

Description of the Dibble Residence Thermal Envelope

This house was built with both a slab on grade and a crawlspace. The main area of the home is slab on grade with a cassion foundation and either wood framed walls sheathed on the exterior, or earth bermed poured cement walls. An additional two bedrooms and a bath are on a bi-level area over crawl space a few steps above the slab portion of the house. This area is built with both poured cement earth bermed walls and framed walls. The slab section is outlined in green in the picture and the crawlspace outlined in red. We propose to treat these two areas differently with regard to Energy Star thermal barrier solutions.



In the slab area of the home, the framing and insulation assembly has been exposed and all insulation and the air barrier will be replaced with R-46 of Roxul rock wool in the ceiling and R-23 in the walls. A sealed SIGA air barrier will be installed over the new insulation and the drywall will be replaced. A visual inspection of the new thermal barrier will meet Energy Star guidelines for verification.

In addition to the insulated walls, there are two large sections of the south wall in the slab area of the house that function as a passive trombe system. These walls are built of concrete block and slag brick about 16 inches thick. The walls has a black absorption material on the outside with a solar glass cover spaced about 1" away from the material to create a superheated surface that transfers heat into the house by convection during the winter when the sun shines on the surface. This area is not insulated to allow for heat to move into the home from the superheated exterior.

In the crawlspace portion of the house the existing drywall and insulated cavities will be retained. This wall assembly already meets Energy Star requirements, to be verified

through a partial exposure of the wall assembly and a thermographic inspection according to RESNET interim guidelines.

The existing frame construction consists of 2 x 6" studs placed 16" OC with plywood corners and foil backed 1" polyiso continuous insulation as sheathing. The stud cavities are filled with 6" unfaced fiberglass batt (R-19) with a 4 mil plastic vapor barrier on the interior. The walls are covered with ½" drywall on the inside and either cedar siding or stucco on the outside for an approximate R-26 wall assembly. The west, north and east walls are earth bermed with a portion of stud wall space above the poured cement wall in the crawlspace area to allow for window openings. These are constructed with the same 2 x 6 assembly.

Most of the ceilings are cathedral with 2 x 12 rafters at 24" OC. The rafters cavities are unvented and filled with two layers of 6" unfaced fiberglass batt, covered with a 4 mil plastic air barrier and ½" drywall. There is a small vented attic area over one of the crawlspace bedrooms and bath that is insulated in the ceiling joists with blown fiberglass insulation and in the interior wall areas with 3 ½" kraft paper faced fiberglass batts. The attic area will be resealed and another two layers of 6" fiberglass batt insulation will be added to increase the R value to 60. The interior attic wall insulation will also be increased to R-26.

The bermed walls are built of poured cement between cement cassettes and are insulated with 4" (R-16) of polystyrene to the bottom of the wall and earth bermed to the window area or to the roof. Continuation of the polystyrene to the very bottom of the wall was visually verified when the slab was removed. The interior slab area of the home is insulated with recycled 3" EXP installed around the perimeter from a 2' depth to the top of the slab on exposed exterior walls. The unexposed exterior basement-like walls are insulated to the full extent of the interior excavation, about 18". Under the slab there are two inches of spray foam insulation over a waffle mat foundation (6" of air space.) with a 4" slab providing approximately R-15 to 20 under the radiant heated floor. This floor assembly is completed and documented through photos, engineering plans and receipts.

The crawlspace area under the floor will be conditioned and the passive radon mitigation system will be converted to an active system. The ground will be covered with recycled vinyl and sealed to the crawlspace walls, the existing passive radon vent will extend under the sealed ground cover and an active fan will be installed. The interior crawlspace walls will be covered with recycled XPS insulation to R 15. The outside vent to the crawlspace will be sealed and insulated. The existing R 19 fiberglass batt stapled to the joists in the floor will remain.

To complete the thermal envelope, the windows in both areas of the house will be renovated or replaced. All of the window trim will be removed to reseat the openings to close breaks in the air barrier.

The final thermal barrier will be tested with a blower door to reduce the pre-remodel NACH score of .43 to below .20 and the CFM/50 score of 3250 to below 2000.