

# RESOURCEFUL HOUSING

*An independent living center demonstrates building technologies chosen for resource efficiency, durability and energy efficiency*



Arroyo Commons, a twelve-unit campus housing project in Livermore, was built by AID Employment for people with developmental disabilities and very low incomes. Completed in 1998, this \$2.3 million project received funding and approval from the U.S. Department of Housing and Urban Development (HUD), the cities of Livermore and Pleasanton, and other partners.

Prior to construction, Green Building in Alameda County selected Arroyo Commons as a Resourceful Building Demonstration Project. A key objective was to demonstrate that salvaged and recycled-content building materials can be used to create resource-efficient housing without sacrificing quality, performance or aesthetics. A \$47,500 grant from Green Building in Alameda County encouraged the selection of construction technologies and products that minimize negative environmental impacts by using natural resources efficiently.

From a resource-conservation perspective, one of the most unique features of Arroyo Commons is its wall system: a steel framework insulated with rice straw bales. Benefits of this building technique include a significant reduction in construction waste, enhanced durability of the structure, greater comfort and lower utility bills.

Tour participants will be welcome to visit the grounds and the common area. Look for the “truth window,” which gives a glimpse of the straw bales inside the walls.

*“We are very concerned about energy efficiency and the use of natural resources. For these reasons we chose to insulate the walls with rice straw. Cooling costs are minimal in the summer. The units are very quiet as well due to the thick walls.”*

—Gordon Burkhart-Schultz, developer

## GREEN at a GLANCE

### ENERGY & SYSTEMS

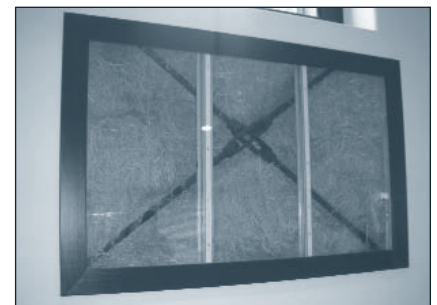
- Recycled steel framing
- Rice straw bale insulation
- Four-unit cluster configuration contributes to energy efficiency
- High efficiency ceiling fans with compact fluorescent lights
- Energy Star® dishwashers, refrigerators and washing machine
- Attic ventilation system
- Hot and cold water pipes insulated
- Duct mastic used on all duct joints
- Lighting controls
- Deciduous trees planted on west and south sides for shading

### MATERIALS & PRODUCTS

- OSB sheathing
- Clay tile roof with double underlayment for projected 50-year lifespan
- Special stucco additive reduces cracking and increases water repellency
- All copper drains, flashing and gutters for low maintenance and longer life
- Low or no-VOC interior paint
- Low VOC, water-based wood finishes
- Range hoods vented to outside

### OTHER GREEN FEATURES

- Pedestrian & bicycle-friendly site design
- Convenient recycling facilities for resident



## RESOURCE-EFFICIENT STRUCTURE

**Framework.** A structural steel framework was selected as the most material-efficient design for Arroyo Commons. This framework, which consists of steel trusses and columns bolted together on site, creates a very durable, long-lasting structure. The steel structural elements were fabricated to architectural specifications at the factory; thus no waste was generated on the jobsite. In addition, steel typically contains a high recycled content.

**Straw bales.** Rice straw bales are stacked within the steel framework, providing superior insulation (estimated at R-45). This significantly reduces the need for air conditioning during Livermore's sizzling summers. An air envelope at the interior and exterior of the perimeter walls prevents moisture from being trapped within the straw bales.

**Oriented strand board (OSB).** Sheathing is OSB instead of plywood. Although the contractor had never used OSB before, he found he preferred it to plywood because it took a larger (four-foot) span, and cost less. He felt it was safer to work with because it didn't have air pockets, and stronger so he didn't have to contend with warping. OSB also represents a better utilization of wood resources, as it is composed of chipped fibers from young, fast-growing trees instead of larger sheets of wood from mature trees.

**BUILT:** 1998

**OVERALL SIZE:**  
7,100 SF

**TYPICAL UNIT SIZE:**  
540 SF

**DEVELOPER:**  
AID EMPLOYMENT

**PROPERTY MANAGER:**  
EDEN HOUSING

**ARCHITECT:**  
MAREK STOKLOSA ARCHITECT

**GENERAL CONTRACTOR:**  
AL JAMES CONSTRUCTION

## RESOURCE EFFICIENCY

**Construction waste management.** The contractor did not need a Dumpster during construction because very little waste was generated. Surplus amounts of the two primary construction materials — structural steel and rice straw — were recycled and reused. Excess straw was used as mulch on the site. As an added benefit, should the buildings become obsolete in the future, the steel components and straw bales easily lend themselves to disassembly and reuse or recycling.

**Longevity and maintenance.** The exterior stucco finish has a special additive that makes it less likely to crack and more water repellent, which should increase the buildings' lifespan and reduce maintenance costs.

*“Even though rice straw insulation is unusual, the actual construction is traditional steel frame. Marrying the two technologies yielded excellent results.”*

**—Gordon Burkhart-Schultz, developer**

