The Catholic University of America

A Community Built By Generations

A THESIS

Submitted to the Faculty of the
Department of Architecture
School of Architecture and Planning
Of The Catholic University of America
In Partial Fulfillment of the Requirements
For the Degrees
Master of Architecture and Masters of Science in Net-Zero Design

By

Evan Michael Dziedzic
Washington, D.C.

Fall 2021 - Spring 2022

A Community Built By Generations

Evan Dziedzic, Master of Architecture and Master of Science in Net-Zero Design

Director: Patricia Andrasik

This thesis book is the culmination of my two semesters worth of work exploring the positive connections and unique correlations between elderly persons and younger generations. The first half of this book focuses on the research and demographics of younger generations and seniors. There are diagrams, graphs, tables, charts, and analyses used for the research to learn about each age group and their interactions with one another. The second half of this Thesis was to design a multigenerational home located on a college campus that could form bonds between the students already on campus and the seniors that were to be moving there. It is important to integrate seniors into everyday life because loneliness is one of the major causes that makes their quality of life decline. I not only focused on the architecture, but the energy efficiency of the building and its comfort for the seniors. Each dwelling had three apartments for seniors and two apartment for family/students on floors above. This was done so different ages could live in proximity without spending too much time with each other. After I thought I had a good grasp of their housing I thought it would be best to design the site and include way-finding points around the site that could be used to form friendships and bonds. These spaces were decided and designed to help improve mental and physical health as well as foster friendship. These spaces included putt-putt, a games plaza, a community garden, and a bunch of other important activities that people of all ages could come and do together.

This thesis by Evan Dziedzic fulfills the thesis requirements for the master's degree in Architecture and master's degree of Science in Net-Zero Design approved by Patricia Andrasik as Director and as Reader.

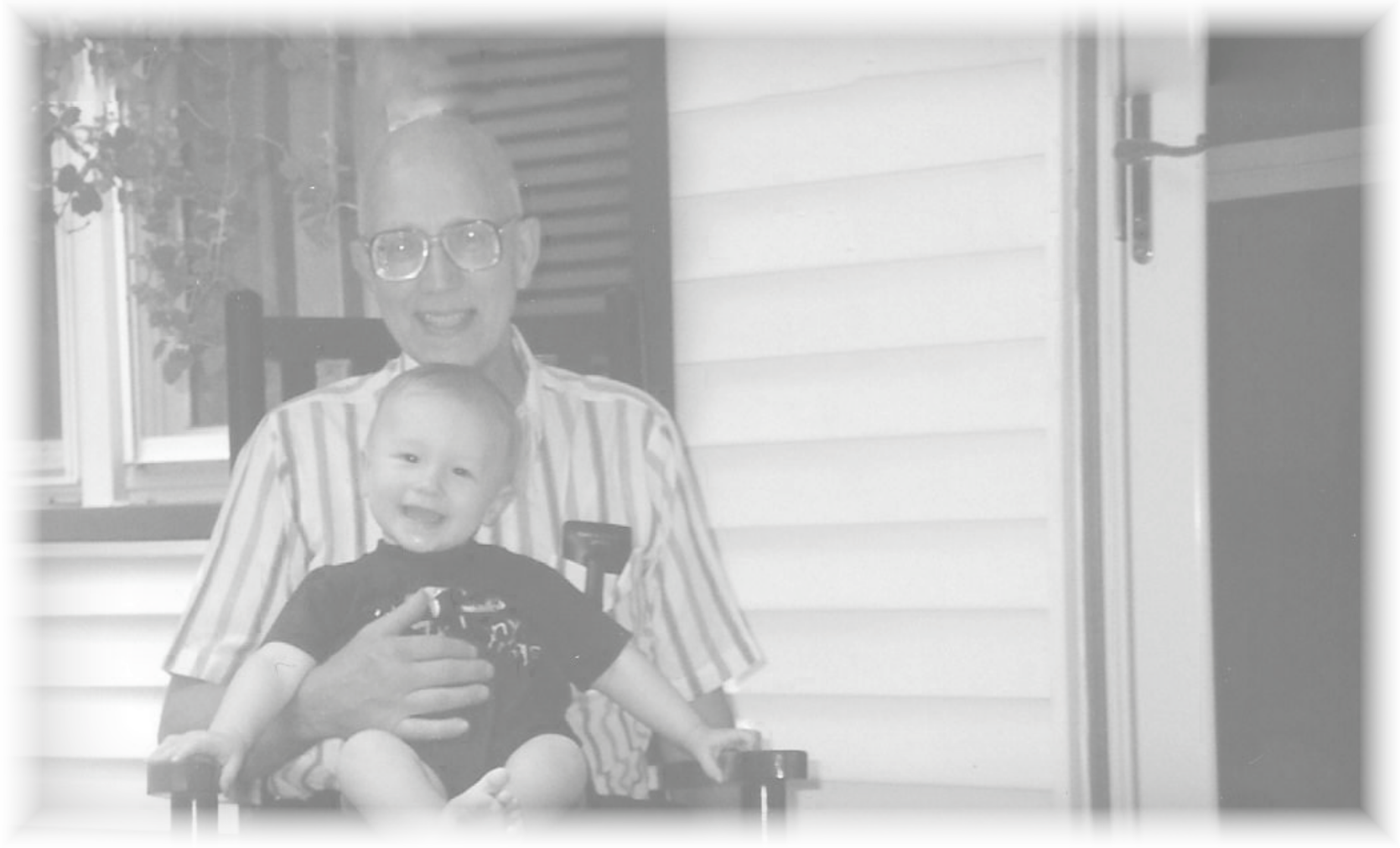
Patricia Andrasik, Director

Table of Contents

Part I - Thesis-I

Part II - Thesis-II

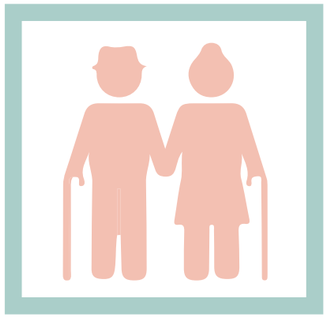
A Community Built By Generations



Part I

Thesis-I

I



Introduction

Thesis Statement

The number of elderly people is projected to double to 1.5 billion in 2050 but this statistic leads to some serious concerns.[1] In today's society of throw away culture, we throw away our goods when we are done with them, and sadly, we are doing the same to the elderly.[2] We throw them away to a facility, where they become isolated, lonely and forgotten.

Elderly people are not the only ones who feel isolated and lonely. In 2017, out of 48,000 college students, 64% felt lonely in the last year.[3] Former U.S. Surgeon General, Dr. Vivek H. Murthy referred to, " loneliness as an epidemic," and it does not discriminate against any age, gender or race. Loneliness causes declines in mental and physical health, but how is it treated, and most importantly, prevented?

In search of solutions for loneliness I discovered the work of American cultural anthropologist, Margaret Mead. She said "Connections between generations are essential for the mental health and stability of a nation," and research from the last 20 years support this claim. Studies have found specifically, the ages 3-5 and 18-25 had the most beneficial impact on elderly.[4] The results showed that each age group benefited physically, mentally, socially and cognitively from intergenerational interactions. A Community Built by Generations will show how multigenerational living can be designed to prevent loneliness, provide accessibility and comfort, and foster friendship through placemaking.

1. Federal Interagency Forum on Aging Related Statistics
2. Laudato Si
3. The Foundation for Art & Healing
4. Schimper Foundation

Inspiration

The inspiration for my Thesis I research came to from the relationship I had with my grandfather. He was and still is my best friend to this day and nothing would change that. We had this friendship that was unbreakable and when we spent time together we always enjoyed each others company and did fun activities. My fondest memories of us being together are when he would pull me around town in this red fisher-price wagon I had. My grandfather would pull me around for miles, hours, in rain and snow and we always had a good time. The time we spent together was enjoyable and beneficial to both of us mentally, physically, and emotionally. Sadly, he passed away in the spring of 2016 and this effected me deeply. I was angry, lonely, and isolated that I lost my best friend and this research is directed to hopefully help those that face isolation and loneliness.

Literature Review

General Elderly Information

- Federal Interagency Forum on Aging Related Statistics
- United Nations: World Population Aging 2020
- United States Census Bureau
- National Center for Biotechnology Information
- Office of the Assistant Secretary for Planning and Evaluation
- United Nations - Department of Economic and Social Affairs
- American Community Survey Reports
- Population Reference Bureau

Wellbeing and Health

- *Mental Health and Illness of the Elderly*
- *Geriatric Residential Care*
- *Mental Health and Illness of the Elderly*
- *Physical Activity and Health in the Elderly*
- *"Promoting and Prescribing Exercise for the Elderly"*
- *BMC Geriatrics*
- *Psychogeriatrics*
- World Health Organization

University Information

- EducationData
- Association of American Colleges and Universities
- The Brookings Institution
- National Center of Education Statistics
- The Urban Institute
- Aging International
- Innovation of Aging
- American Journal of Criminal Justice

Intergenerational

- Educational Gerontology
- Social Science & Medicine
- Housing LIN
- *Intergenerational Program Effects on Social Responses of Elderly Adult Day Care Members*
- Children and Young People Committee
- British Columbia Medical Journal
- Journal of Intergenerational Relationships

Elderly Housing Design

- *Living for the Elderly: A Design Manual*
- International Journal of Strategic Property Management
- *IOP Conference Series. Materials Science and Engineering*
- *Optimizing Housing for the Elderly: Homes Not Houses*
- *Design for Assisted Living: Guidelines for Housing the Physically and Mentally Frail*
- Regional Science and Urban Economics
- Joint Center for Housing Studies of Harvard University

Nursery School Information

- National Center of Education Statistics
- Statitsta
- United States Census Bureau
- Department for Children and Families
- National Foundation for Education Research
- Sage Journals
- Research on Aging
- Kaiser Family Foundation

Environmental Resources

- Koeppen Geiger
- Climate Consultant
- *Spatiotemporal Analysis of Heat and Heat Wave Effects on Elderly Mortality in Texas, 2006–2011*
- Location and Environment of Elderly Population
- The Science of the Total Environment
- IECC
- National Institute of Aging

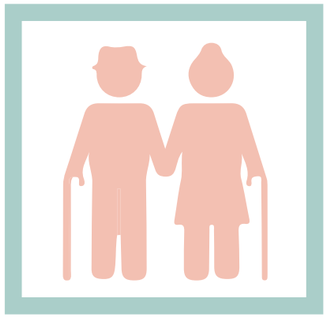
Elderly Housing Types

- *Housing and the Aging Population: Options for the New Century*
- *Housing America's Elderly: Many Possibilities, Few Choices*
- *Housing for the Elderly: Planning and Policy Formulation in Western Europe and North America*
- *Aging at Home: How the Elderly Adjust Their Housing Without Moving*
- Seniorliving.org

Isolation vs Socialization

- Generations United
- Health Resources and Services Administration
- Pew Research Center
- World Health Organization
- US National Library of Medicine National Institutes of Health
- Generations: American Society of Aging
- Pathway Health
- Journal of Neurology, Neurosurgery and Psychiatry

II



Elderly Research

World Elderly Population

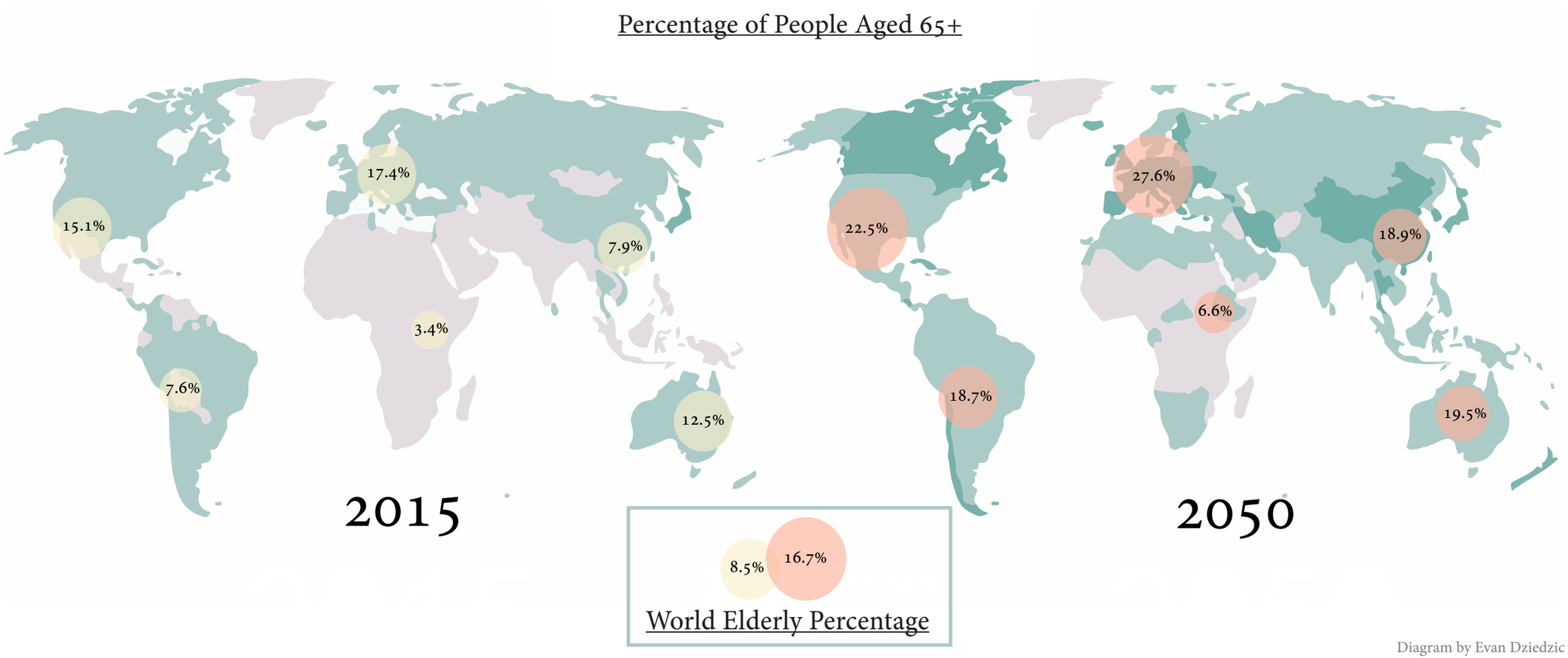


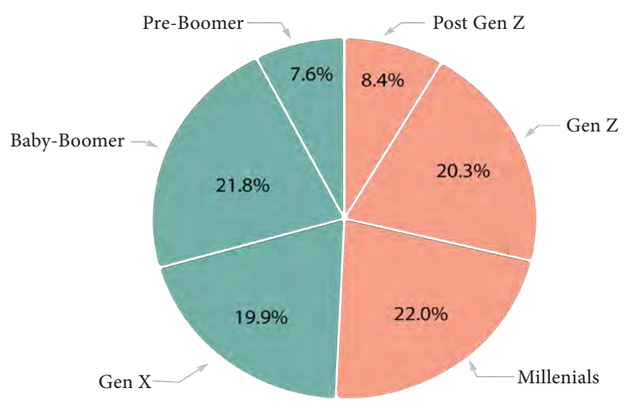
Diagram by Evan Dziedzic

The World Health Organization says that between 2015 and 2050, the population of people over 60 years will nearly double from 12% to 22%. By 2020, people aged 60 years and older will outnumber children younger than 5 years. In 2050, 80% of older people will be living in low- and middle-income countries. The pace of population aging is much faster than in the past. All countries face major challenges to ensure that their health and social systems are ready to make the most of this demographic shift.

In 2015, 8.5% of the worlds population was over the age of 65. When it is 2050, the elderly percentage is expected to be 16.7%. It is predicted that in 2050, the continents with highest percentage of elderly people will be Europe with 27.6%, North America with 22.5%, and Oceania with 19.5%. Countries in each of these continents treat their elderly different. In most European and Asian countries the elderly are remembered and taken care of. However, in the United States, we remove our elderly from the population and isolate them in their own rooms until their final days. They are left lonely and lost.

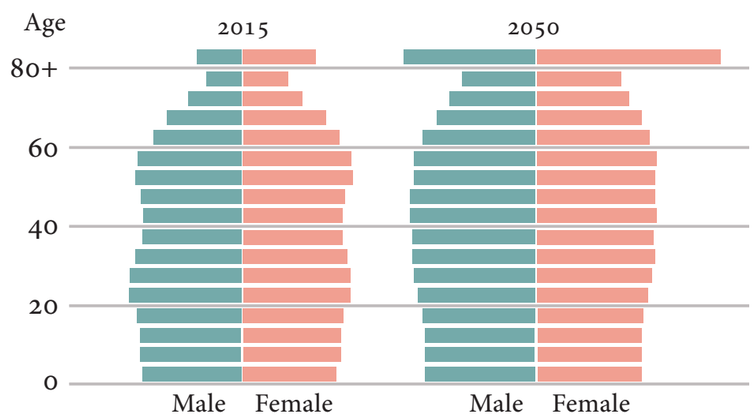
Americas Generations

Generation Percentages (2019)



The Brookings Institute

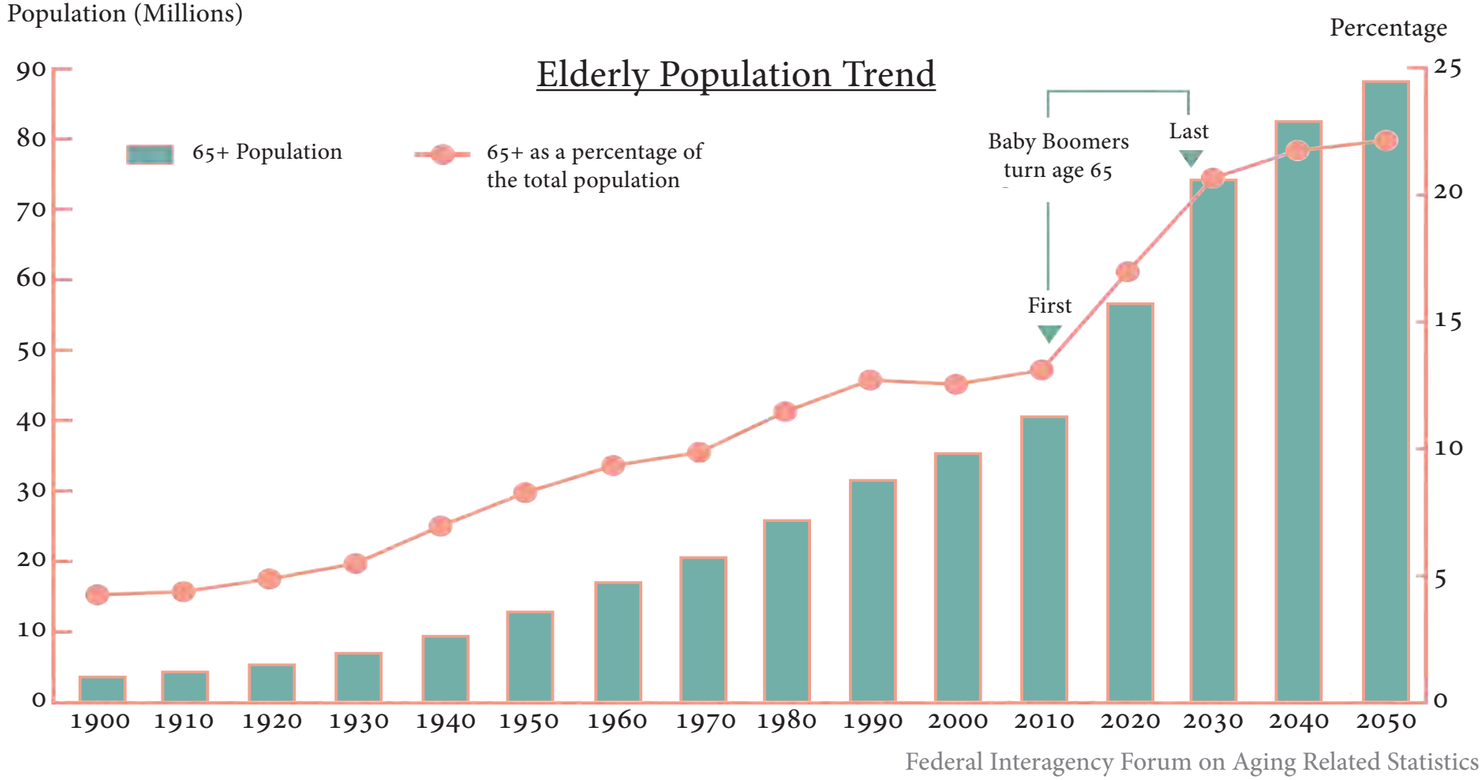
Age Distribution Predictions



Federal Interagency Forum on Aging Related Statistics

Baby Boomers have the second highest percentage of the population before Millennial's and they are the next generation to be entering 65+ age category. In the United State Age Distribution chart you can see the age ranges beginning to square out, when in past generations it used to be skinny at the top and wider at the bottom. From 1900 to 2010 the elderly population has been steadily rising. From 2010 to 2030 the 65+ generation is expected to jump exponentially. The reason for this is because in 2010 the Baby Boomers Generation started to reach 65 and in 2030 the last few will be turning 65+.

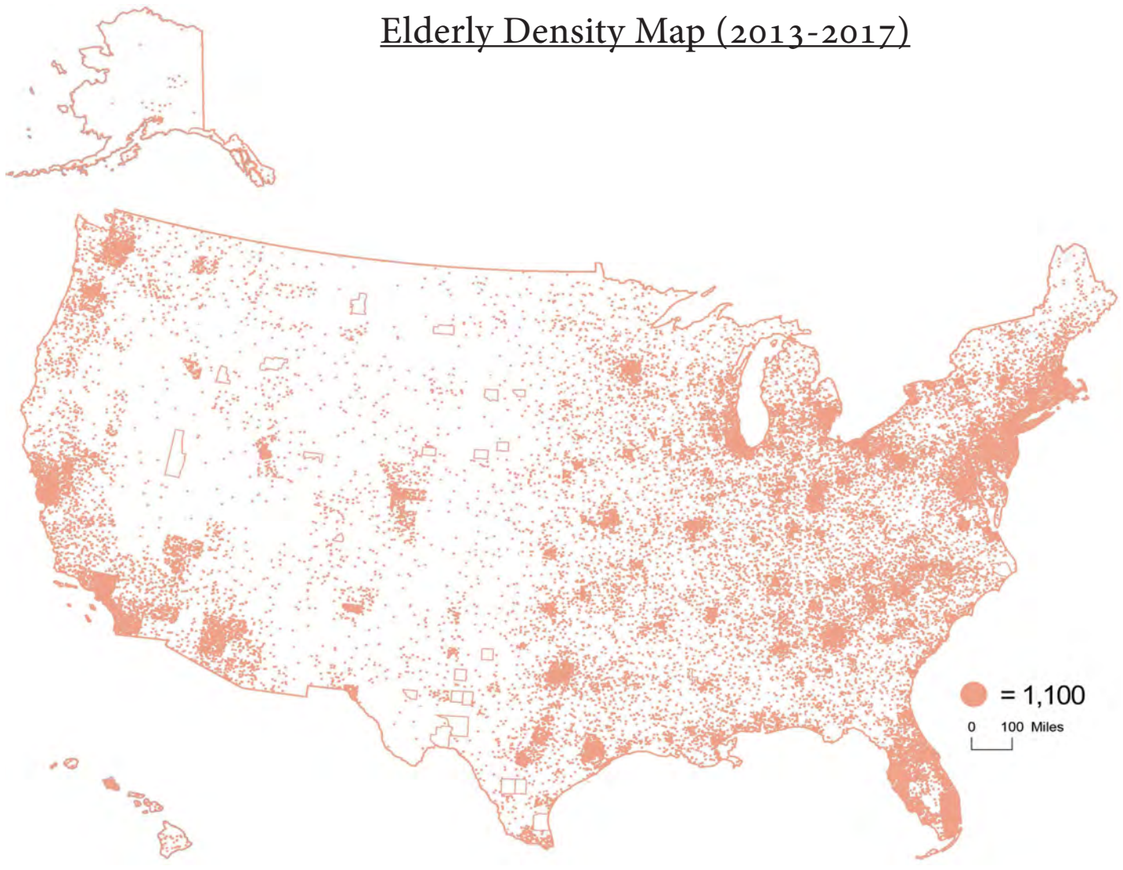
Elderly Population Trend



Federal Interagency Forum on Aging Related Statistics

Americas Elderly Population

Elderly Density Map (2013-2017)



United States Census Bureau

Top 10 States with the Most Elderly (2019)

#	State	Population (Million)
1	California	5,500,000
2	Florida	4,200,000
3	Texs	3,500,000
4	New York	3,200,000
5	Pennsylvania	2,300,000
6	Illinois	2,000,000
7	Ohio	2,000,000
8	Michigan	1,700,000
9	North Carolina	1,700,000
10	New Jersey	1,500,000

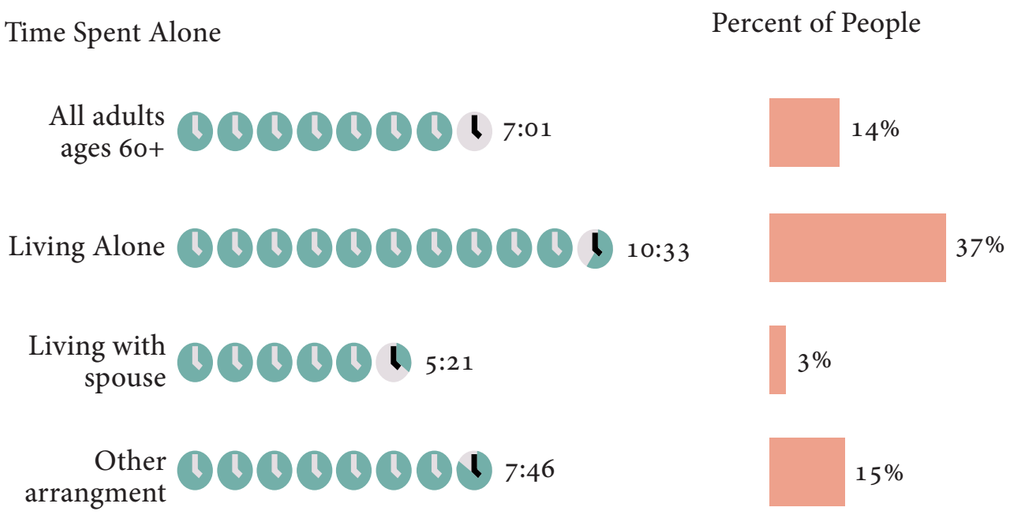
Evan Dziedzic

On this map it shows the density of elderly people in the United States. This map paints a different picture then the one above because each dot represents 1,100 people over the age of 65. It shows there are more elderly people in California, Texas, Florida, New York, Pennsylvania, and New Jersey. While places like Vermont, Arizona, and Idaho have significantly less density, but higher age difference percentage.

When looking at the population of the elderly it is important to know the difference between the percentage of a state and population of a state. States like Vermont, Arizona, and Idaho have a high percentage of elderly because there is not a large number of people there to begin with. So the elderly percentage of Vermont may be 19.4% while the population is 626,000. While in Pennsylvania the percentage is 18.2% and the population is actually 2,300,000.

Elderly Loneliness and Isolation

Elderly Time Spent Alone (2014-2017)

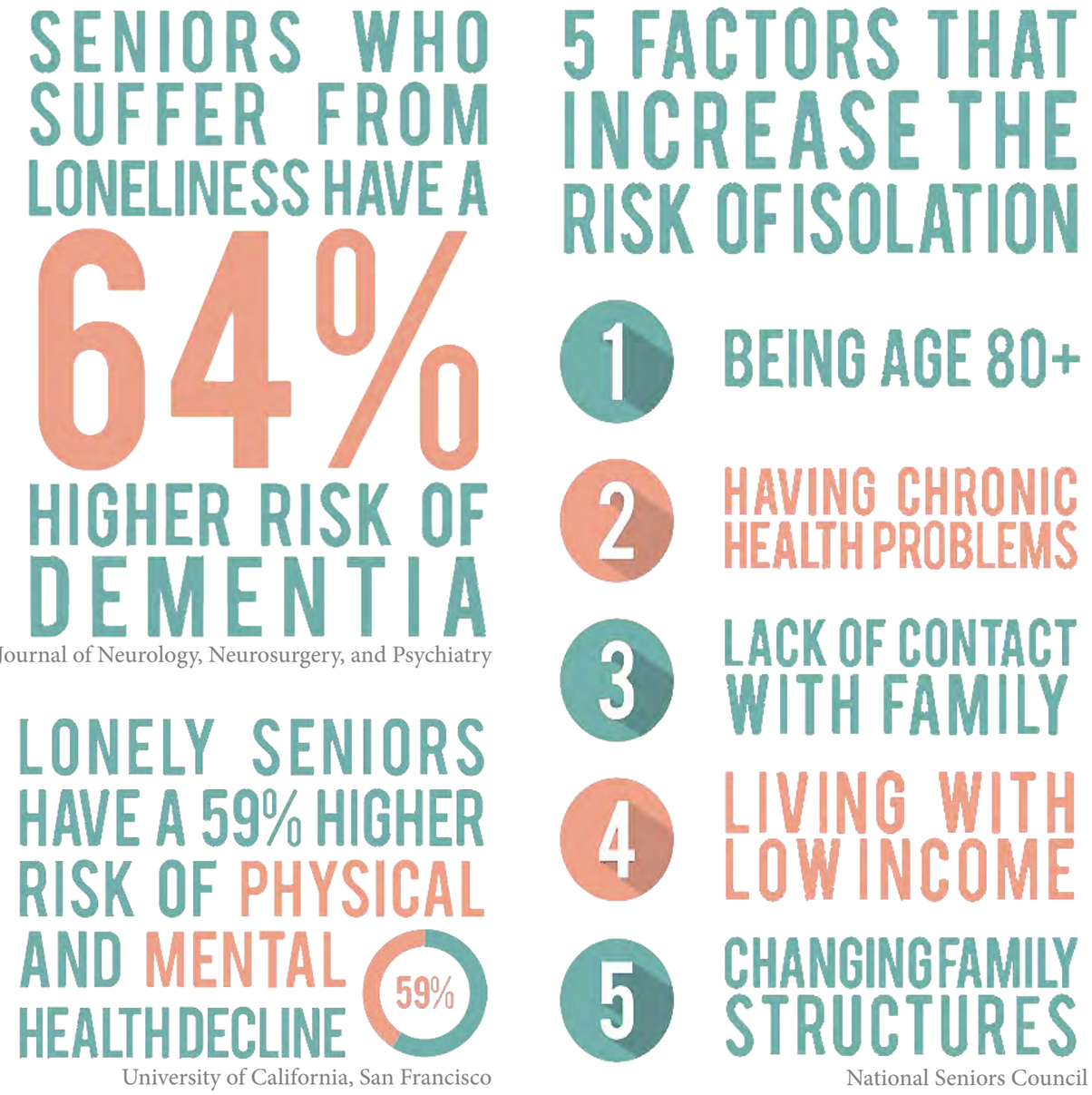


Pew Research Institute

Being alone and feeling lonely are two distinct areas of elderly living that cannot be confused. When an elderly person is alone they are by themselves and are not suffering in anyway. But loneliness is the feeling of being lost and forgotten. However, being alone can be a catalyst for elderly people to start feeling lonelier sooner. When they have the feeling of lonesomeness that is when there is a decline in health and quality of life. In the overall Time Spent Alone chart it can be seen and predicted which group of people begin to feel lonely. In the group of living alone, 37% spend 10.5 hours by themselves. It was also found woman tend to be more alone more often then men.

Then in the statistics to the right it shows the issues of being isolated and feeling alone. When elderly feel isolated and lonely their mental and physical health steadily declines and the quality of life also falls. If loneliness is the factor, how do we prevent loneliness, encourage friendship, and promote active and social lifestyles?

Elderly Loneliness Statistics

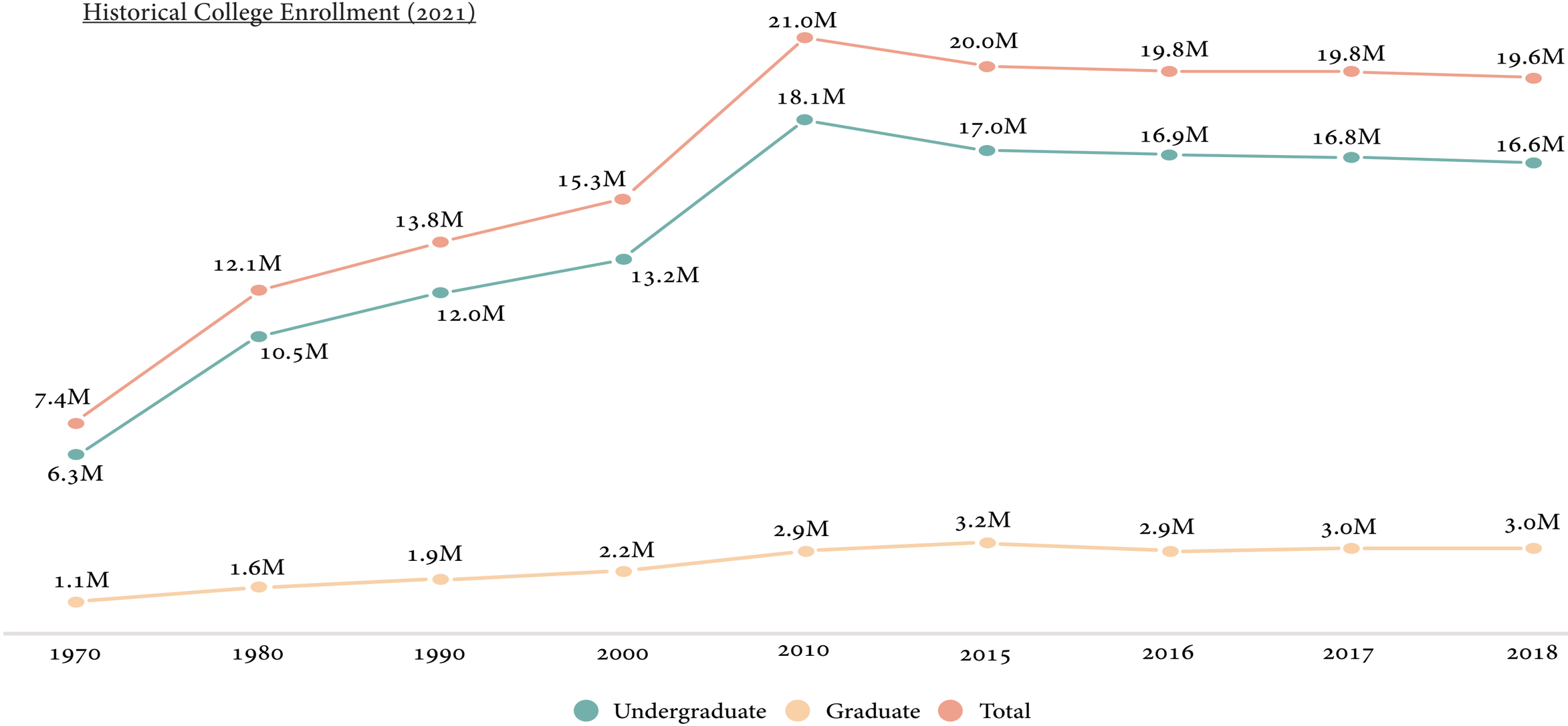


III

College Research

United States: University Student Research

Historical College Enrollment (2021)



Educationdata.org

United States: University Student Research

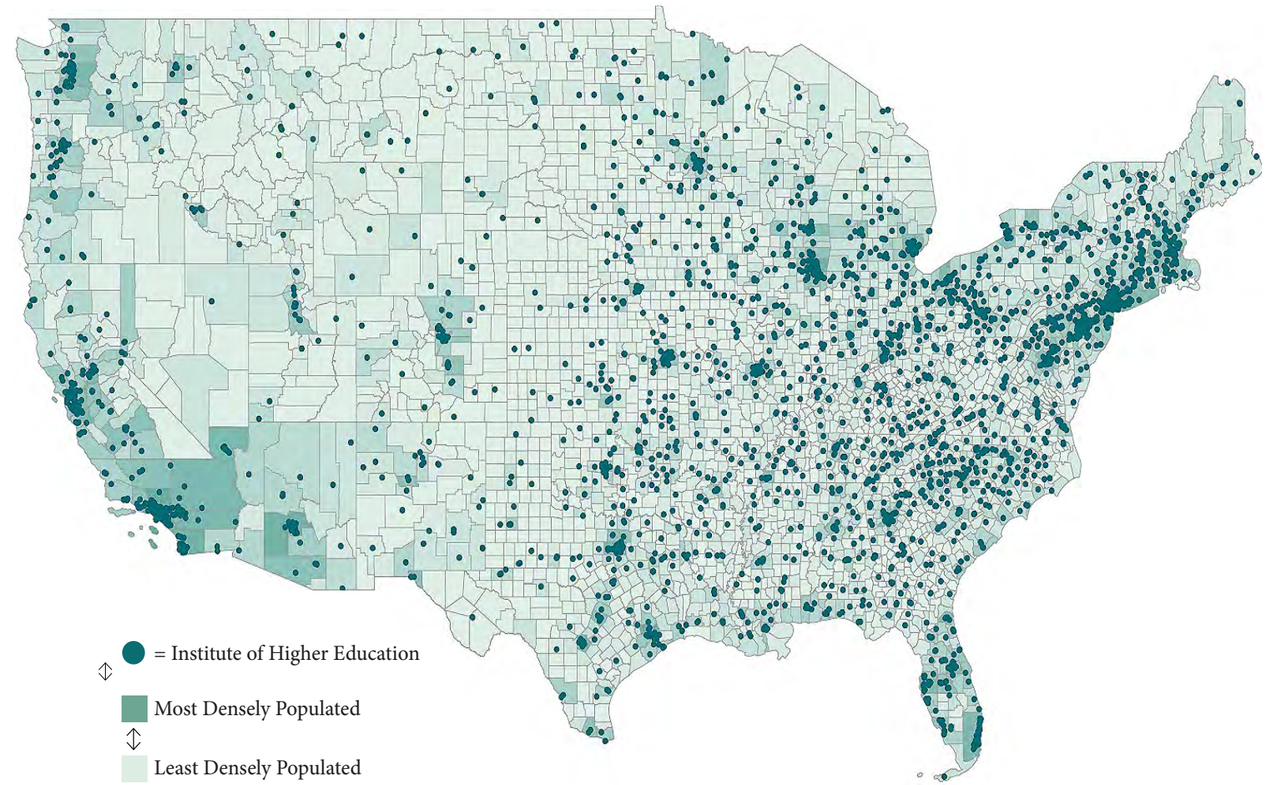
Top 10 States with Most College Students (2021)

#	State	Population (Million)
1	California	2,710,000
2	Texs	1,640,000
3	New York	1,250,000
4	Florida	1,070,000
5	Illinois	738,000
6	Pennsylvania	700,000
7	Ohio	645,000
8	Arizona	582,000
9	North Carolina	564,000
10	Georgia	542,000

Evan Dziedzic

Similar to the elderly, California, Texas, New York, and Florida have the highest populations of college students. With these states having the greatest college student populations I then thought about the different colleges that would have the most students and elderly in the surrounding area. After seeing the population of college student numbers per state I wondered the density of students and the amount of institutions in the different parts of the United States.

Top 10 States with Most College Students (2015)

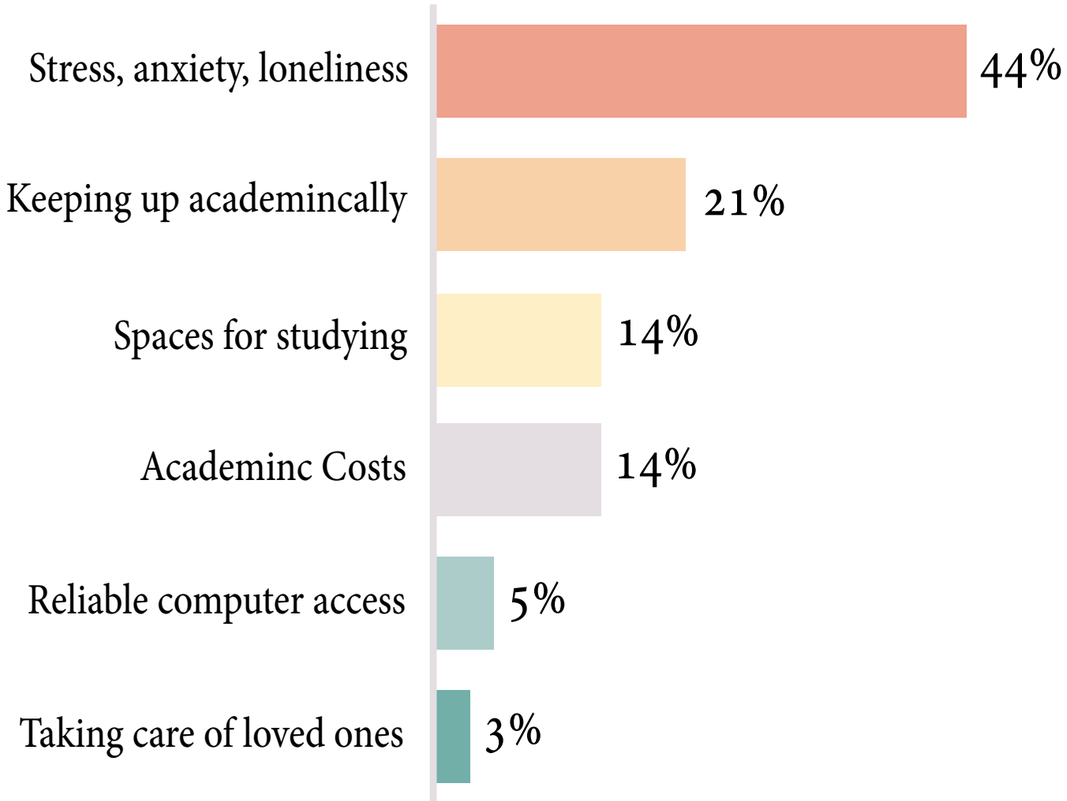


The Brookings Institution

This map surprised me as to difference in density and the number of colleges. In southern California there may be a higher density of students with a good amount of higher education schools, but on the east coast there are far many more schools with a lesser density of students. So I figured there would need to be a way to figure out if there were students who were in need of something or having issues. Similar to elderly people, I found that college students are actually considered the loneliest age group and have more social and monetary insecurities than any other group.

