

Modern



SAVING FACE

Structural damage hindered the original plans to preserve the existing framing, so the home had to be rebuilt. The front-elevation facade was maintained, however, and integrated into the new structure.



Design in a Historic Neighborhood

BY TREY FARMER



A century-old bungalow is renovated to maintain its original character while achieving Passive House certification

Just outside of downtown Austin, Texas, our 1914 Craftsman-style home is a case study for Passive House renovation, achieving PHIUS+ 2018 Certification and PHIUS+ Source Zero Certification in a hot, humid climate. This renovation fulfilled both a personal and professional mission. My wife, Adrienne, and I bought the house more than a decade ago after falling in love with the neighborhood. We were always thinking about what it could be and planned to update it. Given my experience as an architect at Forge Craft Architecture + Design, and with Adrienne's emphasis on healthy and sustainable interiors at her firm, Studio Ferme,

AN OPEN PLAN WITH POCKETS OF PRIVACY



The house is defined by an open but flexible floor plan. The combination playroom/guest room can be made part of the living space or separated with large double doors for privacy as needed. Furnishings that add flexibility, like the Murphy bed, allow the space to serve multiple purposes. The living room, dining room, and kitchen feel larger than they are thanks to modern windows and a light well for daylighting. Pocket doors add a degree of privacy and separation and also act as a sound barrier.



CONNECTION WITH NATURE

Natural light floods the primary bedroom, which enjoys access to a shaded screened porch.

Stairs to loft

we saw this as our opportunity to demonstrate the possibilities for a small, healthful, high-performance home.

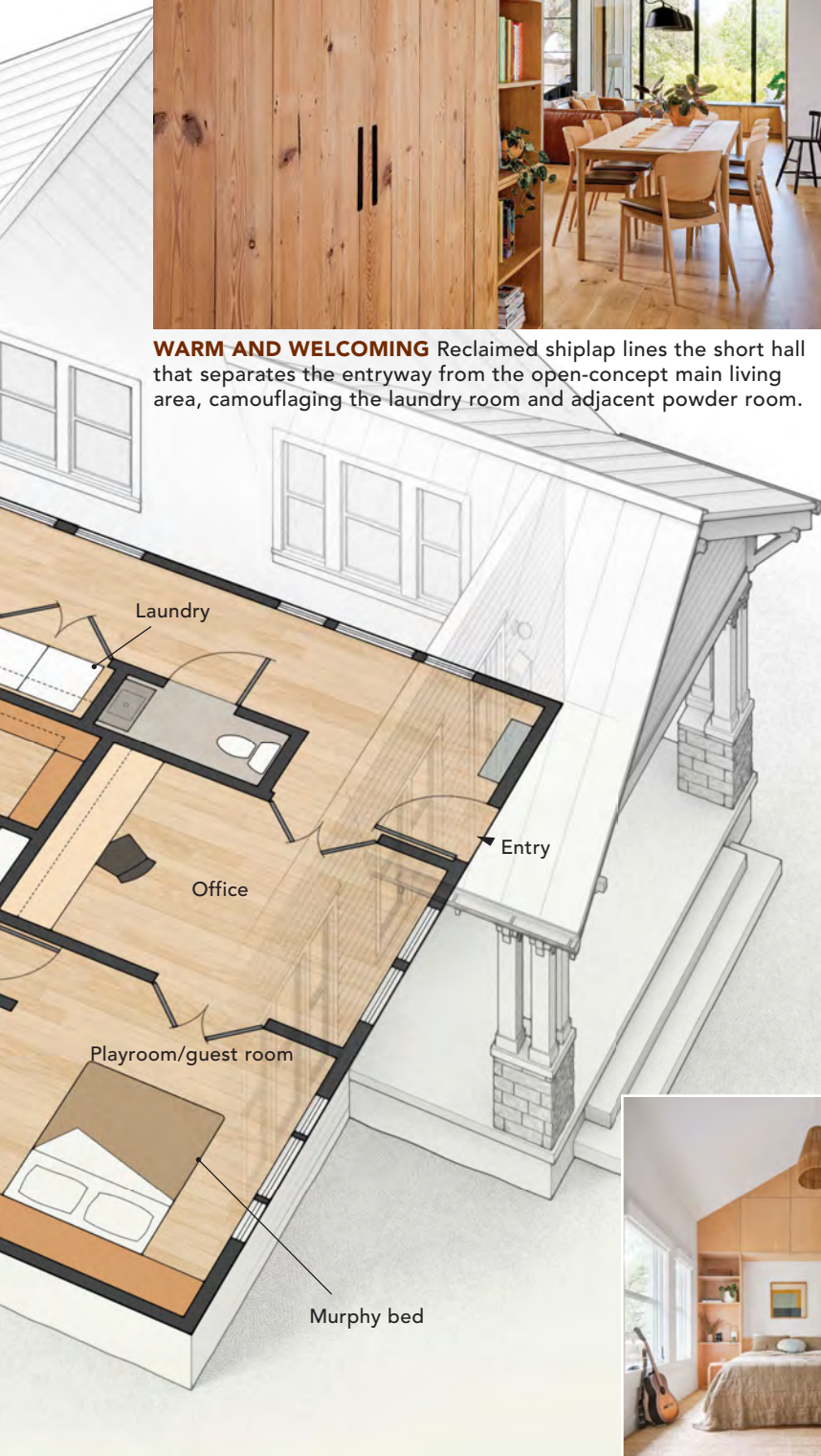
Together, we improved the building envelope, which lacked insulation; added square footage with a modern addition; and created a flexible floor plan that matched our young family's lifestyle while maintaining the integrity of the historical structure. Electrification is a priority for any Passive House project, so we also added a 6.3kw PV array and battery backup.

