

Building Science Guide



Best Practices for High-Performance Homes



Hi There!

Welcome to the Building Science Guide on Best Practices for High Performance Homes! To start, what are high-performance homes? High-Performance homes are homes that have been independently verified and tested to maximize the performance of their design.

But why does performance matter? Third party verification unlocks home potential and enables you to value engineer your product, specifically around comfort, efficiency, and health. There's no doubt that homes built with green features and performance in mind garner special attention in the market, capturing on average \$3 more per sq ft than code-built homes. There are also many financial incentives available to builders delivering high-performance homes. Since 2014 our partners have collectively earned around 1.9 million dollars a year.

Sound awesome? Then let's get started!

What You'll Learn in This Guide

This Building Science Guide will cover various high-performance building strategies that will help you improve the comfort of your homes and reduce the risk of warranty callbacks. As you walk, jog, or run on your high-performance journey, we're here to support you. Let us know what you need help with and, as we like to say at Southern Energy Management, Shine On!

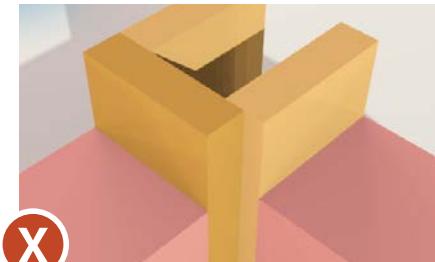
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Advanced Framing Basics

Advanced Framing has many benefits such as reducing material/labor costs, improving comfort and performance, and helping to meet certification requirements for efficiency programs like ENERGY STAR and ecoSelect, without compromising structural integrity. This guide covers the **three primary** Advanced Framing techniques; insulated corners, insulated headers, and insulated wall intersections.

Insulated Corners



This corner framing does NOT accommodate insulation, reducing performance.

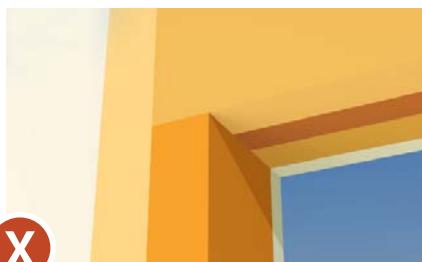


This is a three stud, or "California" corner which allows for max insulation coverage.



A two stud corner with a small nailing strip or drywall clips is a great alternative.

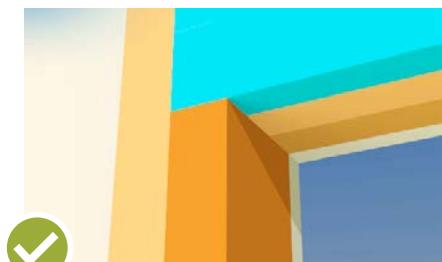
Insulated Headers



This header is NOT insulated resulting in a path for heat to transfer in or out of the home.

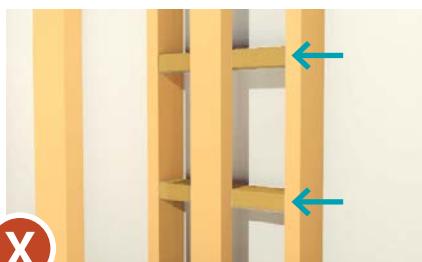


Header insulation will replace the often used OSB filler.

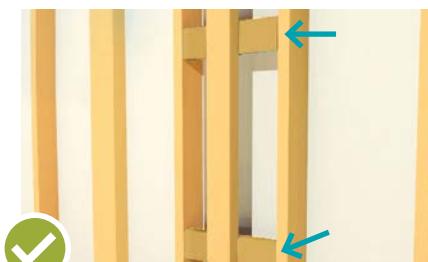


The header insulation can be centered on either side.

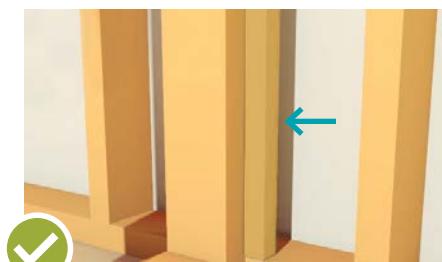
Insulated Wall Intersections



This interior wall intersection does NOT allow for insulation behind the blocking.



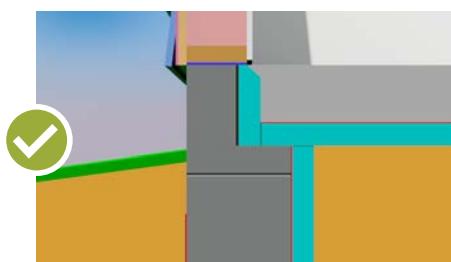
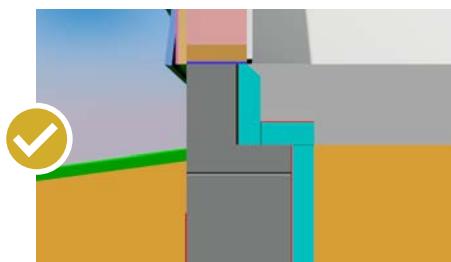
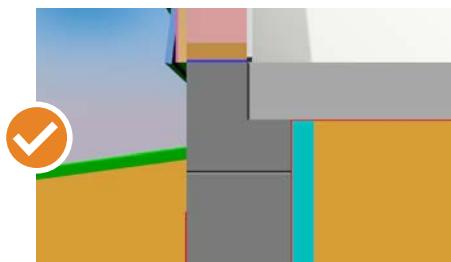
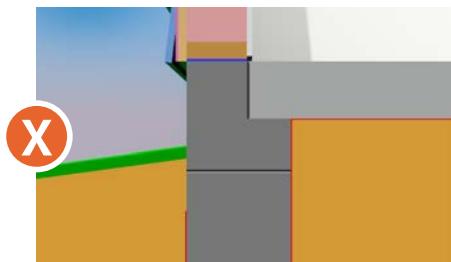
Horizontal ladder blocking allows for insulation to be placed behind.



