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El Retiro del Sol: LEED Retirement Community

Abstract

A hacienda is a Spanish term for a large estate. Many of these estates used to combine living with productive activities such as plantations, mines, factories. Our goal of this project is to design a LEED certified green retirement community that incorporates healthy living with an authentic hacienda theme. It will allow for a safe, gated community by integrating health for the mind, body, and soul of the elderly residents. It will make them feel younger as well as less impactful to the environment while living in a green estate. The facility will have three forms of housing, each LEED Gold certified according to Building Design and Construction credentials. This project will incorporate an old, dilapidated retirement home, along with additional land, in Sun City, Arizona. The market value is low for this area, making it affordable, and the weather is ideal for abundant sun collection for any photovoltaic layouts. Sun City is a well-known retirement city where the median age of a resident is 75. It is currently a hot spot for elderly migrants from other states to come settle down, but not be held down. Our facilities will be a safe, relaxing, yet active place for our residents.

El Retiro del Sol retirement village will have an Hacienda theme because of the American Southwest aesthetic, in addition to the ability to use traditional materials such as clay and adobe. An hacienda is a large estate (traditionally Hispanic), that combines different productive activities such as mining and agriculture. As a result, the village will be cohesive in its environment while respecting architectural traditions of the area. Haciendas also give an architectural space or area for gardens and patios that are easily building into the facilities. We will have three types of housing in order to provide three different lifestyles in one community, thus catering to preferences of all kinds. The Neighborhood home is the most affordable living option (\$250K entrance fee), the Hacienda is in the next scale of affordability (\$600K), and the Apartment style is the most expensive option because it provides the healthcare to more residents (\$650K). With these costs, we are expecting an initial budget of 262 million dollars; however, as residents naturally move on from our facility, we will gain more money for additional improvements.

Demographics

According to the 2010 census, Sun City, Arizona is home to 37,499 residents. 79.8% of the population is over the age of 65, and the median age was 75 years. These statistics combined show a need for retirement facilities in this area. The median income for a household was \$32,508. The economic climate in the area is important to consider because the money we put into the retirement home is an investment into the potential residents who will then invest in our facility. We need to be sure that this population can afford the lifestyle we provide.

Site Selection

As stated above, we chose our location in Sun City, Arizona due to the population needs. This city is also perfect for the aging population as a result of the climate. The American Southwest is hot and dry in summer and moderately cold in the winter. There is relatively low precipitation (9 inches annually) with 85% sunshine on a yearly basis. We will need to design to save the water collected, in addition to the fact that we will need to protect residents from the heat and sun. Still, this climate is sought by many elderly people, resulting in a high population density.

Therefore, we will buy and repurpose a current retirement facility, adapting it to our needs. Figure 2 shows the selected site, Ventana Winds Retirement Home and an adjacent plot of land. This retirement home received two of five stars in online reviews, meaning that there is a lot of room for improvement namely in the healthcare context; however, we believe that there is also a lot of room for improvement with regard to sustainability.

Land Development

In conjunction with our desire to be as sustainable as possible, we do not want to disturb the land. As stated above, we will be repurposing the current retirement facility to meet our needs. With the empty plot of land in Figure 2, we will be creating some open community spaces as well as building smaller homes for group living outside of the Assisted Living facility. There, up to six individuals will be able to live together in a home with a small crew of nurses who monitor the wellbeing of the home community. We want to give our residents as much autonomy as possible because we see independence as a pillar in quality of life. As long as these residents can, we want them to live as normally as possible. Still, we want to have open areas so that residents in all of our housing styles can get outside and enjoy the sun. We will have an accessible walking path connecting each building to the gardens because we believe in the healing power of nature.

Culture

Since Sun City, Arizona is located in the American Southwest, we want to honor the Hispanic

influences in both architecture as well as activities despite the majority white population. The buildings in our retirement community will have a cohesive appearance, light adobe walls with red clay roof tiles. The main building will be in the hacienda style, with a large courtyard featuring a fountain and garden. Not only does this style highlight nature and the culture of the area, but the fountain will specifically provide evaporative cooling for the building.

