

Client/Developer: Department of Hawaiian Home Lands
 Architect: Armstrong Design, LTD
 Contractor: Armstrong Builders, LLC
 Engineers: BASE + Akinaka Associates

Sustainability Consultant: Green Sand, Inc.
 HERS Rater: Green Building, LLC
 Landscape Architect: PBR Hawaii
 Other Partners: HUD, USDA Rural Development, Veterans Affairs, FHA, Home Street Bank, Office of Hawaiian Affairs



Photo: David Franzen

CLIMATE-RESPONSIVE

The Kumuhau Subdivision provided ecofriendly and climate-responsive home ownership opportunities to 45 Native Hawaiian families in Waimanalo, on the island of Oahu, Hawaii. After developing the site, the Department of Hawaiian Home Lands (DHHL) competitively selected Armstrong Development to design and build the project. The climate-responsive and cost-effective designs include social elements, such as carports that act as outdoor shaded rooms and considerations for future expansion. The homes were so popular and demand so great that all the homes were sold in one day.

CORE PROJECT EMPHASES:

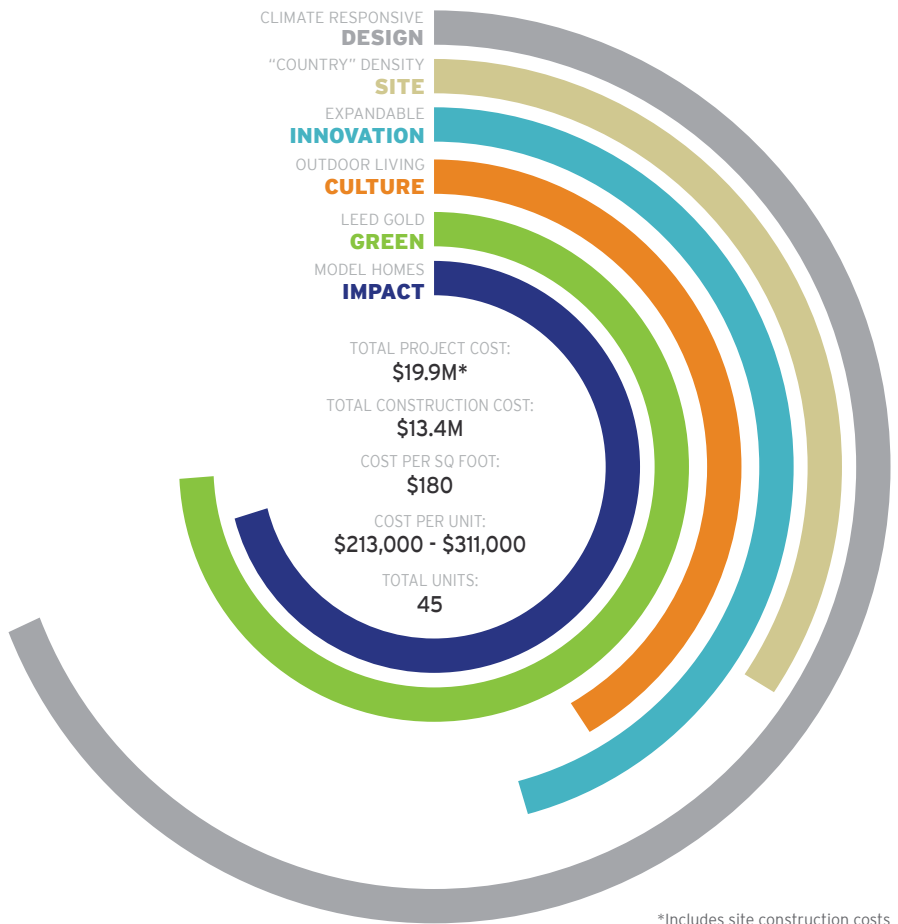


LESSONS LEARNED

- Site planning and home design may be more cost effective when integrated.
- Well-designed homes that also reduce energy costs to homeowners will be in high demand, even during a recession.
- Proper ventilation, shading, and site orientation can mitigate the need for mechanical cooling in a tropical climate.

