DEPARTMENT OF CODE ADMINISTRATION
BUILDING INSPECTION ★ CODE ENFORCEMENT

400 Main Street, Suite 547, Knoxville, TN 37902
August 14, 2014

Required Inspections List and General Inspection Information Handout

Significant changes: 2012 International Residential Code effective October 22, 2012

1. **Winders** are now required to have a minimum tread depth of 6" at the narrow end. Code section R311.7.5.2.1.

2. **Carbon monoxide alarms** are now required just outside of the bedrooms in homes with fuel-fired appliances or with an attached garage. These are required to be installed in accordance with the manufacturers written instructions. Code section R315.

3. **Fire protection of floors** over a crawl space containing a gas appliance and over a basement is now required by using ½" gypsum or 5/8" wood structural panels on the underside of floors built with trusses, I-joists or joists smaller than 2" x 10". Code section R501.3. **(Starts January 1, 2016)**

4. **Deck ledger connection to band joist** spacing of ½" lag screws has been reduced as follows: 30" O.C. for deck joist spans less than 6'; 23" for 6' to 8'; 18" for 8' to 10'; 15" for 10' to 12'; 13" for 12' to 14'; 11" for 14' to 16' and 10" for 16' to 18'. Code section R507.

5. **Masonry veneer anchors spacing** has been increased to allow for a maximum of 32" O.C. horizontally which would require a maximum of 12" O.C. vertically to maintain the 2.67 sq. ft. maximum per anchor. Code section R703.7.4.1.

6. **Flashing at foundation** is now required for adhered masonry veneer. This must be minimum 26 ga. Galvanized or plastic with a 3½" attachment flange and must extend a minimum of 1" below the foundation plate line. The required water resistive barrier shall lap over the attachment flange. Code section R703.12.2.

7. **Drip edge** at eaves and gables is now required for all shingle roofs. Code section R905.2.8.5. Equivalent alternate methods of compliance, such as wrapping the framing, may be approved if it is determined it will provide comparable protection.

8. **Protection from impact** is now required for all appliances located where they are subject to vehicle impact such as in a garage. Approved barriers include a 2" sch. 40 iron pipe filled with concrete set in 6" dia. X 12" deep concrete or bolted to the slab with 3 – ½" x 2¼" anchors or a wheel stop type barrier bolted to the slab. Code section M1307.3.1.

9. **Clothes dryer exhaust duct** specified length has been increased to 35 feet. Code section M1502.4.4.1.10.

Points of Interest

1. **Sprinklers.** State legislature passed removing sprinkler requirement from the residential code. A jurisdiction must pass it by a two-thirds majority to reinstate it.

2. **Smoke detectors.** Listed wireless smoke detectors now approved by the code. All alarms must still activate when one goes off.

3. **Decks.** There is a new section in the code for decks. Section R507.

4. **Pre-approved plans.** All new plans required.

5. **Code violation citations.** Must specify where the code is located and the hours during which they may be read.

2012 INTERNATIONAL RESIDENTIAL CODE®

FOR ONE- AND TWO-FAMILY DWELLINGS

A Member of the International Code Family®

2012 IRC®

For

Knox County, Tennessee

Ordinance # O-12-9-101

KNOX COUNTY CODE ADMINISTRATION & INSPECTION

PLANS REVIEW INFORMATION PACKET

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Information Package For Knox County Residential Building Code Inspections

Please call 865-215-2325and press 1 at least 48 hours in advance to schedule your required inspections.

When each phase of your building construction is ready for inspection you must contact the Knox County Code Administration and Inspections office between the hours of 8:00 AM and 4:30 PM by calling 865-215-2325. **re-inspections** on rejected items, **additional inspections** or **cancelled inspections** will be billed at $30 each if adequate notice of cancellation is not given.

ELECTRICAL work in Knox County must be permitted and inspected by the State of Tennessee Electrical inspectors. Call KUB at 865-558-2504, LCUB at 865-986-6591 or CUB at 865-457-9232 for information on electrical work in Knox County.

SAFETY FIRST

No inspections shall be performed on any jobsite or portion thereof where there are unsafe conditions or violations of the occupational safety and health standards for the construction industry promulgated by the Occupational Safety and Health Administration (OSHA). For example **temporary rails are required for all fall hazards** and trench boxes or other methods are required for unstable soil conditions.

FOOTING INSPECTION

All foundations, including deck footings, are to be inspected before the concrete is poured. All grade stakes, bulkheads and any required reinforcing must be installed before inspection. Items checked for on this inspection include the following:

- Posting of permit and lot number or address
- Toilet facilities available for workers
- Silt fence and/or strawbales for erosion control
- Graveled construction entrance to the site
- Minimum setback requirements
- Footing size and layout
- Footing soil condition and reinforcing
- Footing grade stakes and bulkheads

SETBACKS from all property lines will be checked for the minimum requirements. Lines or strings marking the property lines may be required to be installed. The road is not the property line. There is generally a 50 foot road right-of-way so most front property lines will be 25 feet from the center of the road.

FOOTINGS should be a minimum of 8" x 16" (24" for 3 story) if the foundation wall is to be 8" block or 8" x 20" (24" for 3 story) if you are using 12" block. Footings should always be installed according to the plans reviewed for the construction. Other footings such as for decks and retaining walls are also required to be inspected. See attached construction handouts for details and requirements.

ROCK OUTCROPPINGS, if encountered, should be cut down 6" to 8" below the bottom of the footing and filled back in with 12" maximum gravel or compacted red clay and have a minimum of 2 #5 or 3 #4 reinforcing bars continuous installed over it extending at least 10 feet beyond each side of the rock.

SOFT GROUND in the bottom of the footing will be rejected. You must dig down to solid ground and may then fill back to the bottom of the footing level with flowable fill. Install a minimum of 2 #5 or 3 #4 reinforcing bars continuous over the footing in this case. Inspection is not required prior to placing the flowable fill but a footing letter must be provided and a footing inspection done prior to pouring the concrete.

FROST LINE protection requires the bottom of all footings to be a minimum of 12" below finished grade.

MONOLITHIC SLABS with footings must be formed and ready to pour with all required reinforcing in place.

EROSION CONTROL must be in place. Requirements and details are in the attached construction handouts.

RETAINING WALL guidelines and details are in the attached construction handouts.

UNDERSLAB PLUMBING INSPECTION

This inspection will be to check for the proper size and configuration of the underslab plumbing after trenches or ditches are excavated and bedded, piping installed and before backfill is placed. The DWV leak test may be performed by using 5 PSI air pressure or by filling the system with water. Supply lines must be tested with 50 PSI air or the actual working water pressure. The radon vent pipe will also be checked.

PRE-POUR SLAB PREPARATION INSPECTION

This inspection will be to check for the 4" gravel base, R-10 perimeter insulation extending 24" minimum horizontally or vertically, vapor barrier, any required reinforcement or control joints, and the radon vent pipe. See attached construction handouts for radon vent details and requirements.

FRAMING AND PLUMBING INSPECTION

This is the rough-in inspection including framing, plumbing, foundation walls and any mechanical and gas components which may be later concealed. This inspection is to be done before any insulation, sheetrock or exterior wall finishes are installed. Electric rough-in should be complete. Items checked for on this inspection include the following:

- Foundation wall construction
- Block lintels with 4" bearing
- Foundation wall size and bracing for backfill
- Foundation wall drain and waterproofing if exposed
- Block pier construction
- Crawl space access and ventilation
- Sill plate anchors
- Framing sizes and layouts for walls, floors and roofs
- Bearing support for load carrying members
- Framing connectors
- Size, type and number of framing fasteners
- Cutting and notching of framing members
- Firestopping and draftstopping/sealing of all penetrations
- Stairs and rails
- Bedroom egress window size
- Tempered glass
- Plumbing supply and drains with test on
- Radon vent system

FOUNDATION WALLS must be properly constructed to support all loads. The proper size, reinforcing and bracing of foundation walls, including freestanding retaining walls, for the depth and type of backfill used must be as per code. See chart below for braced walls. See handout attached for freestanding walls. An engineer sealed design will be required if the wall is subject to hydrostatic pressure from groundwater or if there is not permanent lateral support at the top and bottom. Foundation walls must extend 6" above grade at all points (4" with masonry veneer).

Minimum Reinforcing	8" Block – Maximum Heights				12" Block – Maximum Heights			
	Fill Ht.	Wall Ht.	Fill Ht.	Wall Ht.	Fill Ht.	Wall Ht.	Fill Ht.	Wall Ht.
No rebar – Hollow	4'-0"	8'-8"			5'-0"	8'-8"		
No rebar – Solid	5'-0"	7'-0"			6'-0"	8'-8"		
#4 @ 48"	4'-0"	10'-0"	5'-0"	8'-0"				
#4 @ 72"					5'-0"	10'-0"		
#5 @ 48"	5'-0"	10'-0"	6'-0"	8'-0"				
#5 @ 72"					6'-0"	10'-0"		
#6 @ 16"	10'-0"	10'-0"						
#6 @ 24"	8'-0"	10'-0"	8'-8"	8'-8"				
#6 @ 32"	7'-0"	10'-0"	8'-0"	8'-0"				
#6 @ 40"	7'-0"	9'-4"			9'-0"	10'-0"	9'-4"	9'-4"
#6 @ 48"	6'-0"	10'-0"			8'-8"	8'-8"		
#6 @ 56"					8'-0"	9'-4"		
#6 @ 64"					8'-0"	8'-0"		
#6 @ 72"					7'-0"	10'-0"		

LATERAL SUPPORT is required for foundation walls parallel to the floor structure. The top must be laterally braced by blocking to the floor diaphragm and the bottom must be braced by a floor slab. Blocking at 48"o.c. in the first two joist spaces is required for backfill less than 4 feet and blocking at 24"o.c. in the first three joist spaces is required for backfill 4 feet or more. See Foundation Wall Bracing handout attached.

LINTELS are required over all openings in block walls including HVAC duct openings and must have 4" minimum end bearing

WATERPROOFING is required for foundation walls enclosing habitable or storage space below grade. This includes brick and stone veneer extending below grade.

BLOCK PIERS are limited in height to four times their least dimension for hollow block and ten times their least dimension when filled solid. Hollow piers must have a 4" solid masonry cap.

CRAWL SPACE access must be at least 18"x 24" and ventilation must be at least 1 sq. ft. of net free vent area for every 150 sq. ft. of crawl space. This may be reduced to 1 sq. ft. for every 1500 sq. ft. if a vapor barrier is installed over the ground. There must be 1 sq. ft. of net free vent area within 3 feet of each corner. A typical block size 8"x 16" vent which takes up 128 square inches of wall only provides between 39 to 72 square inches of net free vent area and vents are marked with how much they provide. It takes 2 vents 8"x 16" with 72 square inches net free vent area each to achieve this one square foot within 3 ft. of each corner. Vents may be omitted from only one side of the house. Requirements and details are in the attached construction handouts

MECHANICAL VENT fans may be used for crawl space ventilation. They must have 1 CFM for every 50 square feet of crawl space area, a vapor barrier is required and there must still be 1 square foot of net free vent area within 3 feet of each corner.

SILL PLATE ANCHORS must be ½" anchor bolts embedded 7" minimum spaced a maximum of 6'-0" on center. These bolts shall be at least 3 ½" but no more than 12" from the end of each plate section. Code approved equivalent anchorage devices may also be used. See attached construction handouts for details and requirements.

FRAMING sizes and arrangements of all floors, walls and roofs are checked on this inspection.

ENGINEERED FRAMING systems such as trusses must be installed according to the manufacturers installation instructions and drawings which must be on site during the inspection. Modifications, cutting, notching, drilling or repairs must be approved in writing by the manufacturers engineer.

FRAMING FASTENERS size, type and spacing for sill plates, girders, studs, joists, ledgers, rafters, headers, beams, braces and sheathing are checked during this inspection.

DIRECT BEARING SUPPORT is required for all load bearing members such as joists, headers, rafters and trusses. This may be provided by using a 2"x 2" ledger strip nailed with 3 16d nails at each joist, structural hangers, dropped girders or other approved methods. A truss girder or other beam must have direct bearing support at least the same width as the truss girder or beam installed and carried down to the foundation. All trusses and beams must sit on the designed bearing points and be installed according to the manufacturers instructions.

COLUMNS OR POSTS with an unbraced height over 8 feet tall but less than 12 feet tall should be at least a 6"x 6" wood post or a 3" diameter steel pipe and all columns or posts must be supported by properly sized footings.

HEADER JOISTS spans over 4 feet must be double members and double jack studs are required for header beams spans 6 feet or more.

