California Department of Public Health Indoor Radon Program

Radon Resistant New Construction (RRNC) Abbreviated Description

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INTRODUCTION

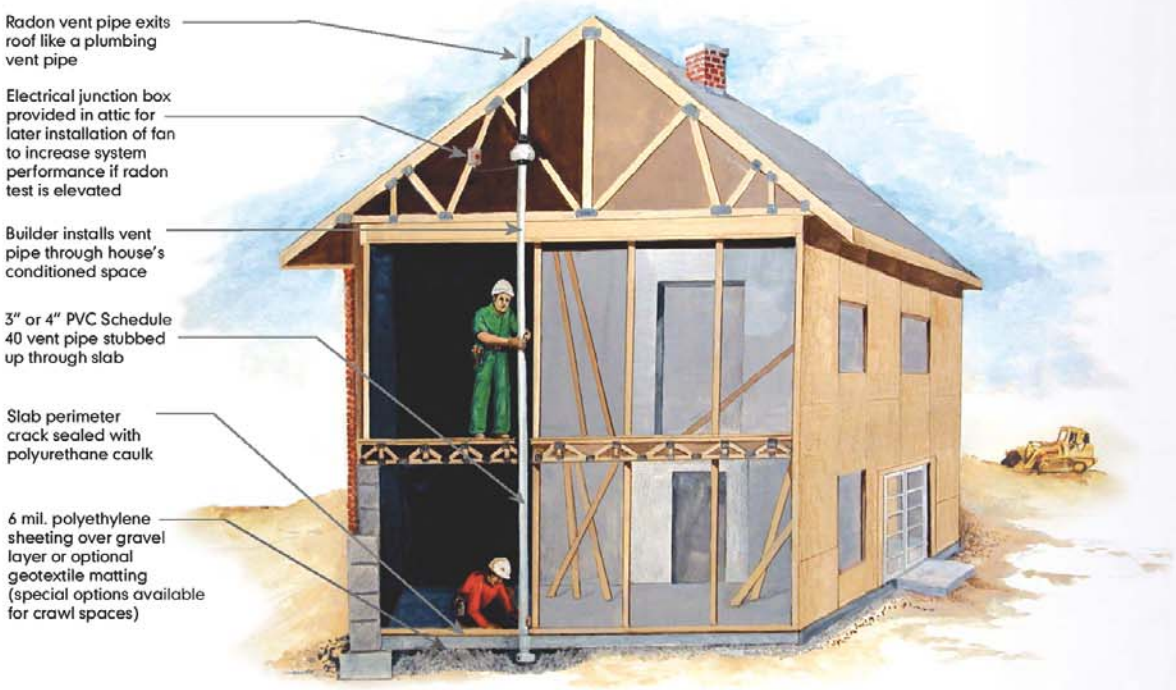
- This presentation is based on Building Radon Out (EPA/402-K-01-002). For full details see the document.

- The newest standard is Standard Practice for Radon Control Options for the Design and Construction of New Low-Rise Residential Buildings (ASTM E 1465 – 07a). It is copyright protected and must be purchased. A single free copy can be obtained from EPA by going to: www.epa.gov/radon/pubs/mitstds.html