BEST PRACTICES

- Outdoor living features provide a connection to the outdoors and a sense of community.
- An innovative approach to high wind code requirements reduced costs by providing bracing for storm events.
- A comprehensive approach to design and building provides multiple benefits: comfort, flexibility, long-term durability, and reduction in costs to the residents.



*Includes site construction costs



OCT 2007: Steward and design
 JUNE 2008: Site construction starts
 OCT 2009: Design and builder selected
 JUNE 2010: Site construction complete
 JULY 2010: Start construction
 JAN - JUNE 2011: Closing on homes and move-in



KUMUHAU SUBDIVISION

CONTEXT

The project is located approximately one mile from the eastern, windward coast of Oahu and the Waimanalo Bay State Recreation Area. Only 15 miles and a 30-minute drive from Honolulu, Waimanalo has one of the highest concentrations of Native Hawaiians on Oahu –almost 25 percent of the town is made up of Pacific Islanders. Waimanalo means “potable water,” apparently named for the many ponds in the area and it’s agricultural history. Today, there is an interest to revitalize Waimanalo’s agricultural traditions through projects such as the 21st Century Ahupua’a.

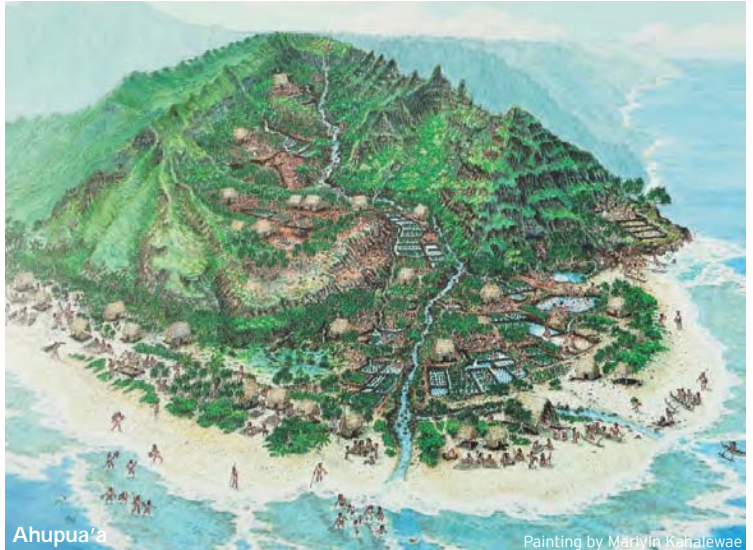


Waimanalo Bay State Recreation Area

Photo: SNCC

AHUPUA'A

Kanewai, or the “rule of the water,” helped to inform the development of the covenants, codes, and restrictions for Kumuhau’s homeowner association. Kanewai is also the basis of the ahupua’a, which is the traditional Hawaiian land ownership and management system. The ahupua’a extends from the mountaintop to the coral reefs in the sea, with specific rights and responsibilities for everyone helping to sustainably manage this very inter-related ecosystem. The ahupua’a system in Hawai’i was mostly destroyed by modern development and economic systems. However, today there is an interest to re-activate the concept as a local form of sustainability, and the town of Waimanalo is on the forefront of this with the 21st Century Ahupua’a, including the Living Laboratory and Sweet Home Waimanalo Market Cafe. It is hoped that future housing development in Waimanalo ties into the exciting sustainability work and reinvigoration of agriculture by local groups.



Ahupua'a

Painting by Mariya Kahalewae



Drawing: Armstrong Design, LTD



21st Century Ahupua'a, Waimanalo

Photo: SNCC

CULTURE

The homes were designed to evoke the colorful plantation style homes of Hawai’i, with both one- and two story-homes. Careful attention was paid to a connection between the indoor and outdoor and to taking advantage of the temperate Hawai’i climate to allow for more outdoor living. Each home has a “lanai,” or veranda, and the parking was designed so that two cars can fit in the driveway, allowing the carport to be used as an outdoor living room. Each carport has a screen, providing extra privacy between neighbors.

