

**2008 The Home Depot Foundation Awards of Excellence for
Affordable Housing Built Responsibly - Full Application**

APPLICANT INFORMATION

Organization Name

Madison Area Community Land Trust (Madison Area CLT Corp)
(www.affordablehome.org)

Federal Tax ID

39-1680095

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What were the qualifications of your organization to undertake this project?

BACKGROUND: MACLT was founded in 1991 with a broad land stewardship mission, and a belief that greenspace and livable communities should be accessible to people of modest means, not just the wealthy. Because of increasing inflation of land costs in Madison (and a corresponding hyperinflation of housing prices), our initial focus was on the construction and renovation of housing that would remain permanently affordable to future generations of homeowners. In addition to Troy Gardens, MACLT has built 34 other homes for low and moderate income first-time homebuyers.

MACLT is a 501(c)(3) nonprofit organization dedicated to promoting the concept of “greenfordable” housing. Greenfordable housing has three major components: First, it must be affordable to low- and moderate-income residents of the community. Second, it must promote energy efficiency and indoor environmental quality through the judicious use of smart design, engineering and construction. Third, the development of greenfordable housing is a continual learning process with each project sharing lessons to help make future greenfordable projects replicable in other communities.

To be honest, this was an enormous project for a small organization such as the Madison Area Community Land Trust (MACLT) to undertake. The qualifications we brought to the project were: (a) a strong commitment to permanently affordable housing, (b) experience doing an ENERGY STAR-certified subdivision called Camino del Sol in 2002 – 2005, (c) a deep commitment to and understanding of universal design principles, and (d) an excellent development team that brought many decades of experience to the table.

We also brought the qualification of being good listeners and collaborators, which was essential to working with numerous stakeholders of Troy Gardens.

STAFF: Our small but hard-working staff also brought some serious credentials to the table. Our executive director (Greg Rosenberg) is an attorney, a founding board member of the National Community Land Trust Network, and brings a long

history of involvement in accessible and affordable housing issues. Our business manager (Mary Myers) has an MBA, and many years of experience working with cooperatively managed organizations. Our (then) marketing director (Sharene Wilcox) had many years of real estate experience as vice president of a local title company.

In summary, we assembled a great team (legal, architectural, civil engineering, landscape design, solar design, sustainability consultant, ENERGY STAR consultant, general contractor), we were passionate about the project, we believed in reaching consensus with all the key stakeholders at Troy Gardens, and we were tenacious. And we were fortunate to find thirty households who believed in our vision and bought homes at Troy Gardens.

PROJECT INFORMATION

Name of Project

Troy Gardens (www.troygardens.net)

Project Location

Madison, WI

Project Type

Troy Gardens is a mixed-income homeownership project, organized as a condominium, and utilizing the cohousing model of community development.

Project Size

Troy Gardens has 30 units of mixed-income cohousing, 20 of which were priced substantially below market for sale to low-to-moderate income households (average homebuyer income was 65% of county median). Ten (10) units were sold at market-rate pricing, with the net proceeds from those units used to subsidize the cost of the below-market-rate units. These homes are set on 31 acres, with 26 acres of protected green space for community gardens, an organic CSA farm, a restored prairie, and nature trails.

Project Summary

OVERVIEW: In October 1995, the state of Wisconsin announced it would sell a 31-acre parcel to the highest bidder. Area residents had been gardening, bird watching, and walking their dogs on this site for many years.

Alarmed at the prospect of losing this neighborhood treasure, concerned neighbors banded together. Community organizing work by the Northside Planning Council soon brought in additional partners (including Madison Area Community Land Trust) and together they formed the Troy Gardens Coalition. The Coalition developed an innovative proposal for integrated land use that combined housing with open space and agricultural uses, and, most importantly, reflected the desires of the surrounding neighborhood.

In December 2001 MACLT purchased the property from the State of Wisconsin and leased 26 acres to the Friends of Troy Gardens, the long-term steward of the natural areas. MACLT reserved 5 acres for the development of a 30-unit owner-occupied mixed-income housing.

Today, the community's vision has been fulfilled, with development completed on a 31-acre urban infill project with a mixed-income ENERGY STAR-certified green

built cohousing community, a working organic farm, community gardens, restored prairie, wildlife habitat areas, and nature trails.

HOUSING SALE PRICES: Twenty of the thirty homes were sold to low-to-moderate income first-time homebuyers and were priced to be affordable to families at 65% AMI. Base price for the two-bedroom homes was \$109,500, and for the three-bedroom homes was \$139,500. The median sale price at that time was \$220,000.

The market-rate homes sold for \$149,500 (two-bedroom) and \$189,500 (three-bedroom).

The two-bedroom homes were 1,150 square feet, and the three-bedroom homes were 1,650 square feet.

UNIVERSAL DESIGN: All homes at Troy Gardens were designed according to universal design principles. Both one and two-story homes have accessible first floors, with a full bath and at least one bedroom on the first floor. Basements were designed to accommodate live-in attendants, with potential for adding a full bath, living room and bedroom to the basement.

Two units were designed with additional accessibility features, including roll-in showers and grab bars for bathtubs.

These homes were designed not only to accommodate persons who presently have disabilities, but also to enable all homeowners to remain in their homes throughout their lifespans.

DRIVING FORCE: The driving force for this project has always been the neighborhood residents and the community gardeners, including Friends of Troy Gardens and the new homeowners there.

Troy Gardens continues to meet the following community-identified goals of: (a) permanently protecting natural areas; (b) managing community gardens and an organic CSA farm to provide a source of healthy and affordable food; (c) teaching young people about conservation and sustainable agriculture; (d) providing mixed-income owner-occupied housing; and (e) safeguarding access for all, regardless of age, income or physical ability.

COMMUNITY FEATURES: Accessibility through universal design is the hallmark of Troy Gardens. It is a walkable community, where pedestrians come first and cars second. There are miles of walkways, both paved and unpaved (mowed grass or crushed rock).

Safety is best accomplished by having a tight-knit community. MACLT's emphasis on community-building, clustering buildings around central courtyards, and the wide range of ages (newborns to age 70) means that there are people watching out for each other at all times of the day and night.

