



CASE STUDY: Awards of Excellence for Affordable Housing Built Responsibly

Mountain Housing Opportunities' Prospect Terrace



Prospect Terrace

Mountain Housing Opportunities (MHO) is a nonprofit development corporation whose mission is to build and improve affordable homes and communities. During 2005, MHO developed 62 homes in safe, attractive neighborhoods for low-income families. Prospect Terrace is located in the West End/Clingman Avenue Neighborhood (WECAN) of Asheville, NC and consists of 17 condominiums and cottages. The homes incorporate innovative green building techniques and strive to optimize affordability, comfort, safety and aesthetics. The development comprises both affordable and market rate units to promote economic diversity and stability in the neighborhood. The goals of the project align with the WECAN Citizens Master Plan, which was created by residents and City officials to set objectives for future development in the neighborhood. Prospect Terrace is the first certified housing development under the new North Carolina HealthyBuilt Homes Program, which seeks to promote green building in NC through certification for green residential builders.

Greening Goals:

MHO put forth three primary goals for the development of Prospect Terrace: achieve low energy and maintenance costs for homeowners; produce healthy and sustainable homes; and serve as a leader in responsible green building in order to inform future developments about best practices.

Integrated Design Process:

At the beginning of the project, a design charrette was held, convening architects, design consultants and builders. In addition, project team members hosted a Green Design Input Session for the project with the goals of soliciting green design and construction ideas, identifying collaborative opportunities, and networking among involved parties. The integrated design process helped keep the development close to budget and completed on time.

Project at a Glance

Location: Asheville, NC

Project Type: New & Rehab Construction

Ownership/Rental: Ownership

Size:

15 new, 2 renovated units (800-1500 sq. ft.)

15,840 total sq. ft.

1.19 acres total, 14 units per acre

Project Completion Date:

November 10, 2005

Affordability:

Mix of affordable and market rate housing. Eleven units sold to households with incomes below 80% of the area median income (AMI)

Project Team:

Developer: *Mountain Housing Opportunities*

Architect: *Mathews Architecture*

Contractor: *Carolina Cornerstone Construction*

Development Cost:

Land cost: \$121,000

Construction costs: \$1,926,000

Soft costs: \$574,000

Total: \$2,621,000

Cost/Savings of Greening:

Documented increased Cost of

Greening: \$136,000

Rebates and Grants: \$136,000

Net Cost of Greening: None

Standards Used:

Energy Star, Advanced Energy Certification, North Carolina Healthy Built Homes Program

Key Green Features:

- Adaptive reuse site
- Conservation or reuse of topsoil
- Solar panels on six houses
- Surpasses Energy Star Homes certification
- Low flow water fixtures
- Rain barrels to prevent run-off
- Nine homes enrolled in local utility's program that guarantees heating and cooling costs for two years



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Green Features

Site Design/Landscape Planning:

Prior to the development of Prospect Terrace, the site contained seven single-family homes, and the remainder of the land was primarily vacant lots or woodlands. Because the land is an adaptive reuse site, MHO was able to use land slated for a radiator repair shop to build high-density housing. All environmental assessments indicated that the site contained no environmental hazards or past incidents. An extensive plan was created to minimize environmental harm and preserve the existing vegetation. As examples, the developers protected trees and the nearby stream from erosion, contractors performed low-disturbance grading, and the team will continually monitor the area to remove invasive vegetation. The development included the creation of a new street, which was curved specifically to avoid cutting down a large red oak tree. In addition, the Department of Environmental and Natural Resources supported restoration of the stream and construction of a wetland that will cleanse stormwater run-off before it reaches the French Broad River.

Location and Linkages:

Prospect Terrace is located on a City public transit line, and MHO built a bus stop shelter in the adjacent park for resident use. The development is located in between downtown Asheville

and the Asheville River district and is within walking distance of restaurants, a recreation center, schools, a ten-acre urban forest, and a variety of social services. The area is pedestrian friendly, as the development is thoroughly linked with existing sidewalks. In addition, the development team set aside a piece of undeveloped green space to be used as a park that includes trails as well as the bus shelter. The project gave this land to the City of Asheville to maintain as a public park.

