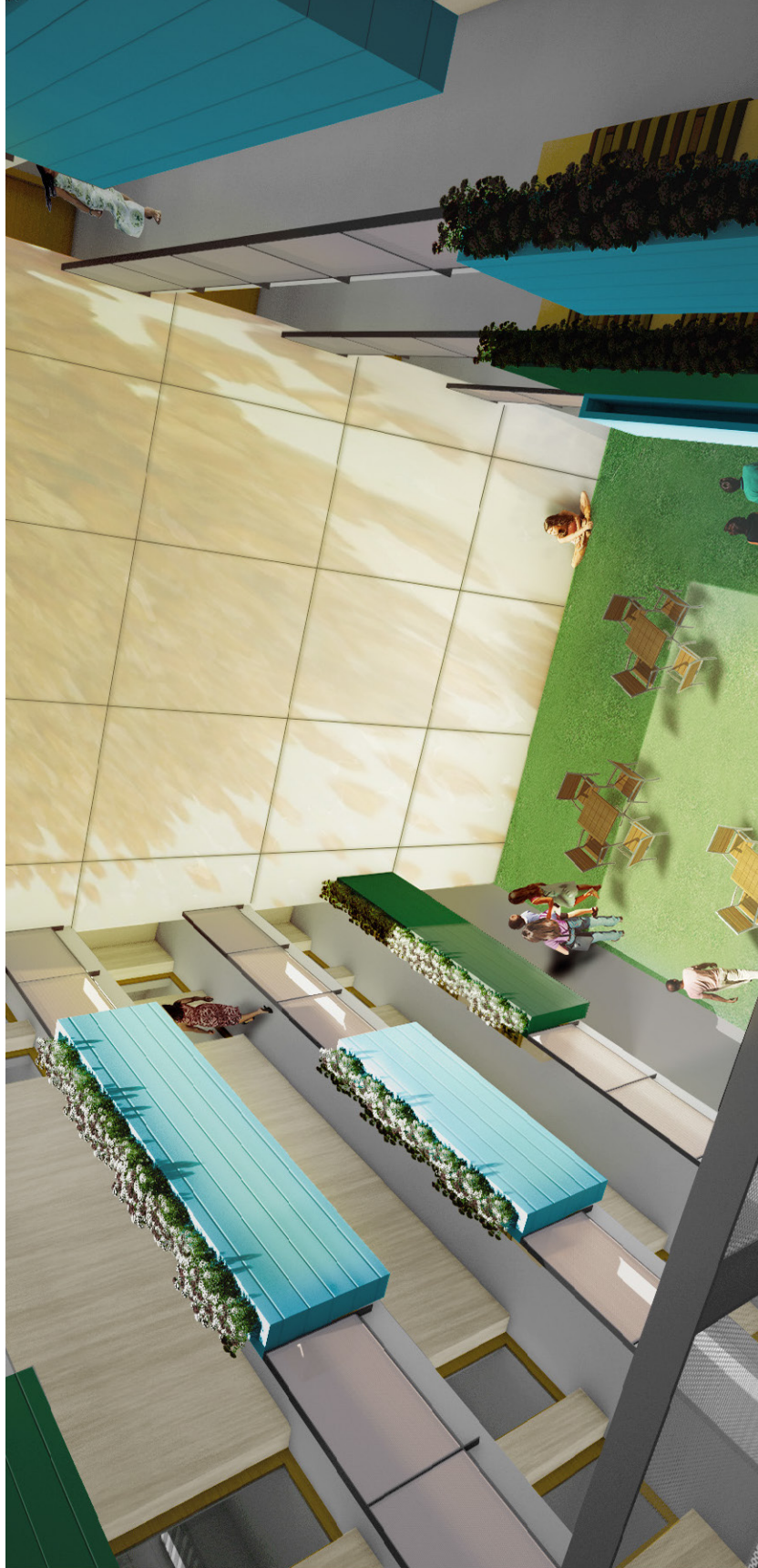
**DESIGN PROJECT 03:**  
**Cooke St. Micro-Housing**  
**Appendix D**

Description: STREET VIEW SHOWING FAÇADE ELEMENTS THAT ARE REMINISCENT OF OLD AND NEW HAWAII DEVELOPMENT NEIGHBORHOOD.

Design and Drawings by:  
Mutual Housing Inc. Hawai'i  
Group 70 International Inc.



## Appendix D



Art piece on wall to be determined

### DESIGN PROJECT 03:

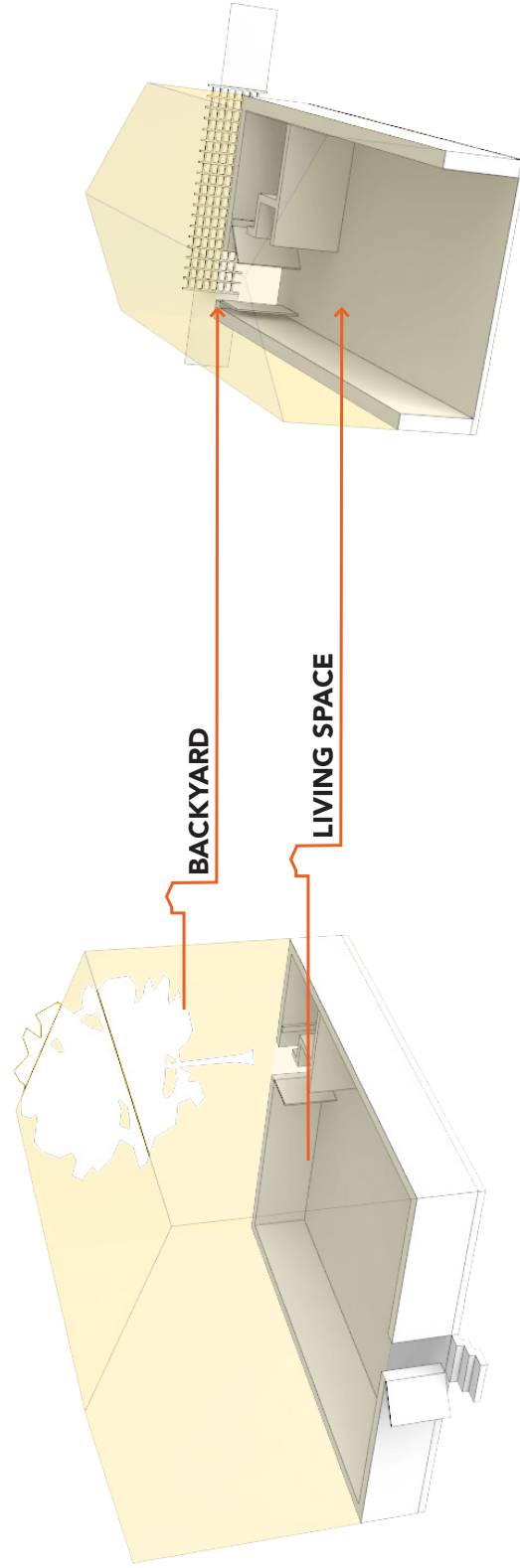
**Cooke St. Micro-Housing**

**Appendix D**

#### Description:

INTERIOR COURTYARD HAS COMMUNAL SEATING AREA, PLANTER BOXES FOR EDIBLES, AND A FIVE STORY BLANK WALL FOR AN ARTIST EXHIBIT.

Design and Drawings by:  
 Mutual Housing Inc. Hawai'i  
 Group 70 International Inc.



## Appendix D

<b>DESIGN PROJECT 03:</b> <b>Cooke St. Micro-Housing</b> <b>Appendix D</b>	Description: CONNECTION BETWEEN LIVING IN A SINGLE UNIT AND A TRADITIONAL HOME BY PROVIDING A BACKYARD COMMUNAL SPACE.	Design and Drawings by: Mutual Housing Inc. Hawai'i Group 70 International Inc.
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Appendix D

A HOME THAT FITS  
Urban Contextual  
Analysis

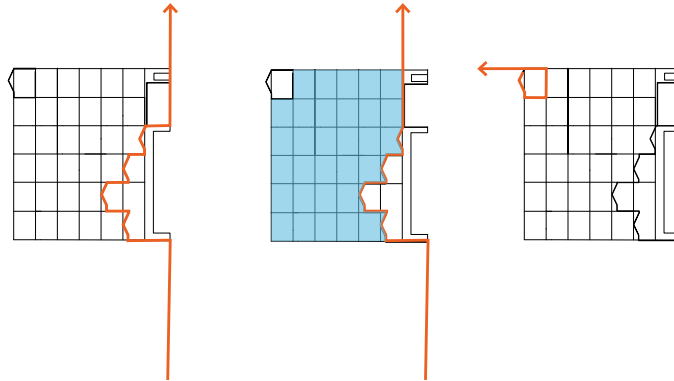


Design and Drawings by:  
Mutual Housing Inc. Hawai'i  
Group 70 International Inc.