BUILDING RADON OUT

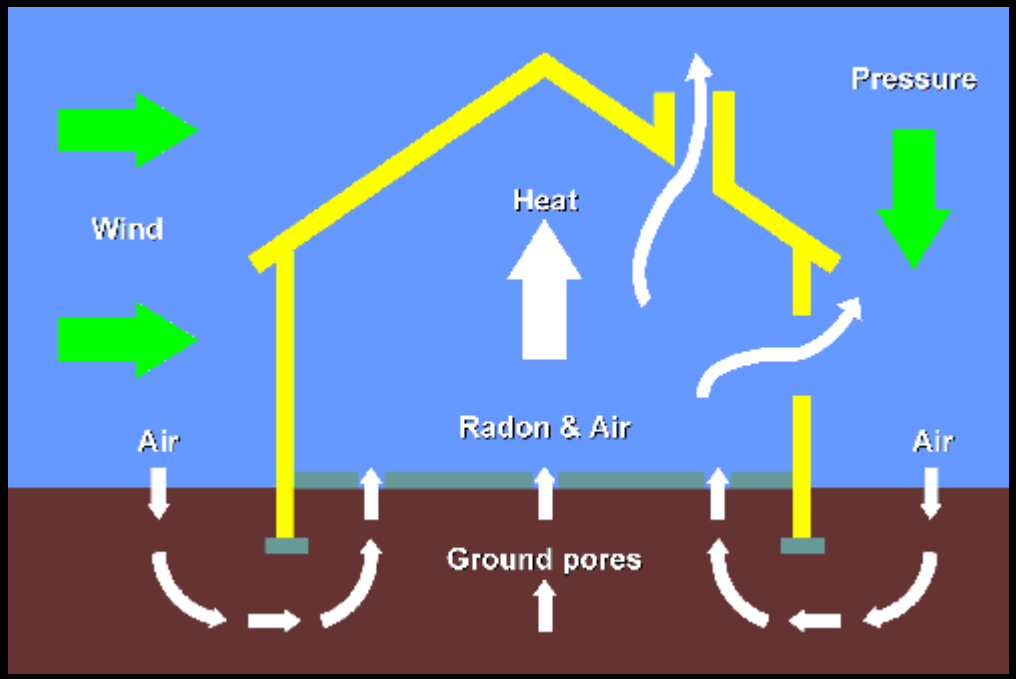
WITH SIMPLE CONSTRUCTION METHODS

Visit www.epa/gov/iaq/radon
or call 1-800-55-RADON



- Radon is a naturally occurring radioactive gas that causes thousands of lung cancer deaths every year.
- Radon is found in homes throughout the U.S.
- Radon enters homes through cracks in the walls, joints, and foundation.
- Homes can be built to resist radon entry.
- Radon resistance is a valuable feature to health-conscious homebuyers.

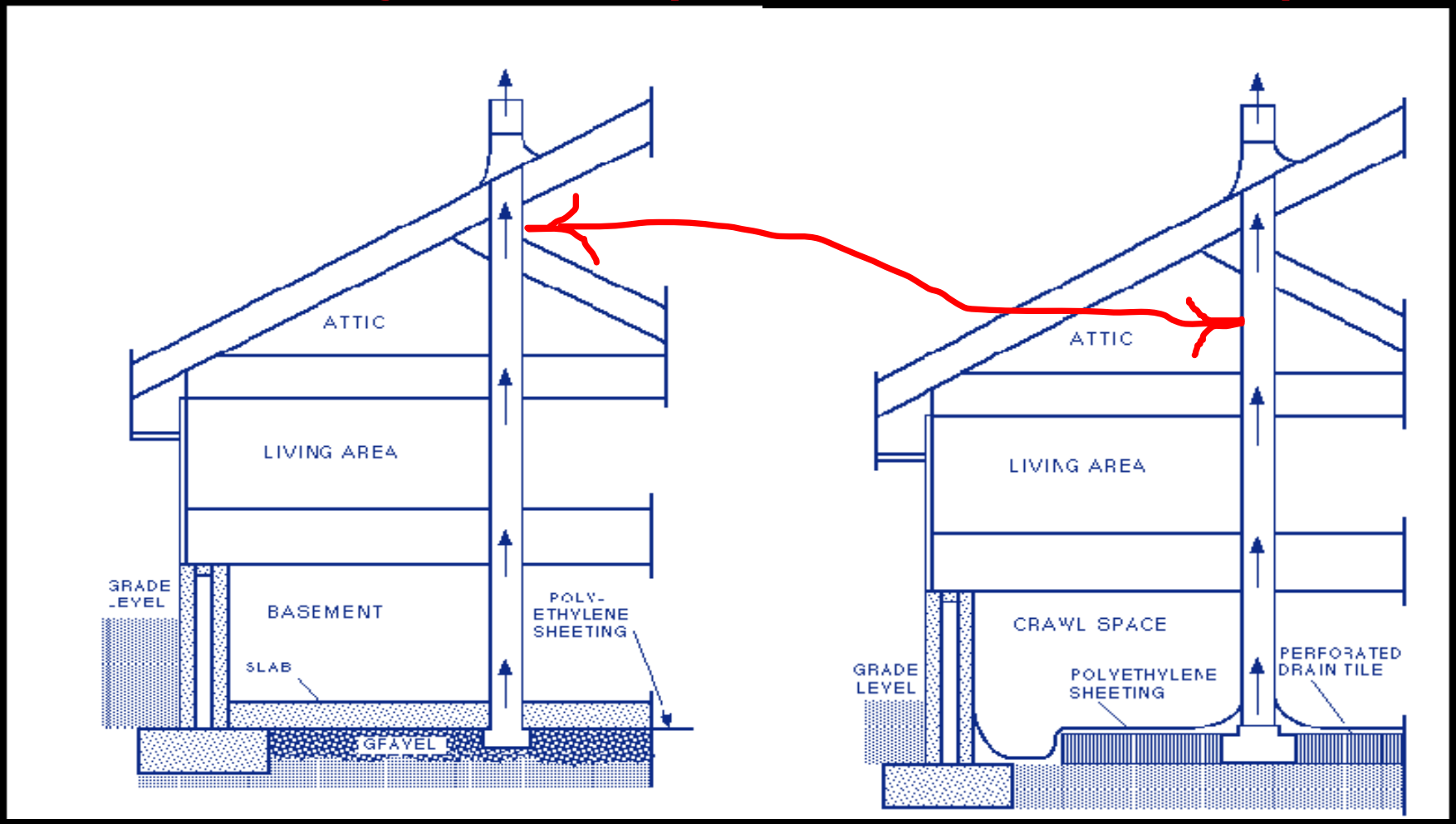
We are trying to counteract the forces that cause houses to suck radon from the ground.



