

*Case Studies*

# NJ **GREEN** HOME REMODELING GUIDELINES





## Use of the Guidelines

*What are the guidelines and what are they not?*

The information provided in these guidelines is intended to assist homeowners, contractors, architects, interior designers, landscape architects, and other professionals who design and remodel residential structures. They draw upon best practices and provide a general overview of green remodeling strategies customized for New Jersey, with links to additional information and resources. These guidelines introduce ways a homeowner or remodeling professional can incorporate green building practices into common home remodeling projects. These are not step-by-step technical guides but rather a menu of ‘best practices’ organized by major building systems. One should become familiar with local building code and zoning requirements before undertaking a green home remodeling project.

The guidelines do not list or endorse specific green products or services but rather identify ‘greener’ options to consider when selecting materials and services for the home.

These Guidelines do not constitute an endorsement, approval, or recommendation of any kind by any persons or organizations affiliated with developing these Guidelines. The NJDEP further disclaims any and all liability for any personal injury, property damage or any other damages that are caused by or that may result from the reliance on these NJ Green Home Remodeling Guidelines.

### **New Jersey Green Home Remodeling Guidelines Version 1.0**

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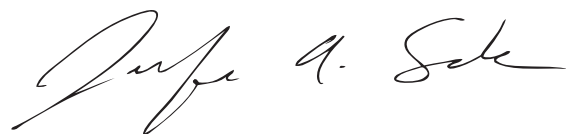
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## RUTGERS Center for GREENBUILDING



Jennifer Senick  
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## Kitchen, Bath, and Living Spaces

The contemporary home serves many different functions for both living and working. Today, best practice for remodeling these areas includes options that not only meet functional needs but are also highly effective in mitigating environmental impact. Kitchens and bathrooms are active spaces and significant consumers of water and energy; choosing environmentally friendly appliances, fixtures, and finishes helps to reduce energy and water consumption and protect non-renewable resources. In kitchens and especially bathrooms, it is advised to invest in durable, high performance features. Whether it's through an energy-saving dishwasher, living room flooring made from renewable materials, bed linens made from bamboo, or a high-efficiency exhaust system, greening living spaces is a fundamental part of the overall green home remodel.



# Case Study



**Location of Project:** Montclair, New Jersey

**Interior Designer:** Jacqueline Germany, President-Owner, and Principal Designer, Nina's Nuances Interior Design, Inc.

**General Contractor:** Jacqueline Germany

## Overview and Scope

This project incorporated a total kitchen remodel with upgrades to the HVAC and water resource systems. The impetus for this green design and renovation project was twofold. The primary reason was that the kitchen did not meet the client's needs: it was outdated, aesthetically unappealing, inflexible, and functionally inefficient. This client was very conscious of his personal use of everyday household items and overall energy and resource consumption. Therefore, when deciding to remodel and renovate, the client chose to employ energy and environmental conservation strategies.

## Design Approach

The environmentally-conscious client provided the principal inspiration for the project, however, being the designer's first truly "green" project opportunity, the designer was equally as excited about completing the remodel. The team undertook the project in 2004 at a time when resources for green design in the residential arena were more limited and the public's knowledge of the benefits and rewards of "green design" was not as sophisticated as it is in 2009. This provided some challenges but also gave the project a more innovative feel.

## Team and Process

The respective backgrounds of the homeowner and designer complemented each other well. The homeowner possessed significant experiential insight as to what green products were available at the time, while the designer, by virtue of training in the environmental sciences and interior design, brought a professional awareness and knowledge of the synthesis and composition of the products. Facilitating the implementation of the green design aspects was the eagerness of suppliers to promote their green products and services.

## Finance

At the time of the project, the cost of utilizing green design techniques was roughly 27 percent higher than conventional design; however, the rapid increase in availability of green design choices and products over the past several years has diminished this premium. For the designer, this project served as a "barometer" for project-related costs. Relative to today, the remodel came well within budget, even with the extra costs for the green features. The client reported energy savings of approximately 20 percent over the first full year following the renovation, and when he decided to sell the home in 2007, the green kitchen turned out to be the most compelling factor in the new owner's decision to purchase.

## Lessons and Trade-offs

Through this project, both the client and designer learned a lot about the varying levels of "greenness" in products marketed as such. When researching green products, they found that one needs to examine carefully the product information and Material Safety Data Sheets (MSDS) to verify the accuracy of the claim. The homeowner and designer were surprised by the lack of quality in some green-labeled products. Therefore, they felt that research into product choices was critical. Luckily, there are several reliable resources available today as well as many more practicing green design and remodeling professionals.

*"In our efforts to help the environment by adhering to green principles of living, we often times forget to factor in how we dispose of our waste products...An important part of our efforts to do green building, design, or remodeling should be how we deconstruct that environment and what we do with its components and waste."*

*- Jacqueline Germany*



Before

After

## List of Green Strategies

### Energy Conservation

- Replaced original appliances with energy-efficient ones
- Replaced original lighting fixtures with energy-efficient fixtures and lamps
- Utilized dimmer switches and more effective lighting controls
- Upgraded windows to improve insulation

### Water Conservation

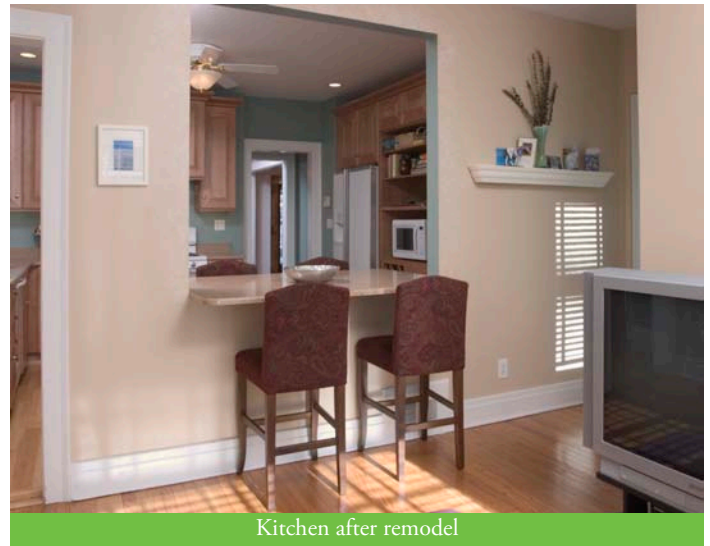
- Replaced original water heater with a tank-less model that heats water on demand
- Incorporated a **reverse osmosis** water filter with an instant hot water faucet
- Installed a whole-house water filter with water softener

### Indoor Air Quality

- Used **low-VOC** paint and non-toxic interior finishing products on cabinets, walls, and flooring
- Replaced **HVAC** system and added new vents and filters
- Added a cooking hood with pollution controls to aid clean exhausting of odors and fumes
- Replaced old plaster and lath with paperless sheetrock

### Sustainable Materials

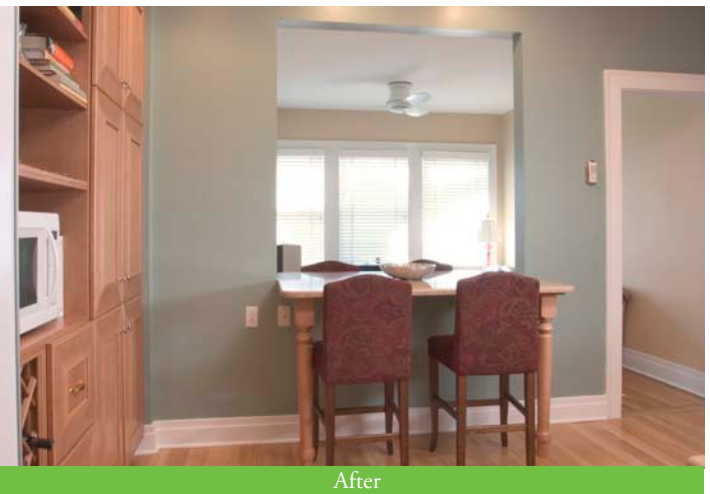
- Installed countertops made from Azrock, a granite alternative made from 70 percent consumer recyclable materials
- Installed cabinets made from river-recovered wood
- Installed bamboo flooring
- Reused door hinges and some antique hardware from original kitchen



Kitchen after remodel



Before



After

# Case Study



**Location of Project:** Elkins Park, PA

**Homeowners:** Mr. and Mrs. Ryan Quinn

**Interior Designer:** Lori Jacobsen, Lori Jacobsen Design, LLC.

**Area Affected:** 190 sq. ft.

## Overview and Scope

The primary objective of the design firm was to create a safe and healthy nursery for an expanding family. Working within the framework of a nearly seventy-year-old home, the team made minimally invasive architectural changes to maintain the integrity of the home. Without changing the layout of the existing space, they focused on “choosing materials and products that are healthier for people, conserve resources and energy, and are resource efficient (as defined by ASID, June 2007).” Subscribing to the parameters of sustainable design, the constraints of the existing space, a fixed budget, and consideration of time, they created an eco-friendly or “green” baby’s nursery.