UNIQUE INNOVATIONS AND SOLUTIONS: Initially, the neighborhood just wanted to preserve an unofficial greenspace. Over a 12-year period, this vision evolved into something far greater.

The lesson is that a combination of neighborhood-based planning, strong community organizing, and the willingness of outside collaborators to participate (but not dominate) in the planning process can result in extraordinary things.

NATIONAL AWARDS: Troy Gardens is the nation's first conservation-based affordable housing project in an urban setting. The unique nature of this project led the Lincoln Institute for Land Policy to select Troy Gardens as their first case study of a community land trust development project (www.troygardens.net). Troy Gardens has also been identified by The Conservation Fund as a leading example of conservation-based affordable housing development practices (www.conservationfund.org/node/693). And in December 2007, Troy Gardens received the inaugural Livable Communities Award from AARP and the National Association of Home Builders (www.aarp.org/families/home_design/universaldesign/design_for_living.html).

TRANSPARENCY AND REPLICABILITY: With funding from the Lincoln Institute for Land Policy, MACLT has created an interactive website (www.troygardens.net) with complete development budget, construction specifications, photos and developer's blog. Its purpose is to provide potential future developers with valuable "lessons learned" from this project. The website also provides local residents, project team and greater community a complete resource to demonstrate the early success of the Troy Gardens project.

Goals of the Project

In 2002, The Madison Area Community Land Trust (MACLT) established five major goals for our work at Troy Gardens:

1) MAXIMIZING COMMUNITY INVOLVEMENT IN THE DECISION-MAKING PROCESS: All major decisions about the site plan were made by the neighbors and users of Troy Gardens. This resulted in an agreement to limit the density of the housing site to 30 units and to include a market-rate component. Community charrettes were held (beginning in 1995) to address a variety of issues, including: (a) defining permitted uses in the different sections of the conservancy lands (farm, prairie, community gardens, and interpretive trail system); (b) laying out buildings and roadways to reduce paved areas and to push cars to the periphery of the site; and (c) designing building exteriors to make sure they harmonized with existing residential housing in the neighborhood as well as the adjacent natural areas.

2) PROTECTING OPEN SPACES: The 26 acres of open space at Troy Gardens are permanently protected by a conservation easement held by the Center for Resilient Cities (formerly Urban Open Space Foundation). This easement defines 4 distinct use zones: organic farm, community gardens, prairie, and wildlife habitat.

The Friends of Troy Gardens (FTG) serves as the steward for these open spaces, managing the farm and community gardens, restoring the prairie and wildlife habitat, and running summer education programs focused on conservation and sustainable agriculture practices.

3) MINIMIZING THE IMPACT OF CARS: Roadways are limited to the eastern and southeastern edges of the site, with a few penetrations to provide accessible parking spaces. One-third of the homes back onto the natural areas, away from parking and roads.

Because of (a) easy access to public transportation (bus stop right in front), and (b) being within biking distance of downtown, many homeowners have one car per household.

4) MAXIMIZING ACCESSIBILITY: A specific design program for accessibility at Troy Gardens was established in 2003 and successfully accomplished: (a) all units, whether 1 or 2-story, are “livable” for a person who uses a wheelchair; (b) all primary pathways are accessible (including a connector to the bus stop); (c) MACLT affirmatively sought buyers with disabilities before construction in order to adapt our designs to meet their individualized needs; (d) basements were included (in all units) that can easily be finished into living space for attendants; and (e) additional elements are described in “*Production Information*”.

5) FOSTERING A SENSE OF COMMUNITY: MACLT’s strategy involved both design and people components. Design: We grouped all homes around two central courtyards, orienting all front doors/porches toward the other homes (and away from cars). And in our next phase of development (2009), we will be constructing a community center, which will serve as a gathering place for shared meals and childcare, meetings, and special events. People: From the moment we broke ground, we began doing two things -- (a) holding monthly potlucks for persons interested in living at Troy Gardens, and (b) creating working groups to prepare homebuyers for self-governance. By the time homeowners assumed control of the condo association, they already had a year of experience working together.

Total Cost of the Project

TOTAL COST OF PROJECT AND COST PER SQUARE FOOT

- Total project cost of \$5,480,090
- Building construction costs: \$3,752,770
- Sitework: \$687,697
- Professional services: \$379,937 (architectural, legal, civil engineering, surveying, ENERGY STAR consulting, landscape design)
- Developer fees: \$215,038
- Land acquisition: \$155,835 (housing site only, not including natural areas)
- Marketing (commission plus advertising): \$113,503 [Average of \$3,783 per unit or 2.4% of sales price]
- Construction loan (interest/fees/closing costs): \$84,814
- Permit fees/connection charges: \$39,809
- Closing costs on sale of units: \$20,092
- All other costs: \$30,595

COST PER SQUARE FOOT

- Building construction only: \$86
- Building construction and sitework only: \$102
- Total project costs (hard and soft costs): \$126

What did it cost to include the greening aspects of the project as a percentage of the project's total development cost?

For the Troy Gardens project team, costing “greening aspects” of the project is somewhat of a misnomer, because we designed and built the project using an integrated design process with energy efficiency and indoor environmental quality in mind, thereby minimizing costly “adds” or other last-minute change

orders. However, we include materials below that would be considered “green” compared to conventional construction and note their incremental costs.

INCREMENTAL COSTS ARE BROKEN DOWN AS FOLLOWS:

- Fiber-cement board siding: \$90,000 (additional cost as compared to vinyl siding).
- Solar thermal ready - includes installing piping infrastructure for solar hot water system in the home (without installing the panels or storage tank): \$21,000, at \$700 per unit.
- ENERGY STAR light fixtures: estimated 50% increase over incandescent.
- ENERGY STAR appliances: estimated 25% increase over standard efficiency.
- ENERGY STAR furnace and AC: \$26,935 (additional cost as compared to standard efficiency).
- Energy recovery ventilators for each home: \$25,500 (plus labor)
- Water efficient fixtures: low-flow faucet aerators, low-flow showerheads: (de minimus cost increase).