RAFTERS of an intersecting gable roof must sit on a valley plate or structural wood blocking may be installed on the underside of the roof sheathing to support the rafters. Rafters should never sit on the roof sheathing only. Rafters which will support brick veneer above shall be tripled and a 6"x 4"x 5/16" steel angle above shall be attached to each stud with two 7/16" x 4" lag screws.

RIDGE BOARDS must always be at least as deep as the cut end of the rafters.

CUTTING, DRILLING AND NOTCHING of structural members is checked on this inspection. A wall stud bracket must be used if a notch exceeds 25% (7/8" in a 2"x 4") or if a bored hole exceeds 40% (1.4" in a 2"x 4") of the depth of the stud. If a top plate is drilled or notched more than 50% a 24 ga. steel plate spanning the area must be installed with 4-16d nails in each end. Joists may be notched in the top or bottom to a depth not exceeding one-sixth of the depth of the joist. Joists shall not be notched in the middle one-third of the span. Notches in the end of a joist for a ledger may be one-fourth the depth of the joist. Holes drilled in joists shall not be within 2" of the top or

the bottom and shall not exceed one-third the depth of the joist. A 3" hole is the maximum allowed in a 2"x 10". If a truss or other engineered member is cut or modified a letter from the truss manufacturer or a licensed architect or engineer must be submitted detailing the proper repairs.

FIRESTOPPING is required at the ceiling and floor level, in chimney chases, at the top and bottom of stair stringers, at openings around penetrations at floor and ceiling and other concealed spaces which may otherwise allow the spread of smoke and gases. Firestopping may be of any material that is not classified as flammable.

DRAFTSTOPPING may be required in the concealed space of a floor ceiling assembly when open web trusses or a dropped ceiling is used. If the concealed area is over 1000 square feet it must be divided into 2 approximately equal areas by attaching 3/8" wood or ½" gypsum board to the side of a truss.

STAIRS must be 3 feet wide and have 6'-8" minimum headroom measured from the plane of the nosings. A ¾" to 1¼" nosing is required when the risers are closed or solid. The maximum riser height is 8" and the minimum tread depth is 9" measured from nose to nose. Enclosed accessible space under stairs must have ½" sheetrock on the walls, underside of stairs and ceiling. Requirements and details are in the attached construction handouts

WINDERS must be at least 6" wide at the narrow end and at least 9" wide at a point 12" from the narrow end.

HANDRAILS AND GUARDRAILS are required if the total stair rise is 30" or more and must be between 34" and 38" above the nose of the treads. Guardrails on the open side of stairs shall not allow a 4 3/8" ball to pass through. Guardrails for decks, balconies and screen porches with 30" or more drop off must be at least 36" high and shall not allow a 4" ball to pass through. Guardrails and handrails must be strong enough to support a 200 pound force applied horizontally. This is usually accomplished by spacing supports (newel posts) no more than 8 feet apart. All rails must terminate into newel posts or return to the wall at the top and bottom. Requirements and details are in the attached construction handouts

EMERGENCY EGRESS or rescue openings are required in each sleeping room and all basements. There must be at least one operable window or door approved for egress. A window must have a net clear opening of 5 square feet for grade floors and 5.7 square feet for other floors. The minimum clear height is 24" and the minimum clear width is 20". These windows and any bars, grills, screens or other obstructions must be operable from the inside without the use of tools or keys. The maximum sill height is 44" above the floor. Requirements and details are in the attached construction handouts.

TEMPERED GLASS is required in windows that are part of the wall surrounding a tub, shower or spa unless the bottom of the glass is 60" higher than the drain, in any window within 2 feet of a door unless the bottom of the glass is 60" higher than the floor, adjacent to any stair, landing or ramp unless the bottom of the glass is 60" higher than the walking surface or over 60" horizontally from the bottom tread and in any window less than 18" above the floor and larger than 9 square feet in area..

PLUMBING must be installed according to the codes and all plumbing materials and appliances must also be installed according to the manufacturers instructions.

WATER SUPPLY piping must have a pressure test on for this inspection. Supply lines may be tested with the actual working pressure or with 50 PSI air pressure. The water supply pipe to the house must be ¾" minimum and ½" branches can serve 3 fixtures maximum. All water supply pipe in crawl spaces, attics or other unconditioned areas must be insulated.

DRAIN, WASTE AND VENT piping may be tested by filling with water or by using 5 PSI air pressure. Sanitary or vent tee's can be used for venting or from horizontal to vertical only. 2" and smaller drain piping must slope ¼" per foot minimum and drain piping larger than 2" must slope 1/8" per foot minimum. All fixtures must be vented.

PIPE SUPPORTS for copper or plastic water supply should be every 6 feet. Plastic drain, waste and vent piping must be supported every 4 feet.

RADON VENT system must be installed except in crawl spaces with approved ventilation. This will include a 3" tee from under a slab or membrane extending into the attic and will only be required to go through the roof if tests show radon levels are high. The pipe must be labeled "Radon" on each level including crawl and attic spaces. Radon requirements and details are in the attached construction handouts.

FIRE RATED ASSEMBLY INSPECTION

For attached dwellings such as duplexes and townhouses and for any buildings with walls or overhangs less than 10 feet apart or less than 5 feet from a property line this extra inspection is required prior to taping, mudding or applying housewrap so the fasteners are fully visible. Framing for fire rated assemblies must be inspected as part of the framing and plumbing inspection prior to this inspection Items checked for on this inspection include:

- Built per approved design assembly with plans on site
- Continuous from foundation to underside of roof deck
- Proper type, size and spacing for fasteners
- Penetrations fire caulked
- four foot wrapback on underside of roof deck
- No plumbing in 2 hour rated walls

INSULATION AND ENERGY EFFICIENCY INSPECTION

This inspection will be to check for the proper installation and R- values of insulation as well as sealing of the building thermal envelope. Efficiency ratings of windows, doors and mechanical equipment may be verified also. Manufacturer's information may be required for alternate methods such as spray foam insulation. Insulation and equipment which will be accessible at the final inspection may be inspected at that time. Items checked for on this inspection include:

- R-13 wood frame wall insulation
- R-19 crawl space floor insulation
- R-38 attic insulation with depth markers every 300 sq. ft.
- Air leakage at doors, windows, penetrations, tubs and ducts
- R-8 duct insulation
- R-3 refrigerant pipe insulation
- Energy certificate posted at electric panel
- High efficiency lamps required in 75% of fixtures

FINAL AND GAS INSPECTION

Construction must be complete and the final inspection must be passed before moving in. Occupying the building before passing the final inspection is a violation of state and local laws. Items checked for on this inspection include:

- Smoke detector locations and operation. Carbon monoxide detectors
- Garage separation requirements
- Fireplace, chimney and chase installation
- Attic and crawl space access, insulation and ventilation
- Mechanical and gas equipment and systems
- Pressure test on gas piping
- Gutters, downspouts and splash blocks
- Deck and porch construction
- Stairs, landings, handrails and guardrails
- Final grading and seeding for erosion control

SMOKE DETECTORS must be electric with battery back up installed in each sleeping area, outside each sleeping area in the immediate vicinity within 20 ft. of the bedrooms, in the garage and on each level of a dwelling including the basement. All detectors must be interconnected so the actuation of one will actuate all of the alarms. The alarm must be audible in all sleeping areas. Detectors must be installed according to the manufacturers instructions and are not to be within 3 feet of an air supply or return vent.

CARBON MONOXIDE detectors are required for homes with gas appliances or attached garages.

GARAGES or other storage areas with a 6 ft. or wider door must have a minimum ½" gypsum board installed on the wall joining the residence and on the ceiling. If there is a room above the garage the ceiling must be ⅝" type x gypsum board. Any penetration through these must use non-combustible material and be sealed. Ducts penetrating these must be minimum 26 ga. sheet steel and have no openings into the garage without an automatic fire damper. The door into the house must be 1⅜" minimum solid wood, honeycomb core steel or 20 minute rated. No windows are allowed in these doors. Attic access in the garage must be covered with ½" or ⅝" gypsum board or two coats of fire retardant paint.

FIREPLACES for solid fuel burning must have an outside air supply for combustion. Hearths must extend 20" to the front and 12" beyond each side minimum if the fireplace opening is greater than 6 square feet and extend 16" to the front and 8" beyond each side minimum if the opening is less than 6 square feet.

CHIMNEYS must extend at least 3 feet higher than the roof at the point of penetration and a minimum of 2 feet higher than any portion of the building or roof within 10 feet horizontally.

MECHANICAL EQUIPMENT including Factory built fireplaces, gas appliances, water heaters, HVAC units and all other mechanical equipment, appliances and materials must be installed according to the code and the manufacturers instructions. The manufacturers instructions must be on site for inspection and left on site until the equipment is removed or replaced. Items of extreme importance include clearance to combustibles, access to equipment, proper venting of equipment, adequate air supply for combustion and dilution and proper gas pipe sizing. All exhaust vents must terminate to the outside away from openings where flue gas could reenter the house.

GAS PIPING will be checked for size, type, location, support and leaks. All future taps must be capped and have a shut off valve. All gas appliances and vents must be installed and hooked up for this inspection. Requirements and details are in the attached construction handouts.

CLOTHES DRYER VENTS shall not be over 35 feet in length and each 90° elbow counts as 5 feet.

INSULATION must be minimum R-38 in the attic and depth markers are required for each 300 square feet. Walls must have R-13 minimum and crawl space floor insulation must be R-19 minimum. Duct must have R-6 insulation minimum. Refrigerant piping must have R-3 minimum. All water supply pipe in crawl spaces, attics or other unconditioned areas must be insulated to protect from freezing. All insulation values including duct insulation and appliance and window efficiency ratings must be posted on a certificate on or near the main electric panel.

LANDINGS 3 foot by 3 foot minimum are required on each side of an egress door. The landing may be 7 ¾" below the threshold for exterior doors and all exterior doors except the front egress door may have one step (two risers) between the floor and the landing.

DECKS, balconies and porches framing details must be as per the code. Requirements and details are in the attached construction handouts.

GUARDRAILS must be installed anywhere there is a 30" or more drop off within 3 feet horizontally including screen porches. They must be 36" minimum height and not allow a 4" ball to pass through.

EGRESS DOORS must be operable from the inside without the use of a key.

BRICK OR STONE VENEER must be supported by masonry, concrete or steel including chimneys. Wall ties must be spaced no more than 32" horizontally and each tie shall support 2.67 sq. ft. of area maximum. Lintels or arches are required over all openings and flashing and weepholes must be located in the first course above grade and in the first course above all openings. Weepholes can be 33" apart maximum. Requirements and details are in the attached construction handouts

FINISHED GRADE around the entire house must slope away from the house a minimum of 6" drop in 10 feet. The ground must slope down away from the house at least 6" even if there is not 10 feet to the property line. There are no exceptions.

EROSION CONTROL landscaping and/or sod or seed and straw is required in the yard areas to provide for erosion control.

CERTIFICATE OF OCCUPANCY

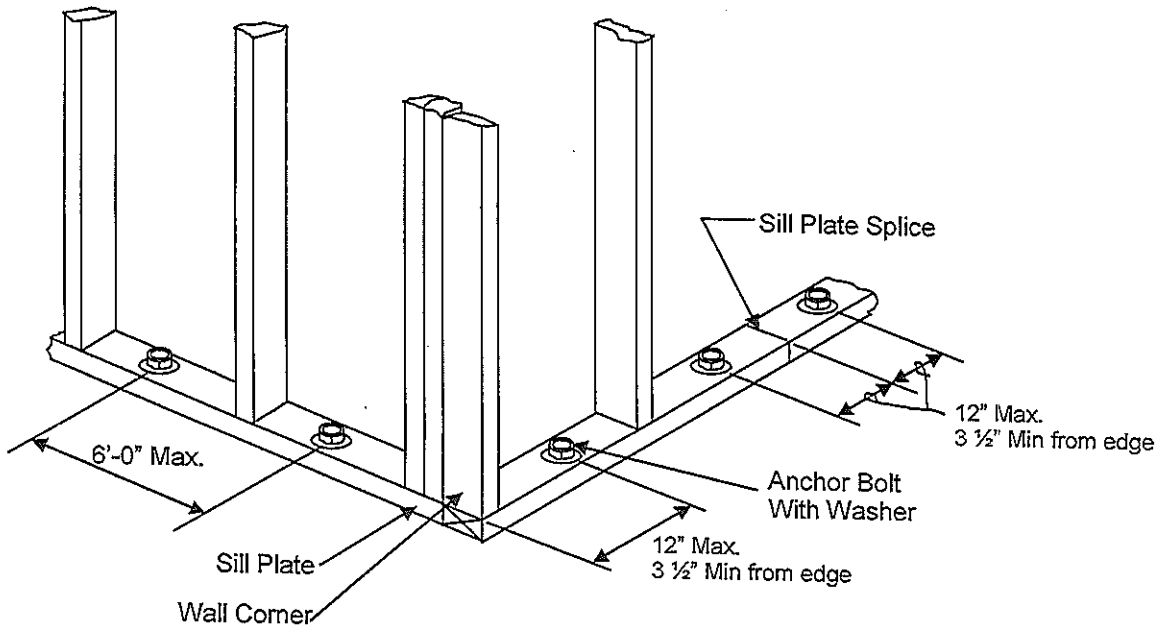
When all inspections have been passed, all requested information received and all fees paid a Certificate of Occupancy or Certificate of Completion will be issued. Occupying or using the building prior to the issuance of these certificates is a violation of state and local laws. In a case of extreme hardship a temporary or partial occupancy may be granted but in no case will this occur where there is potential danger.