## Design Approach

The homeowners wanted to create the safest and healthiest environment for their baby. The firm helped to educate the couple on everyday products that can have an adverse effect on their health and helped the homeowners both select safe, environmentally-friendly products and make changes to improve indoor air quality.

## Team and Process

Lori Jacobsen Design worked together with the homeowners throughout the design process. The project began with an in-home consultation with the clients. After defining the design needs of the client and considering the budget, they worked together to create a plan that met those needs. The homeowners were then asked to approve the final design plan.

## Finance

Working with a budget of \$10,000 the team was pleased to find out that their green choices and strategies came in under budget.

Generally the design firm does not work with clients on a strict budget. Therefore, this project offered the opportunity to create a baseline for other projects of this kind.

The homeowners expect cost savings from their investments by lowering heating and cooling costs through yearly maintenance of the HVAC system, upgraded air filters, and installation of natural window shades with insulators.

## Lessons and Trade-offs

Because of their extensive knowledge and continuing research in the area of green design, the design firm was not surprised by the project cost. To create a non-toxic nursery, the firm made suggestions to the homeowner about removing materials that could degrade indoor air quality. In general, the firm advises homeowners to participate in the design process, which helps create a transparent plan with few or no surprises in the end.

*“This particular project was a dream. The client’s and our firm’s green objectives were completely aligned. Therefore, we all were on the same page from the beginning to the end.”*

*- Lori Jacobsen*



## List of Green Strategies

### Energy Conservation

- Checked heating and cooling systems to ensure optimal efficiency
- Upgraded air filters
- Installed energy-saving window shades and insulators

### Resource Conservation

- Installed area rug made from 100 **post-consumer recycled content** (polyethylene terephthalate (PET) from recycled plastic bottles)
- Repurposed a salvaged chair using remnant fabric from a furniture manufacturer

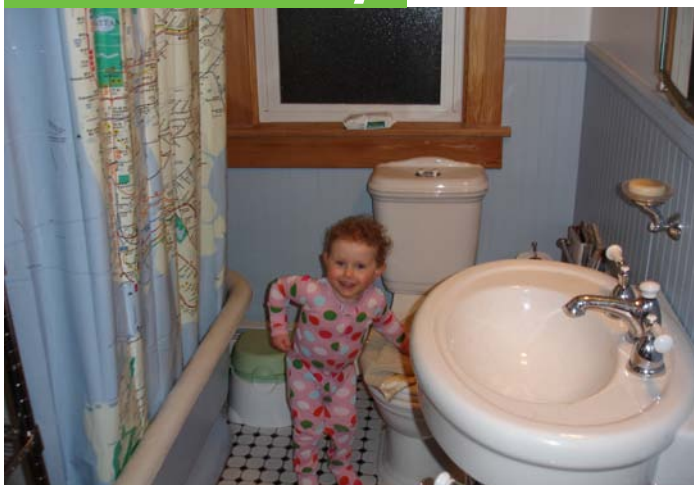
### Indoor Air Quality

- Removed all existing materials with high-**VOC** contents
- Used low-**VOC** paint
- Refinished hardwood floors with a no-sanding and non-toxic finishing product
- Cleaned floors with a neutral product that contains no harmful **solvents**
- Used environmentally-friendly, low-**VOC** carpeting and furnishings
- Chose a natural organic wool fiber and cotton mattress and bumpers for the crib



Repurposed chair from remnant fabric

# Case Study



**Location of Project:** Highland Park, New Jersey  
**Homeowners:** Randall Solomon and Rebecca Hersh  
**General Contractor:** Richard Stryker Contracting  
**Area Affected:** approx. 1350 sq. ft.

## Overview and Scope

This green remodel of a 90-year-old craftsman bungalow included an upgrade to a high-efficiency natural gas furnace, replacement of **single-pane windows**, installation of spray denim insulation, and the addition of a dual-layer high-venting roofing system. Green interior renovations included upgrades to the kitchen with **Energy Star®** appliances and installation of water saving fixtures and dual flush toilets in the bathroom. Existing materials were preserved whenever possible, such as exterior cedar siding, wooden porch floor boards, antique doors and fixtures, and subway-style bathroom tiles. Care was also taken to properly remove lead paint and to use only non-toxic paints and finishes.

## Design Approach

Randy and Rebecca wanted to design a home that embraced their sustainable values and lifestyles, and that would save them money through reduced utility bills, and provided a healthy environment for their growing family.

## Team and Process

The homeowners were the driving force behind the green aspects of this project. They researched and proposed almost all of the green techniques and materials that went into the remodel, working step-by-step with the contractor to decide on the best options. By communicating the commitment to green design from the start, the homeowners made sure that the contractor also understood the importance of reducing construction waste materials and using non-toxic finishes whenever possible.

## Finance

The homeowners looked to reduce costs and conserve resources by preserving and reusing existing features of the home. For example, instead of replacing bathroom tile with all new **recycled content** tiles, they only replaced the most worn out sections with new tiles. When it made sense to replace older systems (such as pre-1994 water guzzling toilets) the homeowner chose to invest in greener alternatives, such as low-flow dual flush toilets, that cost more up-front but that will pay for themselves in reduced water bills over time.

## Lessons and Trade-offs

Do your homework. The homeowners didn't have to hire a "green" contractor but they did have to put in the extra time and effort to research green features and materials and to communicate these choices to the contractor.

*"The good news is that the dual-flush toilets are a big hit with our friends...the bad news is that anytime we have a guests over we end up using more water because everyone wants to check them out!"*  
- Randy Solomon



Upstairs bathroom before



## List of Green Strategies

### Energy Conservation

- Replaced old single-pane windows with energy-efficient double-pane, **low-E**, argon filled windows with fiberglass composite frames
- Upgraded existing oil/steam heating system with highly-efficient (87 percent efficient) natural gas/hot water furnace
- Installed zone heating and **programmable thermostats**
- Upgraded kitchen appliances with **Energy Star®** dishwasher and refrigerator
- Added spray denim insulation (recycled blue jeans) to attic, basement, and exterior walls where no or little insulation existed
- Sealed cracks and leaks to reduce air **infiltration**
- Installed a dual layer, high-venting roofing system to reduce temperature build-up inside the attic during the summer months

### Water Conservation

- Installed low-flow faucets and shower heads and added faucet aerators to existing fixtures
- Installed dual flush (0.8 and 1.6 gallon per flush) toilets

### Resource Conservation

- Preserved 90 year old existing cedar siding
- Refurbished antique bathtub with a new coat of paint
- Preserved black and white subway tiles in upstairs bathroom by replacing only broken tiles
- Refinished and reused antique doors and fixtures
- Replaced rotten floor boards on the front porch with antique floor boards in the attic where they could be appreciated

### Indoor Air Quality

- Professionally stripped lead paint from windows and doors
- Vacated the house during the renovation to avoid construction-related dust and air pollution
- Used low-**VOC** water-based finishes on all trim work



Downstairs bathroom after remodel

# Case Study



**Location of Project:** Chatham Township, New Jersey

**Homeowners:** Ken and Kathy Abbott

**Architect:** Brian and Janet Siegel, Siegel Architects

**Interior Designer:** Eco-Interiors by Patricia Gaylor

**General Contractor:** John Marinaccio Construction

**Green Building Consultant:** Anna Hackman

**Landscape Architect:** Back to Nature

**Organic landscaper:** Greenpath Organic Landcare

## Overview and Scope

Located in Chatham Township, New Jersey, this project entailed significant changes to a home previously renovated in 1988. It included changes to the kitchen, dining room, and family room as well as the addition of new living space over the garage. The dining room was relocated to its original location in the front of the house while the kitchen was shifted over to the dining room's position. This allowed the kitchen to become the "heart" of the home, providing a connection to the deck, family room, mudroom, and dining room. The wall between the new kitchen and existing family room was opened up completely, letting light flow from front to back of the house and giving a view of the family room and backyard from the kitchen. The mudroom, removed during the previous renovation, was restored. All of this reconstruction was done within the existing footprint of the house, except for a 72 square foot extension in the rear corner to make enough room for an office off the mudroom.

