

The demand for senior friendly, single family homes has increased as the baby boomer generation moves away from traditional senior housing. Generation X is expected to follow the same trend as they move into retirement. Builders in Daytona Beach Florida are preparing for the future by creating extensive senior living communities. The BEACH House provides an energy efficient and sustainable solution for this housing boom by combining forward thinking age in place design with passive energy saving architecture and old Florida style.

A NEW BEGINNING FOR AN OLD CITY

Daytona Beach, the “World’s Most Famous Beach,” is best known for its wide, white-sand beaches. These hard-packed sand beaches hosted car races in the 1920s which led to the foundation of NASCAR. Today the hard-packed beaches allow the unique experience of driving to your favorite surf spot. Nestled just north of Cape Canaveral on Florida’s east coast, the city boasts year round mild weather with easy access to the Atlantic Ocean, the intracoastal river, and natural springs. Thousands of visitors come to Daytona Beach each year to enjoy the beautiful beaches, partake in the Daytona 500 experience, or cruise on historic A1A during Bike Week.

Daytona Beach’s primarily tourism driven economy was greatly affected by the economic recession of the 2010’s. An already aged infrastructure and the failing economy lead to the historic ocean and riverfront areas of the city becoming dilapidated. However, the economic lull provided an opportunity for investors and city leaders to revitalize the city. Daytona Beach

and the surrounding areas are in the midst of a master plan to breathe new life into the area. Daytona International Speedway has completed a \$400 million re-imaging of the speedway and has a 1.4 million square foot retail and entertainment center, Daytona One, under construction just north of the track. A multi-million rejuvenation of the historic waterfront areas including Beach Street and the Main Street Pier is underway that includes adding entertainment venues and rehabilitating classic hotels. The city also has plans to gentrify housing sections near the river and ocean, and an expansive 6900 home senior-living development, Latitude Margaritaville is in the construction phase. The city's revitalization is perfectly timed to coincide with the upcoming boom in housing for America's aging population.

As the Baby-Boomer generation ages, the need for senior-friendly living arrangement increases. It is expected that the population of persons over the age of 65 years will grow by nearly 30 million in the next 20 years, resulting in one out of three households being led by a person in this age group. Nursing homes and other traditional senior-living arrangements are less sought after as in-home care gains popularity. These trends create a demand for single-family homes that are affordable and accessible.



Figure 1: Welcome sign at Daytona Beach's beach access ramp for vehicles



Figure 2: Colorful, water-centered signage along Daytona Beach's beachside boardwalk



Figure 3: Artist Rendering of Latitudes Margaritaville¹

Like many coastal Florida cities, Daytona Beach is a retirement destination. Florida has seen a 2.1-percent increase in persons 65 years-of-age and older between 2010 and 2014, giving a total of 4 million persons in this age bracket. Baby Boomers and Generation X are more likely to care about sustainability and green living than past generations. As the need for senior housing increases, there should be a conscious effort to meet the green demands of the aging population. The goal of The BEACH House is to provide an energy-efficient and sustainable housing option for current and future seniors.

Team Daytona Beach was inspired by the rehabilitation of their home city. The team wanted to design a house that exemplified the sustainability of new construction with the distinct style of old Florida. The team wanted to design a home that met the needs of the growing senior demographic, but that also appealed to the city's current homeowners. Team Daytona Beach wanted to design The BEACH House.

DESIGNING THE BEACH HOUSE

BEACH is an acronym for Building Efficient, Affordable, and Comfortable Homes. This acronym was used throughout the design process to guide the team's decisions. Efficient, affordable, and comfortable, these attributes were chosen because they meet the needs and desires of the target market in Daytona Beach.

TARGET CLIENT

Team Daytona Beach designed The BEACH House for the upcoming senior-friendly, single-family housing boom. The

target clients of the house are the upcoming "empty-nesters" of the Generation X. The BEACH House provides this group with the opportunity to down-size their living arrangement and have a sustainable home, an important quality for many in this generation. The ideal homeowner of The BEACH House is a small family of 2-3 people with desire to live sustainably. The family should have a combined income of \$50,000 - \$60,000 per year, and be looking to make an investment in the future.

