Question 1)

How do I choose whether the floor or the foundation walls will serve as the pressure and thermal boundary?

Answer 1)

It depends on the house. Unfortunately, there is no "one size fits all" answer here. You will need to depend on sound, knowledgeable auditing skills along with guidance from the Michigan field guide. Consider the following:

Assuming the pressure boundary will be continuous and in contact with the thermal boundary, here are some variables to consider with suggested solutions provided by the Michigan Field guide:

Foundation wall air sealing and insulation when:

- Unconditioned basement or crawlspace containing ductwork, furnace, and water lines (unintentionally conditioned)
- Reasonable drainage with no moisture issues
- Unconditioned basement or crawlspace floor air sealing and insulating would be difficult to perform
- Concrete floor, concrete or concrete block walls
- Foundation walls test tighter than the floor
- If the unoccupied basement may be occupied someday or if the laundry is currently being done in the area
- If the unoccupied basement has an interior stairwell from the house
- If the crawlspace vents can be closed off

Floor air sealing and insulation when:

- No furnace or ducts present (completely unconditioned)
- Dry crawl space with ground moisture barrier installed during weatherization
- Damp basement with no solution during weatherization
- Accessible air-sealing and insulation
- Floor tests tighter than foundation walls
- Rubble masonry, cracked foundation or stone walls
- Exterior entrance with stairway
- Building codes forbid closing crawlspace vents
- Unoccupied basement with dirt floor or deteriorating concrete

Even though we have seen plenty of these scenarios and conditions listed here, we all realize that in the "real world" there will be a myriad of others to contend with. That is why it is important to understand the concepts of keeping the thermal and pressure boundaries in alignment while considering what areas of the foundation are conditioned, unconditioned, or unintentionally conditioned. Use your "eyes" along with diagnostic testing results, and sound building science to give you guidance to make the logical, proper decision.

Question 2)

Should basements always be separated from the crawlspace by air sealing?

Answer 2)

It depends on the house. When it comes to making the final decision on separation of a basement and crawlspace, it is important to utilize SWS guidance and also consider local Michigan Residential Code requirements which are more specific to our housing stock and the typical foundation scenarios that we run into. To be better able to answer this question, we first need to review some definitions and categorize the types of basements we typically encounter.

Definitions:

Conditioned basement or crawlspace – intentionally heated or cooled (SWS definition)

Unconditioned basement or crawlspace – without *intentional* heating or cooling (SWS definition)

Unintentionally conditioned - heated or cooled by uninsulated pipes, the furnace cabinet or ducts etc. (no SWS definition)

****Note****

The SWS does not clearly define unconditioned and unintentionally conditioned spaces as one and the same or with no heat at all. Hence, the need for the unintentionally conditioned space definition. We have very few basements in Michigan that are completely not heated in any way.

Typical basement types:

- Finished/capable of being finished – not connected to crawls and not part of this conversation
- Conditioned – intentionally heated in some way – likely only a register or two – mostly used for storage, laundry…etc. – very common
- Unintentionally conditioned – not intentionally heated, but heated by ducts, pipes…etc. – can start out like this or made like this as part of weatherization by shutting off that unnecessary register in the basement – very common
- Unconditioned – no heat sources at all – not common – maybe even rare

Next, let's look at what the guidance tells us. While MiTEC direction and guidance will always refer you to the SWS and the Michigan Field Guide, **keep in mind that local authorities have precedence over national guidelines**. Also, some guidance is open to interpretation and common sense. You will find that the answer to this question reflects just that. Please consider this perspective when you encounter the following situations.

The SWS tells us that in most cases the connected crawlspace will be separated from the basement with a continuous air barrier. Examples:

- Conditioned basement connected to a vented crawlspace
- Conditioned basement connected to a closed crawlspace
- Unconditioned basement connected to a closed crawlspace

The SWS tells us that in this case the crawlspace may not be separated from the basement:

- Unconditioned basement connected to a closed crawlspace (basement can be considered an extension of the closed crawlspace)

How do we apply our definitions and typical basement types to this guidance? Let's look at applying SWS direction to the specifics of our typical basements and crawlspaces. Depending on the circumstances, a bit of interpretation is required.

- **Conditioned basement connected to a vented crawlspace**
  - This situation always requires separation
- **Conditioned basement connected to a closed crawlspace**
  - The Michigan Residential Code states that if you are going to have a closed crawl, you will need either conditioned supply air including a return air pathway or add mechanical exhaust ventilation
  - Once an appropriate vapor barrier is properly installed in the crawlspace and the perimeter is air sealed and insulated, it is not much different than what the MRC tells us, and we can consider the crawlspace as an extension of the basement
  - The thermal and pressure boundaries need to be in alignment for each space
- **Unconditioned basement connected to a vented crawlspace**
  - If by unconditioned we mean unintentionally conditioned, then we must separate them or turn the crawl into a closed crawl
  - If it is truly unconditioned – no heat sources at all – then it's up to the auditor to make the call on the perimeter or the floor – if the call is to air seal and insulate the floor then there is no reason to separate them
- **Unconditioned basement connected to a closed crawlspace**
  - Per the SWS – considered as an extension of the crawlspace and does not need to be separated
  - This is exactly what we would have if we made it a closed crawl in Bullet 3 for an unintentionally conditioned space – separation not required
  - The difference between conditioned and unintentionally conditioned in Bullet 2 may be just closing a supply register as part of Weatherization work – conditioned and unintentionally conditioned are typically not much different – if you follow the guidance in Bullet 2 – separation not required
  - The thermal and pressure boundaries need to be in alignment in each space

So, like many things we deal with in Weatherization, we must apply sound building science and common sense in dealing with areas that are a bit "grey" and open to interpretation. This guidance is associated with "typical" Michigan basements under the conditioned/unintentionally conditioned definitions. There may be instances where you do want to separate a conditioned basement from a closed crawlspace such as reconciling your thermal and pressure boundary alignment decisions. For the most part:

- Vented crawlspaces must always be separated if the basements are conditioned or unintentionally conditioned
- Vented crawlspaces connected to a truly unconditioned basement may or may not be separated based on the Auditor decision regarding alignment of the thermal and pressure boundaries

- Closed crawlspaces that are connected to conditioned and unintentionally conditioned basements will typically not have to be separated if appropriate Weatherization measures are performed