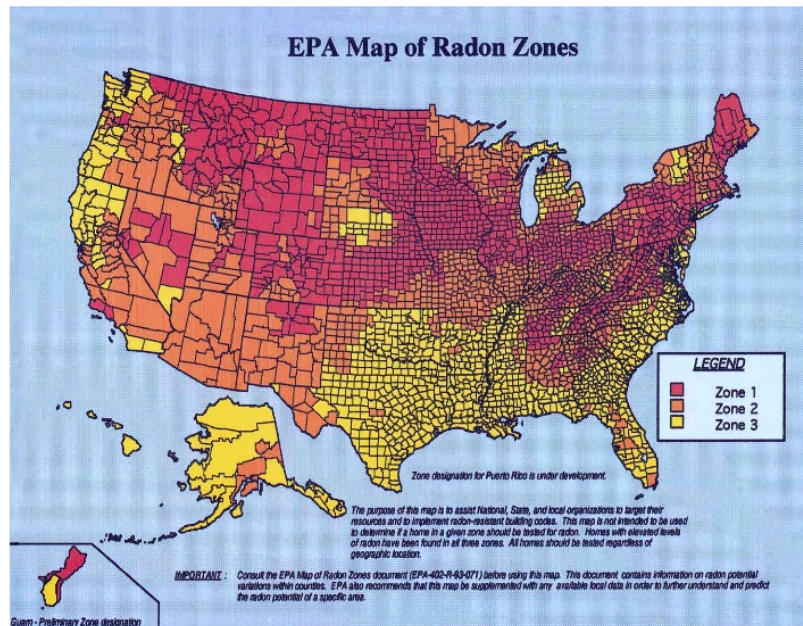


Twinsprings Research Institute

*The story of our Do It Yourself
(Potential?) LEED for Homes Green
Building project in Colorado*

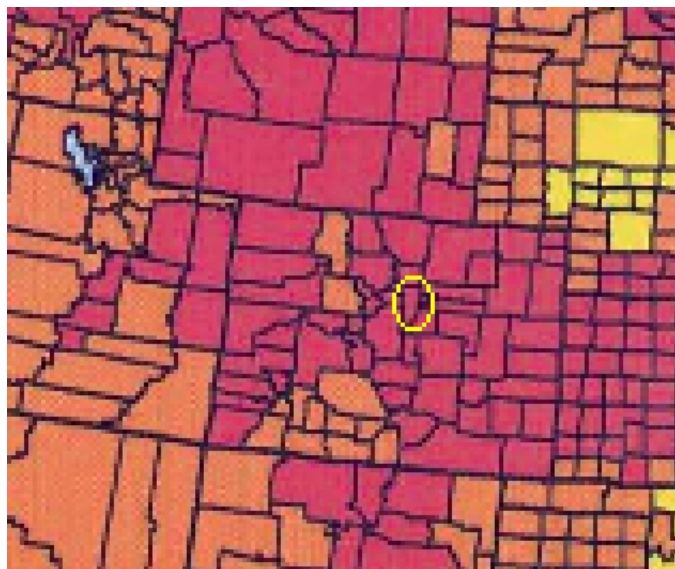
Radon Mitigation

Posted on [April 19, 2013](#) by [ellen](#)