We are also including space for activities for the community members so that they can continue to live culturally-enriched lives. For example, we'll have dance lessons, art classes, and other opportunities for the residents to learn new skills or have new experiences. In the main hacienda house, there will be a large room with a stage for dances or concerts. At El Retiro del Sol, we are committed to helping the elderly transition into their later years with grace and ease. Since the community is located in close proximity to Phoenix, Arizona, there will be endless opportunities for the residents to travel to the city in order to visit galleries, or go to larger theaters.

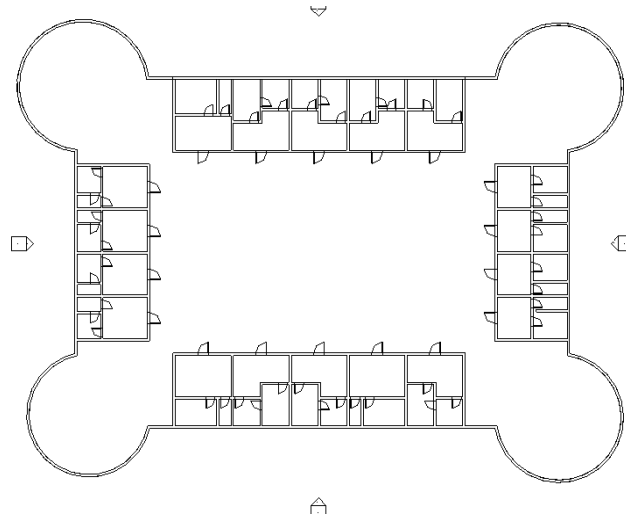
Natural Habitats

No information could be found on the exact animals that live in Sun City, Arizona. However, animals that live in Arizona most likely to be in this area include jackrabbits, skunks, coyotes, roadrunners, hawks, owls, spiders, and scorpions, and snakes. We will have to be conscious about disturbing these animals' habitats when doing construction; however, we are committed to the success of ecosystems everywhere, meaning that we care about the success of species everywhere.

Building 1: Hacienda

The main building is square, a hacienda with an open roof and a center patio in the facility providing plentiful space for community members to keep active through the day, socialize, or take up hobbies and embrace their souls. The corner edges are rounded on the exterior but square in the indoor side, to allow plenty of space for stairs or elevators. The main building is a two-story building with open corridors out in the open. The first floor will house all amenities such as the barber shop, bar- cafe, chapel, concert hall along with a set of classrooms that serve as multipurpose rooms and a child day care center. The second-floor houses fancy-high end living suites for couples. Each suite offers a master bedroom with an attach bathroom, a living room dining area and a small kitchen station. There will be a total of 16 suites each able to house 2 people.

To accommodate the hacienda style, the corridors will have arches to go with the aesthetic and structural stance of the building; they will be brightly colored to help with air ventilation. This color technique is seen in other similar climates such as Mexico. There will be a patio in the center with benches, patio tables, and a waterfall, decorated with succulent plants all over to provide evaporative cooling in the square patio of the hacienda.



Guadalupe-- Floor plan of the second floor of the Hacienda building

Elderly people want to live in retirement homes to avoid loneliness and boredom. Therefore, it is important to keep that aspect at the core of the facility. Typically, people go to gyms or parks to find recreational activities to relax or entertain themselves. A center patio inside the home facilities allows for center connection, as well allows for natural light to brighten the area. Providing recreational areas and activities along with amenities and everyday things on site lowers the amount of driving the residents must do in their lives.

A member could practice yoga daily; an activity that can lead to physical activity and positivity in the community. Therefore, it is important to always keep a garden patio. Not everyone is a yoga fan; other members prefer arduous or intensive workouts in group exercises. The classrooms will serve as multipurpose rooms and craft rooms for the community. There will also be a children's day center, located in this area of the retirement center because studies have shown small children are mutually beneficial to elderly folks. There will also be solar panels located on top of the roof because they benefit the facility by providing another source of energy and alleviate grid use.

Since Arizona is located in the desert a good heating system is needs to be put in place to compensate for the high temperature differential between day and night. It will fit the aesthetic of the hacienda to place modern metal lamps along the arches of the corridor. The lamps can be made from recycled metal obtained from nearby local shops, and powered via propane fuel, as it is cheap and efficient. Every suite will have the same heating and cooling system; unlike most retirement homes, the halls or corridors of ours won't be under the climate control. Higher ceilings will be offer to the first-floor rooms and facilities to aid with the ventilation and cooling. Every toilet placed inside the living community will be water-efficient saving gallons for every flush. Roofs into the center patio will be slanted inwards to provide shade in the patio at different times of the day. There will always be a shaded region in the patio. We will also set rainwater harvesting tanks underground on the rounded corners under the stairwells and elevators. Since Arizona is a dry area, and rain rates are low and scarce, but we will use everything we can.

