



## Building America Case Study Technology Solutions for New and Existing Homes

# Ducts Inside Conditioned Space [Dropped Ceiling or Fur-down]

Gainesville, Florida

### PROJECT INFORMATION

Project Name: Belmont

Location: Gainesville, FL

Partners: Tommy Williams Homes  
Florida H.E.R.O.

Building America Partnership for  
Improved Residential Construction

Building Component: HVAC

Application: New; Single and/or multi-  
family

Year Tested: 2011

Applicable Climate Zone(s): all

### PERFORMANCE DATA [of the measure alone, not whole house]

Cost of Energy-Efficiency Measure  
(including labor): \$0.40/ft<sup>2</sup>

Projected Energy Savings: 6.5X%  
overall savings based on BA2010  
Benchmark

Projected Energy Cost Savings:  
\$165/year compared to BA2010  
Benchmark

Forced air distribution systems (duct systems) typically are installed out of sight for aesthetic reasons, most often in unconditioned areas such as an attic or crawlspace. Any leakage of air to or from the duct system (duct leakage) in unconditioned space not only loses energy, but impacts home and equipment durability and indoor air quality. An obvious solution to this problem is to bring the duct system into the interior of the house, either by sealing the area where the ducts are installed (sealed attic or crawlspace) or by building an interior cavity or chase above the ceiling plane (raised ceiling or fur-up chase) or below the ceiling plane (dropped ceiling or fur-down) for the duct system. This case study examines one Building America's Builder Partner's implementation of an inexpensive, quick and effective method of building a fur-down or dropped ceiling chase.

An interior duct system is built inside a homes' thermal and air barrier. A dropped ceiling or fur-down chase places the duct system below the ceiling plane of the house in a framed chase built beside and below the duct system. Sealing the ceiling of the chase from the attic above is the most difficult and necessary part of this operation; if poorly executed the chase will be better connected to the attic than the interior of the house, defeating the main purpose of the technique, eliminating duct leakage to the outside.

By designing the chase's path to avoid intersecting load-bearing walls, sealing of the chase's top plane, or ceiling, is fairly easy. Non-load bearing walls need to be constructed to leave a gap of 3/4" between the top plate of the wall and the bottom chord of the attic trusses. This 3/4" space allows the chase's ceiling drywall to extend beyond the borders of the chase over the top plates of the walls.

Step-by-step Continued:



3: Then the supply ductwork is installed under the drywall. The main ducts are hung from the drywall. Rigid ducts are used whenever possible.

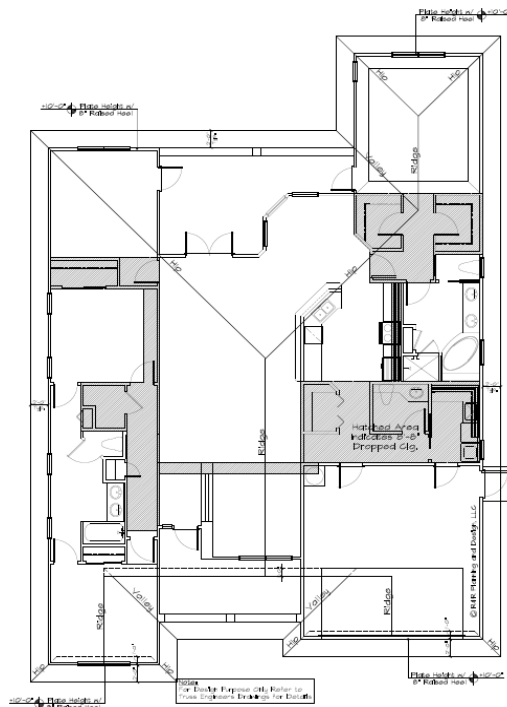


4: The rest of the framing of the chase is now installed.



5: Drywall is installed over the chase and the rest of the house, finishing the chase's construction.

For more Information, see the Building America measure guideline report, [http://apps1.eere.energy.gov/buildings/publications/pdfs/building\\_america/measure\\_guide\\_ducts\\_new\\_con.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/measure_guide_ducts_new_con.pdf)



Step-by-step:

1: Lay out chase path on floor plan (shaded area), avoiding load-bearing walls as much as possible. This is best done during the home's design phase. Size the chase using information derived from the HVAC designers Manual J and D calculations].

2: Sheet rock is installed at the top of the chase path as indicated in the design plan. By keeping the top plate of the non-load bearing interior walls 3/4" from the bottom chord of the roof trusses, the chase ceiling drywall can be slipped through this space.

Continued on Left:

Lessons Learned

- Team meetings on site after the home has been “dried in” with the objective of minimizing the need to alter or redo work due to lack of knowledge of the requirements are very important to insure quality work from all involved sub-contractors.
- Constant vigilance is needed by job-site supervisor to insure proper implantation of system.
- There are additional costs for materials, or additional framing and drywall. A more expensive duct system (duct-board versus flex-duct) may be required due to space limitations).
- Payback is impacted by other efficiency improvements, depending on the expense of the method employed. Therefore, cost benefits are seldom the sole motivation for implementation).

Looking Ahead

Interior duct work is mandated by the new Challenge Home Program. This method represents one of the easier and less expensive methods of constructing a functioning interior duct system. There is significant cost savings with this method compared to a foam sealed attic, and a significant labor savings when compared to a raised ceiling or fur-up chase system. Therefore it is expected that this method of interior duct construction will gain in popularity in the future.