There are 2 basic variations

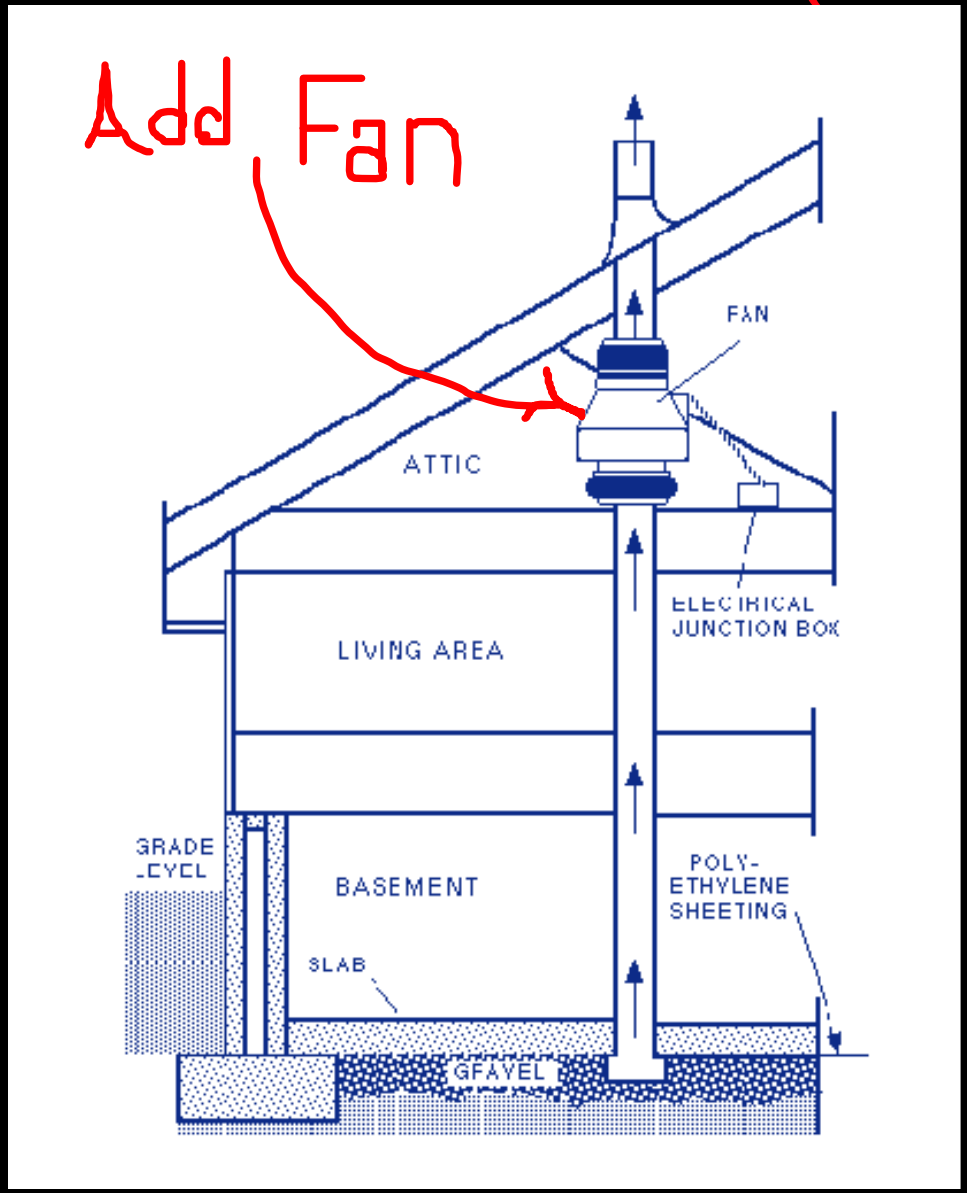
- Slab-on-Grade (Basements are similar but must deal with basement walls)
- Raised Foundation