Detailed construction handout information sheets are available online at www.knoxcounty.org/codes

Knox County Code Administration & Inspection *(865) 215-2325*

IRC – Anchor Bolts

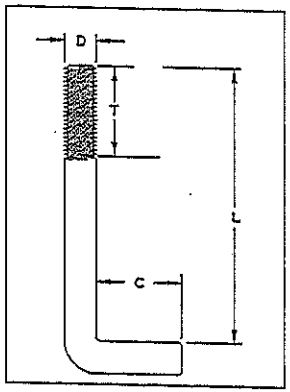
REV. 11-2012



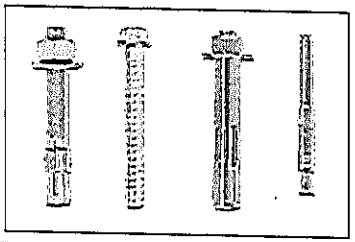
Section R403.1.6, IRC:
½" (or larger) diameter anchor bolts embedded 7" minimum spaced 6 feet on center maximum or approved anchorage devices are required.

NOTES:

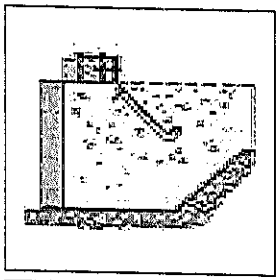
1. Anchor bolts must be placed within 12" of each wall corner and all sill plate splices at a minimum 3 ½" from the edge.
2. Maximum spacing of bolts is 6'-0".
3. Bolts must be ½" diameter minimum size with washers.
4. Right angle bend anchor bolts must have 7" embedment.
5. Alternate anchor bolts and anchor straps may be used and must be installed per manufacturer's instructions and may require engineer's approval.



Right Angle Bend Anchor Bolt
(Per Code)



Alternate Engineered Anchor Bolts
(Engineering Required)



Alternate engineered
anchor strap
(Code Approved)

Knox County Code Administration & Inspection
IRC EXHAUST AIR INFORMATION

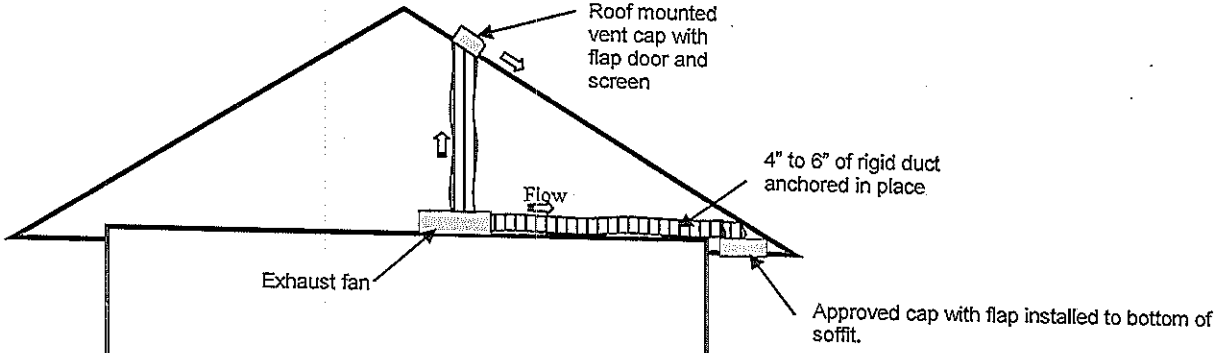
Rev. 11-2012

IRC section M1506 & M1507: **Recirculation of air.** Exhaust air from bathrooms and toilet rooms shall not be recirculated within a residence or to another dwelling unit and shall be exhausted directly to the outdoors. Exhaust air from bathrooms and toilet rooms shall not discharge into an attic, crawl space or other areas inside the building.

Exhaust Openings. Air exhaust openings shall terminate not less than 3 feet from property lines; 3 feet from operable and nonoperable openings into the building and 10 feet from mechanical air intakes except where the opening is located 3 feet above the air intake.

Knox County Code Administration & Inspection Department accepts a vent terminating in the soffit. The vent must be permanently attached to soffitt area with 4 to 6 inches of rigid duct. The duct must attach to an approved exhaust cap with a proper flap closing mechanism. The cap is to be mounted to the underside of the soffit.

NOTE: If the exhaust fan is installed in a separately enclosed toilet room, another exhaust vent fan must be installed in the shower/bath area to remove moisture.

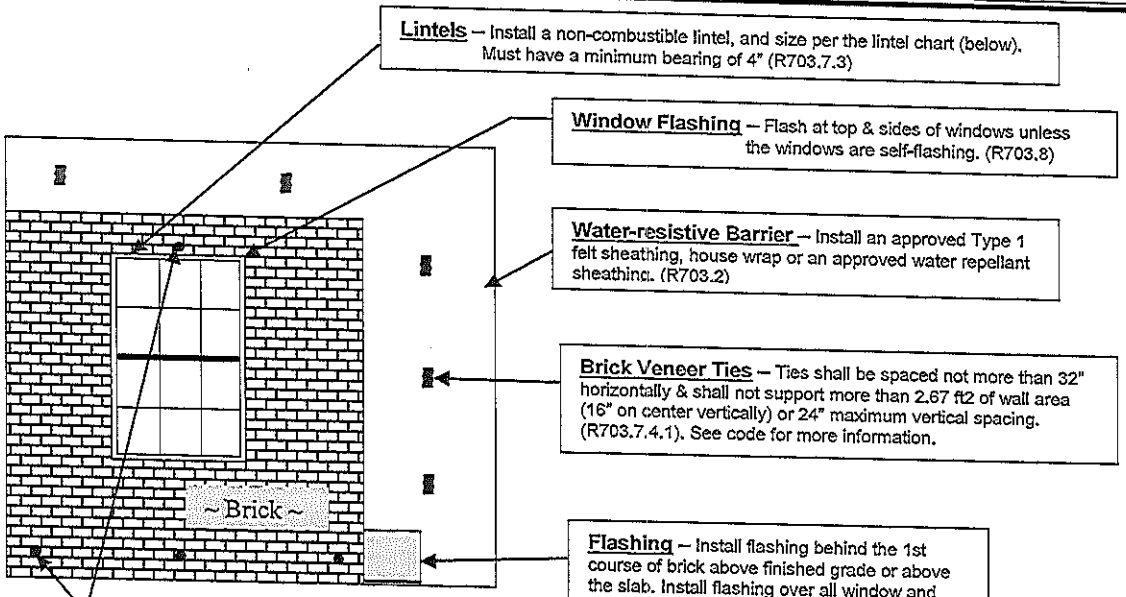


The illustration shows examples of proper means for venting of exhaust fans to the outdoors. Similar methods may be utilized and field approved by the inspector.

Knox County Code Administration & Inspection

BRICK INSTALLATION INFORMATION

REV. 112012



Lintels – Install a non-combustible lintel, and size per the lintel chart (below). Must have a minimum bearing of 4" (R703.7.3)

Window Flashing – Flash at top & sides of windows unless the windows are self-flashing. (R703.8)

Water-resistive Barrier – Install an approved Type 1 felt sheathing, house wrap or an approved water repellant sheathing. (R703.2)

Brick Veneer Ties – Ties shall be spaced not more than 32" horizontally & shall not support more than 2.67 ft2 of wall area (16" on center vertically) or 24" maximum vertical spacing. (R703.7.4.1). See code for more information.

Flashing – Install flashing behind the 1st course of brick above finished grade or above the slab. Install flashing over all window and door openings. (R703.7.5 & R703.8)

Weep Holes – Install min. 3/16" weepholes at a maximum spacing of 33" on center immediately above the flashing. (R703.7.6)

WALL ELEVATION

TABLE R703.7.3.1 from 2012 INTERNATIONAL RESIDENTIAL CODE ®
ALLOWABLE SPANS FOR LINTELS SUPPORTING MASONRY VENEER [a,b,c,d]

SIZE OF STEEL ANGLE [a,c,d] (Inches)	NO STORY ABOVE	ONE STORY ABOVE	TWO STORIES ABOVE	No. of ½" or equivalent reinforcing bars in reinforced lintel [b,d]
3 x 3 x ¼	6' - 0"	4' - 6"	3' - 0"	1
4 x 3 x ¼	8' – 0"	6' – 0"	4' – 6"	1
5 x 3 ½ x 5/16	10' - 0"	8' – 0"	6' – 0"	2
6 x 3 ½ x 5/16	14' – 0"	9' – 6"	7' – 0"	2
(2) 6 x 3 ½ x 5/16	20' – 0"	12' – 0"	9' – 6"	4

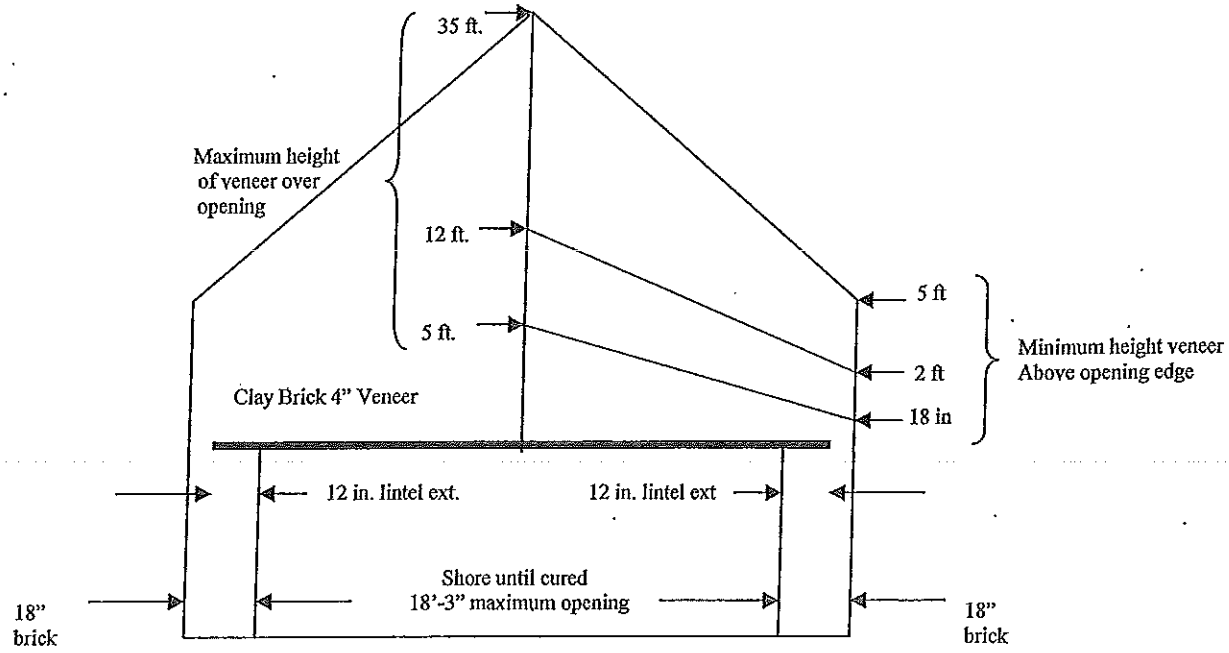
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.
[a] Long leg of the angle shall be placed in a vertical position.
[b] Depth of reinforced lintels shall not be less than 8 inches and all cells of hollow masonry lintels shall be grouted solid. Reinforcing bars shall extend not less than 8 inches into the support.
[c] Steel members indicated are adequate typical examples; other steel members meeting structural design requirements may be used.
[d] Either steel angle or reinforced lintel shall span opening.