Starting from "scratch"

The house is located in a National Register Historic District, so we wanted to keep as much of the existing structure as possible. We met with a friend who oversees Preservation Austin to talk through our proposed changes. The plan was to save all the framing, but once the siding came off and we saw the extent of the water and termite damage, the plans changed. What remains of the original structure is the porch and columns (the piers were redone in the '80s).



WARM AND WELCOMING Reclaimed shiplap lines the short hall that separates the entryway from the open-concept main living area, camouflaging the laundry room and adjacent powder room.



DETAILS ADD DRAMA The addition of a light well in both the kitchen and the bathroom-suite shower maximizes natural light; overhead lights are rarely needed during the day.



SPACE-GAINING SOLUTION Turning the former attic space into a conditioned loft created more square footage without eating into the first-floor plan. The flexible space below doubles as a playroom and guest bedroom with a Murphy bed.

Starting from near scratch allowed us to transition from 2x4 framing to 2x6, offering a deeper cavity for insulation and truer walls. We also had to address a foundation that was 2 in. out of level. New piers were installed to support the addition as well as level what remained of the existing structure. Steel shims were used to make up the difference on existing piers.

To help meld the existing and the new, we worked with local architect Hugh Jefferson Randolph, who specializes in contempo-

A jumper duct balances pressure by allowing air to flow between the great room and the master bedroom.

The range hood exhausts cooking odors through a roof vent.

The ERV supplies fresh air to the main living spaces and exhausts stale air from the kitchen and bathrooms.

Incoming makeup air in the kitchen is filtered through an inline filter box.

A shared gable vent brings fresh air to the ERV intake and makeup air to the kitchen.

DESIGNING AN HVAC SYSTEM FOR A PASSIVE HOUSE

Heat pump supply

Heat pump return

ERV intake

ERV exhaust

The conventional process when designing an HVAC system is to determine sizing and costs based on square footage and then wait until after framing to begin installation. This approach offers limited flexibility for adjustments based on architecture.

To better meet the goals of this historical-meets-modern Passive House, I partnered with the fine team at Positive Energy, a local mechanical-design firm. The full system was designed in Revit to dial in the assemblies, accounting for hot and cold spots within the layout. This ensured an even distribution of conditioned air and enabled proper sizing of ductwork to fit within the structural system and to meet the specifications of the home. The 3D modeling made installation go more smoothly because the installers knew exactly what was needed and could plan accordingly.