Passive systems (what we all want)



Vents not in exterior walls

Passive converted to Active (if required)



What are Radon-Resistant Features

1. Gas Permeable Layer
2. Plastic Sheeting
3. Vent Pipe
4. Junction Box
5. Sealing and Caulking

Gas Permeable layer

- 4 inches of gravel ½ to ¾ inch clean
- Perforated pipe
- Soil-gas collection mat

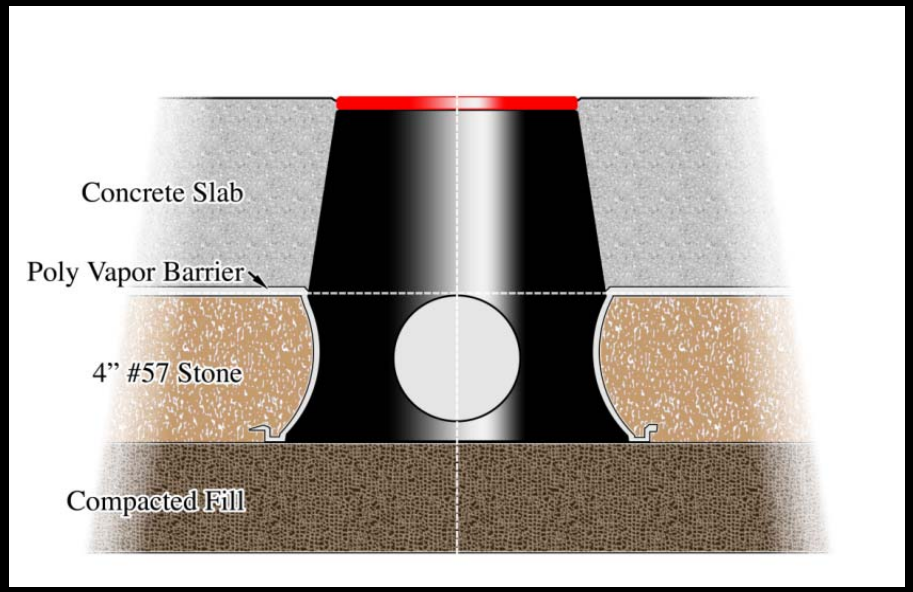
Gravel layer

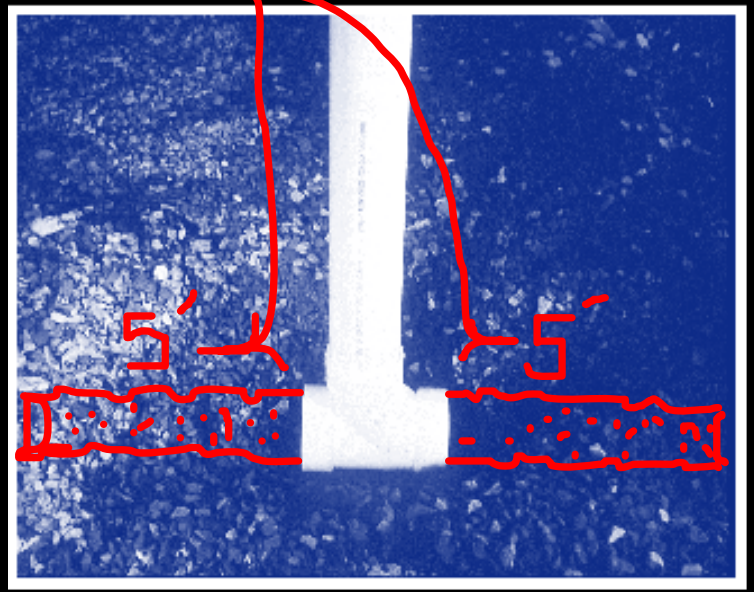
Inserting vent pipe

***Air*QES™**

3 or 4 inch tee

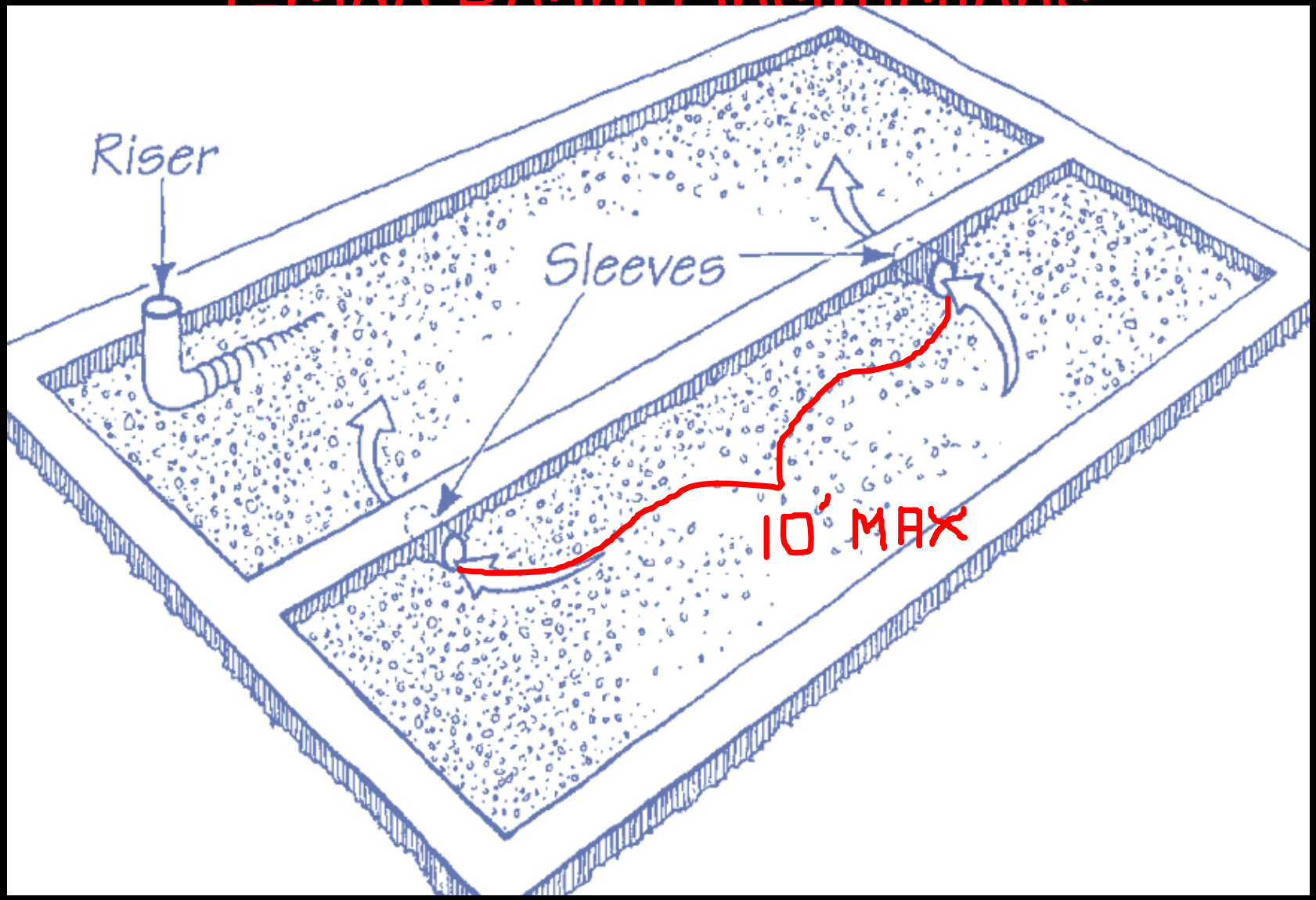
(+10ft perf-pipe)