Description: URBAN CONTEXT, A WALKABLE NEIGHBORHOOD WITH PARKS  
FOOD SHOPPING AND ENTERTAINMENT NEAR THE FUTURE RAIL  
LINE.

DESIGN PROJECT 03:  
Cooke St. Micro-Housing  
Appendix D

**A HOME THAT FITS**  
Urban Contextual  
Analysis

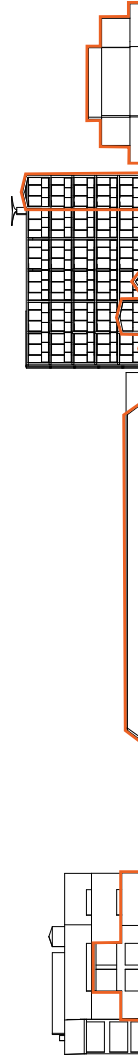
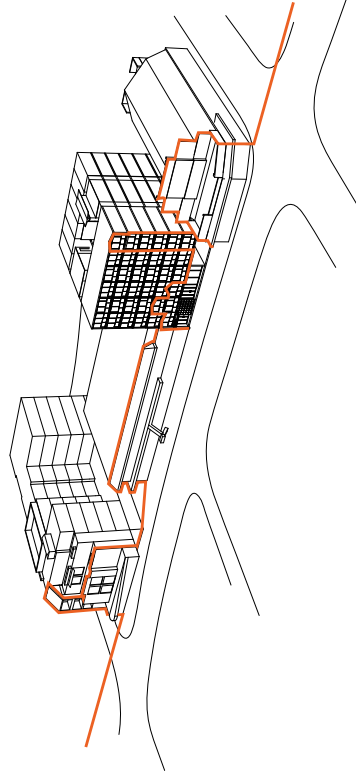


WITH AN  
APPRECIATION FOR  
HUMAN SCALE

WE ADAPT TO THE  
KAKA'AKO VISION OF  
TOMORROW

AND A ROOM TO  
GROW A COMMUNITY!

## Appendix D



Description: ASPECTS OF THE BUILDING SPEAK TO THE OLD KAKA'AKO ROOF-  
LINES AND THE NEW HIGH-RISE ROOFLINES.

Design and Drawings by:  
Mutual Housing Inc. Hawai'i  
Group 70 International Inc.

**DESIGN PROJECT 03:**

**Cooke St. Micro-Housing**

**Appendix D**

## A HOME THAT LIVES

Community Gathering

ARTIST:

Kaili Chun

ART SITE #1:

Car Entry (east passage)

TITLE:

*patience, patient, enduring, long suffering; to tolerate. Lit. great breath.*

MEDIUM:

Translucent concrete, LED's

DIMENSIONS:

10'H x 40'W

DESCRIPTION:

"The inspiration for the potential to include an art/architectural feature within the courtyard is based on Kaka'ako's history of being host to a broad range of human experiences, sometimes hard and difficult, at other times amazing and beautiful. One important aspect that stands out through the historic layers of Kaka'ako, is the resiliency of its people, land and waters. Able to endure hardship and adversity, they worked to treat others with compassion and restore balance in their lives and with the environment.

Prior to its development, Kaka'ako was noted for its salt beds and fishponds. Salt or "pa'akai continues to be an extremely valuable commodity in the Hawaiian culture, serving as a major food preservative and spice, used in Hawaiian healing practices (la'au lapa'au), and functioning as a type of "protection" when used in cleansing and purifying rituals. Pa'akai also reminds us of the proper stewardship of our lands and natural urban resources.

With pa'akai in mind, the artwork could be a contemporary interpretation of the ancient salt beds (loko pa'akai), breathing light into the darkness and illuminating the night in order to create an inviting passage that serves as an automobile entry and extension of usable communal space. The art panels could be inset into the mauka and makai walls of the passage. The illuminated concrete panels will create a welcoming transition space between public and private space, while supplying security lighting that is smart, comforting and well-designed."

ART SITE #2:

Interior Courtyard Wall

TITLE:

*Ho'ōla healing*

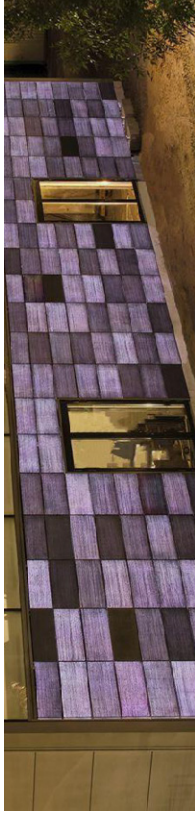
DIMENSIONS:

49'H x 26'W

DESCRIPTION:

"The interior courtyard could feature a monumental art wall. This "canvas" could be used for the private use of the inhabitants. The idea is to have "the wall" act as a vehicle for communication, dialogue and discourse. If there is interest and commitment from the community, program rules for their engagement of the wall would be developed by management in collaboration with residents. Projects can be created by individuals or together with others. This could be a dynamic, changing canvas where projections, installations, and all modes of social art could be incorporated.

"Hopefully, the use of social art will support the creation of a vibrant, energetic and active community."



### DESIGN PROJECT 03:

#### Cooke St. Micro-Housing

#### Appendix D

Description: INVOLVING MEMBERS OF THE COMMUNITY. ARTIST INVOLVEMENT ON TWO AREAS ON THE BUILDING. THIS CREATES A STRONGER CONNECTION WITH THE COMMUNITY, KNOWN FOR ITS ARTISTS

Design and Drawings by:  
Mutual Housing Inc. Hawai'i  
Group 70 International Inc.

## Appendix D

**YOUR COMMUNITY**  
Site Plan

GROUND FLOOR INTERIOR AREAS	
ENTRY/LOBBY	861 SF
COMMUNITY SPACE	508 SF
MANAGER'S OFFICE	195 SF
OFFICE	115 SF
RESTROOM	62 SF
LAUNDRY / RESIDENT LOUNGE	402 SF
STORAGE	374 SF
UTILITY	225 SF
CIRCULATION / TRASH	624 SF
<b>TOTAL NET SF</b>	<b>3,366 SF</b>



SECURE BIKE STORAGE



FEWER PARKING STALLS WITH CAR SHARE

9 Stalls  
2 for car share  
1 for Loading

**OVERALL PROJECT NUMBERS**

GROUND FLOOR GSF	3,805 SF
SECOND FLOOR GSF	6,128 SF
THIRD FLOOR GSF	6,128 SF
FOURTH FLOOR GSF	6,128 SF
FIFTH FLOOR GSF	6,128 SF
SIXTH FLOOR GSF	6,128 SF
SEVENTH FLOOR GSF	6,128 SF
<b>TOTAL PROJECT GSF</b>	<b>40,573 SF</b>