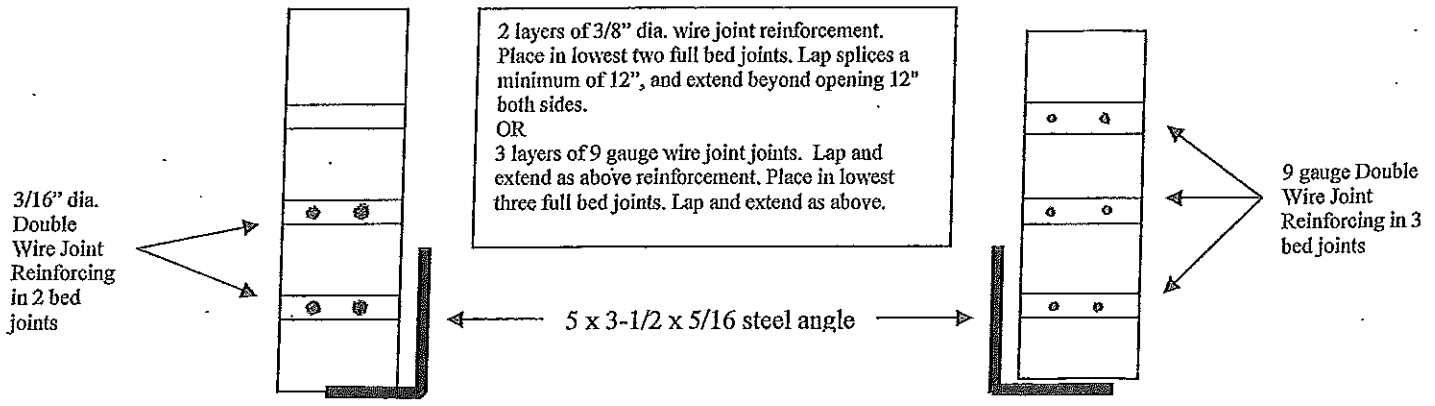
Alternate Method for Support of Brick Veneer above Garage Door

Typically garage door openings over 10 feet are required to be designed by an engineer. However, in North Carolina the Department of Insurance has officially recognized an alternate method of support that incorporates the concept of reinforcing of brick veneer. This technique allows the use of ladder wire joint reinforcing in the first few horizontal mortar joints above the openings as described by diagram below.

Construction Considerations:

1. The maximum opening allowed by this method is 18'-3" inches with a minimum of 18"of brick required on either side of opening.
2. A maximum height of 5' of brick may be supported above the opening provided there is a minimum of 18" of veneer above edges, a maximum height of 12' of brick provided there is a minimum of 2'of veneer above the edges and a maximum height of 35 feet of brick provided there is a minimum of 5 feet of veneer above the opening edges.
3. Care must be taken with the placement of additional openings (i.e. windows) above the garage opening. If the height of veneer is less than 3 feet the depth of openings should be limited to ½ the height of the veneer and they must be placed within 12 inches of the bottom and 6 inches from the top of the veneer.
4. A 5" x 3 ½ "x 5/16" angle should be used to facilitate installation and should be shored for at least 7 days after installation.
5. For double garage doors with 1'- 6" in between the steel angle must be continuous over both openings and the 1'- 6" in between.





PERMITS SHALL NOT BE CONSTRUED TO BE APPROVAL OF VIOLATIONS OF PROVISIONS OF THE CODE OR OTHER LAWS. ISSUANCE OF PERMITS SHALL NOT PREVENT THE BUILDING OFFICIAL FROM REQUIRING CORRECTION OF ERRORS IN PLANS, CONSTRUCTION OR OTHER VIOLATIONS OF THIS CODE.

ELECTRICAL PERMITS SHALL BE OBTAINED FROM THE STATE OF TN. ELECTRICAL INSPECTOR AT THE LOCAL UTILITY COMPANY. KUB 865-558-2504 OR LCUB 865-986-6591 OR CUB 865-457-9232

SMOKE DETECTORS REQUIRED IN EACH SLEEPING ROOM, OUTSIDE EACH SLEEPING ROOM WITHIN 20 FT. OF DOOR, IN GARAGE AND ON EACH STORY. DO NOT PLACE WITHIN 3 FT. OF AIR VENTS. DETECTORS SHALL BE INTERCONNECTED SO THAT ACTUATION OF ONE WILL ACTUATE ALL ALARMS. ALARMS SHALL BE AUDIBLE IN SLEEPING AREAS. PRIMARY POWER SHALL BE FROM BUILDING WIRING AND BATTERY BACK UP REQUIRED.

GARAGES OR ROOMS WITH 6 FOOT OR WIDER DOOR TO OUTSIDE MUST HAVE ½" GYPSUM BOARD ON CEILING AND WALL BETWEEN GARAGE AND DWELLING. ATTIC ACCESS IN GARAGE MUST BE COVERED WITH SAME OR 2 COATS OF FIRE RETARDANT PAINT. ⅝" TYPE X GYPSUM BOARD REQUIRED ON CEILING IF A ROOM IS ABOVE. 1⅜" SOLID CORE WOOD, HONEYCOMB CORE STEEL OR 20 MIN. RATED DOOR REQUIRED BETWEEN GARAGE AND DWELLING. GAS APPLIANCES IN GARAGE MUST BE 18" ABOVE FLOOR. DUCTS IN GARAGE MUST BE 26 GA. STEEL WITH NO OPENINGS INTO GARAGE WITHOUT AUTOMATIC FIRE DAMPER.

BEDROOMS AND BASEMENTS SHALL HAVE AN EMERGENCY ESCAPE DIRECTLY OUTSIDE. THIS CAN BE A DOOR OR WINDOW WITH A CLEAR OPENING OF 5 SQ. FT. ON GRADE FLOOR AND 5.7 SQ. FT. ON OTHER FLOORS. 20" MIN. CLEAR WIDTH. 24" MIN. CLEAR HEIGHT. 44" MAX. SILL HEIGHT.

STAIRS 36" MIN. WIDTH, 8"MAX. RISER HEIGHT AND 9" MIN. TREAD DEPTH. ¼" TO 1¼" NOSING REQUIRED IF SOLID RISERS. WINDERS 4" MIN. TREAD DEPTH AT NARROW END AND 9" MIN. AT 12" FROM NARROW END. HANDRAILS/GUARDRAILS 34" TO 38" ABOVE TREAD NOSE REQUIRED IF TOTAL RISE 30" OR MORE. 4⅜" MAX. PICKET SPACING ON OPEN SIDE. RAIL ENDS MUST TERMINATE IN POSTS OR RETURN TO WALL. DECK/BALCONY GUARDRAILS 36" MIN. HEIGHT AND 4" MAX. SPACING FOR PICKETS.

FIREPLACES/CHIMNEYS SHALL BE PER CODE AND MANUFACTURERS INSTRUCTIONS. HEARTHS SHALL BE CONSTRUCTED OF AND SUPPORTED BY NON-COMBUSTIBLE MATERIAL AND EXTEND 20" IN FRONT AND 12" TO THE SIDES IF FIREPLACE OPENING IS OVER 6 SQ. FT. CHIMNEY SHALL EXTEND 3 FT. MIN. ABOVE ROOF AT PENETRATION AND 2 FT. HIGHER THAN ANY PART OF BUILDING WITHIN 10 FT.

ATTIC ACCESS 22"X 30" MIN. VENTILATION 1 SQ. FT. NET FREE VENT AREA PER 150 SQ. FT. MAY BE REDUCED TO 1 SQ. FT. PER 300 SQ. FT. IF 50-80% IS IN UPPER PORTION OF ATTIC SPACE. RIDGE BOARD MUST BE AS DEEP AS CUT END OF RAFTERS. RAFTER TIES MUST BE IN LOWER ⅓ OF ATTIC IF CEILING JOISTS ARE NOT PARALLEL TO RAFTERS. COLLAR TIES OR RIDGE STRAPS ARE REQUIRED IN UPPER ⅓ OF ATTIC. FELT IS REQUIRED UNDER SHINGLES.

WALL BRACING REQUIRED AT CORNERS AND AT EVERY 25 FT. WITH OSB/PLYWOOD, 1"X 4" LET-IN BRACES OR METAL STRAPS. 16% OF WALL LENGTH MUST BE BRACED FOR 1 STORY, 30% OF 1ST STORY AND 16% OF 2ND STORY FOR A 2 STORY AND 45% OF 1ST STORY, 30% OF 2ND STORY AND 16% OF 3RD STORY FOR A 3 STORY. BRACING MUST BE INCREASED 1.5 TIMES FOR BRICK OR STONE VENEER ON 2 OR 3 STORY HOUSES. CORNER BRACING BY GARAGE DOOR MUST BE 16" WIDE FOR 1 STORY OR 24" FOR 2 STORY AND NAILED 3" O.C.

BRICK/STONE WALL TIES SHALL BE SPACED 32" MAX. HORIZONTAL AND SUPPORT 2.67 SQ. FT. OF AREA MAX. WATER-RESISTIVE BARRIER (HOUSEWRAP/FELT) REQUIRED UNDER ALL EXTERIOR WALL FINISHES. 1" AIR SPACE AND FLASHING WITH WEEPHOLES IN THE FIRST COURSE ABOVE GRADE AND OVER ALL OPENINGS ARE REQUIRED FOR MASONRY OR STONE VENEER. NON-COMBUSTIBLE SUPPORT REQUIRED FOR ALL VENEER. STEEL LINTELS MUST BE SIZED PER CODE.

BEARING HEADERS OVER 16 FT. GARAGE DOOR MUST BE 2-2X 12 WITH ½" STEEL PLATE BETWEEN BOLTED AT 2 FT. O.C. STAGGERED TOP AND BOTTOM OR A PRE-ENGINEERED BEAM.
PRE-ENGINEERED COMPONENTS SHALL BE INSTALLED ACCORDING TO MANUFACTURERS INSTRUCTIONS. DRILLING, NOTCHING, CUTTING OR MODIFICATION OF DESIGN OR ARRANGEMENT REQUIRES WRITTEN APPROVAL OF DESIGN ENGINEER.

CRAWL SPACE MIN. HEIGHT 18"AND ACCESS MIN. 18"X 24". 1 SQ. FT. NET FREE VENT AREA REQUIRED WITHIN 3 FT. OF EACH CORNER AND 1 SQ. FT. NET FREE VENT AREA REQUIRED PER 150 SQ. FT. OF CRAWL SPACE OR FOR EACH 1500 SQ. FT. IF A VAPOR BARRIER IS INSTALLED. PIER HEIGHT IS MAX. 4 TIMES LEAST DIMENSION FOR HOLLOW AND 10 TIMES FOR SOLID OR FILLED.

FOOTINGS 2500 PSI MIN. CONCRETE ON UNDISTURBED OR 90% COMPACTED SOIL, 8" THICK AND EXTEND 12" BELOW GRADE. 16" WIDE MIN. FOR 8" HOLLOW BLOCK WITH WOOD FRAME UP TO 2 STORY AND 24"-32" WIDE FOR SOLID OR FILLED BLOCK WITH WOOD FRAME UP TO 3 STORY. FOOTING MUST EXTEND 2" MIN., BUT NOT MORE THAN FOOTER THICKNESS, ON EACH SIDE OF WALL. ANCHOR BOLTS MUST BE ½" DIA. EMBEDDED 7" AND 6 FT. O.C. MAX. OR CODE APPROVED ALTERNATE.

INSULATION: ATTIC R-38 AND DEPTH MARKERS REQUIRED EACH 300 SQ. FT.; WALL R-13; FLOOR R-19; SLAB R-10 - 2"X 24" RIGID AT PERIMETER; DUCT R-8; REFRIGERANT PIPES R-3. CERTIFICATE OF R-VALUES AND APPLIANCE AND WINDOW EFFICIENCY RATINGS MUST BE POSTED NEAR MAIN ELECTRIC PANEL. WATER PIPE IN CRAWL OR ATTIC MUST BE INSULATED.

FOUNDATION WALLS MUST EXTEND 6" ABOVE GRADE (4" FOR MASONRY VENEER) AND MUST BE PROPERLY SIZED AND REINFORCED FOR WALL HEIGHT AND BACKFILL DEPTH. FOUNDATION WALLS MUST BE BRACED TO FLOOR DIAPHRAGM AT THE TOP ON ALL SIDES. ENGINEERING WILL BE REQUIRED IF THERE IS HYDROSTATIC PRESSURE FROM GROUNDWATER, UNSTABLE SOILS OR NO PERMANENT LATERAL SUPPORT AT THE TOP AND BOTTOM ON ALL SIDES.

FIREBLOCKING REQUIRED TO CUT OFF ALL CONCEALED DRAFT OPENINGS AT ALL FLOOR AND CEILING LEVELS, AT TOP AND BOTTOM OF STAIRS, AT OPENINGS AROUND VENTS, PIPES, DUCTS OR WIRES AT THE FLOOR AND CEILING, AT 10 FT. INTERVALS IN TALL WALLS AND AROUND CHIMNEYS OR IN CHASES AT FLOOR AND CEILING LEVEL. DRAFTSTOPPING REQUIRED IN OPEN WEB TRUSS FLOOR SYSTEMS WITH USEABLE ROOMS ABOVE AND BELOW IF CONCEALED SPACE EXCEEDS 1000 SQ. FT.