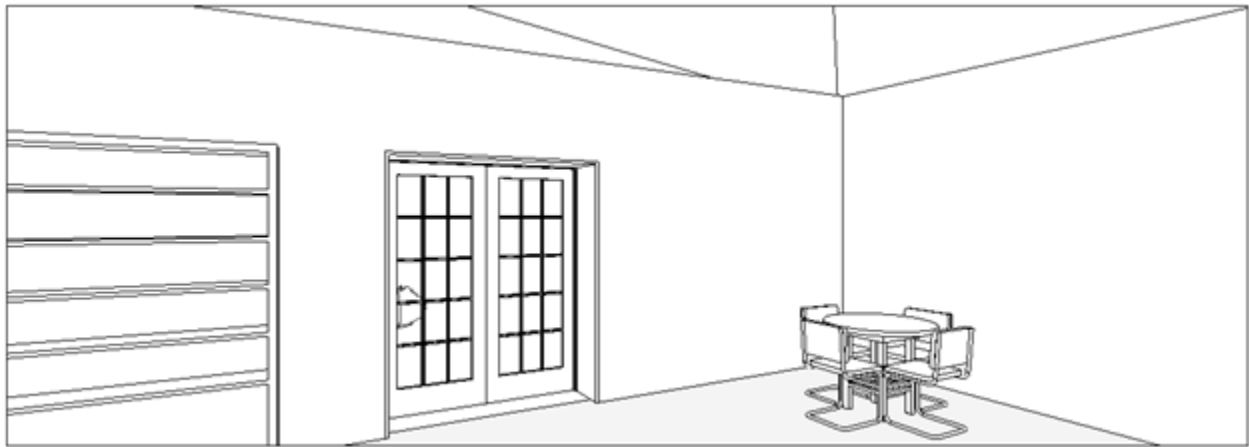
Building 2: The Neighborhood Home

The Neighborhood Building is one of six cookie cutter homes, which allow individuals to maintain the feeling of home while on the premises. Each home has 6 rooms for individuals or couples. In this environment, the elderly can maintain autonomy for as long as possible. There is a large kitchen as well as multiple common living spaces so that residents can socialize in both large or small groups. There will be gardens be positioned between the homes as a possible activity for the residents. All the homes will

have toilets with water-efficient capabilities and windows that contain the temperature inside the home as preferred.

There is open space for tenants to enjoy activities of their choice, in order to enrich themselves with the idea of a healthier life is vital. Therefore, they have lawns and gardens as well, and with a short walk or bike trip they can reach the main facility for the amenities and extra services. People who are physically active are able to process and live longer due to the physical activity. Providing tenants with access to these activities increases quality of life. Residents who live in the house clusters are allowed access to the main Hacienda. They don't have to make a trip to the local YMCA, gym or pool lowering the parking footprint as well lowering emissions if they use their cars less overall.