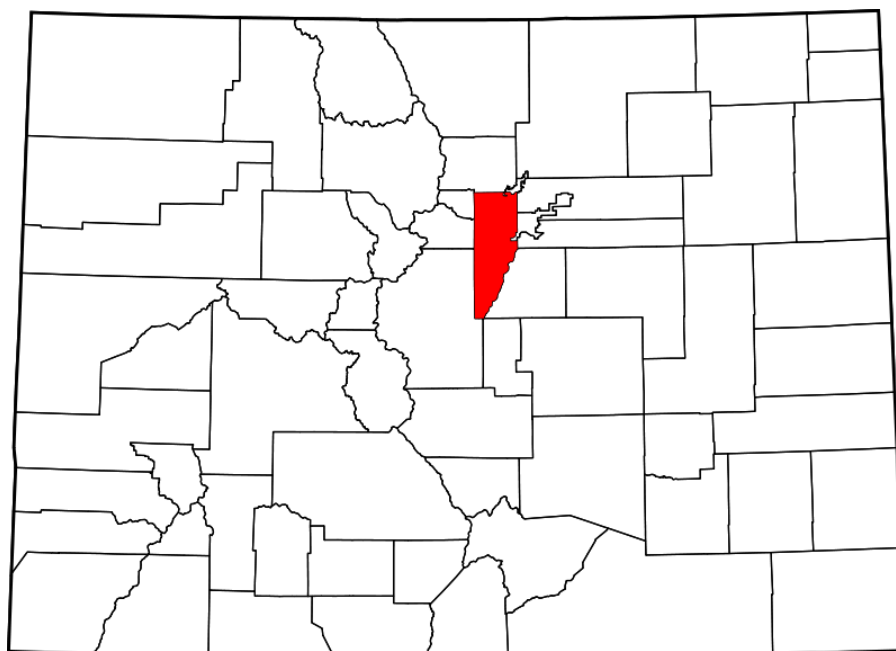


US Radon Zone Map

Zone 1 has the highest concentration of Radon in the ground. Radon has been found to be a naturally occurring cancer causing element that is concentrated in homes that have direct contact with the earth especially in Level 1 (Red) zones.



Radon zone Jefferson County Co



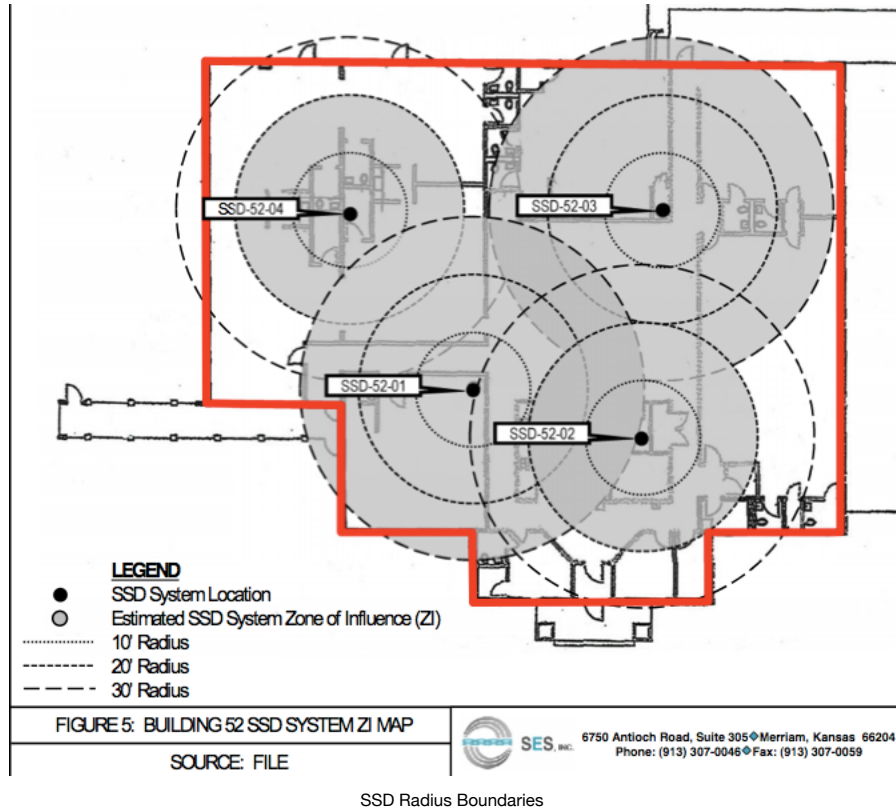
Relative Location of Jefferson County in Colorado

Jefferson County is a high concentration area and Radon Mitigation was one of the LEED Durability Issues cited during the design charrette and noted as requiring extra design attention. Although there is some evidence that a thick vapor barrier is sufficient protection from radon, the most commonly accepted method is passive or active gas exhaust from beneath the slab.

