Building America Case Study
Whole-House Solutions for New Homes

S&A Homes

East Liberty | Pittsburgh, PA

PROJECT INFORMATION

Construction: New home

Type: Single-family

Builder: S&A Homes, State College, PA
1-855-SAHOME1
www.sahomebuilder.com

Size: 950 to 1,340 ft²

Price Range: about $90,000

Date Completed: 2009

Climate Zone: Cold, IECC 5A

Team: IBACOS

PERFORMANCE DATA

HERS Index: 51-55

Projected annual energy cost savings: $1,651

Added first cost of efficiency measures: $9,419

Annual mortgage increase: $752

Annual net cash flow to homeowner: $899

Billing data: Not available

S&A Homes, a production home builder from central Pennsylvania, partnered with Building America research team IBACOS and East Liberty Development Inc., and helped revitalize an inner city neighborhood in Pittsburgh when they began construction on several new homes on infill lots. The narrow two-story homes with basements were designed around an efficient HVAC system with a compact duct design that kept all ducts in conditioned space. Open-web floor trusses between the basement and first floors provided a path for ducts within the homes' thermal envelope.

Raised heel trusses allowed for R-49 blown fiberglass insulation in the attics. A precast concrete wall system was delivered to the sites with a layer of 2.5-inch extruded polystyrene and steel faced concrete studs built in, for a thoroughly insulated, air sealed foundation and basement wall that installed quickly. Above-grade walls were 2x6 24-inch on-center and filled with R-24 blown-in fiberglass. The builder was meticulous about air sealing all holes through the walls.

Fresh air is ducted from outside to the return plenum, and a fan-cycler provides ASHRAE 62.2 rates for fresh air at a 50% run time. The completed homes showed blower door test results of 3.0 air changes per hour (ACH) at 50 Pascals.

"We literally designed the house around the HVAC system."

Eric Jester, a project manager with East Liberty Development, Inc.

(Photo top left) S&A Homes designed the layout and framing of their narrow urban infill homes with the HVAC system in mind to keep the ducts in conditioned space with the most efficient compact duct design possible. Open-web trusses allowed S&A to route ducts between floors.

Building America U.S. Department of Energy

KEY ENERGY-EFFICIENCY MEASURES

HVAC:

- 96%-AFUE two-stage gas furnace with a multi-speed blower
- 14-SEER cooling system
- Ducts in conditioned space
- Fresh air ducted to return plenum and fan-cycler for 50% run time to meet ASHRAE 62.2.

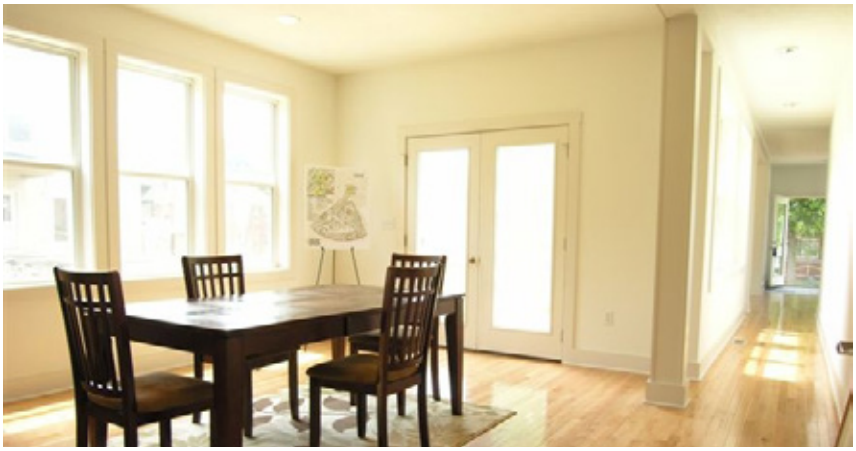
Envelope:

- 2x6, 24-inch-on-center advanced framing
- Wall insulation: R-24 blown-in fiberglass
- Attic insulation: R-49 blown-in fiberglass insulation
- Foundation insulation: precase concrete with 2½-inch extruded polystyrene insulation (R-12.5)
- Windows: Double-pane, U = 0.33 and SHGC = 0.30
- Air sealing tightness: blower door testing of 3.0 ACH at 50 Pa

Lighting, Appliances, and Water Heating:

- 100% CFL
- ENERGY STAR® appliances
- 0.82 EF (energy factor) tankless gas-fired hot water heater

For more information, please visit:
www.buildingamerica.gov



High-performance windows and 100% fluorescent lighting add to the energy savings in these craftsman-style homes.

Lessons Learned

- S&A Homes designed the framing and walls with the HVAC layout in mind to keep the ducts in conditioned space with the most efficient compact duct design possible. Open-web trusses allowed S&A to route ducts between floors.
- The basements are insulated and air sealed with precast concrete walls that come to the site with 2.5 inches of foam insulation and steel-reinforced insulated concrete studs already attached. S&A originally planned to increase basement insulation with R-13 batts in the cavities, but when they tried it with the first home, they had a very cold winter and got some condensation, so they removed the batts and did not install them in other homes.
- IBACOS provided subcontractor training sessions with mockups of assemblies at its warehouse. Subcontractors got hands-on training and could give suggestions for improving the techniques before they were applied in the field.
- S&A Homes worked with East Liberty Development, Inc., which chose inner city lots in a distressed neighborhood. The land was inexpensive, the new homes helped spark a neighborhood renaissance of higher property values and lower crime, and S&A Homes got a lot of positive publicity from the project.
- S&A's partnership with IBACOS on this project led to development of a "lab" home in a suburban neighborhood where S&A Homes is testing production techniques for net zero energy homes.

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

For more information, visit:
www.buildingamerica.gov

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