The 366.5 square foot addition above the garage contains a fifth bedroom, bath and laundry room. To make this section over the garage blend in with the rest of the house, the architect designed a hip roof for the entire house.

## Design Approach

The homeowners, Ken and Kathy Abbott, were very focused on a green renovation. Their major goals included improving traffic flow and daylight downstairs, getting more counter space and cooking space in the kitchen, and providing an extra room for a new baby and an office upstairs.

## Team and Process

Ken and Kathy Abbott provided the initial impetus for the green remodel. Working with the architect, the green building consultant, and the designer, she was very mindful of trying to save energy, re-purpose items she already had, use local materials, and keep the indoor air quality as clean as possible.

## Finance

The Abbotts wanted to make the renovations as "green" as possible without incurring much additional expense. To that end, the only thing that cost more up front was the solar water heater, for which the estimated payback period was eight years.

## Lessons and Trade-offs

If able to do it all over again, the Abbotts would choose an architect that was **LEED** certified, as they felt that they needed to educate the architect and builder on the green aspects of the project. One major lesson would be to perform air sealing before laying the sheetrock; they performed the air sealing after the building was done and afterwards an energy audit showed lots of air leaks from the attic and basement. One major design change would be to avoid putting recessed "can" lights (also called high-hats or recessed downlights) in ceilings that open to unconditioned spaces, such as the cathedral ceiling in the family room or upstairs rooms, because they allow unwanted heat flow between conditioned and unconditioned spaces.

*"I love my bioswale, stream and organic gardens. I also like that we didn't put as much construction waste in the landfill as we would have with a conventional demolition or carpenter. I think about what my children and their children will do as landfill space becomes scarcer and scarcer. Sustainability is important to me. I felt a responsibility not to add to my family's carbon footprint."*

*- Kathy Abbott*



Solar hot water heating



## List of Green Strategies

### Energy Conservation

- Replaced 30-year-old windows with new **low-E** windows throughout the house
- Installed triple cellular blinds in master bedroom
- Installed new **Energy Star**® appliances
- Added two solar panels used for hot water

### Water Conservation (Outdoors)

- Ensured that there would be no net increase in stormwater **runoff** from the slight increase in our house footprint
- Contoured the garden on both sides of the house to absorb rain water
- Built a **bio-swale** containing attractive **native plants** on the uphill side of the yard that historically collected too much rain water and caused basement flooding
- Used sump pump water to make a landscaped stream that provides a frog habitat

### Indoor Air Quality

- Used zero-**VOC** paints
- Installed **formaldehyde-free, sustainably-harvested wood** kitchen cabinets
- Purchased natural jute fabric for window treatments
- Used water-based wood floor finishes

### Resource Conservation

- Repurposed existing kitchen cabinets into two armoires and one laundry cabinet
- Altered existing wall unit in the family room to fit a new flat-screen TV
- Repurposed old kitchen sink into a laundry sink
- Installed recycled glass bathroom countertops and border tiles
- Installed an acrylic laundry countertop made from **recycled content**
- Purchased handmade kitchen tiles from New Hampshire, meeting criteria for locally-based products
- Requested a separate dumpster for concrete for the demolition of the old front porch and sidewalk

### Sustainable Sites

- All the plantings, grass, etc., were planted with no pesticides
- Chose an organic landscaper to take care of the lawn and garden



Kitchen after remodel



Bathroom after remodel

# Case Study



**Location of Project:** Montclair, New Jersey

**Homeowners:** Jeff and Amy Plaut

**Architect:** John Thomas Collins

**Interior Designer:** Eco-Interiors by Patricia Gaylor

**General Contractor:** Woodhaus Construction

**Area affected:** 1000 square feet

## Overview and Scope

This house is an 1801 Federal-style farmhouse, one of the oldest continually-occupied homes in Montclair, and is on both the New Jersey and the National Registers of Historic Places. The current owners worked to achieve a balance between preservation of the historic character and fabric with green environmental standards and the everyday needs of an active family lifestyle. The renovation focused on opening up rooms and repurposing space. This included updates to the existing kitchen, family room, laundry room, and the addition of a breakfast room.

## Design Approach

Designer Patricia Gaylor and the homeowners, Jeff and Amy Plaut, both desired to do as green a renovation as possible. The designer worked with the Plaunts to develop an environmentally-conscious, practical design that also preserves the historic quality.

## Team and Process

Patricia worked with the Plaunts on the general look and plan for the renovation, and Patricia specified all the products being used to be as green as possible. All plywood used on the renovation by the contractor contained no added **formaldehyde**, energy-efficient lighting and appliances were specified, and the cabinets used were no added **formaldehyde** plywood boxes with a low-VOC paint finish.

## Finance

The cost of the renovation was considerably high to begin with due to the age of the home. Special consideration had to be taken at every turn to keep costs to a minimum. But for the most part, selections were made on the basis of their sustainability and green quality, not over high price. The construction and materials costs were fair. There will be a huge return on investment in energy savings. Before the renovation, the house was leaky, and the homeowner's heating bills were very high. Good insulation, the addition of radiant heat flooring in the kitchen, and energy-efficient windows contribute to the new tighter building envelope.

## Lessons and Trade-offs

The major surprise was how much work was required to fix old renovations and get the home up to current code. While this was expected for such an old house, the costs were higher than anticipated. Although the project was completed on time, the team ended up substantially over budget due to the poor condition of the home's infrastructure. However, both Patricia and the Plaunts were very satisfied with the results.

*"I thoroughly enjoyed working on a period renovation, and melding new technologies with the old house...Green remodeling is the only way to go, as far as I'm concerned. As a designer, it's my job to show the homeowner that a remodel of her home should be as healthy to the family as possible, leave as low a carbon footprint as possible, and make it as energy-efficient as possible. I think these things can be accomplished in a 'green' fashion with very little in the way of extra cash output...What surprised me the most? Nothing! Being in the remodeling business for so many years, green or not, it's always a challenge."*

*- Patricia Gaylor*



Breakfast room



## List of Green Strategies

### Energy Conservation

- Selected **Energy Star**® appliances, including the refrigerator, dishwasher, television, and clothes washer and dryer
- Purchased a stove and refrigerator made domestically
- Installed hydronic radiant heat under the kitchen floor
- Installed highly efficient **low-E** glass and argon filled windows
- Chose borate-treated blown-in **cellulose insulation** for the space between the interior and exterior walls for significantly increased energy efficiency
- Used **CFLs** in the majority of light fixtures, including the outside fixtures

### Water Conservation

- Installed water filtration systems at sinks to eliminate use of bottled water
- Installed low flow faucets and faucet aerators

### Indoor Air Quality

- Built cabinets from wood with no added **formaldehyde**, and painted them with **low-VOC** paint
- Painted interior walls with environmentally-friendly **low-VOC** paint
- Purchased laundry room cabinets made of medium-density fiberboard (MDF) with no added urea **formaldehyde**
- Coated soapstone countertops are coated with food-grade mineral oil once a month

### Sustainable Materials

- Stripped and repaired the original brick hearth to restore it as the focus of the kitchen
- Constructed porches using local bluestone and flooring made from **recycled content**
- Installed eastern white pine floors, harvested from family-owned, responsibly-managed New Hampshire forests
- Used domestic clay for the butler's pantry wall tile made by an environmentally responsible New Hampshire firm that reuses clay waste, water for processing, and shipping boxes
- Installed white Danby marble countertop from Vermont in baking area
- Installed Marmoleum linoleum flooring, made from **jute**, flax, and linseed oil



Gas range and oven



Mud room

# Case Study



**Location of Project:** Galloway, New Jersey

**Homeowners:** Stephen and Barbara Fiedler

**Interior Designer:** Fiedler Designs, LLC

**General Contractor:** Fiedler Designs, LLC

**Area affected:** 350 sq. ft.

## Overview and Scope

This project involved a total renovation of an existing kitchen and dining room into a combined kitchen with two sit-down eating spaces. The “great room” effect of this gathering space was the goal of the design, and the materials used helped meet the design goal of a total “green” or sustainable kitchen.