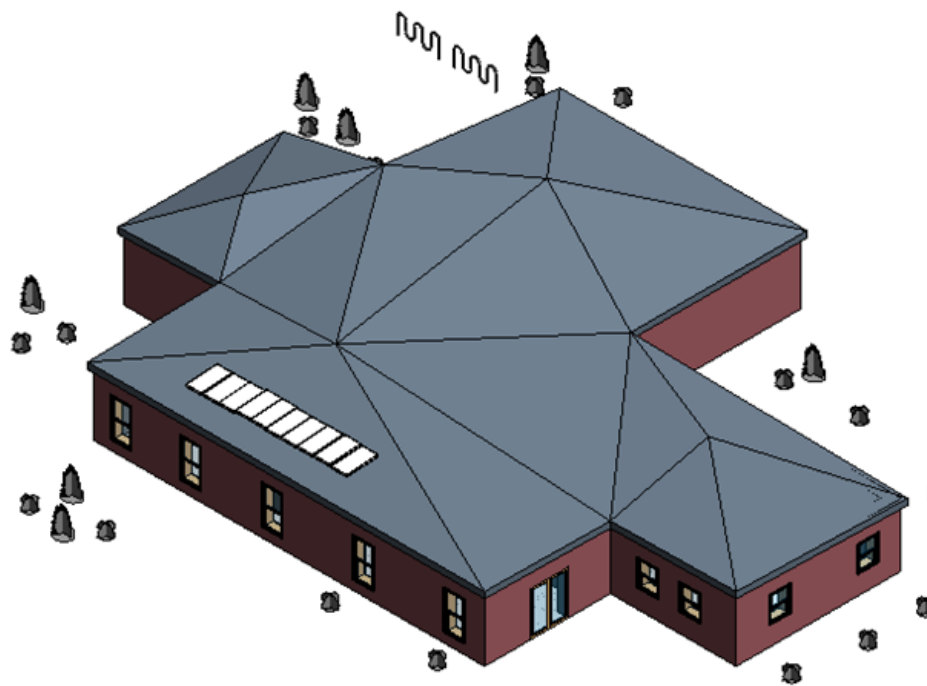
In terms of LEED certification, sixty points are required in order to be considered "Gold". Most of the LEED points awarded to this building (Multifamily Midrise) are due to site selection and metering of utilities. We will test the air and water system to prove sustainability. In addition, these homes will be made from locally sourced materials (adobe) that are traditional for this southwest style housing. The roof will be made from clay tile with a high albedo so that light is reflected to keep the home cool. Because of the high level of sunlight (85% of the year), it is beneficial to include solar panels to generate energy. The solar panels will be oriented at the latitude of nearby Phoenix at 35 degrees.



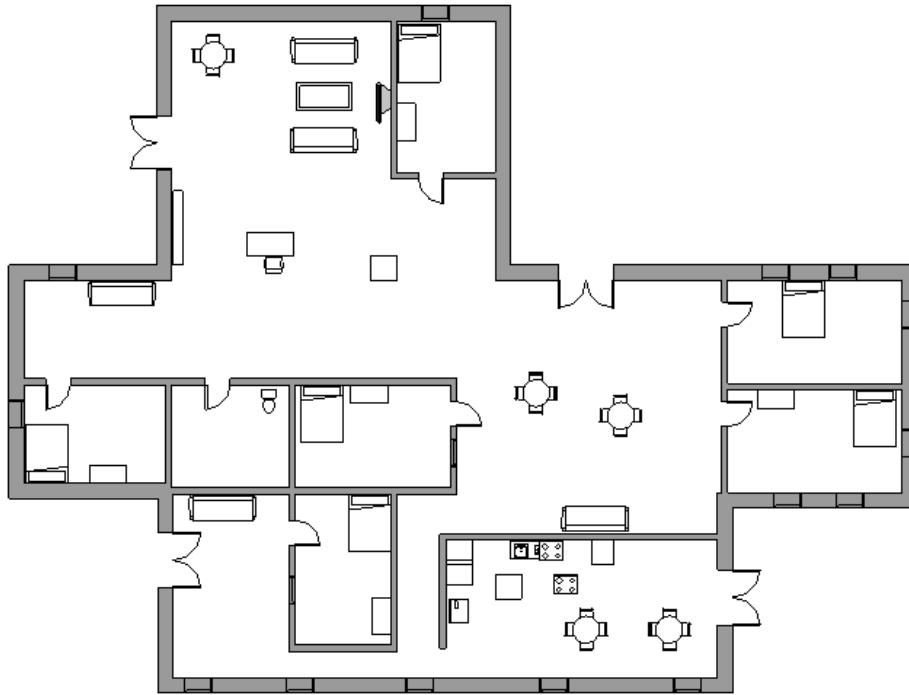
Julie—view of entrance to Neighborhood home



Julie— isometric view of Neighborhood home



Julie— Neighborhood Home floor plan; the bathroom fixtures (tub, etc.) and kitchen appliances would not cooperate.



