

# Basement Wall Retrofit with Foam Plastic Insulating Sheathing (FPIS) Continuous Insulation (ci)

## IMPORTANT! READ ALL INSTRUCTIONS BEFORE BEGINNING INSTALLATION

Properly insulating and finishing a basement wall with FPIS ci can improve property value, comfort, and the usable square footage of any building with below-ground space. According to the U.S. Department of Energy (DOE), it also can save up to \$350 per year in energy bills. However, proper planning and installation is required for a basement retrofit to be effective. This guide provides the basic steps to consider and provides additional resources to help ensure a successful outcome for your basement retrofit or remodeling project.

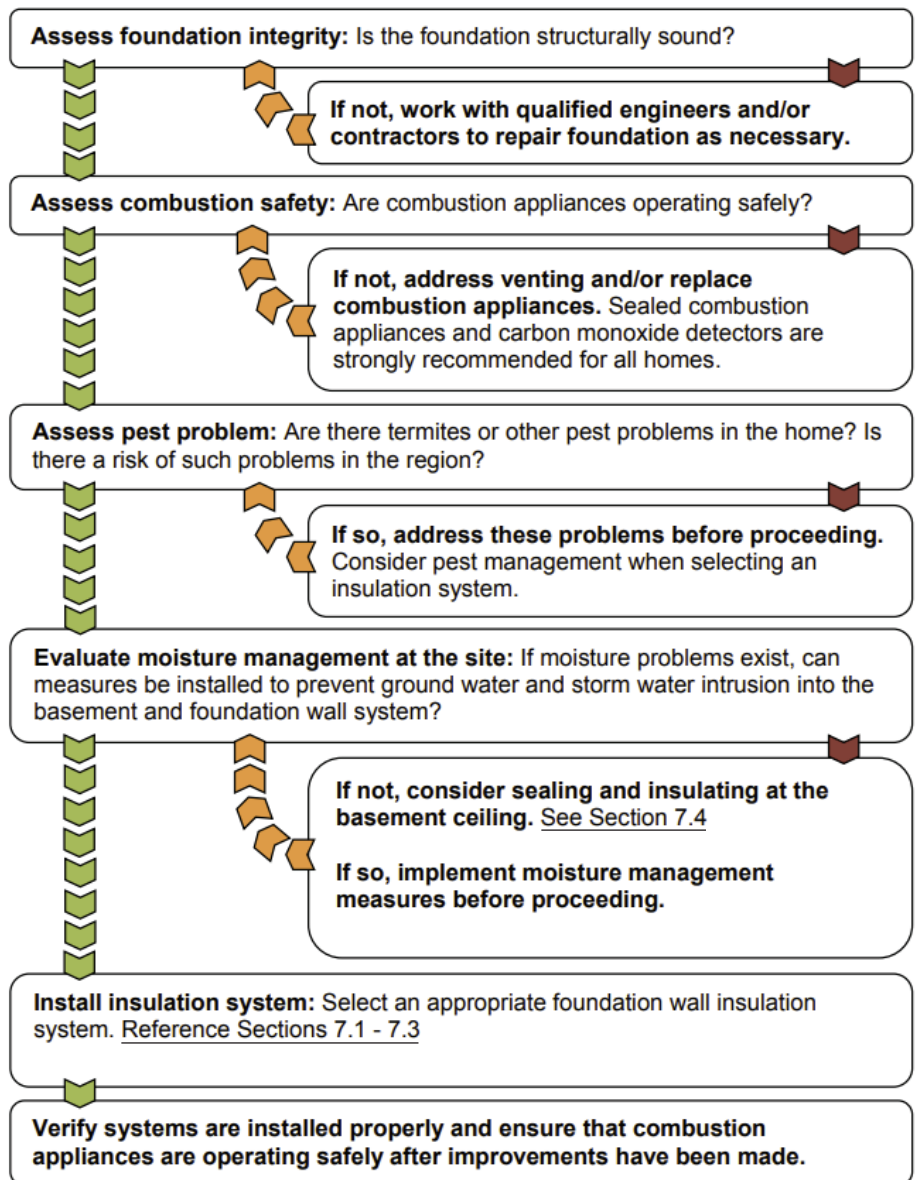
### STEP 1: ASSESS BASEMENT CONDITIONS BEFORE STARTING WORK

Use this chart to assess a basement for potential problems to address prior to insulating and finishing the space. The foundation should be structurally sound and free of both pests (e.g., termites) and ongoing or periodic moisture problems (i.e., dry or otherwise designed to manage potential moisture intrusion). In addition, combustion appliances like a gas furnace or water heater should be carefully assessed as noted in the chart. For more information related to use of this chart, [refer directly to its source](#).



