ORDINANCE NO. 18657

AN ORDINANCE introduced by Councilmembers Clark Duffy, John Nave, and Jeff Preisner amending City of Topeka Code § 26-325 to include as amended Appendix F, “Radon Control Methods” of the International Residential Code for One and Two Family Dwellings, 2003.

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF TOPEKA, KANSAS:

Section 1. City of Topeka Code § 26-325, Reserved is amended to read as follows:

International Residential Code.

Appendix F, “Radon Control Methods” is hereby adopted and amended, to read as follows:

NEW CONSTRUCTION RADON CONTROL METHODS
FOR THE CITY OF TOPEKA

SECTION AF101. SCOPE

AF101.1 General. This appendix contains requirements for new construction in jurisdictions where radon-resistant construction is required.

Inclusion of this appendix by jurisdictions shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101.

SECTION AF102. DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

SUB-SLAB DEPRESSURIZATION SYSTEM (Passive). A system designated to achieve lower sub-slab air pressure relative to indoor air pressure by use of a vent pipe routed through the conditioned space of a building and connecting the sub-slab are with
outdoor air, thereby relying on the convective flow of air upward in the vent to draw air from beneath the slab.

**SUB-SLAB DEPRESSURIZATION SYSTEM (Active)**. A system designed to achieve lower sub-slab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the slab.

**DRAIN TILE LOOP**. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a basement or crawl space footing.

**RADON GAS**. A naturally occurring, chemically inert, radioactive gas that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock and can accumulate under the slabs and foundations of homes where it can easily enter into living space through construction cracks and openings.

**SOIL-GAS-RETARDER**. A continuous membrane of 6-mil (0.15mm) polyethylene or other equivalent material used to retard the flow of soil gases into a building.

**SUB-MEMBRANE DEPRESSURIZATION SYSTEM**. A system designed to achieve lower-sub-membrane air pressure relative to crawl space air pressure by use of a vent drawing air from beneath the soil-gas-retarder membrane.

**SECTION AF103. REQUIREMENTS**

**AF103.1 General**. The following construction techniques are intended to resist radon entry and prepare the building for post-construction radon mitigation, if necessary (see Figure AF102). These techniques are required in areas where designated by the jurisdiction.
AF103.2 Subfloor preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building, to facilitate future installation of a sub-slab depressurization system, if needed. The gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate, a minimum of 4 inches (102mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51mm) sieve and be retained by a ¼-inch (6.4mm) sieve.

2. A uniform layer of sand (native or fill), a minimum of 4 inches (102mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.

3. A uniform layer of sand or native fill a minimum of 4 inches (102mm) thick, with a minimum 2 inch (51mm) diameter interior perimeter drain tile loop laid approximately 12 inches inside the internal perimeter of the foundation footing.

4. Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire sub-floor area.

AF103.3 Soil-gas-retarder. It is recommended, but not required, that a minimum 6-mil (0.15mm) [or 3-mil (0.075mm) cross-laminated] polyethylene or equivalent flexible sheeting material shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly to serve as a soil-gas-retarder by bridging any cracks that develop in the slab or floor assembly and to prevent concrete from entering the void spaces in the aggregate base material. If utilized, the sheeting shall cover the entire floor area with separate sections of sheeting lapped at least 12 inches (305mm). The
sheeting shall fit closely around the pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

**AF103.4 ENTRY ROUTES.** It is recommended, but not required, that potential radon entry routes be closed in accordance with Sections AF103.4.1 through AF103.4.10. Notwithstanding the foregoing, the covering of sump pits as described in Section AF103.4.4 is required.

**AF103.4.1 Floor openings.** Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate basement or slab on grade concrete slabs shall be filled with polyurethane caulk or equivalent sealant applied in accordance with the manufacturer’s recommendations.

**AF103.4.2 Concrete joints.** All control joints, isolation joints, construction joints and any other joints in concrete slabs or between slabs or foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk or other elastomeric sealant applied in accordance with the manufacturer’s recommendations.

**AF103.4.3 Condensate drains.** Condensate drains shall be trapped or routed through nonperforated pipe to daylight.

**AF103.4.4 Sumps.** Sump pits open to soil or serving as the termination point for sub-slab or exterior drain tile loops shall be covered with a gasketed or otherwise sealed lid. Sumps used as the suction point in a sub-slab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps use as a floor drain shall have a lid equipped with a trapped inlet.
AF103.4.5  **Foundation walls.** Hollow block masonry foundation walls shall be constructed with either a continuous course of solid masonry, one course of masonry grouted solid, or a solid concrete beam at or above finished ground surface to prevent passage of air from the interior of the wall into the living space. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be sealed. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of masonry block or wood foundation walls below the ground surface shall be filled with polyurethane caulk or equivalent sealant. Penetrations of concrete walls shall be filled.

AF103.4.6  **Dampproofing.** The exterior surfaces of portions of concrete and masonry block walls below the ground surface shall be dampproofed in accordance with Section R406 of this code.

AF103.4.7  **Air-handling units.** Air-handling units in crawl spaces shall be sealed to prevent air from being drawn into the unit.

   Exception: Units with gasketed seams or units that are otherwise sealed by the manufacturer to prevent leakage.