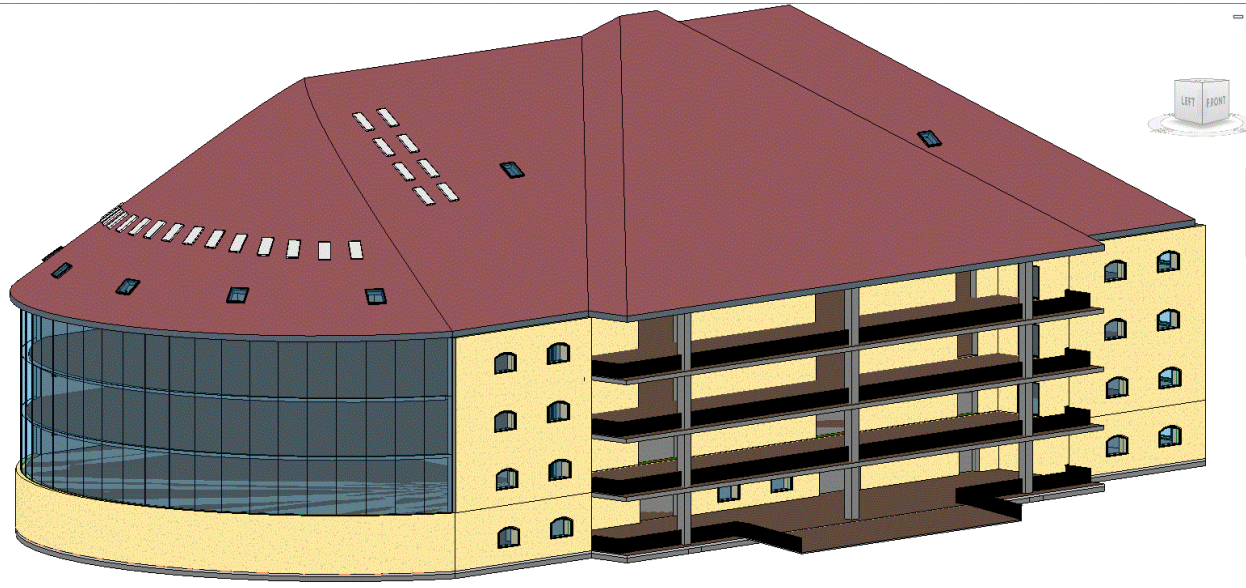
Julie -- Floor Plan of Neighborhood Home



Julie -- Rendering of the Neighborhood Home entrance; note the bicycle racks, native plants, and overhang.

Building 3: Apartment Complex, Main Housing

Along with several of different housing options, El Retiro Del Sol will provide an apartment complex that provides housing for single individuals, or assisted living as well as a hospice environment. To obtain accredited LEED Gold points, it was imperative to look at the residents' comfort as well as their environmental footprint when designing our facilities. This building in particular will hold the majority of residents and is one that will be built from scratch. It is estimated to receive a LEED point toward its integrative process based on its intent to support high-performance and cost effective project. This building will also contribute to the synergy of the community. It incorporates the clay roofing, warm color scheme and hacienda theme with a modern twist.



Kimberly-- North face of Apartment building

For credits toward LEED location and transportation, the intent of the apartment complex is to enhance livability and improve human health by encouraging daily physical activity. Along with the pool amenities, the building will have a wellness gym and plenty of bike racks and riding paths to encourage bicycle activities for brisk, relaxful bike rides. In attempting these credits, the renovated apartments have potential to earn 12 LEED points under neighborhood development out of the total 16. This is to avoid development on environmentally sensitive lands and thus, reducing the environmental impact from the location of a building on a site. Sun City has very little foliage, so removal to reconstruct will not be impacted. There will be an improvement plan of planting extra foliage, common to the area. This will help create activities for residents to maintain and restore native natural communities. Creating an entire community with multiple amenities and nearby shopping will reduce the need for cars and make the included plans for parking lots strictly for visitors.