Min.	8" Block – Max. Heights				12" Block – Max. Heights			
Rebar	fill	wall	fill	wall	fill	wall	fill	wall
Hollow	4-0	8-8			5-0	8-8		
Solid	5-0	7-0			6-0	8-8		
#4 @ 48	4-0	10-0	5-0	8-0				
#4 @ 72					5-0	10-0		
#5 @ 48	5-0	10-0	6-0	8-0				
#5 @ 72					6-0	10-0		
#6 @ 16	10-0	10-0						
#6 @ 24	8-0	10-0	8-8	8-8				
#6 @ 32	7-0	10-0	8-0	8-0				
#6 @ 40	7-0	9-4			9-0	10-0	9-4	9-4
#6 @ 48	6-0	10-0			8-8	8-8		
#6 @ 56					8-0	9-4		
#6 @ 64					8-0	8-0		
#6 @ 72					7-0	10-0		

RADON VENT PIPE MUST BE INSTALLED EXCEPT IN CRAWL SPACES WITH APPROVED VENTILATION. THIS WILL INCLUDE A 3" PIPE EXTENDING FORM A TEE UNDER A SLAB OR MEMBRANE UP INTO THE ATTIC. VENT MAY TERMINATE IN THE ATTIC AND WILL ONLY BE REQUIRED TO GO THROUGH THE ROOF IF TESTS SHOW HIGH RADON LEVELS. ALL POTENTIAL RADON ENTRY ROUTES SHALL BE SEALED INCLUDING FLOOR OPENINGS, CONCRETE JOINTS, SUMP PITS AND THE TOP OF HOLLOW FOUNDATION WALLS.

DRYER VENTS MUST NOT EXCEED 35 FT. IN LENGTH WITH EACH 90° BEND COUNTING AS 5 FT. OF LENGTH. JOINTS MUST BE RIVETED OR APPROVED REINFORCED ALUMINUM TAPE WITH NO SCREWS GOING INSIDE VENT. EXHAUST VENTS FOR BATHS MUST TERMINATE TO THE OUTSIDE.

TEMPERED GLASS REQUIRED: AROUND A TUB OR SHOWER IF BOTTOM OF GLASS IS LESS THAN 5 FT. ABOVE FLOOR; WITHIN 2 FT. OF A DOOR IF BOTTOM OF GLASS IS LESS THAN 5 FT. ABOVE FLOOR; IF LESS THAN 18" ABOVE FLOOR AND OVER 9 SQ. FT. IN AREA; AND ADJACENT TO STAIRS, LANDINGS OR RAMPS IF BOTTOM OF GLASS IS LESS THAN 5 FT. ABOVE WALKING SURFACE OR IF LESS THAN 5 FT. HORIZONTALLY FROM THE BOTTOM TREAD.

FOUNDATION AND/OR FRAMING PLANS AND DETAIL DRAWINGS ARE REQUIRED AS LISTED BELOW. SUBMIT FOR REVIEW.

☐ FOOTERS	☐ PIERS
☐ FOUNDATION WALL	☐ FLOOR SLAB
☐ FLOOR FRAMING	☐ WALL FRAMING
☐ ROOF FRAMING	☐ DECKS/PORCHES
☐ CEILING FRAMING	☐ STAIRS/RAILS
☐ _____	☐ _____
☐ _____	☐ _____
☐ _____	☐ _____

Knox County Code Administration & Inspection

IRC – Under-Floor Space Information

REV. 112012

SECTION R408 UNDER – FLOOR SPACE (Partial readings of code section)

R408.1 Ventilation
The under-floor space between the bottom of the floor joists and the earth under any building (except such space occupied by a basement) shall have ventilation openings through foundation walls or exterior walls. The minimum net area of ventilation openings shall not be less than 1 square foot for each 150 square feet of crawl space area, unless the ground surface is covered by a class 1 vapor retarder material (with approved retarder, the minimum ventilation shall be 1 square foot of ventilation per 1500 square feet of under floor space area). One such ventilating opening shall be within 3 feet of each corner of the building.

R408.2 Openings for Under-floor Ventilation
Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed ¼".

1. Perforated sheet metal plates not less than 0.070inch thick.
2. Expanded sheet metal plates not less than 0.047 inch thick.
3. Cast iron grill or grating.
4. Extruded load bearing brick vents.
5. Hardware cloth of 0.035 inch wire or heavier.
6. Corrosion Resistant wire mesh, with the least dimension being 1/8 inch.

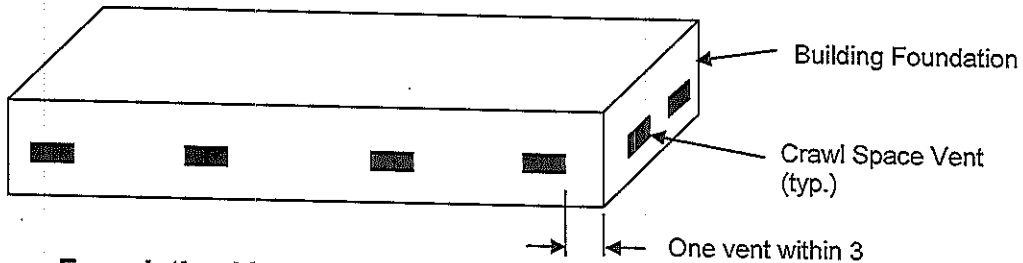
R 408.3 Unvented Crawl Space (Requires approval of submitted plans)
1. Exposed earth must be covered with a continuous vapor retarder with joints overlapped by 6" and sealed or taped. The vapor retarder must extend at least 6" up the stem wall where it must be attached and sealed to the wall, and one of the following is provided;
2. Install continuously operated mechanical exhaust ventilation at a rate of 1 cfm for each 50ft^2 of crawl space floor area with an air pathway to the common area with the perimeter walls insulated.
3. Conditioned air supply sized to deliver a rate equal to 1 cfm for each 50 ft ^{2} of under – floor area, with a return air pathway to the common area (by a duct or grill) with perimeter walls insulated.
4. Plenum complying with section M1601.4, if the under-floor space is used as a plenum.

Access
An access crawl hole 18" by 24" shall be provided to the under-floor space or in accordance to section R408.4.

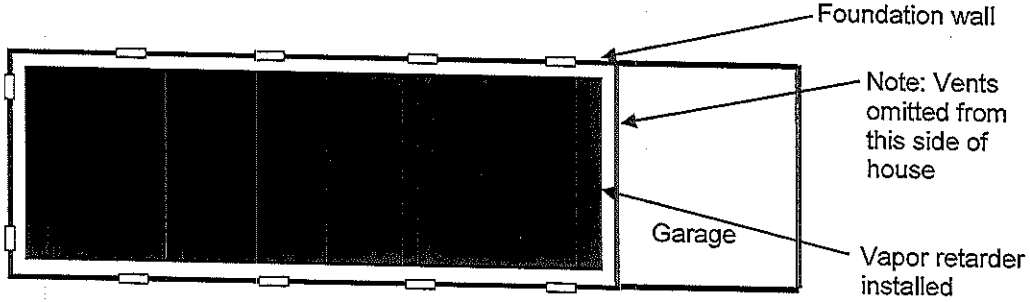
Removal of Debris
The under-floor grade shall be cleaned of all vegetation and organic material. All wood forms used for placing concrete shall be removed before a building is occupied or used for any purposes. All construction materials shall be removed before a building is occupied or used for any purpose.

Finish Grade
Grade may be located at the bottom of the footings; however, if there is evidence that the groundwater table can rise to within 6" of the finished floor (and does not readily drain, the grade of the under-floor space shall be as high as the outside finished grade and an approved drainage system is provided.

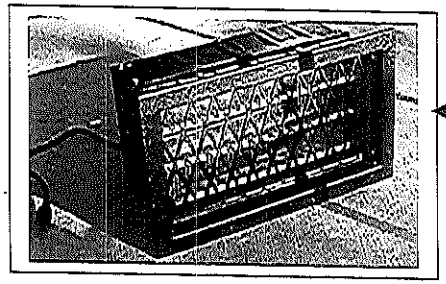
IMPORTANT:
Because of the recent awareness of fungus growth issues in crawl spaces and due to the lack of good airflow within them, a mechanical humidistat controlled fan(s) may be required by the Knox County Code Administration & Inspection Department. Call the codes office for details of installation.



Foundation Vent Layout



Foundation Plan View



Example of a mechanical power vent for a crawl space. Needs to be controlled by a humidistat or comparable means.

Knox County Code Administration & Inspection
Residential Deck Code Handout

REV. 121212

This handout is a guide and is not all-inclusive and all materials must be installed per the manufacturers' instructions and the 2012 International Residential Code IRC.

1. Flashing shall be installed at top of the ledger board and between the house wall. Flashing shall be continuous corrosion resistance type and installed per manufacturers instructions. This is usually stainless, double hot dipped galvanized, vinyl or copper. Aluminum flashing is not allowed.
2. The house wall ledger board shall be bolted to the house and be the same size as the floor joists (or larger if installing ledger strips).
3. The house ledger board shall be bolted (staggered top to bottom) to the house with ½" dia. lag bolts * with washers that are long enough to fully penetrate the structural member of the house. Bolt spacing shall be as follows: Joist Span 6' Bolt Spacing 30" oc

Joist Span	8'	Bolt Spacing	23" oc
Joist Span	10'	Bolt Spacing	18" oc
Joist Span	12'	Bolt Spacing	15" oc
Joist Span	14'	Bolt Spacing	13" oc
Joist Span	16'	Bolt Spacing	11" oc
Joist Span	18'	Bolt Spacing	10" oc

   Do not bolt to brick. Center of bolts must be at least 2" from the edge.
4. Joist hangers shall be sized and anchored * in accordance to the joist size and manufacturer's instructions.
5. Joists shall be sized per ***table 1.***
6. Deck girders shall be sized and supported in accordance with ***table 4.*** Girders must be fully supported by and structurally anchored to posts.
7. Posts shall be sized in accordance with ***table 2.*** All posts must be structurally anchored to the footing.
8. Ledger strips can be used in lieu of hangers or wall bearing. Ledger strips are to be 2" x 2" minimum and anchored with 3 - #16 nails * spaced 2" – 3" apart under each joist location.
9. Footings shall be sized in accordance with ***table 3.***

**** ALL FASTENERS, HANGERS, AND NAILS ARE TO BE DOUBLE HOT DIPPED GALVANIZED OR STAINLESS STEEL.***

Handrails and Guardrails:

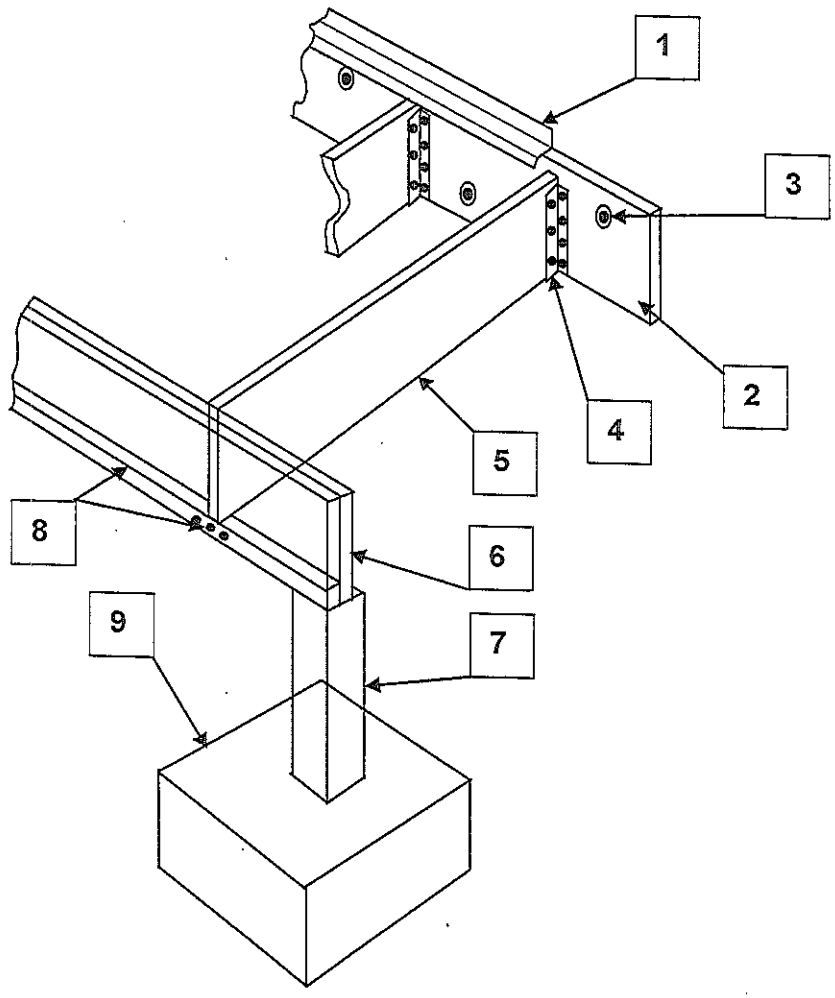
Porches and decks with a raised floor surface located more than 30" above the grade or floor below shall have guardrails not less than 36" in height. Intermediate rails shall be placed which do not allow passage of a 4" sphere.

