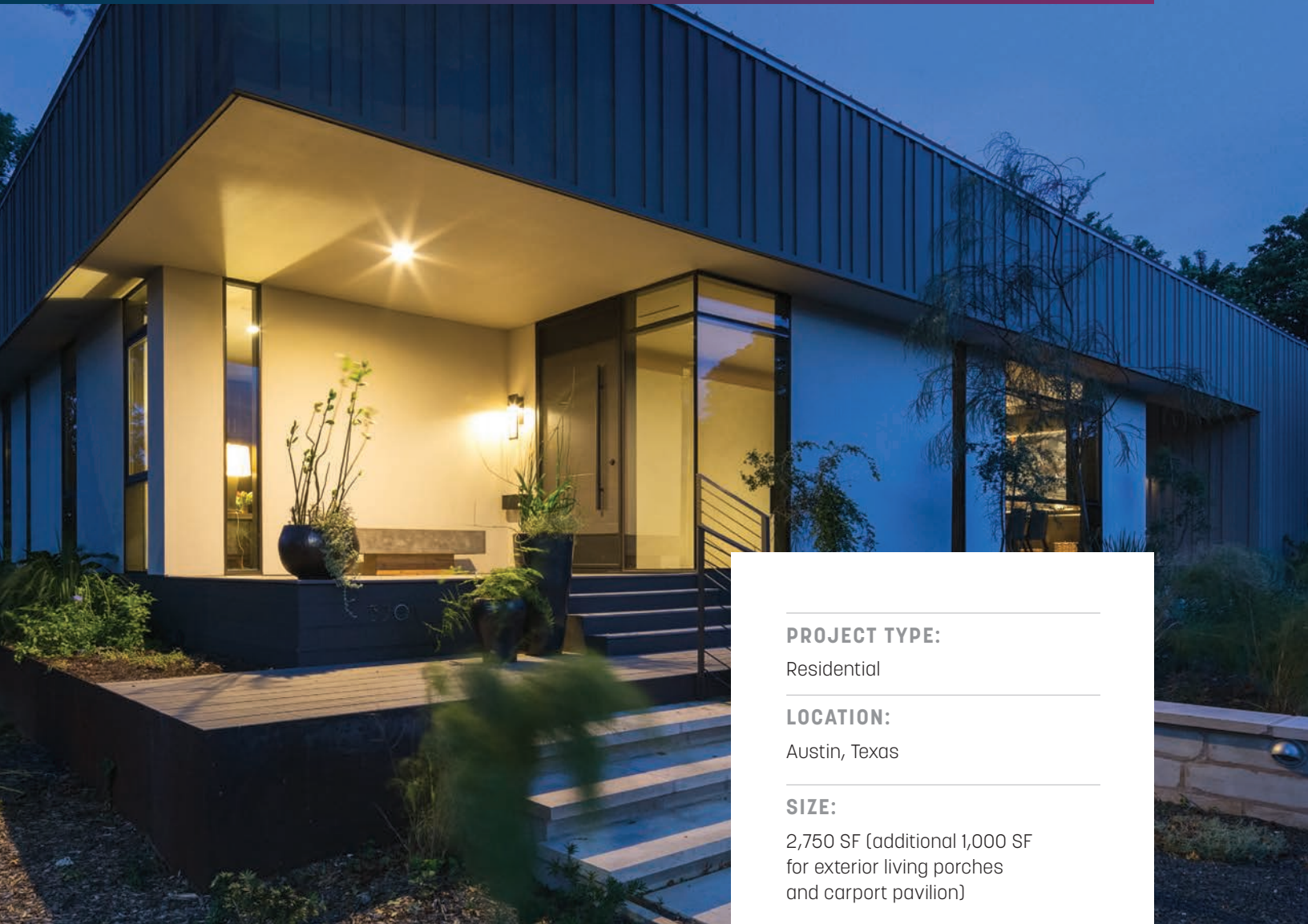


IMPACT OF DESIGN SERIES, VOL. 3

Gradients of Green



PROJECT TYPE:

Residential

LOCATION:

Austin, Texas

SIZE:

2,750 SF (additional 1,000 SF
for exterior living porches
and carport pavilion)

**CASE BRIEF BY
LAURA BRITT DESIGN**

CLIENT OVERVIEW

[Personal residence of Laura Britt, ASID] The client is a family of three. Mother and son have a history of respiratory problems. This design project is a case study platform to implement both environmental and health and wellness aspects of sustainability in a residential space.