### STEP 2: COMPLY WITH LOCAL BUILDING CODE REQUIREMENTS FOR FINISHING BASEMENTS

Local building departments generally require permits for major alterations like finishing an existing basement. The work must comply with building code, electrical code, and energy code requirements, among others as locally defined. Compliance with local requirements is necessary by law and intended for the safety and protection of the building's occupants.



Source: DOE Building Technologies Program, Measure Guidelines: Basement Insulation Basics

### STEP 3: HAVE A GOOD PLAN & EXECUTE IT

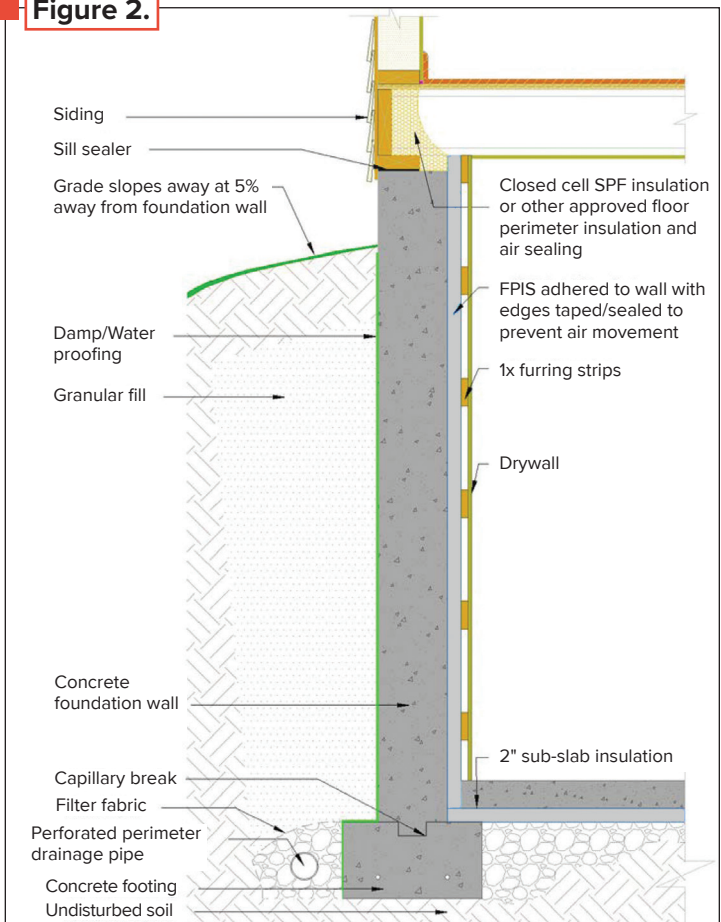
Whether required for a local construction permit or not, a basic plan (at minimum) should be developed to indicate important construction details, materials, and methods for upgrading the basement. This will help with ordering the correct materials, accurate pricing, construction quality, and inspection. The plan should also include any actions identified in **Step 1** and code requirements identified in **Step 2**. Seek assistance from a design or construction professional as needed.