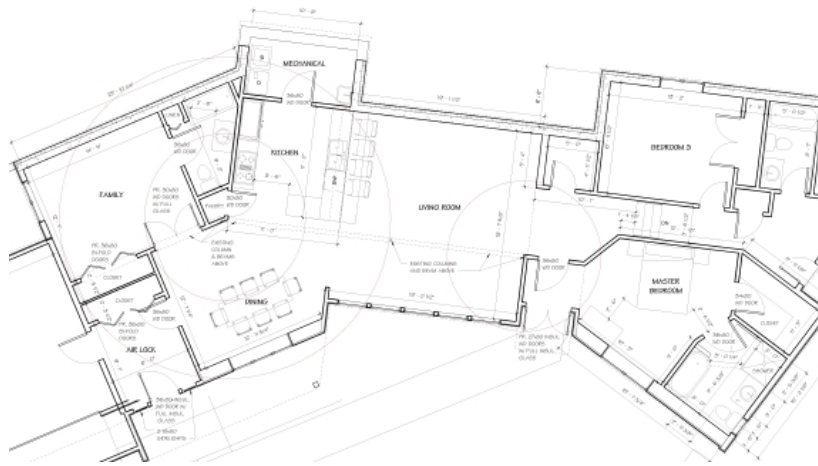
The best information that I found for installing a sub-slab depressurization system for radon mitigation was a [report to the GSA](#). I also found the details of the installation method in the EPA's [Passive Radon Control System for New Construction](#).

The GSA report found the ideal spacing of the sub slab depressurization system stack locations using an ingenious method to detect soil porosity under an existing slab site.

“To impart a vacuum at the extraction point, a commercial shop vacuum was placed over the extraction point hole. A source of smoke (e.g., smoke tubes), were used at the communication test holes to provide a qualitative assessment of the radius of influence of the extraction point. Results of all communication testing indicated that the soils immediately beneath the slab floors of both buildings was of sufficient porosity, as all communication test results indicated positive movement of the generated smoke into the communication testing points.”



With the rock fill used under our slab, I felt secure in estimating that a similar spacing and radius for our mitigation system would be sufficient. I located out of the way locations for each of the two stacks that I figured our slab would require and drew these boundaries.



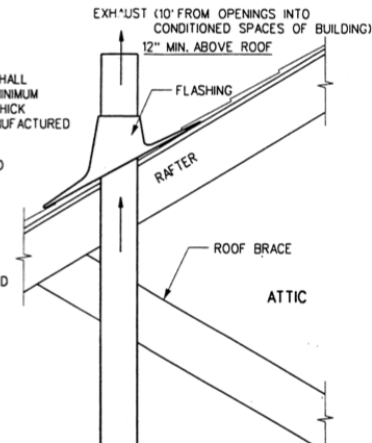
Dibble Radon Ports

Ten and twenty foot radii are drawn, A thirty foot radius from each port covers most of the slab.

PASSIVE SUB-SLAB DEPRESSURIZATION RADON CONTROL SYSTEM FOR NEW CONSTRUCTION

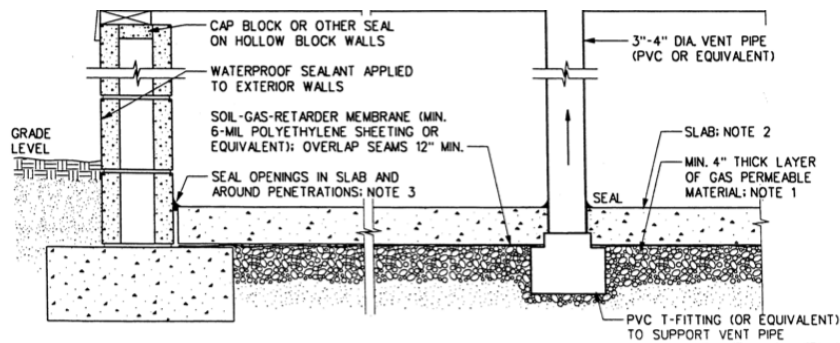
NOTES:

