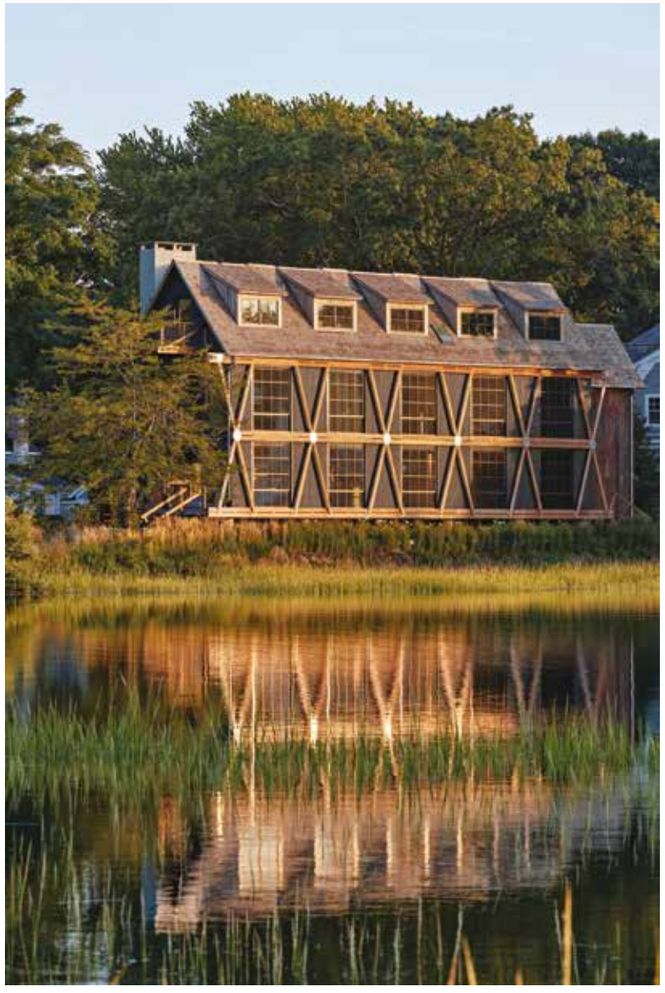
ONLY PASSING THROUGH

Trolley House
Rowayton, Connecticut
Bruce Beinfield
3,400 square feet

It's not a matter of *if* the Trolley house will flood but *when*. Architect Bruce Beinfield's personal residence occupies a delicate spit of land, only 25 feet wide, in the middle of an estuary that rises and falls with sea tides. The "lot," created with rubble fill in 1894, formerly lodged a trolley line that shuttled customers to Roton Park, a long-gone seaside amusement park remembered for its pristine beaches and granite rock outcroppings. The amusement park was decimated by a hurricane in 1938. Only faded photographs and parts of an elevated track bed remain.

Beinfield offers his 75-foot-long home near Norwalk, Connecticut, as a teaching laboratory for resisting the major storms that strike New England with growing frequency. The lesson starts with raising most of the home on concrete piers 15 feet above the ground, 2 feet higher than federal flood regulations require. Where the structure does touch ground, at the entry and garage, flood vents in reinforced concrete walls allow water to pass through. Flood damage typically occurs when outside water, with no place to go, pushes on a wall. Flood vents stabilize hydrostatic pressure on either side of the wall, reducing the potential for damage. Federal guidelines allow enclosed



Bruce Beinfield's home near Norwalk, Connecticut, sits at the edge of an estuary that rises and falls with the sea. It occupies a slice of land that used to support trolley tracks to a seaside amusement park. *Photos © Robert Benson Photography*

spaces below the floodplain as long as they have flood vents and the walls of the enclosed space rise above the flood level.