A vertical stud wide enough to be used as a drywall attachment point is fine.

Stem Wall Slab Insulation

In many areas of North Carolina slab insulation is required by code. Even where it is not required, the energy benefit from properly installed slab insulation can be significant. However, there are multiple types of slabs and even more ways of insulating them! When pouring and insulating a slab, it is important that the builder has a strong understanding of how the thermal performance of the foundation assembly will affect the home's performance as it relates to that climate region.



Incomplete Slab Insulation

Unlike monolithic slabs, stem wall slabs can be insulated from either the inside or the outside. Insulating the inside of the slab negates need for the termite inspection gap, provides protection for the insulation, and is often visually preferred. If left uninsulated, stem wall slabs still have the same potential for conductive heat loss.

Perimeter Only GOOD

To maximize durability and thermal performance of the slab insulation, it is strongly recommended to install the insulation board on the inside of the stem wall. This will protect the insulation from damage during construction and after!

Perimeter + Cut Block BETTER

Although perimeter insulation provides the greatest energy savings, under slab insulation should not be ruled out. This can add additional energy savings especially in cold climates. It can cover the entire under slab area or simply a two foot deep footprint all the way round.

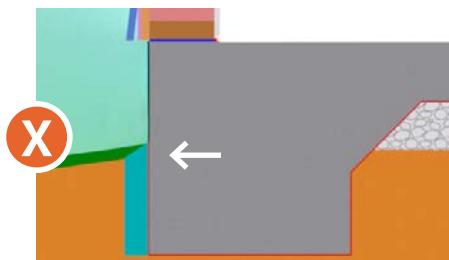
Perimeter + Under BEST

When possible, ensuring a continuous thermal break by separating the entire slab from the conditioned space should be a builder's goal. However, this can be complicated and working with your engineer and code official is recommended to ensure no issues will arise.



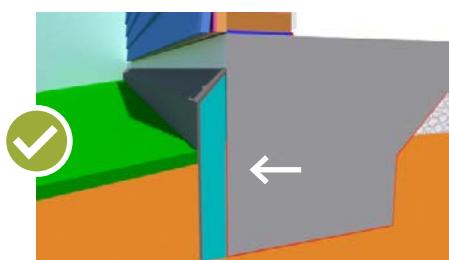
Monolithic Slab Insulation

In many areas of North Carolina slab insulation is required by code. Even where it is not required, the energy benefit from properly installed slab insulation can be significant. However, there are multiple types of slabs and even more ways of insulating them! If you are building on a monolithic slab you still have several options to properly insulate your slab. There will be some challenges insulating the edge between the house and garage, accommodating brick or stone facades, and protecting any exposed insulation. You should always defer to your foundation contractor on these details, but the benefits still far outweigh the difficulties. Here are our recommendations.



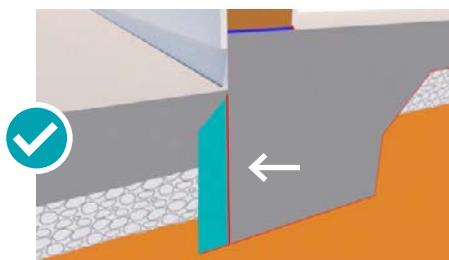
Partial Slab Insulation

Perimeter slab insulation should cover as much of the exposed concrete as allowed by code. It can be tempting to cut the insulation at ground level to avoid seeing it, but this creates an area for heat to move in or out of the home and there will be heat loss through the floor and foundation if not fully insulated.



Perimeter Slab Insulation BEST

NC code requires a 2" termite inspection gap be left at the top edge of the slab. When this is the case, builders should minimize the gap to the code requirements. It is also recommended that a protective layer (stucco or concrete slurry) be installed over the insulation to avoid damage during and after construction.



Garage and Porch

PRO TIP

Insulating garage and porch intersections is often a challenge for monolithic slabs. This image shows how this can be done properly. It is important to install insulation at all boundaries between conditioned floor space and exterior sections of the slab. Programs like EnergyStar require 100% slab edge insulation, including the detail areas.



Leading the Change Since 2001



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Southern Energy Management, headquartered in Raleigh, NC, is a team of building scientists, solar designers and installers, and entrepreneurs dedicated to improving the way the world makes and uses energy. Founded in 2001, we have specialized in green building consulting and verification, and solar energy design and construction for nearly two decades. We are passionate about helping builders and developers create, market, and sell high-quality, sustainable communities and buildings.



Questions?

Our team of building scientists are happy to help!

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