

CARMEN AVENUE

ORIENTATION, ORIENTATION, ORIENTATION *Livermore, CA*

Downtown Livermore has gotten a little more affordable, thanks to a new 30-unit apartment complex on Carmen Avenue, a short walk from the new Civic Center library. Developed and managed by Allied Housing, Inc. and Affordable Housing Associates, the development is one of the first multifamily projects in California to be GreenPoint Rated. Key green features include jobsite waste recycling, passive solar design, natural ventilation, a photovoltaic system, low-toxicity finish materials, and excellent access for people with disabilities.

The project architect's mantra during design was "orientation, orientation, orientation." Once a project's location is determined, the design team needs to focus on getting the building orientation right to take advantage of solar access and prevailing winds, and to improve circulation patterns for residents.

LOCATION

Carmen Avenue, Livermore, California

PARCEL SIZE/DENSITY

1.04 acres;
30 dwelling units per acre

BUILDING TYPE

Two buildings (2 and 3 stories) with rental apartments

TOTAL SQ. FT.

28,936 sq. ft.

TARGET POPULATION

Low-income individuals and families, including people with special needs such as survivors of domestic violence and people with disabilities

NUMBER OF UNITS

30 total: Studios (2), 1-bedroom (5), 2-bedroom (16), 3-bedroom (7)

COMPLETION DATE

January 2008

OWNER/DEVELOPER

Allied Housing, Fremont, CA
Affordable Housing Associates, Berkeley, CA

ARCHITECT

Kodama Diseño Architects, San Francisco and Oakland, CA

GENERAL CONTRACTOR

Segue Construction, Point Richmond, CA

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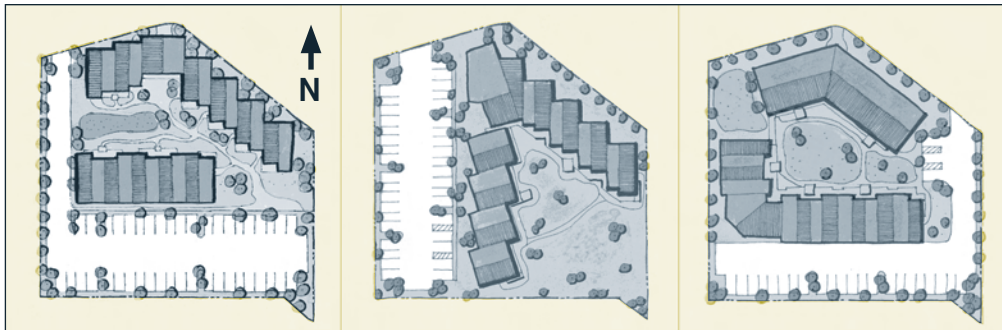
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Project architects analyzed multiple plans to optimize solar orientation, open space, views and access. The site plan on the far left was ultimately selected; it places the building on an east-west axis with parking hidden at the rear.

GREEN at a GLANCE

Key green aspects of Carmen Avenue are listed here.

PLANNING & DESIGN

- Urban infill site
- Proximity to public transit and neighborhood services
- Courtyard with areas for play, socializing and relaxing
- Parking in back puts emphasis on people, not cars
- Design for safety: All main entrances visible from street or from other apartments
- Orientation for passive solar design (all units face south), natural ventilation and community interaction
- Thermal mass to manage heat gain
- Design for affordability and accessibility

SITE

- Section 01505 C&D waste management plan
- Two-week flush-out of interior spaces prior to occupancy
- Recycled-content aggregate
- High efficiency irrigation; no plants that are invasive or require shearing
- Exterior lighting designed to reduce light pollution

STRUCTURE

- High-volume recycled flyash concrete
- Composition roof shingles with 40-year manufacturer's warranty
- Radiant roof barrier
- Low-e² double-glazed windows with vinyl frames

SYSTEMS

- Dual-flush toilets, faucet aerators and low-flow showerheads
- Combined water/space hydronic heating
- 32-kilowatt photovoltaic system
- Designed to exceed Title 24 by 15%
- Low-mercury fluorescent lighting