AF103.4.8  **Ducts.** Ductwork passing through a crawl space or beneath a slab shall be of seamless material unless the air-handling system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed to prevent air leakage.

AF103.4.9  **Crawl space floors.** Openings around all penetrations through floors above crawl spaces shall be caulked or otherwise filled to prevent air leakage.
AF103.4.10 Crawl space access. Access doors and other openings or penetrations between basements and adjoining crawl spaces shall be closed, gasketed or otherwise filled to prevent air leakage.

AF103.5 Passive sub-membrane depressurization system. In buildings with crawl space foundations, the following components of a passive sub-membrane depressurization system shall be installed during construction.

Exception: Buildings in which an approved mechanical crawl space ventilation system or other equivalent system is installed.

AF103.5.1 Ventilation. Crawl spaces shall be provided with vents to the exterior of the building. The minimum net area of ventilation openings shall comply with Section R408.1 of this code.

AF103.5.2 Soil-gas-retarder. The soil in crawl spaces shall be covered with a continuous layer of minimum 6-mil (0.15mm) polyethylene soil-gas-retarder. The ground cover shall be lapped a minimum of 12 inches (305mm) at joints and shall extend to all information walls enclosing the crawl space area. It is recommended that acoustical sealant, butyl rubber, or butyl acrylic caulks be used to provide adhesion to the polyethylene sheeting. Polyurethane caulk will also provide some adhesion to the polyethylene sheeting. Seams between adjoining sheets of sheeting are usually sealed by applying a continuous bead of sealant between the sheeting in the 12-inch strip where the sheets overlap. Plastic should be secured to the wall at 6 to 12 inches above the crawlspace floor with a ½ inch wide bead of acoustical sealant or butyl caulk along the wall. For a more durable connection mechanical fasteners, such as strapping, should be considered, to hold the plastic to the wall.
AF103.5.3 Vent pipe. A plumbing tee (2 inch minimum diameter) or other approved connection shall be inserted horizontally beneath the sheeting and connected to a 3- or 4-inch diameter (76mm or 102mm) fitting with a vertical vent pipe installed through the sheeting. The vent pipe shall be extended up through the building floors, terminate at least 12 inches (305mm) above the roof in a location at least 10 feet (3048mm) away from any window or other opening into the conditioned spaces of the building that is less than 2 feet (610mm) below the exhaust point, and 10 feet (3048mm) away from any window or other opening into the conditioned spaces of the building that is less than 2 feet (610mm) below the exhaust point, and 10 feet (3048mm) from any window or other adjoining or adjacent buildings.

AF103.6 Passive sub-slab depressurization system. In basement or slab-on-grade buildings, the following components of a passive sub-slab depressurization system shall be installed during construction.

AF103.6.1 Vent pipe. A minimum 3-inch-diameter (76mm), ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into a “T” fitting (2 inch minimum diameter) or equivalent method to be used to ensure that the pipe opening remains within the sub-slab permeable material. Alternatively, the 3-inch (76mm) pipe shall be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the sub-slab aggregate or connected to it through a drainage system.

The pipe shall be extended up through the building floors, terminate at least 12 inches (305mm) above the surface of the roof in a location at least 10 feet (3048mm) away from any window or other opening into the conditioned spaces of the building that
is less than 2 feet (610mm) below the exhaust point, and 10 feet (3048mm) from any
window or other opening in adjoining or adjacent buildings.

**AF103.6.2 Multiple vent pipes.** In buildings where interior footings or other barriers
separate the sub-slab aggregate or other gas-permeable material, each area shall be
fitted with an individual vent pipe. Vent pipes shall connect to a single vent that
terminates above the roof or each individual vent pipe shall terminate separately above
the roof.

**AF103.7 Vent Pipe drainage.** All components of the radon vent pipe system shall be
installed to provide positive drainage to the ground beneath the slab or soil-gas-
retarder.

**AF103.8 Vent pipe accessibility.** Radon vent pipes shall be accessible for future fan
installation through an attic or other area outside the habitable space.

Exception: The radon vent pipe need not be accessible in an attic space where
an approved roof-top electrical supply is provided for future use.

**AF103.9 Vent pipe identification.** All exposed and visible interior radon vent pipes
shall be identified with at least one label on each floor and in accessible attics. The label
shall read: “Radon Reduction System.”

**AF103.10 Combination foundations.** Combination basement/crawl space or slab-on-
grade/crawl space foundations shall have separate radon vent pipes installed in each
type of roof or shall be connected to a single vent that terminates above the roof.

**AF103.11 Building depressurization.** Joints in air ducts and plenums in unconditioned
spaces shall meet the requirements of Section M1601. Thermal envelope air infiltration
requirements shall comply with the energy conservation provisions in Chapter 11.

Firestopping shall meet the requirements contained in Section R602.8.

**AF103.12 Power source.** To provide for future installation of an active sub-membrane or sub-slab depressurization system, an electrical circuit terminated in an approved box shall be installed during construction in the attic or other anticipated locations of vent pipe fans.

[The rest of this page is intentionally blank.]
Section 2  This ordinance shall take effect and be in force from and after its passage, approval and publication in the official City newspaper.

PASSED AND APPROVED by the City Council June 13, 2006.

__________________________________
William W. Bunten, Mayor

ATTEST:

____________________________
Iris E. Walker, City Clerk