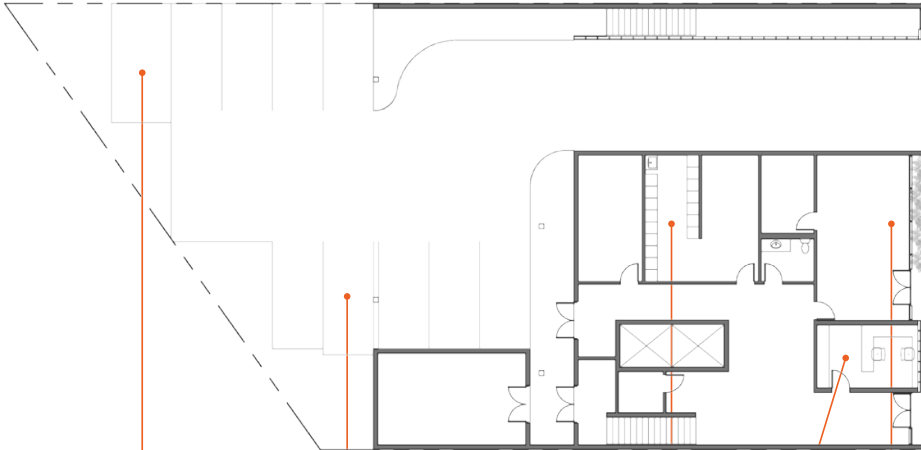
RESIDENT LAUNDRY AND LOUNGE



MANAGER'S OFFICE



COMMUNITY SPACE



**Appendix D**

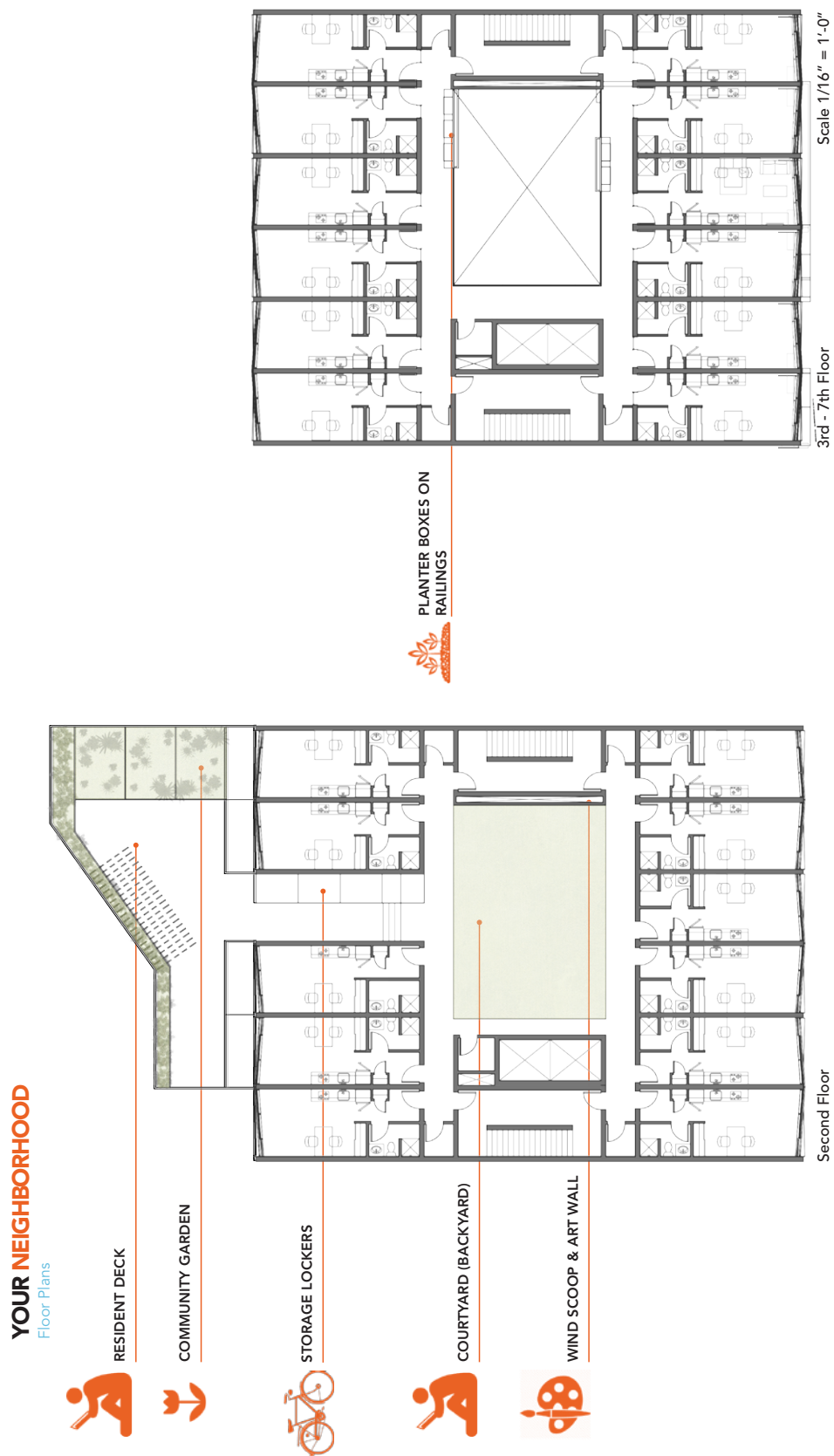
**DESIGN PROJECT 03:**  
**Cooke St. Micro-Housing**  
**Appendix D**

Description: BUILDING LAYOUT PROVIDING COMMUNITY SPACE, COMMUNAL LAUNDRY SPACE, CAR SHARE, AND SECURED BIKE STORAGE.

Design and Drawings by:  
Mutual Housing Inc. Hawai'i  
Group 70 International Inc.



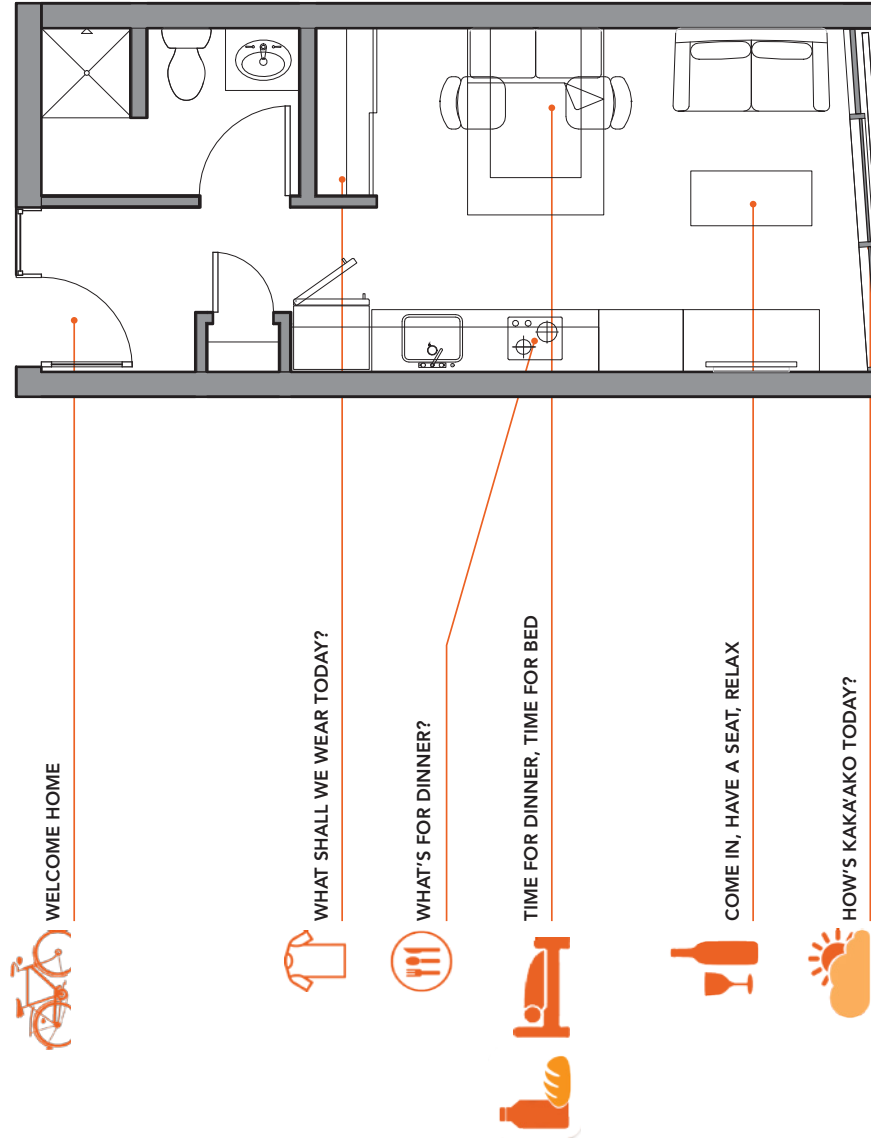
Appendix D



Description:		Design and Drawings by: Mutual Housing Inc. Hawai'i Group 70 International Inc.
DESIGN PROJECT 03: Cooke St. Micro-Housing Appendix D		