College Student Barriers

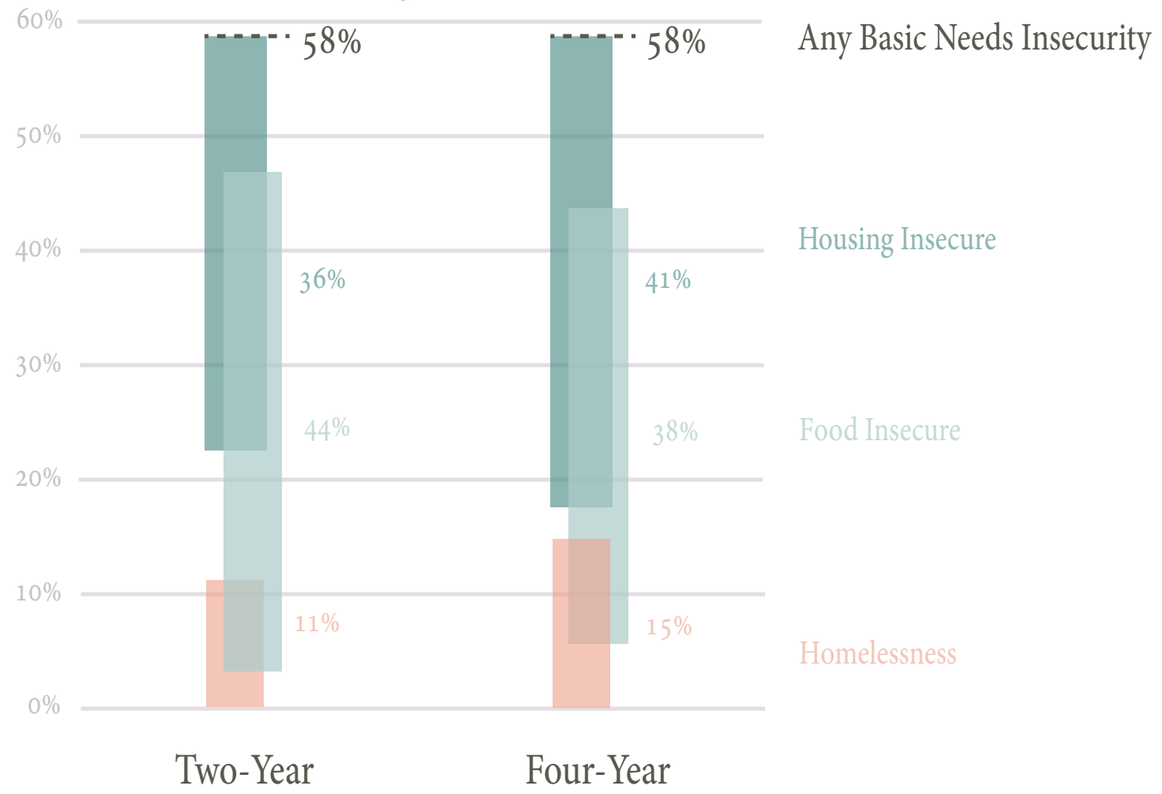
College Student Challenges (2020)



Strada-College Pulse Survey

In a study done in 2020, out of 46,000 college students, 44% of them felt stress, anxiety, and loneliness. This does not include every college student in America, but this is a good pool of students to refer to. 44% is a ridiculously high number and this issue probably makes the other challenges more prevalent. High levels of loneliness and anxiety causes difficulty in focusing and doing well. If this is the case, how can environemnt be designed that reduces the stress, anxiety, and loneliness? Should this envrionemnt have social aspects as well as academic aspects?

College Student Insecurities (2020)



Association of American Colleges and Universities

Another study showed that 41% of students that attend a four year college have housing insecurities. With students being stressed and lonely and not having housing options, the human brain can only take so much negativity and anxiety. Designing some sort of community that includes college housing and positive feelings is detrimental for college students well-being.

IV

Nursery Research

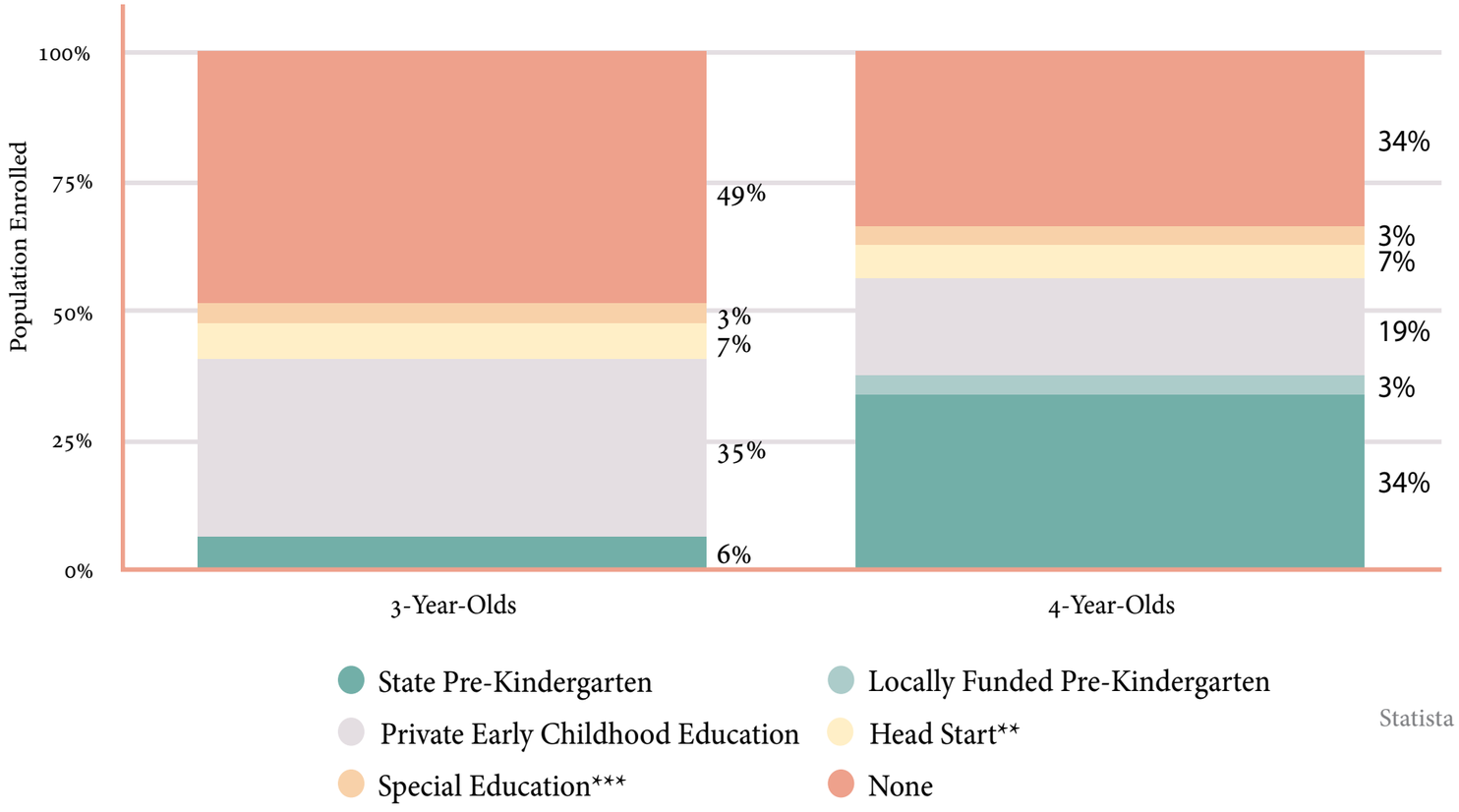
Daycare/Nursery Population

Top 10 States with the Most Daycare Students (2017)

#	State	Population (Million)
1	California	235,000
2	Texs	224,000
3	Florida	174,252
4	New York	122,871
5	Georgia	80,874
6	Illinois	71,759
7	New Jersey	53,370
8	Wisconsin	49,789
9	Pennsylvania	49,789
10	Oklahoma	41,264

National Center of Education Statistics

Percentage of Students and Types of Daycare (2020)

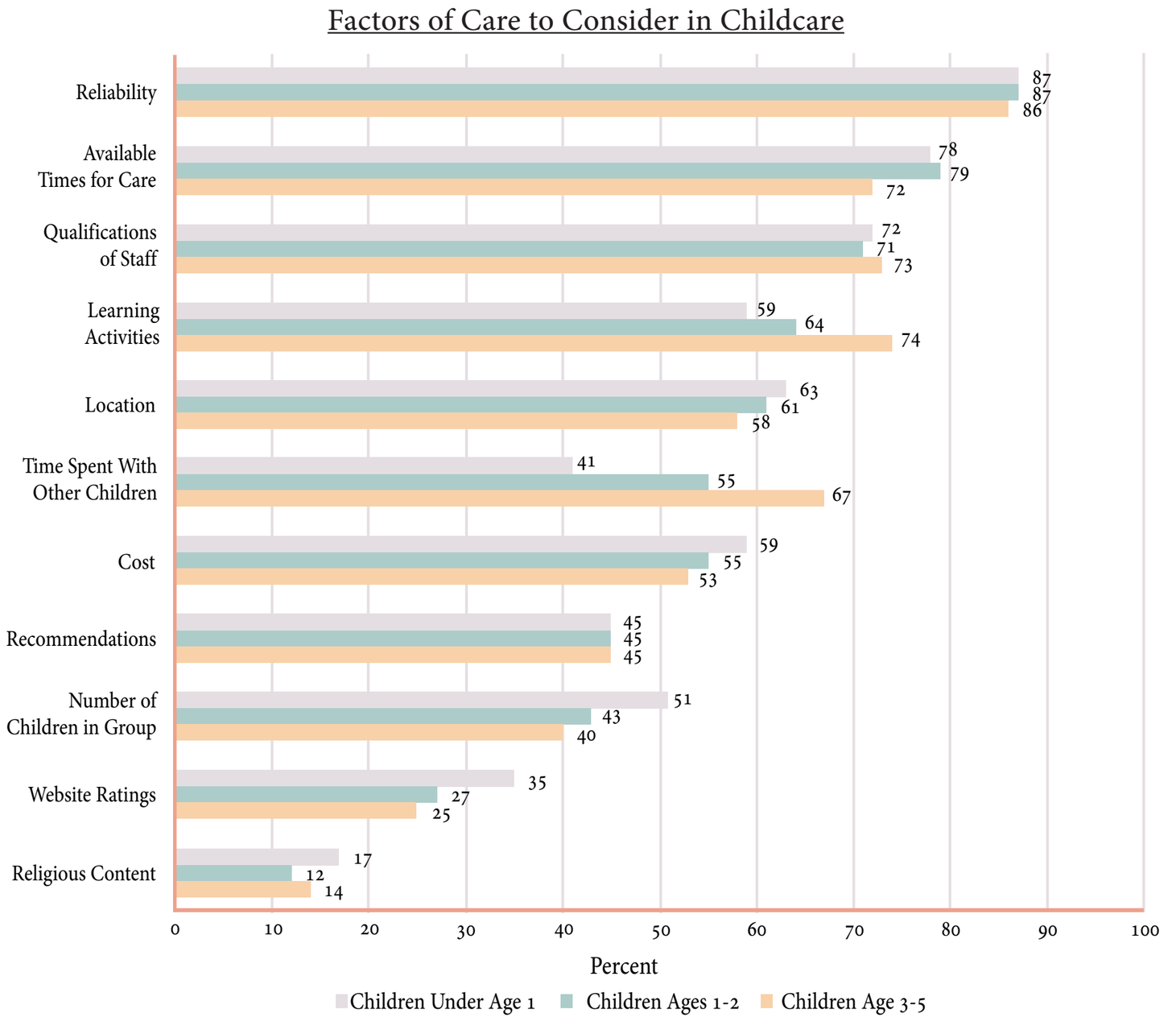


Statista

The next step after researching college student demographics, I thought it would be best to investigate the demographics of nursery school children aged 3-5. I then found a map of the United States and saw the percentages and populations of nursery school students. Comparing these numbers showed a correlation with the number of elderly and college students in California, Texas, New York, and Florida.

After seeing the population of each state and their nursery students I wondered the kinds of schools and daycares they went to. From this research I found that a majority of students 3-4 do not actually go to any kind of daycare. It was found that 49% of kids aged 3 did not attend any school and stayed at home. While 34% of kids aged 4 did not atten any school. From this I wondered why so many kids did not go to daycare. I found a few main reasons as to why kids did not go to daycare. I found that most new parents could not afford to send their kids, others could not find a reliable program, and some said there was a lack of options nearby to work or home.

Daycare Factors

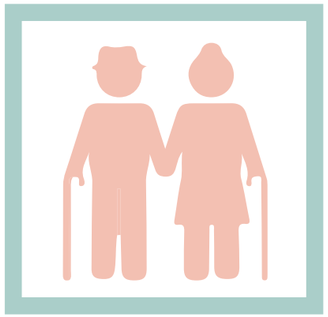


U.S. Department of Education

When picking a facility for the care of loved ones there are certain characteristics people look for to if it can be a good match. In this graph, it shows the primary factors parents looked for when looking at nursery schools for kids. To no surprise, for ages 3-5 the primary factors were time spent with other children, learning activities, availability, and reliability. People want the best for their loved ones, even if that means sending them somewhere.

After seeing these factors I also learned that some of these factors also carry over to elderly care facilities. People want what is best, however, the facilities have issues with staff, funding and maintenance. In elderly facilities family members look for professional certified staff, social events with outside people and other elders, as well as convenient location. So no matter the age family members look for the faculties that can take care of their lover ones best.

V



Aging Brain

Brain Maturity

Brain Maturity Based on Age Groups

Adolescence = Ages 1- 19

At adolescence the brain is fully grown, but the “wiring” is still in the process. The brain is approaching its full weight. The emotional center of the brain are fully developed, but the processing centers are still under development. This explains the young mind’s ability to learn and adapt, but its stubbornness and desire to act impulsively.

Early Adulthood = Ages 20 - 45

In the early 20s, your brain is considered at its adulthood. The human brain is at the maximum of its ability and power. The peak of your brain power comes around 22 and lasts for only 5 yeas. The brain is able to asses situations and information and has developed the proper neural pathways for emotional response.

Adult = Ages 45-60

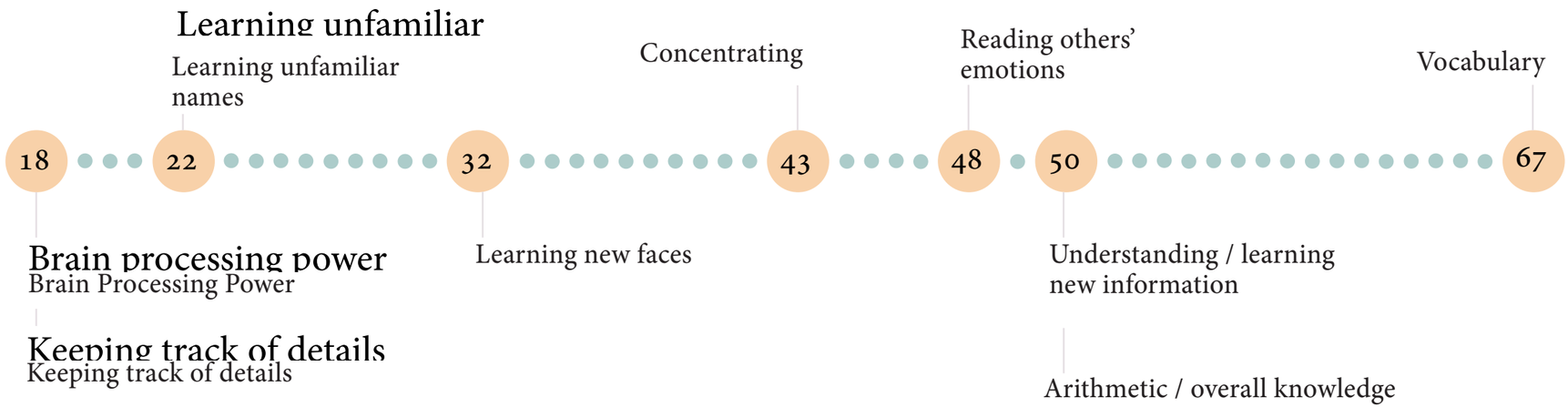
According to new research, the human brain starts to hit its first major decline at 45. It is estimates that between ages 45 and 49, men and women suffer a 3.6% loss, and the brain’s capacity for memory, reasoning and comprehension begin to wane. Also, your level of forgetfulness increases significantly.

Old Age = Ages 60+

As you surpass 60 years old, you are steadily losing brain cells. The ends of the brain cell receptors state decaying at a high rate. By age 65-70, men will suffer a loss of 9.6% and women will suffer a 7.4% loss. The shrinkage of the brain usually leads to worsened reasoning, spatial orientation, and verbal memory.

Brain Function

The Age Your Brain Peaks at Everything



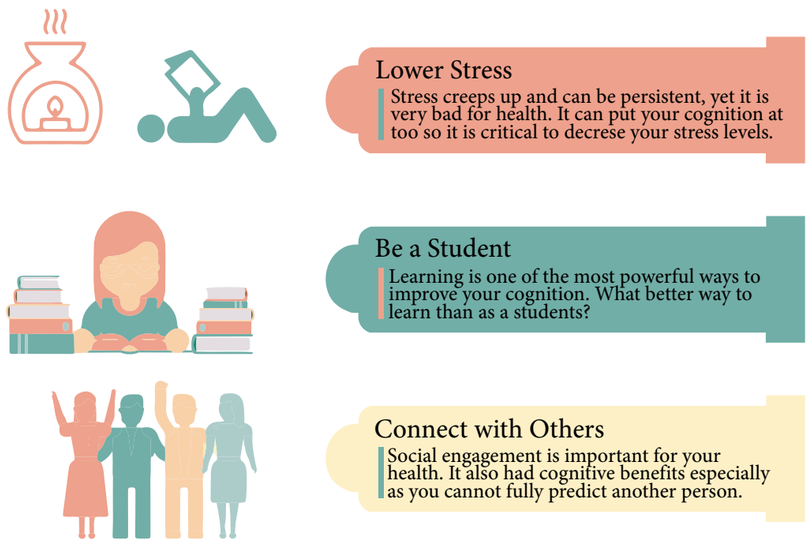
Sage Journals

Strategies to Improve Brain Function

Be Physically Active
Exercising regularly can improve your physical health, mental health and cognition.

Play Cards and Board Games
Games are a great way to stretch your mind. Look for ones that are challenging and involve strategy (chess is especially great)

Have a Growth Mindset
Believing that you can learn and grow is a powerful part of doing so. This alone helps with cognition



Lower Stress
Stress creeps up and can be persistent, yet it is very bad for health. It can put your cognition at too so it is critical to decrese your stress levels.

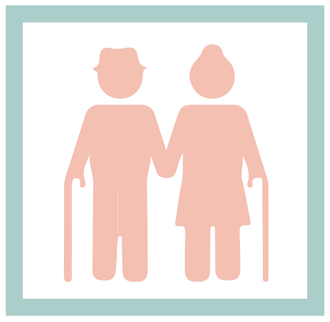
Be a Student
Learning is one of the most powerful ways to improve your cognition. What better way to learn than as a students?

Connect with Others
Social engagement is important for your health. It also had cognitive benefits especially as you cannot fully predict another person.

Kapok

Another important area to research was how the brain ages and its cognitive function when it gets to a certain age. Each age group has an area where the brain matures and at certain ages there are cognitive functions that peak. However, when there is something wrong like hearing loss or physical discomfort, cognitive abilites get worse. But there are strategies that have been found to help with brain function and even improve its abilites. Some of these things include dealing with stress in a healthy way, learning new skills or ideas, being social with others, physcially active, and may other strategies that help.

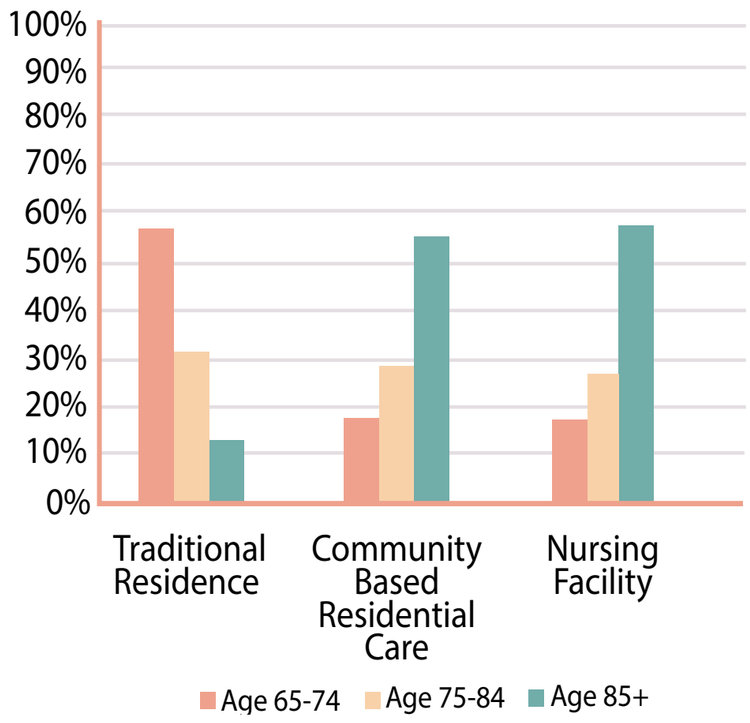
VI



Elderly Housing Trends

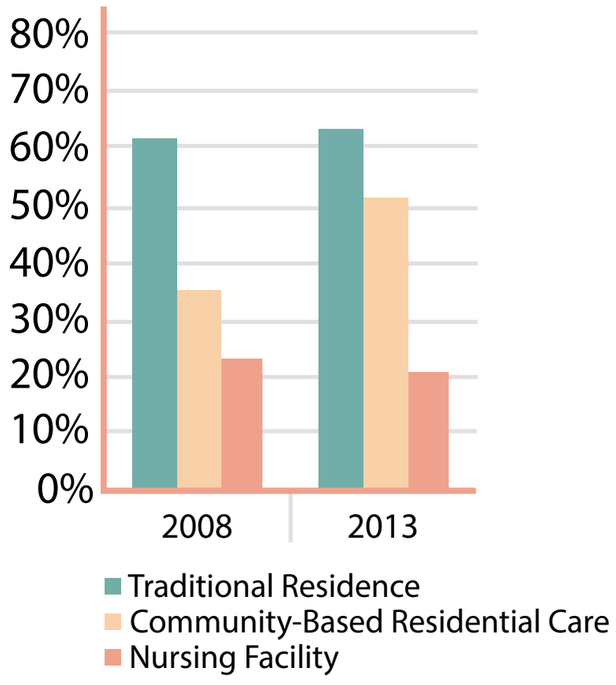
Elderly Residential Types

Age Distribution by Residential Settings



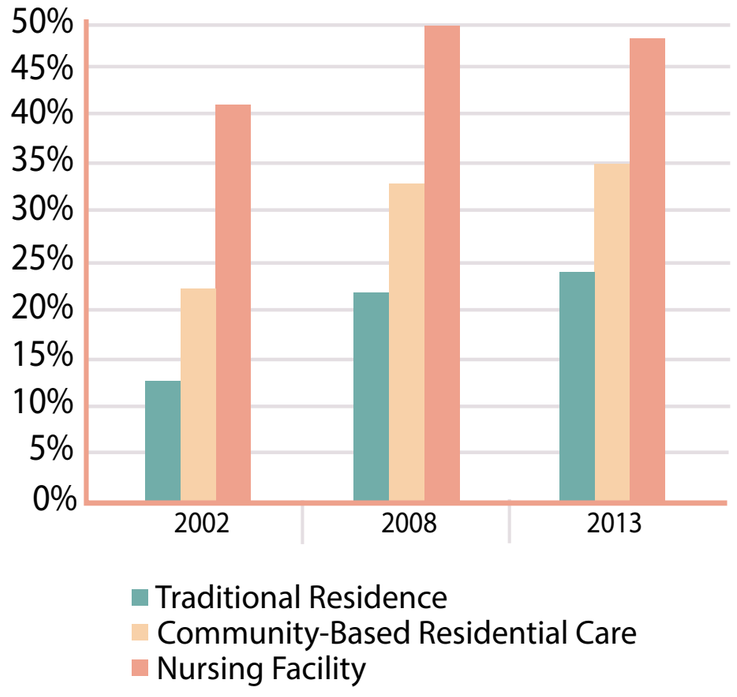
As shown in the graph, it can be seen that ages 65-74 tend to stay in their homes. Ages 75-84 are split between the three living options. Finally, ages 85+ are split relatively even between Community Based Residential Care and Nursing Facilities. Despite having these three living options each one has its own issues.

Physical Discomfort by Residential Settings



When it comes to physical comfort it has been found that the Traditional Residence tend to be the most uncomfortable. In close second is Community-Based Residential Care. If these two types cause physical discomfoty, what is an alternate living option.

Mental Disorders by Residential Settings

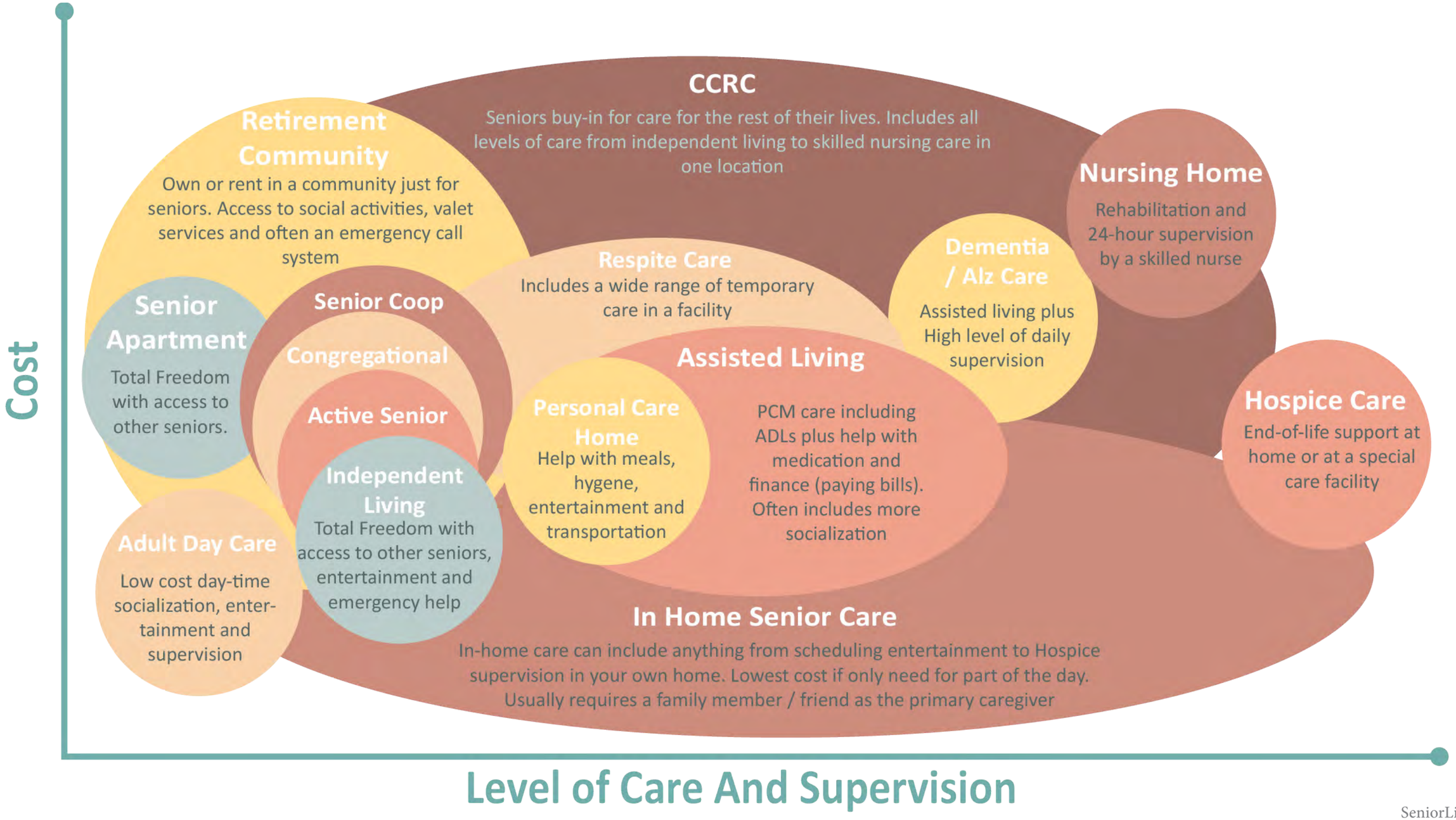


Pew Research Center

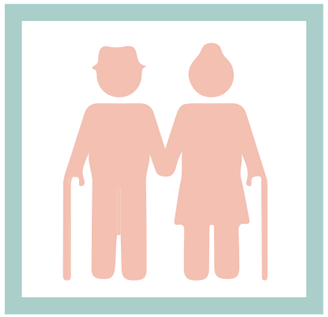
Another issue commonly found in elderly housing is an increase in mental disorders. Baed on the chart above it can be seen that mental disorders are very prevelant in Nursing Facilties as well as Community-Based Residential Care. If these three hosuing options have their issues what is the best living situation.

Residential Spectrum

Senior Living Spectrum

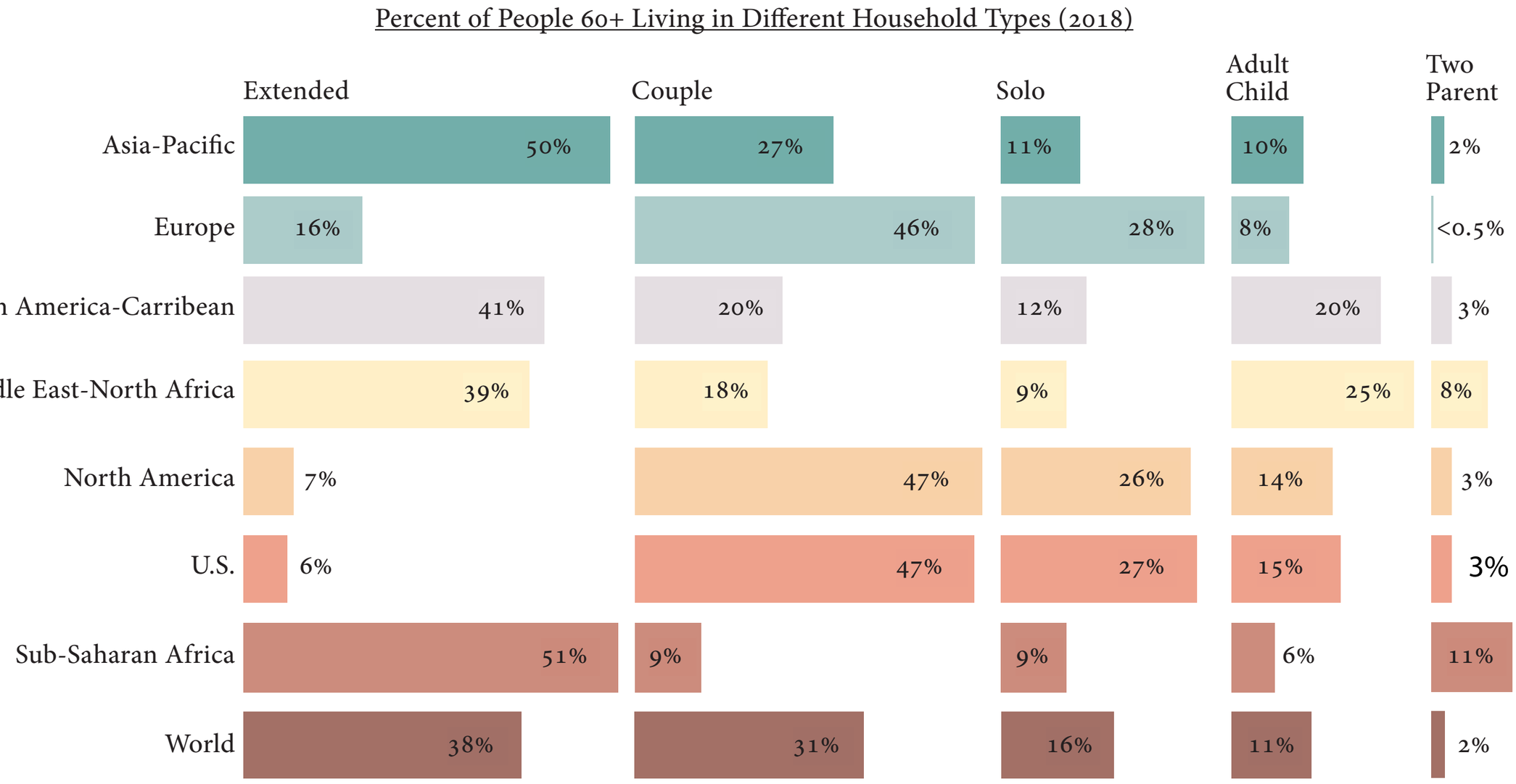


VII



Multigenerational Living

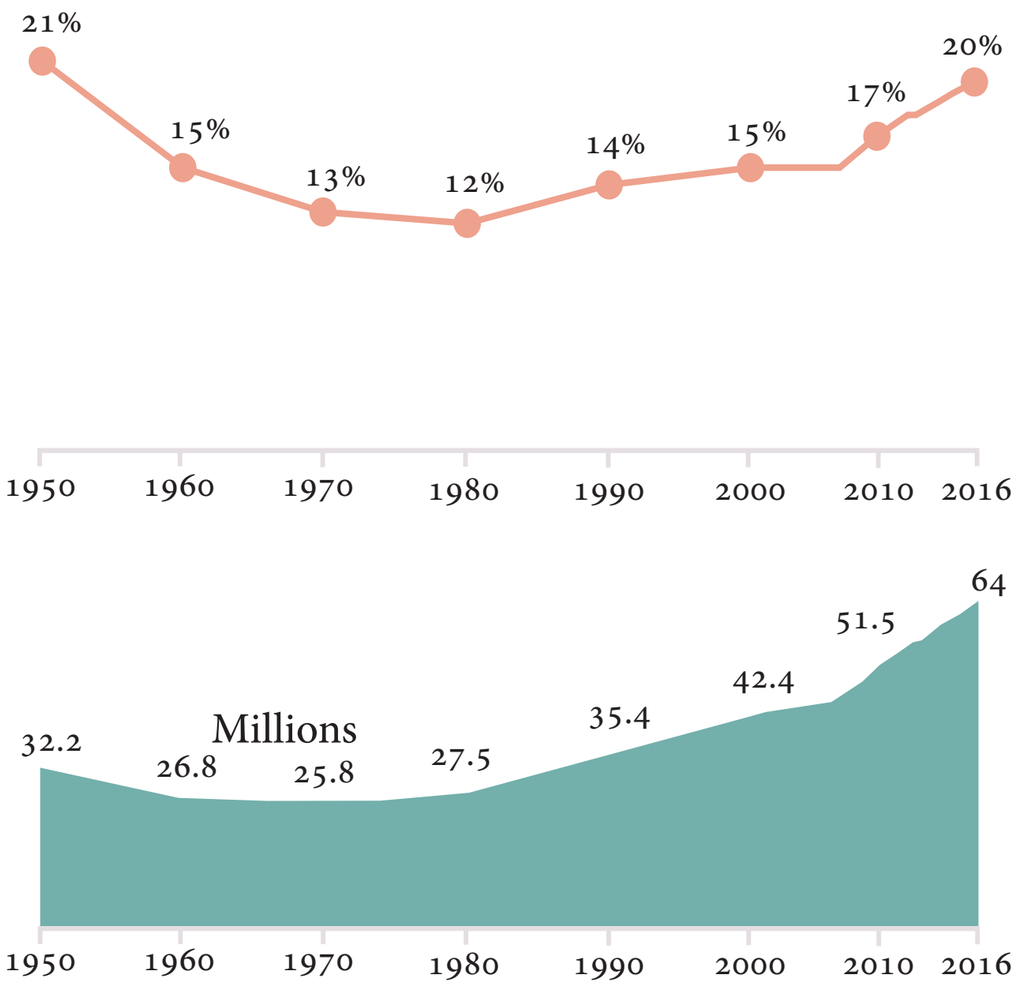
Elderly Household Types



Looking at the chart above it can be seen which parts if the work have a greater respect for their elderly and the contributions they have to soceity. In the united states only 6% of elderly people live with their extended families and over 27% of them live alone. Extended living is two low compared to other countries found in Asia and South America. In Asia 50% of elderly people live with their extended family, in Africa 51% of elderly live with extended family, and in Latin America 41% of elderly live with extended family.