DESIGN CHALLENGE

Design and build a healthy, sustainable, smart, high performing home with a strong connection to the outdoors to experiment and model healthy design and building.

DESIGN SOLUTION

- Applied healthy living features that support enhanced indoor air quality (IAQ), healthy food prep, and filtered water, as well as selected healthy furnishings.
- Minimized energy footprint by installing LED lighting, efficient appliances, a rooftop solar power system, and a charging hookup for an electric car.
- Minimized water use by installing efficient plumbing fixtures and a rooftop rainwater collection system that irrigates the landscape directly at the roots.
- Considered design solutions for aging in place, including an ADA ramp for access into the home, low-maintenance materials, universal design features within the interior, and a pier and beam foundation that provides subtle shock absorption for joints.
- A strong connection to the outdoors is apparent through the consideration of solar orientation, sightlines and access to the outdoors, a large outdoor living area, and a nationally certified landscape.

IMPACT OF DESIGN

- Reduced waste significantly by donating original home to another family rather than adding demolition waste to the landfill.
- Produced more energy by solar array than consumed.



- The tankless water heater, only igniting when hot water is needed, uses less energy than a standard electric water heater and reduces CO₂ output compared to traditional tank heaters.
- All electrical lighting fixtures were specified as LED for high efficiency purposes, using as little as 15 percent of the energy of conventional lighting with a life expectancy up to 50,000 hours.

PROCESS

TIMELINE

- Design: February 2012 – August 2014
- Old Home Removal: October 2014 – January 2015
- Construction / Approval: March 2015 – March 2016

PROJECT TEAM

- Designer: Laura Britt Design
- Architectural Consultant: Tom Tornbjerg, AIA
- Builder: Bonterra Build Design, Austin Pitner
- Sustainability Consultant: Green Building – Austin Energy
- LEED Consultant: US-EcoLogic
- Solar Power: Revolve Solar



OVERVIEW

Gradients of Green is a LEED-Platinum certified single family home that referenced the WELL Building Standard in its design. As the personal residence of Laura Britt, ASID, owner and principal of Laura Britt Design, the objective was to implement both environmental and health and wellness aspects of sustainability in a residential space for the family. The building was also intended to serve as a role model for universal design/accessibility in residential architecture, and to be an example of a home showcasing thoughtful 'visitability.'

Utilizing various healthy and sustainable design strategies in the architecture, spatial layout, and overall product selection, the project created a healthy building, inside and out, with strong visual connection between key interior areas and easy access to outside from the main public and private areas.

The objective was to implement both environmental and health and wellness aspects of sustainability in a residential space for the family.



BACKGROUND

This case study originated as an intended remodel of a 1951 ranch-style house. However, it was determined that a remodel would not be feasible, due to structural issues with the existing foundation, and resulted in the shift to a new construction project. Rather than demolishing the existing home and sending it to a landfill, the owners donated it to a family of 14. The home was transported in three segments to Bertram, Texas (50 mile approximate distance) over three separate moves. (Watch the home removal process [here](#).)

The new house was intended to be a healthy, family-friendly home with both flexible and defined spaces. Research and problem-solving were employed in creating the healthy home as standards did not exist for a single-family residence. The WELL Building Standard was referenced for principles and research on healthy buildings, and a thorough search was conducted when choosing healthy materials. Focus on indoor air quality was pertinent as Britt and her son have respiratory problems. Focus on energy efficiency and water conservation were also priorities for the family.





PROCESS

This project documents the decision making approach – the “Gradients of Green” – that can be achieved while balancing multiple constraints along the way. A multitude of decisions were made throughout the design process, from building orientation and siting, to energy sources, to material selections, all the way to the furnishings. With those decisions, the design team had the initial opportunity to make a significant impact, but also faced the challenge of the higher price tag that accompanied this approach which is offset by long-term benefits. Fortunately, when it comes to sustainable and green design, it is not an all or nothing approach, but rather a spectrum that people can choose from – i.e., gradients of green.