**TOTAL UNIT INTERIOR SQUARE  
FOOTAGE: 310 SF**

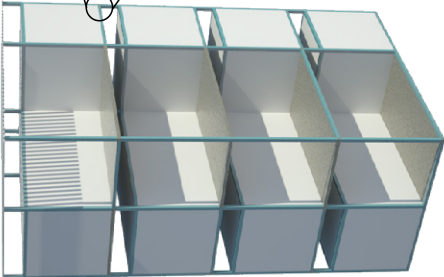
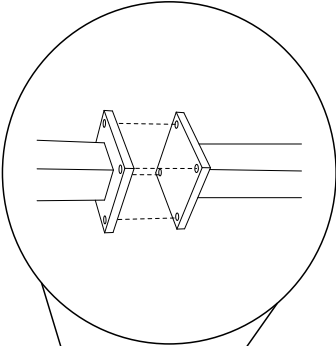
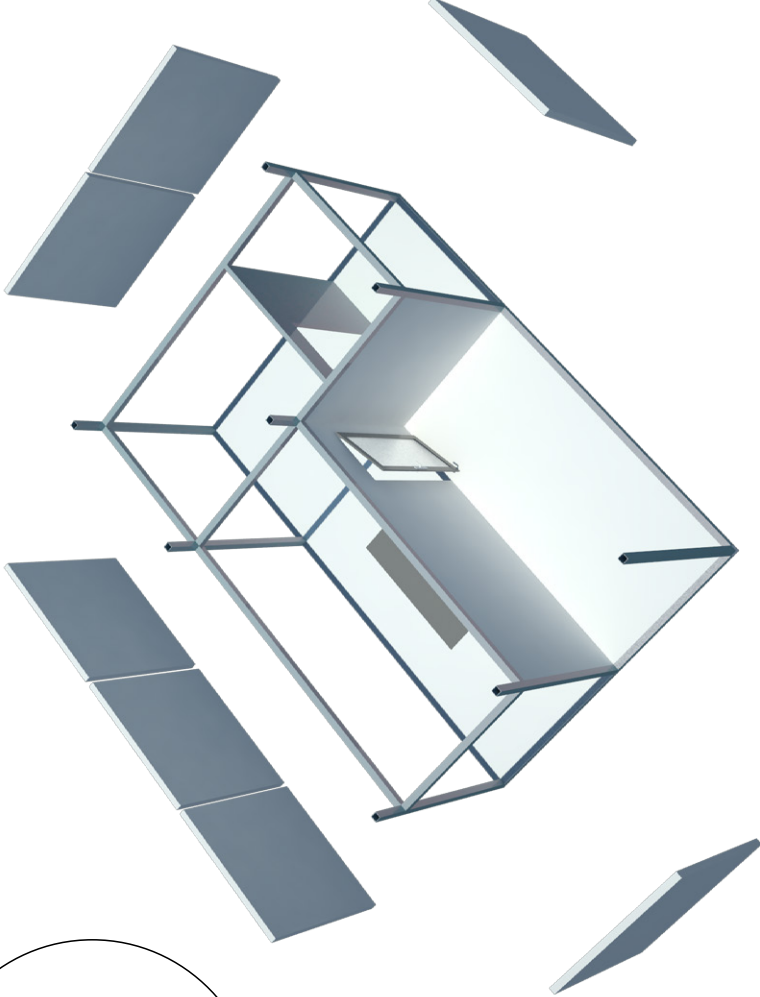
- FEATURES:**
- A FULL FHA COMPLIANT BATHROOM
  - 2-BURNER STOVE TOP
  - ABOVE-RANGE MICROWAVE
  - FULL-HEIGHT REFRIGERATOR
  - MURPHY BED / DINING TABLE COMBO
  - FULL-HEIGHT WINDOWS
  - AMPLE STORAGE SPACE

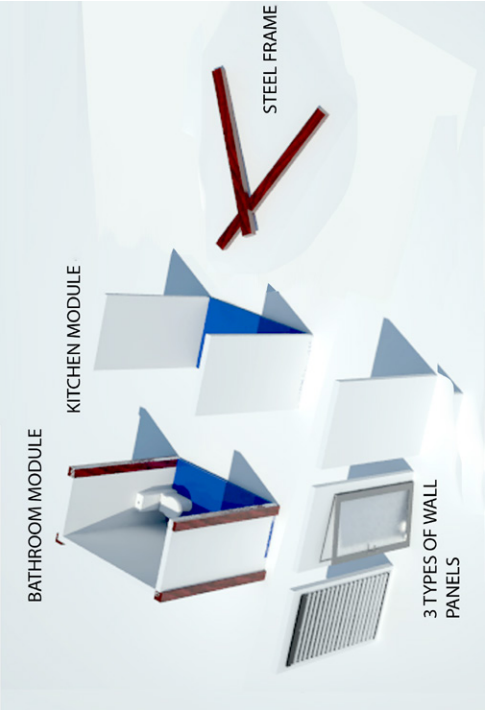


Description: FLOOR PLAN, FULL KITCHEN, FULL BATH AND MULTI USE SPACE  
DINING ROOM DOUBLES AS BEDROOM. FLEXIBILITY OF SPACE  
ALLOWS THE 310 SQUARE-FOOT UNIT TO FUNCTION AS A LARGER

Design and Drawings by:  
Mutual Housing Inc. Hawai'i  
Group 70 International Inc.

Appendix E





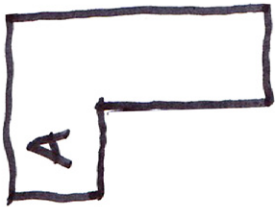
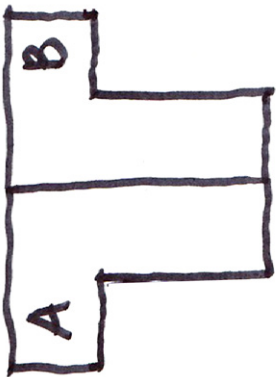
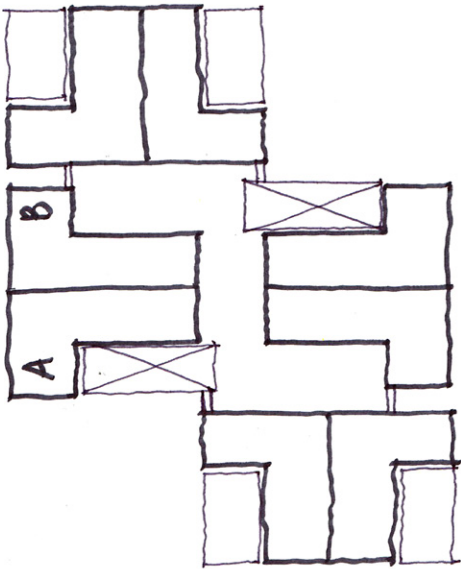
Project: **DESIGN**

**Appendix E**

Description: THE MODULAR UNIT CONSISTS OF A STEEL FRAME AND A SERIES OF PANELS. THREE TYPES OF WALL PANELS ARE USED TO MAKE A NUMBER OF DIFFERENT CONFIGURATIONS. THE OPTION TO CLUSTER HORIZONTALLY AND VERTICALLY IS ACHIEVED THROUGH FLANGE ATTACHMENTS.

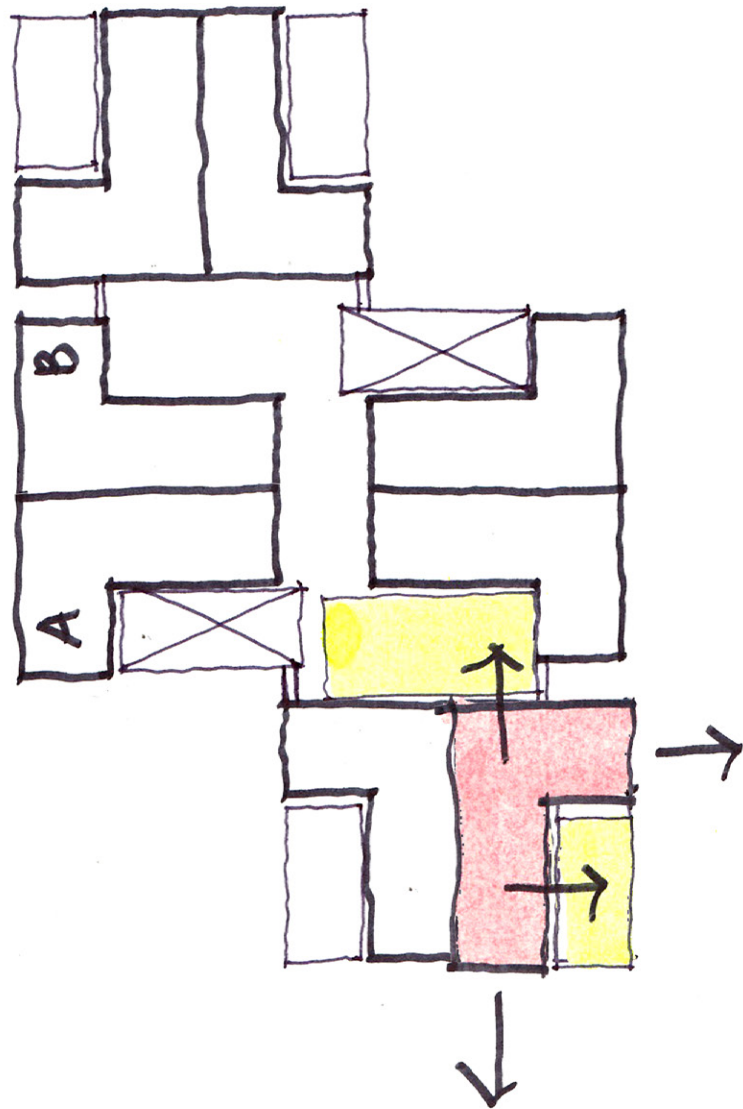
Design and Drawings by:  
Russell Wozniak