Stairs:

Open sides of stairs with a total rise of more than 30" above the grade or floor below shall have guardrails not less than 34" in height measured vertically from the nosing of the treads. Intermediate rails shall be placed which do not allow passage of a 4" sphere.

Treads and Risers:

The maximum riser height shall be 8" (measured vertically between leading edges of adjacent treads). The minimum tread depth shall be 9" (measured horizontally from nose to nose). A nosing not less than ¾" but not more than 1 ¼" shall be provided on stairways with solid risers.

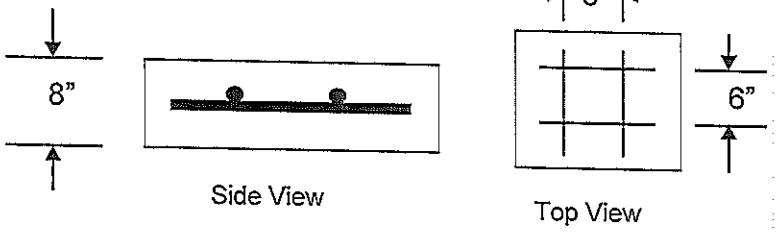


Based on the 2012 International Residential Code. Other materials, configurations, or engineered designs may be utilized that fall within the guidelines of this code.

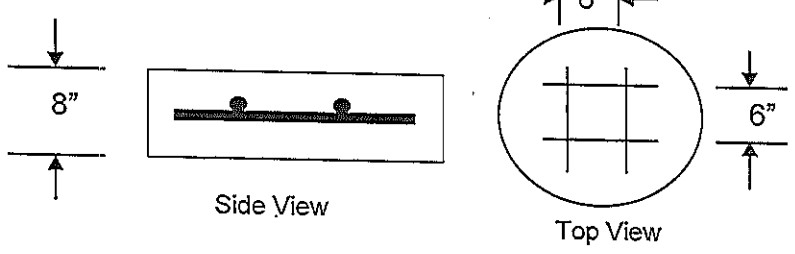
TABLE 1: Joist Span Chart				
	Spacing of Joists o.c.			
Joist Size	12"	16"	19.2"	24"
2" x 6"	10'-9"	9'-9"	9'-2"	8'-6"
2" x 8"	14'-2"	12'-10"	12'-1"	11'-0"
2" x 10"	18'-0"	16'-1"	14'-8"	13'-1"
2" x 12"	21'-9"	18'-10"	17'-2"	15'-5"
Note: Above span length are clear span dimensions between bearing points. (Based on No. 2 pine)				

TABLE 2: Deck Post Sizing		
Post Height	Wood Post Size	Round Metal (Sch. 40)
0' to 8'-0"	4" x 4"	3" Dia.
8' to 12'	6" x 6"	3" Dia.
Note: Call the Codes office if your posts are greater than 12 feet in height or provide an engineered design.		

TABLE 3: Deck Pier Footing Chart				
Header Size	2 @ 2"x6" or a single Member	2 @ 2"x8"	2 @ 2"x10"	2 @ 2"x12"
Square Footing Size	12" x 12"	17" x 17"	20" x 20"	24" x 24"
Round Footing Size	14"	19"	23"	27"
Note: Minimum thickness of concrete = 8", minimum frost line depth = 12". Install two (2) #4 rebar in each direction spaced 6" on center.				



Typical Square Footing Rebar Placement



Typical Round Footing Rebar Placement

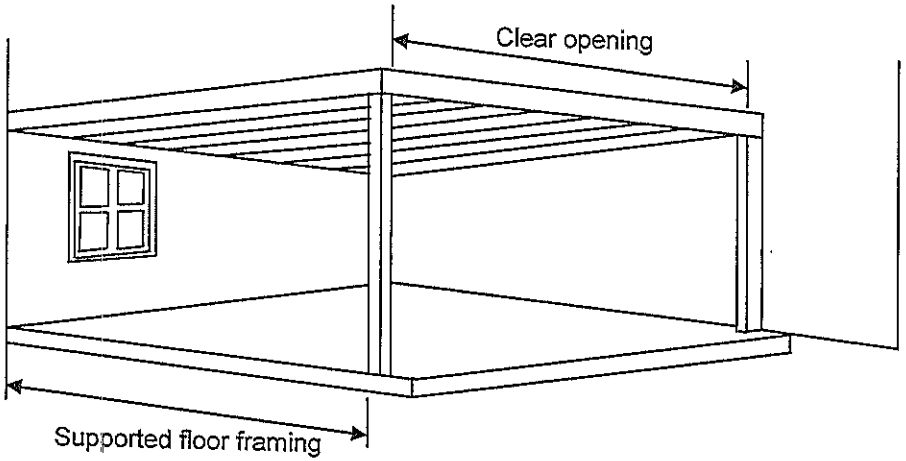
Table 4: Girder Sizing – 40 psf Live Load, 10 psf Dead Load, 1.00 Load Duration Factor

CLEAR OPENING	Span of Supported Floor Framing									
	4'	6'	8'	10'	12'	14'	16'	18'	20'	22'
4'	(1) 2x6	(1) 2x6	(1) 2x6	(1) 2x6	(1) 2x8	(1) 2x8	(1) 2x10	(1) 2x12	(1) 2x12	(2) 2x12
5'	(2) 2x6	(2) 2x6	(2) 2x6	(2) 2x6	(2) 2x6	(2) 2x8	(2) 2x8	(2) 2x10	(2) 2x10	(2) 2x10
6'	(2) 2x6	(2) 2x6	(2) 2x6	(2) 2x6	(2) 2x6	(2) 2x8	(2) 2x8	(2) 2x10	(2) 2x10	(2) 2x10
7'	(2) 2x8	(2) 2x8	(2) 2x8	(2) 2x8	(2) 2x10	(2) 2x10	(2) 2x10	(2) 2x12	(2) 2x12	(2) 2x12
8'	(2) 2x8	(2) 2x8	(2) 2x8	(2) 2x8	(2) 2x10	(2) 2x10	(2) 2x10	(2) 2x12	(2) 2x12	(2) 2x12
9'	(2) 2x8	(2) 2x8	(2) 2x10	(2) 2x10	(2) 2x10	(2) 2x12	(2) 2x12	(2) 2x12	(2) 2x12	(3) 2x12
10'	(2) 2x8	(2) 2x8	(2) 2x10	(2) 2x10	(2) 2x12	(2) 2x12	(3) 2x10	(3) 2x10	(3) 2x12	(3) 2x12
11'	(2) 2x10	(2) 2x10	(2) 2x12	(2) 2x12	(2) 2x12	(3) 2x10	(3) 2x10	(3) 2x12	(3) 2x12	(3) 2x12
12'	(2) 2x10	(2) 2x10	(2) 2x12	(2) 2x12	(3) 2x10	(3) 2x12	(3) 2x12	(3) 2x12	(4) 2x12	(4) 2x12
13'	(2) 2x12	(2) 2x12	(2) 2x12	(3) 2x10	(3) 2x12	(3) 2x12	(3) 2x12	(4) 2x12	(4) 2x12	*3-1/2 x 11*
14'	(2) 2x12	(2) 2x12	(3) 2x10	(3) 2x10	(3) 2x12	(4) 2x12	(4) 2x12	(4) 2x12	*3-1/2 x 12-3/8*	*3-1/2 x 12-3/8*
15'	(2) 2x12	(3) 2x10	(3) 2x10	(3) 2x12	(3) 2x12	(4) 2x12	(4) 2x12	*3-1/2 x 12-3/8*	*3-1/2 x 12-3/8*	*3-1/2 x 13-3/4*
16'	(3) 2x10	(3) 2x10	(3) 2x12	(3) 2x12	(4) 2x12	(4) 2x12	*3-1/2 x 12-3/8*	*3-1/2 x 13-3/4*	*3-1/2 x 13-3/4*	*3-1/2 x 13-3/4*
17'	(3) 2x12	(3) 2x12	(3) 2x12	(4) 2x12	(4) 2x12	*3-1/2 x 12-3/8*	*3-1/2 x 13-3/4*	*3-1/2 x 13-3/4*	*3-1/2 x 15-1/8*	*3-1/2 x 15-1/8*
18'	(3) 2x12	(3) 2x12	(4) 2x12	(4) 2x12	*3-1/2 x 12-3/8*	*3-1/2 x 13-3/4*	*3-1/2 x 13-3/4*	*3-1/2 x 15-1/8*	*3-1/2 x 16*	*3-1/2 x 17-7/8*
19'	(3) 2x12	(4) 2x12	(4) 2x12	(4) 2x12	*3-1/2 x 13-3/4*	*3-1/2 x 13-3/4*	*3-1/2 x 15-1/8*	*3-1/2 x 15-1/8*	*3-1/2 x 16-1/2*	*3-1/2 x 16-1/2*
20'	(4) 2x12	(4) 2x12	(4) 2x12	*3-1/2 x 13-3/4*	*3-1/2 x 13-3/4*	*3-1/2 x 15-1/8*	*3-1/2 x 17-7/8*	*3-1/2 x 19-1/4*	*3-1/2 x 22*	*3-1/2 x 23-3/8*

Southern Pine lumber sizes for No. 2 grade are shown in regular type, with number of plies given in parentheses. Southern Pine glued laminated timber sizes for 24F-1.8E combination are shown in italics when (4) 2x12's no longer meet design conditions. A 3.0" bearing length is assumed on girder ends.

Steps in Using this Table:

1. Verify the applicability of this table's design loads in pounds per square foot (psf) and corresponding load duration factor.
2. Find the span of supported floor framing. (i.e. span of joists or trusses that frame into the beam).
3. Find the clear opening required in feet.
4. Select the number of plies and size or the Southern Pine 24F-1.8E glued laminated timber.
5. Beams supporting face mounted joists cannot be smaller than joist and top flange hangers are required.
6. Member sizes were designed assuming beams were braced continuously to prevent lateral compression buckling.



Knox County Code Administration, Building Inspection & Code Enforcement

IRC – DUCT INSTALLATION & INSULATION

Rev. 112012

2012 International Residential Code ®
INSULATION N1103.2 Ducts.

N1103.2.1 Insulation. Supply and return ducts shall be insulated to a minimum of R-6. Ducts in floor trusses shall be insulated to a minimum of R-6. Ducts in the attic shall be insulated to a minimum of R-8. **Exception:** Ducts or portions thereof located completely inside the building thermal envelope.

N1103.2.2 Sealing. Ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.4.1.

N1103.2.3 Building cavities. Building framing cavities shall not be used as supply ducts.

DEFINITIONS

BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, floor, roof and any other building elements that enclose conditioned space or provides a boundary between conditioned space and exempt or conditional space.

CONDITIONED SPACE. For energy purposes, space within a building that is provided with heating and/or cooling equipment or systems capable of maintaining, through design or heat loss/gain, 50°F (10°C) during the heating season and 85°F (29°C) during the cooling season, or communicates directly with a conditioned space. For mechanical purposes, an area, room or space being heated or cooled by any equipment or appliance.

GARAGE DUCT INSTAIATION

R302.5.2 Duct penetration. Ducts in the garage and ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum No. 26 gage (0.48 mm) sheet steel or other approved material and shall have no openings into the garage.

R302.5.3 Other penetrations. Penetrations through the separation required in Section R302.6 shall be protected as required by Section R302.11, Item 4.

Knox County Code Administration & Inspection

EMERGENCY ESCAPE AND RESCUE OPENINGS

REV. 112012

Section R310 of the 2012 International Residential Code® for one and two family dwellings with explanation and Knox County amendments.

310.1 Emergency escape and rescue openings. Basements and every sleeping room shall have at least one operable emergency and rescue opening. Such opening shall open directly into a public street, public alley, yard or court. Where basements contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room, but shall not be required in adjoining areas of the basement. Where emergency escape and rescue openings are provided, they shall have a sill height of not more than 44 inches above the finished floor. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section 310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with section 310.2. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

310.1.1 Minimum opening area. All emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet.
EXCEPTION: Grade floor openings shall have a minimum net clear opening of 5 square feet. (Note: A grade floor opening is defined as, "A window or other opening located such that the sill height of the opening is not more than 44 inches above or below the finished ground level adjacent to the opening.)

