



Building America Case Study Whole-House Solutions for New Homes

David Weekley Homes

Eagle Springs & Waterhaven | Houston, TX

PROJECT INFORMATION

Construction: New home

Type: Single-family

Builder: David Weekley Homes
Houston Division (281) 249-7777
www.davidweekleyhomes.com

Size: 1,780 to 3,350 ft²

Price Range: \$189,990 to \$306,990

Date Completed: 2011

Climate Zone: Hot-humid

Team: Building Science Corporation

PERFORMANCE DATA

HERS Index: 59-68

**Projected annual energy
cost savings:** \$2,756

**Incremental cost of energy-
efficiency measures:** \$3,314

**Annual mortgage
payment increase:** \$400

**Annual net cash flow
to homeowner:** \$2,356

Billing data: Not available

The Houston division of David Weekley Homes, worked with Building America research partner Building Science Corporation to design Builders Challenge homes in two Houston-area developments that achieved HERS scores of 59 to 68. The production builder, who operates in eight southern states, has qualified 1,500 homes for the U.S. Department of Energy's Builders Challenge, more than any U.S. home builder except Lennar Homes, which also builds in Texas. David Weekley Homes is also one of America's largest privately held home builders, having completed more than 65,000 new homes since opening in 1976.

The team used advanced framing techniques that include open headers over windows, 2x6 24-inch on-center framing with framing member alignment, two-stud corners, insulated corners, and insulated headers above windows and doors. These techniques reduce thermal bridging (i.e., a heat conduction path) by allowing more space for wall insulation and requiring fewer studs. The techniques save lumber as well. Any remaining thermal bridging was stopped by the exterior wall sheathing of R-5 extruded polystyrene (XPS) rigid foam insulation, which was sealed at the seams and edges to also form an exterior air barrier that was fully aligned with the R-20 damp-sprayed cellulose wall cavity insulation. The builder achieved whole-house air-tightness of 3.0 air changes per hour at 50 Pascals of pressure with this wall system and other air barrier details including gluing sheetrock to the framing; applying draft stopping in the building chases and behind the bathtubs, showers, and fireplace inserts; air sealing all holes for electrical wiring, plumbing/piping, and duct shafts; and caulking wall corners and the top and bottom plates. High-efficiency HVAC, appliances, and lighting add to savings.

KEY ENERGY-EFFICIENCY MEASURES

HVAC:

- 15 SEER AC; 95% AFUE gas furnace, Variable-speed air handler in unconditioned attic
- Mastic-sealed R-6 flex duct in unconditioned attic; jump ducts in bedrooms, duct leakage = 2.8 cfm/100 ft² @ 25 Pa
- Central-fan-integrated supply ventilation with variable-speed fan cycling and motorized damper plus MERV 11 filter on fresh air intake.

Envelope and Windows:

- 2x6 24-inch on-center advanced framing
- Unfaced fiberglass batts on sloped ceilings; R-38 unfaced batt or R-38 blown-in cellulose on flat ceilings, radiant barrier in vented attic
- Wall insulation: R-20 cellulose plus 1 inch R-5 XPS
- R-13 grade-1 batt insulation in 2x4 frame wall
- Double-pane, low-e, vinyl windows U = 0.34, SHGC = 0.30-0.34
- Blower door test = 3 ACH50

Lighting, Appliances, and Water Heating:

- 80% CFLs
- ENERGY STAR® refrigerator and dishwasher
- 0.62-EF gas water heater

For more information, please visit:

www.buildingamerica.gov



Advanced framing, which includes aligning all framing elements from the roof to sill plate, saves lumber. The savings more than offset the cost of additional insulation. The roof sheathing is lined with a radiant barrier to reduce solar heat gain for additional energy savings.

Lessons Learned

- Onsite training is essential. Framing contractors did not implement correctly advanced framing until site supervisors started making them redo incorrect framing.
- Climate-specific details (for Houston, Texas) include a radiant barrier in the attic and low-solar-heat gain windows (SHGC=0.34), which result in cooling load savings.
- Analysis by Building Science Corporation on one home model showed switching from 2x4 16-inch on-center to 2x6 24-inch on-center construction can reduce board feet by 40% (from 5,186 ft to 3,082 ft) and cut costs 40%, from \$2,749 to \$1,632. The number of 8-ft studs in this analysis was cut by 52% from 1,403 to 665.
- MERV 11-filtered central fan-integrated supply ventilation with variable-speed fan cycling, a motorized damper on the fresh air intake, jump ducts in bedrooms, a 15 SEER air conditioner, and a 95% AFUE gas furnace provide highly efficient HVAC and balanced ventilation for health and comfort.

“The major challenge for any builder is to look at their home as a whole system....This isn't something that a builder can do just by flipping a switch or spending more money...You have to fail a lot of blower door tests and duct blaster tests first.”

David Weekley, president of David Weekley Homes

U.S. DEPARTMENT OF
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Energy Efficiency &
Renewable Energy

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www.buildingamerica.gov

PNNL-SA-87333 April 2012

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