Appendix E



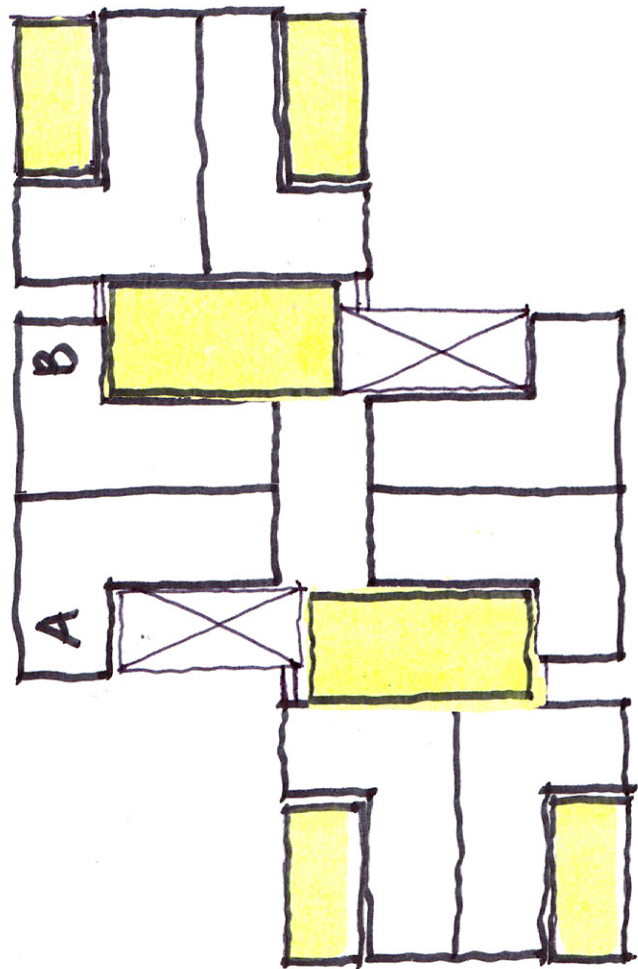
Project: <b>DESIGN</b>		Description: A STANDALONE UNIT CAN FUNCTION BY ITSELF, PAIRED OR CLUSTERED.	Design and Drawings by: Russell Wozniak
<b>Appendix E</b>			

Appendix E



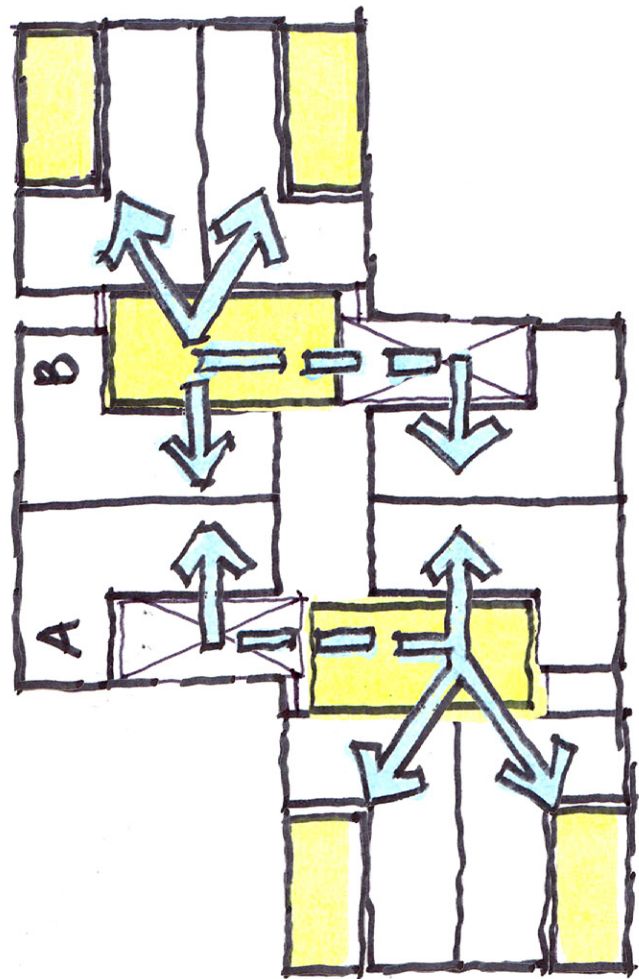
Project: <b>DESIGN</b>		Description: SITUATING THE UNITS CAN BE DONE TO ALLOW THE VOID SPACES TO BECOME COMMUNAL OR PRIVATE.	Design and Drawings by: Russell Wozniak
<b>Appendix E</b>			

Appendix E



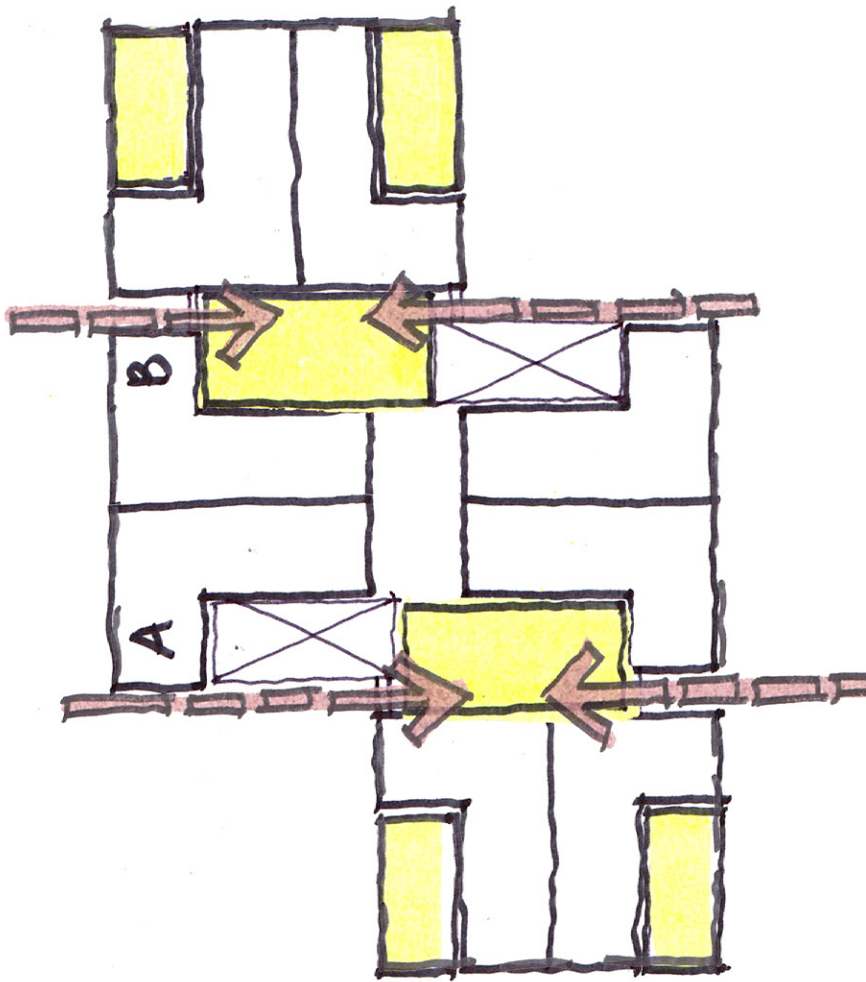
Project: <b>DESIGN</b> <b>Appendix E</b>	Description: A COMBINATION OF PUBLIC COMMUNAL AND PRIVATE SPACES.		Design and Drawings by:  Russell Wozniak

Appendix E



Project: <b>DESIGN</b> <b>Appendix E</b>	Description: CIRCULATION THROUGH THE FLOOR PLAN RESULTS IN CROSSING OVER COMMUNAL SPACE IN ORDER TO ENCOURAGE USE OF THE SPACE AND CONNECTION WITHIN THE COMMUNITY.	
	Design and Drawings by: Russell Wozniak	