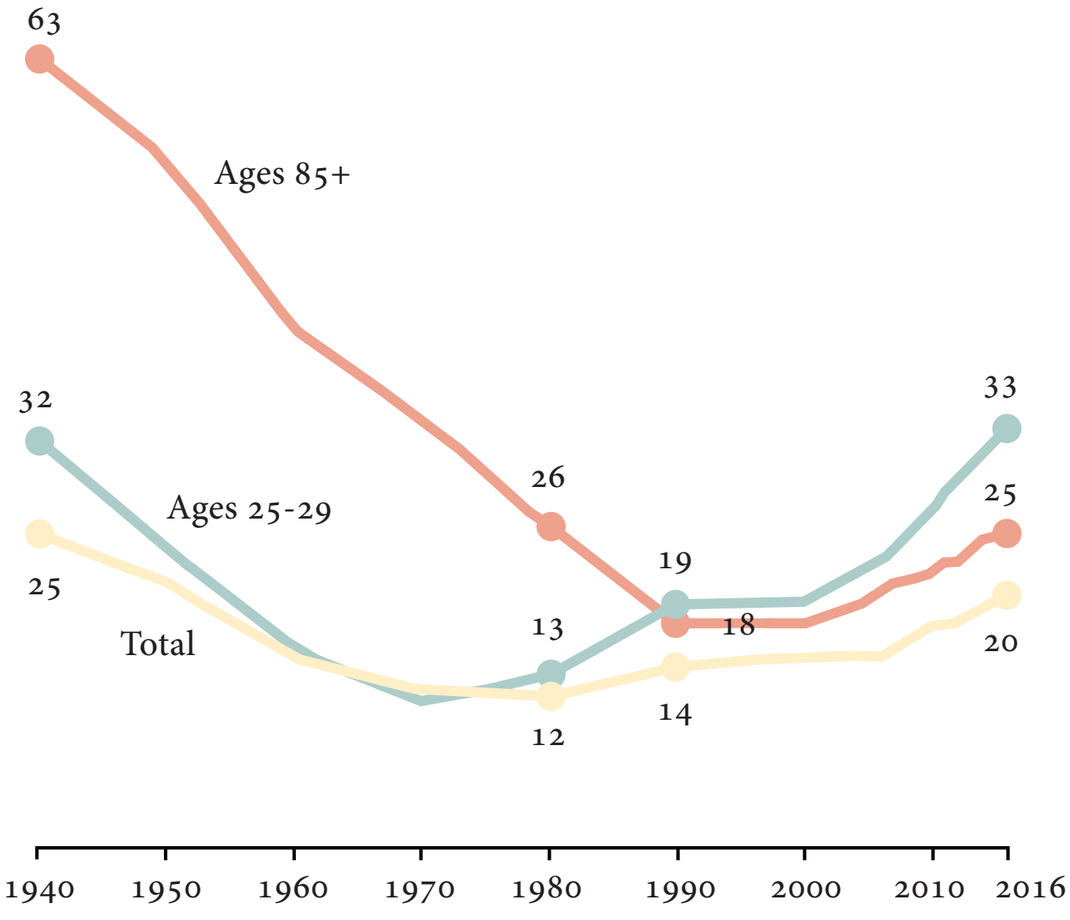
Americas Multigenerational Living

Americans Living in Multigenerational Homes (2016)



Pew Research Center

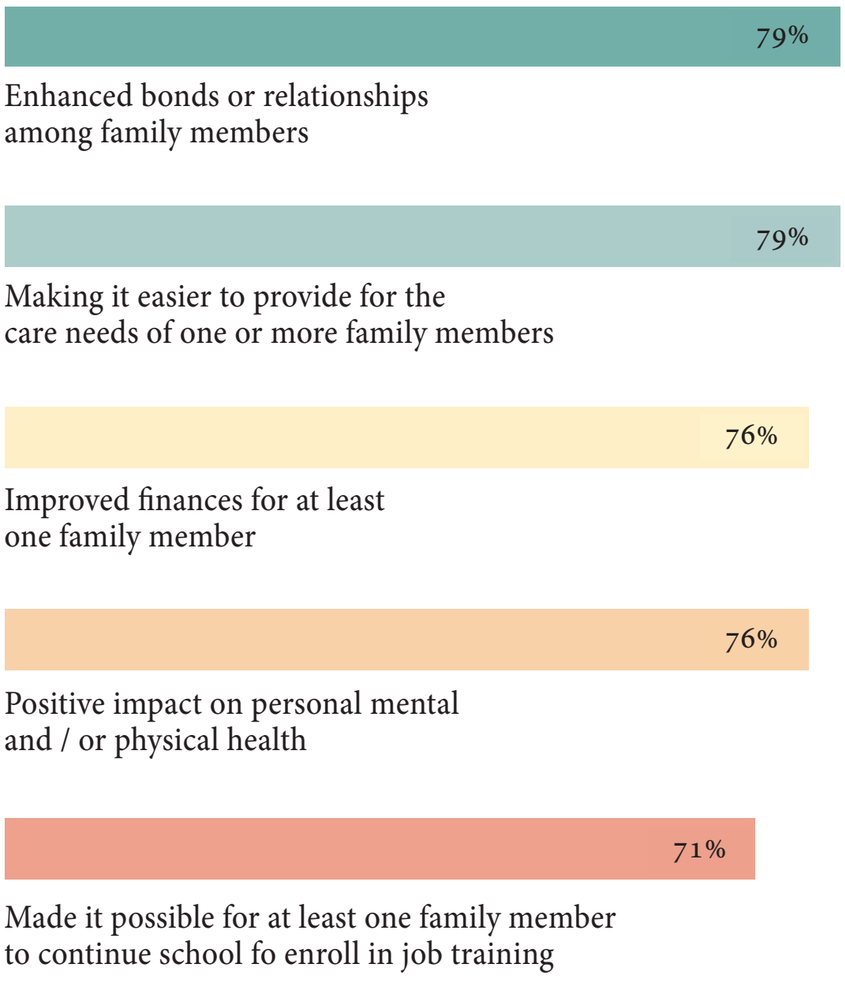
Ages Living in a Multigenerational Household (2016)



Pew Research Center

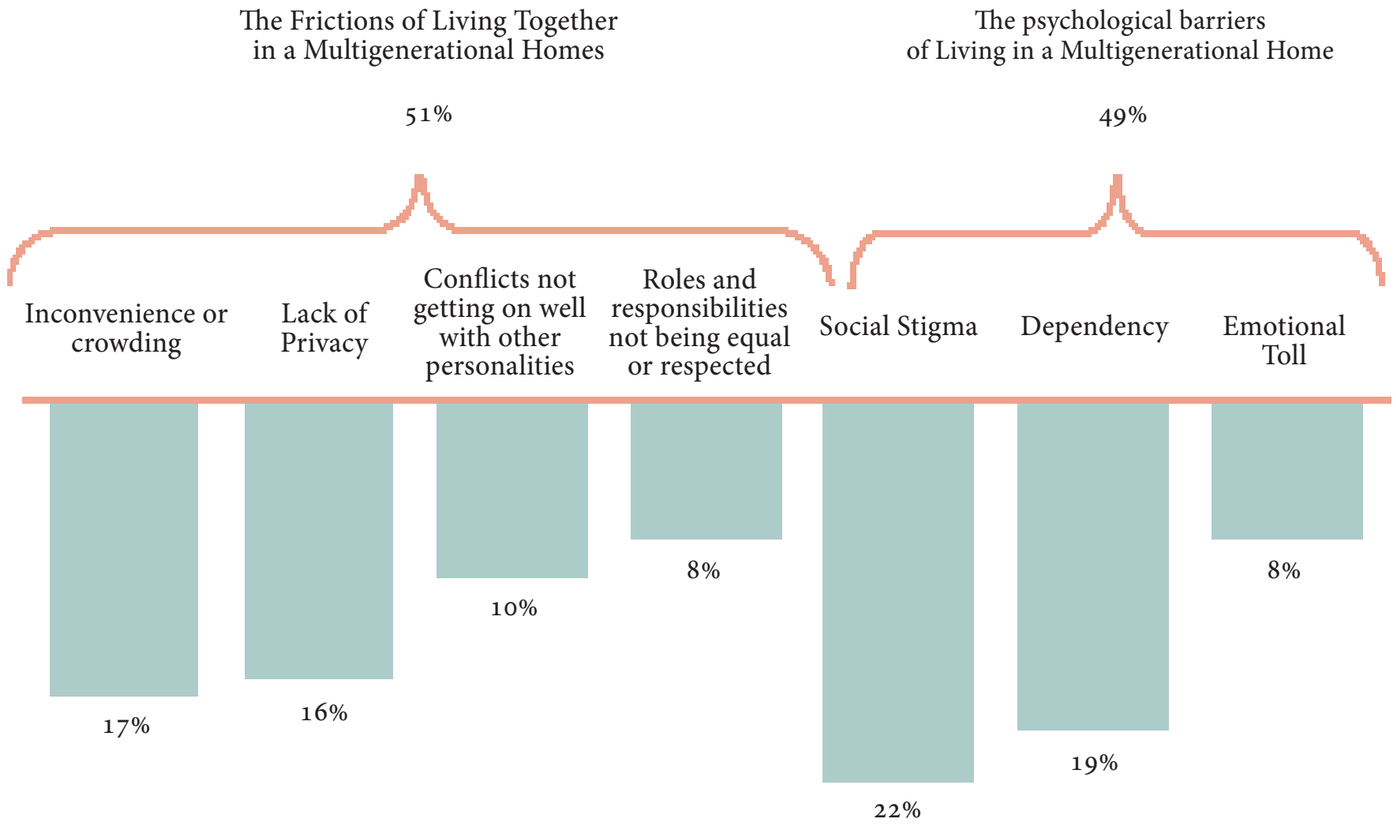
Advantages and Disadvantages

Benefits of Multigenerational Housing



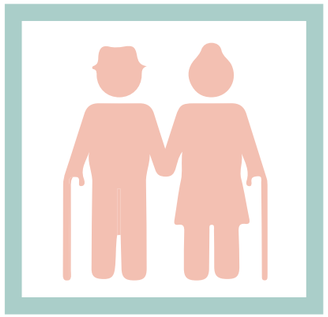
Generations: American Society on Aging

Barriers to Living in a Multigenerational Household



Generations: American Society on Aging

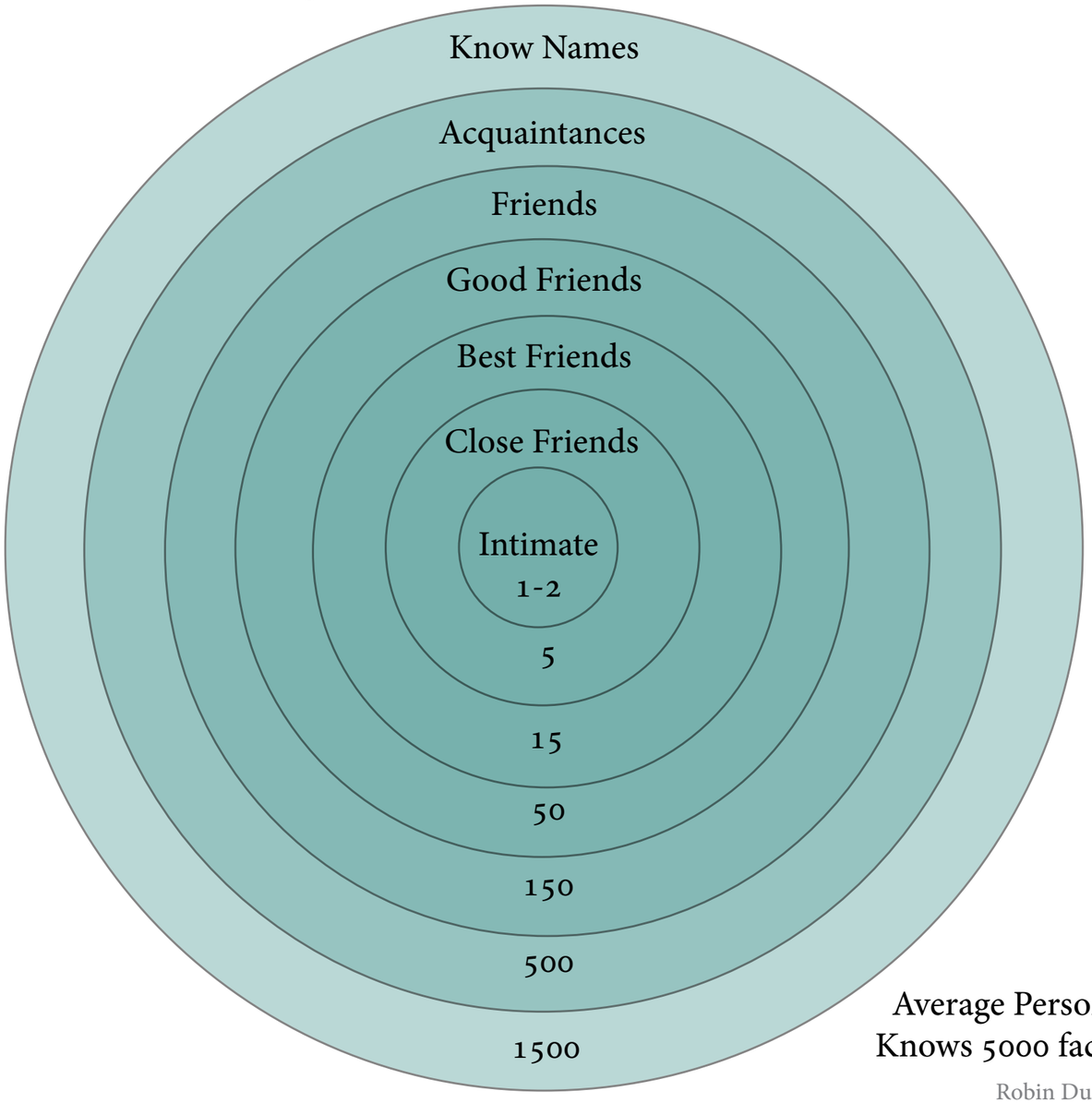
VIII



Friendship

Friendship In America

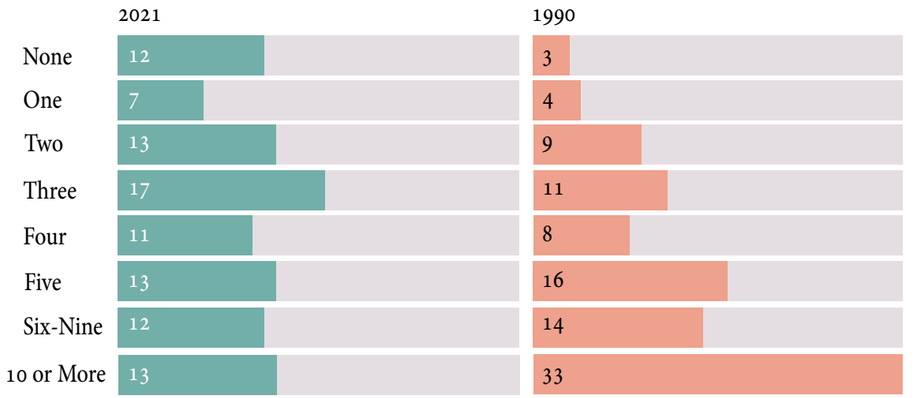
Circles of Friendship



Average Person
Knows 5000 faces

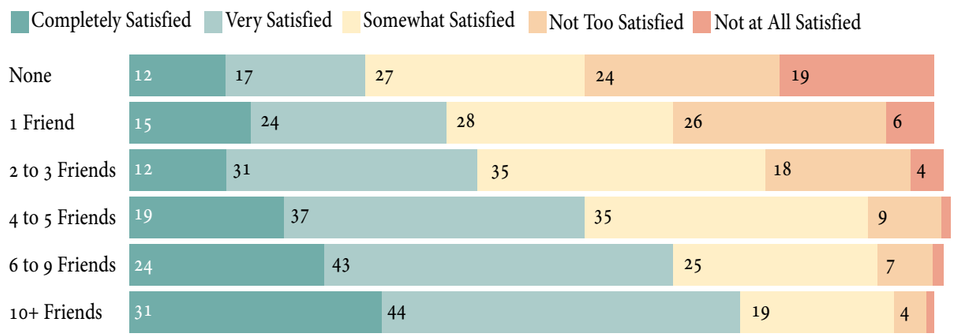
Robin Dunbar

Number of Close Friends in America



Survey Center of American Life

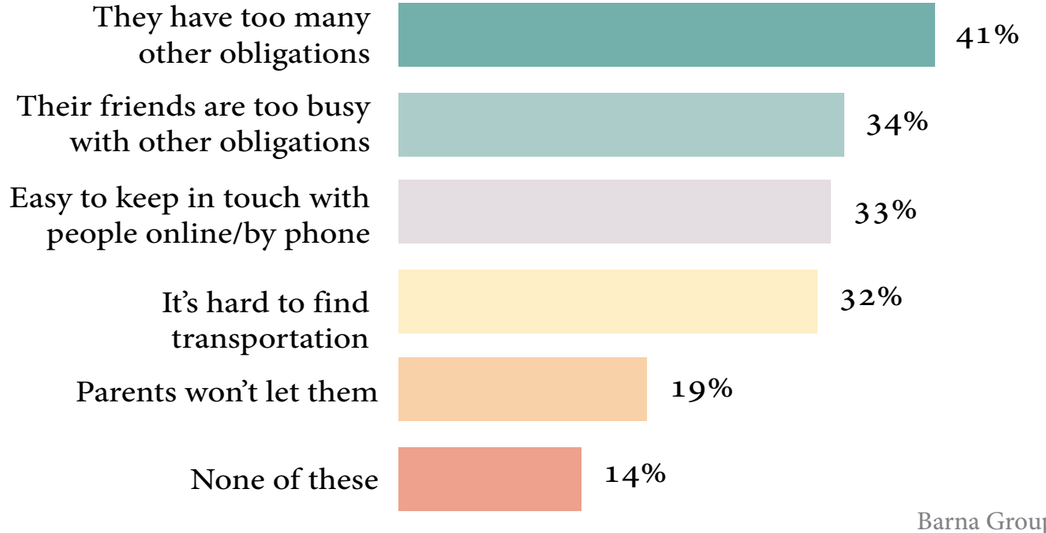
Level of Satisfaction With More Friends



Survey Center of American Life

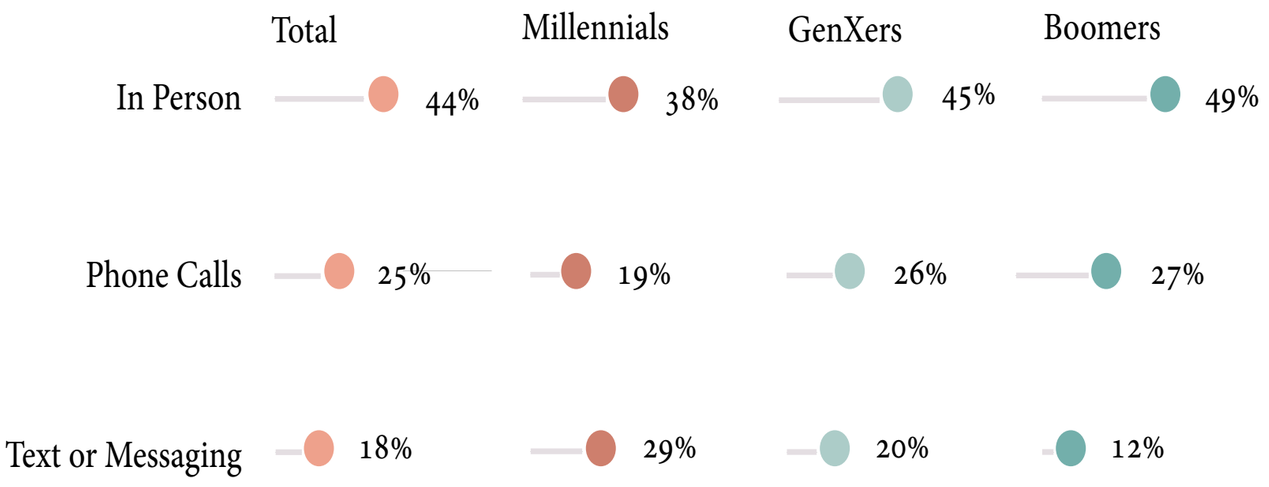
Communication and Spent Time

Reasons Friends Do Not Spend Physical Time Together



Barna Group

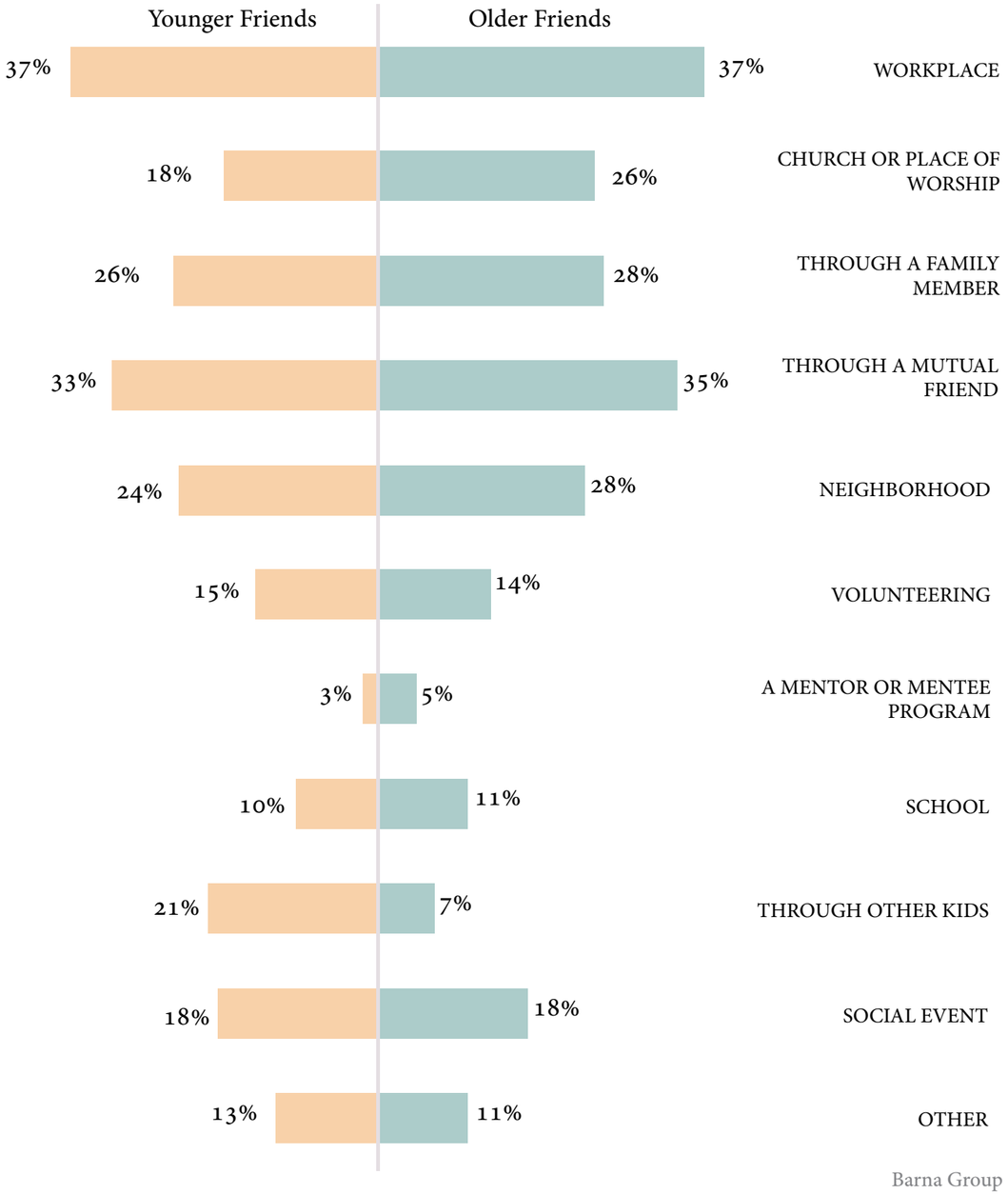
Friends Ways of Communication



AARP

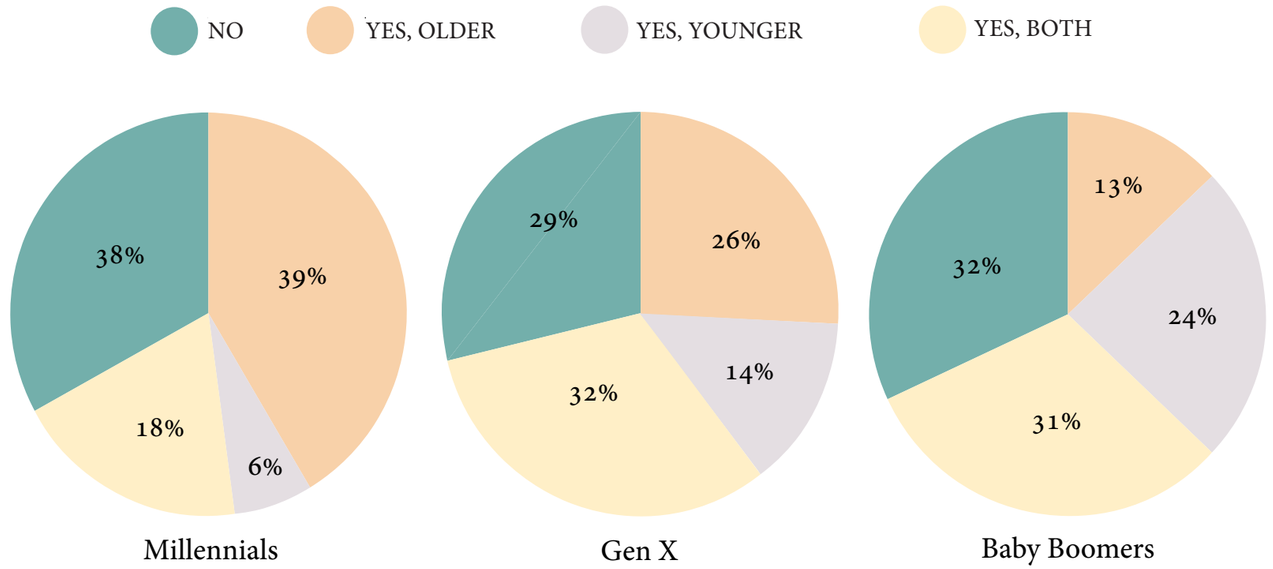
Multigenerational Friends

Places Intergenerational Friends Meet



Barna Group

Ages With Multigenerational Friendships



Barna Group

In the graph on the left it shows the percentage of places and activities of where people of different generations have become friends. The top three activities and places people meet to become friends are at a workplace, through a mutual friend, and in the neighborhood. On this list there are several others activities and places like volunteering, school, family members and others. Seeing these different places I took note because they will be important ways for multigenerational communities. They will serve as the bonding experiences for the elderly and college students.

The chart above shows what percentage of people from each generation have friends that are either older or younger. For example, in each one of these generations, nearly 1/3 of them do not have multigenerational friendships. While 1/3 of millenials and Gen X people are most likely to have friends that are older and very few baby boomers have older friends. These pie charts show a very interesting percentage of people in each generation that have friends that are either older or younger.

IX

Precedents

Generations: Living at Muhlgrund

Location: Vienna, Austria
Architect: ARTEC Architekten
Date: 2011
Client: BUWOG

Housing LIN

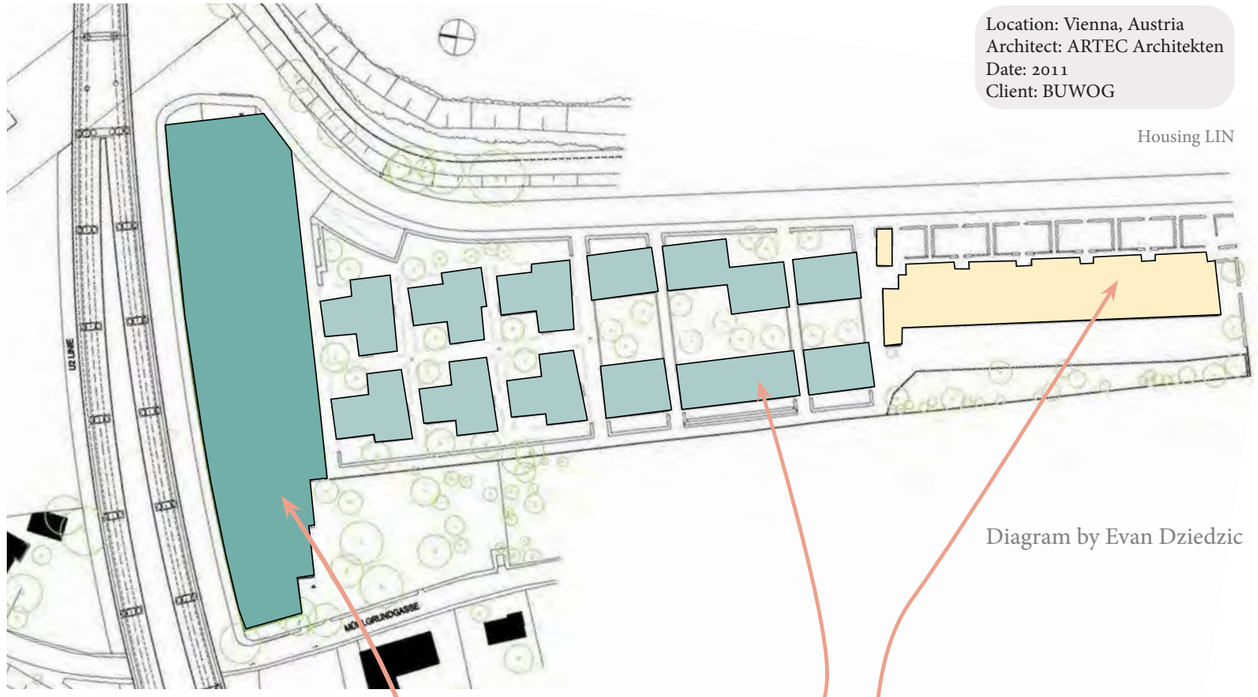
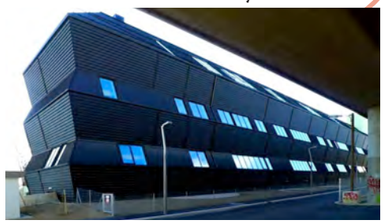


Diagram by Evan Dziedzic

Residential House System A



Residential House System B

Residential House System C

wordarchitects.com

Programming

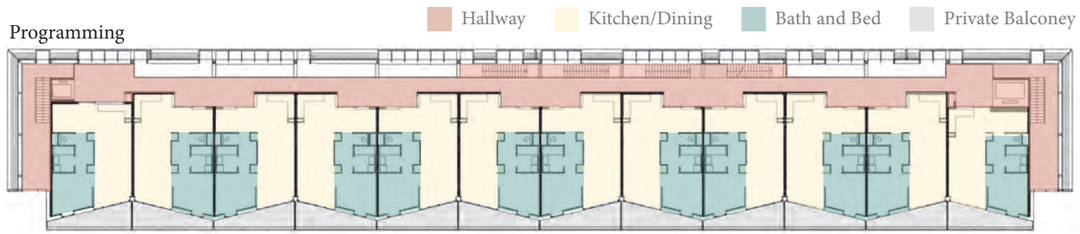


Diagram by Evan Dziedzic

Rythem and Glazing

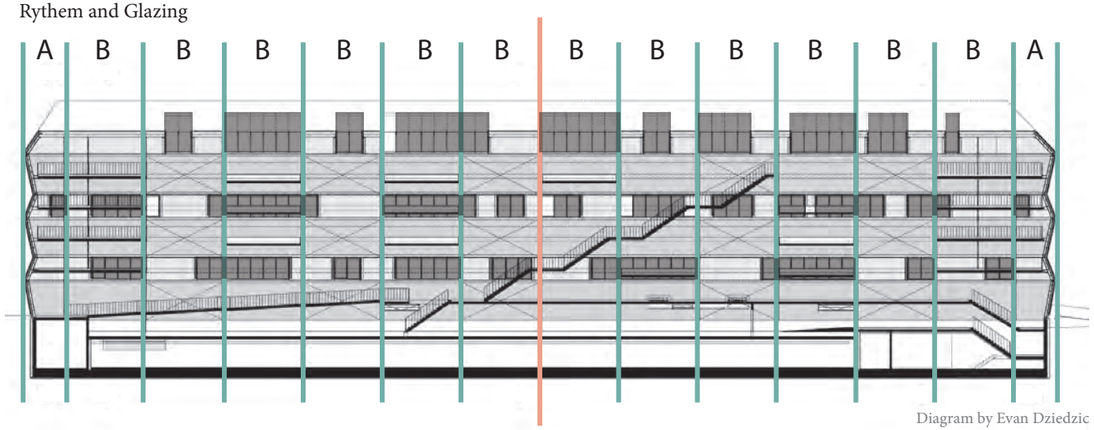


Diagram by Evan Dziedzic

The goal of this project was to "anticipate and adapt flexibly to changing housing needs at different stages of life, to provide a barrier-free living environment and housing and to promote coexistence and, in particular social inclusion in the community."[1] In this three residential house system there a total of 149 residential units, some specifically for the elderly, some for young families and the opportunity to combine units. Site includes childrens playroom, playground, multifuntional room with a kitchen. Overall, the building focuses on the health and wellness of the inhabitants.

Residential House System A does many things well in its design. First, the building is oriented east to west which allows for tall glazing on the north and a full facade of glazing facing south for winter sun. The rooms provide a nice common layout of hallway, to kitchen/dinning, and then bath and private bedroom. Finally, the structure and symmetry give it a feeling of strenght as well as uniformity. But on the elevations the building includes asymmetrical window design and placement.

Generations: Living at Muhlgrund

Elevation Massing and Tartan Grid

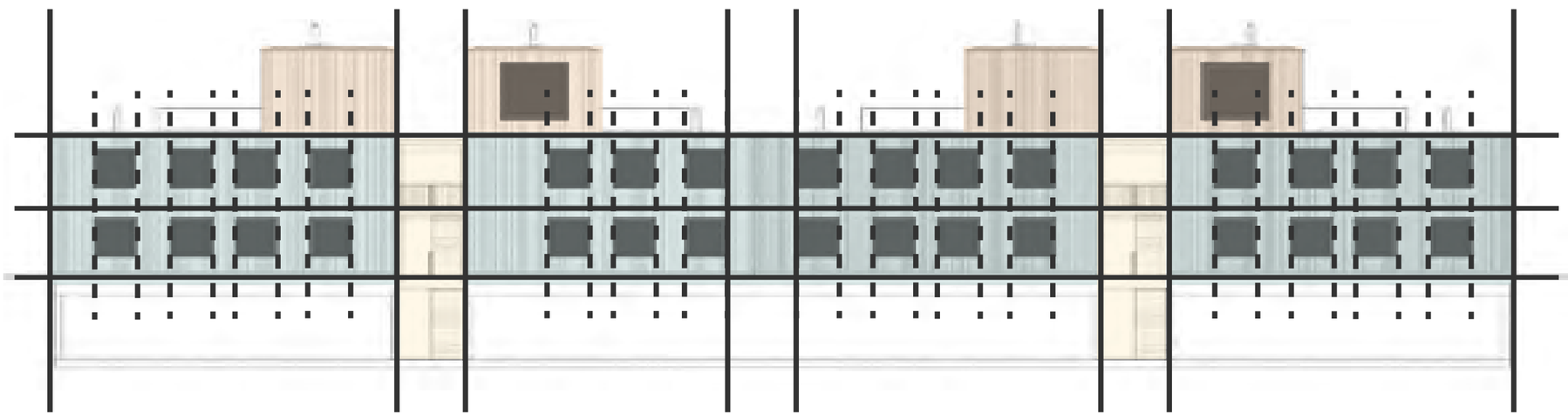


Diagram by Evan Dziedzic

Site Pattern Analysis

Diagram by Evan Dziedzic

What is super unique about Residential Housing System B is that it is basically the same apartment layout repeated except it is rotated 180 degrees so sometimes the rooftop window faces into the courtyard and sometimes it faces outside to the beyond. This makes these adaptable modular housing that can fit to anyones lifestyle or age. These apartments are designed very simply, but the use of materials give the units a natural feel and warmth. When people look across the the unit group parallel it is basically looking at your reflection in the mirror. These units have a different pattern compared to Residential Housing Systme A, which is ABABA.

The pattern analysis of this site is very interesting because it guides your eye towards the south of site based on the courtyard and building orientations. It feels like the desing is meant to guide you into the courtyard and you are abruptly stopped when you meet the north facade of the condominiums. The orientation is everything in the project and guides the user to nature.

Marmalade Lane

Location: Cambridge, Cambridgehsire - Built: 2018 - Architect: Mole Architects

Diagram by Evan Dziedzic

architecture.com

Site Circulation and Massing

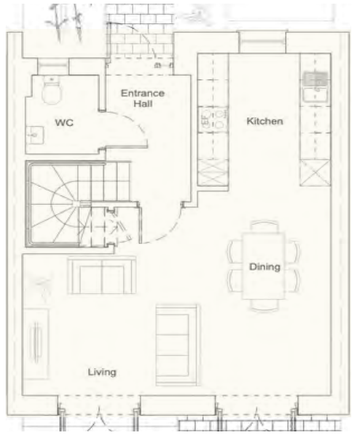
Directional Path

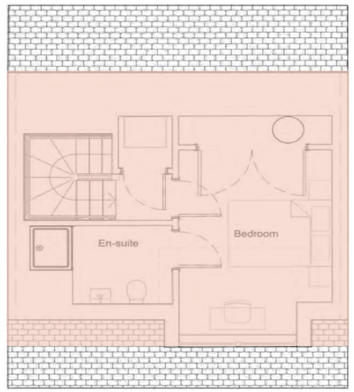
Building Massing

Marmalade lane is a development with 42 homes with a mixture of 2-5 bedroom terraced houses. There is a mix of families from young families, couples, retired seniors, and single person homes. Each person picked the shell of the home they wanted and were able to design the interior layout the way they wanted. People have the option to either live in a house or live in an apartment building. All the buildings are connected to a main courtyard that promotes social gathering. Included in the development is a neighborhhod community center as well as community spaces people can hold events in.

Programming

Public Space Private Space Flexible Space Community Space





House Layout

Apartment Layout

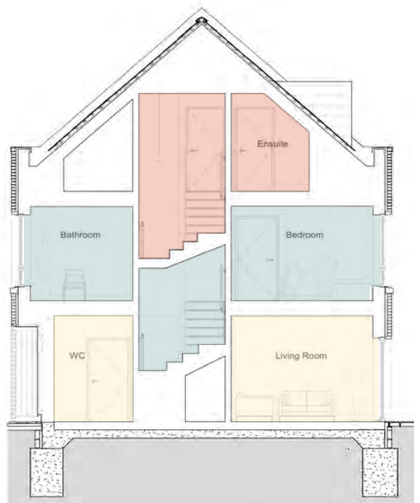
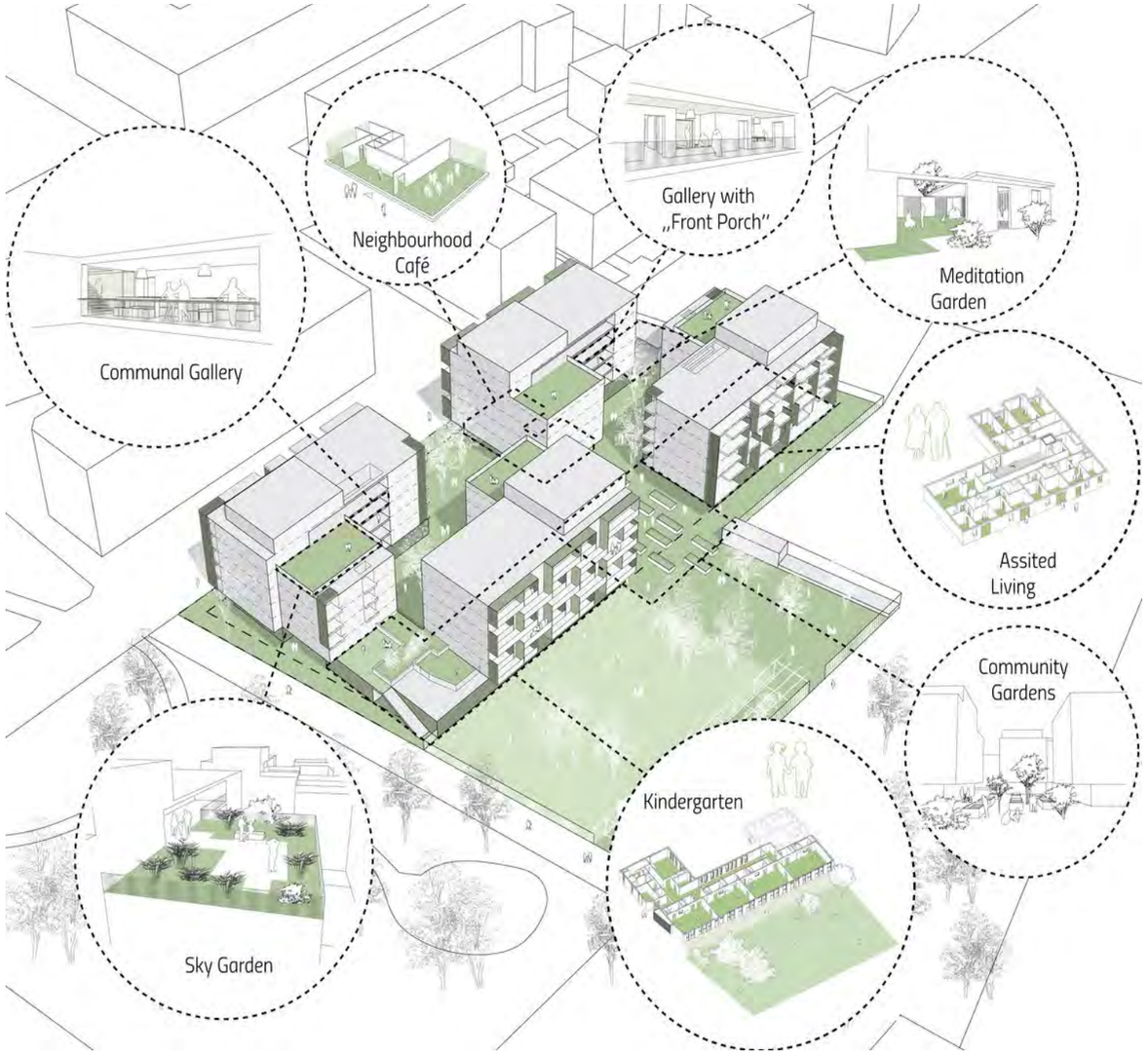


Diagram by Evan Dziedzic

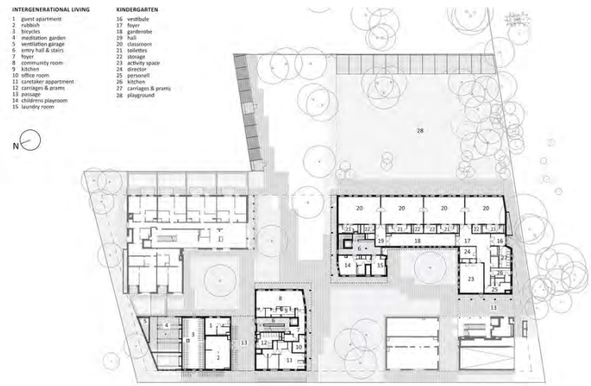
Zwei + plus Intergenerational Housing

Location: Wien, Austria - Built: 2018 - Architect: trans_city TC



architecture.com

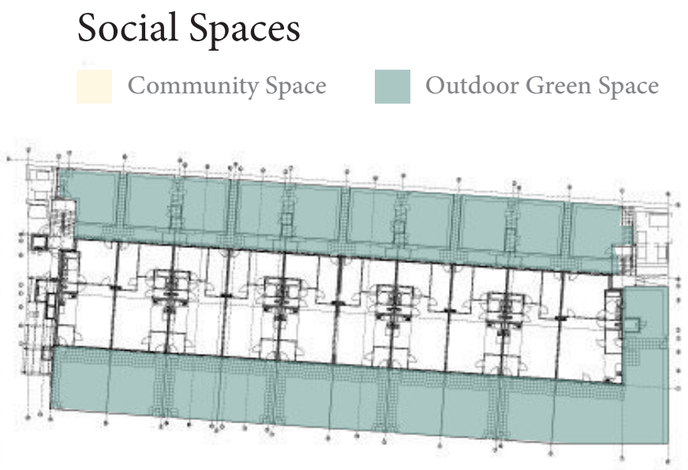
Of the three precedents this one is the most unique because it practices the other half of intergenerational design. Instead of just having families it included a kindergarten/ daycare with the program as well. This adds for the opportunity of elderly to interact with both families and the daycare student ages. Another unique aspect to this precedent is that the floor plans have two common types of plans. One included apartments with two bedrooms that are seperated by a balconey so people can meet on the balconey and a floor plan with just normal 2-3 bedroom apartments. Either way, every floor has rooms that promote and live intergenerationally.