The homes were also designed to be easily expandable, an important consideration, given that many Native Hawaiian families are large. Extra plumbing stubouts allow for eventual buildout of an additional bathroom and bedroom.



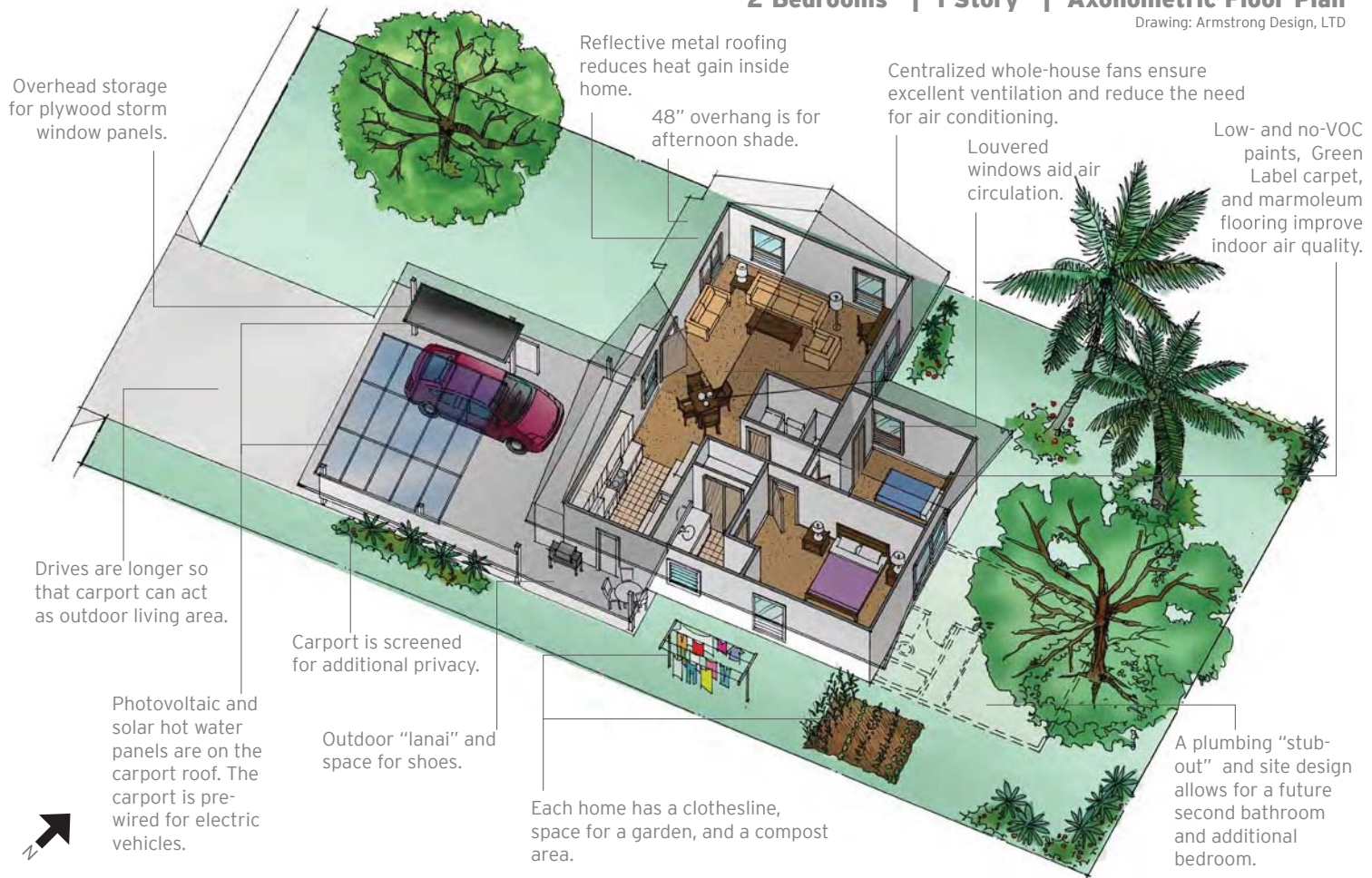
Photo: SNCC

GREEN

Electricity in Hawai'i is extremely expensive, at more than 25 cents per kilowatt hour. The many green features are therefore specifically targeted to resident health and energy efficiency. The homes have solar hot water, net-metered 2.5kW photovoltaic (PV) panels, low-emittance window glazing, above-code wall insulation, compact fluorescent lightbulbs, and "solar clothes dryers" (otherwise known as outdoor clotheslines). The homeowners received both federal and state tax credits totaling 65 percent of installed cost for the PV and solar hot water systems, and many report they now pay only the minimum \$16.85 monthly electrical hookup fees.

2 Bedrooms | 1 Story | Axonometric Floor Plan

Drawing: Armstrong Design, LTD



Kohila fan closed



Kohila fan open

GREEN

The homes were designed to be LEED Silver under the LEED for Homes rating system but have since achieved LEED Gold certification. The homes were designed to be energy efficient, with a tight building envelope, good air circulation and ventilation. The homes feature a whole-house Airscape fan, which was customized to be much quieter by making changes to the motor and location and is now called the Kohila fan, which means "gentle breeze." It is located centrally in each home and sits on the roof. In addition to the home having a whole house fan, each bedroom and bathroom have Whispergreen exhaust fans, which are very quiet.



KUMUHAU SUBDIVISION

INNOVATION

Because this was a design/build process, the design was tested against costs at every step along the way. This allowed for innovative measures to be incorporated, such as the solution to the high wind design load requirement per building code. Instead of stiffening the entire house frame at the exterior walls, or installing expensive storm windows, Armstrong designed custom, predrilled plywood panels that can be easily installed over the windows before a large storm event, when the high winds occur, and that serve to stiffen the entire frame of each home. The plywood panels are stored in custom-made racks located overhead in each carport.