310.1.2 Minimum opening height. The minimum net clear opening height shall be 24 inches.

310.1.3 Minimum opening width. The minimum net clear opening width shall be 20 inches.

310.1.4 Operational Constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.

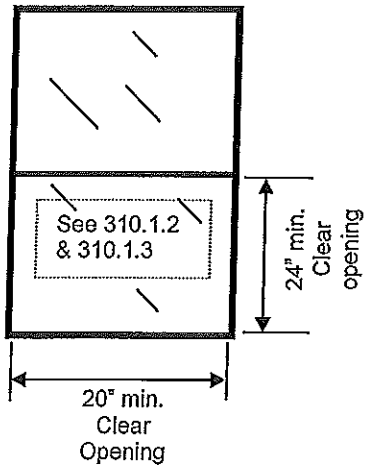
310.2 Window wells. The minimum horizontal area of the window well shall be 9 square feet with a minimum horizontal projection and width of 36 inches.

310.2.1 Ladder and steps. Window wells with a vertical depth greater than 44 inches (below grade) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or rungs shall have an inside width of at least 12 inches, shall project at least 3 inches from the wall and shall be spaced not more than 18 inches on center vertically for the full height of the window well.

310.4 Bars, grilles, covers, and screens. Bars, grilles covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, provided the minimum net clear opening size complies with Sections 310.1.1 to 310.1.3, and such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening.

310.5 Emergency escape windows under decks and porches.
Emergency escape windows are allowed to be installed under decks and porches provided the location of the deck allows the emergency escape window to be fully opened and provides a path not less than 36 inches in height to a yard or court.

Single or double hung windows: The clear opening is calculated with the lower sash fully opened and then multiplying the clear width times the clear height of the opening. (See section 310 above).



Knox County Code Administration & Inspection

Energy Conservation Code Requirements – IRC Residential

REV. 012013

Inspectors will verify energy conservation code requirements based upon 2012 IRC regulations. The owner/contractor will sign the certificate verifying the type of insulation and the equivalent R-values of the house's different insulation requirements as shown below.

AREA	INSULATION VALUE
Attic*	R-38*
Wood Frame Wall	R-13
Mass Wall	R-5 (R-10 if more than ½ on interior)
Floor	R-19
Basement Wall	R-10 / R-13**
Slab	R-10 (2 ft deep or wide)
Crawl Space Wall (Unvented)	R-10 / R-13**
HVAC Duct	R-8 in Attic(All other R-6)***
HVAC Refrigerant Line	R-2
Plumbing	R-2

*Exception: When R-38 is required in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves (Energy Truss). Insulation markers required every 300 sq.ft.

** Exception: *R*-10 applies to continuous insulation, R-13 to framing cavity insulation; either insulation meets the requirement.

*** Exception: Ducts or portions thereof located completely inside the building thermal envelope.

A permanent certificate shall be posted on or in the electrical distribution panel per Section N1101.16 of the 2012 IRC.

The building thermal envelope shall be durably sealed to limit infiltration and tested or inspected in accordance with Section N1101.12.1 of the 2012 IRC.

AIR BARRIER AND INSULATION INSPECTION

COMPONENT	CRITERIA
Air barrier and thermal barrier	Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air-permeable insulation is not used as a sealing material.
Ceiling/attic **R-38 minimum** **R-30 (Energy Truss)**	Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed. Attic access (except unvented attic), knee wall door, or drop down stair is sealed.
Walls **R-13 minimum**	Corners and headers are insulated. Junction of foundation and sill plate is sealed.
Windows and doors	Space between window/door jambs and framing is sealed.
Rim joists	Rim joists are insulated and include an air barrier.
Floors (including above garage and cantilevered floors) **R-19 minimum**	Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of floor.
Crawlspace walls / Basement walls **R-10 if continuous** **R-13 if in wall cavities**	Insulation is permanently attached to walls. Exposed earth in unvented crawlspaces is covered with Class I vapor retarder with overlapping joints sealed / taped. Unvented crawl space insulation extends 24" vertically or horizontally at grade.
Shafts, penetrations	Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditional space are sealed.
Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.
Garage separation **R-13 minimum**	Air sealing is provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures are airtight, IC rated and sealed to drywall. Exception – fixtures in conditioned space.
Plumbing **R-2 minimum** and wiring	Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
Shower/tub on exterior wall **R-13 minimum**	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.
Electrical/phone box on exterior wall	Air barrier extends behind boxes or air sealed type boxes are installed.
Common wall	Air barrier is installed in common wall between dwelling units.
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.
Fireplace	Fireplace walls include an air barrier.

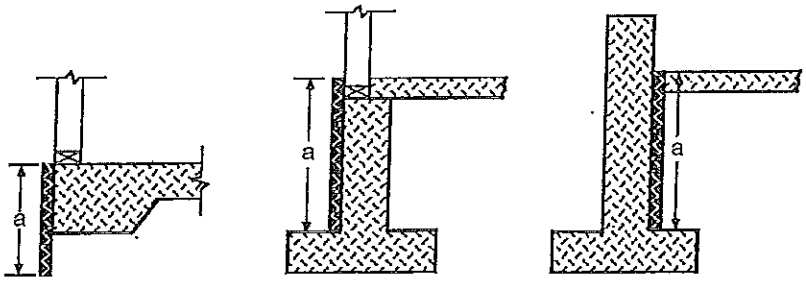
Slab Edge Insulation

N1102.2.7 Slab-on-grade floors. Slab-on-grade floors with a floor surface less than 12 inches below grade shall be insulated in accordance with Table N1102.1. The insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall. Insulation located below grade shall be extended the distance provided in Table N1102.1 by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil. The top edge of the insulation installed between the exterior wall and the edge of the interior slab shall be permitted to be cut at a 45-degree (0.79 rad) angle away from the exterior wall. Slab-edge insulation is not required in jurisdictions designated by the code official as having a very heavy termite infestation.

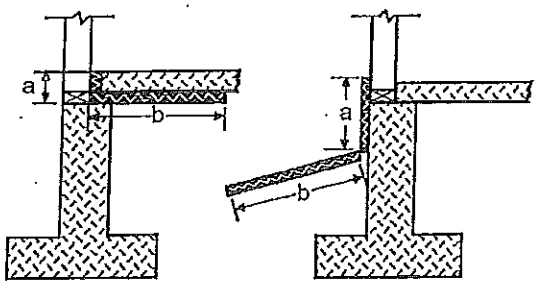
❖ The perimeter edges of slab-on-grade floors must be insulated to the *R*-value listed in Table N1102.1. These requirements apply only to slabs 12 inches (305 mm) or less below grade. The listed *R*-value requirements in the table are for unheated slabs. A heated slab must add another R-5 to the required insulation levels based on Note d of Table N1102.1.

The insulation must extend downward from the top of the slab or downward to the bottom of the slab and then horizontally in either direction until the distance listed in Table N1102.1 is reached. See Commentary Figure N1102.2.7 for examples or how the distance is measured. Most of the heat loss from a slab will occur in the edge that is exposed directly to the outside air. The insulation must be installed to the top of the slab edge to prevent this heat loss. Slab insulation may be installed on the exterior of the slab edge or between the interior wall and the edge of the interior slab as in a non-monolithic slab. In this type of installation, the exposed insulation could cause problems with tack strips for carpeting. Therefore, the insulation is allowed to be cut at a 45-degree angle away from the exterior or the wall. If a monolithic slab and foundation is being used, the required insulation would obviously need to be installed on the exterior and then either extended to the required depth or turned out to the exterior and be protected by either some type of pavement or a minimum of 10 inches (254 mm) of soil. Insulation which is exposed on or near the surface is easily damaged. This protection method assures that the insulation remains in place and provides the intended energy savings.

In areas with very heavy termite infestation, slab perimeter insulation need not be installed per Table N1102.1. These areas are identified in Figure R301.2(6) or the jurisdiction may base their determination on the local history and situation. It is important to understand that the revisions of the 2006 IRC energy requirements provide this exemption from the slab insulation provisions for any area with heavy termite infestations. The fact that this is an exemption and does not contain any requirement for a compensating increase of insulation at other locations is important. The 2000 and 2003 editions of the IRC only permitted the elimination of this slab edge insulation if one of the trade-off approaches from the IECC was used to make up for this lack of insulation at the slab edge. The requirements of IRC Section N1102.1.3 could still be used in areas which do not have a heavy termite infestation to eliminate the slab edge insulation if desired. Typically, slab perimeter insulation can be traded off entirely in these climates by increasing the ceiling or wall insulation *R*-values or by using glazing with a lower *U*-factor.



a = insulation depth



a + b = insulation depth

Figure N1102.2.7
SLAB EDGE INSULATION METHODS

Energy Efficiency Certificate

Permit No. _____

Address: _____

Insulation Ratings		R-Value
Roof/Ceiling:	With attic	*R-*
	Without attic	*R-*
Walls:	Frame	*R-*
	Mass	*R-*
	Basement	*R-*
	Crawlspace	*R-*
Floors:	Over Unconditional space	*R-*
	Slab-edge (depth)	*R-* / *2 ft*
Ducts:	Outside conditioned space	*R-*

Fenestration Ratings	NFRC U-Factor
Opaque Doors:	*U-*
Windows:	*U-*
Skylights:	*U-*

Equipment Performance		Efficiency
Heating System:	HSPF/AFUE	
Cooling System:	COP/SEER	
Water Heater/Boiler:	EF/E_o OR E_t	

Builder/Designer: _____ Date: _____

Adopted Code Edition: 2012 IRC

THIS CERTIFICATE SHALL BE PERMANENTLY POSTED ON OR IN THE ELECTRICAL DISTRIBUTION PANEL AS REQUIRED BY ENERGY/RESIDENTIAL CODES

EROSION CONTROL BEST MANAGEMENT PRACTICES

Sediment is the number one pollutant by volume in our waterways. An uncovered lot can release 30 tons per acre of soil during a large rain event. Erosion control best management practices (BMP's) are temporary measures implemented during construction to reduce the impact caused by ground-disturbing activities. BMP's must be planned to remain functional until final ground cover is established. *Inspect your erosion controls after every rain and at least once a week.*

PLAN IN PHASES

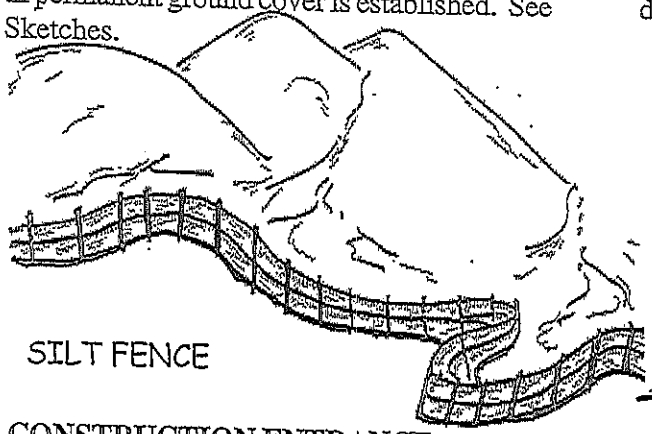
Large projects should be conducted in phases. Plan ahead to remove existing vegetation only when absolutely necessary.

GROUND COVER

Revegetation (permanent or temporary) is the best form of erosion control for any site. Plant temporary vegetation for erosion control. Non-vegetative cover (straw, matting, mulch, etc.) can be used when it is not a good time of year to start vegetation. Cover stockpiles and excavated soil with secured tarps or plastic sheeting. *Tennessee Department of Environment and Conservation regulation requires temporary vegetation be planted on sites that are idle for more than 30 days.* Plant permanent vegetation as soon as possible.