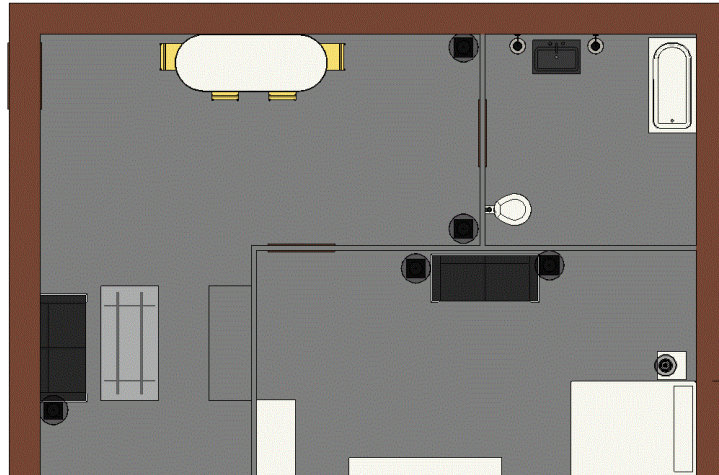
The climate of Sun City Arizona will greatly contribute to site assessment. It is an area known for a large solar exposure. The topography is relatively level and therefore does not require much remediation for construction. El Retiro del Sol is intended to conserve existing natural areas by minimal new constructions and effects to biodiversity. The community intended will also create exterior open space that encourages interaction with the environment, social interaction, passive recreation, and physical activities. A number of skylights and balconies will increase night sky access for our residents. Many are impaired in different ways but will not need to go further than their bedroom window to enjoy the night sky or natural sunlight. Geothermal systems will also be optimized to reduce heat island reduction and to minimize effects on microclimates and human and wildlife habitats by reducing heat islands.

Irrigation will be unnecessary thanks to the low maintenance native plants. Succulents like aloe plants and cactus use very little water and flourish in dry areas like Sun City, Arizona. This will greatly reduce our water usage. Toilets and showers will use low pressure systems. The apartment complexes do not have individual kitchens and will reduce dishwasher and water for food prep will be reduced and minimized to the dining hall. The staff will be training on water metering, especially nurses when caring for the residents.

The apartment complex is estimated to receive the majority of its LEED points from the Energy and Atmosphere section. The intent is to further support the design, construction, and eventual operation of a project that meets the owner's project requirements for energy, water, indoor environmental quality,

and durability. With geothermal heat pumps, rainwater collection, state of the art efficient appliances, and solar collection we aim to offset energy by over 50%. Geothermal is a newer source of renewable energy not directly mentioned in LEED certification. This kind of out of the box thinking deserves innovation credit.

Along with LEED accreditation, these services will provide optimal care for our residents. Every floor serving a different group of need, it has the versatility to be turned into different ways to provide a variety of services. The individual rooms give a certain privacy that is often preferred by the elderly people. Each floor will be accommodating to higher needs of care, but each room will be wheelchair accessible and spacious.



Kimberly - Aerial view of the standard bedroom.

The main lobby of the apartment building will have a café as well serve as a second hang out and as an extra amenities area. The electricity use in this apt building can be control by using automatic light fixtures as well solar panels can be placed above the facility. The overall structure of the building will also accommodate climate control windows as well as adobe walls and a clay roof. There will also be a medical center located in the first level for the tenants of all 3 buildings. This building along with the others will be equipped or will be connected to the onsite filtration system that will be located in this building.

El Retiro del Sol is a state of the art facility with different living options located in one community. Amenities and services offered in different buildings promote interconnection in between the communities and provide space for mind body and soul to fuse. Efficient use of resources provide a controlled climate that is comfortable for the inhabitants. In between the buildings, there will be gardens with succulent plants due to the climate in the region as well as seasonal pools and fountains. The benefit of a series of multiple buildings on the area goes hand and hand with our mission of providing a living community for retirees where they feel as there are not in an elderly housing place but a home. When people live in this retirement home they should find peace of mind and connect with their spiritual self while interchanging ideals and knowledge with the community.

Works Cited

"Concrete Roof Tiles - Hacienda | Monier Roofing", Monier.co.nz, 2016. [Online]. Available: <http://www.monier.co.nz/Tiles/Hacienda.aspx>. [Accessed: 21- Oct- 2016].

The design incorporation for a hacienda theme was not just for aesthetic appeal. The clay tiles they use for roofing is actually a remarkable money saver in terms of their weather prevention and long-lasting usage. Impervious to frost and ice the roof tiles are ideal for those living in colder climates. They are impervious to the effects of frost and ice, and will never warp, no matter how cold it gets. They provide acoustic insulation and assist in keeping unwanted noise out. Their advanced insulation properties mean that the only noise in your home will be the noise created by you and your family. The clay tiles provide thermal insulation as they keep you comfortable in your home all year round, while helping save money and the environment through energy savings. Concrete roof tiles will not rust, warp or corrode, a problem with other roofing materials.