Building Design Greening:

Energy: The project made great efforts to maximize energy efficiency. Six of the homes have active solar systems for water heating, and the remaining homes were built south facing with the option of adding PV systems in the future. The units also have south facing glazing with larger soffits and overhangs for summer shading. In addition, 75% of the lighting fixtures are fluorescent and the outside lighting is high-efficiency. The refrigerators and dishwashers are Energy Star, the hot water heaters were selected for their high efficiency ratings, and the thermostats are programmable to ensure appropriate heating and cooling usage. Nine of the homes are enrolled in Advanced Energy's (a local nonprofit) SystemVision Program, which guarantees heating and cooling costs for the first two years.

The homes are tightly insulated and sealed, and all but three were insulated with 16" centers and cellulose. Framing techniques included "Ladder T" and alternative corner framing to improve insulation. The windows are all inert gas-filled double glazed windows with a 10 year warranty on all insulated glazing. The homes all meet duct blaster tests of less than 3% leakage from the heated envelope.

Indoor Environmental Air Quality: To minimize pollutants, the houses were developed with capillary breaks between the foundation and framing, drainage boards



for below-grade walls, continuous foundation drains, vapor barriers placed above drainable substrate, bath exhaust fans, whole house fans and exterior vented hoods from the kitchen. The HVAC systems allow circulation of fresh air through the homes on regular intervals, including during heating and cooling of the units.

In addition, products and materials were selected with careful consideration of environmental health. Choices included low-VOC paints and finishes, recycled content carpeting, and certified environmentally safe spray foam cavity insulation or formaldehyde-free, low-VOC insulation.

Resource Conservation/Materials: "Ladder T" and alternative corner framing techniques allowed the use of 4' exterior intervals, engineered lumber in the floor and roofs and finger-jointed studs in all 2x4 walls, all of which helped to reduce wood waste from the development. The project did not implement an on-site dumpster during construction in order to promote resource use and conservation; waste was sorted and either recycled or left for pick-up by residents for re-use. An on-site recycling center was set up for wood, metal, cardboard, glass and aluminum, and removed trees were taken to a nearby mulching yard. In addition, MHO saved or reused 75% of the topsoil at the site. Existing mulch, compost and straw bales were used for erosion control.

Measurable Benefits

- Rain barrels prevent run-off of 10,000 gal/year
- Low flow showerheads save 64,000 gal/year
- Aerators in bathroom and kitchen fixtures restrict flow to 1.8 and 2.0 gal/min respectively, and showerheads offer maximum 2.25 gal/minute
- Conservation or reuse of 75% of onsite topsoil



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Green Features

Water Conservation: Sixty gallon rain barrels were installed on five of the homes that are expected to catch 10,000 gallons of water per year. The water will be used for landscaping, although the onsite vegetation was selected for its drought-resistant qualities and will not require watering once it is well-established.

All water fixtures meet the National Energy Policy Act standards for low-flow. The bathroom and kitchen fixtures have aerators to restrict flow to 1.8 and 2.0 gal/min respectively, and the low-flow showerheads offer a maximum of 2.25 gal/min.

Commissioning: A third party tested the HVAC systems through visual inspections as well as duct blaster tests.



Operations and Maintenance: The affordable units were registered with Advanced Energy's SystemVision Program. The Program sets a guaranteed maximum for the utility costs of the homes for the first two years and Advanced Energy will follow up with the homeowners if there is excess energy usage. Based on a third-party assessment, the SystemVision Program estimated that the utility bills will not be outside of the range of \$11-\$29 per month. If they are, the Program covers the difference.