This information was compiled from the following sources: (a) cost comparisons provided to us by our general contractor, McGann Construction, and (b) additional cost figures for ENERGY STAR appliances, which were developed in collaboration with our local power utility, Madison Gas and Electric.

How were the greening costs paid for? (e.g., rebates and grants, increase in unit prices, etc.)
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MACLT chose our “base” package for homeowners using the most cost-effective energy efficiency and renewable energy measures we identified with the help of our energy efficiency consultant, Josh Arnold and Focus on Energy.

The incremental costs were subsidized by funds from the following sources:

- Focus on Energy (www.focusonenergy.com, Wisconsin’s public benefits fund): Provided technical and financial resources to the project, including a grant of \$12,000 to cover a portion of the incremental costs of energy efficient equipment.
- Madison Gas and Electric: \$24,500 to cover part of the costs of ENERGY STAR appliances, mechanical systems and light fixtures.

However, a benefit of our integrated design process was a Homebuyers Fair for current and potential community residents. MACLT hosted a community event where current and potential homeowners could learn about energy efficiency,

renewable energy and green building upgrades to their homes (e.g. solar hot water panels, bamboo floors, etc.) and the possible benefit to them.

In addition, our Homebuyers Fair featured trusted home loan providers who were able to access Fannie Mae's Energy Efficient Mortgage product and other products that enabled homebuyers to include energy efficiency measure upgrade costs as part of the mortgage financing for the units. By rolling the upgrade costs into the home mortgage financing, many homebuyers chose to specify additional energy efficiency, renewable energy and indoor environmental quality upgrades to their homes with minimal or no additional out of pocket expenses.

In some cases, preliminary energy modeling indicated that homeowners who chose to specify additional energy efficiency or renewable energy measures (such as solar hot water) may end up saving more money per month than the cost of financing the measure (which in some cases amounted to an additional \$20 or \$30 payments per month when amortized over a 30-year mortgage financing package.)

Through integrated design, financial savvy and appropriate use of mortgage instruments, MACLT helped our homeowners accomplish two major goals—implementing energy efficiency and renewable energy measures and conserving cash flow.

If possible, compare the per-unit costs and total development costs per square foot of your project with those of similar-sized units in comparable non-green constructed projects in your area. Did the energy efficient, healthy and sustainable measures you incorporated in the project significantly impact/affect the annual income needed of families to afford purchasing or renting the units? Please explain.

Costs per square foot for this project were as follows:

- Building construction only: \$86
- Building construction and sitework only: \$102
- Total project costs (hard and soft costs): \$126

Based on information provided by our architect (Jim Glueck), per square foot costs for this project were somewhere between \$7 and \$10 higher than for comparable conventionally built housing.

However, the additional costs for construction were not passed along to our homebuyers, due to fundraising efforts filled the gap between (a) aggregate sales revenue for the project, and (b) total development costs. Fundraising for this project came for a variety of sources, including HUD subsidy funds, Federal Home Loan Bank, private foundations and businesses, and an equity investment by MACLT.

Project Start Date

April 13, 2006

Project Completion Date

September 18, 2007

When were all of the units occupied

All units were occupied by May 2007.

Number of units occupied by families/individuals based on annual income as a percentage of Area Median Income (AMI)?

Of the 20 income-restricted households:

- 70% (14 households) are between 51% - 80% AMI;
- 20% (4 households) are between 31% - 50% AMI, and
- 10% (2 households) are 30% AMI or below.

The 10 market-rate units were sold to households above 80% AMI, Though we did not do any formal income verification for those buyers, most have incomes between 80% and 120% AMI.

What retention mechanism is in place to assure long term affordability of units? Please describe the retention mechanism and how long the units will remain affordable for families earning 80% or less of AMI. (e.g., tax credit requirements, deed/resale restriction, land trust, etc.)

Under the community land trust model, the 20 income-restricted homes are permanently affordable, based on restrictions in both the master ground lease and individual covenants attached to each of these homes.

The Community Land Trust (CLT) movement originated in the late 1960s, drawing inspiration from the civil rights and microcredit movements and the land reform principles of Henry George and others. A CLT provides a form of permanent stewardship of land for the benefit of the community that removes land from the speculative market and facilitates multiple uses such as affordable housing, neighborhood revitalization, commercial space, agriculture, recreation, and open space preservation. CLTs never sell the land. Instead we sell homes on the land for prices significantly below normal market values, and keep them permanently affordable through resale restrictions.

For more information about the community land trust model, go to www.cltnetwork.org.

In addition to implementing the community land trust model, the housing units were built for durability and energy efficiency to minimize operations and maintenance costs by MACLT and the homeowners, thereby contributing to the units long-term affordability. Building for durability and energy efficiency also helped MACLT accomplish other goals, as described in more detail below.

Please describe the need for affordable, efficient, healthy housing in the community where this project is located. Describe how you analyzed, identified and addressed the need.

When the Madison Area Community Land Trust was founded in 1991, the median price of a home was \$83,000 (which was a sharp increase from 5 years previous). Today, the median sale price of a home in the Madison area is \$220,000. From 1991 to 2006, housing prices increased an average of 8% per year, while wages increased an average of 4% per year. In 2004, for the first time in Madison's history, a household of median income could no longer afford a home at the median sale price.

For the past three years, average income has been flat, and even with more modest increases in housing prices, fewer and fewer households in Madison can afford to buy a home of any size.

In addition, lower-cost housing in Madison tends to be clustered in neighborhoods poorly served by public transit, with lack of access to green spaces and healthy food. This housing is, by and large, older and very energy-inefficient and costly to operate and maintain.

With Troy Gardens, MACLT wanted to provide permanently affordable housing that would be durable, livable, energy efficient, and set in a healthy environment, with easy access to public transportation, and within walking distance of an elementary school.

Describe any barriers you had to overcome in order to complete the project where it is located. (e.g., environmental? Regulatory? budgetary?) How were the barriers overcome?