Mitsubishi VRF Heat Pump

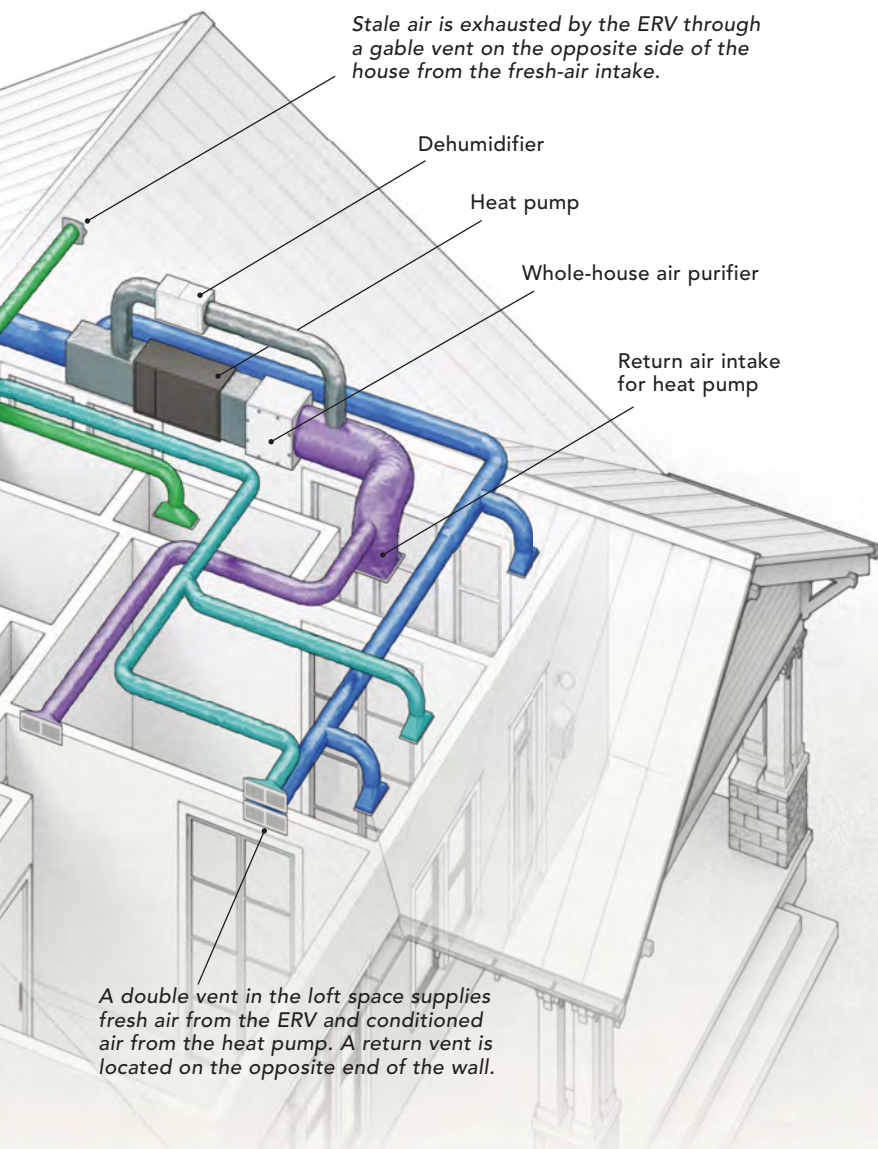
A VRF (variable-refrigerant flow) heat pump modulates the amount of refrigerant sent through the system, saving energy by circulating the minimum amount of refrigerant needed for each individual zone to satisfy the heating or cooling loads.

rary additions to historic homes (see “Adding on to historic homes,” p. 52). By replacing the back half of the floor plan with a modern addition, we added 50% to the square footage, from 1400 sq. ft. to 2100 sq. ft. We dialed in the floor plan with a focus on openness and flow. We also added a light well in the kitchen and other architectural details, such as different ceiling planes to define spaces without adding more interior walls, and we mixed in full-height windows and other modern details for a cohesive aesthetic throughout.

Investing in the envelope

After living for 10 years in a 100-plus-year-old home with no insulation in the walls or floor and insufficient fiberglass batts in the roof, we made insulation a key priority. We wanted to avoid spray-foam insulation within the interior of the home because of its environmental impact and our concern with indoor-air quality.

Mineral-wool batts were used for cavity insulation in both the walls and the roof. Mineral wool has a higher R-value per inch than fiber-



A double vent in the loft space supplies fresh air from the ERV and conditioned air from the heat pump. A return vent is located on the opposite end of the wall.

IQAir Perfect 16 Air Purifier Given the proximity of the home to a highway and a train line, indoor-air quality was a priority. The IQAir filter box provides MERV-16 filtration of air on the return side of the VRF heat pump.

Panasonic Intelli-Balance 100-CFM ERV This balanced ventilation system provides fresh air to the main living spaces while exhausting stale air from the bathrooms and kitchen. It positively pressurizes the home, helping to keep airborne contaminants from entering.

Santa Fe Ultra70 Dehumidifier The air conditioner doesn't run often in a Passive House because the house doesn't heat up enough to require it. We added dedicated dehumidification to counter the potential for microbials due to Austin's high humidity.

Custom kitchen makeup-air system This system brings in outside air to replace contaminated indoor air exhausted through the range hood. The incoming air is filtered through a Honeywell Media Air Cleaner.



FRESH AIR FOR COOKING The kitchen makeup-air system replaces air exhausted by the range hood with filtered fresh air from outside. Also part of the air-quality strategy, the induction range avoids the many toxic byproducts of a gas combustion range.

glass, and it retains its shape better than fiberglass or cellulose. Zip System R-Sheathing was used for the roof and the walls because of its integrated rigid insulation and water-resistive barrier. We were already over existing setbacks before the sheathing went on, so this was an all-in-one solution that allowed us to "hide" continuous insulation behind the sheathing to achieve our insulation goals.