Precedent Analysis

Site Design

Generations: Living at Muhlgrund



Marmalaid Lane

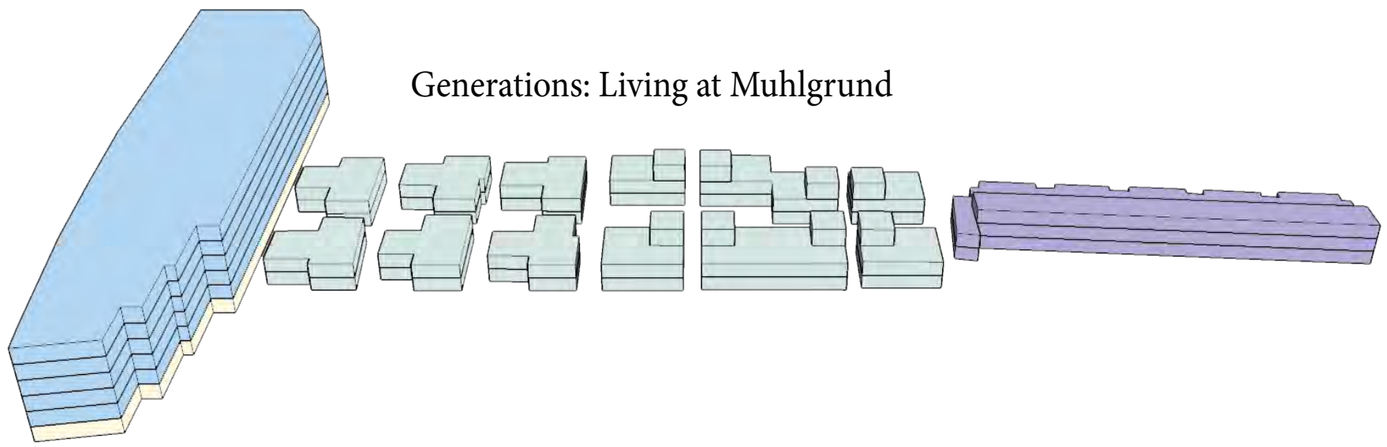
zwei+plus Intergenerational Housing

Diagram by Evan Dziedzic

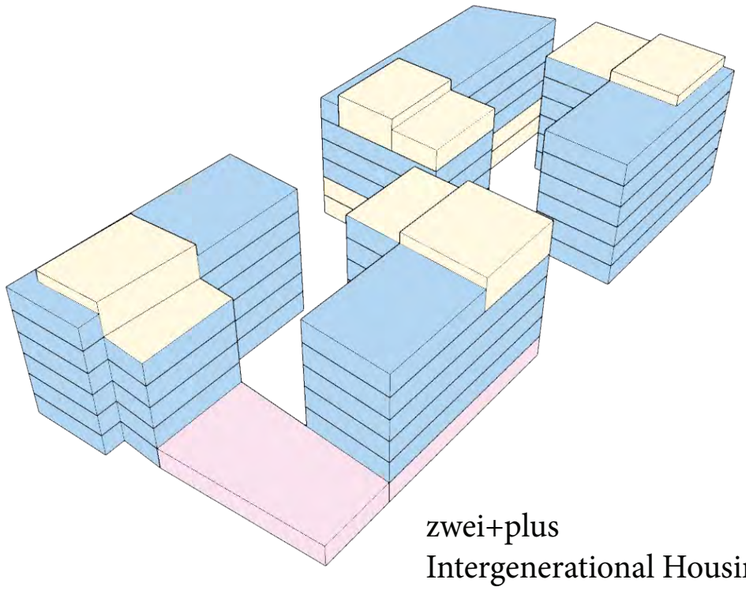
Looking at the site plans for all three of these intergenerational developments made me come to the realization that they are desing around the community and socialization aspect of humans. Each site provides some form of community outreach or socializing aspect. For example, each one of these plans has several outdoor green spaces that serve and the social hub of gathering. It is in these green spaces that people meet and decide on where they are going or what they are doing. Some projects include a cafe or cofee shops, communal gardens, flexible use spaces, and porches with views to the outdoors. For the sake of the elderly and younger generations, these places are built to promotes socialization.

Precedent Analysis

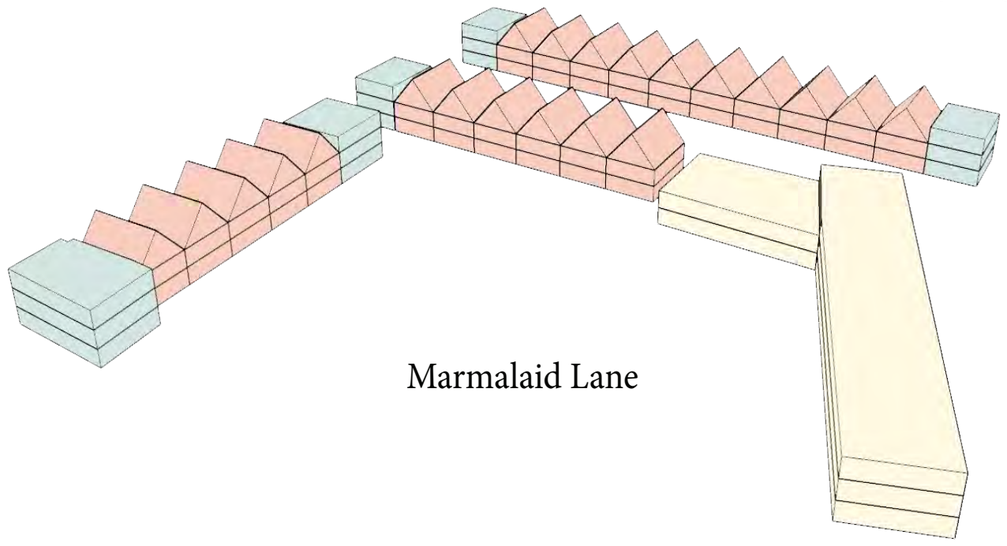
Massing Types + Floor Designations



Generations: Living at Muhlgrund



zwei+plus
Intergenerational Housing



Marmalaid Lane

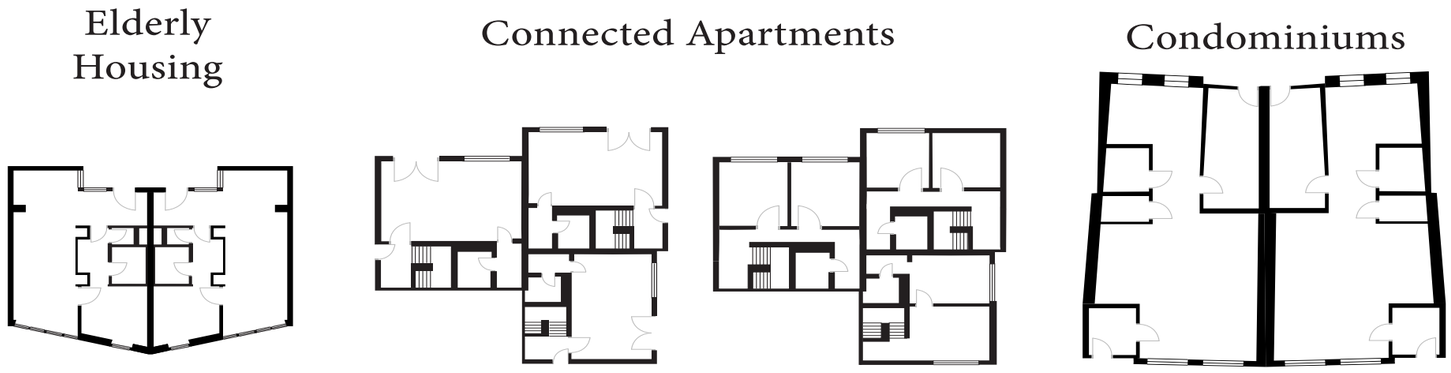
Diagram by Evan Dziedzic

The programs for each one of these intergeneraitional living conditions are very similar with their own spins on design. All of them have community building spaces for the reisdents to use as social activity ares. However, some have intergenerational living apartments, normal apartments, houses, condiminiums, and one even has a kindergarten on the bottom floor. Only one precedent deals with hosuing which is interesting because it is the most expensive option to promote intergenerational housing. Each one takes the aspect of families living together, while only one includes the incorporation of younger school children.

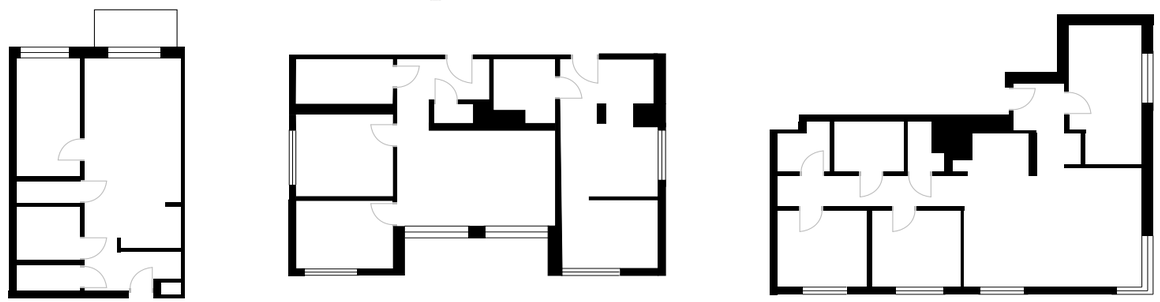
Floor Types

Community Space | Kindergarten | Elderly Living | Condominiums | Houses | Apartments

Precedent Analysis

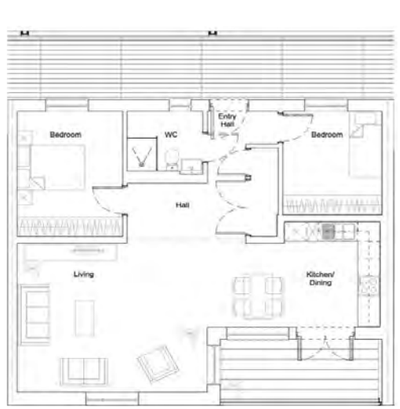


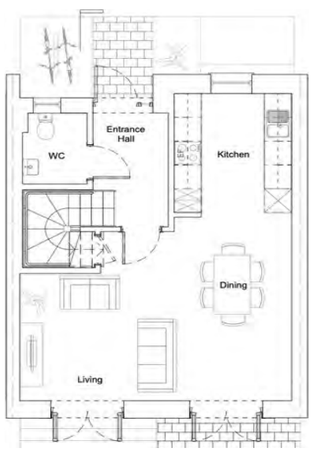
Generations: Living at Muhlgrund

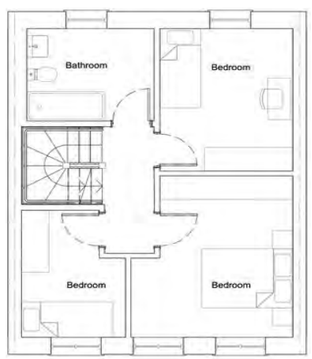


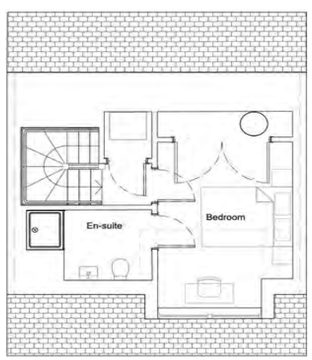
zwei+plus Intergenerational Housing

Diagram by Evan Dziedzic









Marmalaid Lane

archdaily.com

Diagram by Evan Dziedzic

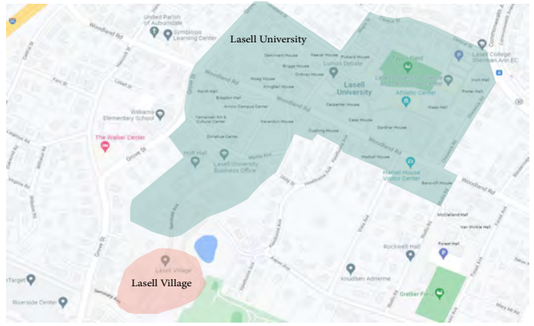
At Generation: Living at Muhlgrund there are four living options available. One are apartments deisgned specifically for elderly. Another one is combined living with three apartments attached to one another for community feel. The next option is two apartments seperated by th public corridor. Finally, the last option is condominium housing. On this site there are four options to pick from and each one is designed based on the amount of care needed. Condos for those with minimum care and elderly specific for the most care.

At zwei + pluse Intergenerational Housing each one of these floor plans related to intergenerational living are unique because some include elderly specific bedrooms, some are customizable before moving in, and some are meant to be just housing for normal families. However, these floor plans are all have one common thing, and that is these floor plans are all modular. Each one has the same basic size and shape making them easy to replicate over and over again. This makes it easy for the person or persons moving in to make easy adjustments and customizations. The three maine styles of hosuing are combined, which is where the family and elderly person share a common room. Seperated, which is when everyone is seperate, but the family and elderly share a balconey together. Finally there is the folo room for either an elderly couple or couple, but this room is always in proximity of combined or seperated.

Finally, In Marmalaid Lane there are two options of living with apartment style and house style. Each way is very similar, but the apartment style tends to be less private than the house style. Most cases it seems that elderly living with family live the house style arrangment, while elderly living alone or as a couple live in the apartment style living situation. There are 21 houses and 21 apartments.

University Based Retirement Community

F. Lasell Village - Newton, Massachusetts
- 6 min walk to furthest university building
- Residents agree to averaging nine hours a week of wellbeing activities and education
- Adapted to those who have difficulty with aging challenges
- Residents are encouraged to interact with university students and professors
- Volunteer at on-campus daycare center



Google Maps

lasellvillage.com

G. The Village at Penn State - State College, PA
- Variety of apartments and cottages that are one to two bedrooms
- Attend free classes based on space
- Take sports lessons from the university teams
- Lifelong learning opportunities
- Can attend events at performance centers and stadium at a discount
- Recommend to volunteer on campus

Google Maps

retireatpennstate.org

X

Program Analysis

Program

Function Matrix

Function

1. People
   - Parents
   - Elderly
   - College Students
   - Nursery Students / Kids
   - Outside Community
   - Building Staff
   - Healthcare Workers
   - Education Professionals
   - Volunteers

2. Activities
   - Teaching
   - Learning / Experiencing
   - Social Gathering
   - Physical Exercise
   - Mental Exercise
   - Gardening
   - Mentoring
   - Working

3. Relationships
   - Family
   - Friends
   - Teacher
   - Student
   - Caregiver
   - Volunteer
   - Partners
   - Mentor
   - Neighbor

Form

4. Site
   - Green Space
   - Gathering Spaces
   - On-Site Transportation
   - Variety of Spaces
   - Nearby Commerce
   - Event Spaces
   - Walking Paths
   - Parking Amenities
   - Biking Paths

5. Environment
   - Warm Climate
   - Dry Climate
   - Flat Terrain
   - Natural
   - Clear Weather
   - Sunny Days
   - Clean Air
   - Pleasant Smells
   - Appropriate Hiearchy

6. Quality
   - Safe
   - Spacious
   - Feeling of Home
   - Easily Accessible
   - Adaptable
   - Universal
   - Modular
   - Independent

Economy

7. Initial Budget
   - Construction Costs
   - Allocation of Funds
   - Material Costs
   - Square Footage
   - Number of Stories
   - Number of Apartments
   - Cost of Rent
   - Cemmercial Leases
   - Educational Programs

8. Operating Costs
   - Site Maintenance
   - Staff Salaries
   - Energy
   - Utilities
   - Healthcare
   - Community Activities
   - Child Care
   - Sustainable Strategies
   - Education Costs

9. Life Cycle Costs
   - Adaptability
   - Expansion
   - Reduce Life Cycle Costs
   - Housing Market
   - Healthcare
   - Education Costs
   - Child Care
   - Job Opportunities

Time

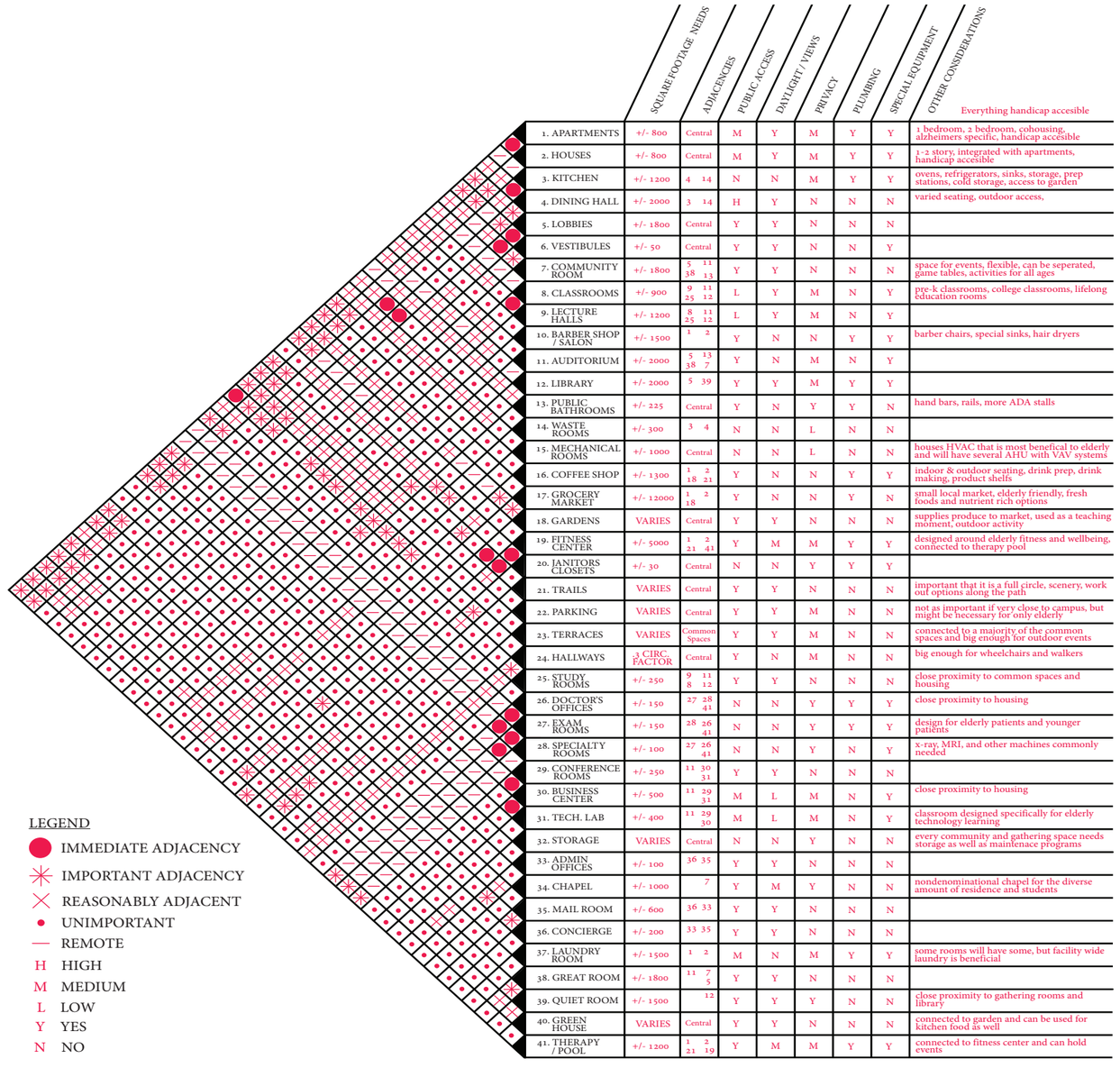
10. Past
    - Historic Preservation
    - Avoiding Past Mistakes
    - Education Tool

11. Present
    - Scheduling
    - Maintenance
    - Classes
    - Community Activities
    - Daily Operations

12. Future
    - Converting
    - Adapting
    - Expanding
    - Phasing

Evan Dziedzic

Adjacency Diagram

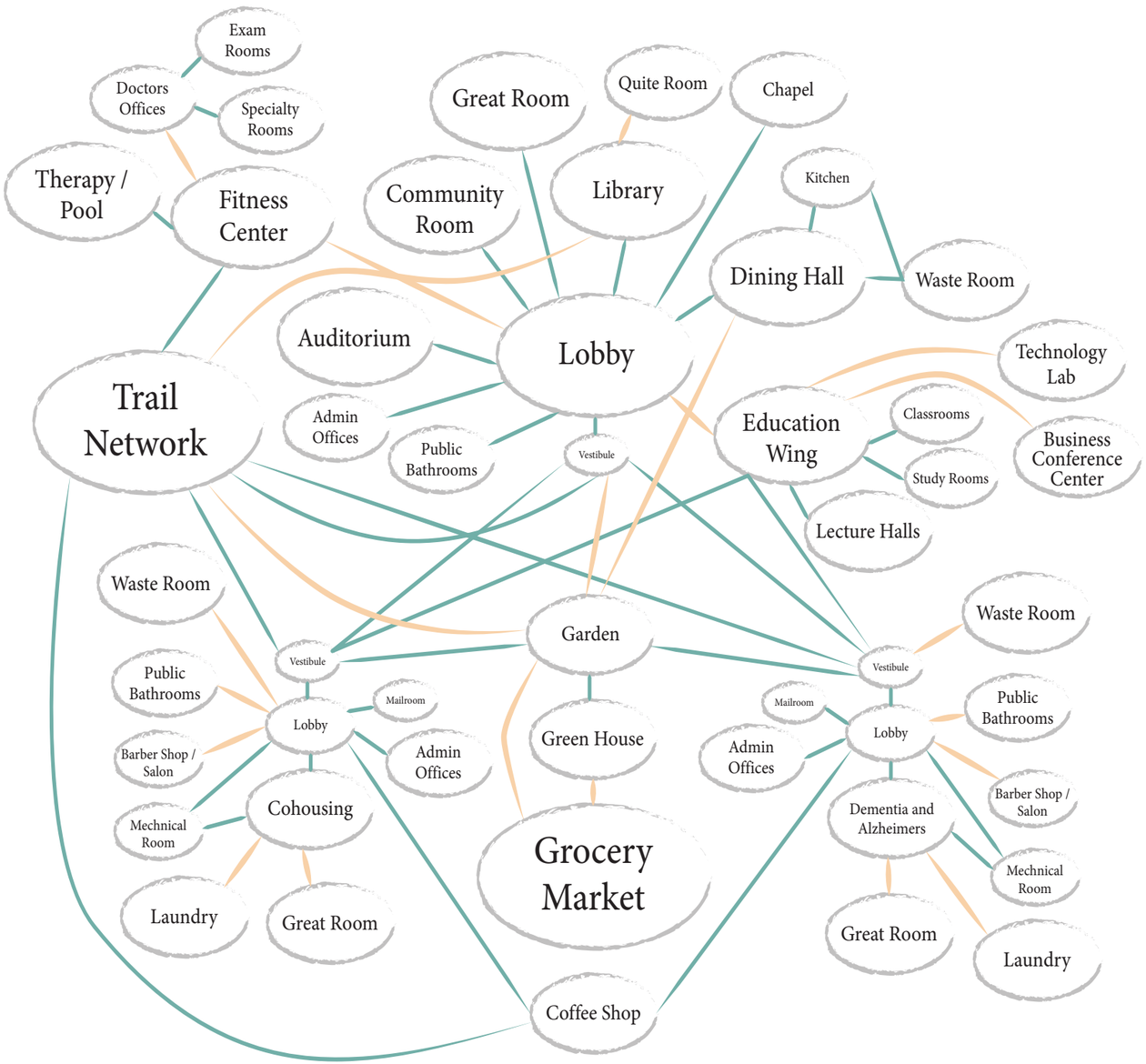


	SQUARE FOOTAGE NEEDS	ADJACENCIES	PUBLIC ACCESS	DAYLIGHT / VIEWS	PRIVACY	PLUMBING	SPECIAL EQUIPMENT	OTHER CONSIDERATIONS
								Everything handicap accesible
1. APARTMENTS	+/- 800	Central	M	Y	M	Y	Y	1 bedroom, 2 bedroom, cohousing, alzheimers specific, handicap accesible
2. HOUSES	+/- 800	Central	M	Y	M	Y	Y	1-2 story, integrated with apartments, handicap accesible
3. KITCHEN	+/- 1200	4 14	N	N	M	Y	Y	ovens, refrigerators, sinks, storage, prep stations, cold storage, access to garden
4. DINING HALL	+/- 2000	3 14	H	Y	N	N	N	varied seating, outdoor access,
5. LOBBIES	+/- 1800	Central	Y	Y	N	N	N	
6. VESTIBULES	+/- 50	Central	Y	Y	N	N	Y	
7. COMMUNITY ROOM	+/- 1800	5 11 38 13	Y	Y	N	N	N	space for events, flexible, can be seperated, game tables, activities for all ages
8. CLASSROOMS	+/- 900	9 11 25 12	L	Y	M	N	Y	pre-k classrooms, college classrooms, lifelong education rooms
9. LECTURE HALLS	+/- 1200	8 11 25 12	L	Y	M	N	Y	
10. BARBER SHOP / SALON	+/- 1500	1 2	Y	N	N	Y	Y	barber chairs, special sinks, hair dryers
11. AUDITORIUM	+/- 2000	5 13 38 7	Y	N	M	N	Y	
12. LIBRARY	+/- 2000	5 39	Y	Y	M	Y	Y	
13. PUBLIC BATHROOMS	+/- 225	Central	Y	N	Y	Y	N	hand bars, rails, more ADA stalls
14. WASTE ROOMS	+/- 300	3 4	N	N	L	N	N	
15. MECHANICAL ROOMS	+/- 1000	Central	N	N	L	N	N	houses HVAC that is most benefical to elderly and will have several AHU with VAV systems
16. COFFEE SHOP	+/- 1300	1 2 18 21	Y	N	N	Y	Y	indoor & outdoor seating, drink prep, drink making, product shelfs
17. GROCERY MARKET	+/- 12000	1 2 18	Y	N	N	Y	N	small local market, elderly friendly, fresh foods and nutrient rich options
18. GARDENS	VARIES	Central	Y	Y	N	N	N	supplies produce to market, used as a teaching moment, outdoor activity
19. FITNESS CENTER	+/- 5000	1 2 21 41	Y	M	M	Y	Y	designed around elderly fitness and wellbeing, connected to therapy pool
20. JANITORS CLOSETS	+/- 30	Central	N	N	Y	Y	Y	
21. TRAILS	VARIES	Central	Y	Y	N	N	N	important that it is a full circle, scenery, work out options along the path
22. PARKING	VARIES	Central	Y	Y	M	N	N	not as important if very close to campus, but might be necessary for only elderly
23. TERRACES	VARIES	Common Spaces	Y	Y	M	N	N	connected to a majority of the common spaces and big enough for outdoor events
24. HALLWAYS	.3 CIRC. FACTOR	Central	Y	N	M	N	N	big enough for wheelchairs and walkers
25. STUDY ROOMS	+/- 250	9 11 8 12	Y	Y	N	N	N	close proximity to common spaces and housing
26. DOCTOR'S OFFICES	+/- 150	27 28 41	N	N	Y	Y	Y	close proximity to housing
27. EXAM ROOMS	+/- 150	28 26 41	N	N	Y	Y	Y	design for elderly patients and younger patients
28. SPECIALTY ROOMS	+/- 100	27 26 41	N	N	Y	N	Y	x-ray, MRI, and other machines commonly needed
29. CONFERENCE ROOMS	+/- 250	11 30 31	Y	Y	N	N	N	
30. BUSINESS CENTER	+/- 500	11 29 31	M	L	M	N	Y	close proximity to housing
31. TECH. LAB	+/- 400	11 29 30	M	L	M	N	Y	classroom designed specifically for elderly technology learning
32. STORAGE	VARIES	Central	N	N	Y	N	N	every community and gathering space needs storage as well as maintenace programs
33. ADMIN OFFICES	+/- 100	36 35	Y	Y	N	N	N	
34. CHAPEL	+/- 1000	7	Y	M	Y	N	N	nondenominational chapel for the diverse amount of residence and students
35. MAIL ROOM	+/- 600	36 33	Y	Y	N	N	N	
36. CONCIERGE	+/- 200	33 35	Y	Y	N	N	N	
37. LAUNDRY ROOM	+/- 1500	1 2	M	N	M	Y	Y	some rooms will have some, but facility wide laundry is beneficial
38. GREAT ROOM	+/- 1800	11 7 5	Y	Y	N	N	N	
39. QUIET ROOM	+/- 1500	12	Y	Y	Y	N	N	close proximity to gathering rooms and library
40. GREEN HOUSE	VARIES	Central	Y	Y	N	N	N	connected to garden and can be used for kitchen food as well
41. THERAPY / POOL	+/- 1200	1 2 21 19	Y	M	M	Y	Y	connected to fitness center and can hold events

Evan Dziedzic

Program

Bubble Diagram



XI

Site Selection

Site Selection - University of Houston

Site Option 1

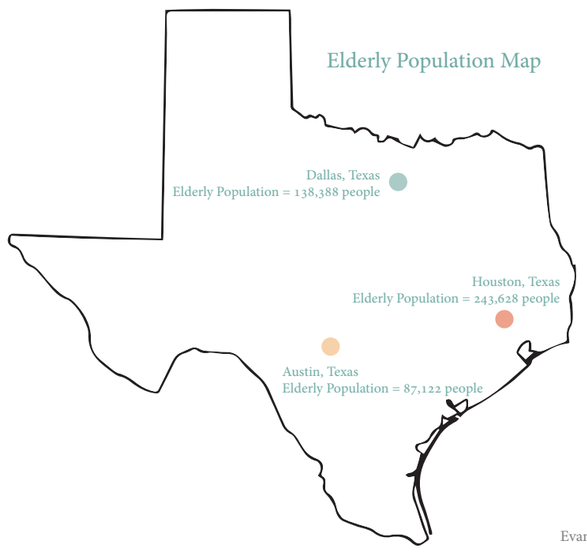
UNIVERSITY of HOUSTON

1. Method of Selection

- Texas has the 3rd highest amount of elderly, 2nd highest amount of college students, and 2nd highest amount nursery students

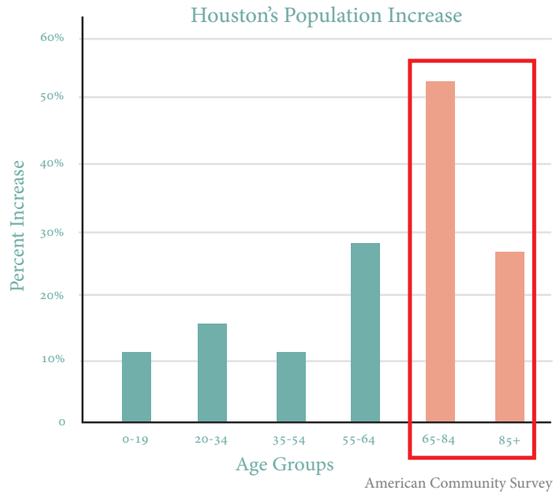
Evan Dziedzic

- The three cities with the largest elderly population in Texas, in 2019, are Houston, Austin, and Dallas



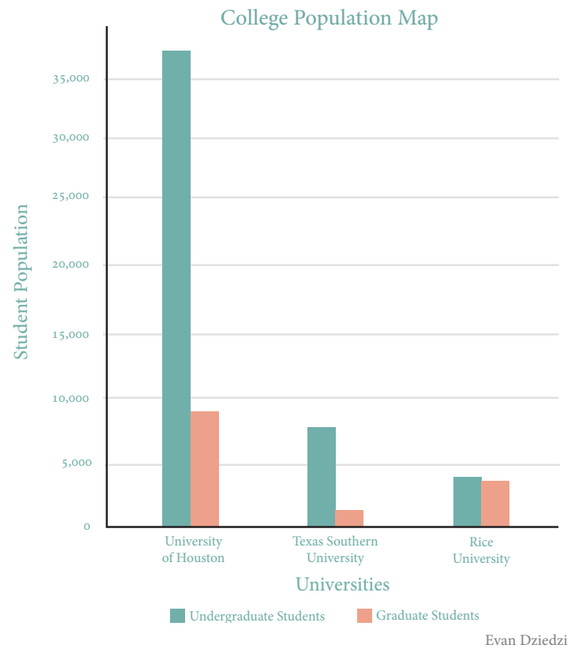
Evan Dziedzic

- Houston's elderly population aged 65+ is growing faster than any other age and has grown nearly 50% from 2010-2018



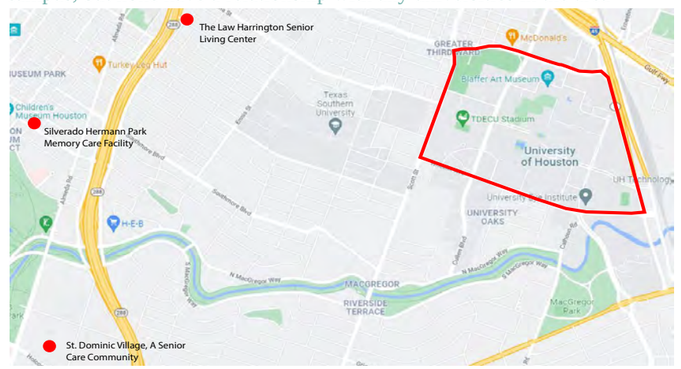
American Community Survey

- Over 30 colleges and universities in the Houston area and the top three with the most college students are the University of Houston, Texas Southern University, and Rice University.



Evan Dziedzic

- There are currently three senior living facilities within two miles of campus, but none have a relationship with any universities in the area



Google Maps

2. Criteria

A. New Construction = +/- 100,000 SQ. FT.
- 3 Program Design
  - Community gathering building
  - Cohousing building for students and elderly
  - Alzehimers and Dementia Building

B. Climate is optimal, but humidity can be a concern

C. Benefiting Communities
- Elderly
- University of Houston
- Surrounding neighborhoods and schools

D. Transportation Options
- Campus Shuttle
- Buses into downtown Houston
- Walking / Biking Paths
- Car

E. Employment Opportunities
- Job creation for college students and elderly
  - Daycare
  - Teaching
  - Grocery / Food Service
  - Volunteer Opportunity
  - Promotes skill learning and experiences
  - Residents learn geriatric care skills
  - Students learn how to teach
  - Elderly take classes at college

G. Medium / High Level Campus Security

F. Neighborhood Amenities
- Use of college facilities
- Classrooms
- Sports Arenas and Facilities
- School events
- Medical research
- School Shuttle
- Greenway Walking / Bike Path

H. Zoning potential or existing infrastructure
- Along the Brays Bayou
- Against Highway Spur 5
- Public and Institutional Zoning
- Underdeveloped sites and brown sites

I. Schools in Proximity
- Rice University
- Texas Southern University
- Energy Institute High School
- Yates High School
- KIPP PEACE Elementary School
- Austin High School

J. Community Attractions
- Houston Museum District
- Houston Zoo
- Museum of Natural Science
- Hermann Park Golf Course
- MacGregor Park
- Shape Community Center
- Darryl & Lori Schroeder Park

Conclusion

- Colleges with University-Based Retirement Communities already exist in other states with high elderly, college student and nursery student populations like California, New York, and Florida.

- University of Houston provides the similar characteristics that are found in other colleges that form their own town college towns

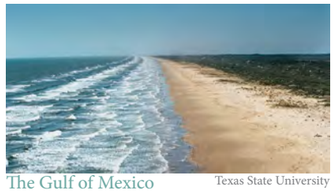
- Has existing medical facilities and easily accessible transportation for the current residents living around and on campus

Site Selection - University of Houston

3. Existing Site

International = Gulf Coast, United States — Google Earth

The Great Plains — Texas: The State of Water

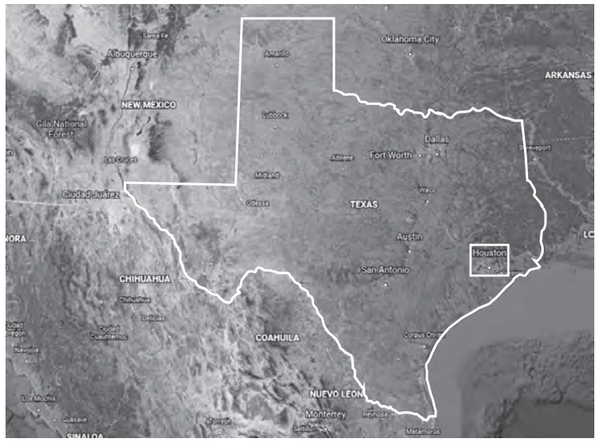


The Gulf of Mexico — Texas State University

Metropolitan = Houston, Texas — Google Earth

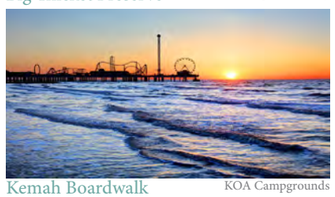
Buffalo Bayou — Buffalo Bayou Partnership

Houston Zoo — Houston Museum District



National = Texas, South Central Gulf, United States — Google Earth

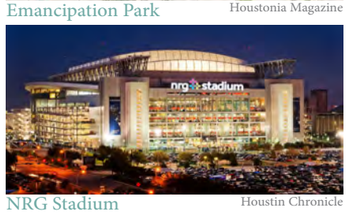
Big Thicket Preserve — Wide Open Country



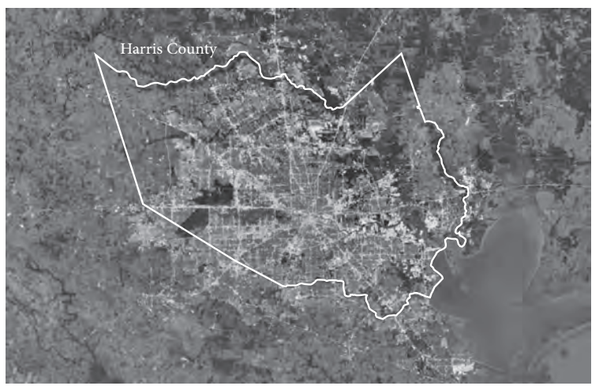
Kemah Boardwalk — KOA Campgrounds

District = Greater Third Ward, Houston, Texas — Google Earth

Emancipation Park — Houstonia Magazine



NRG Stadium — Houstin Chronicle



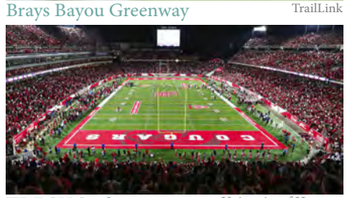
Regional = Harris County, Southeast Texas — Google Earth

San Jacinto Park — Rice Design Alliance

Brazos Bend — Texas Park and Wildlife

University of Houston - Main Campus, Houston, Texas — Google Earth

Brays Bayou Greenway — TrailLink



TDECU Stadium — University of Houston

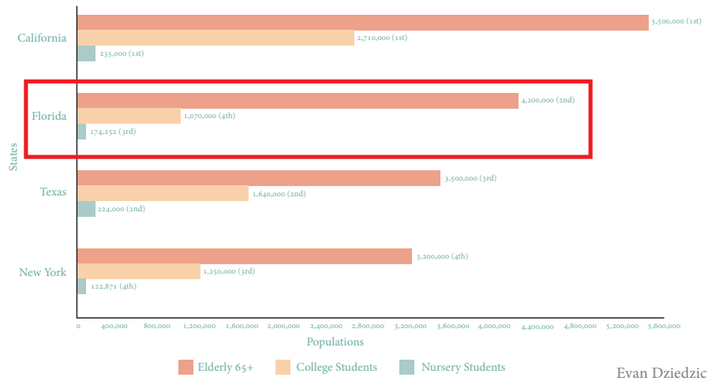
Site Selection - UNF

Site Option 2

UNF UNIVERSITY of NORTH FLORIDA

1. Method of Selection

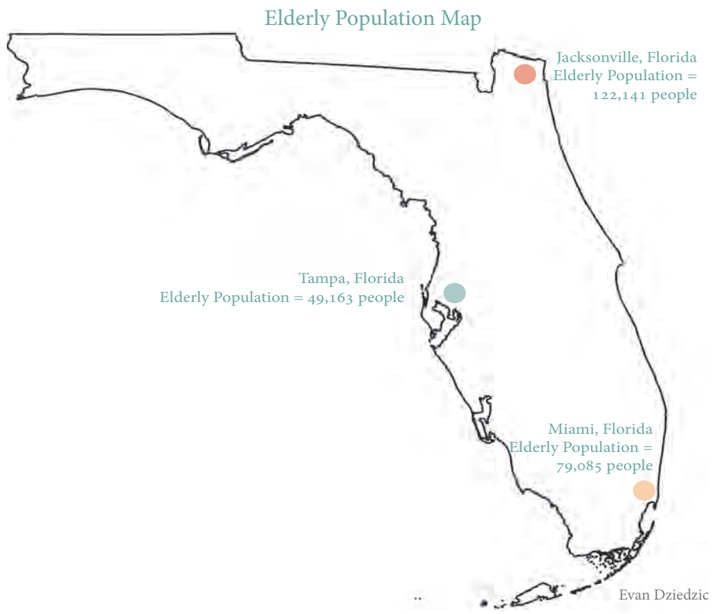
- Florida has the 2nd highest amount of elderly, 4th highest amount of college students, and 3rd highest amount nursery students



Evan Dziedzic

- The three cities with the largest elderly population in Florida, in 2020, are Jacksonville, Miami, and Tampa.