FINISHES & FURNISHINGS

- Low-VOC paint and adhesives
- Recycled-content exterior paint
- Natural linoleum and low-emission carpet
- Recycled plastic benches
- Central laundry
- Energy Star refrigerator and low-water dishwasher

OPERATIONS AND MAINTENANCE

- O&M manual for building staff

■ Green Building Features ■

LIVABLE, AFFORDABLE COMMUNITIES

A courtyard between the development's two buildings provides space for children to play and adults to socialize and relax. Parking is situated at the rear of the site to improve pedestrian access and better connect the homes with the neighborhood. The site is located on two bus lines and within a short walk of a grocery store and Livermore's Multi-Service Center, which offers an array of social services.

REDUCING ENERGY BILLS & TACKLING CLIMATE CHANGE

It gets hot in Livermore, with summer temperatures of 100°F and higher not uncommon. To create homes that would be affordable and comfortable, the developer and design team focused on passive solar design and natural ventilation. To reduce the need for air conditioning to the point where it is rarely needed, the design incorporates thermal mass, overhangs and energy-efficient windows to manage heat gain, and takes advantage of cool night air and consistent afternoon breezes.

Cutting the Cooling Loads

- | | | |
|---|--|---|
| <p>1. BUILDING ORIENTATION – Elongated along east-west axis</p> <p>2. GLAZING PLACEMENT – Almost all glazing is on true south and true north facades</p> <p>3. GLAZING TYPE & WINDOWS – Low-e² insulated glazing with vinyl windows</p> <p>4. ROOF INSULATION – R-30 fiberglass insulation</p> | <p>5. WALL INSULATION – R-21 fiberglass insulation</p> <p>6. OVERHANGS & TREES – Six-foot overhangs on the south facade of one building; three-foot overhangs on the south facade of the other building.</p> <p>7. FLOOR MASS – Outdoor walkways are concrete deck; interior floors are not mass construction</p> | <p>8. WALL MASS – 5/8-inch gypboard on all walls and ceilings</p> <p>9. RADIANT BARRIER – Yes</p> <p>10. ATTIC VENTING – Ridge vent</p> <p>11. SEALING DETAILS – Sill plate gasket, outlet gaskets, caulking, taping and more</p> |
|---|--|---|

Some of the passive design measures, like orienting the buildings along an east-west axis, took time to work out, but cost nothing extra to build. Other measures, like overhangs on the south facades, have a price tag, but will significantly reduce cooling loads and the tenant's energy bills. The table below shows how the design team approached the challenge of reducing the cooling loads, beginning with the building orientation.

INSIDE TIP:

Spend most of the design time and budget on low-tech solutions.

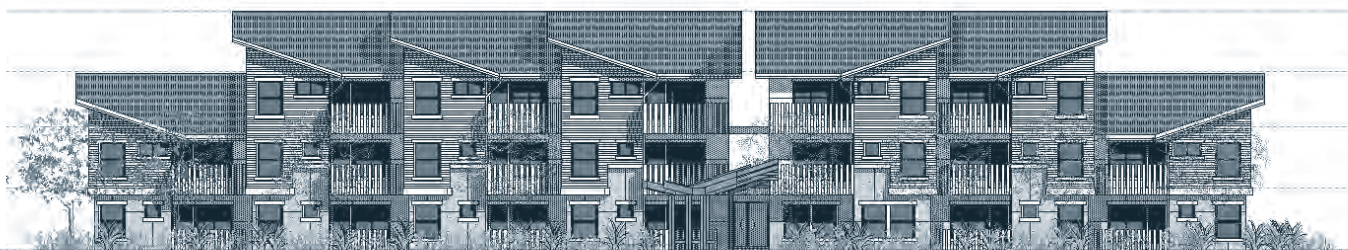
Start the design of HVAC and lighting by trying to minimize or even eliminate anything that uses power or requires regular maintenance. Passive features that use standard construction materials are sometimes less expensive upfront, and are always less expensive over time. At Carmen Avenue, passive features include the solar orientation; 5/8-inch gypboard throughout for thermal mass; exterior walkways to form south-facing overhangs; high-performance glazing; and high interior volumes for ventilation and daylighting. Only after maximizing the low-tech features should effort be spent on designing HVAC and lighting systems and controls.