Perforated pipe

Grade Beam Obstructions



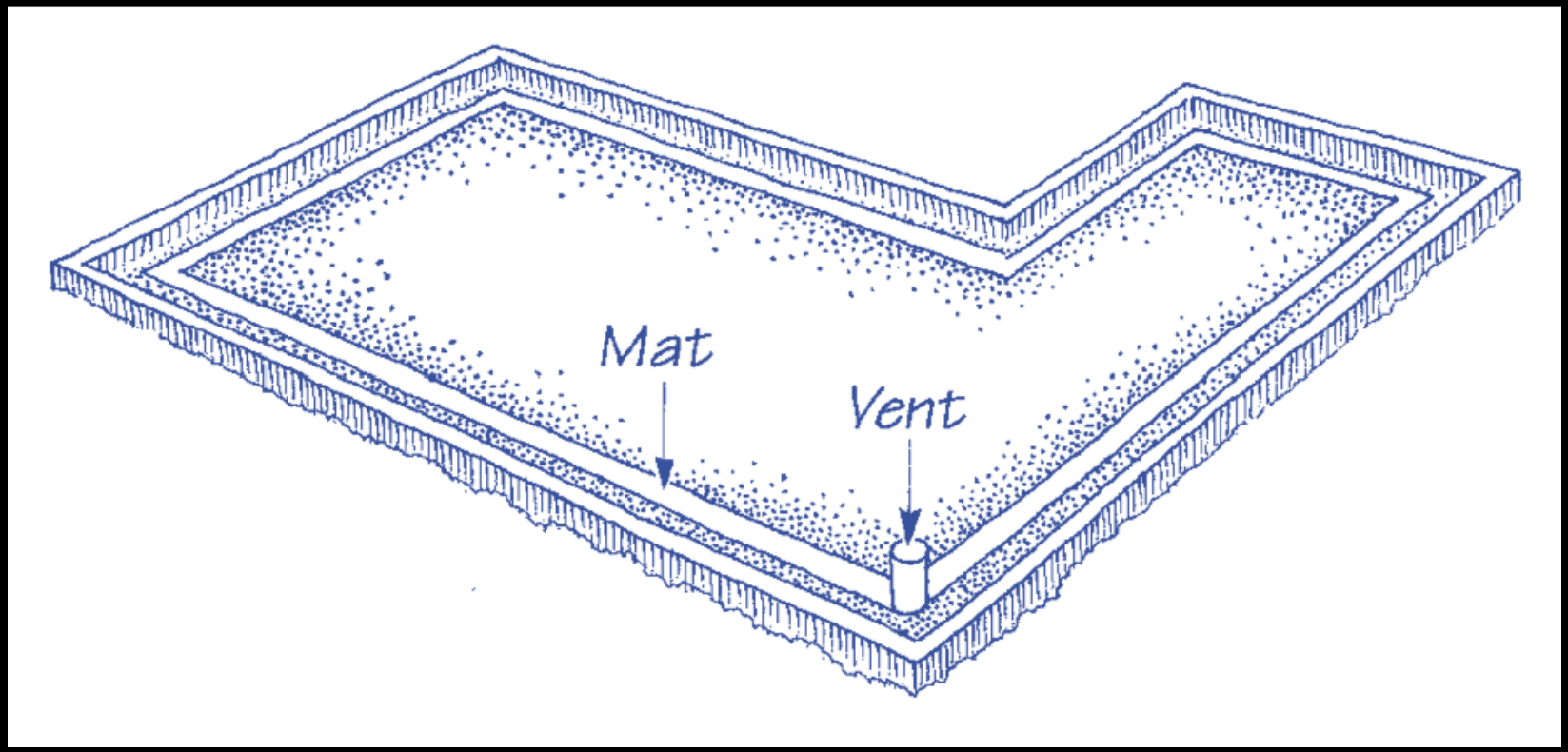
Options to Avoid Grade Beam Obstructions

1. Use Post and Beam Supported on Pads rather than Continuous Footings
2. Inserting at least Two 4-Inch Pipe Sleeves through the Grade Beam Sleeves should be every 10 Feet
3. Place a Riser on each side of the Grade Beam and tie them into the Vent Stack or add another Vent Stack