There were innumerable challenges to completing Troy Gardens. The list includes (but is not limited to) the following:

- 1) Raising nearly \$1,000,000 in public and private funding to purchase the land and subsidize the cost of the below-market-rate units.
- 2) Negotiating a highly complex Planned Unit Development (PUD) agreement with the City of Madison, to incorporate the unusual diversity of land uses at Troy Gardens.
- 3) Fulfilling our commitment to build consensus among a large group of stakeholders, which resulted in a master development plan that successfully

combined all the conservancy, agriculture, affordable housing, and greenbuilding objectives of the neighbors, community gardeners, prospective homeowners, easement holders, City of Madison and the State of Wisconsin.

4) Achieving our greenbuilding objectives while still keeping 20 of the 30 homes affordable to buyers at 65% of median income.

5) Selling 29 of the 30 homes before completion, in the face of an overall real estate market that was plummeting quickly.

DESIGN (PLANNING PROCESS)

A. Integrated Design Process

Integrated design incorporates sustainability up front using an integrated and total systems approach to the development process. It also involves purposefully bringing together the expertise of various design, construction and engineering disciplines early in the design process to produce high performing buildings with reduced environmental impacts. List each member of your development team, describe what specialty/skill they brought to the team and any certification/licensing they hold.

KEY DEVELOPMENT TEAM MEMBERS INCLUDED:

Architect: NCRB-certified architect Jim Glueck has been designing affordable and accessible housing for nearly 30 years. He began his career focusing on passive solar designs, and brings decades of experience with energy-efficient design. He has won numerous awards over the span of his career – please see his attached resume for more details.

General Contractor: McGann Construction (www.mcgannconstruction.com) was founded in 1988, and has focused much of its efforts in the construction of high-quality affordable housing. They have won numerous awards for their projects, including 14 “Project of Distinction” awards from Associated Builders and Contractors of WI (ABC).

Civil Engineering and Landscape Design: JJR (www.jjr-us.com) is a nationally recognized leader in landscape architecture, planning, urban design, civil engineering and environmental science. They have won many awards for their forward-thinking, environmentally responsible design work, in the areas of landscape architecture and civil engineering.

Solar Design and Installation: Full Spectrum Solar (www.fullspectrumssolar.com) designed and installed the solar PV and thermal systems at Troy Gardens. Company president Burke O’Neal has 10 years of experience in solar energy design and installation, and holds the following certifications: NABCEP Certified Solar PV Installer, MREA, PVUSA, SEI certified; Certified Renewable Energy Site Assessor.

Sustainability Consultant: Josh Arnold and Focus on Energy. Focus on Energy provided technical and financial resources to provide MACLT with a list of energy efficiency and renewable energy measures that could be implemented at the Troy Gardens project and financial grants to help cover the incremental costs of the measures.

Were charrettes part of the design development process? For your project, how many charrettes were conducted, who participated in them (e.g., architect, land use planner, green design specialist, engineers, local residents, etc.) and what was accomplished?

Between 1995 and 2006, there were at least a dozen charrettes for Troy Gardens, organized by the Northside Planning Council, Friends of Troy Gardens, as well as Madison Area Community Land Trust. These included:

- (A) Charrettes focusing on the site plan for the greenspace areas of Troy Gardens, involving neighborhood residents, community gardeners, members of the Friends of Troy Gardens, landscape architects, and staff and board members from MACLT.
- (B) Charrettes focusing on the housing site at Troy Gardens, involving neighborhood residents, community gardeners, members of the Friends of Troy Gardens, landscape architects, architects, and staff and board members of the MACLT.

Our commitment to charrette participants was to give them 95% of what they asked for, and we believe that we were successful in doing that. From the beginning, MACLT's commitment as developer was to design a project that would draw a careful balance between the conservation, agricultural, and affordable housing elements of Troy Gardens, while making sure that we always paid close attention to the hopes and dreams of the people who lived in the neighborhood, as well as those people and organizations who had been stewards of Troy Gardens for many years.

When the architectural drawings were completed for this project, who certified that the sustainability criteria and goals of the project would be met?

CERTIFICATION OF GREENBUILDING FEATURES CAME FROM TWO SOURCES:

- 1) Mark Fredenberg (EMF Home Inspection), our ENERGY STAR consultant, provided document review, conducted site inspections and performed certification testing as required under the Wisconsin ENERGY STAR Homes program.
- 2) Josh Arnold (JD, MBA, LEED AP, Principal of 360GREEN, Inc.) provided green building guidance and support, while previously working as part of the Focus on Energy program to provide energy efficiency and renewable energy design review for the project.

Did use of an integrated design process reduce permitting time and cost overruns?

The integrated design process most definitely reduced cost overruns. We did not see significant change orders in any area except for landscaping, where we encountered additional charges relating to fine-tuning the stormwater infiltration system.

The integrated design process also meant that we were very well prepared when we submitted our Planned Unit Development (PUD) application, the precursor to the permitting process. Once the PUD was approved, we had few difficulties in obtaining the necessary permits to complete the project.

B. Site Selection

Describe the geographical and topographical features that characterize the area on which the units were constructed/rehabilitated.

Troy Gardens is located on the northside of Madison, just a few blocks from the shoreline of Lake Mendota. It is part of a contiguous wildlife corridor extending north to Cherokee Marsh.

The land now known as Troy Gardens was one of the very few remaining greenfield areas within Madison, having been used as farmland and/or “unofficial” parkland over the past several decades. Twenty-five of these acres are now permanently protected greenspace, containing community gardens, a working farm, a restored prairie, woodland areas, nature trails, and woodland areas (including a restored maple forest). Five of these acres was set aside for mixed-income cohousing.

To the west and north of Troy Gardens is the Mendota Mental Health Institute campus. To the east is Karstens Circle, which is a low-income rental neighborhood. To the south is Troy Drive, with small owner-occupied housing. And just a few blocks away is Maple Bluff, the most affluent neighborhood in Madison.

Was an assessment undertaken to determine the site's geotechnical conditions (past use of site, water table, underground streams, drainage conditions, soil quality, etc.)? Who conducted the assessment and what were the findings?