Resident Education: All homeowners received a manual with descriptions and illustrations of their home's unique characteristics as well as maintenance infor-



mation. MHO met with groups of owners to provide training and information on the HVAC, solar and other systems. In addition, information was provided to residents about local environmental resources such as the North Carolina Green Power program, the City of Asheville's recycling services and the Green Building Hotline.

Project Financing:

Sources of funding for the project include: HomeTrust Bank, Asheville City HOME Funds, and the North Carolina Housing Finance Agency.

Cost of Greening:

The cost increase of greening was \$8,000 per home, or about 6% of a \$130,000 home, although virtually all of this increase was covered by grant funds. The increased cost will be offset by lower utility payments and future maintenance expenses.

Sources of Funding/Rebates:

North Carolina State Energy Office financed all greening aspects of the development.

Life-Cycle Cost Analysis:

No LCC analysis was completed, however, many materials were selected for their long life spans. In addition, the development team received guidance from North Carolina Solar Center, Home Energy Partners and HealthyBuilt Homes in the form of information that helped guide decisions in a way that a life-cycle analysis might have.

Occupant Satisfaction:

"[Prospect Terrace] blends in with the existing fabric of the neighborhood, while adding to the unique character of Asheville. Thanks to the high quality that went into the building...I have not only realized a low heating bill, but also a low water bill."

—Prospect Terrace Home Owner

Green Highlights

- Energy Star appliances and fans
- Fluorescent lighting
- Whole house fan
- Externally vented kitchen range hood
- Programmable thermostats
- Low-VOC paints and finishes
- Fresh air intake through HVAC systems
- Environmentally safe foam cavity insulation
- Recycled content carpet and decking
- Maximum use of engineered lumber
- Reduced oriented strand board sheathing
- Concrete with fly ash
- Natural marmoleum products
- Bamboo flooring in entry ways
- Gas filled double glazed windows
- Low-flow water fixtures
- Rain barrels for stormwater collection
- Continuous foundation drain at outside perimeter
- Drainage board for below grade walls
- Highly effective ventilation system



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Looking Ahead

Challenges:

In obtaining the land for Prospect Terrace, MHO had to combine 25 separate parcels of land. MHO waited two years to assemble the full property, which then had to be rezoned to allow for the higher density of Prospect Terrace. The team successfully overcame this challenge and produced a high-density development while preserving open space for the residents' enjoyment. MHO also faced several challenges relating to the natural features of the land. The development sits above a spring fed stream which carries stormwater to the French Broad River. As such, the project team had to be careful in its consideration of cutting and filling.

"With the Prospect Terrace project, Mountain Housing Opportunities, Inc. was very responsive to the housing needs and Citizen's Master Plan of low and moderate income residents in the targeted neighborhood. In addition to meeting the North Carolina HealthyBuilt Homes guidelines for sustainability and high performance, a particularly innovative aspect of the project is its enrollment in the SystemVision Initiative (run by a nonprofit, Advanced Energy), which guarantees low energy use for the first two years."

-Member, Awards Advisory Committee

Partnerships:

MHO has a strong partnership with the State Energy Office and the North Carolina Solar Center, with whom they have worked to pilot a statewide program to promote sustainable development. MHO has created a lasting partnership with Home Energy Partners, a high performance building consultancy, and the two continue to work together as a direct result of the great success of Prospect Terrace. Other MHO partners on the Prospect Terrace project include: HomeTrust Bank, Western North Carolina Green Building Council, the Affordable Housing Coalition, Buncombe County, the City of Asheville, Land of Sky Regional Council, North Carolina Community Development Initiative, North Carolina Housing Finance Agency and Robert & Stevens P.A.

Policy/Practice Implications:

Prospect Terrace has had and will continue to have significant influence on green building policies and standards. It helped to pilot the North Carolina HealthyBuilt Homes Program and was selected by the Green Building Council to demonstrate the use of green building techniques, systems and materials. MHO is currently planning to build six more homes on scattered infill lots which will meet the NC HealthyBuilt Homes Standards. Their houses demonstrate limited-budget green building techniques and concepts in affordable housing markets.

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