This high-performance home delivers healthy indoor air quality, energy efficiency, thermal comfort, long-term durability, and visual and spatial comfort. While the WELL Building Standard focused on commercial application at the time of design and construction, the same principles can certainly be applied within the field of residential design. These principles have been thoughtfully integrated into the design of the home and directly relate to ethically, physically, psychologically, and environmentally responsible design.



“When it comes to sustainable and green design, it is not an all or nothing approach, but rather a spectrum that people can choose from – i.e., gradients of green.”



DESIGN SOLUTION AND IMPACT



FLEXIBLE LAYOUT

The house was designed in a U-shape configuration which wraps around a large back porch. The living room is the focal point of the house and provides flexibility as it incorporates 1,000 square feet of exterior living space open to the dining room and the kitchen. The public space is extended by opening to the family room that doubles as a guest room, thereby creating one large entertaining space. The family room can be sealed off with pocket doors when not in use. A closet and direct access to a full bathroom make this space easy to transform into a guest room. The family room shares that bathroom with the son's bedroom, which sits off a hallway that includes a laundry room, mudroom, and access to the carport. The entryway is defined by a kitchen wall with refrigerator, pantry, and oven. The master suite is acoustically-separated from the rest of the house by doors, and buffered by a closet and a bathroom. The suite unfolds with a large walk-in closet, a fully-accessible bathroom with natural daylighting, and the bedroom.



AIR

Zero or low-volatile organic compound (VOC) paint, stains, adhesives, and furnishings were utilized throughout the home for enhanced indoor air quality (IAQ). Many of the furnishings are part of the firm's domestically manufactured furniture line by Laura Britt and incorporate low/no VOC construction. The furniture line is made from sustainable and recycled materials with low VOCs to reduce off-gassing (Vervano). Sustainably harvested oak floors with no VOCs (Reclaimed DesignWorks), and an adhesive that also has no VOCs were chosen (DriTac). Responsibly produced walnut cabinets certified by the Forest Stewardship Council and use water-based adhesives without VOCs or formaldehyde (Heritage Joinery) were selected. The counters are made out of clay molded using heat and pressure in a process that avoids using VOCs and won't off-gas (Dekton).

In addition to a variable refrigerant flow (VRF) HVAC system and a supplemental dehumidification system, large exterior doors opening to the outside from public and private spaces provide natural ventilation.

The intensive building specific HVAC system provides a measurable difference in humidity levels, leading to reduction of dust mites, allergens, and off-gassing.



LIGHT

Daylighting strategies and considerations of solar orientation were incorporated throughout the building, ranging from large areas of protected glazing and skylights, to windows between interior spaces, to indirectly illuminated interior spaces.

All electrical lighting fixtures were specified as LED for high efficiency purposes. General, accent, and task lighting needs were met using strategically placed luminaires, with higher output selections placed in areas to allow for fewer fixtures in the space. Dimmable lighting through the Lutron control system provides light control, programmed to be on when needed and off when not, thereby creating energy savings while contributing to comfort levels.

Exterior considerations were made based on night sky sensitivity in order to limit “light pollution.” Careful planning for exterior fixture placement has reduced the number of exterior fixtures necessary to light the architecture, while still providing a safe environment and accommodating outdoor activities.

LEDs use as little as 15 percent of the energy of conventional lighting, with a life expectancy of up to 50,000 hours.



NOURISHMENT

Appliances that preserve and prepare food using healthier methods were incorporated in the kitchen. A steam oven was installed to provide nutritional benefits with daily use by residents. Steam ovens preserve the natural flavors of foods, as well as vitamins and minerals. Steamed food has a vitamin content of up to 50 percent more than boiled food, thus contributing to a healthier diet. A dynamic dual compressor refrigerator that provides separate air flow for the refrigerated compartment and freezer compartment eliminates excess moisture and allows foods to stay fresh longer. Additionally, the stainless-steel interior limits odor absorption as compared to commonly found plastic interiors. An induction cooktop (Gaggeneau) is a faster way to heat food which reduces microwave use and also reduces emission of heat and natural gasses into the surrounding environment.





FITNESS

To promote physical activity in the residence, a multi-purpose room accommodates additional exercise space. Visual connection and easy access to the outdoors also encourages outdoor fitness and walks to the adjacent park.