Elderly Population Map



Evan Dziedzic

- Of the 11 counties in Jacksonville, Florida, 9 had a population increase and 6 had a significant increase. Duval county had the 4th largest increase and is home to University of North Florida.

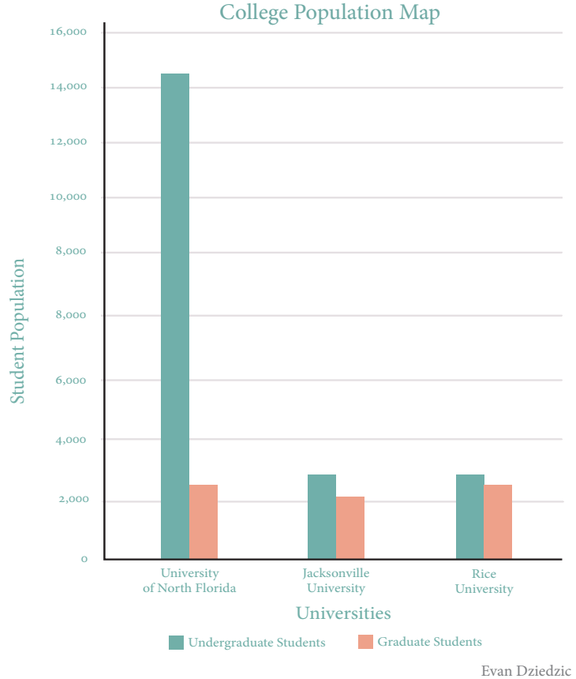
Jacksonville's Population Increase

County	2010	2020	Percent Change
Duval	864,263	995,567	15.2%
St. Johns	190,039	273,425	43.9%
Clay	190,865	218,245	14.3%
Nassau	73,314	90,352	23.2%
Alachua	247,336	278,468	12.6%
Baker	27,115	28,259	4.2%
Bradford	28,520	28,303	-0.8%
Columbia	67,531	69,698	3.2%
Flagler	95,696	115,378	20.6%
Putnam	74,364	73,321	-1.4%
Union	15,535	16,147	3.9%

US Census Bureau

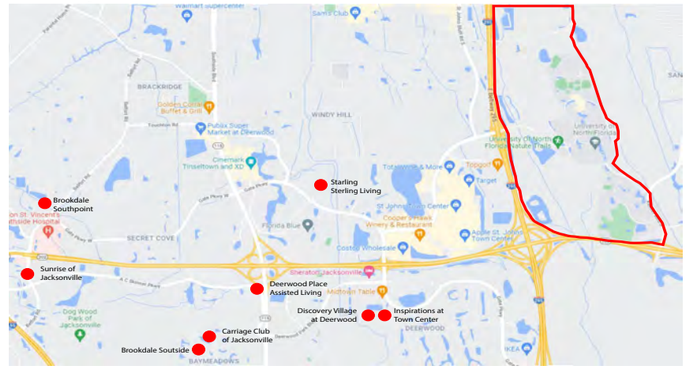
- In Jacksonville there are 10 colleges and universities. The top three colleges with the most students are The University of North Florida, Jacksonville University, and Flagler College.

College Population Map



Evan Dziedzic

- There are currently 6 senior living facilities in close proximity to the University of Northern Florida and none of them interact with the University.



Google Maps

2. Criteria

A. New Construction = +/- 100,000 SQ. FT.
- 3 Program Design
  - Community gathering building
  - Cohousing building for students and elderly
  - Alzehimers and Dementia Building

B. Climate is optimal, but humidity can be a concern

C. Benefiting Communities
- Elderly
- University of North Florida
- Surrounding neighborhoods and schools

D. Transportation Options
- Campus Shuttle
- Walking / Biking Paths
- Car
- Town Connector Buses

E. Employment Opportunities
- Job creation for college students and elderly
- Daycare
- Teaching
- Grocery / Food Service
- Volunteer Opportunity
- Promotes skill learning and experiences
- Residents learn geriatric care skills
- Students learn how to teach
- Elderly take classes at college

G. Medium Campus Security

F. Neighborhood Amenities
- Use of college facilities
- Classrooms
- Sports Arenas and Facilities
- School events
- Beach Access by transportation
- Nature Trails
- Mayo Hospital

H. Zoning potential or existing infrastructure
- Bordered by Highway 295, 212, and 202
- Located inland
- Public and Institutional Zoning
- Undeveloped sites and many trees

I. Schools in Proximity
- Florida State College
- Sandalwood High School
- Duval Charter School K-6
- Deerwood Academy Preschool
- Windy Hills Elementary School
- Tulsa Welding School

J. Community Attractions
- University of North Florida Nature Trails
- Jacksonville Golf and Country Club
- Windsor Parke Golfe Club
- Jacksonville Beach
- Flight Adventure Park Jacksonville
- Dog Wood Park of Jacksonville
- Deerwood Rotary Childrens Park

Conclusion

- Currently in Florida there are 6 Colleges with University-Based Retirement Communities. All UBRCs are located in north-west Florida and central Florida.

- Overall, the elderly in Florida are spread out more evenly through out the state. The population of elderly and college students is significantly less than those in high density cities in other states.

- University-Based Retirement Communities have already been implemented effectively through out the state, but with the increase in Duval County a new facility may need to be implemented

- Not a big need for more UBRC's in this area or Florida.

Site Selection - UNF

3. Existing Site

International = Atlantic Ocean, United States — Google Earth

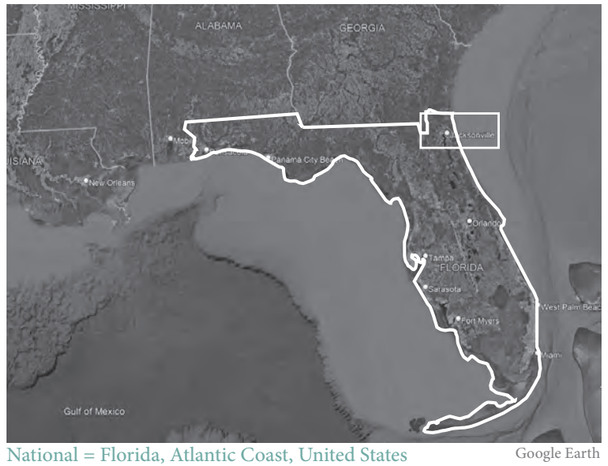
Timucuan Preserve — Will Dickey Photography

The Everglades — Antropocene.it

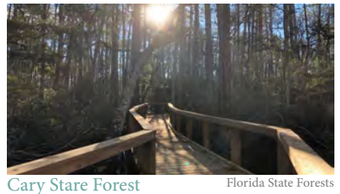
Metropolitan = Jacksonville, Florida — Google Earth

Memorial Park — St. Petersburg Parks & Rec

Fort Caroline — National Park Service



National = Florida, Atlantic Coast, United States — Google Earth



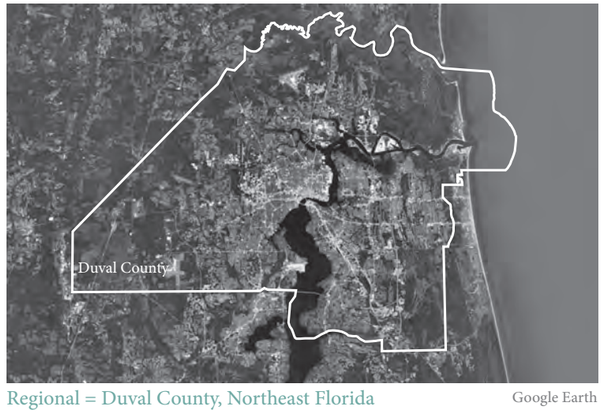
Cary Stare Forest — Florida State Forests

Cradle Creek — The Volen Group

Neighborhood = Sans Pareil, Jacksonville, Florida — Google Earth

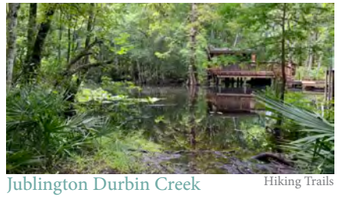
Glen Kernan Club — Glen Kernan

Jacksonville Club — Jacksonville Golf Club

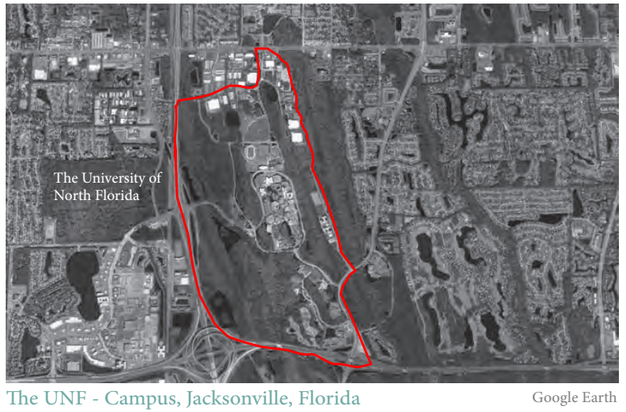


Regional = Duval County, Northeast Florida — Google Earth

Jennings State Forest — Van Delicious



Jublington Durbin Creek — Hiking Trails



The UNF - Campus, Jacksonville, Florida — Google Earth

UNF Nature Trail — UNF Digital Commons

Hodges Stadium — Daily Relay

Site Selection - UC San Diego

Site Option 3

UC San Diego

1. Method of Selection

- California has the highest amount of elderly, highest amount of college students, and highest amount nursery students

Evan Dziedzic

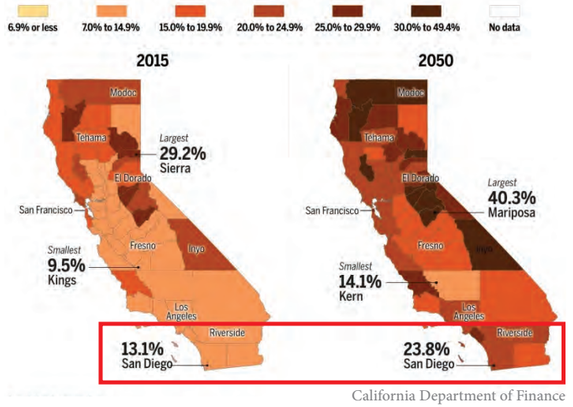
- The three counties with the largest elderly population in California, in 2019, are Los Angeles, Orange County, and San Diego County.

Elderly Population Map

Evan Dziedzic

- In the next 35 years it is expected that San Diegos elderly population will increase over 10%. San Diego has the 3rd highest elderly population and is expected to grow steadily.

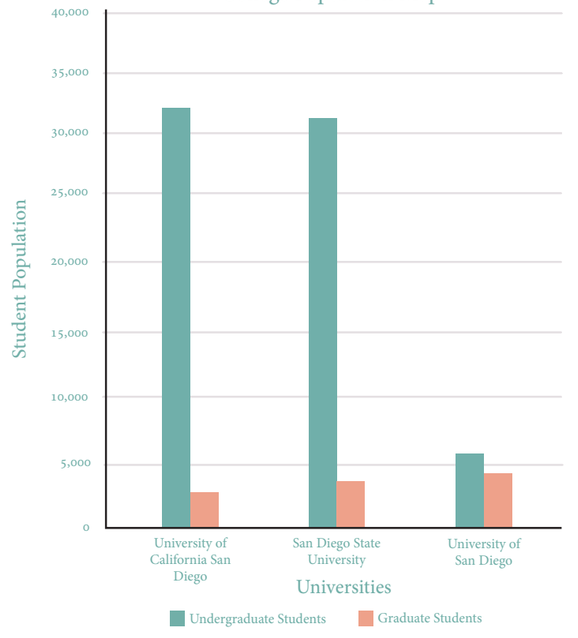
California's Population Increase



California Department of Finance

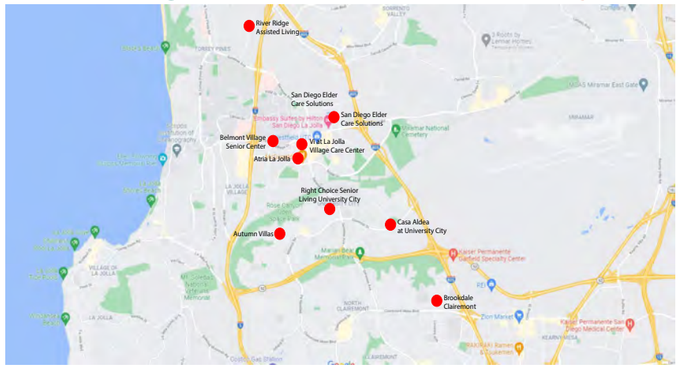
- In San Diego County there are 12 colleges and universities. The top three colleges with the most students are The University of California San Diego, San Diego State University, and National University

College Population Map



Evan Dziedzic

- Currently 19 senior living facilities in close proximity to the University of California San Diego and none of them interact with the University.



Google Maps

2. Criteria

A. New Construction = +/- 100,000 SQ. FT.
- 3 Program Design
  - Community gathering building
  - Cohousing building for students and elderly
  - Alzehimers and Dementia Building

B. Climate is ideal, warm and dry climate is best for health and wellbeing

C. Benefiting Communities
- Elderly
- University of California San Diego
- Surrounding neighborhoods and schools
- Surrounding institutes

D. Transportation Options
- Campus Shuttle
- Walking / Biking Paths
- Campus light rail

E. Employment Opportunities
- Job creation for college students and elderly
- Daycare
- Teaching
- Grocery / Food Service
- Volunteer Opportunity
- Promotes skill learning and experiences
- Residents learn geriatric care skills
- Students learn how to teach
- Elderly take classes at college

G. Medium Campus Security

F. Neighborhood Amenities
- Use of college facilities
- Classrooms
- Sports Arenas and Facilities
- School events
- Beach Access by transportation
- Nature Trails
- VA San Diego Healthcare System

H. Zoning potential or existing infrastructure
- Bordered by San Diego Freeway
- Close proximity to beach
- Brown Sites
- Desert land and foliage

I. Schools in Proximity
- Seventh College
- Eleanor Roosevelt College
- Thurgood Marshall College
- Torrey Pines Elementary School
- La Jolla Country Day School
- Doyle Elementary School

J. Community Attractions
- Torrey Pines City Beach
- Scripps Coastal Meander Trailhead
- Black's Beach
- Torrey Pines Golf Course
- Los Pansaquitos
- Ellen Browning Scripps Memorial Pier
- Salk Institute

Conclusion

- Most of the current UBRC's are located in Northern California or in the Los Angeles County area, but California overall has a large amount of retirement communities

- The area of The University of California San Diego is near the water and outdoor activities, has many other schools and institutions in the area, and is like its own town because the surrounding areas are suburban neighborhoods

- With the expected growth of the elderly population by 2050, he University of California San Diego area may be the ideal place for and UBRC, considering weather, population, and location

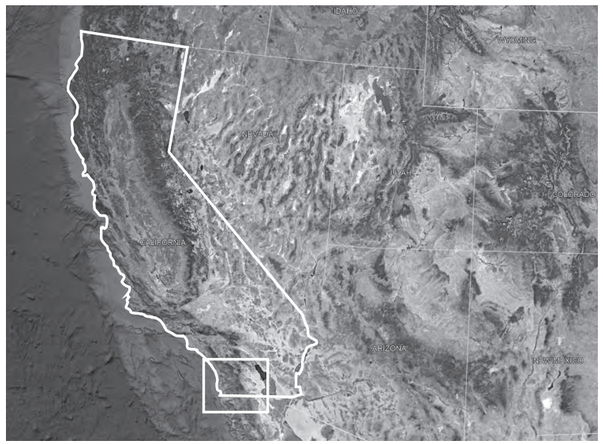
Site Selection - UC San Diego

3. Existing Site

International = Pacific Ocean, United States — Google Earth

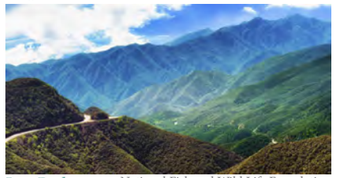
Santa Barbara — Robb Report

Napa Valley — Abercrombie & Kent

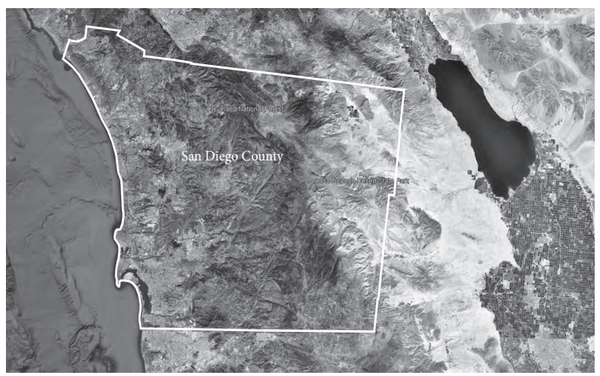


National = California, South Pacific, United States — Google Earth

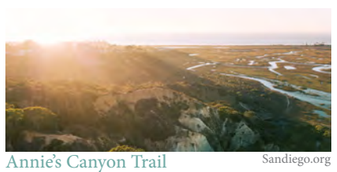
Sequoia National Park — National Park Foundation



Los Padres — National Fish and Wild Life Foundation



Regional = San Diego County, Southwest California — Google Earth



Annie's Canyon Trail — Sandiego.org

Sunset Cliffs — RootsRated

Metropolitan = San Diego, California — Google Earth

Neighborhood = Torrey Pines, San Diego, California — Google Earth

UC San Diego - Campus, San Diego, California — Google Earth

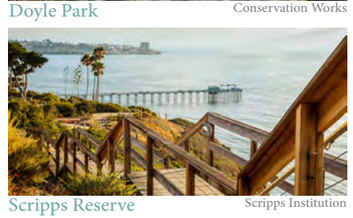
Mount Soledad — California Beaches

La Jolla Cove — La Jolla Mom

Torrey Pines — Sandiego.org

Black's Beach — Viewfinder

Doyle Park — Conservation Works

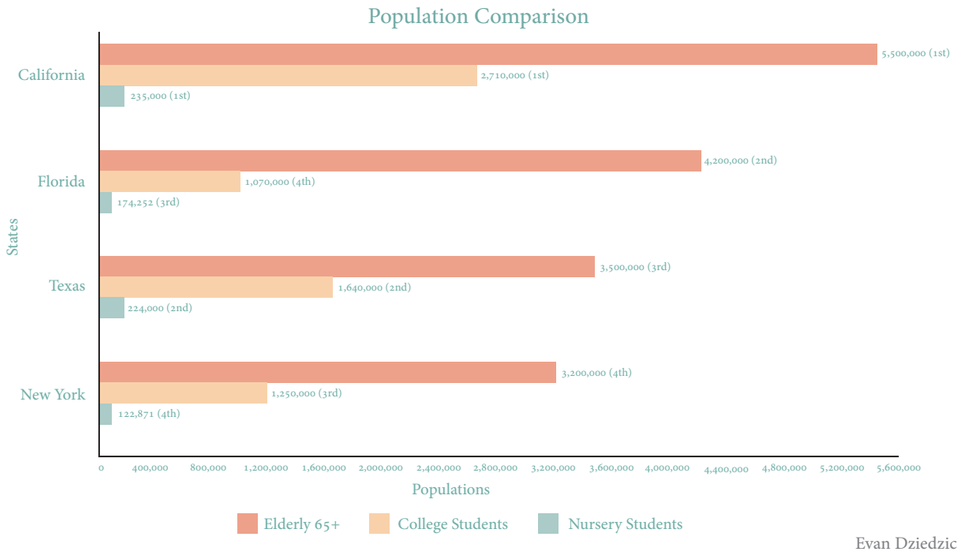


Scripps Reserve — Scripps Institution

Site Comparison

Population Comparison

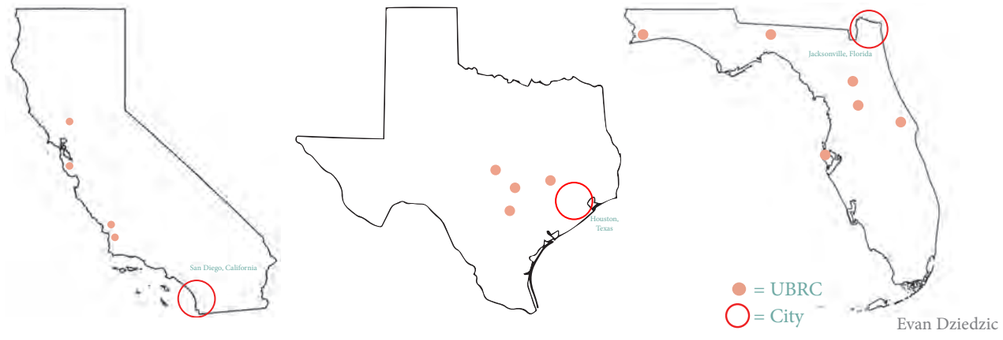
- State Populations
  - Looked at the top four states with the highest elderly, college student, and nursery student populations
  - Came to the conclusion that the four states were California, Florida, Texas, and New York
  - Of the four states, New York had the least amount of population in all three researched groups so it was not focused on site research



Evan Dziedzic

Comparison of Existing University Based Retirement Communities

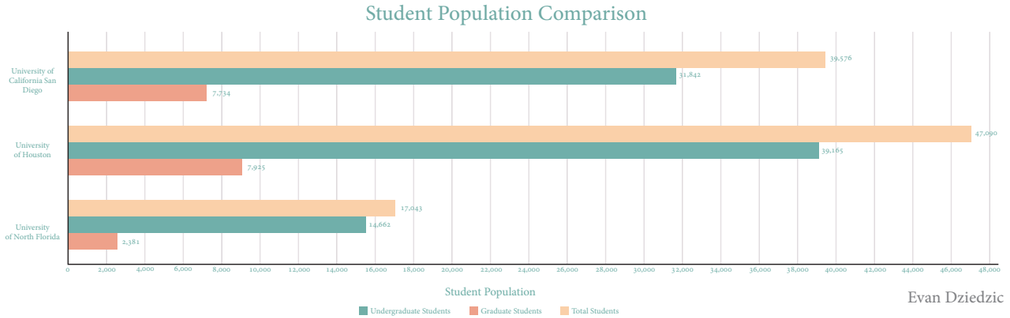
- Existing UBRC's
  - Over 100 UBRC's in the United States with a few being in the construction phase
  - California has four, two in northern California Bay area and two in Los Angeles County
  - Florida has six, three in north eastern Florida and three in central Florida
  - Texas has five, all in the southwest area of Austin and Dallas



Evan Dziedzic

College Population Comparison

- Larger campuses have the feeling out a college town that is easily navigable
- Larger student body allows for more interaction and social life on and around campus
- Campus needs to have outdoor experiences in and around the campus



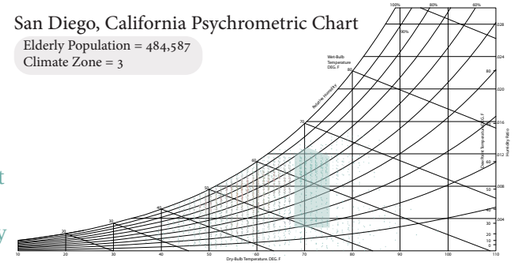
Evan Dziedzic

Climate Comparison

- Houstin has a warm and wet climate
- Jacksonville has a warm and wet climate
- San Diego has a warm and dry climate
- Based on psychrometric charts, Jacksonville and Houston have the most days out of the comfort zone
- Jacksonville and San Diego has the most consistent temperature ranges
- San Diego has the least amount of days of humidity outside the comfort zone

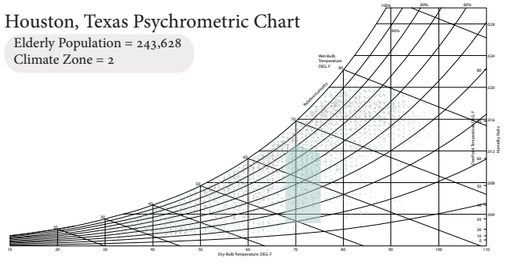
San Diego, California Psychrometric Chart

Elderly Population = 484,587
Climate Zone = 3



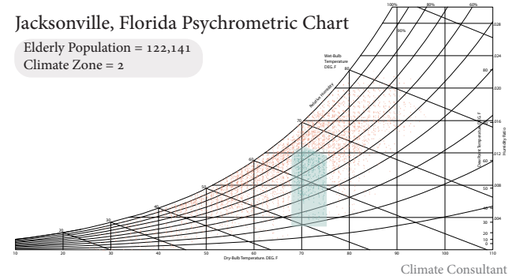
Houston, Texas Psychrometric Chart

Elderly Population = 243,628
Climate Zone = 2



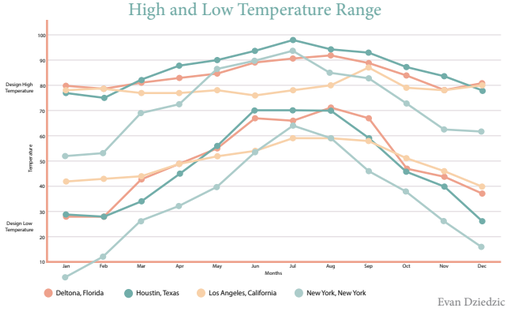
Jacksonville, Florida Psychrometric Chart