## Design Approach

The Stephen and Barbara Fiedler looked to the **U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED)** for general green building guidance. They were inspired initially by the Jackie O’Neil LEED home in Perkiomenville, Pa.

## Team and Process

The project involved numerous phone calls to green product suppliers and requests for product samples. The Fiedlers visited green product installation showrooms, read blogs on green products and attended seminars and conventions to educate themselves on green kitchen remodeling strategies and materials.

## Finance

The Fiedlers put aside some cost considerations for this project in order to test the viability of several green products, many of which were new to the marketplace. In order to cut costs, the entire project’s labor was performed by Fiedler Designs LLC. The cost savings of **Energy Star®** appliances, the tankless water heater, a smaller lighting load, and greater long-term material durability may pay for themselves, but not for some time. It will benefit future customers to choose sustainable products and techniques as they become more mainstream.

## Lessons and Trade-offs

The biggest surprises of this project were the durability and stability of No-Added Urea Formaldehyde (NAUF) composite casework products and the bamboo cabinets. The Fiedlers would urge others to consider rapidly renewable woods, fibers, and composites as opposed to traditional woods with long growing times, and also to avoid products with high-VOC and urea **formaldehyde** content. Seeking out higher production capacity fabricators to use similar green materials would cut some costs. One of the biggest trade-offs was the lack of **LED** lighting choices for different applications. The designer looks forward to when **LED** lighting is available at a reasonable cost for task lighting and overhead lighting.

*“The entire project was a valuable learning experience, particularly in researching and working with new green materials; understanding which green materials to recommend for future clients.”*

*- Stephen Fiedler*



Energy Star® refrigerator



## List of Green Strategies

### Energy Conservation

- Installed 14" round **solar light tubes** to bring in natural light
- Purchased **Energy Star**®-rated dishwasher, gas stove, refrigerator, and microwave
- Installed recessed hi-hat ceiling light fixtures with sealed, close contact insulation capability
- Used **LED** bulbs in high hat recessed fixtures
- Chose low-voltage lighting fixtures

### Water Conservation

- Chose a two-handle kitchen faucet to minimize hot water demand
- Installed a tankless gas water heater
- Installed a reverse osmosis water purification system with a separate dispenser tap at sink
- Installed an under-mount stainless steel single bowl sink with a built-in drain board

### Indoor Air Quality

- Used NAUF plywood for sub=flooring and cabinet case construction; NAUF bamboo materials
- Chose no-**VOC** paints for the walls, ceiling and trim
- Hazardous Air Pollutant (HAP) -free, no-VOC, water based finish on all cabinetry components

### Sustainable Materials

- Chose bamboo products for cabinet doors, drawer fronts, side veneers, panels and case edging
- Installed recycled glass/concrete countertops
- Purchased engineered quartz secondary table tops
- Installed low-**VOC** natural linoleum flooring
- Installed insulation made from **borate**-treated shredded cotton blue jeans
- Tiled walls with 100 percent **pre-consumer recycled content** wall tiles
- Used 100 percent recycled wall board from power plant scrubber lime and recycled paper



Energy Star® gas range, oven, microwave, and dishwasher



Recycled glass countertop



Dining area

# Case Study



**Location of Project:** Summit, New Jersey at the 100 year-old Twin Maples Estate

**Homeowners:** The Fortnightly Club of Summit (501c3 charity organization)

**Architect:** Hiland Hall Turner, Hiland Hall Turner Architects

**General Contractor:** Roger Polo, Polo Master Builders

**Interior Designers:** Peter Salerno of Peter Salerno Inc.; Kim Nadel of Niche Interior Design; Joan Picone of Joan Picone, Inc.; Jerri Eskow of Iron Gate Interiors; Sherrie Legro Round of Enchantment Lives; Kristen Bouterse of Paints Plus; Danielle Ann Millican of Danielle Ann Millican, Inc

**Photographer:** Marisa Pellegrini

**Area Affected:** Approximately 2200 square feet.

## Overview and Scope

This project involved the preservation and complete green renovation of a century-old historic carriage house at the Twin Maples Estate in Summit, New Jersey. The work was completed for the recent Twin Maples Centennial Show. The second floor apartment was fully renovated, as was the lower level foyer and all of the heating, cooling and water systems for the structure. The lower level bays were left intact to preserve their historic terra-cotta tile floors and mahogany bead board walls and ceilings. Wood insulated garage doors were added to improve energy efficiency in the lower level.

## Design Approach

One of the most important aspects of sustainable building practice and design is the reuse of existing structures and materials; the renewal of this 100 year-old carriage house represents a prime example of how new life can be brought to a historic building. The designers wanted to demonstrate that green design could be practical and aesthetically pleasing. They aimed to create beautiful interior spaces using environmentally-friendly furnishings, reclaimed and renewable flooring, and energy-efficient appliances throughout the house.

## Team and Process

Seven interior designers teamed up with architect Hiland Hall Turner and builder Roger Polo. The designers incorporated several themes,

including natural colors and materials, circular patterns representing the natural cycle, and a juxtaposition of contemporary and rustic details. The concept was to reuse, recycle and use renewable and energy-efficient resources.

## Finance

Polo Master Builders and their subcontractors donated the materials and labor necessary to renovate the carriage house. Hiland Hall Turner donated his architectural services. The designers and their suppliers donated the interior finishes. Perfection Contracting donated the installation of the new high-efficiency hybrid heating and cooling system.

## Lessons and Trade-offs

The design team found that while many green products, such as energy and water-efficient features, are readily available, other environmentally friendly products may be more expensive and require more careful research. Product availability for certain spaces may be trickier than others due to lack of knowledge on the part of suppliers as well.

*"We hope to inspire architects, builders and homeowners to take action to make historic buildings more sustainable by installing history-friendly and eco-friendly building materials, as well as state-of-the-art efficient energy systems."*

*- Heidi Evenson, Co-Chairman, Twin Maples Centennial Show House*



Remodeled Kitchen



## List of Green Strategies

### Energy Conservation

- Installed **Energy Star**® appliances in the kitchen
- Installed a high-efficiency hybrid heating and cooling systems to heat and cool the apartment and lower level foyer
- Added blown-in insulation to the walls and attic space
- Added a new insulated hay loft door and two insulated garage doors to improve energy efficiency and add natural light to the interior

### Water Conservation

- Installed low-flow fixtures in the kitchen and bathroom
- Installed a dual-flush toilet in the bathroom

### Indoor Air Quality

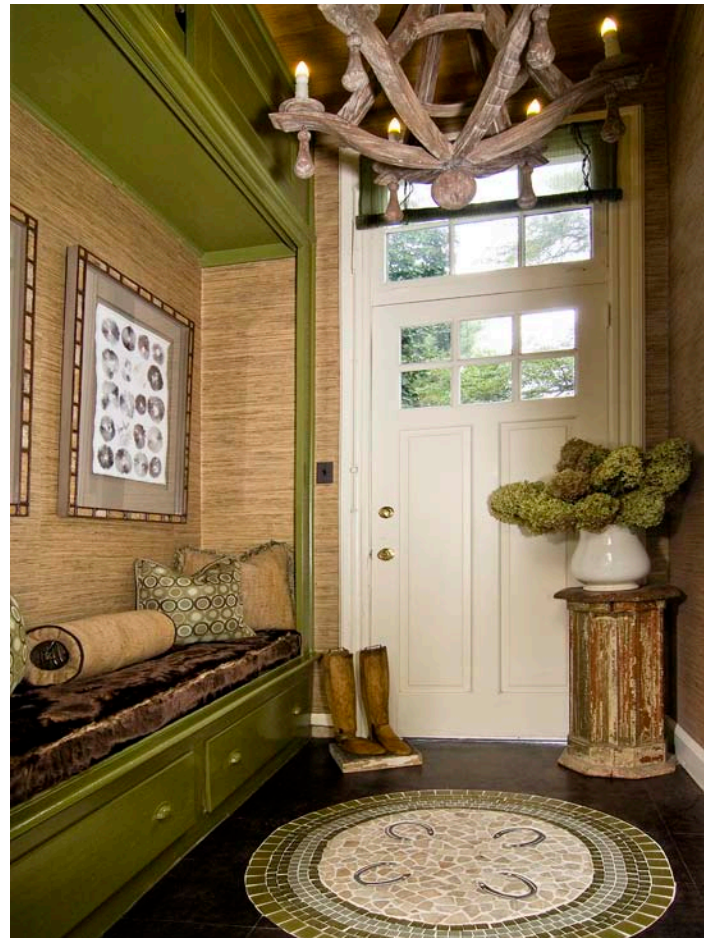
- Installed **formaldehyde-free** cherry cabinets in the kitchen
- Used low-**VOC** paints throughout the structure
- Used a green product to finish the recycled barn wood floor