Thompson, "Stay Fit in Your Senior Years", EverydayHealth.com, 2016. [Online]. Available: <http://www.everydayhealth.com/senior-health/stay-fit.aspx>. [Accessed: 21- Oct- 2016].

To design a proper facility and community for the elderly and retiring, we needed to research what activities they are capable of doing as well as what they are interested in. Staying fit encompasses so much more than just exercise. It is a lifestyle and an atmosphere we want to provide for our residents and guests. You may wonder, though, if you can keep up the same pace you once did. Can you still ride a bike, run some laps, and play a round of tennis? The answer can be yes, if you make the appropriate adjustments to your fitness routine. Our facility can provide the mental support to push senior citizens to be more active. Staying fit comes down to you and what you're comfortable with, says Carol Ewing Garber, PhD, associate professor of movement sciences at Columbia University and a registered clinical exercise physiologist who researches the role of exercise in senior health.

Howarth, Dan. "AS Arquitectura Turns Dilapidated Mexican Hacienda into ..." Dezeen. Architizer, 29 Aug. 2016. Web. 20 Oct. 2016.

Dezeen online magazine has an article of a redone and dilapidated old-style hacienda. This article takes an old hacienda into a modern twist with a wonderful integration of foliage and remaining stones. However, it does not incorporate any LEED certifications or sustainable designs into the architecture. This article was interesting to reference because of how they upkeep the layout of the hacienda. A hacienda is a Spanish term that means a large estate or describes a large plantation home. This architecture is classic for the southwestern area. The clay roofing and open layout are ideal for a well-lit and accommodating community.

"Human Medicine", D28d0ipak1ih43.cloudfront.net, 2016. [Online]. Available: <https://d28d0ipak1ih43.cloudfront.net/app/media/716>. [Accessed: 21- Oct- 2016].

To prepare a facility for the elderly, there is a number of health and safety requirements we must think of fulfilling before we can properly make it LEED certified. Designing a retirement community requires a full care and treatment facility. Our residents should not have to go far for their weekly check-ups and routines. It is important to know how much space a medical facility needs, especially since we want multiple ones throughout the community. Here are a list of guidelines we can go buy when designing our medical center. We need space for machinery, proper disposal and sanitation stations, we need office spaces for doctors, nurses and the works.

"Integrating Photovoltaics in Buildings for Renewable Energy Production | U.S. Green Building Council", Usgbc.org, 2016. [Online]. Available: <http://www.usgbc.org/node/4603173>. [Accessed: 21- Oct- 2016].

We made sure we understood what was needed for each point of the LEED building certification. This site was useful for looking up specific terms I am unfamiliar with as a student. As a LEED specialist, I am still able to see this as reference. This course provides real world examples to illustrate proper understanding of photovoltaic, as well as other build design and construction requirements for points. and how photovoltaics can be used in LEED to achieve an onsite energy production.

"Sun City West, Arizona (AZ 85375) Profile: Population ..." City-Data. Onboard Informatics, 2016. Web. 20 Oct. 2016.

City-Data works with unison of a number of other sources to compile facts about all of the cities in the United States. Viewers are capable of looking at different demographics of the city along with common geographical facts, like the size and population. The site even has the temperature and weather conditions at that moment of the city the viewer is looking at. We used this site to gain brief knowledge about Sun City, Arizona. The site even provides median household incomes of the permanent residents currently living there. The cite provides great surface information for visitors and potential homeowners. Sun City is a predominantly White American community of a population of elderly citizens with a median age of 75. It is a common location for elderly migrants because of its pleasant retirement community and atmosphere.

"SUN CITY, ARIZONA", Suncityaz.org, 2016. [Online]. Available: <http://suncityaz.org/>. [Accessed: 21-Oct- 2016].

Sun City, Arizona is split into two districts, both of which, are well known retirement communities. With 120 clubs and seven contemporary, spacious Recreation Centers in Sun City, Arizona, you won't have to look far to find there's always something to do. Many Sun City AZ residents own and use licensed golf carts as their transportation around the community. These are allowed on all Sun City AZ streets with a posted speed limit of 35 mph or less. Not only is this transportation option extremely economical for trips to grocery stores, drug stores, and shopping centers, it also provides residents with the transportation to reach a variety of local healthcare services.