



## Building America Case Study

### Technology Solutions for New and Existing Homes

# Capillary Break Beneath a Slab: Polyethylene Sheeting Over Aggregate

Southwestern Pennsylvania

## PROJECT INFORMATION

**Project Name:** Capillary Break  
Beneath a Slab: Polyethylene Sheeting  
Over Aggregate

**Location:** Southwestern PA

**Type:** Residential

**Partners:** Builder is confidential

**Building America Team:** IBACOS,  
[www.ibacos.com](http://www.ibacos.com)

**Building Component:** Foundation,  
water management

**Application:** New construction; single-  
and multifamily homes

**Year Tested:** 2013

**Applicable Climate Zone(s):** All except  
dry climates

## PERFORMANCE DATA

Cost of energy efficiency measure  
(including labor): N/A

Projected energy savings: N/A

Projected energy cost savings: N/A

In this project, U.S. Department of Energy Building America team IBACOS worked with a builder of single- and multifamily homes in southwestern Pennsylvania (climate zone 5) to understand its methods of successfully using polyethylene sheeting over aggregate as a capillary break beneath the slab in new construction. This builder's homes vary in terms of whether they have crawlspaces or basements. However, in both cases, the strategy protects the home from water intrusion via capillary action (e.g., water wicking into cracks and spaces in the slab), thereby helping to preserve the durability of the home.

An example of this strategy is a single-family, 2,000-ft<sup>2</sup> home with three bedrooms, two and a half baths, and a conditioned (closed) crawlspace. First, the builder pours the footers for the home on level ground. Next, the builder fills the space within the footers with ½-in.-diameter aggregate to a depth of 8 in. Although aggregate depth in new construction often is only 4 in., this builder employs an 8-in. depth of aggregate to provide a larger area to accommodate any water beneath the slab. It also allows room for installation of a passive radon system that routes 4-in. PVC pipe within the inside perimeter of the footer.

After the aggregate is in place and level, the builder lays 6-mil polyethylene sheeting flat within and on top of the footer. The vapor retarder is run over the footer to provide an additional capillary break and over the foundation wall to prevent moisture wicking. The sheeting is not lapped up the sides of the walls; however, the joints of the flat sheets overlap each other by 12 in. and are sealed with tape. For additional ground-level water management, the builder also sprays waterproofing on the exterior of the below-grade foundation wall and brick ledge, along with adding exterior drains encased in aggregate. This spray-applied waterproofing (not dampproofing) is installed prior to slab preparation. Finally, the builder pours the concrete slab directly over the polyethylene sheeting, using care not to damage the sheeting.

By placing polyethylene sheeting directly onto aggregate under the slab, the slab remains protected from potential water damage, thereby helping to preserve the durability of the home.

## Description



Place and level ½-in. aggregate at least 4 in. deep within the footer.

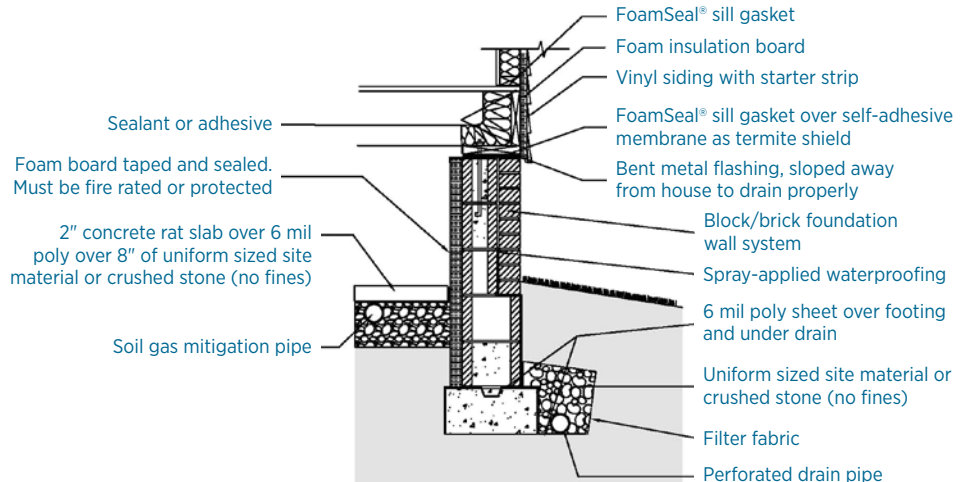


After the 6-mil polyethylene sheeting is laid over the aggregate, carefully pour the concrete over it.



The result is a closed crawlspace with a slab protected from water wicking up through the slab.

Image credit: All images were created by the IBACOS team.



This diagram shows the placement of polyethylene sheeting over aggregate as a capillary break beneath a slab. This construction also includes PVC piping for a radon mitigation system.

## Lessons Learned

- Using the basic code language found in 2009 International Residential Code Section R506.2.3, the builder created a best practice by additionally implementing a 6-mil vapor retarder under the slab and over the footer.
- By placing aggregate under the slab, any water that seeps into the subslab area has room to flow through the aggregate and away from the slab.
- The polyethylene sheeting between the aggregate and the slab prevents water from wicking up through the slab via capillary action to structurally damage the home during freeze-thaw cycles.
- The integrity of the polyethylene sheeting must be maintained during construction so it is not torn or damaged when the concrete slab is poured onto it.
- An 8-in. depth of aggregate serves double duty by allowing for installation of a passive radon system beneath the slab.

## Looking Ahead

The strategy of using polyethylene sheeting over aggregate as a capillary break to prevent water from reaching the slab and degrading the durability of the home is successful and is used frequently in constructing new homes. A strategy for using rigid foam board instead of polyethylene in the same application may become more commonplace in the future as codes move in that direction.