The target client is compared to the average Daytona Beach resident in Table 1. While the average resident does not meet the income criteria of the target client, Team Daytona Beach does not believe this makes Daytona Beach poor target climate. Daytona Beach has nearly 36% of its residents living below the nation's poverty line.² This will inevitably lower the average income reported in census.

Table 1: Target Client versus Average Daytona Beach Resident

	Target Client	Daytona Beach Average
Age Range	40-50	41-42
Household Income	\$50k - \$60k	\$29k

BUILDING FOR THE BUYER

Having a target client of an older family led Team Daytona Beach to their guiding attributes of efficiency, affordability, and comfort. The team also emphasized the two underlying attributes of every good design: simplicity and safety.

The team focused on using passive energy-saving techniques to simplify the homeowner's interaction with the house. Window placement, cathedral ceilings, and wall construction all reduce the energy consumption of The BEACH House, without any input from the homeowner. The parallel plumbing and zoned HVAC systems also reduce energy and water consumption. They are also easy to maintain by homeowner, and are familiar to neighborhood repairmen.

The BEACH House has an all-electric power system. This simplifies the electrical system, making it easier to maintain and repair. The house is a grid-tied and is capable of being fully powered by its 9.3 kW photovoltaic solar array. If there is a period of high power demand, or utility power outage, the house is equipped with a lithium-ion energy storage system. This system is used to offset demand that the solar array cannot meet, during the day and through the night, and it can act as an emergency back-up.

The sustainability of The BEACH House goes beyond the selection of locally sourced and recycled materials. The entire life cycle of the home was considered. Team Daytona Beach considers the highest form of sustainability to be the sustained use of the product. The BEACH House is designed to grow and adapt with the homeowner, eliminating the need for the



Figure 4: Clerestory Windows used for Daylighting above the Kitchen

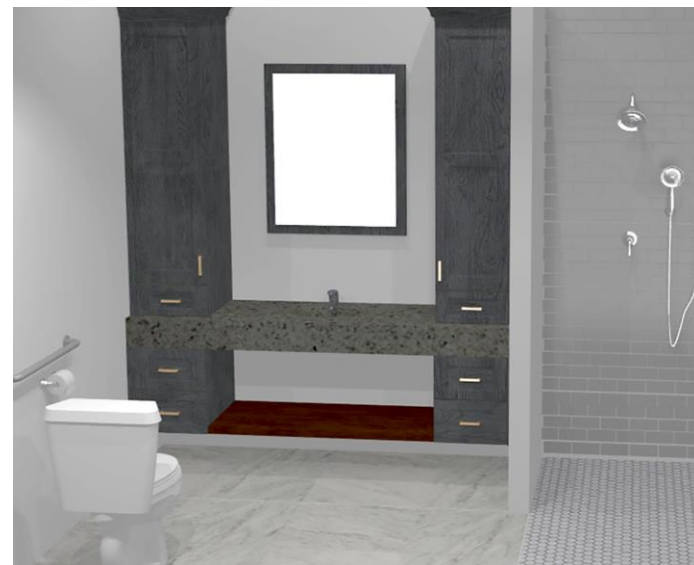


Figure 5: Fully ADA Compliant Bathroom

homeowner to leave, or discontinue use, of the home. This feature is a unique adaptation to age-in-place design, and has been coined a *forever* home. The home can become fully ADA compliant with minor cosmetic changes, such as a kitchen make-over. All walkways and doorways are at least 36-inches to allow for easy passage of a wheelchair or a walker. Door thresholds are flush or have a subtle ramp leading to the transition. The bathroom is fully ADA compliant, and has a seamless transition from floor to shower.