To further reduce energy use, the apartments have combined water/space hydronic heating systems, Energy Star appliances, and low-mercury fluorescent lighting in the bedrooms, kitchens and bathrooms. All of the electricity use in the common areas will be met by a rooftop photovoltaic system.

INSIDE TIP:

Don't exclude good ideas early on just because they seem expensive.

The Carmen Avenue buildings were designed from the start with large open roof areas sloping towards true south at an ideal solar pitch to allow for the possibility of installing photovoltaics. Recognizing that nothing ever gets funded that isn't already in the design, the team designed the solar electric system before funding was found. Good ideas, even if they seem expensive, should be kept on the table at least until the end of design documents. You may find money for it, you may find a cheaper method, or you may find a good deal that you weren't aware of.



KODAMA DIEBOLD ARCHITECTS

HEALTHY & ENVIRONMENTALLY PREFERABLE MATERIALS

The project team minimized jobsite waste by writing and implementing a Section 01505 construction and demolition (C&D) waste management plan. At least 65% to 75% of construction waste was diverted from landfills.

INSIDE TIP:

Successful C&D waste requires a team effort.

Many municipalities, as well as programs such as GreenPoint Rated, require that construction projects document that they have diverted high volumes of their waste from landfills. To make sure this process goes smoothly, develop a well-considered C&D waste management plan in advance. Also be sure to involve subcontractors in this planning process. Often subcontractors such as framers and drywall installers manage their own construction waste, so a documentation system needs to be in place to track their waste as well as any general waste created on site. Before the first scrap of wood is created, have a plan for how the subcontractors will handle and document waste, who your disposal company is, how they will be providing the documentation you need, and other logistics.

CARMEN AVENUE

This Case Study was written by StopWaste.org as part

of its Multifamily Green Building Guidelines.

To obtain the Guidelines and many other

waste-reduction and green building publications,

visit www.multifamilygreen.org

or call 510-891-6500.

Construction materials were selected for durability, including a composite shingle roof with a 40-year manufacturer's warranty. Recycled-content materials include aggregate used as a road and foundation base, high-volume flyash concrete and exterior paint. Low toxicity materials include low-VOC paint, natural linoleum flooring, recycled-content carpet with Green Label Plus certification of low emissions, and sheet rubber flooring with Greenguard certification of low emissions.

INSIDE TIP:

Put green product sales representatives to work.

When making a case for lifecycle cost benefits or when managing the submittal process in construction, get product representatives to support you. Many sales reps have PowerPoint presentations, lifecycle cost analysis spreadsheets and studies that support the use of their products, and some will provide assistance with submittal review and even provide oversight of the installation. Linoleum flooring is a good example of a product that is widely recommended because of its durability and nontoxic nature, yet it requires a higher level of technical knowledge to install properly.

WATER CONSERVATION

The landscape was designed to use very little water. With the exception of a small grassy play area, the plants are drought tolerant and many are native. The irrigation system uses high efficiency bubblers and drip to deliver water more efficiently than pop-up sprayers. Low water-use dishwashers, dual-flush toilets, good quality faucet aerators and low-flow showerheads will also save water.

■ Financing ■

Green building features were designed into this project from the beginning.

SITE ACQUISITION COSTS \$1 million

AVERAGE COST/SQ. FT. \$449/sq. ft.

DEVELOPMENT COSTS

Construction \$7.5 million

Soft costs \$5.5 million

Total \$13 million

AVERAGE CONSTRUCTION

COST/SQ. FT. \$259/sq. ft.

AVERAGE COST/UNIT \$433,000

MAJOR FUNDING SOURCES

City of Livermore \$2.9 million

County of Alameda \$1.45 million

State MHP \$2.45 million

4% tax credit \$5.3 million

Other \$0.9 million

AFFORDABILITY TARGETS

Households making less than 50% of the area median income (AMI) 29 units

Onsite property manager 1 unit