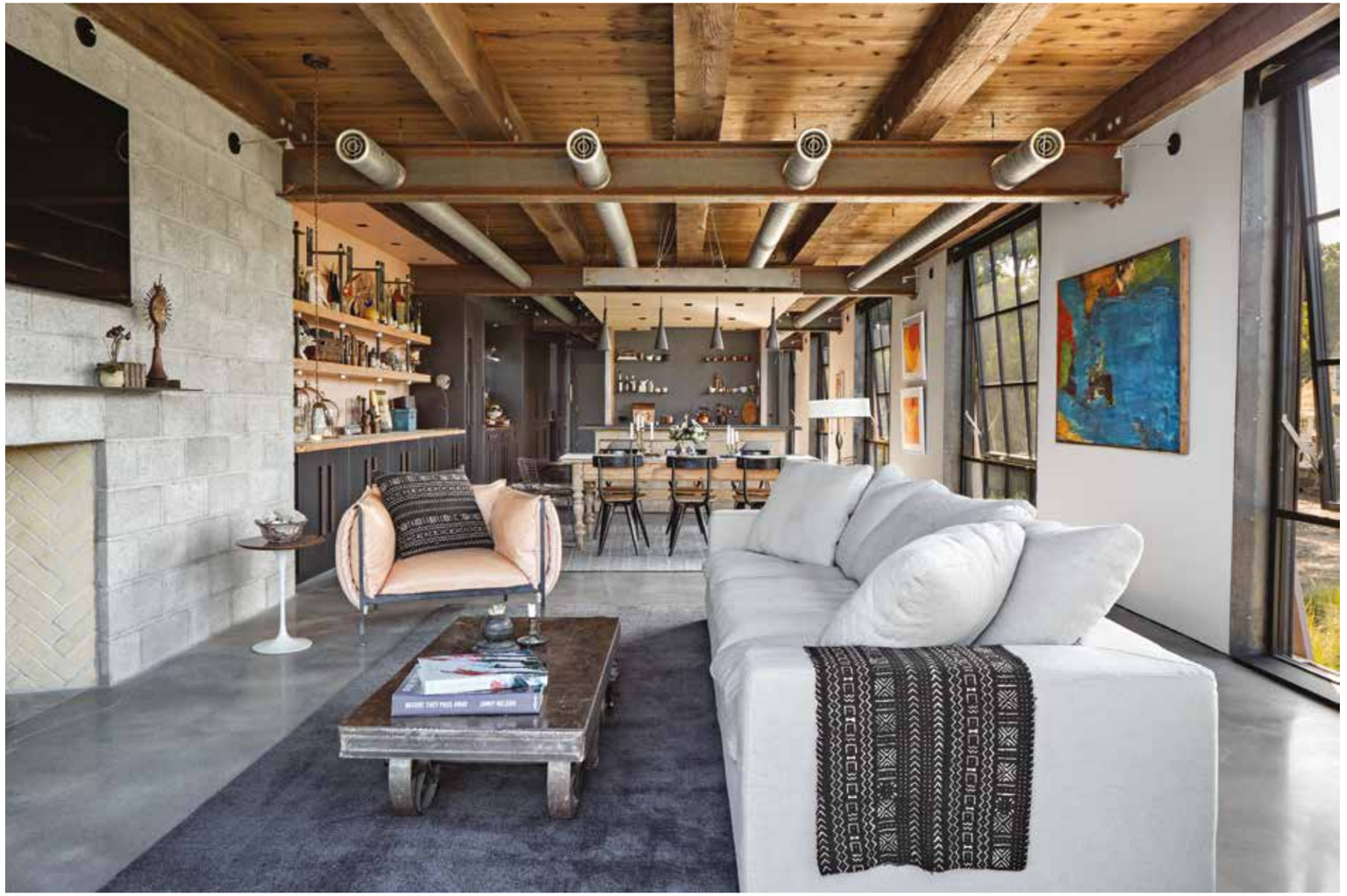
When storms approach, Beinfield can roll down shutters to cover the home's big openings. Invisible from the exterior, hidden behind bracing, the shutters can sustain category 5 hurricane winds of up to 200 miles per hour. When the shutters are open, as they are on most days, banks of divided-light windows fill the home with sunlight. Concrete floors collect radiant heat to warm the house at night, when the shutters can be closed to prevent heat loss. They are assisted by beefed-up insulation in the exoskeleton. When it's really cold, radiant floor heaters and a high-efficiency heat pump provide backup heat.

Beinfield drew design inspiration from sepia-toned photos of the old amusement park. They showed a series of vibrant, barnlike structures and a diagonally braced wooden roller coaster. Beinfield's home, partly built with salvaged wood, could be confused for an old barn. Bracing on the exterior walls picks up on the trestle of the roller coaster. The interiors pay homage to the industrial heritage of the early twentieth century with a palette of timbers, raw steel, concrete, and copper.

The narrow lot could support only a 12.5-foot-wide street façade. That turned out to be a blessing because it allows passersby to see Farm Creek from the road. Beinfield encountered local environmental opposition to his project when first proposed, even though a

A rustic, industrial design pays homage to the area's barnlike structures and old roller coaster. The house sits on concrete piers 15 feet above the ground except at the entry and garage, where flood vents in reinforced concrete walls allow water to pass through.