### Resource Conservation

- Incorporated fixtures comprised of existing materials such as **reclaimed** wood and recycled aluminum
- Refurbished new items from recycled materials such as a stairway runner from an old conveyor belt, a lamp from a wrought-iron gate, a nightstand from a sewing machine table, and a writing desk from an old barn door
- The flooring throughout was reclaimed from a barn in West Virginia

### Sustainable Materials

- Utilized renewable and recycled materials throughout the house, including recycled leather tiles, bamboo flooring, reclaimed barn wood flooring, recycled glass, natural carpeting and wall-covering materials (including hemp, straw, and sea grass)

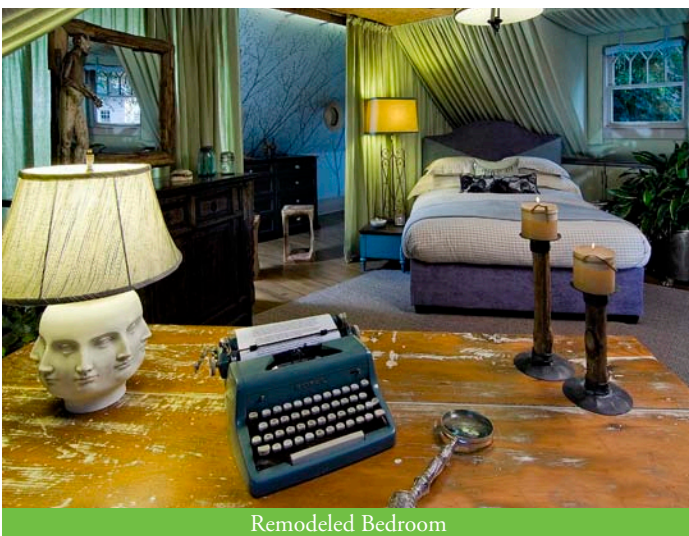


Remodeled Foyer



Remodeled foyer

Remodeled bathroom



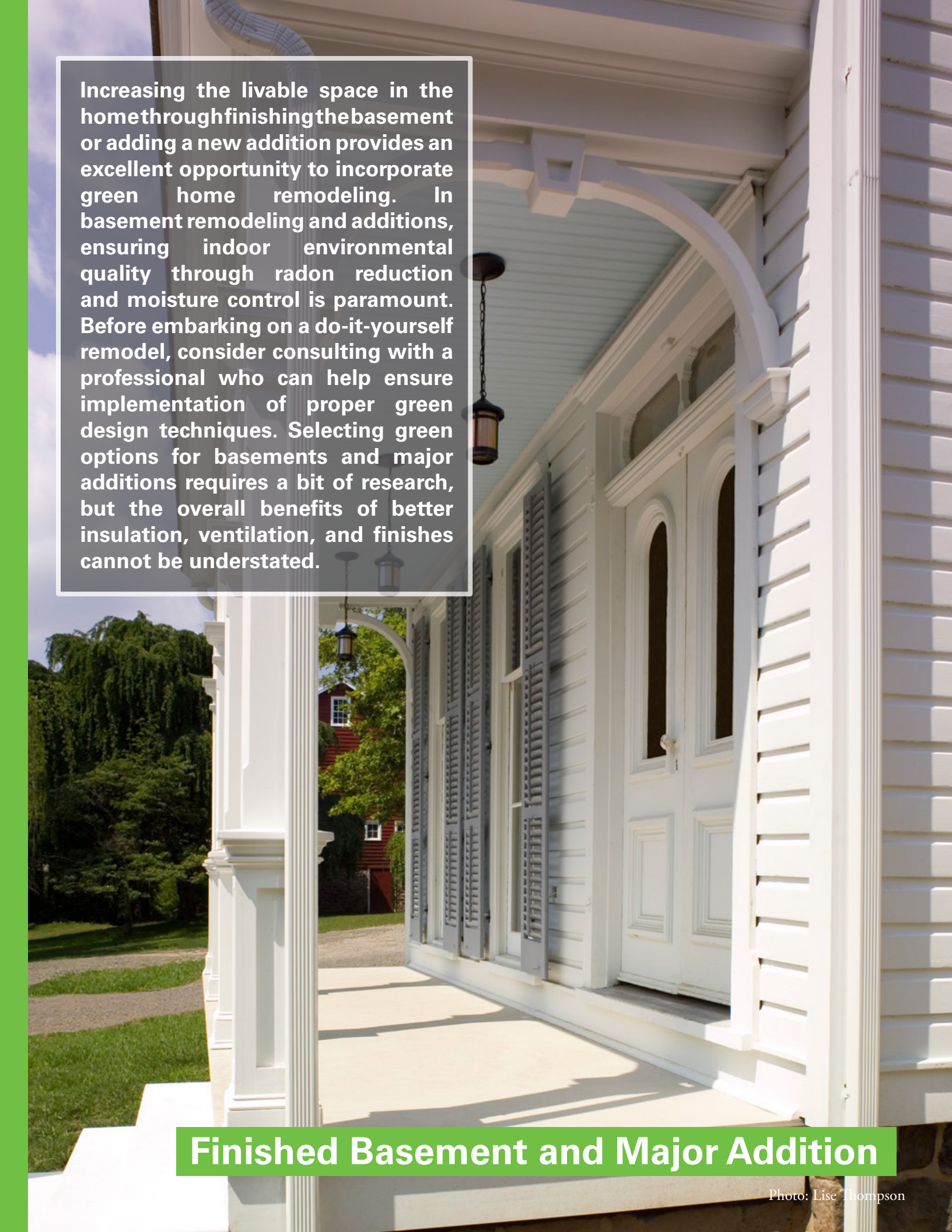
Remodeled Bedroom



Remodeled and restored exterior





A photograph of a white house with a porch and a finished basement addition. The house has white siding, a white door with a transom window, and white columns. A concrete walkway leads to the door. In the background, there are green trees and a red house. The sky is blue with some clouds.

Increasing the livable space in the home through finishing the basement or adding a new addition provides an excellent opportunity to incorporate green home remodeling. In basement remodeling and additions, ensuring indoor environmental quality through radon reduction and moisture control is paramount. Before embarking on a do-it-yourself remodel, consider consulting with a professional who can help ensure implementation of proper green design techniques. Selecting green options for basements and major additions requires a bit of research, but the overall benefits of better insulation, ventilation, and finishes cannot be understated.

## Finished Basement and Major Addition

Photo: Lise Thompson

# Case Study



**Location of Project:** Ridgewood , New Jersey

**Homeowners:** Ed Schwartz, Julie Tung

**Interior Designer:** Lori Jacobsen, The Repurposed Home

**Sustainability Consultant:** Green Living Solutions

**General Contractor:** Norton Thompson, Tremor Contracting

**Area Affected:** ~5,000 square feet

## Overview and Scope

This project involves the complete restoration of a historical home, originally built circa 1767. The new remodel has three major components. First, the existing part of the home was restored, all systems were updated and a thermal envelope was established. Next, an attached stucco garage built in the 1970's was removed, along with a damaged portion of the home, with plans for a new detached garage to be built later. Finally, a wing which was originally built in 1860 but removed at some point thereafter, is being partially rebuilt. This addition will include an expanded kitchen, family room, master suite, and finished basement.