A geotechnical analysis of the 5-acre housing site was conducted in 2006 (by GCC, Inc). Historically, the site has been farmed or has lain fallow, and therefore the soil conditions are very good for agricultural uses. The soil was also found to

be quite good for building purposes, though the relatively high clay content posed some challenges for stormwater infiltration on the housing portion of the site.

Was the project developed on a grayfield, brownfield or adaptive reuse site to redevelop? If so, what environmental site assessments were conducted and what remediation measures were required?

The project was developed as a conservation-based affordable housing development in conjunction with 26 acres of permanently protected land, including a community garden, a restored prairie and an operating farm that participates in a community share agriculture (CSA) program. Although the housing component was developed on what was essentially a greenfield site, it was a strategic urban infill site that was planned for many years. An environmental site assessment was conducted in 2000, and found that the only area in need of remediation was an abandoned railroad bed. The railroad tracks were capped prior to the land being purchased by MACLT, and are secured by an environmental remediation easement that protects the integrity of the cap.

Was a site development plan created to minimize environmental intrusion, preserve open space and environmentally sensitive areas, and conserve existing vegetation during construction/rehabilitation of the housing? If yes, please describe the plan.

The site development plan was conceptualized as a conservation-based affordable housing project in order to preserve open space and environmentally-sensitive areas, including a community garden, a restored prairie and an operating farm.

The 26 acres of green space were well protected during housing construction. A silt fence surrounded the entire housing site, keeping runoff and sediment out of the natural areas. MACLT also met frequently with the Friends of Troy Gardens before and during the construction process to provide information and address any concerns. Because the housing site was an open field, there were no significant trees or vegetation that were identified as warranting preservation.

For new construction projects, what run-off, air movement patterns, solar access, zoning, parcel shape and developments adjacent to the project were considered in the preliminary design of the project?

The project's concept was the primary driver of the preliminary design. The conservation-based affordable development mission required the project team to minimize the intrusion of homes into the existing conservation land. Housing was clustered in the southeast quadrant of Troy Gardens in order to preserve contiguous green space for the community gardens, prairie and farm.

The configuration of the homes was designed to promote community and sense of place by creating large common green spaces acting as centerpieces of the community.

The greenspaces compliment a series of stormwater detention areas (with rain gardens) installed in the housing site, to minimize stormwater running into the municipal stormwater system.

The homes take advantage of passive and active solar components where possible. Solar exposure is excellent for all buildings, with each building having a shared “solar roof” for the installation of solar PV and thermal panels.

During construction and afterwards, MACLT considered the impact on the neighbors to the east and south of the project. We planted shrubs and other vegetation along the east edge of the site to screen the cars in the parking lot. On the southern edge, we retained a 60-foot green space buffer, and also built a rock wall along the edge of the parking lot, to preserve the existing view of the homeowners living across the street.

For rehabilitation projects, what ecological site design/on-site erosion control measures had to be implemented?

N/A

Is the project located on a site(s) with access to existing roads, water, sewers and other infrastructure?

The project is a strategic urban infill site, located along Troy Drive in the city of Madison, WI. This area has existing water, sewer, electrical, gas, phone and cable service. The utility infrastructure connects primarily to Troy Drive, with electrical service connecting from a pre-existing power line located along the north edge of the housing site.

C. Accessibility

Is the project accessible to public transportation or within walking distance of jobs, schools and services?

A public bus stop is located right in front of Troy Gardens, and MACLT installed a bench at the bus stop as part of this project. The location is ¼ mile from Mendota Elementary School, and within biking distance of a middle school. It is less than one mile from Warner Park, the largest public park in Madison. It is just over 1 mile to a grocery store, public library, and hardware store.

Is the project pedestrian-friendly where walking and bicycling is encouraged?

Troy Gardens is on the bike route around Lake Mendota, one of the main recreational bike routes in the city of Madison, that connects to literally dozens of miles of other, specially marked bike routes. The site itself contains several miles of nature trails in the 26 acres of preserved space. Several of our

homeowners commute by bike to workplaces in downtown Madison, a trip of approximately 20 minutes.

D. Storm Water Management & Water Conserving Landscaping

Was an on-site stormwater management plan developed for this project?

Yes, there is an extensive stormwater management plan for the housing site, which contains a series of bioswales or rain gardens utilizing native vegetation. These areas are designed to hold stormwater for up to 48 hours, to improve on-site infiltration, and reduce the amount of water going into the municipal stormwater system.

Overall, with 26 of the 31 acres at Troy Gardens being green, pervious space, stormwater infiltration at Troy Gardens is very, very good.

Beginning in 2008, and in collaboration with Sustain Dane (www.sustaindane.org), the homeowners at Troy Gardens are installing rain barrels to capture stormwater for gardening. Over time, we expect that all thirty homes at Troy Gardens will have rain barrels.

Was a landscape plan developed to limit water and energy demand in order to preserve the natural environment?

Because 10 of the 31 acres at Troy Gardens are devoted to agriculture, irrigation in those areas is necessary during the growing season.

The landscape plan for the housing site is designed to need very little in the way of irrigation – aside from the flower and vegetable gardens grown by the homeowners in front of their homes. Aside from the internal courtyard areas, the housing site is planted with a native prairie seed mix that will require little mowing or watering once established.

What best practices or innovative techniques (e.g., bioswales) were designed into the project to address effective storm water management during the construction/rehabilitation phase and for the long-term?

Both of the large courtyards, which serve as a central community connector, also feed into the bioswale (rain garden) system. The rain gardens along the western edge and eastern edge of the housing site are designed to retain stormwater for up to 48 hours, to improve on-site infiltration, and reduce the amount of water going into the municipal stormwater system.

E. Building Orientation

Describe the plan for the project's site orientation taking into account solar access, shading, and natural lighting. For an existing building, what measures had to be incorporated to address solar access, shading, and natural lighting?

SOLAR ACCESS: Each building (both 3 and 4-unit clusters) was designed to have a shared roof for solar PV and thermal panels. Four of the buildings have a south-facing shared solar roof. Four have a west-facing shared solar roof, and solar panels for these roofs are slightly larger to compensate for reduced solar exposure.