The BEACH House has an automated ventilation and humidification system that works with the HVAC unit in the main living area to provide ultimate control of the interior, thermal environment. While Florida may be humid, Colorado can be very dry. Mini-split HVAC units do not have a way to humidify air, so Team Daytona Beach developed a humidification. The humidifier is coupled with the north-facing clerestory windows. The system sense the indoor and outdoor temperature and humidity. If the indoor conditions are not within the set, desired range, the system will turn on. If the house needs humidity, the humidifier provide water micro-droplets. If the house is too hot, the clerestory windows open to vent out the hot air that collects in the cathedral ceiling and to let fresh air in. When the windows open, the HVAC in the main living area turns off to save energy.

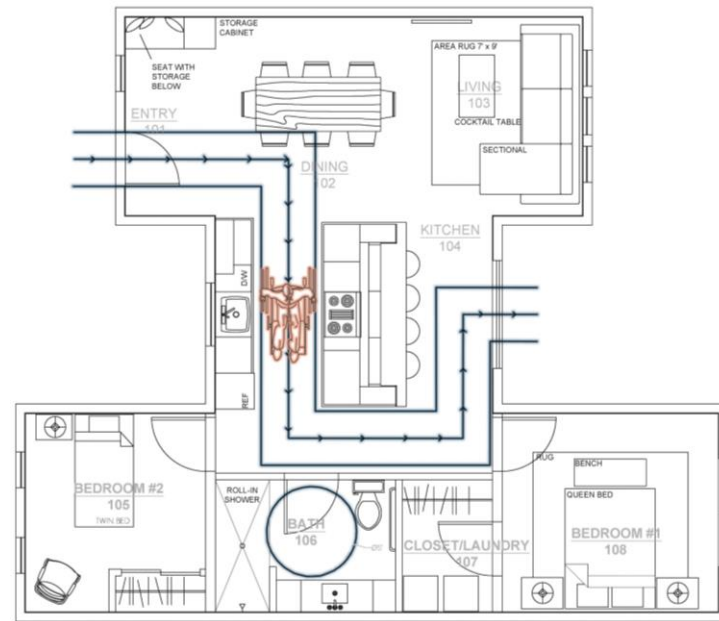


Figure 6: ADA Compliant Walkways and Bathroom

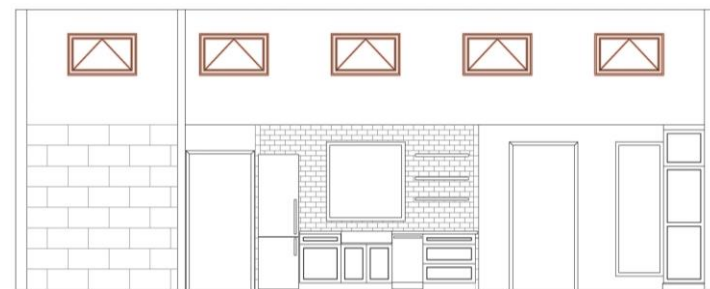



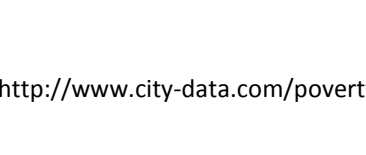


Figure 7: Automated Clerestory Windows

COST ESTIMATE

The estimated cost of The BEACH House is \$139,000. This is under the target cost \$200,000. The house is compared to similar sized homes within the greater Daytona Beach area in Table 2 below. The estimated costs of the first two houses include land costs. An estimate of the cost of the building without land is shown below the listed price. The BEACH House is in line with the other buildings in the area.

	Attributes	Estimated Cost
	2 Bed 1.5 Bath 1030 sq. ft	\$259,000 <i>\$200,000</i>
	3 Bed 2 Bath 1092 sq. ft	\$185,000 <i>\$ 135,000</i>
	2 Bed 1 Bath 950 sq. ft.	\$139,000

¹ <http://www.buffettnews.com/2017/02/16/26587/>

² <http://www.city-data.com/poverty/poverty-Daytona-Beach-Florida.html>