Elderly Population = 122,141
Climate Zone = 2



Climate Consultant

High and Low Temperature Range



Evan Dziedzic

Evan Dziedzic

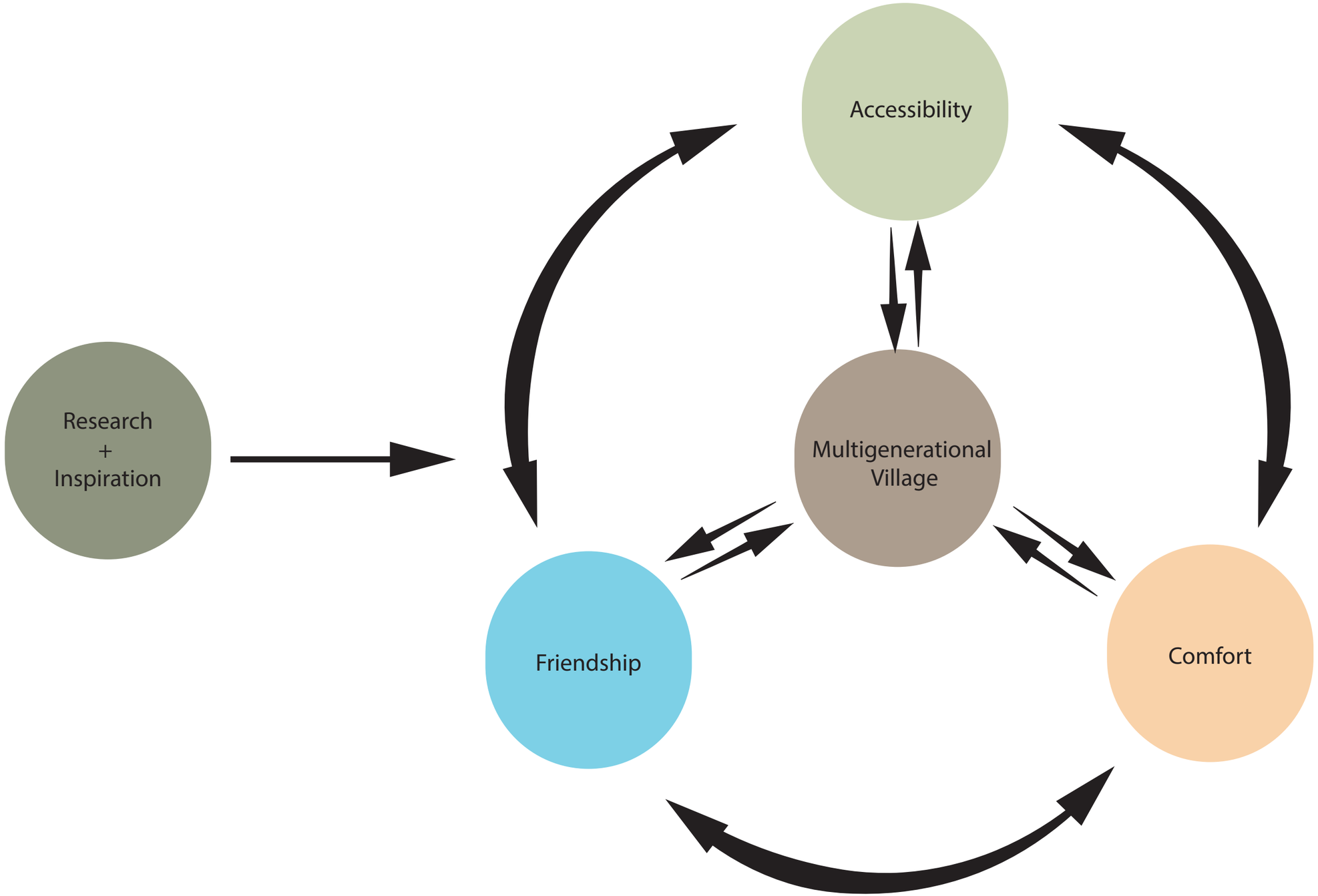
Part II

Thesis-II

XII

Design Process

Design Process



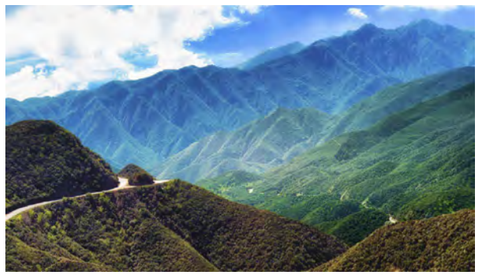
XIII

Site Analysis

Site Selection

Region of California

Sequoia National Park — National Park Foundation



Los Padres — National Fish and Wild Life Foundation

Torrey Pines Neighborhood

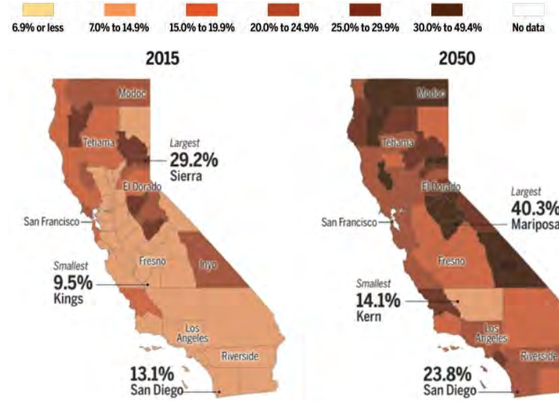
Torrey Pines — sandiego.org

Black's Beach — viewfinder

Elderly Age Population Map

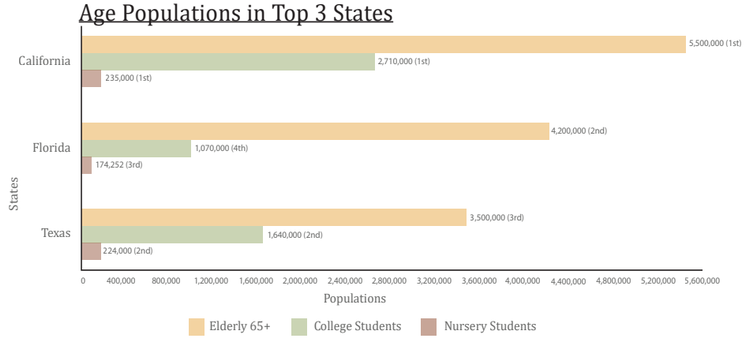
Evan Dziedzic

Elderly Age Population Map



California Department of Finance

Age Populations in Top 3 States



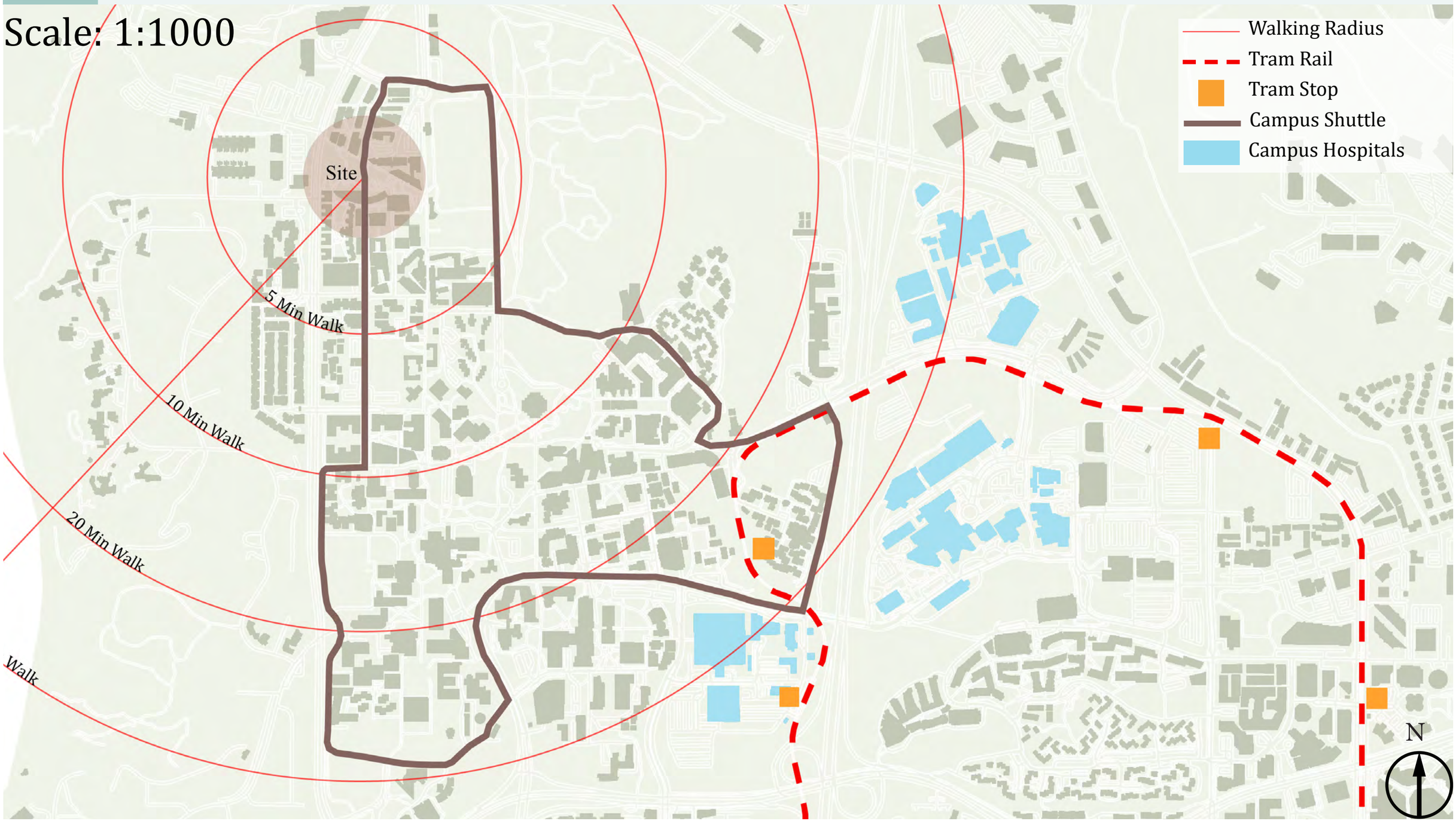
Existing Site

Figure Ground

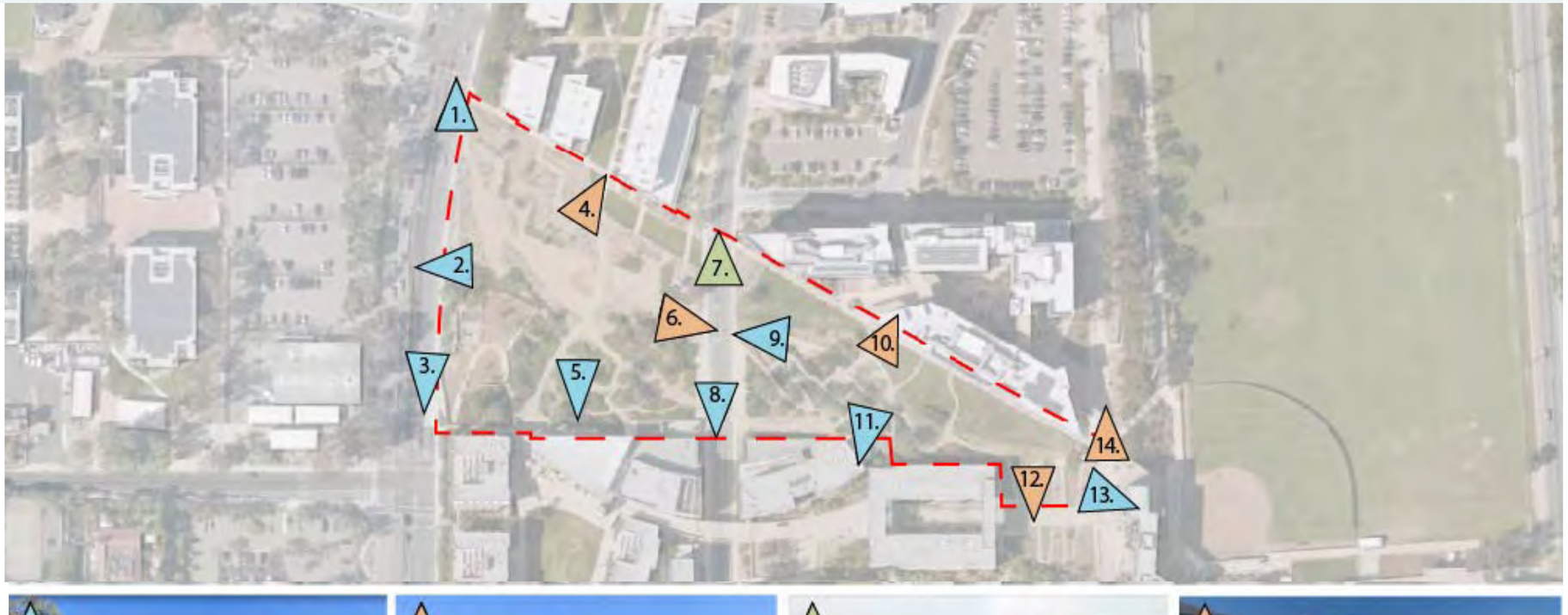
Scale: 1:1000

Site Vicinity

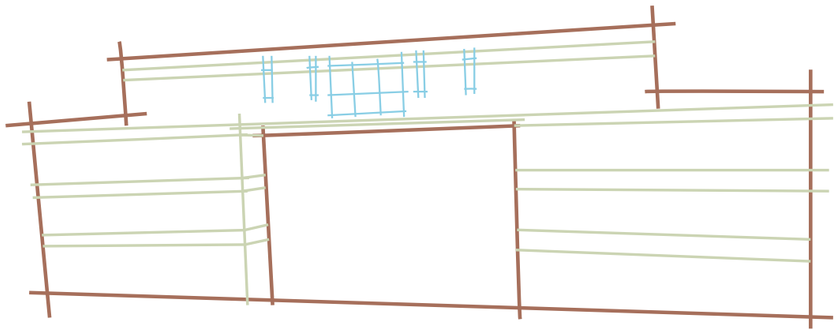
Scale: 1:1000

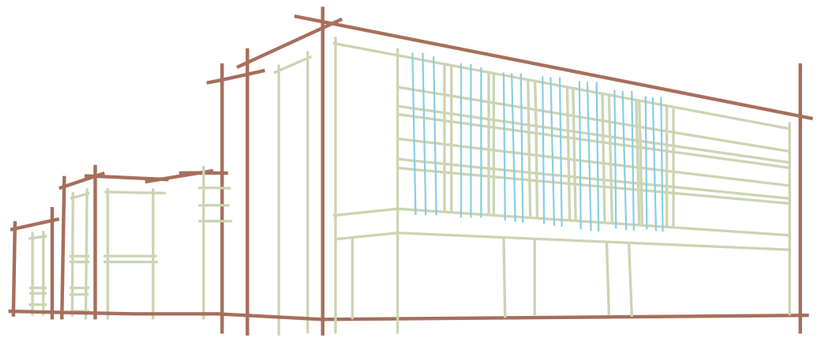


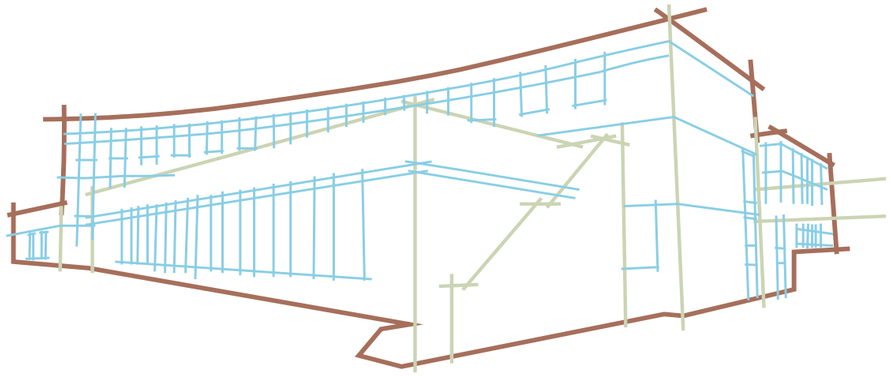
Site Views

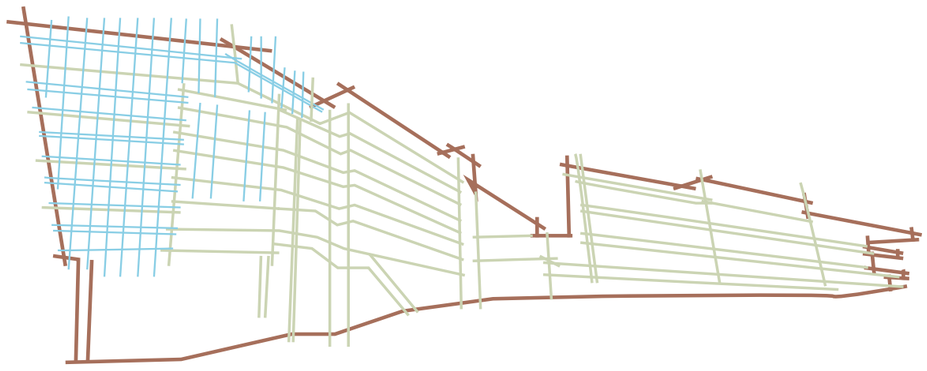


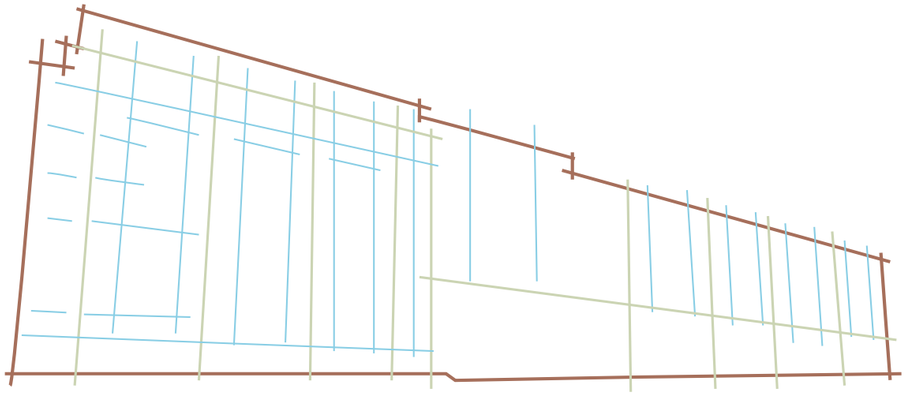
Surrounding Building Analysis

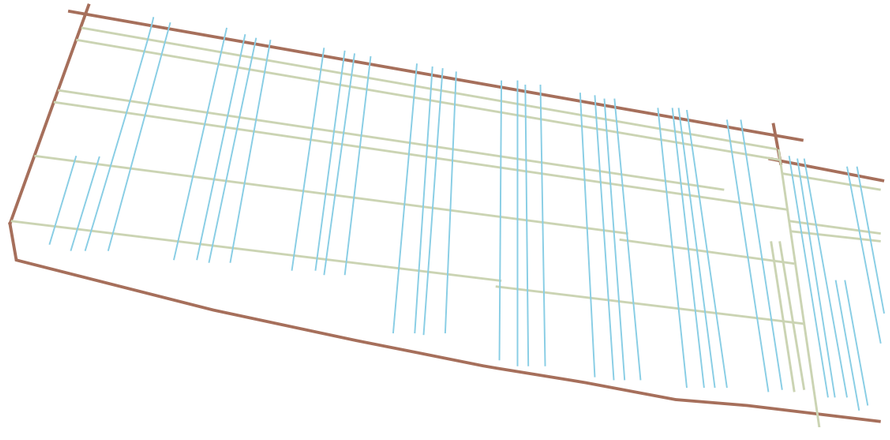




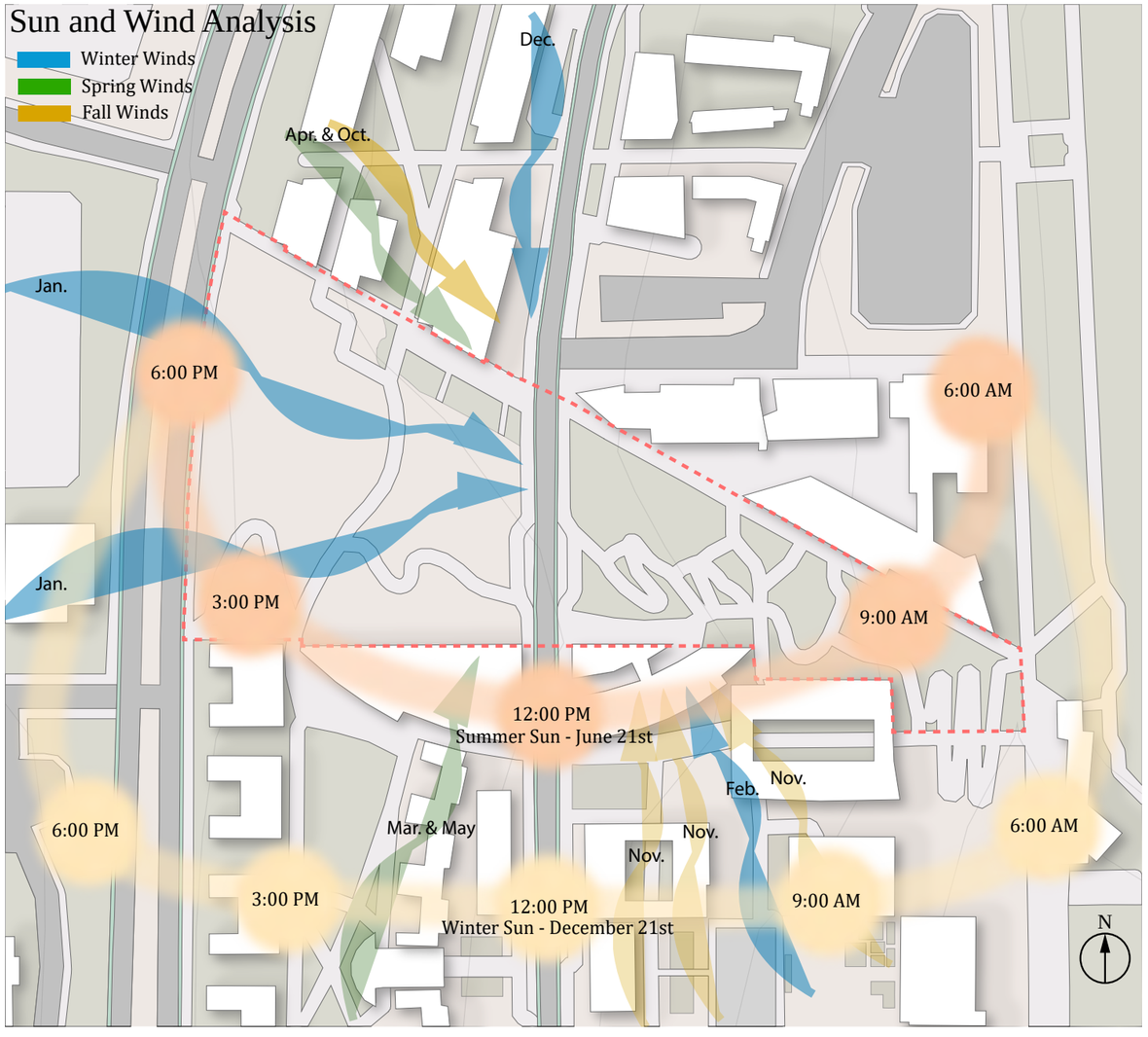


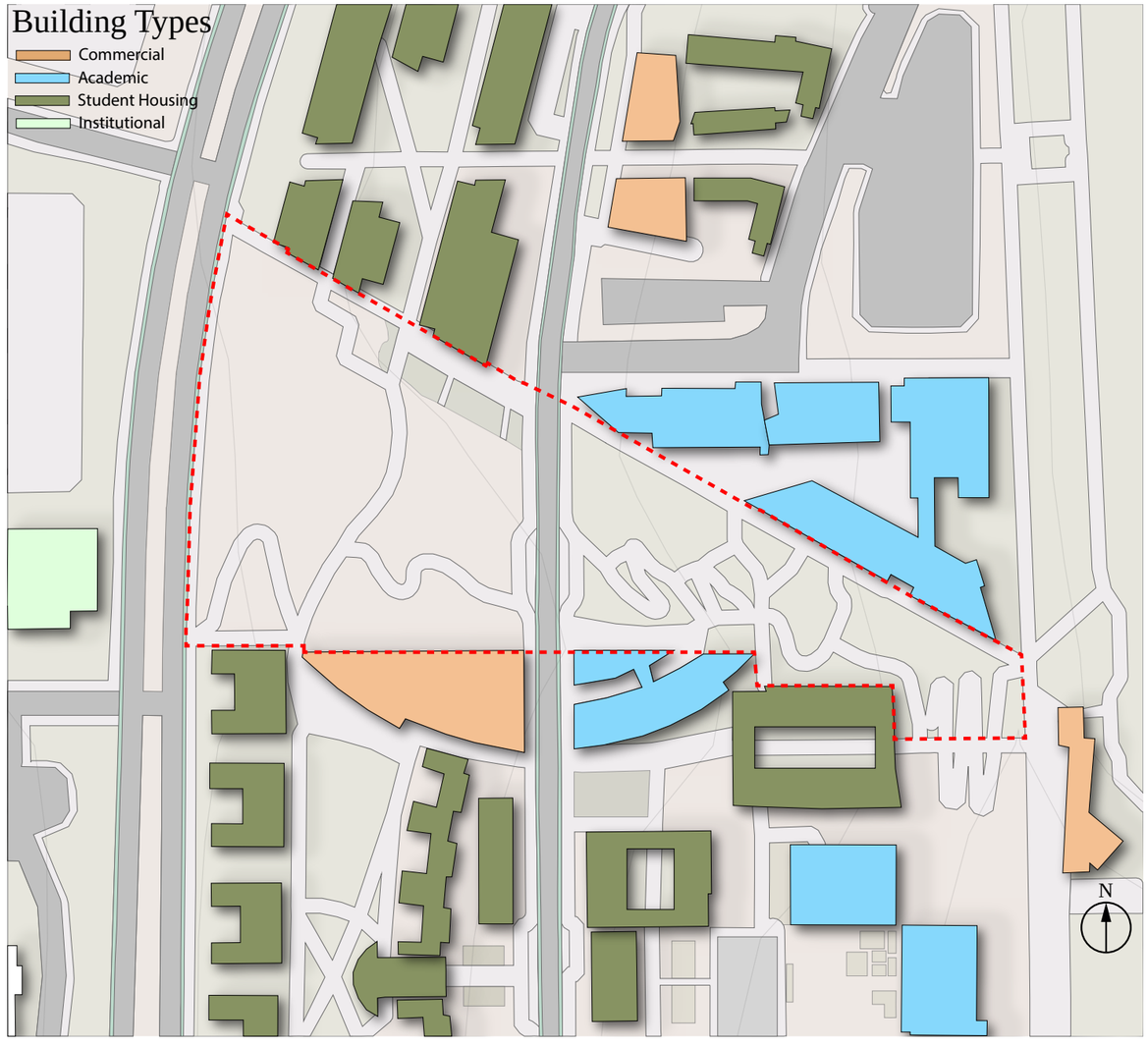




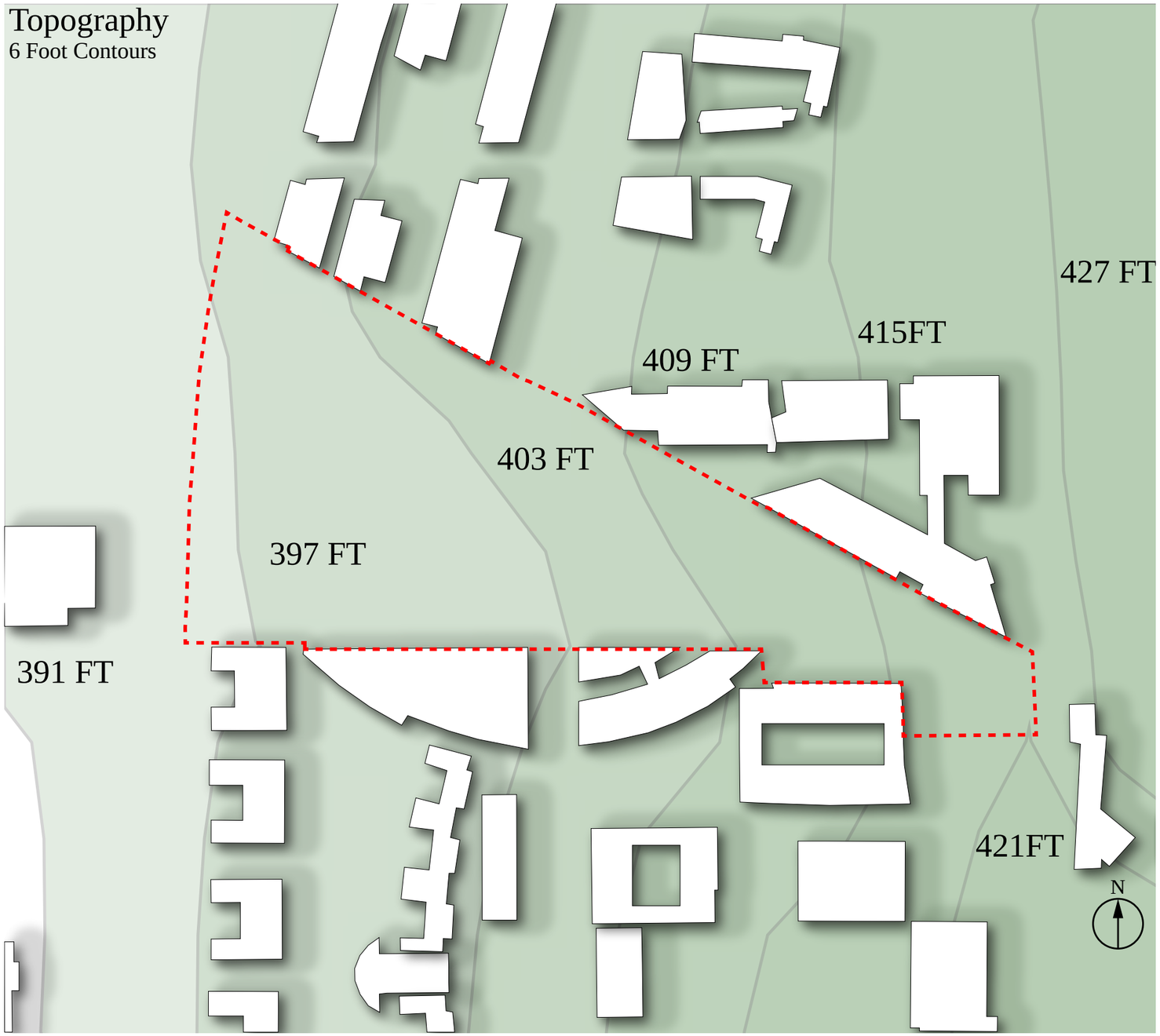


Micro Analysis





Micro Analysis



Climate Analysis

California Climate

Zone 7

Reference City:	San Diego
Latitude:	32.73 N
Longitude:	117.17 W
Elevation:	10 ft

Basic Climate Conditions

	(F)
Summer Temperature Range	14
Record High Temperature (1963)	111
Record Low Temperature (1949)	29

Design Day Data

Winter	99%	42
	97.5%	44

Summer

1%:	83	MCWB	69
2.5%:	80	MCWB	69

Climatic Design Priorities

Winter: Insulate
Reduce Infiltration
Passive Solar

Summer: Shade
Allow natural ventilation
Distribute Thermal Mass

Title 24 Requirements

Package	*C*	*D*
Ceiling Insulation	R38	R30
Wood Frame Walls	R21	R13
Glazing U-Value	0.38	0.67
Maximum Total Area	14%	20%

Climate

Climate Zone 7 is the southernmost coastal region of California. The warm ocean water and latitude make this climate very mild. The temperature of the ocean water affects the air temperature over it, and this in turn moderates temperatures over the coastal strip.

The ocean influences the weather most of the time, however the wind changes sometimes, bringing in the hot and extremely drying Santa Ana winds. The weather in the summer is warm and comfortable, and hot enough that cooling is necessary on some days.

	Oceanside	*Chula Vista*	*San Diego*	*La Mesa*
HDD	2009	1321	1256	1400
CDD	505	862	984	1110

HDD = Heating Degree Days (base 65F)
CDD = Cooling Degree Days

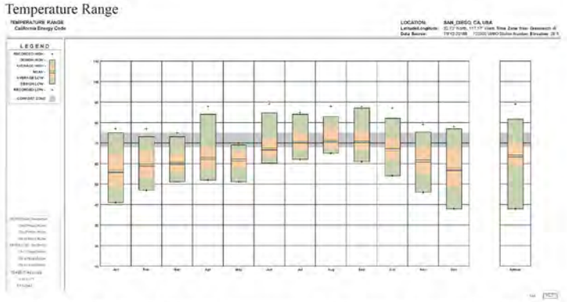
However, daily high fogs naturally cool the area at night. The winters are cool and heating is necessary sometimes. The weather and comfort standards in this region are in concurrence as shown by the low consumption of energy use.

Climate Summary

Based on the research completed in Thesis-I, climates that are dry and provide a lot of sunlight are best for seniors. San Diego, California is located in climate region 7 of California and in this region the climate is heavily affected by the ocean making the climate very mild and on the cooler side. This means that instead of more cooling degree days there needs to be more heating degree days. The sun is out a majority of the day and there is very little cloud coverage so it is important to harness the sun to its maximum potential. Since the ocean is close by there are cold winter winds that need to be blocked and cool fall winds that need to be used for natural ventilation. In the winter it is important to use the sun to its full advantage, reduce infiltration and obtain passive solar energy. While in the summer shading, natural ventilation, and distributed thermal mass are important.

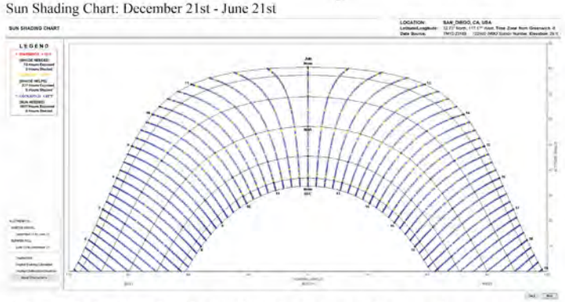
Climate Analysis

Temperature Range



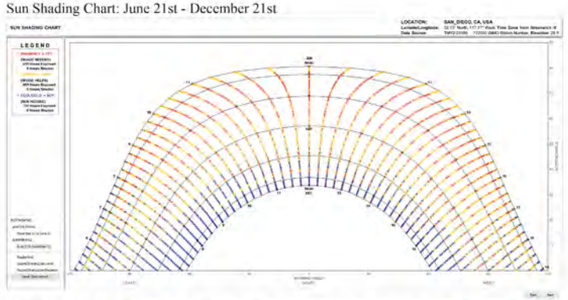
Based on the date seen in San Diego's temperature range bar chart it can be seen that the summer months of July, August, and September mean temperatures land in the comfort zone. A quarter of the year lands in the comfort zone, but then surprisingly, the rest of the year actual lands below the comfort zone so that means buildings will need to be more heated than cooled.

Sun Shading Chart: December 21st - June 21st



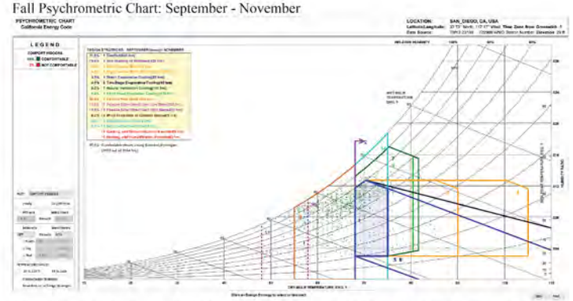
In the Sun Shading Chart from the days December 21st to June 21st, it can be seen that a majority of the winter and spring months need sun. Because of this heat gain strategies need to be a consideration. The legend shows that only 73 hours are warm/hot and that shade is needed, while 1887 hours are too cold and that sun is needed for warmth. Elderly people easily get cold do to poor circulation so heat gain and collection is very important.

Sun Shading Chart: June 21st - December 21st



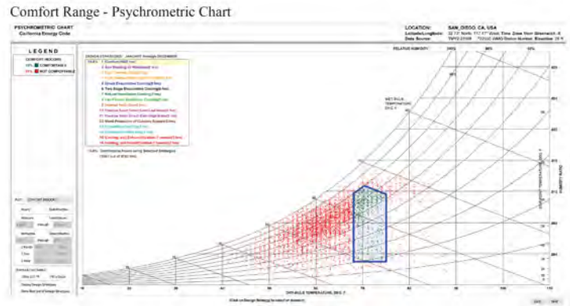
Unlike the chart to the left, it can be seen there are many more hours between the months of June and December that are comfortable. During the summer and fall months 959 hours are comfortable and now only 791 hours need sun and warmth. Therefore shading is important to block the sun for the 458 warm/hot hours, but heat gain is still a very important strategy once it come to the end of the fall.

Fall Psychrometric Chart: September - November



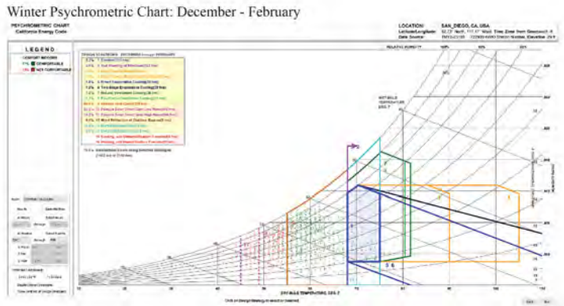
Like all the other season, internal heat gain is the strategy that provides the most comfort hours for the fall.

Comfort Range - Psychrometric Chart



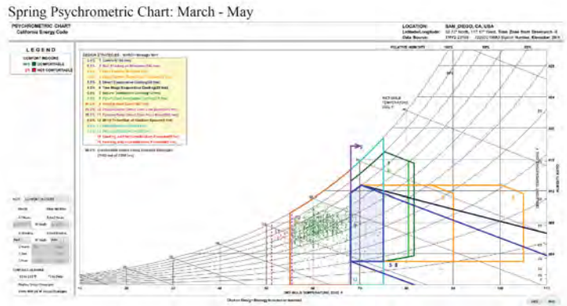
After looking at the psychrometric chart it can be seen that only 19% of the year is naturally comfortable. Based on where the comfort zone it seems that the environment is on the colder side.

Winter Psychrometric Chart: December - February



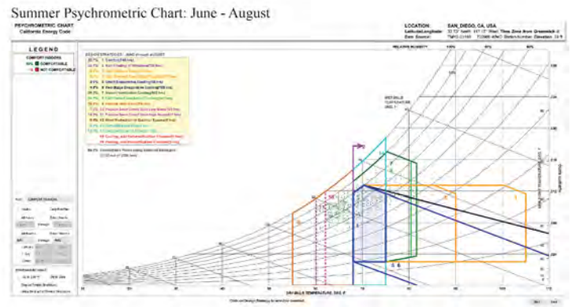
During the winter season it can be seen that internal heat gain would be the most beneficial strategy to improve the amount of hours of comfort.

Spring Psychrometric Chart: March - May



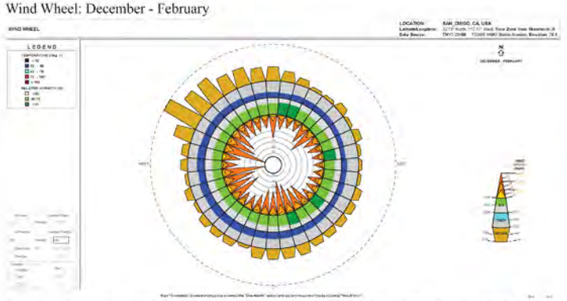
Similar to the winter strategies, internal heat gain is the best strategy to increase the amount of comfort hours.

Summer Psychrometric Chart: June - August



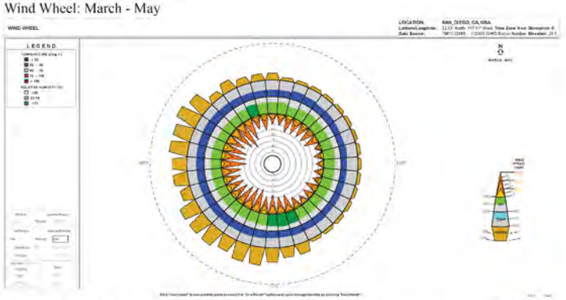
During the summer the greatest strategies to increase the amount of comfort hours are internal heat gain as well as sun shading for windows.

Wind Wheel: December - February



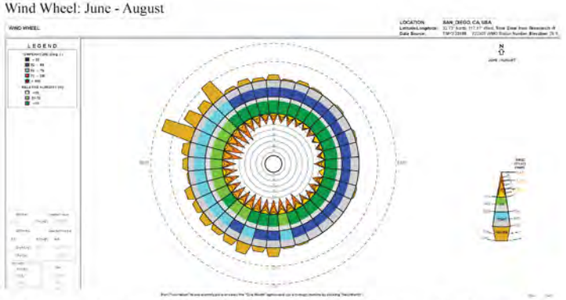
Based on the winter Wind Wheel, there are average winds that blow from the west and the soututh so trees and surrounding buildings would be good buffers against the colder winds.

Wind Wheel: March - May



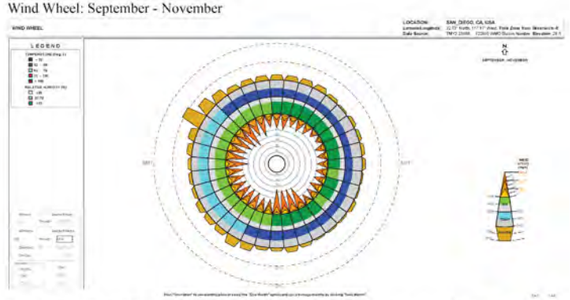
The spring months have very little wind, but from the west there are some average winds from the ocean.

Wind Wheel: June - August



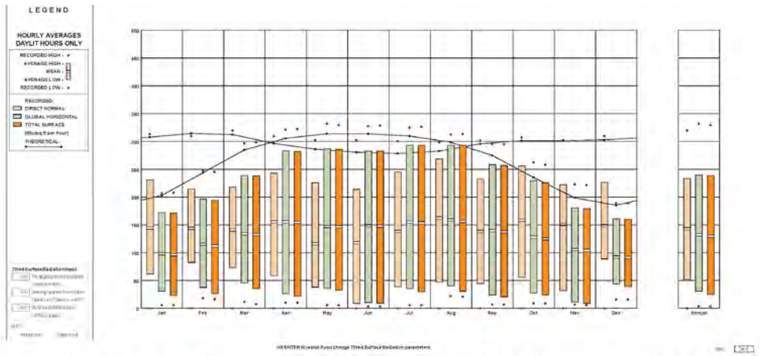
In the summer there are some very mild winds coming from the northwest, but they are very mild and last a while.

Wind Wheel: September - November

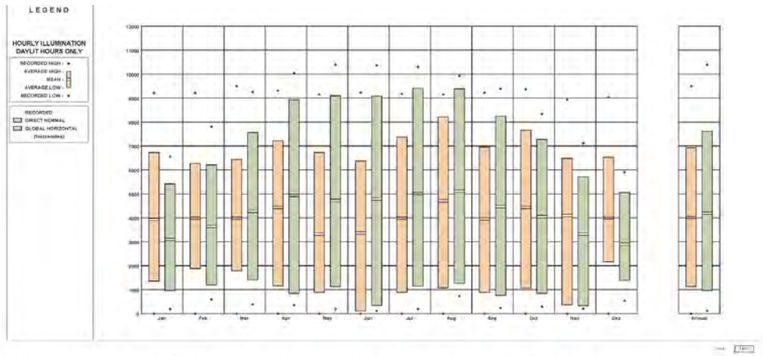


Based on the Wind Wheel there are average fall winds the southeast and northwest, and like the spring these winds are very average.

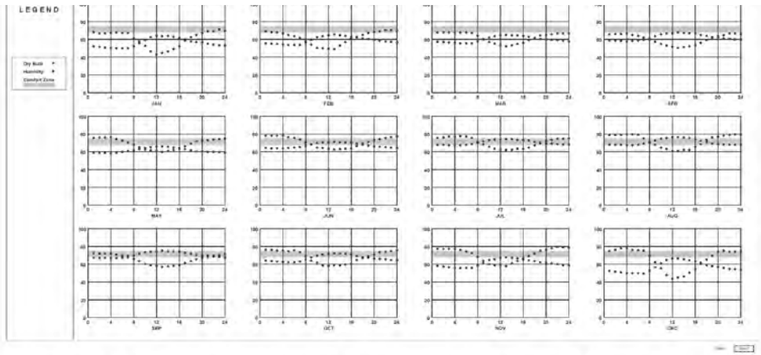
Climate Analysis



After looking at the Radiation Range bar chart it can be seen that in the months April to August that the hourly average of daylight hours are greater than other months because during the summer days last longer. This allows for more sunlight which means that there is more sunlight energy to be available for solar energy. In other months, when the sun is less direct solar radiation is lower and less energy is obtained.

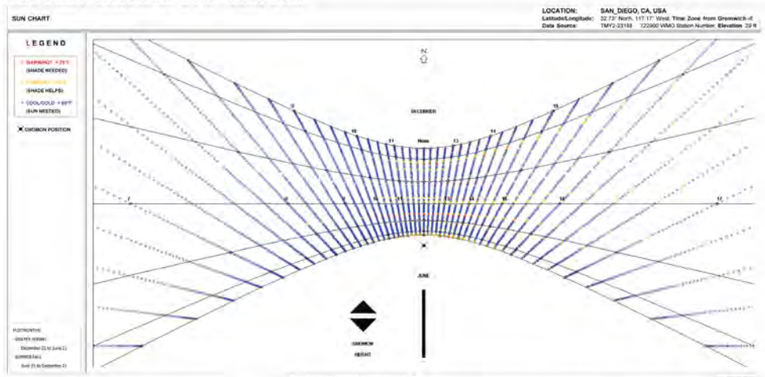


As seen in the Illumination chart in the months from April to August the illumination range is at its highest. The reason for this is because in this part of the United States there is not a lot of cloud coverage making it a very well lit area with very little coverage. This means that there is a great need for shading on buildings so outdoor environments can be safer as well as more comfortable. Especially for people who are older and have preexisting conditions.



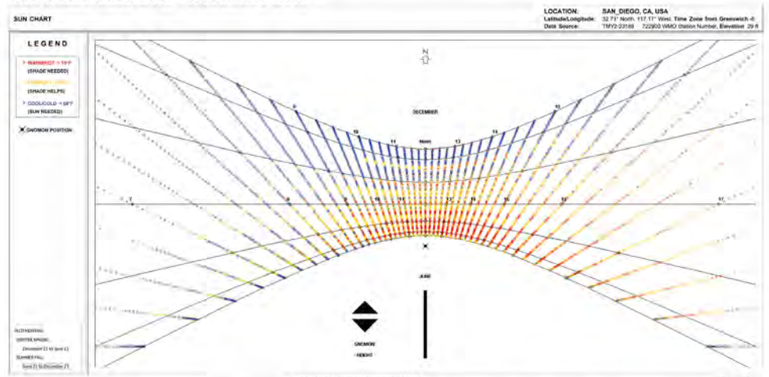
In the Dry Bulb x Relative Humidity chart, it can be seen that in many of the months the dry bulb and humidity zones fall inside the comfort zone. Knowing this means that the humidity is not a huge concern here and the environment is on the dryer side which is beneficial to the people living in this area. Dryer climates is more beneficial to elderly people because it allows for better blood flow, but keeping elderly people hydrated is important.

Sun Chart: December 21st - June 21st



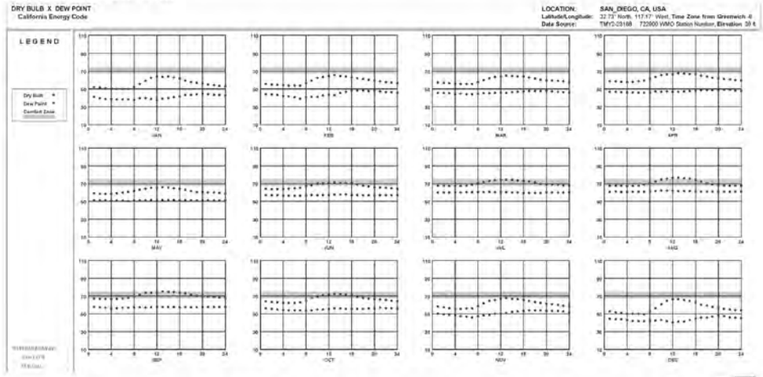
The Sun Chart is best used for a physical model to see what angle is needed for shading devices. Using the line and the point with the x through it, the angle of the shading can be determined. However from December to June, very little shading is needed because of the lack of sun and daylight during winter and spring.

Sun Chart: June 21st - December 21st



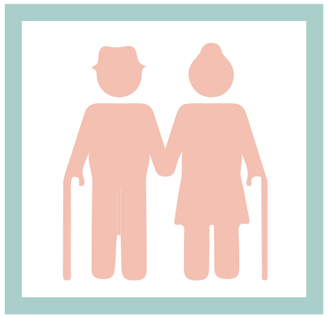
Compared to the winter and spring, the summer and fall require a lot of shading at wide covering angles. It can be seen that a majority of summer and the beginning of fall require shading which has been shown consistently through out the different data charts. For this to be the most effective a physical model with a light would show how effective the shading would be based on the different points seen in the sun chart.

Dry Bulb x Dew Point



Unlike to the previous chart, it can be seen that the dry bulb x dew point points on the chart are the below the comfort point, but close to it. This means that a majority of the months are close to comfortable, but to make them more consistent there needs to be more moisture added for it to be less dry. Dryness in elderly people is an issue because it can lead to dehydration, therefore adding moisture needs to be considered.

XIV



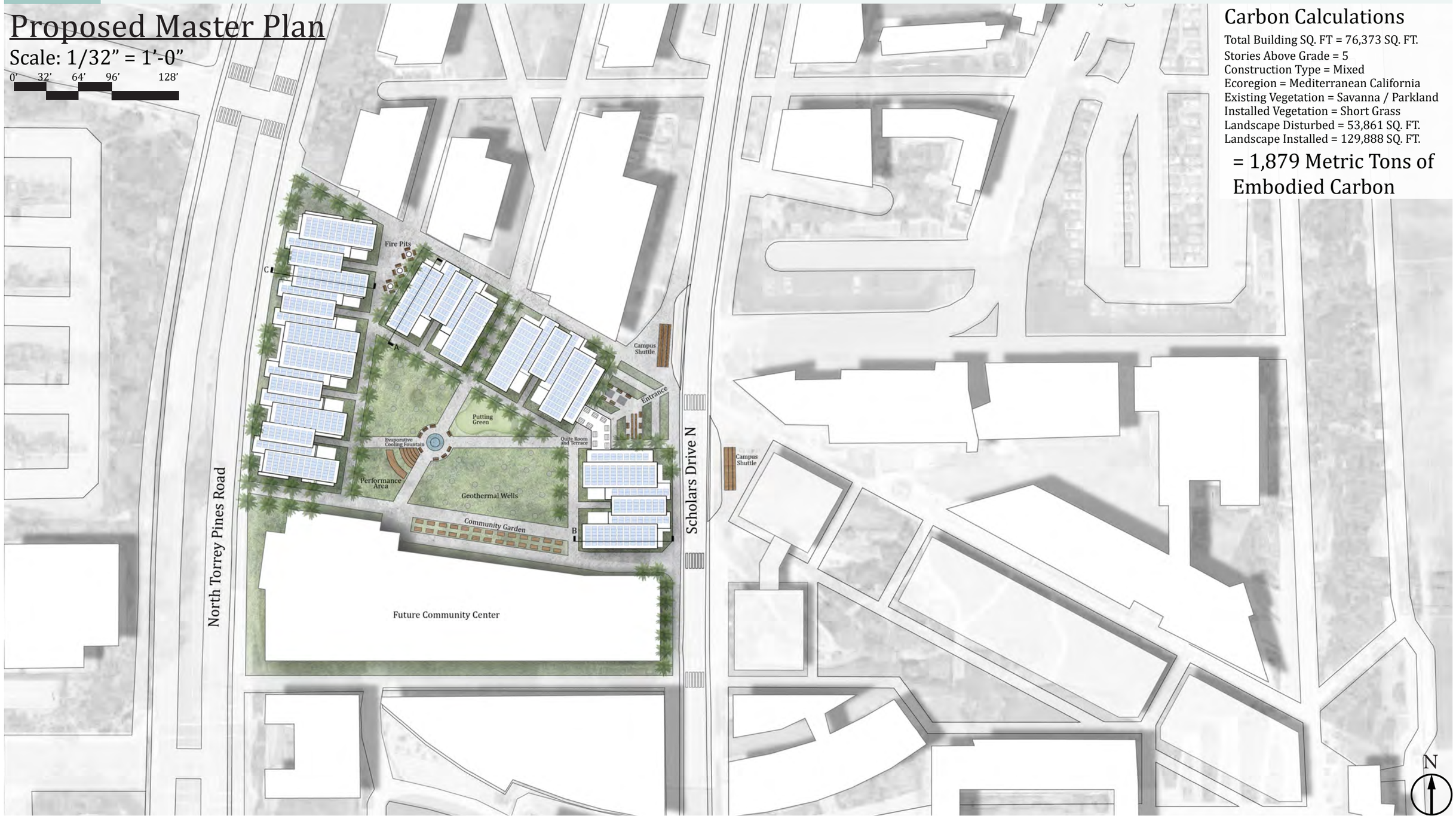
Proposed Designs

Proposed Site Plan + Carbon Calcs

Proposed Master Plan

Scale: 1/32” = 1’-0”

0’ 32’ 64’ 96’ 128’

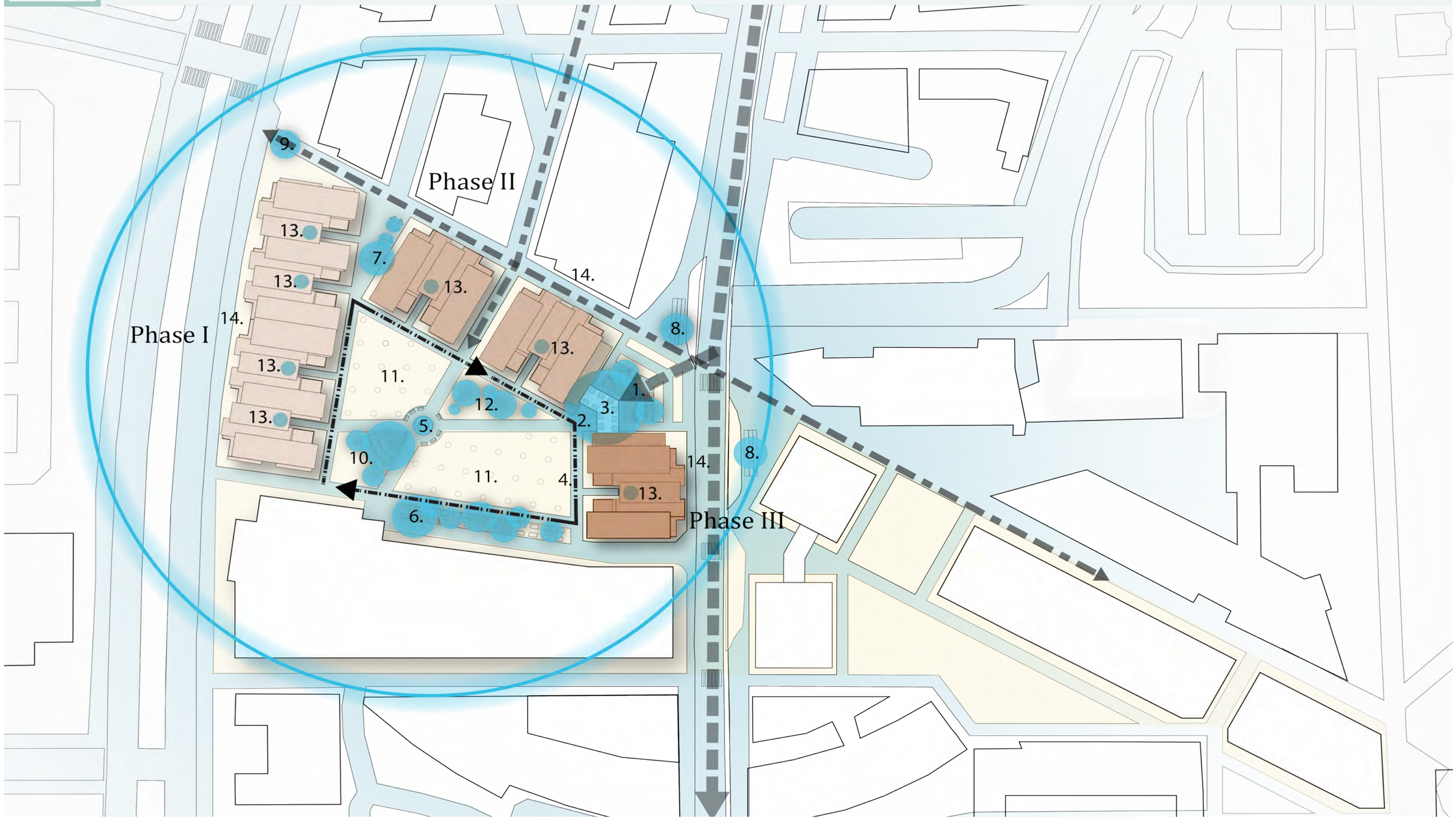


Carbon Calculations

Total Building SQ. FT = 76,373 SQ. FT.
Stories Above Grade = 5
Construction Type = Mixed
Ecoregion = Mediterranean California
Existing Vegetation = Savanna / Parkland
Installed Vegetation = Short Grass
Landscape Disturbed = 53,861 SQ. FT.
Landscape Installed = 129,888 SQ. FT.

