PARTNERSHIP FOR ADVANCING TECHNOLOGY IN HOUSING

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Groundbreaking 'Green' in San Francisco

Folsom Dore Apartments mix affordability with sustainability

TECHNOLOGY HIGHLIGHTS

- Photovoltaic System
- Natural Ventilation
- Fly-Ash Concrete
- ENERGY STAR® Appliances and Fixtures
- Fiber-Cement Siding
- Formaldehyde-Free Cabinets
- Recycled-Content Flooring and Carpeting
- Low- or No-VOC Paints and Sealants
- Drain-Water Heat Recovery
- High Density Infill Development
- 70% Parking Reduction
- LEED® Certified Project

Citizens Housing Corporation (CHC) is a non-profit, public benefit corporation established in 1992 to increase and preserve affordable housing opportunities for low-income Californians. With the San Francisco housing market ranked least affordable in the country, Citizens Housing is responding to the severe shortage of affordable housing across the entire state by building new affordable homes and preserving existing affordable units that are at risk of conversion to market-rate housing.

CHC's current development portfolio includes over 2,000 units throughout California, over 90% of which are affordable to low-income seniors and families earning between $12,000 and $30,000 annually. CHC forms partnerships and provides community-oriented housing with a long-term commitment to affordability, quality living environments, and a dedication to improving the lives of the residents. Acting as its own property manager, CHC is especially committed to implementing energy, water, and resource efficiency measures, such as efficient HVAC equipment. As such, the PATH demonstration project with CHC was envisioned to showcase affordable, durable, and energy-efficient design and construction techniques, serving as a model for future CHC developments as well as other developer projects.

With the leadership of CHC's project manager and technical assistance from their design team—David Baker + Partners Architects (with Baker Vilar Architects)—and PATH, a multitude of sustainable and PATH technologies were installed at the Folsom Door Apartments demonstration site. Ninety-eight new units were created in this high-density development for residents at or below 60% of the Area Median Income. The project, which combines energy and resource efficiency with indoor environmental health and careful site selection, is likely to become one of the first affordable housing complexes in the nation to receive a LEED® (Leadership in Energy and Environmental Design) certified rating from the U.S. Green Building Council.

Advanced Technologies

It is the goal of the U.S. Department of Housing and Urban Development's Partnership for Advanced Technology in Housing (PATH) program to accelerate the development and use of new technologies that will substantially improve the quality, durability, energy efficiency, environmental performance, and affordability of America's housing stock. The new Folsom Dore Apartments feature several high performance and green technologies.

1

Structural Concrete

Fly-Ash Concrete—The manufacture of cement is energy intensive and produces a significant amount of carbon dioxide emissions. Fly ash, a waste byproduct of coal combustion, is an inexpensive substitute and reduces the amount of cement needed while increasing the strength and durability of the concrete (1). Using fly ash in concrete not only saves CO_2, it also diverts material from the waste stream. At the Folsom Dore Apartments, the builder used 50% fly-ash-content concrete mix for the mat slab foundation and 15% fly-ash-content shotcrete mix for most structural walls.

Shotcrete on Structural Walls—With shotcrete, a spray-applied concrete product, less material is needed to adequately cover irregular surfaces and the application can take half the time of traditional methods, saving time and labor. Shotcrete requires a much lower water-to-cementitious-material ratio, which increases its compressive strength, reduces shrinkage, and lowers its permeability.

2

Exterior Finishes

Fiber-Cement Siding—Fiber-cement siding reduces the demand for redwood or cedar siding, improves durability and fire resistance.

Reuse of Brick from Original Façade—Reuse ranks even higher than recycling on the hierarchy of effective strategies for "green" building. Reusing brick from the original façade reduces the project's need for virgin materials and prevents (or delays) diverted and reclaimed materials from going to the landfill (2).

Energy Savers

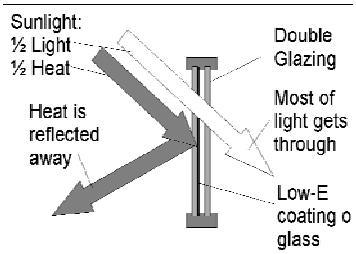
ENERGY STAR® Appliances—ENERGY STAR® appliances reduce energy consumption and save occupants money on their energy bills. Appliances provided by the third-party laundry service were also ENERGY STAR®.

3

Compact Fluorescent Lighting—Lighting in the kitchens and baths is fluorescent or compact fluorescent, accounting for 75% of all lighting. Fluorescent fixtures (3) reduce energy consumption by 50–75%, saving homeowners money on their energy bills. They also last up to seven times longer than incandescent lamps, thus reducing maintenance and replacement costs. Fluorescents generate less waste heat than incandescent lamps and fixtures.

HVAC

Natural Ventilation—The building was designed to maximize the benefits of natural ventilation in the units, thereby eliminating the need for in-unit air conditioning. Features such as operable windows and baseboard hydronic heating (combination water/space heater) reduce energy consumption and operating costs. Kitchen range hoods and bath fans are vented to the outside, helping to improve indoor air quality and preventing overheating and excess moisture buildup.