NATURAL LIGHTING: Sixteen of the homes are end units, with wonderful daylighting characteristics, and where only the bathrooms, laundry rooms and basements require supplemental lighting during daylight hours. The remaining 14 homes are interior units, and they were designed to also have excellent daylighting characteristics – only on overcast days is it necessary to turn on lights in any room except the bathroom, laundry room and basement.

SHADING: Front porches and two-foot roof overhangs provide excellent shading characteristics.

F. Reduced Material Use

Please describe any optimal-value engineering and/or advanced framing techniques that were used to reduce material consumption.

Techniques incorporated into the design and construction of Troy Gardens included:

- (a) Trusses 24 inches on center;
- (b) Engineered I-Joists for floor framing (24 inches on center);
- (c) Stacked the wall, second floor and roof framing;
- (d) Non-bearing partition built with a single top plate;
- (e) Right-sized headers -- sizing all headers in bearing walls to accommodate the worst case load and span, sizing each header for its particular load and span;
- (f) Stud walls 24 inches on center.

Were materials selected in order to reduce raw material consumption (e.g., materials with recycled content)? If so, which materials (brand names are not necessary)?

The following materials were selected in order to reduce raw material consumption:

- Fiber-cement board siding;
- OSB for flooring, sheathing;
- Green upgrade package included bamboo, tile, cork and linoleum floors.

Was a waste minimization and construction waste reuse/recycling plan developed and followed for the project? Please describe the plan.

Troy Gardens utilized the waste minimization and construction waste reuse/recycling guidelines of the Wisconsin Green Built Home™ program. These included (but were not limited to):

- (1) saving and reusing all site topsoil,
- (2) recycling of glass, aluminum cans and plastic bottles,
- (3) recycling cardboard, wood scraps, wood pallets, metal, gypsum wall board, and asphalt roofing, and
- (4) reuse of concrete rubble (from temporary sidewalks).

Were subcontractors required to participate in waste minimization efforts? How was the requirement enforced?

All subcontractors were required to comply with the waste reuse/recycling plan, which was posted at the job site, with ongoing compliance monitoring by the general contractor.

Were on-site recycling efforts (e.g., grinding waste) used in the project? Please explain.

No

If the project involved the rehabilitation of units, what opportunities for deconstruction were considered? How were usable materials reused or managed?

N/A

G. Life Cycle Assessment (LCA) and Costing (LCC)

Was a LCA tool used to determine which materials were the most environmentally preferable to use? Please explain.

Creating a conservation-based affordable housing project necessitated that the project team specify materials and equipment that would provide a durable, energy efficient home ownership experience for our residents. We chose several materials (e.g. fiber-cement siding) based on our mission of conservation-based affordable housing. Although we did not use a formal LCA tool, we did rely on our project team's experience to help choose products that would help us accomplish our goals for longevity and energy efficiency.

Was a LCC method used to capture the future benefits (cost savings) of greening the project? Explain the method used and the assumed building lifetime. Were the projected savings considered or factored into funding commitments provided by lenders or other financial service providers involved in the project?

The project team was in frequent contact with home mortgage providers and invited trusted lenders to a home buyers event where people could discuss the costs and benefits of various energy efficiency, renewable energy and green building options that were available to them as upgrades. Several lenders provided opportunities for homebuyers to finance the costs of their energy efficiency, renewable energy or green building features in their home mortgages enabling some homeowners to afford such systems with little to no out of pocket expenses.

The project team did not use a formal LCC tool but did rely on their own experience to inform materials selection and equipment choices.

If LCC was not used, are there plans to do so in the future?

For our next project at Troy Gardens, the Community Agriculture Center, we will be building a LEED-certified, zero-net energy building adjacent to the housing site for use by the community and other stakeholders. We anticipate using a more formal LCA and LCC tool for this project.

BUILDING DESIGN

A. Roof & Skin

Please describe the roofing materials and exterior cladding that were used in the project. In selecting these materials, was improving building envelope performance and reducing maintenance costs a primary consideration?

The roof has architectural asphalt shingles. The siding is HardiePlank fiber-cement board siding.

Long term durability, esthetics and environmental considerations were the major factors in deciding to use fiber-cement board siding. Because of its extremely long life, this siding should greatly reduce ongoing maintenance expenses for the homeowner's association.

Architectural shingles provide slightly improved durability, but were included primarily to improve the esthetics of the project, where the roofs figure prominently in the overall look of the buildings. [We considered a metal roof, but with the cost approximately 3 times greater than asphalt shingles, we were simply unable to afford it.]

B. Framing

Please describe any efficient structural systems that were used to reduce wood waste.

Advanced framing techniques incorporated into the design and construction of Troy Gardens included:

- (a) Trusses 24 inches on center;
- (b) Engineered I-Joists for floor framing (24 inches on center);
- (c) Stacked the wall, second floor and roof framing;
- (d) Non-bearing partition built with a single top plate;
- (e) Right-sized headers -- sizing all headers in bearing walls to accommodate the worst case load and span, sizing each header for its particular load and span;
- (f) Stud walls 24 inches on center.

Was sustainably harvested lumber used for framing? What certification standard (FSC, SFI, PEFC) was used in rating the wood?

No. Because of our cost-constraints, we were not able to use sustainably harvested lumber for this project. It is our intent to use this type of lumber for our next project (Troy Garden Community Agriculture Center).

C. Heating, Ventilation and Air Conditioning

What systems and envelope design measures were incorporated in the project to address proper ventilation and energy efficiency? Why?

Envelope design measures at Troy Gardens included:

- (1) R-50 cellulose ceiling insulation,
- (2) walls 24 inch on center with 5 ½ inch blown fiberglass BIBS system (R-23),
- (3) ENERGY STAR qualified windows -- low E, argon-filled insulated glass rated at U-.32 or better,
- (4) 2 inches of extruded polystyrene on foundation walls,
- (5) foamed-in-place insulation at box sill areas and around openings

Ventilation systems included:

- (1) Energy Recovery Ventilators (ERV's) in each unit,
- (2) externally exhausting bath fans,
- (3) externally exhausting range fans.