COMFORT & MIND

Accessible home design will foster usability for ages 8-80. Universal Design strategies were employed to allow for “aging in place.” Specific considerations include an accessible ramp from the parking area and space allocation for wheelchair turning radius. Flush shower floors provide ease of access by eliminating the curb. This is particularly helpful for those with mobility impairments. For aiding eyesight, supplemental reading lighting in the bedrooms, indirect lighting in bathroom areas, as well as pathway egress lighting in hallways and walkways were all specified. Contrasting colors in materials were used to appeal to aging eyes.

The holistic design focused on intentional human connections through an open plan for public spaces, as well as deliberate functional separations, providing either social interaction or privacy when necessary.

Strong connections between indoor and outdoor spaces contribute to mood and psychological well-being.

Visibility and direct access to outdoor spaces contributes to an observed dramatic increase in outdoor activities like children’s outdoor play, grilling, entertaining large groups (up to 50 people flowing seamlessly from outside to inside), relaxing, reading, etc.



WATER FILTRATION & CONSERVATION

A water treatment system removes impurities, including lead and chlorine, and provides water softening.

At the exterior, a metal roof was specified to allow for rainwater collection, an easy way to capture and strategically redistribute water where it is needed. This rainwater harvesting system also reflects the sun’s heat rather than absorbing it. A rainwater garden was created by planting 98 percent heat- and drought-tolerant plants that absorb rainwater and distribute it. A drip irrigation system was installed to control the amount of water used to keep the plants alive.

The high-performing system minimized waste, energy usage, and impact on the environment. Reverse osmosis improved water quality at the main drinking supply in the kitchen.





ENERGY EFFICIENCY

Building site and location was selected to reduce sun exposure and maximize the site's breezes. A fully-insulated envelope was established from a pier-and-beam foundation, and the strategic design of adjacencies between multi-purpose spaces reduce the building's footprint. Solar panels (11.76-kilowatt solar photovoltaic system comprised of 42 SolarWorld 280 Sunmodules and the accompanying Enphase M250 Microinverters) were installed to provide clean, affordable energy, contributing to a reduced dependence on fossil fuels and imported sources of energy. Real-time system monitoring ensures measurable results of energy conservation.

Other energy efficiency features include radiant heating in the master bath to limit heating the whole house, LED lights, a VRF HVAC system, a dehumidifier to lessen the cooling load, an induction cooktop and steam oven to cook with less energy, and plugs for electric cars in the carport.

Earned a five-star rating from the Austin Energy Green Building Program.

The solar array produces more energy than is consumed by the house. From June 2017 to May 2018, total energy produced by the solar array was 14,040 kWh whereas the energy consumption from the house was 11,093 kWh.

The tankless water heater only ignites when hot water is needed, creating a lower environmental impact through reduction of energy use, while also reducing CO₂ output compared to traditional tank heaters.



SUSTAINABILITY

Sustainable materials were utilized throughout the home, one highlight being the ultra-durable and sustainable composite decking used at the exterior, comprised of rapidly renewable bamboo as the primary material. Other features include termite resistance, increased tensile strength, and durability. Remaining mindful of the longevity of materials, solar orientation and overhangs provide protection to the windows, doors, and exterior stucco material. Utilizing weather-resistant exterior siding prevents problems with expansion and contraction, reducing the need for upkeep and repainting.

Received LEED-Platinum certification in April 2016 for LEED BD+C: Homes v3 – LEED 2008. It is also rated as a 5 Star Green Building project by the City of Austin, the highest rating available.

The home has become a certified urban wildlife habitat by the National Wildlife Federation. Conservation of resources was achieved through an efficient and thoughtful use of space, resulting in a smaller building footprint.



ABOUT LAURA BRITT DESIGN

Laura Britt Design is an award-winning, full-service studio, specializing in turnkey services for the discerning client. Launched in 2001, Laura Britt Design employs a complete team of interior designers and support staff to ensure every client experiences the turnkey service they deserve. By integrating architectural and interior design solutions, the Laura Britt Design team creates transformative spaces that are both beautiful and functional. Client interaction and attention to detail create the foundation for every project. By first listening to the client's needs and desires, the team can then fully express those needs in individualized spaces so that clients are comfortable and nurtured in their surroundings. At a pragmatic level, the firm combines forward thinking technology and best practices with internal process and project management to maximize organized efficiency.