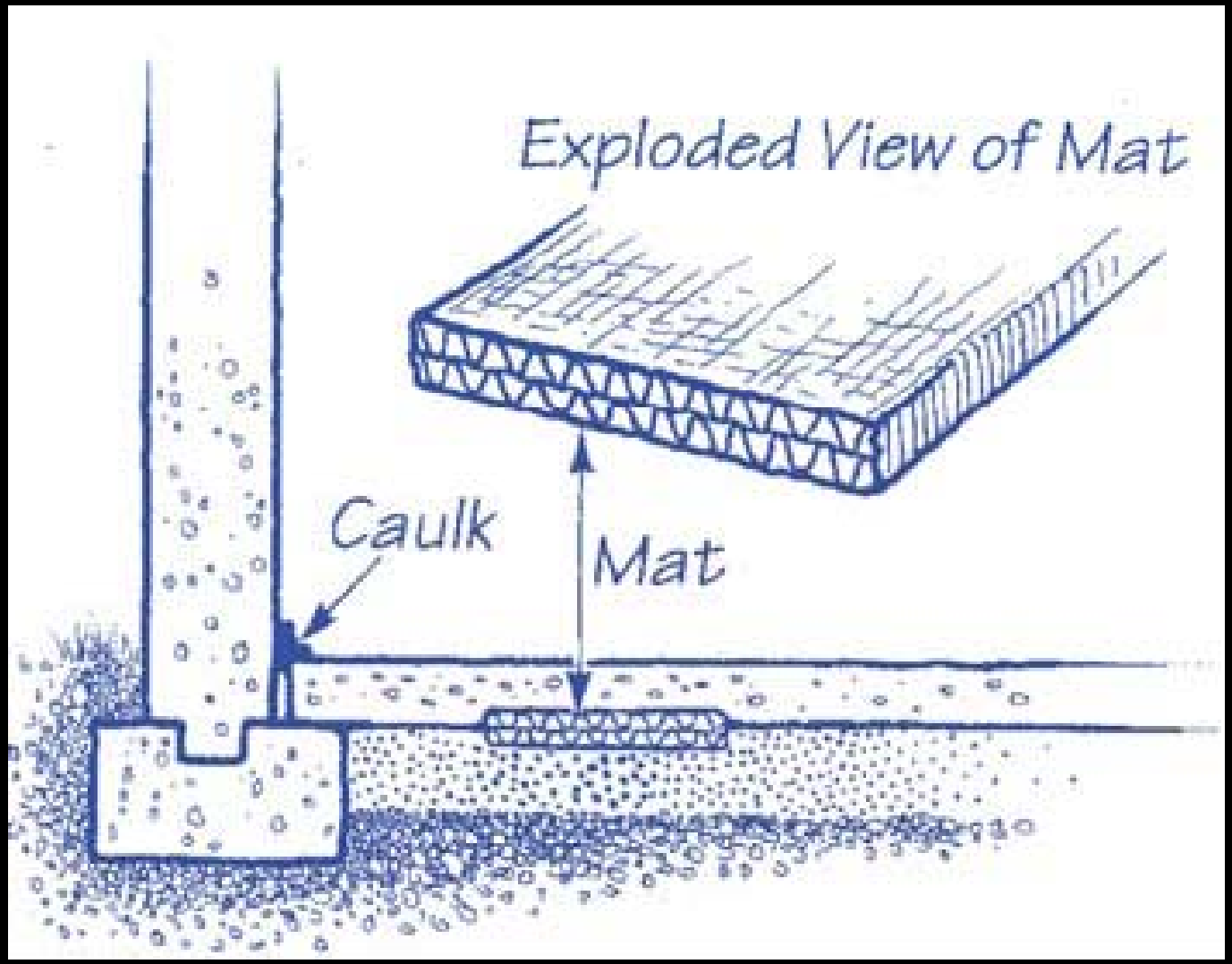
Perforated pipe

- Loop of 3 or 4 inch perforated drain pipe
- In trench 1 inch of gravel over top and approximately 12 inches from the inside of the exterior perimeter foundation walls.
- 3 inch minimum pipe up to 2000 sq ft
- 4 inch minimum pipe 2000 to 4000 sq ft
- For larger areas subdivide into smaller 2000 to 4000 sq ft

Soil Gas Collection Mat



Exploded View of Mat



Sub-Slab Polyethylene Membrane

- Do we need to have membranes under slabs?

Slab-on-Grade Foundations

- EPA (Building Radon Out) Prior to pouring the slab lay a minimum 6-mil (or 3-mil cross laminated) polyethylene or equivalent flexible sheeting material on top of the gas permeable layer. The sheeting should cover the entire floor area.

Concrete over polyethylene

- CIP29 National Ready Mix Concrete Association (NRMCA)
  - Current recommendation of ACI Committee 302 is to place concrete slab directly on top of vapor retarder (radon retarder in this case).

Concrete over polyethylene (cont.)

- Rules when using Vapor Retarders (NRMCA)
  - Place vapor retarder directly under the slab
  - Place on a smooth base
  - Order a concrete mixture designed for minimum shrinkage

Poured Foundation Walls

Caulk all Control Joints, Isolation Joints, and any other Joint with elastomeric sealant