Energy efficiency systems included:

- (1) ERV's in each unit,
- (2) ENERGY STAR ® appliances, furnaces, air conditioners, and light fixtures,
- (3) low-flow shower heads and faucet aerators (reducing need for hot water), and
- (4) use of passive solar or daylighting to minimize use of indoor lighting.

Renewable Energy: Many units feature solar photovoltaic (PV) and/or solar hot water panels

What method was used to determine the appropriate size, design and installation of the HVAC system?

Based upon the architect's specifications, our HVAC subcontractor, in collaboration with our ENERGY STAR consultant and staff from RenewAire (manufacturer of our ERV system), designed and installed the HVAC systems.

During design, our systems specifications were “right-sized” using Manual J of the ACCA and under the standards of the Wisconsin ENERGY STAR Homes program. During construction and again upon installation, our ENERGY STAR consultant verified that the appropriate equipment had been installed.

What heating and/or cooling equipment was installed in the project? Why?

We installed the following HVAC equipment at Troy Gardens

- Furnace: Carrier model 58MXB 92
- Air Conditioner: Carrier model 24ACA3 (13 SEER)
- Energy Recovery Ventilator: RenewAire Breeze BR130

This equipment represented the best balance we could achieve between (a) energy efficiency and (b) cost-effectiveness.

How was the performance and efficiency of the installed heating/cooling equipment verified?

The performance and efficiency of the installed HVAC equipment was verified by our ENERGY STAR consultant. The consultant provided visual inspections, systems testing and a “blower door” test in order to verify equipment.

What method/instructional guide was used to determine the appropriate size, design and installation of the duct system?

Our HVAC subcontractor conducted the initial design of the duct system, which was subsequently refined through on-site meetings involving the general contractor, architect, RenewAire (manufacturer of the ERV unit) and MACLT.

How were duct joints sealed?

The duct joints were sealed with duct mastic, as per the architect’s specifications.

Were the ducts tested and evaluated for leakage? By what method?

Our HVAC subcontractor field tested for leakages. Subsequent field testing was conducted by our ENERGY STAR consultant to confirm that there were no leakages in the duct system.

Please describe the air sealing procedures you undertook to reduce air infiltration?

EXTERIOR: Tyvek HomeWrap® taped at every opening.

INTERIOR: vapor retarder in walls and ceilings.

Blower door testing conducted by our ENERGY STAR consultant to identify and eliminate/minimize sources of air infiltration.

D. Insulation

Describe the insulation used in the project and why it was selected.

Envelope design measures at Troy Gardens included: (1) R-50 cellulose ceiling insulation, (2) walls 24 inch on center with 5 ½ inch blown fiberglass BIBS system (R-23), (3) 2 inches of extruded polystyrene on foundation walls, (5) foamed-in-place insulation at box sill areas and around openings.

Given the project cost constraints, the BIBS system, plus rigid foam for the foundation, represented the best compromise we could identify of (a) cost-effectiveness, and (b) excellent insulation characteristics. If cost were not an objective, we would have looked at either (a) wet cellulose or (b) SIPs.

E. Windows

Describe the type of window units installed and why they are appropriate for the local climate.

For this project we used the following ENERGY STAR qualified windows (Low-E with Argon) -- insulating glass, vinyl-clad, screens for entire operable area:

- Silverline 2800 (Configuration – single and double; Type – single hung)
- Silverline 2900 (Configuration – double; Type – single hung)
- Silverline 7450 (Configuration – triple; Type – awning)
- Silverline 7552 (Configuration – double; Type – casement)

Based on the experience of our architect, these windows represented the best balance between (a) energy efficiency and (b) cost-effectiveness for our climate in Wisconsin.

What were the windows' U-factors or R-values?

All windows have a U-value of .32 or better.

F. Lighting

Describe the lighting products and systems used for exterior and interior lighting of the units.

All light fixtures and ceiling fans (except for the dining room light) are ENERGY STAR-certified fluorescent light fixtures.

- Bedrooms, hallways and bathrooms: Progress P3765-09STRWB
- Stair sconce: Progress P7044-09EBWB
- Kitchen: Kichler 10301-WH
- Kitchen (under cabinet): Kichler 10027WH
- Dining: Kichler 3347NI
- Bathroom over sink: Progress P7115-60EB
- Front and rear doors (exterior): Kichler 9021OZ
- Fan/Lights: Hampton Bay Windward II

G. Appliances

Were ENERGY STAR products incorporated in the operations of the residential unit?

All dishwashers, refrigerators, furnaces, and air conditioners are ENERGY STAR-certified.

- Refrigerator: GE model GTH18D
- Dishwasher: GE model GSD2000
- Furnace: Carrier model 58MXB 92
- Air Conditioner: Carrier model 24ACA3 (13 SEER)

H. Water Conservation

What products/design measures addressing water efficiency were incorporated in the project?

Low-flow aerators were installed on all faucets and shower heads. Dual-flush toilets were offered as a low-cost upgrade option (90% of homeowners have dual-flush toilets). In addition, tankless water heaters were included as an upgrade option (three homeowners have tankless systems).

OTHER PROJECT CONSIDERATIONS

A. Indoor Air-Environmental Quality

What measures were incorporated in the project to minimize potential sources of pollutants?

Energy recover ventilators were installed in all homes to insure healthy indoor air quality. The location of the homes immediately adjacent to a conservancy area results in excellent outdoor air quality.

Entry mats are used by homeowners to reduce the introduction of outdoor pollutants.

What measures were undertaken to manage air pollutants generated in a residential unit?

All range hood and bathroom fans vent directly to the outdoors, protecting indoor air quality. All units have a RenewAire Breeze BR130 energy recovery ventilator with a cleanable spun polyester filter. Furnaces have standard filters.

What moisture management measures were incorporated in the interior design of the residential unit?

Energy recovery ventilators are installed in all homes to manage interior moisture levels. Bath and range hood fans vent directly to the outside.

B. Operations & Maintenance

Was commissioning done for the homes/units? If so, briefly describe the process and the cost.

No

For homeownership projects, was a home maintenance and operations manual developed for owners on the use and care of the home? What was included in the manual?