Appendix E



Project: <b>DESIGN</b>		Description: CRITICAL TO THE INTERIOR COMMUNAL SPACES IS THAT THERE IS VISUAL CONNECTION TO THE STREET, THIS IS CONNECTED TO INDIVIDUALS CONNECTION TO THE OUTSIDE COMMUNITY, IMPROVED SAFETY, LIGHT AND VENTILATION.	Design and Drawings by:  Russell Wozniak
<b>Appendix E</b>			



## Appendix E

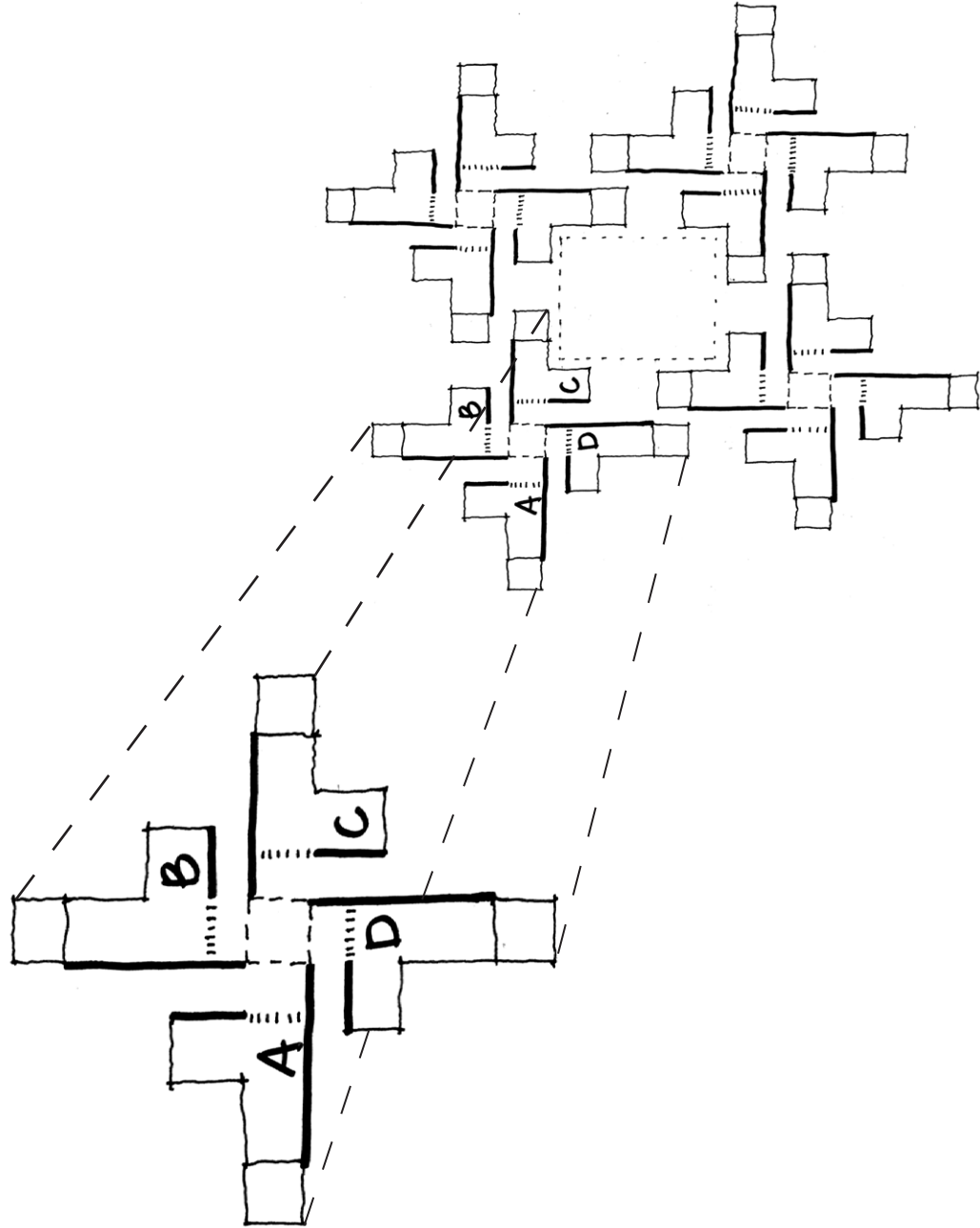
### DESIGN

Description:

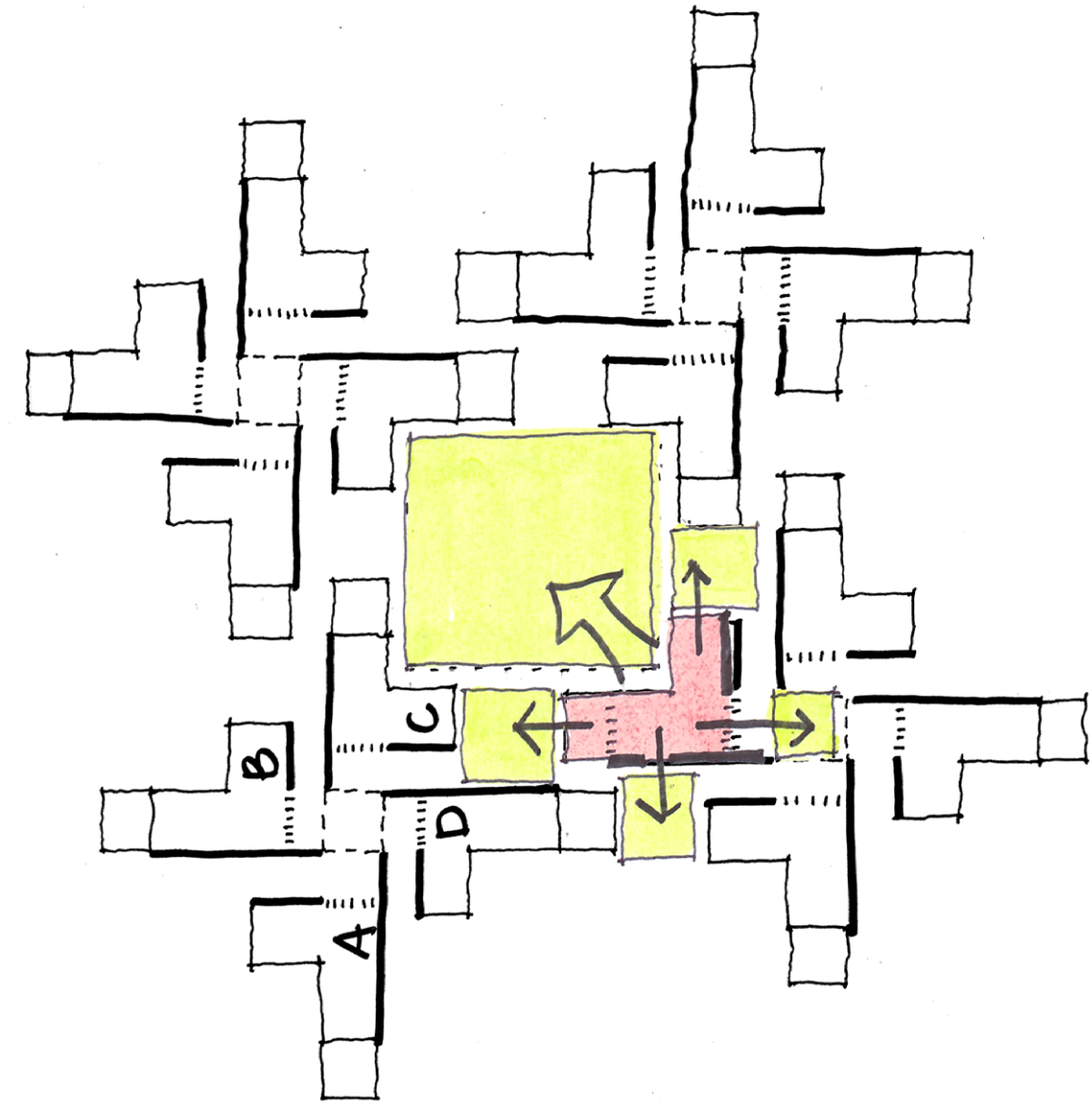
A VILLAGE LIKE HORIZONTAL CLUSTERING CAN BE DONE ON A SMALL OR LARGE SCALE. THE INTERIOR VOID SPACES AND CONNECTION TO THE EXTERIOR CAN BE SCALED UP OR DOWN.