1. ALL CONCRETE SLABS THAT COME IN CONTACT WITH THE GROUND SHALL BE LAID OVER A GAS PERMEABLE MATERIAL MADE UP OF EITHER A MINIMUM 4" THICK UNIFORM LAYER OF CLEAN AGGREGATE, OR A MINIMUM 4" THICK UNIFORM LAYER OF SAND, OVERLAIN BY A LAYER OR STRIPS OF MANUFACTURED MATTING DESIGNED TO ALLOW THE LATERAL FLOW OF SOIL GASES.
2. ALL CONCRETE FLOOR SLABS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH LOCAL BUILDING CODES. ADDITIONAL REFS: AMERICAN CONCRETE INSTITUTE PUBLICATIONS, "ACI302.1R" & "ACI332R", OR THE POST TENSIONING INSTITUTE MANUAL, "DESIGN AND CONSTRUCTION OF POST-TENSIONED SLABS ON GROUND".
3. ALL OPENINGS, GAPS AND JOINTS IN FLOOR AND WALL ASSEMBLIES IN CONTACT SOIL OR GAPS AROUND PIPES, TOILETS, BATHTUBS OR DRAINS PENETRATING THESE ASSEMBLIES SHALL BE FILLED OR CLOSED WITH MATERIALS THAT PROVIDE A PERMANENT AIR-TIGHT SEAL. SEAL LARGE OPENINGS WITH NON-SHRINK MORTAR, GROUTS OR EXPANDING FOAM MATERIALS AND SMALLER GAPS WITH AN ELASTOMERIC JOINT SEALANT, AS DEFINED IN ASTM C920-87.
4. VENT PIPES SHALL BE INSTALLED SO THAT ANY RAINWATER OR CONDENSATION DRAINS DOWNWARD INTO THE GROUND BENEATH THE SLAB OR SOIL-GAS-RETARDER MEMBRANE.
5. CIRCUITS SHOULD BE A MINIMUM 15 AMP, 115 VOLT.



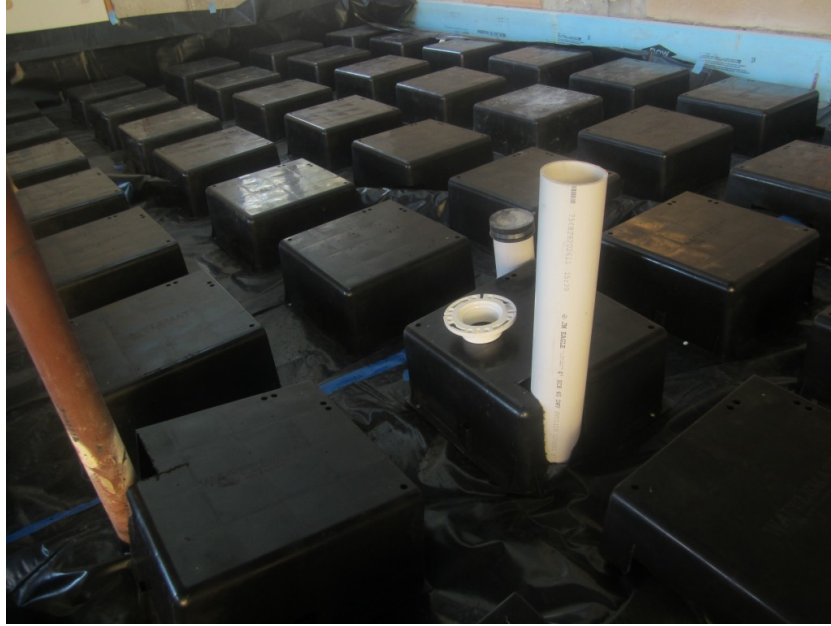
SSDS Requirements

As in these requirements, we installed 2 to 4" of road base aggregate to allow for gas flow under the slab.



SSDS Basement Diagram

4" PVC T's were buried in the aggregate as this drawing shows.



Radon Mitigation Pipe

The slab SSDS pipes were left short temporarily but will be extended through the roof. They were sealed at their bases by taping the 10 mil vapor barrier around them and then the 2" of spray insulation was sprayed over that. These pipes, along with the edges and the plumbing pipes will also be sealed with caulk as called for in the mitigation requirements.

The crawlspace already has a passive radon exhaust system, however we will probably install a fan in all these radon pipes to make them active. Fantech fans are usually used in these systems and are specified in the GSA report.

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