## Design Approach

The homeowners originally started this project with the challenge to show that a historical home could be remodeled sustainably while also adhering to the aesthetics and integrity of the building's past. To this end, the design team used **reclaimed**, salvaged, and recycled components wherever possible. The owners also desired to reduce their carbon footprint by increasing the energy and water efficiency of his home.

## Team and Process

The homeowners planned this project before building green had started to become more common. Since at the time there were very limited resources to assist them, they were inspired to launch a green consulting firm, Green Living Solutions. Therefore they acted as the advisors, choosing all of the green products, features, and materials. The architect was chosen for his experience with older homes and not necessarily for his interest in sustainability, but working with the homeowners, the architect and contractor learned a great deal about green remodeling. The interior designer selected additional detail and materials to further a green result.

## Finance

Restoring a historic house properly is inherently more expensive than a standard renovation. Materials used, as well as specialists with experience working on older homes, tend to be more expensive than average. Since the owners have a financial background, they considered the overall costs of operating a home and chose green features that had reasonable payback periods, including efficient lighting and HVAC equipment, better insulation, and a **photovoltaic** array. The payback periods for all of these features are estimated to be no longer than six years.

Other aspects of green construction were no more expensive than their conventional counterparts, since the homeowners had a good sense of what green products were available.

So far, the owners have reported reduced energy use from the previous owners by roughly 70 percent. When all aspects of the project are complete, they expect to be at 80 percent - 90 percent lower than the energy used by the previous owners despite the fact that the house will be nearly 40 percent larger!

## Lessons and Trade-offs

The design team found that most contractors are not fluent in the latest green trends and sustainable practices. A green consultant can make one aware of those options and provide guidance on their viability in the real world; available locally, installed properly, performing up to expectations, etc. Green options tend not to be more expensive if one knows where to look. By becoming aware of green options, homeowners can make sustainable choices without sacrificing comfort, safety, or savings.

*"People think of building green as being difficult, more expensive, etc.. It's at the point where all construction should be done with an eye for sustainability. Green building leads to more durable structures, better indoor air quality, greater comfort, and lower energy costs, not to mention doing our part to reduce green house gases and our reliance on foreign energy sources."*

*- Ed Schwartz*



Ductwork sealed and insulated



All climate heat pumps



## List of Green Strategies

### Energy Conservation

- Improved the thermal envelope, allowing the system to perform much more efficiently
- Utilized a heat-pump-assisted water heating system that dehumidifies the basement, and captures energy to offset water heating needs
- Installed an ultra-insulated hot water tank
- Reduced air infiltration through caulking and air sealing
- Installed expandable spray foam insulation in parts of the attic, the basement ceiling, and the restored addition\*
- Installed **cellulose insulation** in the attic
- Sealed and insulated ductwork
- Excavated dirt crawl spaces which will be replaced with poured concrete over 2" of rigid **extruded polystyrene** foam board
- Incorporated **fly ash** in the concrete of the new foundation to reduce the amount of cement needed
- Used **Energy Star**® rated appliances
- Used **CFLs** in most light fixtures
- Installed **solar tubes** for natural daylighting
- Proposed a solar array to offset a significant portion of electricity usage
- Retrofitted fireplaces with inserts that prevent conditioned air from being pulled from the home during use

### Water Conservation

- Installed low-flow fixtures and toilets
- Utilized an outdoor rainwater harvesting system to reuse rainwater for gardens and landscaping
- Created **rain gardens** to keep storm water on site and facilitate **infiltration**
- Replaced part of the driveway with permeable surface



### Indoor Air Quality

- Removed old **asbestos** and lead pipes
- Removed lead paint where necessary
- Replaced **carbon monoxide** producing appliances
- Used low- and no-VOC paints
- Used hardwood and cork flooring instead of carpeting
- Installed an all-climate **heat pump** with an air filtration system to constantly filter air, provide proper humidity levels, and produce indoor air quality that is better than outdoors

### Resource Conservation

- Used **reclaimed** materials wherever possible
- Reused old floorboards for repairs in other parts of the home
- Salvaged front doors from a pre-demolition 1880's brownstone
- Reupholstered furniture with surplus scrap materials
- Collected stones to be used to build a retaining wall
- Sorted and recycled construction debris

### Sustainable Materials

- Installed cork flooring in the foyer and kitchen
- Used countertops made from scrap pieces of granite and recycled glass
- Chose closets and cabinets from manufacturers with sustainable practices



Salvaged front doors



Expandable spray foam insulation\*

\*To avoid fire hazard when using spray foam materials installed in walls or ceilings, choose an approved, fire resistant thermal barrier with a finish rating of not less than 15 minutes as required by building codes. Rim joists/header areas in accordance with the IRC and IBC, may not require additional protection. Foam plastic must also be protected against ignition by code-approved materials in attics and crawl spaces. See relevant Building Codes and [www.iccsafe.org](http://www.iccsafe.org) for more information.

# Case Study



**Location of Project:** Stormville, NY

**Homeowners:** Deborah Monroe

**Architect:** Jordan Valdina

**Landscape Architect:** Deborah Monroe

**General Contractor:** Deborah Monroe

**Area Affected:** 725 sq. ft.

## Overview and Scope

The project transformed a 1960's studio apartment and garage into a 1-bedroom in-law apartment with a kitchen and bathroom, living room and laundry room. A new 3.5 bedroom/2.5 bath home, built to the **U.S. Green Building Council's LEED Silver** rating, was built and connected by a covered breezeway to the existing in-law apartment.

## Design Approach

Surrounded by an organic beef farm and overlooking pastures and a pond, the homeowner wanted to respect the quiet and beautiful section of Stormville where she lived and aimed to have a lesser impact on the environment throughout the remodeling process. In turn, her desire was to make small changes to the house that would make a huge impact on energy savings and indoor health.

## Team and Process

The homeowner was responsible for all changes and upgrades to the home. The renovation to the in-law apartment took place gradually over a period of six years.

## Finance

The homeowner developed a marketing program to secure sustainable materials and sponsorships for the project. The program offered three levels of sponsorship (bronze, silver, gold) based on the percentage of discounted or donated materials and/or labor. In return, sponsors received varying levels of marketing and publicity, including recognition on the project's website. The highest level of sponsorship included participation in a series of open houses over the course of six months. For more information on the project and a full list of sponsors, see ([www.monroegreenproject.com](http://www.monroegreenproject.com)).

## Lessons and Trade-offs

The homeowner was interested in installing **photovoltaic** panels but the existing site conditions that included a 200 year old maple tree on the south side of the home and the costly up-front investment did not create a good return on investment, even with New York State's solar rebates. Instead, the homeowner plumbed the home for future installation of geothermal and solar-thermal, to take advantage of these technologies as they become more cost-effective down the road through better incentives and/or and technological advancements.

*"You can do things the easy way or do them the right way....only a valiant soul will endure the pressure to do anything the right way....be that valiant soul and change your world."*

*- Deborah Monroe*



Before remodel



## List of Green Strategies

### Energy Conservation

- Removed vinyl siding, used **house-wrap** and added 2-3 inch insulation board to the exterior, and installed fiber-cement siding
- Installed **Energy Star**® lighting and appliances
- Removed saturated and non-functioning insulation with blown **cellulose** made from 100 percent recycled newspaper in the attic, bathroom, and under stairs to reduce drafts
- Added European flat panel radiant baseboard on the ground floor
- Installed double pane **low-E** windows; caulked and used foam insulation around windows to reduce air leakage
- Extended eaves for **passive solar heating** and cooling and took out roof **soffit** to eliminate drafts
- Installed chimney for pellet stove that currently uses 1/2 - 3/4 of the amount of pellets and propane used before the changes

### Water Conservation

- Replaced a 3.5 gallon toilet from 1952 with a low flow toilet
- Installed low flow faucet in bathroom and water filter on kitchen sink (now uses tap water instead of bottled water)
- Replaced dirt driveway with semi-pervious stone that becomes more solid when wet but still allows for water **infiltration**
- Extended eaves to protect the home against rain and moisture

### Indoor Air Quality

- Repainted entire house with no- or low-**VOC** paints
- Removed carpet and installed wood flooring upstairs to reduce allergens and eliminate **VOC off-gassing** from carpet
- Uses green cleaning products

### Sustainable Materials

- Replaced trim with **FSC-certified wood**
- Replaced all sheetrock in bathroom with **recycled content** sheetrock



Blown cellulose insulation in attic



European flat panel radiant baseboard

# Case Study



**Location of Project:** Tri-state area

**Architect:** Tom Vierschilling (Project Manager), LEED AP, WESKerch Architecture

**Sustainability Consultants:** Homeowners and project team members

**Landscape Design:** Gaia Gardens

**General Contractor:** Robert Nagy Building Company

**Green Interior Design:** Patricia Gaylor Interior Design

**Energy Monitoring Services:** Christine Bruncati, R.A., New Jersey Institute of Technology

**Area Affected:** 3200 sq. ft.

## Overview and Scope

A couple with young children purchased the house in which the wife grew up. The home is a 1930s colonial, 3-bedroom, 1.5 bath. Since they had to remodel, they decided to do a “green” remodel with improved energy efficiency, better indoor air quality, and sustainable materials and practices. Their goal was to create a safer, healthier, and more environmentally responsible home in which to raise their family. In addition, the move provided them with a “right-sized” home and a more sustainable location, with a greater number of amenities within walking distance to reduce the need to use a car for transportation. With some additional effort, they decided to pursue a **LEED** for Homes Platinum rating and use the project to help educate and inspire others about sustainable building and remodeling.