Design and Drawings by:  
Russell Wozniak

### Appendix E



## Appendix E



### DESIGN

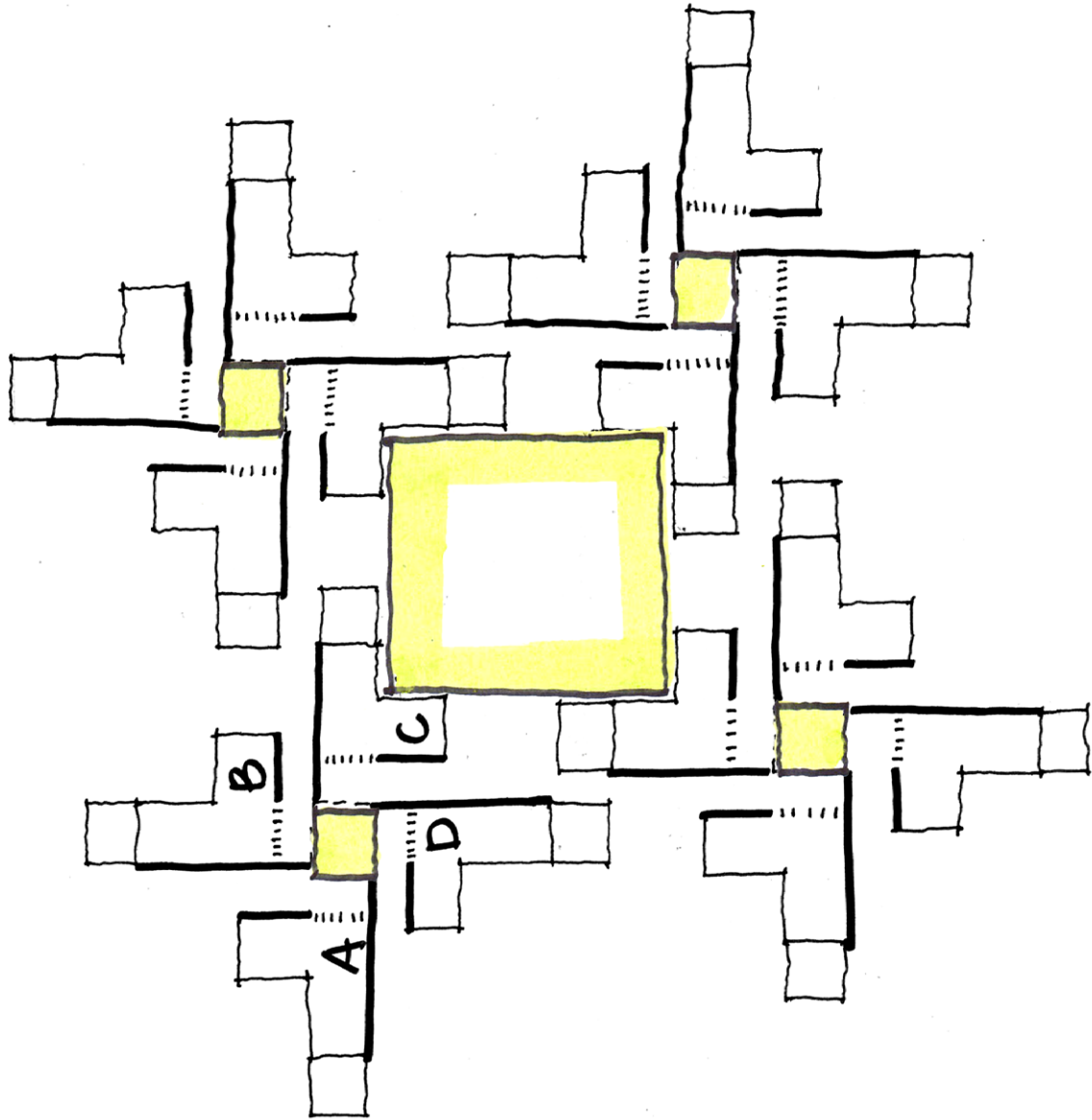
Description:

SCALING UP COMMUNITY CENTRAL SPACES.

Design and Drawings by:  
Russell Wozniak

Appendix E

## Appendix E



### DESIGN

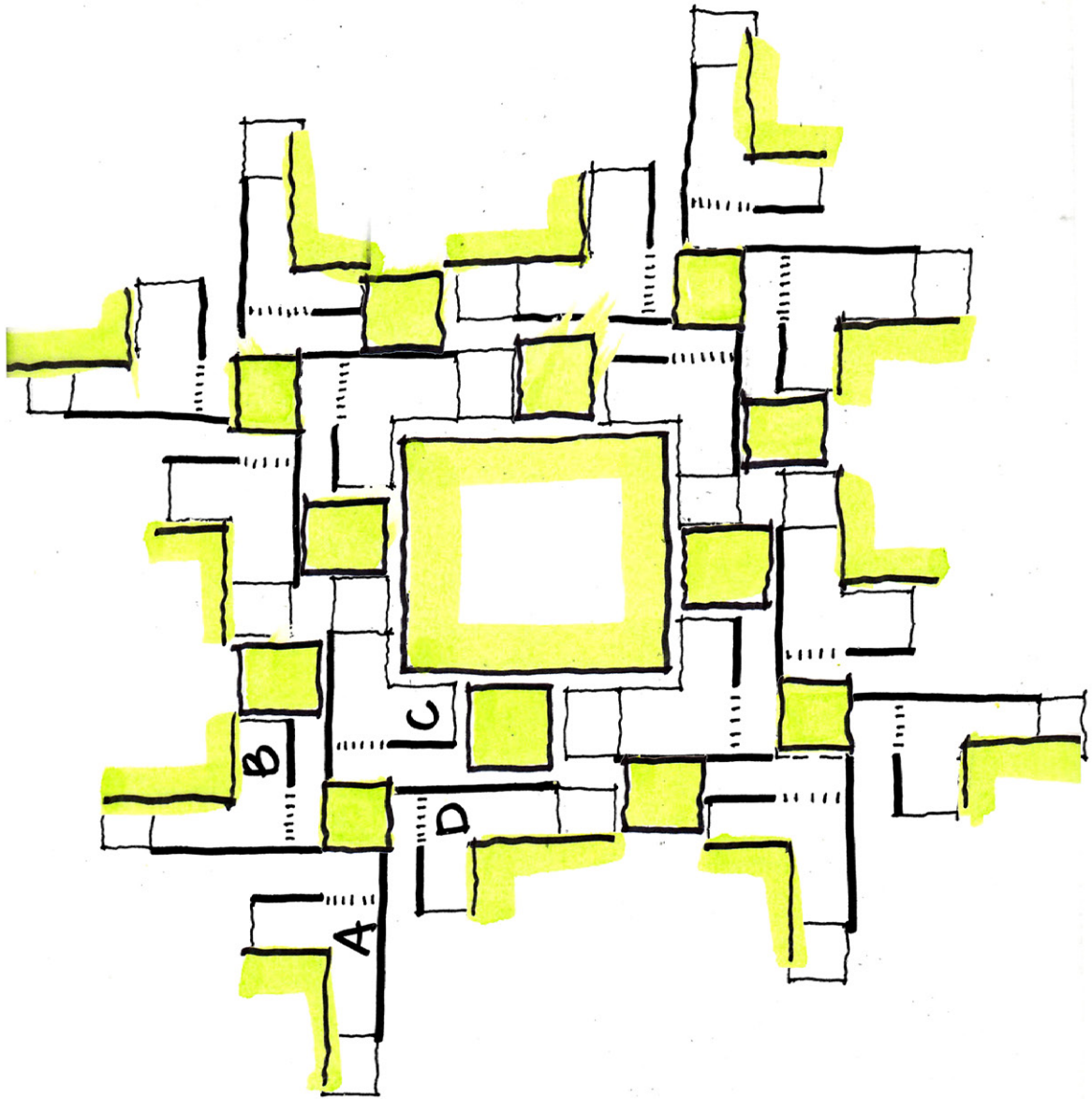
Description:

SMALLER COMMUNAL  
SPACES CAN EXIST  
WITH THE LARGER  
SPACES PROMOTING  
INTERACTIONS ON  
DIFFERENT LEVELS.