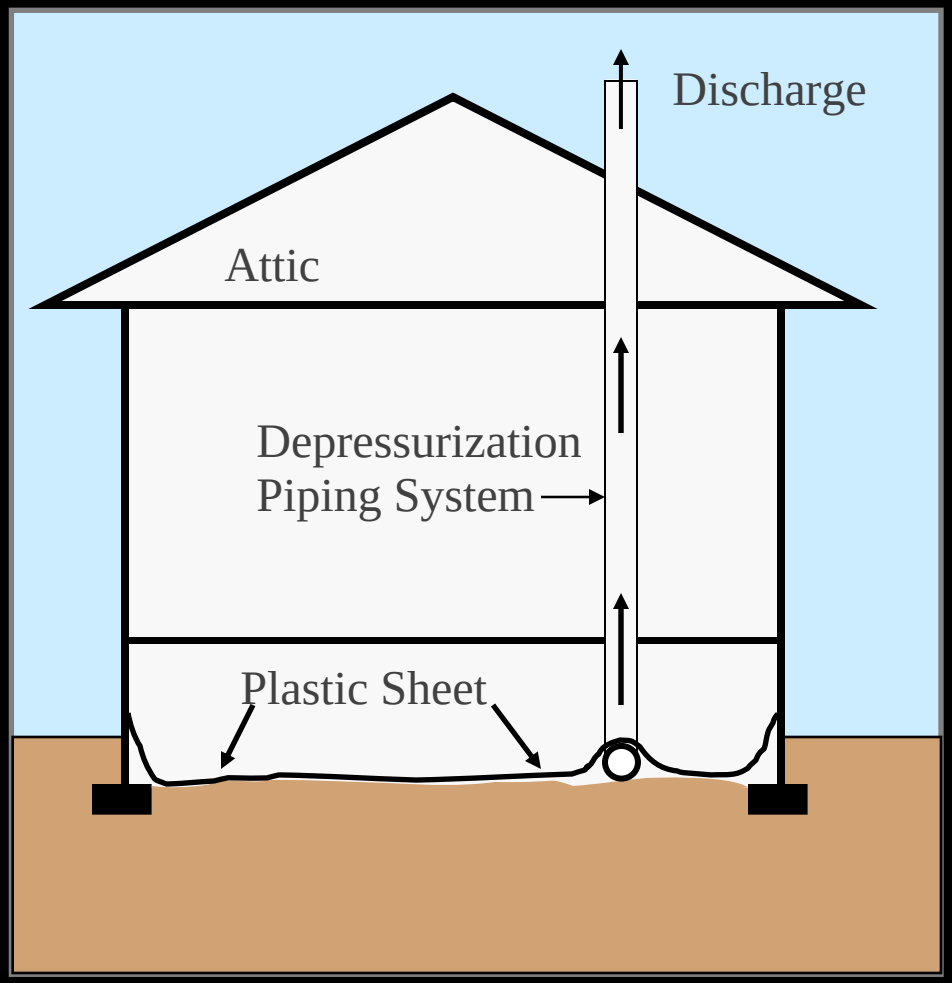
Hollow Block Foundation Walls

- Radon can move up through the spaces.
- Top with a continuous course of solid block or grouted solid on top.
- Alternatively use a solid concrete beam at or above finished ground level.
- Damp proof foundation walls and seal penetrations.

Slab

- Take steps to control cracking
- All control joints should be sealed with polyurethane caulk
- Do not puncture plastic sheeting prior to pouring slab
- It is preferable to use low slump concrete.

Passive System Concept for Crawl Spaces



- Suction point is under plastic sheet placed over exposed soil or rock
- Seams and edges are sealed
  - Requirement in EPA model standards but not in building codes

Crawl Spaces cont.

- 5 ft or more corrugated perf pipe to Tee or gas collection matting to vent pipe
- Seal edges to foundation and vertical penetrations such as posts and plumbing.

Determine Vent Pipe Location and size

- Route pipe through warm spaces
  - Ideally installed in a vertical run
  - Not in outside walls
- Discharge 1 ft above roof, 10 ft from opening in building, 10 from other building
- Use 4 inch pipe when possible

Post-Occupancy Radon Testing

- All new homes with RRNC features should be tested after occupancy to determine whether system activation is needed to further reduce radon levels
- System activation is accomplished by adding an in-line fan to the passive stack in the attic

Passive RRNC Limitations

- Tests have shown RRNC effectiveness ranges from 0 to 90% averaging 50%
- Passive RRNC does NOT guarantee radon levels will be below EPA's 4 pCi/L guideline
- Active systems provide larger radon reduction and are less dependent on the above factors (typically 95+% effective)

Passive RRNC Limitations (cont.)

- RRNC works, but it needs to be done correctly.
- If not installed properly, passive systems may not provide much, if any radon-reduction, and can make future activation difficult, impractical, or impossible.

Living Greener Starts From The Ground Up!!

Make sure that their dream home is safe for their family to breathe. Build Radon Out!

That’s all Folks