## Design Approach

The design team initially struggled with trying to preserve as much as possible of the original home for conservation and sentimental reasons. But in the end it was agreed that the house’s performance was best served by making it a true “gut-rehab.” As a gut-rehab the house is eligible for seeking both the **Energy Star**® for Home rating and a **LEED** for Homes Platinum rating from the U.S. Green Building Council. (Only one home in New Jersey is currently rated Platinum, and that is new construction.) The residence is being remodeled using many of the latest environmentally responsible methods and materials. The benefits will include lower operating costs, a smaller carbon footprint, a healthier home, and better environmental stewardship. It will serve as a model of how to “green” an older traditional-style house at different ranges of budgetary investment and how traditional builders can adapt to green building techniques.

## Team and Process

The homeowners met with the architect to scope the project and present the variety of initiatives they were interested in pursuing. The architect in turn made suggestions and initiated the design. The homeowners found an interior designer focused on green residential design. They interviewed several builders before deciding on a team that included a green building specialist and a builder who was interested in learning to adapt additional green building practices to his work. The homeowners brought an **HVAC** contractor on board to explore high-efficiency systems. As the team was assembled, they met and communicated frequently.

## Finance

Many of the green methods and materials used can be implemented in any home, with a modest budget, and with a short payback to make it healthier and environmentally friendly. Others are appropriate in a remodel with a bit more investment and longer payback period. Some of the materials chosen, such as flooring, are less expensive than the traditional products. More expensive choices were evaluated using long-term cost savings as a basis, and some choices were pared back to reduce the budget. The homeowners anticipate tremendous savings in energy costs and maintenance. They are grateful to have had the assistance of the project team and partners in keeping costs reasonable, including BASE, Superior Walls, Huston Lumber, Serious Windows, Caroma, Smart Little House, and others.

## Lessons and Trade-offs

The biggest challenges for the homeowners, though not really surprises, were the initial difficulties in finding a builder and subcontractors who were knowledgeable and interested in green building. It required research before deciding upon the products that met their needs, since many new options are just now becoming available. The final challenge was managing the budget. The best advice they have is to do a lot of research up front, assemble a capable and enthusiastic team in the design phase (including all of the major sub-contractors) and integrate them in the complete planning process. The team approach helps avoid delays and allows everyone to contribute ideas early in the process, where the costs are lower and benefits potentially higher.



Before remodel



*"We're blending a variety of best practices in green home building while trying to preserve the character of a home that's been in the family for 50 years. It's a challenge, but we'll end up first of all with a very comfortable and healthy home for our family that will have low energy and maintenance costs, and is within easy walking distance of a variety of amenities. In the process of building a home, we're hoping to pass on the values and responsibility that will make the world a better place for our children and generations to come."*

- Homeowners

## List of Green Strategies

### Energy Conservation

- Sealed all leaks in **building envelope** with **spray foam insulation** (seams, outlets, switches)
- Insulated exterior walls and attic roof with closed cell spray foam, which features twice the **R-Value** of typical batt insulation with no hydrochlorofluorocarbons (HCFCs) or **formaldehydes**
- Installed **low-E** glass windows with insulated frames and low **U-factors**
- Designed to maximize daylighting
- Replaced all lighting with efficient **CFL** and **LED** lighting
- Installed occupancy sensors and centrally/remotely controllable lighting
- Installed geothermal ground source **heat pump** for heating and cooling, expected to eliminate most fossil fuel usage
- Installed super-insulated, high-efficiency gas hot water heater, partially heated by geothermal system
- Installed efficient radiant floor heating
- Installed a whole-house energy recovery ventilation system to reduce need for air conditioning
- Designed for solar hot water heater
- Used advanced framing techniques: insulated headers, open insulated corners, 24" O.C. framing, hangers instead of jack studs, and no vents or piping in exterior walls
- Designed integrated shading system to block high angle summer sun and allow low angle winter sun for passive heating

### Water Conservation (Indoors)

- Installed low-flow aerated faucets/showerheads
- Purchased touch-control kitchen sink faucet
- Installed dual-flush toilets (0.8 gpf and 1.26 gpf)

### Water Conservation (Outdoors)

- Limited lawn area, reducing water, fertilizer, and pesticide usage and energy necessary to mow lawn
- Purchased **native, drought-resistant plants**

- Installed rain barrels and **rain gardens** to use rainwater for irrigation and reduce **runoff**
- Paved driveway and hardscapes with pervious paving materials

### Indoor Air Quality

- Used low/no-**VOC** paints and sealants
- Purchased countertops and cabinets made with low-**VOC** finishes and other **formaldehyde-free** products
- Built detached garage to prevent auto fumes from infiltrating house
- Installed high-MERV air filter with ventilation systems
- Used no carpeting throughout the home

### Resource Conservation

- Prefabricated foundation walls greatly reduce construction and demolition waste

### Integrated Pest Management

- Used organic fertilizers and pest control
- Used termite shields and simple screening



Superior building envelope



Advanced framing technology

# Case Study



**Location of Project:** Rosemont, New Jersey

**Design Team:** Conservation Development, LLC and Entasis Architecture, LLC

**Landscape Design:** Paul W. Steinbeiser, Inc.

**General Contractor:** Robert J. Brander, Inc. and Conservation Development, LLC

**Homeowners:** Lise Thompson and Robert Brander of Conservation Development, LLC

**Area Affected:** 5,646 sq. ft. home (including 2006 addition, finished basement and attic), 1,200 sq. ft. bank barn, 960 sq. ft. 3-bay garage barn, 384 sq. ft. barn, 195 sq. ft. barn, 70 sq. ft. well house, and metal corn crib, on 2.4 acre site

## Overview and Scope

This project involved the preservation of and addition to a circa 1869 Victorian home and exterior buildings. Systems and landscape were modified where necessary. A barn of 1,200 sq. ft. was approved for conversion to apartment space.

Sustainable building practices were used where possible that included reused, recyclable, and renewable materials that promote healthy indoor living. Systems were designed to be energy-efficient and water saving.

## Design Approach

The goal of this project was to update and restore the historic home and its exterior buildings using methods that integrated sustainable building practices with historic detailing to highlight the existing original qualities of the home.

## Team and Process

The owners acted as the general contractor and project managers for this project. Their relationships of over 15 years with most of the contractors helped tremendously with communication throughout the project. They used a true integrated design process and made a commitment to spending scheduled time with all members of the project's team, allowing for the most efficient communication in order to integrate green design issues, materials and methods.