“ I have seen the aloha from the many people....I have met through this process, how much care and pride they have in their work. That is important to me as a Hawaiian, because it has always been about partnership and those that come to provide helping hands and their hands mana’o. So this house represents me everything as a Hawaiian, and it’s beautiful, beautiful, beautiful. ” - Raenani, Laiopus homeowner

IMPACT

More than 55 percent of Native Hawaiians pay more than 30 percent of their income for housing, and only 57 percent own their homes. The cost of living in Hawai’i is very expensive and Native Hawaiians do not have the same access to tribal trust land as many tribes on the mainland, requiring them to qualify for conventional mortgages or wait to be assigned a home through the DHHL wait list. In order to qualify, families must have at least 50 percent blood quantum, must qualify for a mortgage, and then may eventually receive a home based on a lottery system.

DHHL recognizes the dire need for more high quality housing and is developing property throughout Hawai’i. DHHL began developing the Waimanalo site before hiring Armstrong through a competitive bid process. Amrstrong won the bid in part because of their commitment to LEED certification. Armstrong acted as the designer and builder. Armstrong and DHHL worked with Home Street Bank to help interested Native Hawaiian families qualify for home mortgages. Because of the green design features, the hard work of families to qualify for mortgages, and the need for housing, the homes all sold within one day.



Photo: David Franzen

LESSONS LEARNED

This process helped to demonstrate that affordable housing can be cost-effectively built to LEED standards and can have a high market demand even in a difficult economic recession. It has also helped to modify DHHL’s development process, so that with new projects, site planning occurs simultaneously with building design. This help to avoid coordination pitfalls. There are also exciting new partnerships to ensure that future projects are developed in an integrated and sustainable manner and that they are climatically and culturally appropriate. Recently, the Office of Hawaiian Affairs, which is focused on reducing the amount that Native Hawaiians pay for housing and on increasing home ownership, partnered with DHHL to help pay for infrastructure costs through paying the debt service on \$90 million of DHHL bonds. These critical partnerships, along with the success of the Kumuhau Subdivision, are leading to exciting new projects including new homes in Kona on the Big Island of Hawai’i and on the island of Maui.



Left-to-right: Kahu Kordell, Anita Seyer-Wong, and Daniel Sandomire. Photo: Yumeko Tochiko