The homeowner association received a complete manual for everything that went into the construction of their homes. This manual included contact information for all subcontractors who worked on this project, installation guidelines, operating manuals, as well as warranty information.

Trainings were provided to homeowners on operation of energy recovery ventilator units, setting their thermostats, operation of solar PV systems, and operation of solar thermal systems.

In addition, we are in the process of developing an online resource section for our homeowners at the MACLT website (www.affordablehome.org).

For rental projects, was a manual developed to inform renters about the green building measures incorporated into their unit and how to use the controllable systems to maximize energy savings and maintain indoor air quality? What else was included in the manual?

N/A

For multifamily rental projects, was specialized training provided to maintenance staff on the building's goals and strategies and all mechanical systems? Who provided the training and how are new maintenance staff trained?

N/A

C. Innovative Options

Please list and briefly describe any renewable energy options and/or solar heating/cooling measures designed into the project.

All homes were designed to meet Focus on Energy's proposed solar thermal ready standard, where all units are pre-plumbed for future installation of solar thermal systems.

Both solar PV and thermal systems were offered as part of our green upgrade package, and approximately half of the homes have a solar PV and/or thermal system.

What other innovative options (e.g., drain water heat-recovery system, heat pump water heater, lighting sensors) addressing energy efficiency were incorporated in the project?

Energy recovery ventilators were installed in all units. Tankless hot water heaters were offered as an upgrade option (3 homeowners elected to install them).

Please describe any other green building design measures you incorporated in the project that you feel you have not yet discussed.

Because it was important to us that (a) all homes had the same base features, and (b) all homeowners were able to select which unit they wanted, we

developed an extensive upgrade package to accommodate the wide range of homebuyers for this mixed-income project.

The green elements of the upgrade package included: (a) solar PV and thermal systems, (b) tankless hot water heaters, (c) bamboo, tile, cork and linoleum floors, (d) and dual-flush toilets. We also offered a “downgrade” package for homebuyers who did not want dishwashers, air conditioners, or garbage disposals (four households elected downgrade options).

What specific lessons were learned that encompass planning, finance, design implementation and construction? What would you do different in a similar future project?

With each project that MACLT undertakes, we learn a great deal more about greenbuilding techniques, leading us to be much more ambitious with each subsequent project. And with each project, the general contractors and subcontractors that we work with continue to accumulate more expertise in greenbuilding practices, which increases our ability to innovate.

Lessons learned at Troy Gardens include the following:

PLANNING: Neighborhood-based planning, while enormously rewarding, takes a very long time to do (if you do it right).

FINANCE: It is very important to work with lenders who believe in the project and furthermore believe in the mission of your organization. For example, the City of Madison CDBG Office and Forward Community Investments strongly supported the project and the work of MACLT, and in turn they made our work much easier. On the flip side, we had one construction lender who was worried about the appeal of Troy Gardens to prospective buyers, and his “due diligence” and constant consultations with his attorney cost us in excess of \$35,000 in legal fees (ironically, sales for Troy Gardens were so strong that we never had to borrow any funds from this particular lender).

CONSTRUCTION: Once again, we learned how important it is to have a general contractor (McGann Construction) that believed in the project and “had our back” throughout the construction process. In particular, our site superintendent (Scott Hanko) and project manager (Aaron Kostichka) played a pivotal role in the success of this project.

LISTENING TO THE PEOPLE DOING THE WORK: Many of our best ideas came from employees of subcontractors, in particular our excavator and HVAC subcontractor. We went out of our way to solicit their input throughout the construction process, and the project is much better for it.

PAY ATTENTION TO UNIVERSAL DESIGN AND STORMWATER

MANAGEMENT: Level entrances are a fantastic feature of universal design, but they can sometimes be in tension with stormwater management. Foundation

penetrations too near ground level can cause problems during snowmelts and heavy rainstorms.

LOVE YOUR ARCHITECT: Having a talented and committed architect who is also a great listener and a good person is really important. We continue to be very fortunate to be able to work with Jim Glueck on all of our development projects.

NATIONAL RECOGNITION

What are the most compelling reasons why this project should be chosen for national recognition? Speak to features such as the magnitude, special nature or impact of the project and results achieved, the possible national significance as a model, or other criteria you believe should be used to make your case.

- (1) Troy Gardens is unique in the entire United States for combining conservation, agriculture and mixed-income greenbuilt housing in one place – and within a city. Other conservation subdivisions cater to the upper-income brackets, and generally have a very small percentage of homes (at best) that are affordable to homebuyers of modest means.
- (2) The neighborhood-based planning process employed at Troy Gardens is a wonderful model of what can be done when a large group of collaborators come together to work with a neighborhood to help it achieve (and even surpass) its hopes and dreams.
- (3) While many people are doing green development, it is very important to MACLT to do “greenfordable” development, in order to bring the benefits of sustainable design to people of modest means. That means striking a balance between what’s green and what’s affordable – which is often very difficult, but absolutely necessary if we are to bring greenbuilding to the affordable housing sector. Until such time as local, state and national funders can devote sufficient resources to subsidize all of the additional costs of greenbuilding, we will never be able to implement 100% of what we would like to do – but we will continue to strive to come up with creative and cost-effective solutions to greenbuilding challenges.
- (4) Our recent Livable Communities Award from AARP and NAHB demonstrates that greenbuilt, universally designed housing is an excellent model for developing intergenerational housing, something that will be in ever-increasing demand as baby boomers continue to age.
- (5) MACLT has developed resources through its own case study to educate other developers (both non-profit and for-profit) about conservation-based affordable housing through our website www.troygardens.net. With the support of the Lincoln Institute of Land Policy, we have posted our photos, construction documents, our budget and a developer’s blog available on our website at no charge to others. We have done so with the intention of helping to further the movement of conservation based affordable housing.
- (6) *Most importantly, this project is worthy of national attention because MACLT is a very small organization (only 3 staff at the time we took on this project), and it demonstrates that even small organizations can do*

ambitious projects if they have the tenacity to see it through, and the blessing of equally committed partner organizations and an excellent design, legal and construction team.