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Windows

Durable and Efficient Windows—Commercial grade windows, which include high STC-ratings, low U-values, high water and air infiltration ratings, and high condensation resistant factors were used throughout. Windows reduce occupant energy consumption by minimizing solar heat gain and conductive heat gains and losses (4). Living spaces are more comfortable and quieter. Windows also contribute to durability by reducing fading of interior finishes and fabrics due to UV radiation.

Flooring

Recycled-Content Carpet Pad—Recycled carpet pads save resources and divert waste from landfills. Using a carpet pad extends the life of the carpet, adds resiliency, and makes it easier to clean.

Finished Concrete/Foundation Floor—In the community and service space, finishing the foundation floor eliminates the need for new materials (5). It is durable and easy to clean.

Recycled-Content Vinyl Flooring—Vinyl flooring in bathrooms contains 40% recycled material. Recycled content replaces vinyl material, thereby reducing the environmental impacts associated with producing and disposing of vinyl.

Interior Finishes

Urea Formaldehyde-Free Cabinets—Urea formaldehyde is a suspected human carcinogen typically used as an adhesive in cabinet materials. Technical experts recommend using a substitute whenever possible to reduce health risks. As part of the project goal for superior indoor environmental quality, the Folsom Dore project team selected urea formaldehyde-free cabinets (6).

Low-VOC Paints and Sealants —Paints, sealants, and adhesives with low volatile organic compounds (VOCs) can substantially reduce the indoor air pollution that causes irritations of the eyes, lungs, and skin as well as respiratory and internal organ problems.

Renewable Energy

Photovoltaic System—The photovoltaic (PV) system produces electricity from sunlight. This saves money on the electricity bill and reduces reliance on the local power plant, which contributes to air pollution. The 13 kW photovoltaic array (7) generates energy for all common load areas. Roof slopes are south-facing to accommodate future solar panels. The PATH technical team did a preliminary cost-benefit analysis for a (PV) system. It was concluded that a PV system serving the entire project was not feasible because the payback was estimated at 32 years and there would need to be separate PV systems for each unit since the plan was to separately meter each unit. As such, it was recommended to install a PV system for the community spaces only if funding was available.

Drain-Water Heat Recovery—The heat from water in tub drainpipes can be recovered to preheat cold water. Drain-water heat recovery (DHR) devices were installed on waste tub drain lines to capture this heat, which helps to preheat cold water going to the shower or to the water heater, thereby reducing the total energy needed to heat the water.

Environmentally Sound Development

The Folsom Dore Apartment project was focused on reducing the negative impact on the natural environment. The urban infill site reuses underutilized space, creating High-Density living options near existing urban infrastructure. Multiple public transportation options can be found within a quarter mile of the site, and the parking lot is home to a City Carshare Pod to further reduce need for individual car ownership. Bike storage is provided for 15% of the units (8). Parking reduction of 70% was achieved, saving resources and mitigating urban heat island effects. Native, drought-tolerant landscaping plantings that do not require irrigation round out the green features of the site (9).

8

9

Cost Analysis

The following list shows the approximate costs for development and occupancy of the Folsom/Dore Apartments.

Parcel Size	25,292 square feet (.58 acres)
Total Square Footage	86,998 gross square feet
Number of Units	98 (including 2 manager units)
Development Costs	
Site Acquisition Costs:	$ 5,700,000
Hard Costs	$ 14,400,000
Soft Costs	$ 6,400,000
Total Costs:	**$ 26,500,000**
Funding Sources	
City of San Francisco	$ 8,755,884
4% Tax Credit Equity	$ 7,870,161
State of California MHP	$ 5,181,995
Tax Exempt Bonds	$ 4,300,000
Federal Home Loan Bank	$ 392,000
Average Cost Per Square Foot	
Construction Costs:	$ 165/square foot
All Costs:	$ 304/square foot
Average Cost Per Unit	
All Costs:	$ 270,408
Average Monthly Utilities (*tenant utility allowance based on electric cooking and all other electric*):	
Studio	$ 18/month
One Bedroom	$ 19/month
Two Bedroom	$ 23/month
Estimated building utility costs:	$ 6,600/month
(includes water, trash, common area electric, gas for entire building)	

Affordability Targets

50 units at 60% AMI; 46 units at 40% SMI (approximately 25% AMI); 2 manager units

Conclusion

The Folsom Dore project team is gathering documentation on the project to apply for a LEED® (Leadership in Energy and Environmental Design) certified rating from the U.S. Green Building Council. If they are successful, which is highly likely, this project would be the first affordable housing project in the U.S. to attain such a certification.

Project Goals

Cost effectiveness and durability within a sustainable framework:

Energy efficiency

Resource efficiency

Water efficiency

Superior indoor environmental quality

Optimal site design