## Finance

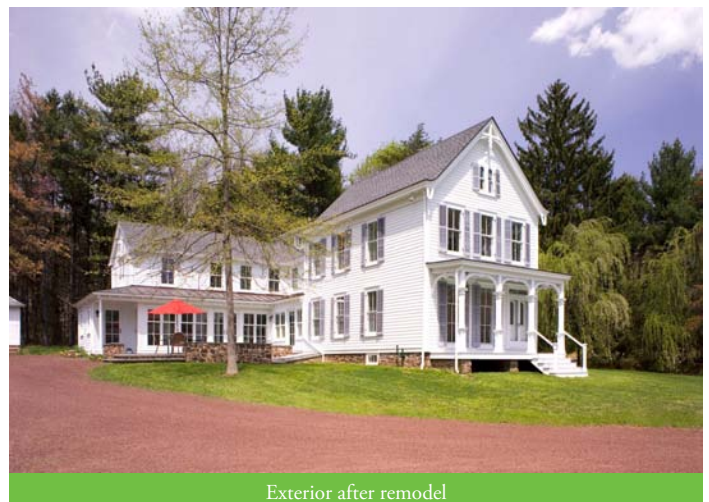
In order for a project to be truly sustainable and repeatable, it needs to be financially feasible. In this project, the research involved in determining which products to use, evaluating their impact and locating those products in a timely fashion was the greatest contributor to the increased budget of the project, which exceeded the installation cost of those products. Like many historic houses, the original house had a south-westerly orientation and the owners oriented the addition to take advantage of passive solar. However, while the quality of the workmanship was consistent with previous projects, the attention to details (e.g. increased insulation, choosing a lighter color for the roof as opposed to a black slate, added overhangs and increased attention to the window efficiency and mechanicals) will likely result in a significant reduction in the cost of heating and cooling the house.

## Lessons and Trade-offs

The restoration process itself was a reminder of how many of the old world building practices are considered green today; siting a house in relationship to the land and weather, using local, reclaimed, or natural materials, natural day lighting and ventilation. Many of these simple time tested practices were applied to the new "green" addition. As part of the commitment to making this project a true restoration, one of the trade-offs was that the home did not qualify for Energy Star because they decided to restore all of the original windows, re-glaze them, add high performance storm windows and insulate around the windows thoroughly instead of replacing them.

*"I believe that restoring an old building is inherently green; it sustains culture as well as resources. It was often a challenge deciding which products and techniques to utilize while trying to balance our commitment to an authentic restoration with our commitment to energy efficiency, a healthy environment and using natural, recycled or long life cycle materials. The green industry changes so rapidly, you have to keep the big picture in mind and make the best choices you can."*

*- Lise Thompson*



Exterior after remodel



# List of Green Strategies

## Energy Conservation

- Installed **low-E** windows in the addition to prevent radiant heat from escaping and block ultraviolet rays that can fade many fabrics and materials
- Re-**glazed** existing windows to help control heat flow
- Replaced broken windows and added **storm windows** to reduce air leakage
- Installed rigid polyurethane foam insulation to cut air flow throughout the **building envelope** and reduce **heating and cooling loads**
- Installed a high-efficiency and high-velocity **HVAC** system and radiant hydronic heat
- Installed a high-efficiency oil-fired burner which doubles as the indirect hot water heater and can be converted to bio-diesel
- Insulated hot water lines with ½" walled rubber insulation
- Designed home to provide for excellent natural day lighting that reduces the demand for artificial lighting during the day
- Oriented renovations toward the southwest providing it **passive solar** advantages **reducing heating loads**
- Specified **Energy Star**® appliances where possible

## Water Conservation (Indoors)

- Installed copper piping with minimal amounts of **PVC**
- Added new plumbing fixtures to comply with new energy codes
- Added ½ inch walled rubber insulation to domestic hot water lines allowing for constant hot water and reducing water wastage
- Installed a thermostatically activated recirculating line that heats water as needed saving energy
- Installed an indirect water heater

## Water Conservation (Outdoors)

- Replaced existing built-in gutters and soffits with 16- ounce copper interior gutters and molding that match the original detailing
- Re-pointed and water proofed the original foundation
- Installed an underground drainage system that collects water from most of the downspouts and the foundation drain and redirects it to a **rain garden** located below the southern lawn
- Planted **rain garden** with **native plants** and with an emphasis on color, appeal to birds and butterflies, and water-absorbent properties
- Protected trees with rock-lined wells
- Used permeable Delaware red stone for driveway

## Indoor Air Quality

- Guttered the original house allowing it to breathe and removing all the accumulated dust that usually remains inside the walls of old houses
- Used non-toxic, natural materials and no-**VOC** paint and water based finishes on the flooring and wood trim
- Utilized existing cross ventilation designed for the original house and added a fresh air exchange unit that brings **HEPA** filtered air into the house every 20 minutes
- Installed a high-efficiency, high-velocity **HVAC** system with multiple zones that aids in moisture control and the prevention of mold and mildew

## Resource Conservation

- Preserved all components of the home and site where possible
- Restored moldings, doors, floors, siding, and masonry where possible with local materials
- Used reclaimed antique hemlock flooring to match the original flooring
- Re-**glazed** existing windows and replaced broken glass with reclaimed antique glass
- Restored barn foundations
- Preserved original roof rafters on the large bank barn while adding a new metal roof and purlins
- Repaired or replaced siding where needed with Pocono Eastern White Pine
- Relocated or replanted trees, shrubs, and other vegetation
- Installed copper gutters and piping that have a long service life and are recyclable
- Used steel beams instead of wood as girders where the original house attached to the new addition
- Installed a new metal roof on the bank barn that will be long lasting and is recyclable
- Utilized reused and local materials where possible



Restored porch



Remodeled interior

## Photography Credits

### Cover

Top left: John D.S. Hatch, Trenton Row House Case Study  
Top right: Michael Fleischacker, Hanson Case Study  
Below top right: Ed Schwartz, Schwartz Case Study  
Bottom left (top): Patricia Gaylor, Abbott Case Study  
Bottom left (bottom): Ford3 Architects and Barbara Geller, Geller Case Study  
Bottom right: John D.S. Hatch, Trenton Row House Case Study

### Kitchen, Bath and Living Spaces

Cover: Patricia Gaylor, Abbott Case Study  
Case Study 1: Jacqueline Germany, Montclair Casew Study  
Case Study 2: Lori Jacobsen, Quinn Case Study  
Case Study 3: Randall Solomon, Solomon Case Study  
Case Study 4: Patricia Gaylor, Abbott Case Study  
Case Study 5: Patricia Gaylor, Collins Case Study  
Case Study 6: Stephen Fiedler, Fiedler Case Study  
Case Study 7: Photography by www.marisapellegrini, Twin Maples Case Study

### Finished Basement and Major Addition

Cover: Lise Thompson, James Dean House Case Study  
Case Study 1: Ed Schwartz, Ridgewood Case Study  
Case Study 2: Deborah Monroe, Monroe Case Study  
Case Study 3: Tom Verschilling, Greendale Case Study  
Case Study 4: Lise Thompson, James Dean House Case Study

### Weatherization and Energy

Cover: John D.S. Hatch, Trenton Row House Case Study  
Case Study 1: Thomas G. Wells, Parkland Properties Case Study  
Case Study 2: John D.S. Hatch, Trenton Row House Case Study  
Case Study 3: GreenStreet Energies, Black Case Study  
Case Study 4: Darren Port, Bellvue Court Case Study

### Outdoor Living and Landscaping

Cover: Michael Fleischacker, Hanson Case Study  
Case Study 1: Michael Fleischacker, Hanson Case Study  
Case Study 2: Ford3 Architects and Barbara Geller, Geller Case Study

### Back Cover

Left: Photography by www.marisapellegrini, Twin Maples Case Study  
Middle: Lise Thompson, James Dean House Case Study  
Right: Patricia Gaylor, Collins Case Study



## Rutgers Center for Green Building [RCGB]

The Rutgers Center for Green Building is located at the Edward J. Bloustein School of Planning and Public Policy, Rutgers, The State University of New Jersey. The Center forms a common umbrella for existing and proposed initiatives being carried out through separate Centers at the Bloustein School, the School of Environmental and Biological Sciences (formerly Cook College), the School of Engineering and other Rutgers units that are integral to developing and implementing innovative green building strategies.

The Rutgers Center for Green Building has developed capabilities in applied green building research that entail modeling the life cycle cost and environmental impact of buildings, post occupancy study tools including survey research and building operating data analysis, and financial methodologies to better estimate green building value. The Center has produced a series of reports documenting best practices in green building and regularly provides green building training and education modules for a variety of audiences.

# RUTGERS Center for GREENBUILDING

Rutgers Center for Green Building

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The Rutgers Center for Green Building developed the guidelines with extensive input and review by an expert advisory group comprised of residential building and remodeling professionals, interior designers, landscape architects, and experts in the field of green building and energy-efficient design.



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