### STEP 4: CONSIDER ACCEPTED/PROVEN PRACTICES

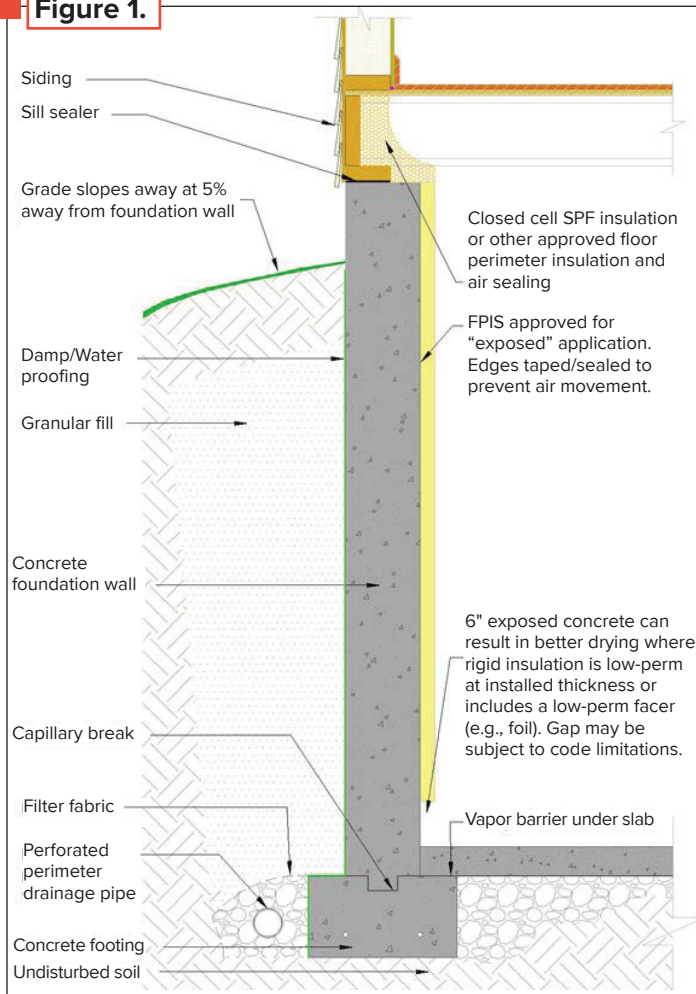
When developing a good plan in **Step 3**, consider accepted practices for basement insulation, moisture management, and finishing. A few examples of accepted practices adapted from details developed by DOE for the appropriate use of FPIS ci on basement walls include: **(A)** as the only insulation layer (see Figure 1), **(B)** with furring to support interior finishes with minimal impact on size of basement space (see Figure 2), or **(C)** with a combination of 2x framing and cavity insulation (see Figure 3).

If using FPIS ci on the basement wall and batt insulation in framing cavities, the batt insulation should not have a vapor retarder facer and the interior finish or paint should be vapor permeable for better moisture control. These examples are not intended to limit use of other appropriate or code compliant details and the various FPIS insulation types (e.g., XPS, EPS, polyiso, and phenolic).