= 1,879 Metric Tons of Embodied Carbon

Friendship Fusion Diagram



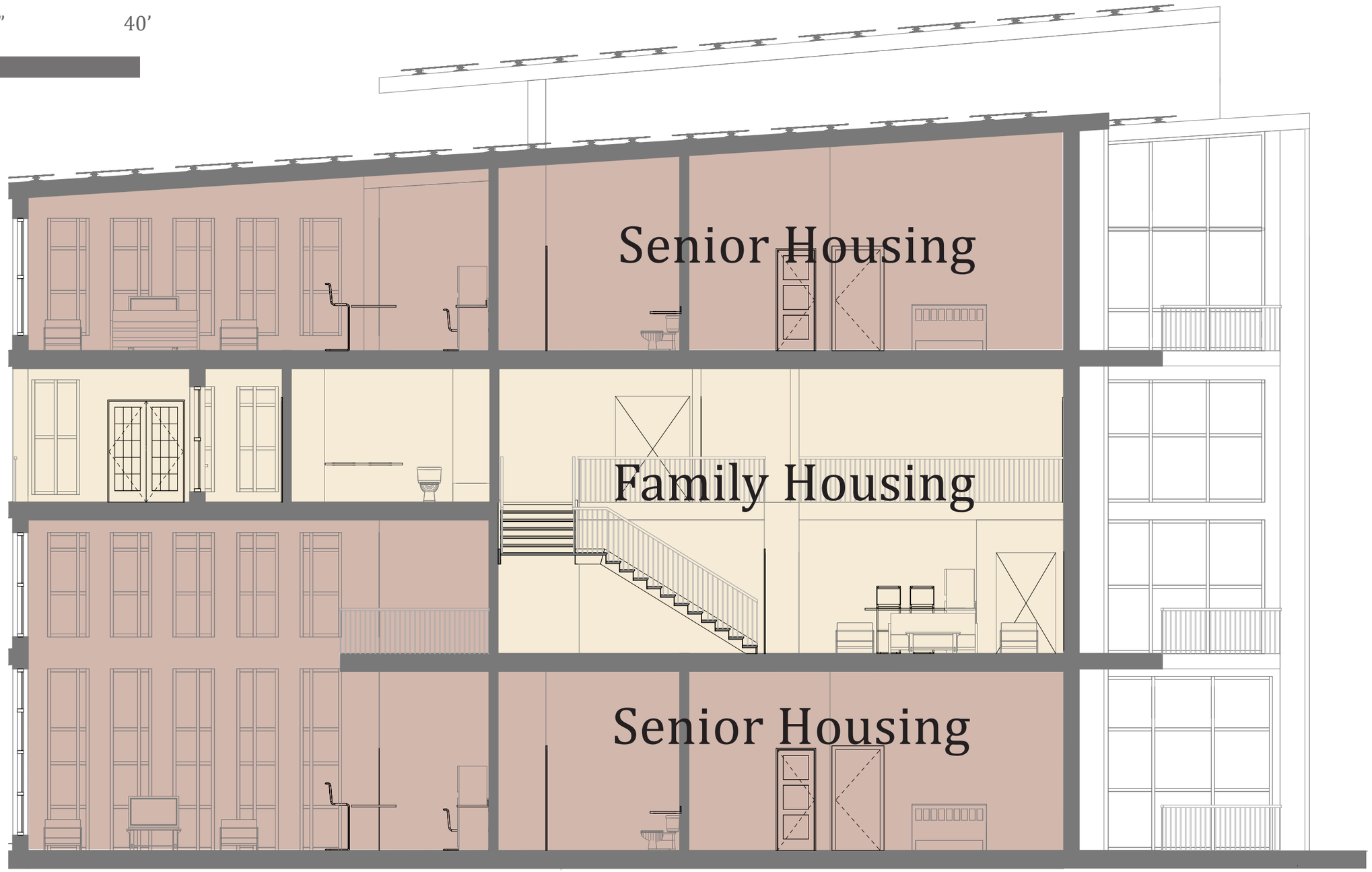
Friendship Fusion Diagram

Mental Health	Physical Health	Friendship / Bonding		Public Access	Natural Daylight	Vegetation	Other Considerations
							Everything handicap accessible
■	■	■	1. Village Entrance	Y	Y	Y	Activites to invite people of all ages. Needs to have access from transport.
■		■	2. Reading Room	N	Y	N	Community room that is accessible to all the residents in the village. Used for reading and games
■		■	3. Roof Top	N	Y	Y	Space above the reading room that is outdoors and looks over the quad of the village
■	■	■	4. Walking Trail	Y	Y	Y	People of all ages like to walk and socialize as they go around the quad trail
■		■	5. Village Fountain	Y	Y	Y	Used as a place of gathering and evaporative cooling
■	■	■	6. Community Garden	Y	Y	Y	Taken care of by the students and seniors to exercise and learn about gardening
		■	7. Fire Pits	Y	Y	Y	Placed in a quite place and enough space to prevent wildfire
	■	■	8. Campus Shuttles	Y	Y	N	Accessible to the residents of the village and stops are at the entrance.
	■	■	9. Public Buses	Y	Y	N	Not used as much. but is still a good option for transportation if needed.
■		■	10. Outdoor Performance Space	Y	Y	Y	Space used by students and other performers. Used for camps, shows, school productions
■	■	■	11. Auxiliary Green Space	Y	Y	Y	Open green space that can be used outdoors movies, sports, and other events
	■	■	12. Put - Put	Y	Y	Y	Putting Green in the main quad that has many wholes so it can support many people
■		■	13. Quite Rooms	N	Y	Y	On the top floor of the housing developments and they all into the center of the village
		■	14. Shepharding	Y	Y	Y	Areas where people can gather to honor ones life after their passing.

Multigenerational Housing

Scale: 1/8” = 1’-0”

0’ 8’ 16’ 32” 40’



North + South Elevations

North Elevations

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

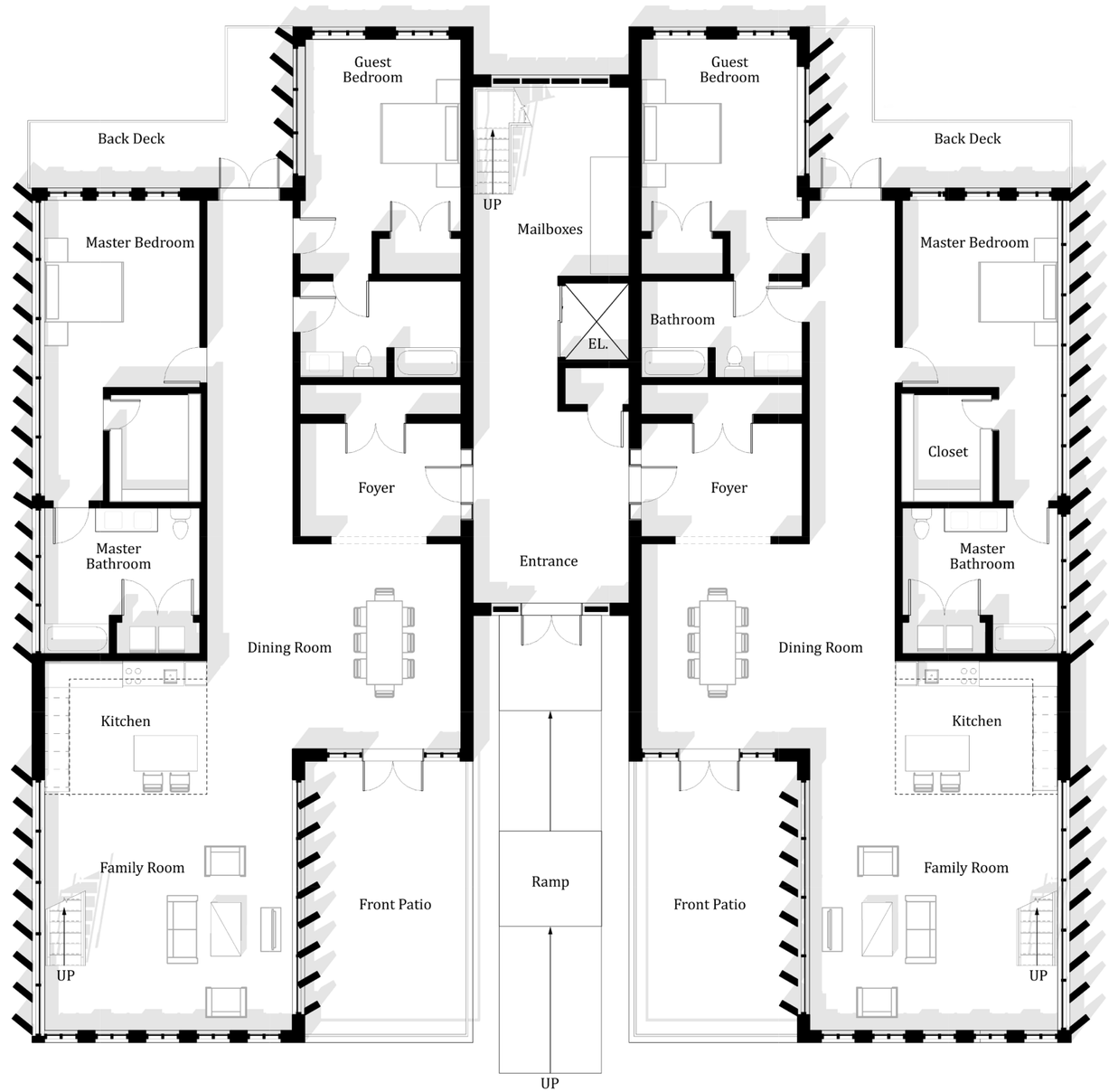
0' 4' 8' 12" 20'

South Elevations

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

0' 4' 8' 12" 20'

Senior Housing Floor Plans

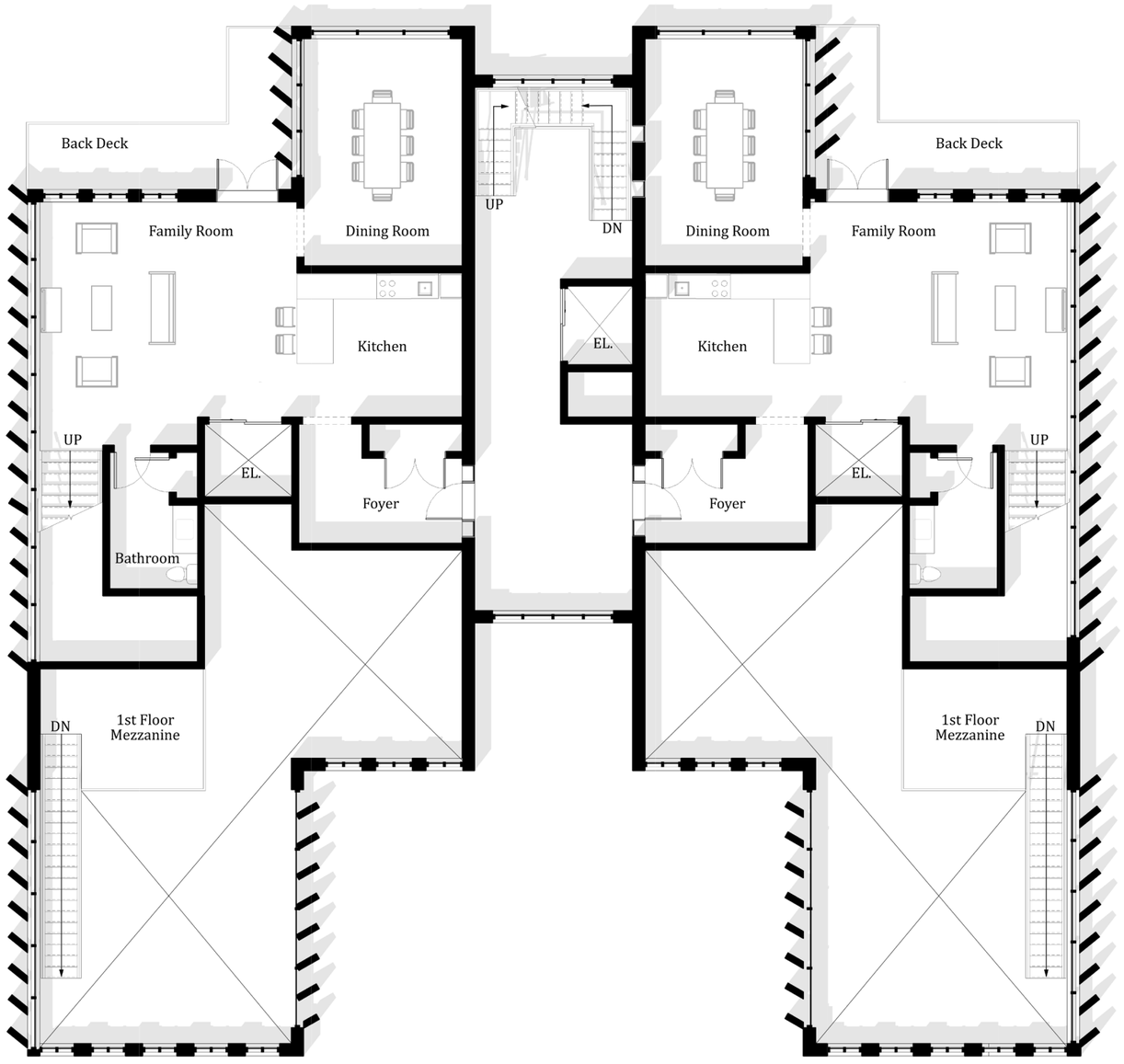


Senior Housing - 1st Floor

Scale: 1/4” = 1’-0”

0’ 4’ 8’ 12” 20’

Family Housing First Floor Plan

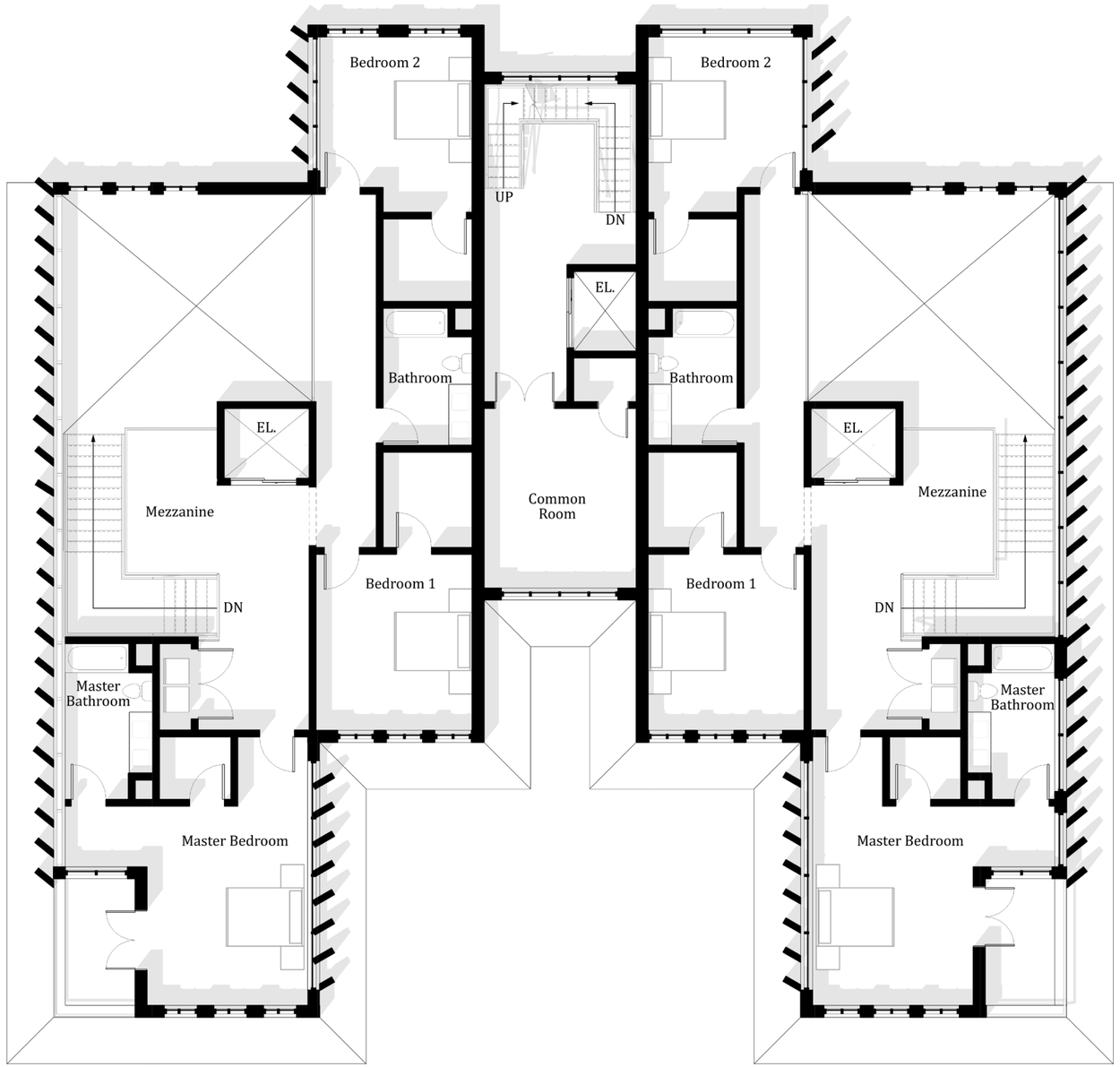


1st Floor Family Dwellings

Scale: 1/4” = 1’-0”

0’ 4’ 8’ 12” 20’

Family Housing Second Floor Plan



2nd Floor Family Dwellings

Scale: 1/4” = 1’-0”

0’ 4’ 8’ 12” 20’

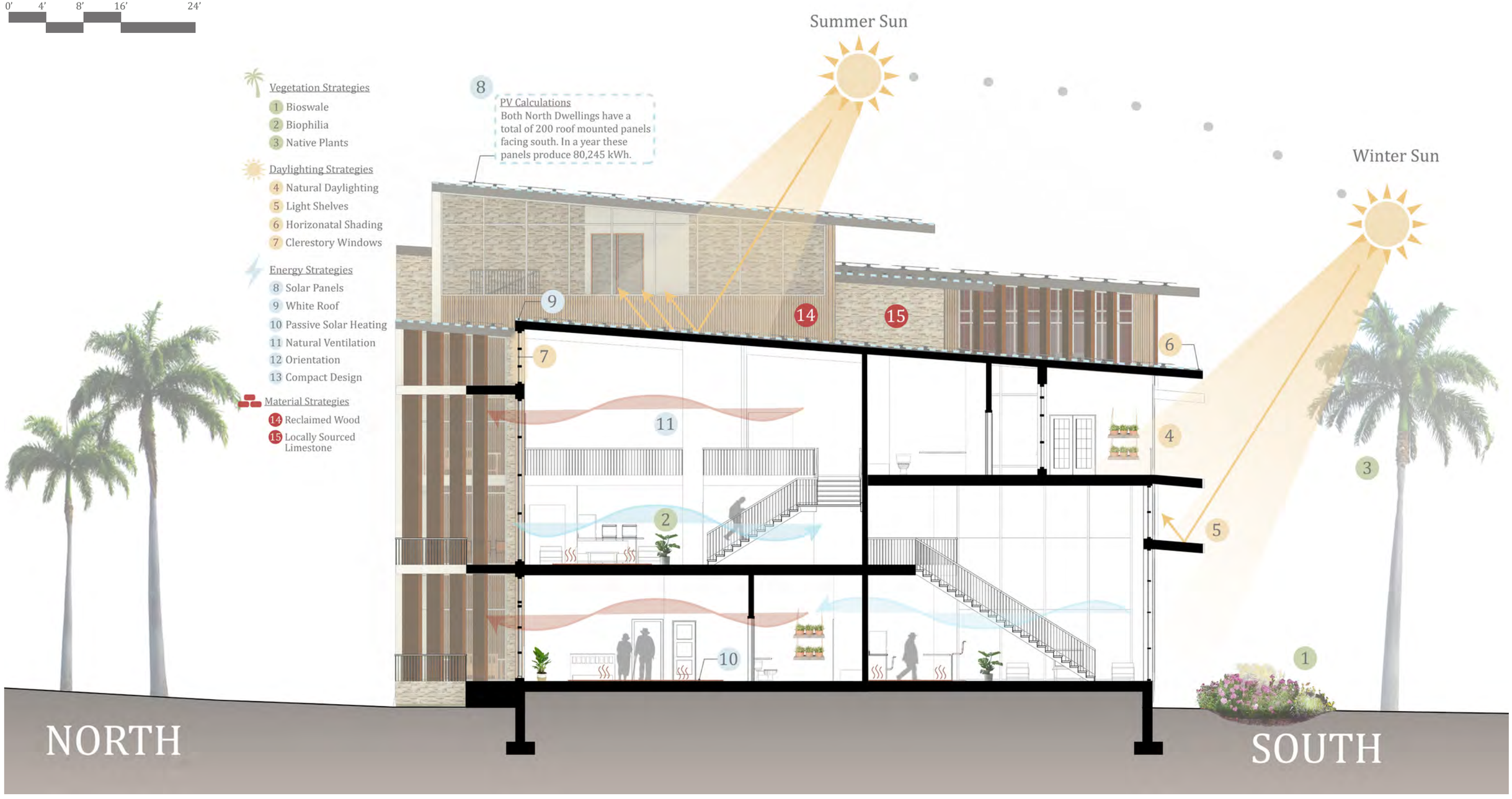
XV

Sustainibility

Synergy Section - A

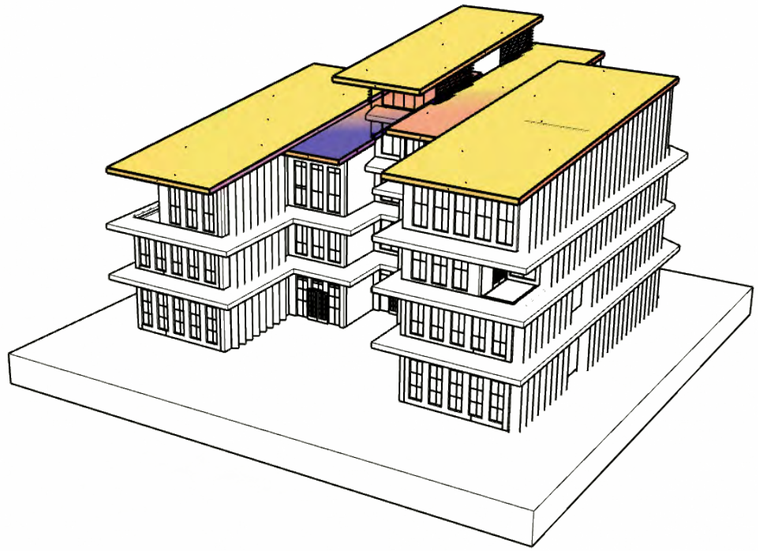
Scale: 1/4” = 1’-0”

0’ 4’ 8’ 16’ 24’



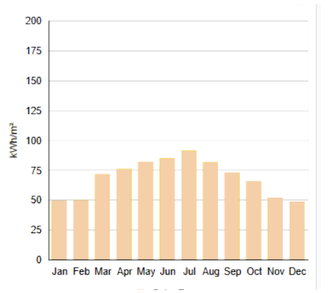
North Dwelling Analytics

Roof Radiation

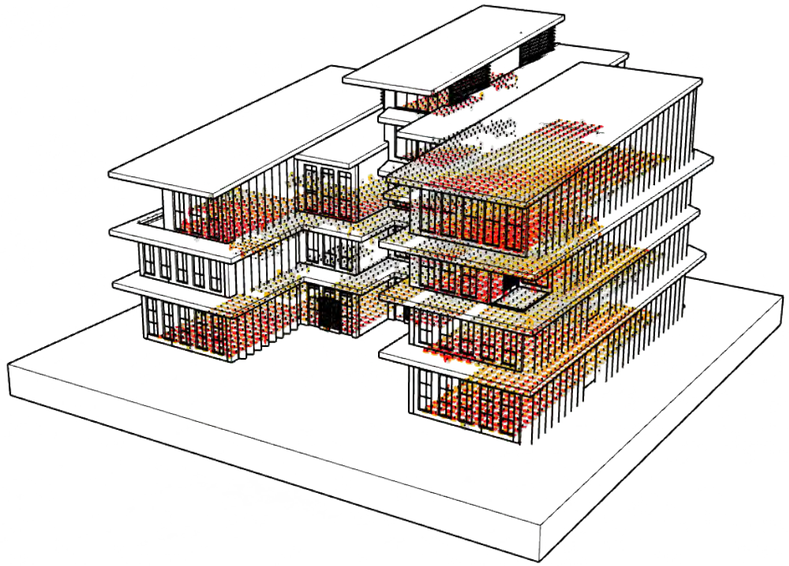


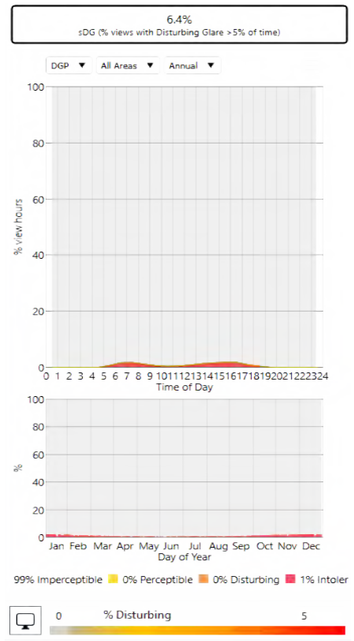
EUI

For the Northern Dwellings, EUI= 6 without PVs

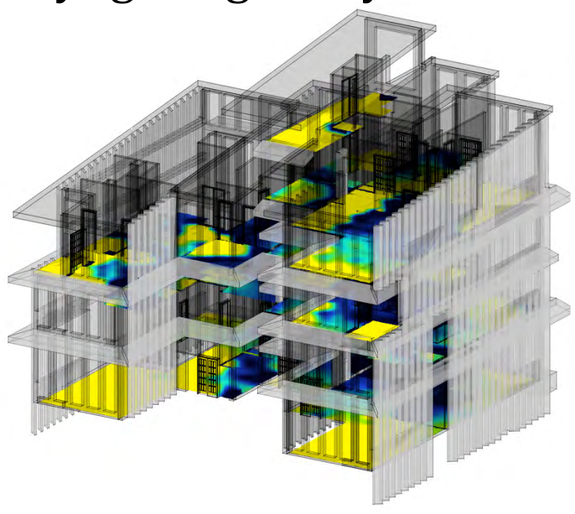


Glare Analysis

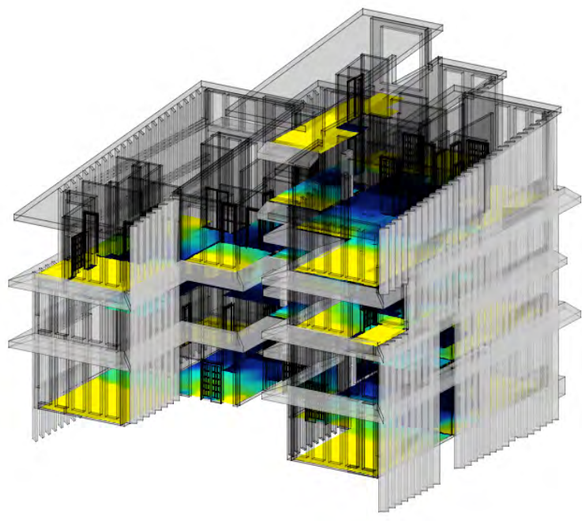




Daylighting Analysis



December 21st, 12:00 pm

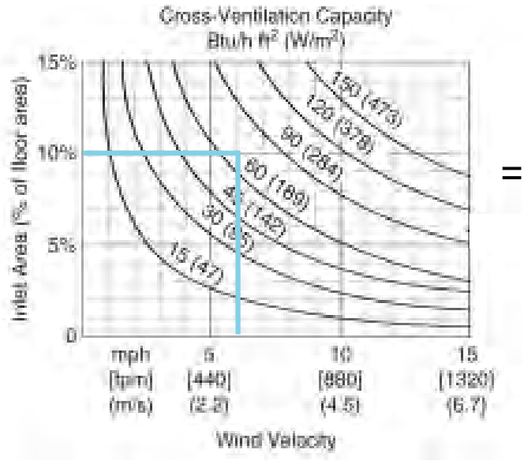


June 21st, 12:00 pm

Ventilation Calculations

Cross Ventilation = 46,568 cfm

Sensible Heat Exchange = 230,510 Btu/h



= 65 Btu/h removed from open windows

Synergy Section - B

Scale: 1/4” = 1’-0”

0’ 4’ 8’ 16’ 24’

Vegetation Strategies
1 Bioswale
2 Biophilia
3 Native Plants

Daylighting Strategies
4 Light Shelves
5 Vertical Shading
6 Operable Clerestory Windows

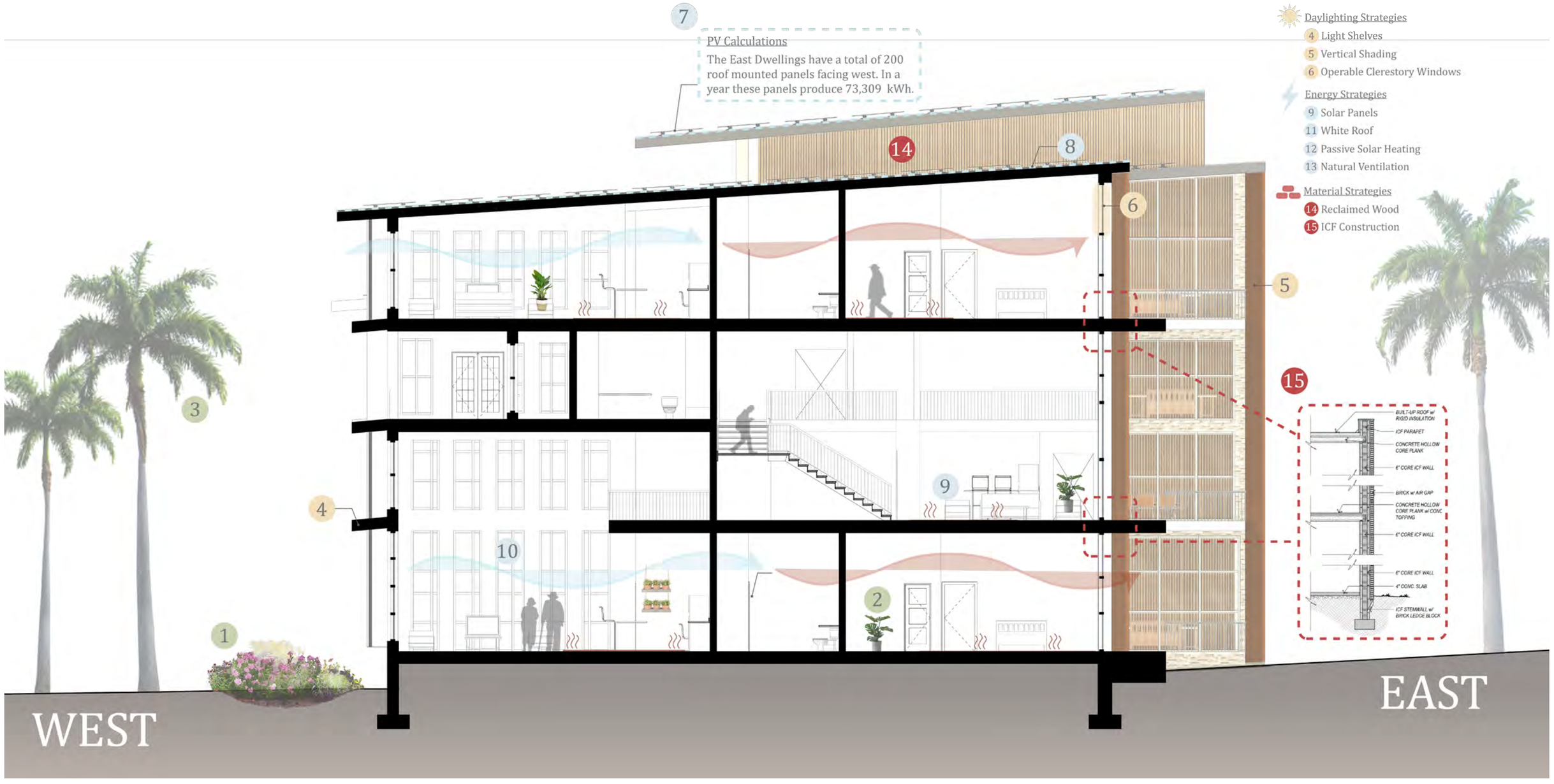
Energy Strategies
9 Solar Panels
11 White Roof
12 Passive Solar Heating
13 Natural Ventilation

Material Strategies
14 Reclaimed Wood
15 ICF Construction

7

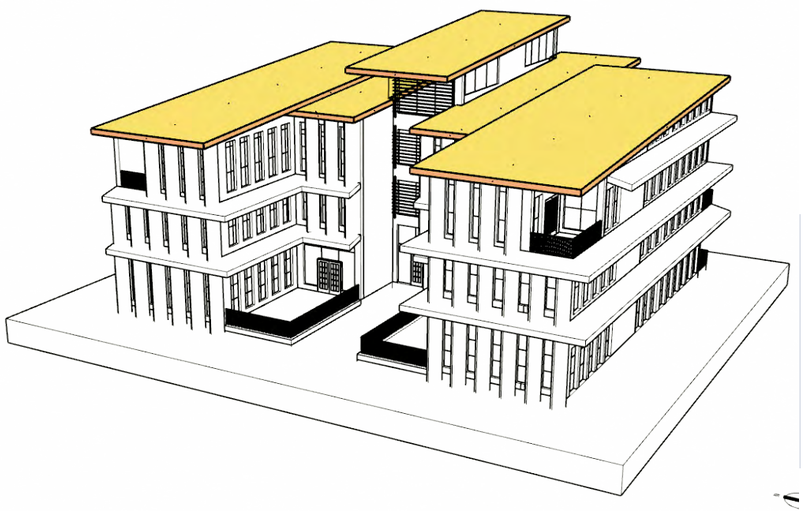
PV Calculations

The East Dwellings have a total of 200 roof mounted panels facing west. In a year these panels produce 73,309 kWh.



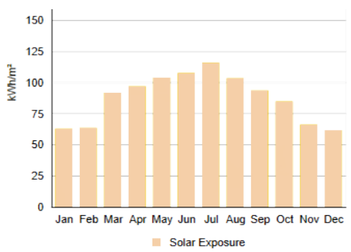
East Dwelling Analytics

Roof Radiation

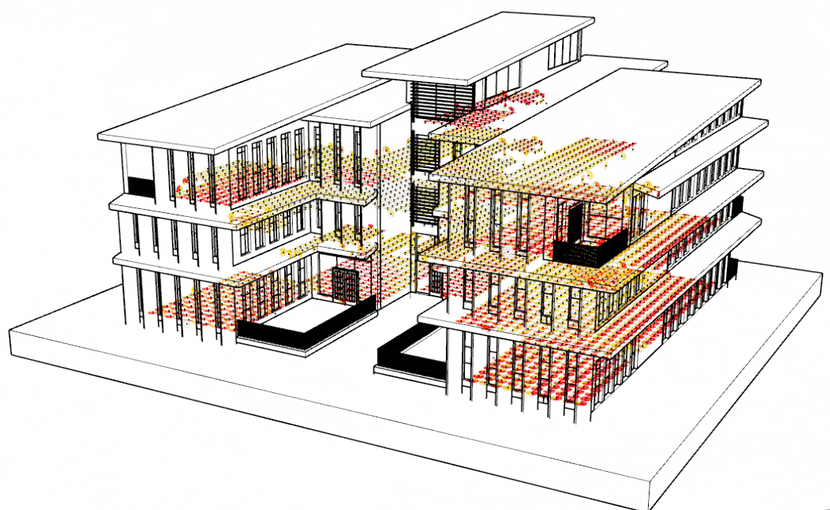


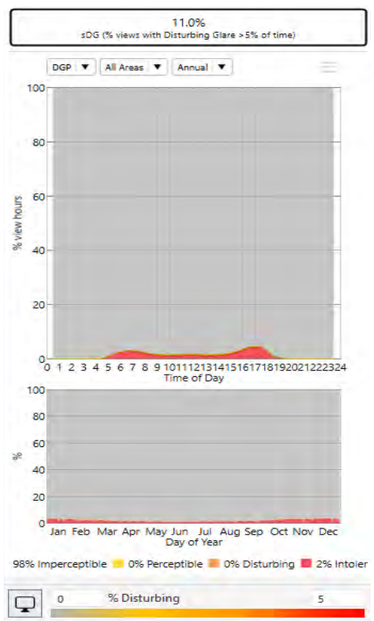
EUI

For the Eastern Dwellings, EUI= 6 without PVs

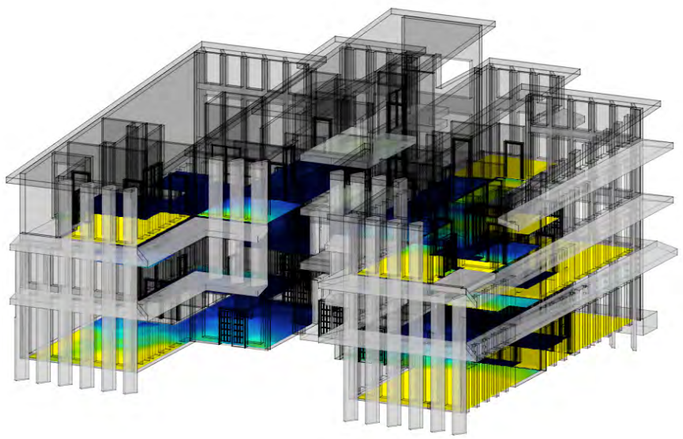


Glare Analysis

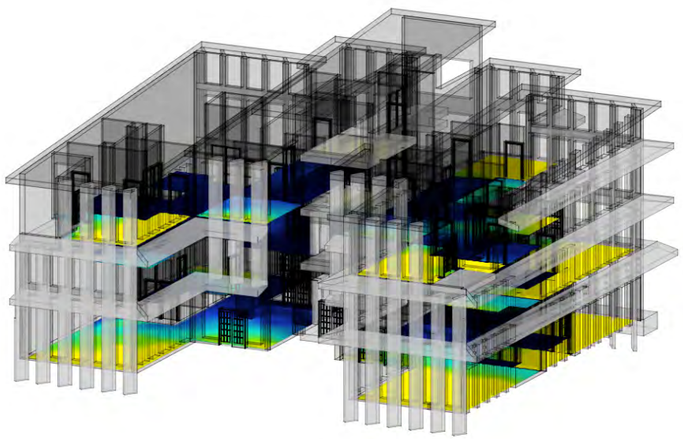




Daylighting Analysis



December 21st, 12:00 pm

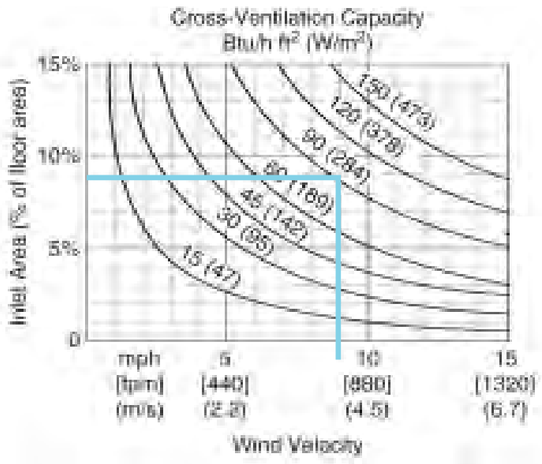


June 21st, 12:00 pm

Ventilation Calculations

Cross Ventilation = 60,291 cfm

Sensible Heat Exchange = 298,440 Btu/h



= 90 Btu/h removed from open windows

Synergy Section - C

Scale: 1/4” = 1’-0”

0’ 4’ 8’ 16’ 24’

Vegetation Strategies
1. Bioswale
2. Biophilia
3. Native Plants

Daylighting Strategies
4. Vertical Shading
5. Operable Clerestory Windows

Energy Strategies
6. Solar Panels
7. Low-E Glazing
8. White Roof
9. Passive Solar Heating
10. Natural Ventilation

Material Strategies
11. Locally Sourced Limestone
12. Reclaimed Wood

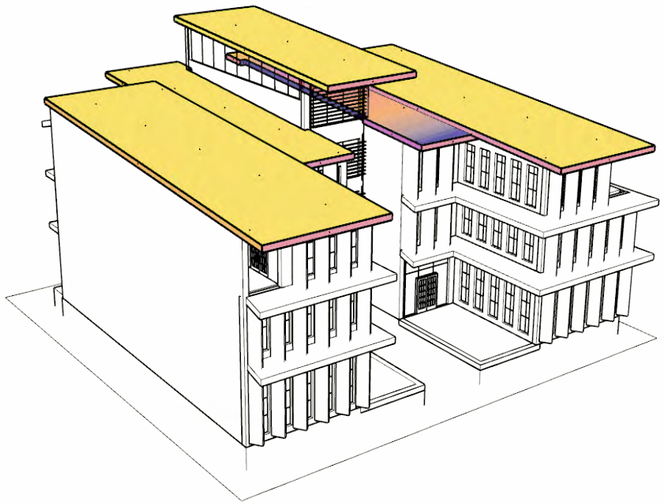
PV Calculations
Because of the length of the West Dwellings, there are a total of 200 roof mounted panels facing east. In a year these panels produce 69,220 kWh.