Design and Drawings by:  
Russell Wozniak

Appendix E

## Appendix E



### DESIGN

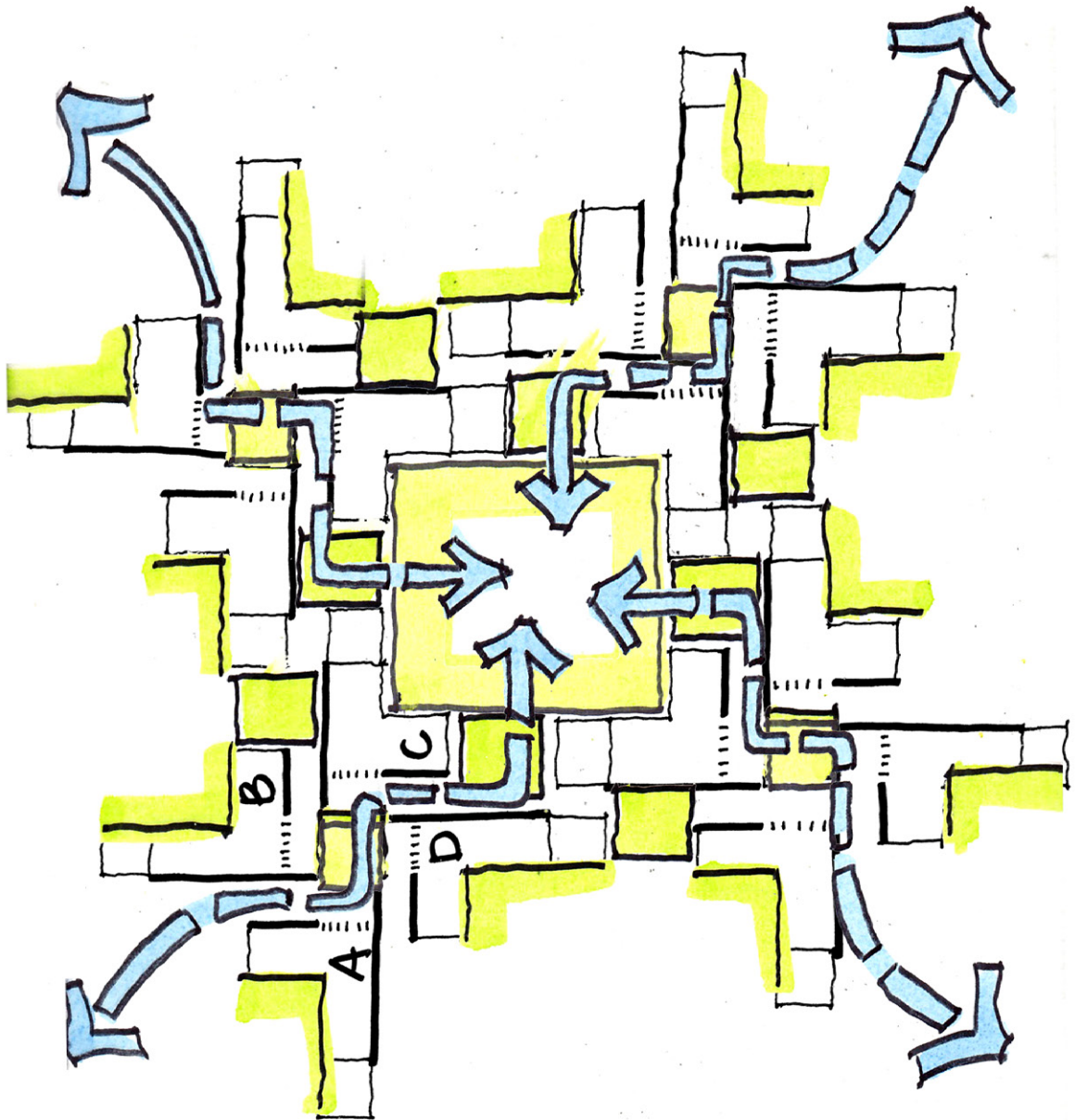
Description:

COMPARED TO TRADITIONAL VILLAGE LAYOUTS THE RATIO OF HERMETICALLY CLOSED PRIVATE SPACE VERSUS COMMUNAL SPACE IS RELATIVELY LOW.

Design and Drawings by:  
Russell Wozniak

Appendix E

## Appendix E



### DESIGN

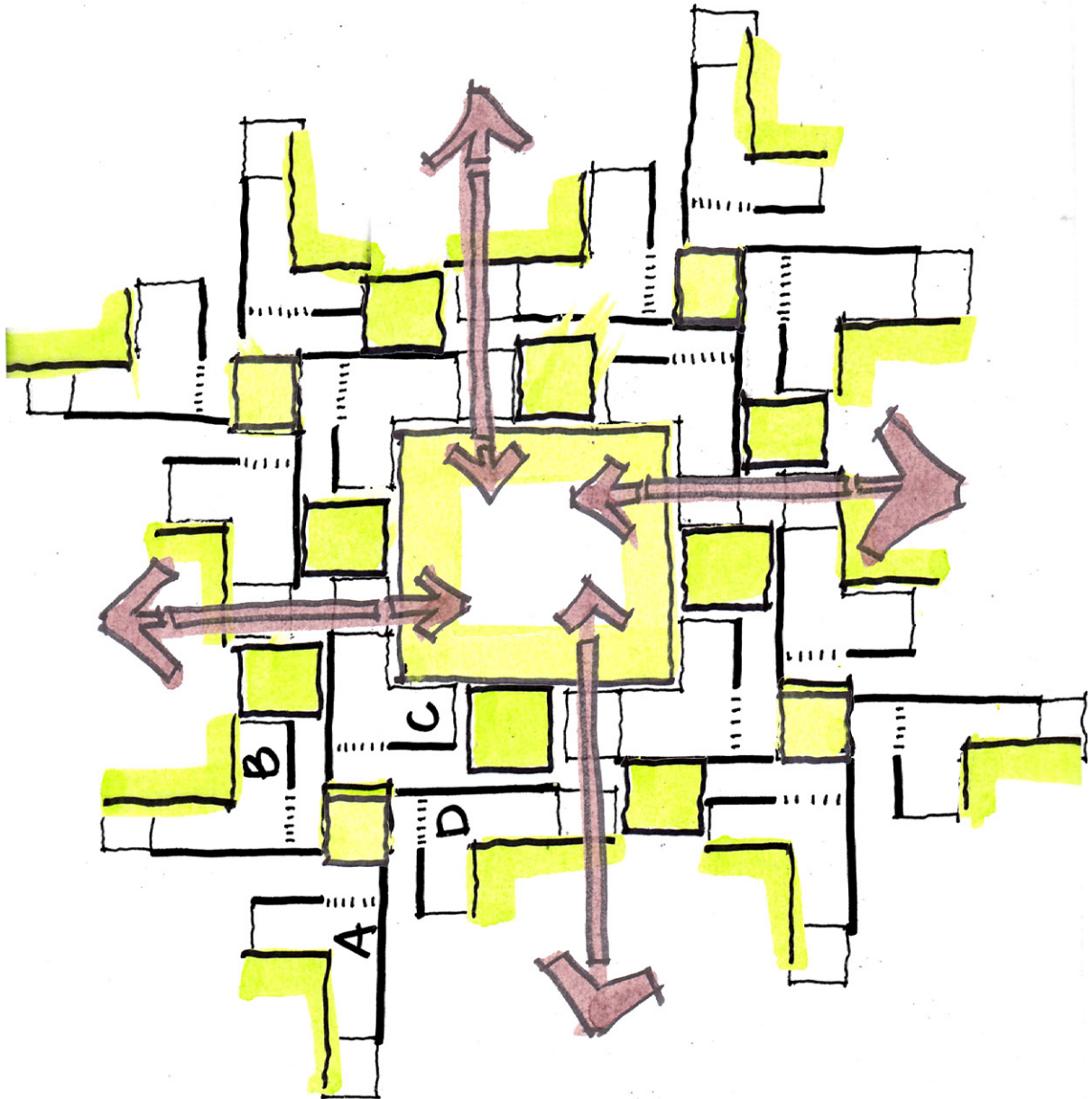
Description:

COMMUNAL SPACES  
DOUBLE AS CIRCULA-  
TION CORE DOORS.

Design and Drawings by:  
Russell Wozniak

Appendix E

## Appendix E



### DESIGN

Description:

VISUAL CONNECTION  
IS MAINTAINED FROM  
THE CENTRAL CORE TO  
THE OUTSIDE.

Design and Drawings by:  
Russell Wozniak

### Appendix E



## DESIGN

Description:

FLOORPLAN OPTION.  
THE USE OF ADAPTABLE FURNITURE SUCH AS A MURPHY BED AND FOLD DOWN TABLES CAN OFFER A WIDE VARIETY OF MULTIPURPOSE SPACES. THE LANAI SPACE CAN BE UTILIZED AS EXTERIOR OR "MID-TERIOR" SPACE BASED ON USER NEEDS.

Design and Drawings by:  
Russell Wozniak

## Appendix E



## Appendix E



### DESIGN

Description:

A SINGLE STANDALONE  
UNIT FUNCTIONS AS  
AN ACCESSORY DWELL-  
ING UNIT.

Design and Drawings by:  
Russell Wozniak

### Appendix E



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