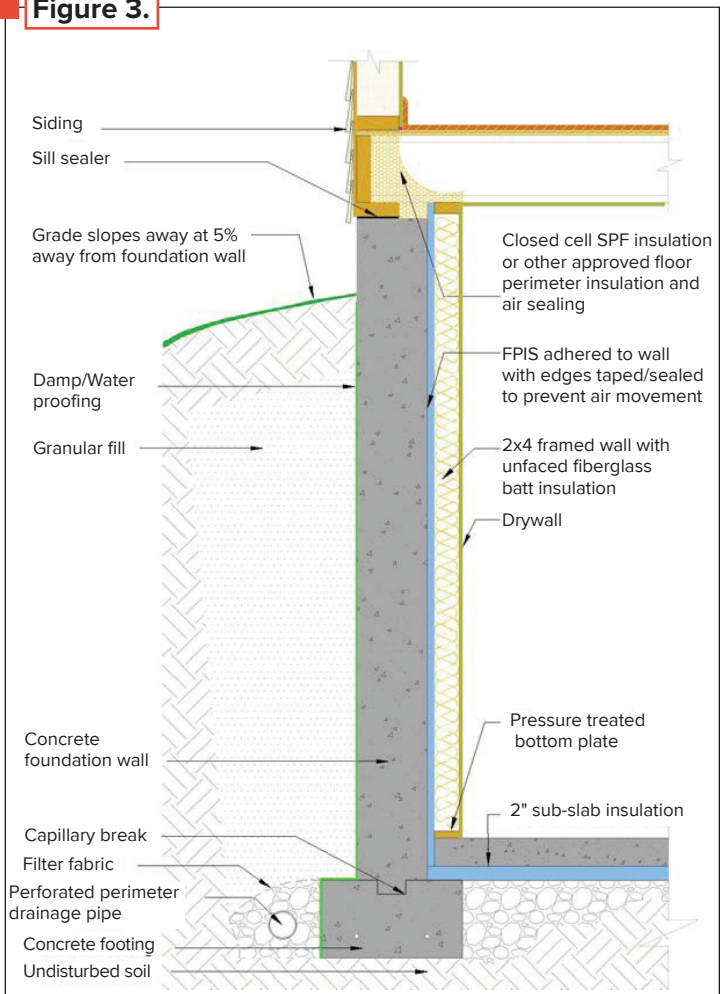
**Figure 2.**



**Figure 1.**



**Figure 3.**



Source for Figures 1-3: DOE Building Technologies Program, Measure Guidelines: Basement Insulation Basics



The following pictures show basement insulation using FPIS ci consistent with the accepted practices shown above, prior to the installation of interior finishes such as gypsum wall board where required.\*



**\*NOTE:** Building codes require a “thermal barrier” (e.g., min. ½” gypsum wall board) over FPIS ci for fire safety protective purposes (as with any combustible building material). FPIS ci is also required to meet certain fire safety material properties to limit flame spread and smoke development. Verify that the foam product you are using meets these requirements. In some cases, installation of

foam products can be specified to remain exposed (i.e., not requiring a thermal barrier) where approved under NFPA 286. Consult the FPIS ci manufacturer’s code evaluation data to verify. These products are useful for basement or unvented crawlspace retrofit projects where the primary goal is energy savings and moisture management, not finished interior space.

In addition, two installation recommendations for FPIS ci are as follows:

- Attach FPIS ci directly to the foundation wall with an approved adhesive compatible with the foam sheathing (in addition to mechanical fasteners, if used).
- Install sheathing with joints butted snugly together and seal the joints using tape or sealant as recommended by the FPIS manufacturer.

Use of adhesives and sealing joints as noted above are intended to help keep the foundation wall and basement space isolated from each other (i.e., prevent air movement through or behind the insulation) for improved moisture control and thermal performance.

**The greater the R-value or thickness of the FPIS ci, the better the thermal performance. Modern energy codes will generally require a minimum of R-5 to R-15 FPIS ci for basement walls.**

## STEP 5: CONSULT REPUTABLE RESOURCES AS NEEDED FOR MORE INFORMATION

Here are some resources to consider:

- [Remodeling for Energy Efficiency](#)
- [DOE Building America Measure Guideline: Basement Insulation Basics](#)
- [DOE Job Aid: Insulate Basement Walls in Conditioned Space](#)
- [DOE Foundation Design Handbook](#)
- [DOE Building America Solution Center: Pre-Retrofit Assessment of Crawlspace and Basements](#)
- [DOE Building America Solution Center: Basement Wall Insulation](#)
- [DOE Building America Solution Center](#)
- [Home Energy: Fixing Wet Basements and Crawl Spaces](#)
- [This Old House: How to Insulate Your Basement](#)

**DISCLAIMER** While reasonable effort has been made to ensure the accuracy of the information presented, the actual design, suitability and use of this information for any particular application is the responsibility of the user. Where used in the design of buildings, the design, suitability and use of this information for any particular building is the responsibility of the Owner or the Owner’s authorized agent. The information contained herein is provided “as is.”

Contact us.



Owned and operated by the Applied Building Technology Group with support from the Foam Sheathing Committee (FSC) of the American Chemistry Council, [continuousinsulation.org](http://continuousinsulation.org) provides informational resources intended to assist the foam plastic insulating sheathing industry, using sound science to develop research supporting the reliable, efficient, and economic design and installation of foam sheathing.