WEST

EAST

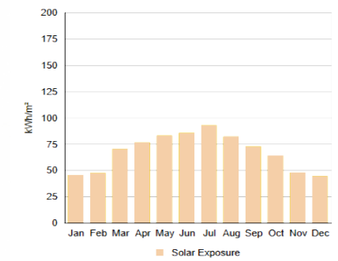
West Dwelling Analytics

Roof Radiation

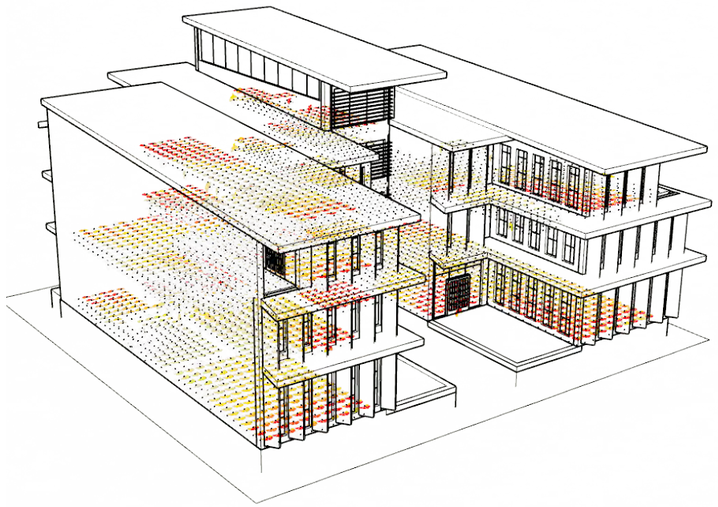


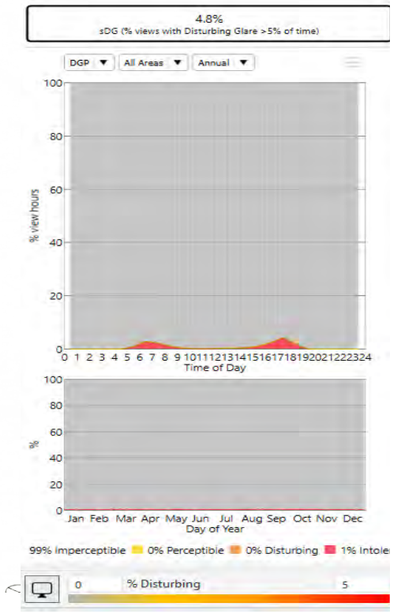
EUI

For the Eastern Dwellings, EUI= 5 without PVs

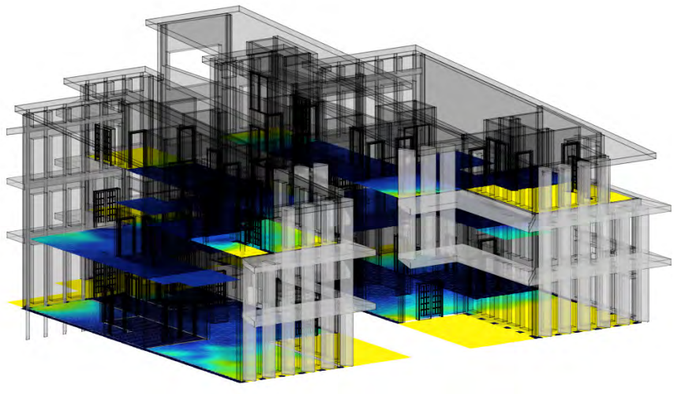


Glare Analysis

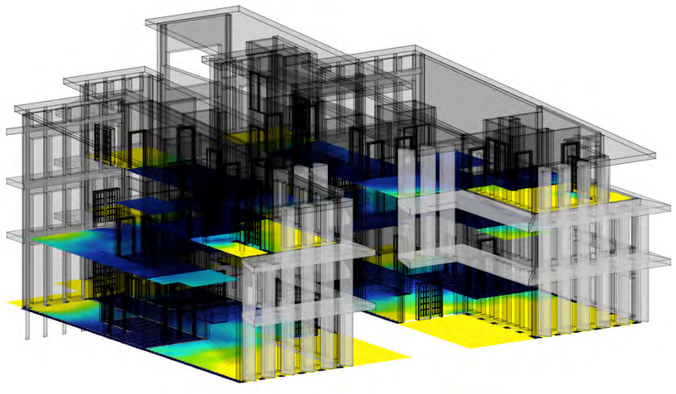




Daylighting Analysis



December 21st, 12:00 pm

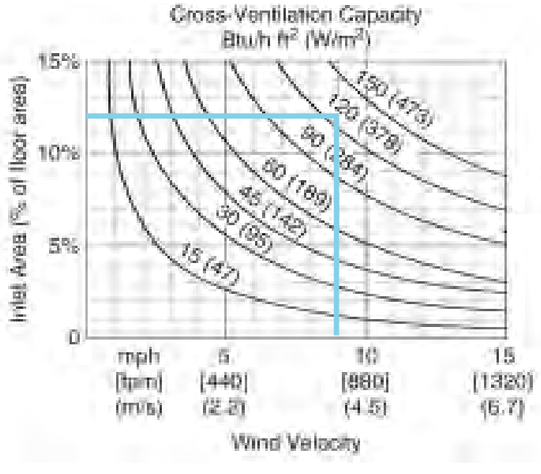


June 21st, 12:00 pm

Ventilation Calculations

Cross Ventilation = 68,222 cfm

Sensible Heat Exchange = 337,698 Btu/h

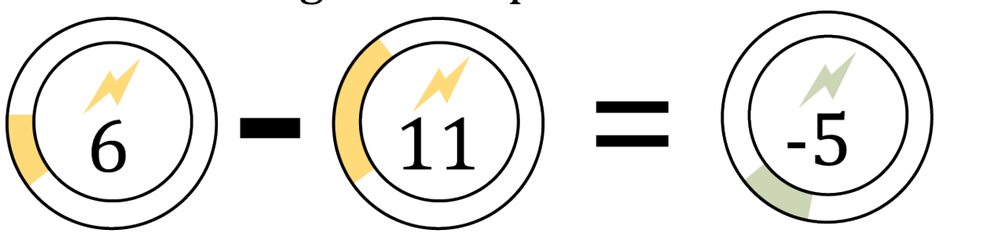


= 120 Btu/h removed from open windows

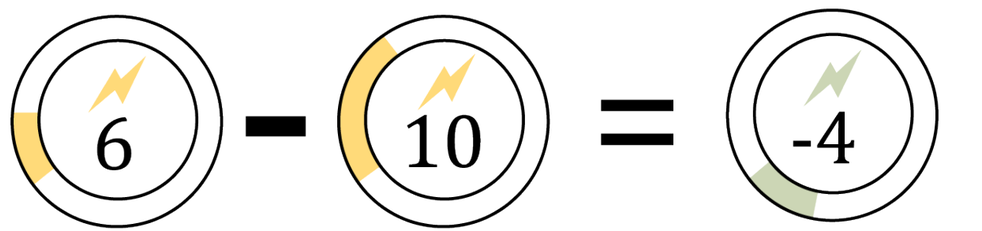
Energy and Materials

Dwelling Energy Outputs

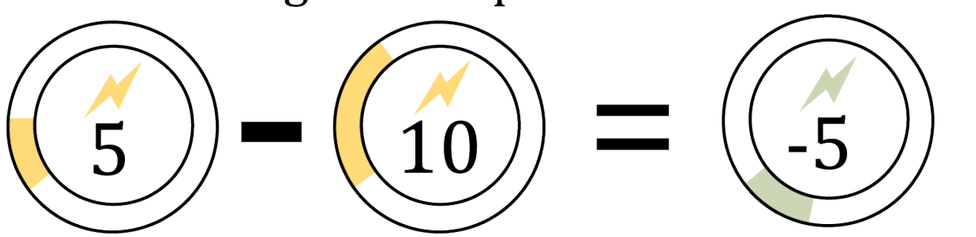
North Dwelling EUI Output



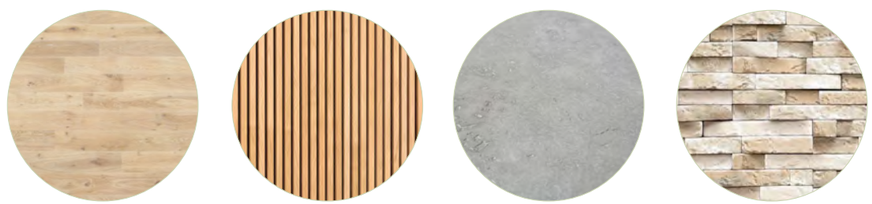
East Dwelling EUI Output



West Dwelling EUI Output



Materiality



White Oak CLT Interior Finish

Local Reclaimed Wood

Cork Flooring

Local Limestone

Plant Species

Arecaceae (Palm Tree)

Leucophyllum (Silver Leaf)

Ophiopogon (Mondo Grass)

Echium Candicans (Pride of Madeira)

Cercidium X (Desert Museum)

Festuca Glauca (Elija Blue)

Trachelospermum (Star Jasmine)

Prostrate Romarinus

XVI

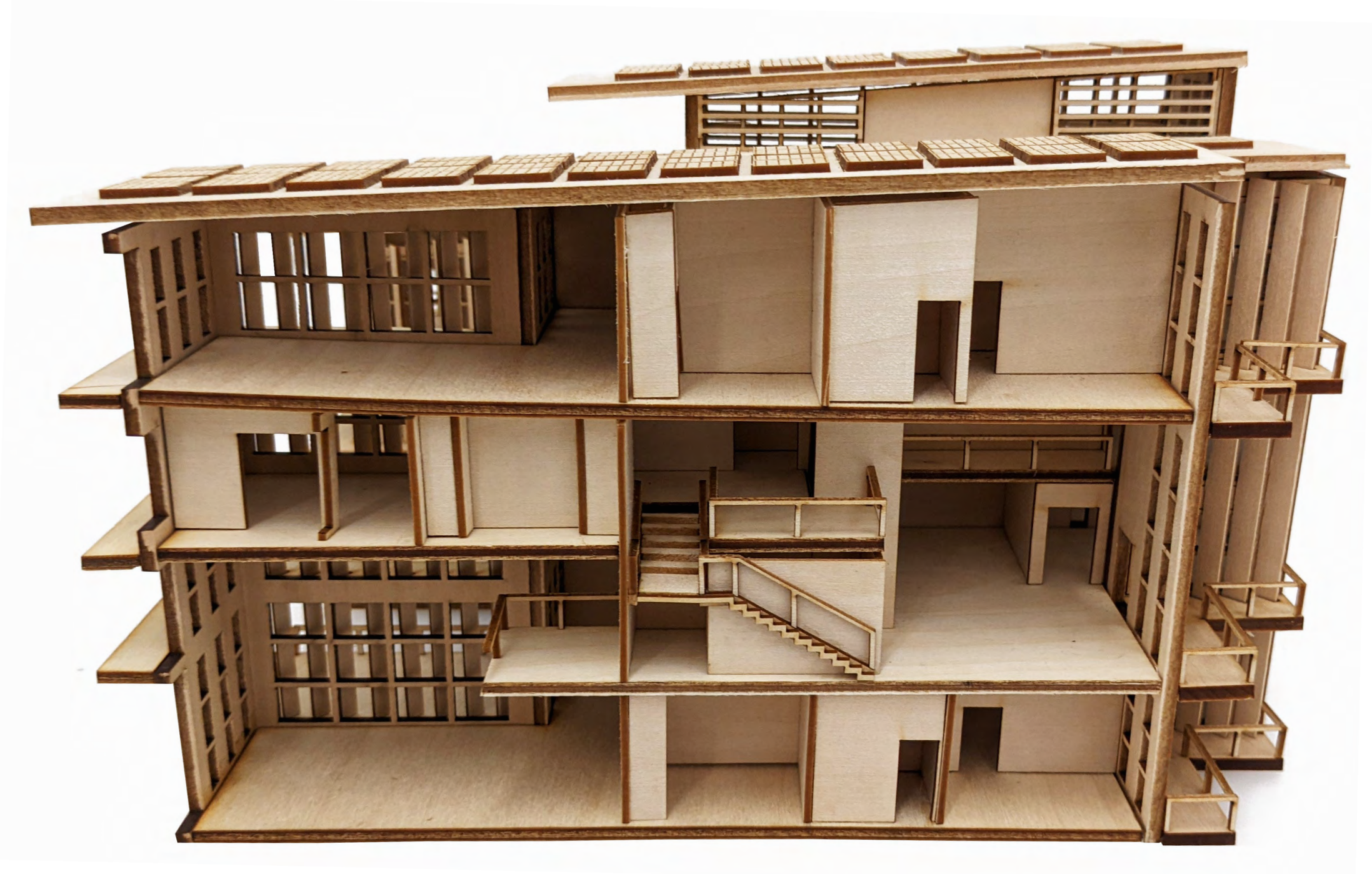
Physical Models

Site Model

Site Model

Unit Model

Unit Model



XVII

Renderings

Entrance

Putt-Putt Golf

Walking Trail + Green Space

Community Reading Room

Fire Pits

Community Garden

Rooftop Patio

Conclusion

My research made me realize that every time I saw my grandfather, we each had a huge impact on each other. Him being in my life made me a better person and me being in his improved his quality of life. Knowing this, I want others to experience the same relationship we had, by integrating the elderly back into society rather than pushing them away.

I truly enjoyed working on this project and it even inspired me to practice what I researched. I am applying to doctoral programs to continue this passion I have so I can learn more and this summer my girlfriend and I are working with the newly opened multigenerational living facility opening here in Brookland because they are looking for volunteers to spend time with their senior residents. This project gave me a new and unique appreciation for seniors and I cannot wait to see what opportunities I have when I begin working and volunteering with them.

Evan Dziedzic

Bibliography

Hancock, Judith Ann. Housing the Elderly New Brunswick, N.J: Center for Urban Policy Research, 1987.

This book is a good source for projections and goes into depth about Americas elderly population as a class. It focuses on the economics, income, migration to the south, integration in everyday society, and housing opportunities. Overall, its great overview of the situation in America and what is expected in the future. In a few parts it goes into detail about the most populated cities and focuses on the percentage that is 65+ in age. While it goes through the cities it also focuses on the different classes and races and analyzes which ones are doing well and which ones are having issues with poverty and homelessness. Similar to other books it takes time to focus on the housing types and possible alternatives that can be possibly helpful. Another nice part of this book is that it also analyzes the elderly people that own property and the people that rent. It goes through the process of how people have got to these points and what they can do to change their situation if needed.

Katsura, Harold M., Sandra J. Newman, and Raymond J. Struyk. Housing for the Elderly in 2010: Projections and Policy Options Washington, D.C: Urban Institute Press, 1989.

The authors came to the conclusion that elderly housing policies are outdated and worry what may happen in the future. With the elderly population rising because people are living longer there needs to be an update to the policy and in this book, they give the results of what would happen if nothing were to change. They ran hundreds of microsimulations to see what kind of crises were to occur if policies were not updated. Because of the tremendous increase in population issues that will arise include affordability, poor housing quality, and suitability for the elderly that have impairments. In this book they are analyzing the policies that can be updated and stimulated to promote elderly to update their housing. The main program discussed in this book is the housing voucher program and the advantage to this program that it ensures housing meets the minimally adequate standards while also making sure participants do not spend 30% of their income on housing.

Painter, Gary, and KwanOk Lee. "Housing Tenure Transitions of Older Households: Life Cycle, Demographic, and Familial Factors." Regional science and urban economics 39, no. 6 (2009): 749–760.

The research in this journal is very in depth and predicts what the next age of elderly will be doing with their housing situations. In 1980, the rate of elderly over 75 owning home was 70% and by 2003 it was raised to 78%. However, as a surprising twist it seems that elderly people are looking to rent homes rather than being a homeowner, who is opposite to those in the past. It is believed that because of dissolution of family, changes in health, and family members moving, more elderly people are downsizing or renting properties for less maintenance. So, the age of the elderly does not have a correlation with either being a property owner or renter, it is more focused on the role of wealth and nearby family.

Chiu, Helen., and Kenneth. Shulman. Mental Health and Illness of the Elderly. Singapore: Springer Singapore, 2017.

After learning about the physical complications elderly people deal with, I thought it would be important to learn more about the mental aspect of aging as well. When reading this book, it explained in great deal the aging process of the brain. The brain is a muscle and after aging for some many decades the cells begin to die and mental illnesses begin to plague the brain. As people get older, they become depressed, anxious, and stressed about everyday life. These symptoms can lead the dementia, Alzheimer's, and Parkinson's which significantly reduces the quality of life. Through reading this book I was able to learn a lot about the aging mind and the tricks that be used to keep the mind active and wondering, even at an elderly age.

Escolar Chua, Rowena L, and Allan B de Guzman. "Do You See What I See? Understanding Filipino Elderly's Needs, Benefits, and Expectations from an Adult Continuing Education Program." Educational gerontology 40, no. 1 (2014): 1–15.

In this journal I learned an interesting fact about education and the elderly. Researchers in the Philippines researched and surveyed elderly people's opinions on continuing education at retirement age. A surprising amount of people wanted to keep learning and even take classes to keep up to date with technology and knowledge. This idea has now been coined as the "Third Age of Education" and this is the point in life where elderly people would like to continue their education and keep their mind sharp.

Hill, Robert D. Geriatric Residential Care Mahwah, N.J: Lawrence Erlbaum, 2002.

This book is unique because it discusses the wellbeing and healthiness of the elderly in residential facilities. For example, it talks about the biological, psychological, and social issues that many residents deal with whether they are 65 or 85. To combat these issues and solve problems they create assessment strategies and procedures for all the staff to follow. What is even better is that it gives examples with intervention ideas so there is some precedent and logic behind solving problematic behaviors or situations. There is also an entire part about the training the staff and employees go through to prepare for their job and the different therapies they use to treat the elderly residents. With this it goes into what they expect residential care in the 21st century will look like with creativity and improvement on the quality of life.

Lobo, Alexandrina. Physical Activity and Health in the Elderly. S.l: Bentham Science Publishers, 2011.

Physical Activity and Health in the Elderly is a book that primarily focuses on exercises for elderly that are physical and target certain areas. It serves as a manual to help those who are compromised physically, just had surgery, and are handicapped by their physical limitations. So, it may not be the most useful book, but it gives good guidelines in the types and amount of exercises elderly people should be completing weekly to stay in shape and prevent their health from declining.

Nied, Robert J, and Barry Franklin. "Promoting and Prescribing Exercise for the Elderly." American family physician 65, no. 3 (2002): 419–426.

"Promoting and Prescribing Exercise for the Elderly" is a great resource to use to learn more about the benefits of physical exercise for older people. It gives cases of successful elderly people sticking to an exercise routine and benefitting from the effects of exercising. Though out the article it hits the benefits of different exercises like strength training, flexibility, and breathing. It takes the idea of physical exercise a step further and explains how to properly promote exercise to make it interesting for the elderly, so they want to continue it.

Tomioka, Kimiko, Norio Kurumatani, and Hiroshi Hosoi. "Positive and Negative Influences of Social Participation on Physical and Mental Health Among Community-Dwelling Elderly Aged 65-70 Years: A Cross-Sectional Study in Japan." BMC geriatrics 17, no. 1 (2017): 111–111.

In this study, researchers were able to spot the different outcomes in voluntary exercise and forced exercise. It was found that elderly people who want to exercise will have more progress and better results if they are willing to exercise and socialize. However, if one was to force and elderly person who does not want to do either they would end up declining in health and skills. From this, it is learned that it is important to inspire and motivate the elderly so they can voluntarily make progress instead of regressing.

Bibliography

Yamazaki, Sachiko, Chiaki Ura, Tsuyoshi Okamura, Masaya Shimmei, Taichi Ishiguro, Keisuke Torishima, and Yu Kawamuro. "Long-term Effects of Rice-farming Care on Cognitive Function and Mental Health of Elderly People with Cognitive Impairment: A Follow-up Study." Psychogeriatrics 19, no. 5 (2019): 513–515.

The researchers in the study took elderly rice farmers and had them practice farming rice again like they once did in the past. Through the repetition and strong memories of farming there were positive results in cognitive function and recalling memory. It was a very short article that had the analytics of the memories being recalled and I wish there was more research about the act of repetition to recall memories from the past. After 6 months of not farming the elderly farmers went back to a state of cognitive decline as if they never went farming again.

Short-DeGraff, Margaret A, and Karen Diamond. "INTERGENERATIONAL PROGRAM EFFECTS ON SOCIAL RESPONSES OF ELDERLY ADULT DAY CARE MEMBERS." Educational gerontology 22, no. 5 (1996): 467–482.

This study really interested me because it brough together two common ideas and made them a synergy. First was the idea of adult day care for elderly people and the other was nursey daycare with younger kids. When both daycares came together there was a reaction of positivity between the two parties. The elderly adults showed improvement mentally and physically when interacting with the 3rd and 4th graders from daycare. Not only did the elderly show improvement, but so did the kids. They were more focused and attentive to tasks they needed to complete when working with the elderly.

Zhong, Sinan, Chanam Lee, Margaret J Foster, and Jiahe Bian. "Intergenerational Communities: A Systematic Literature Review of Intergenerational Interactions and Older Adults' Health-Related Outcomes." Social science & medicine (1982) 264 (2020): 113374–.

Of all the journals and research, I found the idea of intergenerational programs and communities to be the most exciting and interesting. It has been found that when elderly people interact with people from younger generations it improves their health and quality of life. The social interaction with younger people stimulates the mind and allows for social bonding. When I was younger, I used to do this all the time when visiting nursing homes and elderly people for volunteer work. Now it is a proven study that bringing in younger people to interact with the elderly creates a positive and healthy environment.

Feddersen, Eckhard, Insa Lüdtke, and Helmut Braun. Living for the Elderly: A Design Manual Second and revised edition. Basel: Birkhäuser, 2018.

This book will definitely be a main source for information because of how up to date it is on the current elderly care. It has topics from interior design to the health and wellbeing of the residents that need care. In the different chapters it focuses on different mental health issues found in the elderly like dementia and Alzheimer's. Another reason this book is great is because it also has a section about cohabitation with younger people called intergenerational living which is a newer unexplored area of elderly living. Later in the semester it will be a good source as well for precedent because it has many case studies to go along with each chapter.

Lee, So Young, and Sung Eun Yoo. "WILLINGNESS TO PAY FOR ACCESSIBLE ELDERLY HOUSING IN KOREA." International journal of strategic property management 24, no. 1 (2020): 70–82.

The authors interviewed 700 people of varying elderly ages and asked them about what they were willing to spend to make their house accessible. It was found that some elderly people were not willing to spend the money to make their current living situation barrier free. However, people on the younger side of the spectrum, around 65, were willing to spend extra for their living situation to be adapted for better use down the road. Since the older elderly people were not willing to spend on adapting their living situations there is a need now for a more affordable living option for those who did not prepare earlier. Of course, this was a small study done in Korea, so in other countries and places there may be a higher or lower demand for accessible housing.

Magdziak, Monika. "Flexibility and Adaptability of the Living Space to the Changing Needs of Residents." In IOP Conference Series. Materials Science and Engineering, 471:72011–. IOP Publishing, 2019.

In this conference essay it focuses on flexible and adaptable housing for people with changing needs. This can super beneficial to know for elderly people for when they get older because the needs of people at age 60 is different from those at age 80. A lot of changes can happen in someone's life in 20 years. It talks about options of modular homes, portable homes, expandable homes, transformable homes, convertible homes and overall flexibility. This essay does not primarily focus on the elderly, but they are mentioned and go into detail about flexible/adaptable housing can be very beneficial for the elderly. The only aspect I wish that was focused on was maybe the average price per square foot about flexible housing and if it is comparable to a static way of living.

Pastalan, Leon A. Optimizing Housing for the Elderly: Homes Not Houses New York: Haworth Press, 1990

In Optimizing Housing for the Elderly: Homes Not Houses, Pastalan covers a wide array of topics from the history of elderly housing, comparing British and American retirement homes, alternative elderly care facilities, and low-cost elderly facilities. Each chapter contains a study about the findings for each of the topics. It was nice to see the housing preferences of vulnerable elders because that can possibly be seen as the bottom line that facilities and housing should meet. It takes things a step further and analyses the other routes elderly people go down like RVing, homelessness, and coping strategies that care takers and elderly people need for a better quality of life when there is less money for assisted living facilities.

Regnier, Victor. Design for Assisted Living: Guidelines for Housing the Physically and Mentally Frail New York: J. Wiley, 2002.

Victor Regnier does a great job writing about the current design ideas for assisted living that focuses on the elderly. In many books I have read so far, a lot of people in the past have said just follow the ADA guidelines, while Victor Regnier writes about how the elderly and disabled are significantly different people. So, he writes steps to designing spaces for elderly people that go to the extent of their needs and issues. He even goes a step further to write about what the elderly does and do not want to see. Victor mentions that elderly people want to live in a place that does not look like a facility, but a place that has a residential homey feel. It is a great book so far that will be more helpful in the case study/precedent research.

Sebesi, S B, H L Groza, A Iano i, A Dimitrova, and D Mândru. "Specific Issues of the Design for the Elderly." In IOP Conference Series. Materials Science and Engineering, 147:12049–. IOP Publishing, 2016.

In this paper from the IOP Conference Series they were able to predict each part of the world's population of elderly. It is predicted that by 2030 there will be 1.4 billion people over the age of 60 and by 2050 there will be 2.1 billion. Every 15 years the population of elderly people is doubling as people are starting to live longer. The researchers are saying that, "globally the 60-year-old persons in 2010-2015 on average could expect to live in additional 20.2 years. This life expectancy at age 60 years was highest in Oceania (23.7 years), in Northern America (23.5 years), and in Africa (16.7 years)." Engineers decided to research different assistive systems for the elderly to help with walking/posture, mobility aids, exercise, rehabilitation robots, assistive robots, prosthetics and others. Later in the paper it talks about aging suites and less about architectural design, but the demographics and assisting equipment is important to know.

Bibliography

Zallio, Matteo, and Niccolò Casiddu. "Lifelong Housing Design: User Feedback Evaluation of Smart Objects and Accessible Houses for Healthy Ageing." In Proceedings of the 9th ACM International Conference on Pervasive Technologies Related to Assistive Environments, 1–8. ACM, 2016.

This conference piece is not the most helpful in architecture or design, but it talks about emerging technologies and adaptions necessary for elderly people to use their building. It talks about active and passive technologies that makes an elderly person's quality of life better. It recommends less stairs, but longer walking paths that lead up to elevators to prevent falling and exhaustion. Widening doors and openings for bigger assisted walkers and wheelchairs. Appropriate lighting that does not affect their vision or reflect unpleasant reflections. Automatic house/building technology that adapts to whether outside, so they do not need to worry about temperature of comfort. And a list of other beneficial technology that can improve the quality of life for the elderly.

Chien, Lung-Chang, Yuming Guo, and Kai Zhang. "Spatiotemporal Analysis of Heat and Heat Wave Effects on Elderly Mortality in Texas, 2006–2011." The Science of the total environment 562 (2016): 845–851.

In "Spatiotemporal Analysis of Heat and Heat Wave Effects on Elderly Mortality in Texas, 2006–2011," researchers focused on two big issues that will become even more a problem as time goes on. With climate change getting worse and people aging older and older there will be many elderly people suffering from heat related illnesses. Texas is one of the hottest states and in El Paso the elderly has been suffering significantly. They did research on the temperatures, how long heat affects the elderly, and how to combat the heat to protect those from getting ill. This article is a great source focusing on the environment and the elderly with a lot of analysis and statistical information.

Golant, Stephen M. Location and Environment of Elderly Population Washington: V. H. Winston, 1979.

In this book it talks about the elderly and patterns that can be traced during their transitions in life. It analyses the migration of the elderly because in most cases and studies the elderly have been migrating to urban centers. Because of this there has been a call to improve the environments around the elderly people by updating public transport, supplying more amenities and social gatherings, and environmental cleanliness. To improve these things the book goes into how society can fix these things for the people living in dense and crowded cities.

Gronlund, Carina J, Antonella Zanobetti, Gregory A Wellenius, Joel D Schwartz, and Marie S O'Neill. "Vulnerability to Renal, Heat and Respiratory Hospitalizations During Extreme Heat Among U.S. Elderly." Climatic change 136, no. 3 (2016): 631–645.

This study was a great way to learn and research about the ways heat affect the elderly. When it comes to the elderly, they are way more prone to heat illnesses than any other group and have a higher mortality rate. In their study they found that on hotter days there were more elderly people admitted to hospitals than other days. The elderly who would leave their homes in the morning and try to go back home in the afternoons, however, in the afternoons area are at their hottest points leaving the elderly stranded. Because of their age they tire easily and are already dehydrated from lack of water. This is a great article to use when it comes to comfort of the elderly and what strategies can be used to keep them cool.

Zhang, Huibo, Ya Chen, Hiroshi Yoshino, Jingchao Xie, Zhendong Mao, Jingwen Rui, and Jinfeng Zhang. "Winter Thermal Environment and Thermal Performance of Rural Elderly Housing in Severe Cold Regions of China." Sustainability (Basel, Switzerland) 12, no. 11 (2020): 4543–.

The researchers in this journal decided to compare the thermal envelopes of housing in urban China and rural China for the elderly. More than 40% of the China's elderly live in rural planes and pastures and the construction of their houses are worse than those in the cities. It was found that 50% of homes were below the thermal neutral temperature for the elderly which is 63 °F. The reason for this below average neutral temperature was because of air leakages from the windows, thermal bridges, and condensation on the exterior walls. This journal may not be the most important one in my thesis, but it will give me a good baseline to figuring out the comfort levels necessary for elderly.

Bjorvatn, Afsaneh. "Hospital Readmission Among Elderly Patients." The European journal of health economics 14, no. 5 (2013): 809–820.

"Hospital Readmission Among Elderly Patients" is a good article to get statistics about the elderly being admitted and readmitted to hospital because there is an upward spike of them returning several times in a year due to poor living conditions. It has facts and statistics about the issue, but it covers more than just elderly patients. Expansive article, but I did not find it as useful as the other articles I have been looking at.

Brink, S. Housing Older People: An International Perspective New Brunswick, N.J., U.S.A: Transaction Publishers, 1998.

In this book the author, Satya Brink, does an amazing analysis of elderly housing around the world. In depth comparison of how different countries care for their old and how culture affects a lot of the housing decision choices made. The countries that are compared are Australia, Denmark, Hong Kong, India, Israel, Japan, Korea, The Netherlands, Singapore, and Taiwan. Each one has its differences and similarities, and some have a very similar to culture to America with putting their elderly in retirement homes. It breaks down all the classes, races, and ages of the elderly and puts the info into matrixes for easy-to-read information about each country. This is a great source for my research so I can see what countries are doing things right and what countries are doing things wrong. For each country she also provided and adaptive floor plan that the different countries think is the best for their elderly citizens.

Costa-Font, Joan, David Elvira, and Oscar Mascarilla-Miró. "'Ageing in Place'? Exploring Elderly People's Housing Preferences in Spain." Urban Studies 46, no. 2 (2009): 295-316.

This journal gives an in-depth view of the situation with the elderly and housing in Spain. The intro provides a good cultural setting about the quality of life of the elderly in the European Union and in most cases the elderly is taken care of by the family. Spain specifically, has found that the elderly would prefer to stay in their home and will be frugal their entire lives so they can adapt their home as they get older. It is predicted that "by 2030, that 24% of the Spanish population will be over 65, and 6.5% will be over 80. In 2050, the percentage of people over 65 is expected to have increased to 31% and the proportion of individuals who will be over 80 is estimated at about 10%." With this, over 88% of the elderly live in their own homes by them self or with significant others. However, a majority do not want to adapt their homes because of the length of time it takes and energy, so many end up living in a difficult situation and not living sustainably. In this paper they were able to derive a formula for the elderly in Spain to calculate what kind of budget an elderly person would need based on their income and dependency. There are several tables that show the elderly age ranges for elderly people living independently at home or in a nursing home and gives great descriptions of the living conditions in these homes.

Kim, Sunghyuk, Hongbumm Kim, and Woo Gon Kim. "Impacts of Senior Citizens Lifestyle on Their Choices of Elderly Housing." The Journal of consumer marketing 20, no. 3 (2003): 210–226.

"Impacts of Senior Citizens Lifestyle on Their Choices of Elderly Housing," is on the shorter side, but it gives a good idea about the things elderly people want in their elderly care facilities in Korea. What is interesting about area is that in their study the ideal things the elderly people look for are proximity to the Seoul, the capital of Korea, a pleasant surrounding environment, and

Bibliography

physical equipment facilities. From this study it was also found that their sample preferred separate housing units or assisted living homes and small social communities. What this journal is lacking are the people who cannot afford such nice accommodations. This survey included more people who could afford the facilities and lifestyles they wanted because of their financial situation. So, I think it is missing those who are less privileged, but it gives a good direction of where the elderly community may be heading.

Liebig, Phoebe., and Jon. Pynoos. Housing Frail Elders: International Policies, Perspectives, and Prospects Baltimore: Johns Hopkins University Press, 1995.

This book is another source that looks at the comparison of housing practices in several different countries like Denmark, Sweden, Great Britian, The Netherlands, Germany, Israel, Canada and the United States. What is unique about this book is that it gives the most recent up to date policies for these nations and the laws that go with housing. It talks about how some nations are turning their retirement homes into more residential living for the elderly. For each country it goes into the population as a whole, marital status, mobility, frailty, jobs, community service and other important things to consider when talking about the elderly and their housing situations.

Liu, Fei, and Xinru Xiong. "Urban Elderly Community Micro-Renewal Planning and Design -A Case Study of Wuhan Anjing Community." In IOP Conference Series. Earth and Environmental Science, 693:12115–. Bristol: IOP Publishing, 2021.

In "Urban Elderly Community Micro-Renewal Planning and Design - A Case Study of Wuhan Anjing Community" researchers analyze an urban neighborhood that was meant to be an area for the elderly. This neighborhood was designed and developed years prior, and the designs made were not necessarily geared toward the elderly, but towards ADA accessibility. The research from the conference is about what changes can be made for the elderly to easily access the urban environment while also staying safe. With the information from the conference, it would be a good source to use for strategies revolved around elderly design in the urban environment.

Sugimoto, Kentaro, Yasuko Ogata, Masayo Kashiwagi, Haruka Ueno, Yoshie Yumoto, and Yuki Yonekura. "Factors Associated with Deaths in 'Elderly Housing with Care Services' in Japan: a Cross-Sectional Study." BMC palliative care 16, no. 1 (2017): 58–58.

This medical journal is a great scope looking into the elderly care system in Japan and how it differs significantly than Spain. In Japan, they are expecting a rise in elderly people needing to be housed and the country does not want to expand their hospital bed numbers or provide nursing homes. They are recommending that people take in their elderly family members and hire a nurse to live in the home or recommend better communication and standards in 'Elderly Housing with Care Facilities'. Researchers sent a questionnaire to hospitals and elderly care facilities and the results were that only 154 facilities answered the questionnaire. What is even more surprising is that over 54% of deaths have occurred in these 'Elderly Housing with Care Services' facilities. In this questionnaire they found that many of these deaths were also caused by lack of communication between doctors and nurses and lack of attention from the nursing staff to help those who cannot take care of themselves.

Wu, Lei, Yao He, Bin Jiang, Dongling Sun, Jianhua Wang, Miao Liu, Shanshan Yang, and Yiyan Wang. "Trends in Prevalence, Awareness, Treatment and Control of Hypertension During 2001-2010 in an Urban Elderly Population of China." PloS one 10, no. 8 (2015): e0132814–e0132814.

I was trying to find what country had the highest population of elderly and it this article it found that China has the highest elderly population and India is in a close second and I was able to find more about Indias elderly. But this article only really gave me the statistics of elderly in China and not much more. This focuses on hypertension in urban China and most the article is about the people who will be going into the elderly age of their life.

Folts, W. Edward, and Dale E. Yeatts. Housing and the Aging Population: Options for the New Century New York: Garland, 1994.

In this book Folts divides up the different types of housing into two categories of private and public sector. Each category has an extensive list of options for the elderly to see what ones have better benefits and quality to people. What is even better is that he goes into more unique ones that more prevalent today like adult daycare, home sharing, and board-and-care homes. Similar to other sources there are two chapters where he goes into great detail about the ways to improve the housing quality for the elderly and the best ways to go through the transition of moving. At the end he gives his theories about issues that can be occurring in elderly housing in the twenty first century. Issues with public health decreasing, mental retardation, economic/demographic issues, and lack of savings. So, this source is an excellent overview of all the different elderly housing options and their information while also thinking about the future of elderly housing.

Golant, Stephen M. Housing America's Elderly: Many Possibilities, Few Choices Newbury Park, Calif: Sage Publications, 1992.

This is another book that focuses on the different types of housing options for the elderly people of America. It is to examine the strengths and weaknesses of the different elderly housing options in America. In the beginning of the book, it discusses the issues at hand and how the elderly population is growing at an alarming rate. It looks at the conventional single-family houses, age segregated developments, rent subsidized housing, assisted living facilities and many more. Great book in looking at the comparison of housing options and how each one has its benefits and flaws.

Heumann, Leonard., and Duncan. Boldy. Housing for the Elderly: Planning and Policy Formulation in Western Europe and North America London: Croom Helm, 1982.

Heumann does a great job categorizing the different levels and stages of elderly. He creates stages for disability, self-care, mobility and other categories that can all be used to determining how much help an elderly person needs. In this book he calls long term assisted living a 'sheltered' environment and he goes into the advantages and disadvantages of rural and urban shelters. This book has a unique perspective as well because it is told through the perspective of North America and the United Kingdom.

Mor, V, V Wilcox, W Rakowski, and J Hiris. "Functional Transitions Among the Elderly: Patterns, Predictors, and Related Hospital Use." American journal of public health (1971) 84, no. 8 (1994): 1274–1280.

"Functional Transitions Among the Elderly: Patterns, Predictors, and Related Hospital Use," was written to share the data found on the effects of moving the elderly from facility to another. It was realized that when elderly patients had more impairments, they would transition from one facility to another more often than those without. The transitions would make the elderly more stressed and increase the severity of the impairment. Through the research they were able to see that through longer hospital stays the elderly where functionally declining much faster.

Struyk, Raymond J., and Harold M. Katsura. Aging at Home: How the Elderly Adjust Their Housing Without Moving New York: Haworth Press, 1988.

What makes this book different from other books is that it has surveys and research about the possibility of elderly people adapting their homes so would not have to move. In most cases this is an ideal situation, but many elderly people do not ahead to adapt their house or have the money it takes to adapt the house. The book goes into the very specific dwelling modifications that are necessary and important from handrails to ramps. One survey mentioned in

Bibliography

the book goes into the varieties of neighborhoods with diverse communities and housing types. It ranges from single family homes, row houses, apartments, and other traditional housing situations. Similar to other books there is a strong emphasis to have emotional support for the families helping the elderly and the elderly themselves. Moving and changes causes a lot of stress and there need to be outlets for all the parties to recover from the stress and anxiety.

Keigher, Sharon Marie. Housing Risks and Homelessness Among the Urban Elderly New York: Haworth Press, 1991.

Keigher goes into detail about the elderly people who get lost in the system and cannot afford their care. These elderly people exist in every city and elderly homelessness is more of an issue in urban contexts then rural contexts. Elderly poverty has been lowering through the years and currently the average rate is around 12% which is at an all-time low. In 1965 it was at 25.3%, but with updated policies and government programs the elderly in poverty has been decreasing. There is also a study done that found 43% of single elderly people are poor or near poor, a rate nearly five times that of elderly couples. She also goes on to write about the public housing programs from the government and approximately 45% of the nation's 1.2 million public housing units are occupied by older Americans. Later in the book she goes into the wellness and support system many elderly people go into to escape poverty and homelessness.