Hidden, roll-down shutters protect the home from hurricanes.



Steel beams separate five activity zones within the long, narrow home. The zones are unified by a concrete floor, long mechanical runs, and a wall of cabinets.

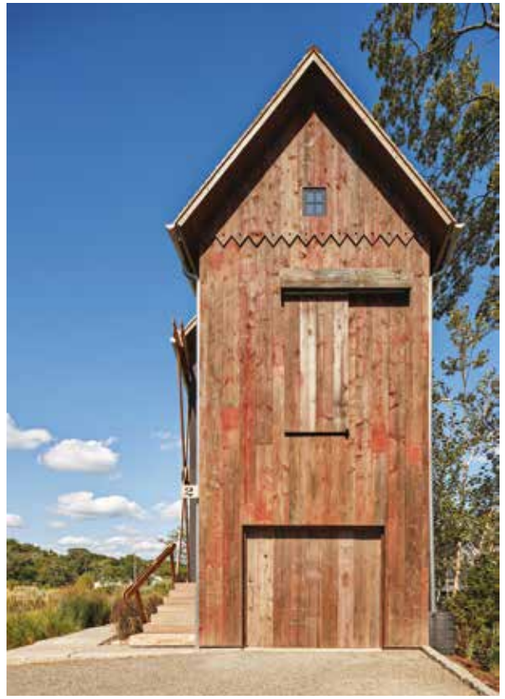
small cottage already occupied the site. He agreed to move the new house closer to the road and keep it out of the estuary. The waterway and adjacent wildland area is a favorite of birders. Lucky ones can spot oystercatchers, ibis, heron, and many other shorebirds, some endangered.

Inside, steel girders and mechanical runs, rather than applied molding, delineate five carefully conceived living zones. Operable steel windows—9 feet high and 7.5 feet wide—center on each zone. The entry zone, consisting of a foyer and stair hall, was designed to engage guests, encourage exploration, and shed expectations. A more utilitarian service zone, wrapped in fir plywood, is where work gets done. It encompasses the laundry room, powder room, mechanical room, pantry, mudroom, gallery, and a computing station. Concrete flooring, spiral duct work, and a 45-foot cabinet run tie the zones together.

The home was designed to foster an intimate relationship with marsh wildlife. Sliding glass-panel doors in the living room and master bedroom open directly to the estuary. An herb garden window above the kitchen galley sink receives morning sunlight. Other sustainable details include salvaged extinct heart pine used to build open shelving in the dining room. Tall shelves for books and collectibles bring to life a library over the garage; it's an ideal spot to study up on the estuary wildlife.

In the kitchen, unfinished copper and brass surfaces change color with the light.

Robust concrete block, used to form the fireplace walls, challenges conventional building material hierarchies.



The sun rises through bedroom windows with concealed interior shutters.

A narrow front façade ensures that passersby can still enjoy estuary views.

CREATING A NATURAL WATER BUFFER

It's hard to tell where Farm Creek estuary ends and Beinfield's "yard" begins. The architect planted the grounds around his house with native species to expand habitat opportunities for the birds, reptiles, and mammals that make up the estuary's ecosystem. He had an ulterior motive too. The plants' deep roots help his yard resist the deepening forces of erosion. They also naturally filter out pollutants.

"With climate change and rising sea levels, the use of native, natural grasses makes sense along the shoreline," says Beinfield. "A healthy estuary system populated with native plants has a remarkable ability to absorb the impact of major weather events. Native grasses have adapted over thousands of years to be quite resilient, with deep root systems that anchor the soil around them."

The living shoreline starts with Northwind switchgrass, hardy and salt tolerant. Large swaths of little bluestem and big bluestem grasses that grow up to 6 inches tall form a natural buffer at the site's upland edge. Closer to the house, Beinfield planted spiked gayfeather to attract swarms of butterflies and hummingbirds. He reinforced the shoreline with sausage-like fabric tubes filled with seeded topsoil. Stacked along the bank, they started to green up in days.

Each plant in the living shoreline produces distinctive seeds, nuts, fruits, and shelter to support various species of birds and animals. The ecosystem yields some lively entertainment in the form of coyotes, deer, and sea turtles. All sorts of birds—ducks, egrets, osprey, blue heron, and seagulls—call the estuary home. The architect enjoys watching them go through their daily fish-catching rituals.

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