Keeping the original front porch was important to maintain the historical facade of the home, but connecting an older porch to new

SPECS

- Bedrooms:** 3 **Bathrooms:** 2½
- Size:** 2210 sq. ft. **Cost:** \$375 per sq. ft. (incl. screened porch)
- Completed:** 2022 **Location:** Austin, Texas
- Architect:** Forge Craft Architecture + Design
- Builder:** CleanTag LLC

Adding on to historic homes

There is no right way or wrong way to approach an addition. Each project is different; no formula fits all. When working with a historic home or one in a historic locale or with a more traditional facade, there are two options. The first is to integrate the addition into the existing architecture. The original home and addition become one, with no visible interruption between. The second approach—the one we took with Trey and Adrienne’s home—is to create purposeful juxtaposition, where each architectural element stands between the existing and the new.

When planning the addition to this Craftsman-style home, we worked closely to create a plan that included a modern addition. (A modern addition has a confident presence, which can complement and amplify historical architecture.) We didn’t want to make changes to the things that worked. While much of the original house was torn down, we liked the front elevation, given the historic nature of the neighborhood.

We approached the project from the perspective of preserving what works and changing what needed to



MODERN MEETS CRAFTSMAN This modern addition is unexpected but purposeful. Variation in the ceiling height adds subtle separation to the open-concept interior. As you move through the addition, the ceiling planes change, drawing the eye up to views of downtown Austin.

change based on the goals of the homeowners. It was about retention and addition for the overall betterment of the house. Despite the need to start from scratch on much the structure, the main house remained with some modifications. Square footage was added with the addition.

The homeowners wanted an open-concept interior. Older homes tend to have divided floor plans with spaces

clearly delineated with walls. Because the interior needed to be reframed, there was an opportunity to open the floor plan to suit the family’s way of living. Trey and Adrienne didn’t want a true great room because it wouldn’t work in the context of their modestly sized home.

The kitchen, dining room, and living room are visually defined using architectural features. The light well in the

kitchen indicates division without walls, and it brings in abundant natural light that amplifies the space. Variation in the ceiling planes creates subtle separation between each space. Using these cues effectively designates areas of the home without impacting sightlines.

—Hugh Jefferson Randolph, principal at Hugh Jefferson Randolph Architects

construction is challenging when it comes to air-sealing. I knew it was a weak point in the air barrier when the initial blower-door test came in at just under 1 ACH50. To achieve the required 0.6 ACH50 airtightness for a Passive House, I reached out to a friend who installs AeroBarrier, which involves a sealant distributed through the air while the house is pressurized by a blower door, effectively sealing existing gaps and leaks in the envelope (for more, see “Is There an Easier Approach to Air-Sealing,” *FHB* #296).

The next blower-door test came in at 0.3 ACH50. This was a significant improvement from the pre-renovation result of 16 ACH50. Not only did we drastically improve the home’s performance, but we created a home designed with sustainability, health, and well-being in mind. □

Trey Farmer is an architect and partner at Forge Craft Architecture + Design. Photos by Leonid Furmansky, except where noted. Drawings by Christopher Mills.



THE RIGHT WINDOWS IN THE RIGHT PLACE

Upgrading windows in any 100-year-old home should help with R-value and add instant curb appeal. We chose triple-pane windows for their high performance, but our stylistic needs varied throughout. We ended up mixing and matching three different styles of Marvin windows. Traditional-style windows keep the front facade looking historically accurate, while a more modern style of window matches the aesthetic of the contemporary addition at the back of the home. We used a more cost-effective option in less visible areas without sacrificing performance.

We kept the new windows the same size and in the same location as the original windows, and all sills line up between the old and new windows. The contemporary addition features floor-to-ceiling windows with a brake-metal trim crafted from thin sheets of metal bent to fit or contour around the window. This minimal trim aesthetic offers a modern profile and makes the most of downtown views.



HISTORICALLY ACCURATE

Located in a historic neighborhood, this Craftsman-style home needed wood-clad windows to fit its historical facade. (Marvin Signature Ultimate)

BALANCING VALUE AND PERFORMANCE

A fiberglass option for less visible areas like the loft and bathroom ensured performance while keeping budget in mind. (Marvin Elevate)



A MODERN AESTHETIC

At the back of the house, modern-style windows complement the new addition and capture a bit of the downtown Austin skyline. (Marvin Signature Modern)