SEDIMENT BARRIERS

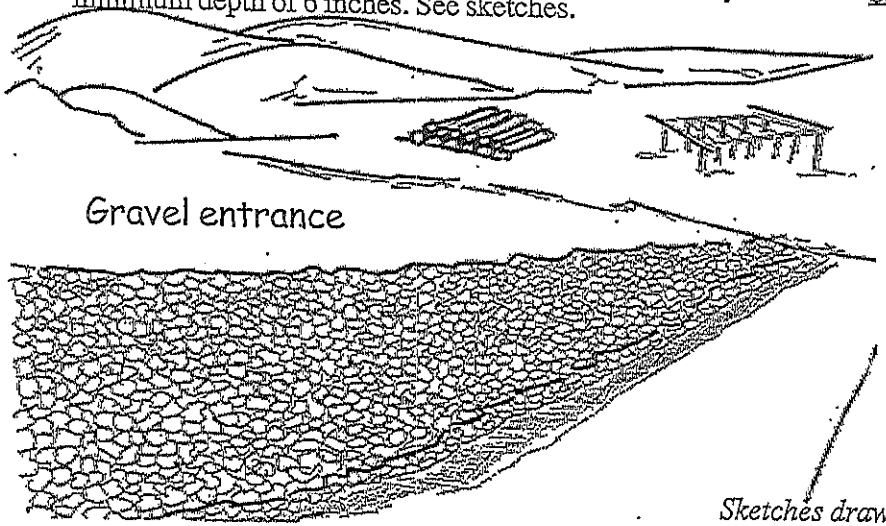
Sediment barriers work as leaky dams causing muddy water to pool behind them and allow the soil to settle out of the water before it drains through the barrier. A single row of silt fence is needed for every 100' of slope length for each disturbed area. Silt fence must be trenched in the ground a minimum of 8 inches to work properly. The fence posts should be at least 36 inches long and staked a minimum of 16 inches into the ground. They should be set on 5 foot centers. Silt fences are only effective if placed along the contours of the landscape. Storm drains need to be protected by a sediment barrier until permanent ground cover is established. See Sketches.



SILT FENCE

CONSTRUCTION ENTRANCE

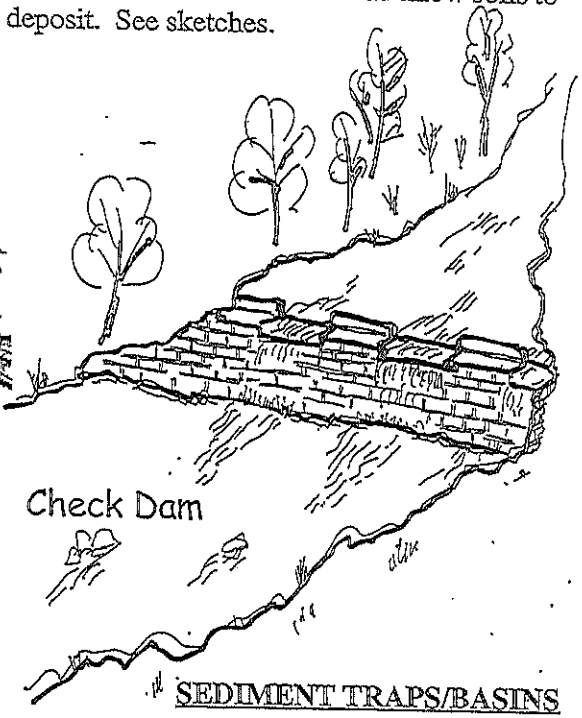
Construction site entrances need to be designed to prevent soil from leaving the site. A gravel construction entrance built to specifications can significantly reduce the amount of soil leaving the site. Gravel entrances need to be a minimum of 100 feet in length and have a minimum depth of 6 inches. See sketches.



Gravel entrance

DIVERSION CHANNELS/CHECK DAMS

Diversion dikes route stormwater runoff around disturbed areas. Diversion channels should be stabilized with grass, rip rap, sod, etc. Small check dams placed in diversion channels help reduce runoff velocites and allow soils to deposit. See sketches.



Check Dam

SEDIMENT TRAPS/BASINS

Sediment traps and basins are constructed water catchments which allow soils to settle out of stormwater runoff. Sediment traps and basins need to be used in conjunction with other BMPs. Sediment traps are to be used on sites less than five acres and sediment basins are to be used on sites five acres or larger.

Sketches drawn by Dave Feldman

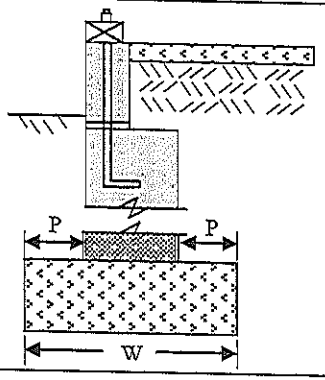
Knox County Code Administration & Inspection
IRC Residential Footing Information

REV.112012

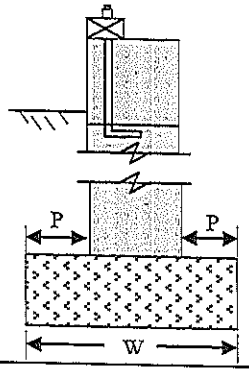
1. Footings are required on all exterior walls, beneath each end of interior girder beams, and beneath all posts supporting decks.
2. Minimum sizes for concrete and masonry footings are based on the load-bearing value of the soil, type of construction, and height of construction. **Table 1** below can be used to size footings.
3. Spread footings shall be at least 8" thick and shall have projections (P) at least 2" on each side of the foundation wall but not more than the thickness of the footing.
4. All exterior footings shall be placed such that the bottom of the footing is 12" minimum below the undisturbed ground surface or finished grade.
5. Additional footing information and requirements can be obtained in Section R403 of the 2012 International Residential Code ®.
6. Slab footings shall be protected against frost by installing insulation per Section R403.3 of the 2012 International Residential Code ®.

TABLE 1: MINIMUM WIDTH (W) OF CONCRETE OR MASONRY FOOTINGS (inches)

	LOAD-BEARING VALUE OF SOIL (psf)			
	1,500	2,000	3,000	≥ 4,000
Conventional light-frame construction				
1-Story	12	12	12	12
2-Story	15	12	12	12
3-Story	23	17	12	12
4-inch Brick veneer over light frame or 8-inch hollow concrete masonry				
1-Story	12	12	12	12
2-Story	21	16	12	12
3-Story	32	24	16	12
8-inch Solid or fully grouted masonry				
1-Story	16	12	12	12
2-Story	29	21	14	12
3-Story	42	32	21	16



GROUND SUPPORT SLAB WITH MASONRY WALL AND SPREAD FOOTING



BASEMENT OR CRAWL SPACE WITH MASONRY WALL AND SPREAD FOOTI8NG

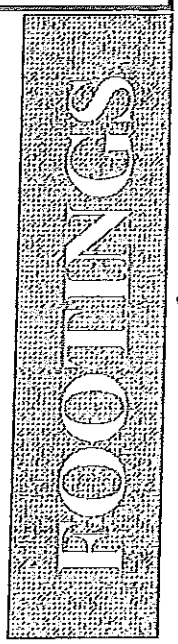
Owner is responsible for scheduling footing inspections.

21

Knox County Code Administration & Inspection

FOOTING INSTALLATION INSTRUCTIONS

REV. 07122007



THE FOLLOWING INFORMATION IS PROVIDED FOR THE INSPECTORS OF KNOX COUNTY CODE ADMINISTRATION & INSPECTION. THIS IS A GUIDELINE ONLY AND IS NOT ALL INCLUSIVE. ANY QUESTIONS SHOULD BE DIRECTED TO THE BUILDING OFFICIAL (S).

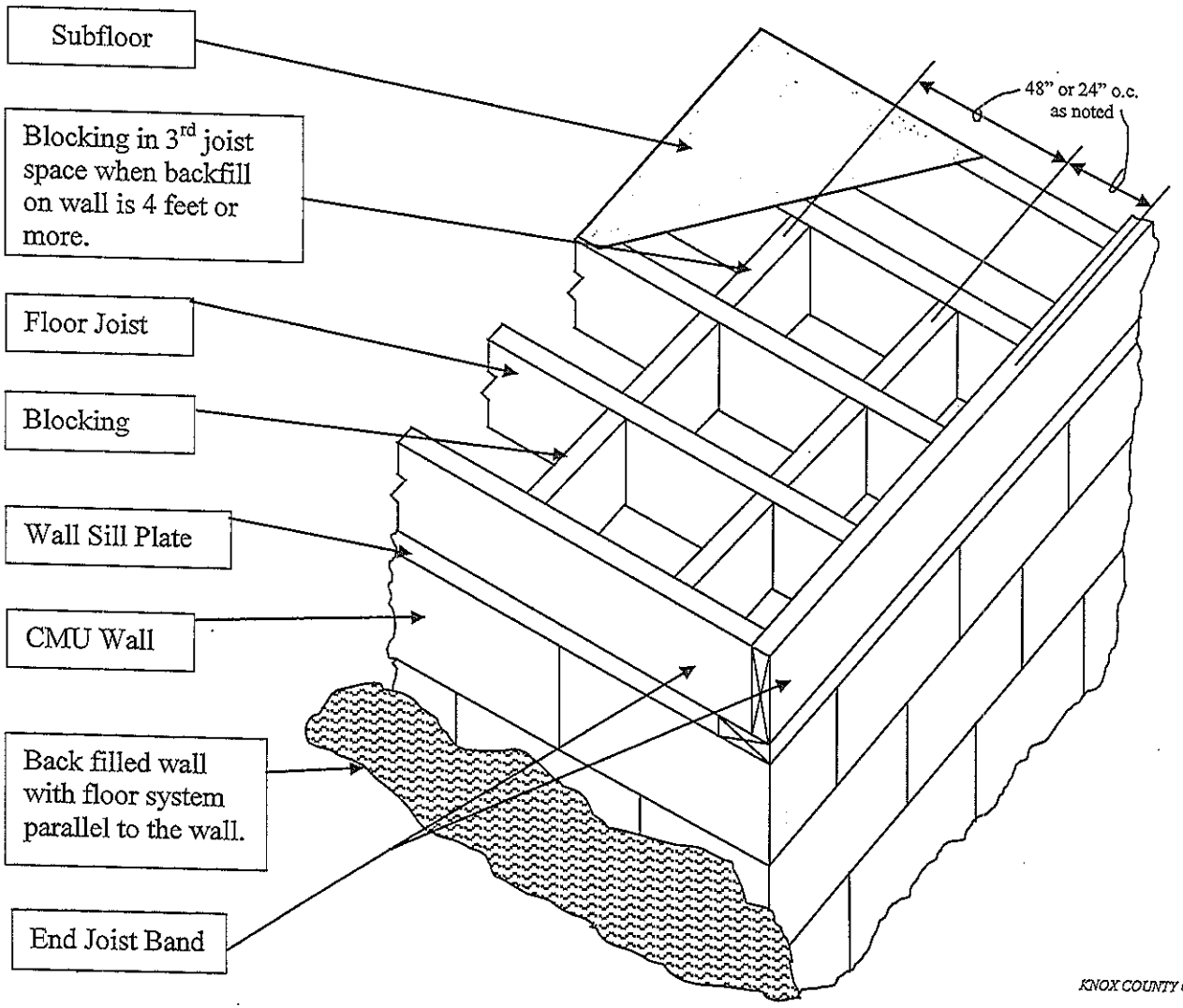
FOOTING SITUATIONS:

1. **NORMAL FOOTING**
   Inspect setbacks, erosion control, posting of permit #, portable restroom. Inspect footing depth, width and concrete depth at stakes. Probe footing to determine adequate bearing capacity. Check for roots, standing water, mud and loose soil. Footings will meet all adopted code requirements.
2. **DEEP FOOTING**
   The builder will dig down to stable soil and bring it up with flowable fill. NO INSPECTION IS REQUIRED UNTIL THE REBAR AND FLOWABLE FILL ARE IN PLACE. A State of Tennessee Engineer's letter is required if a material other than flowable fill is used.
   The builder will need to provide the Knox County Codes Department with a letter describing the soil condition of the deep footing (how deep, width, soil type, etc.).
   Inspector will verify proper footing depth, placement of rebar on top of the flowable fill (2 runs of #5 or 3 runs of #4 are required).
   This can be varied by a State of Tennessee Engineer's letter.
3. **PARTIAL ROCK**
   Areas of rock must be bedded with 6" or more of compacted clay or #57 stone. Stone fill can be up to 12" deep. Stone fill is best when a drain system is incorporated. Install 2 runs of #5 rebar or 3 runs of # 4 rebar over the stone areas and 2 feet beyond on either side. In lieu of stone fill and rebar, a small rock area can be spanned with a masonry lintel and placing a bulkhead on either side of the rock.
4. **ALL ROCK**
   Concrete can be poured directly to rock if the entire footing has rock and does not change to a different soil condition (i.e. red clay). Low areas can be leveled with 57 stone up to a depth of 12". Install rebar through entire footing of 2 runs of #5 rebar or 3 runs of # 4 rebar.
5. **STONE FILL ACTING AS A DRAIN SYSTEM FOR A FOOTING SYSTEM**
   Install 3" to 12" of #57 stone with a drain installed at the low point of the fill area.

Knox County Code Administration & Inspection (865) 215-2325

IRC - Foundation Wall Bracing, Section R404.1

REV. 112012



FOUNDATION WALL BRACING – Section R404.1, 2012 IRC.

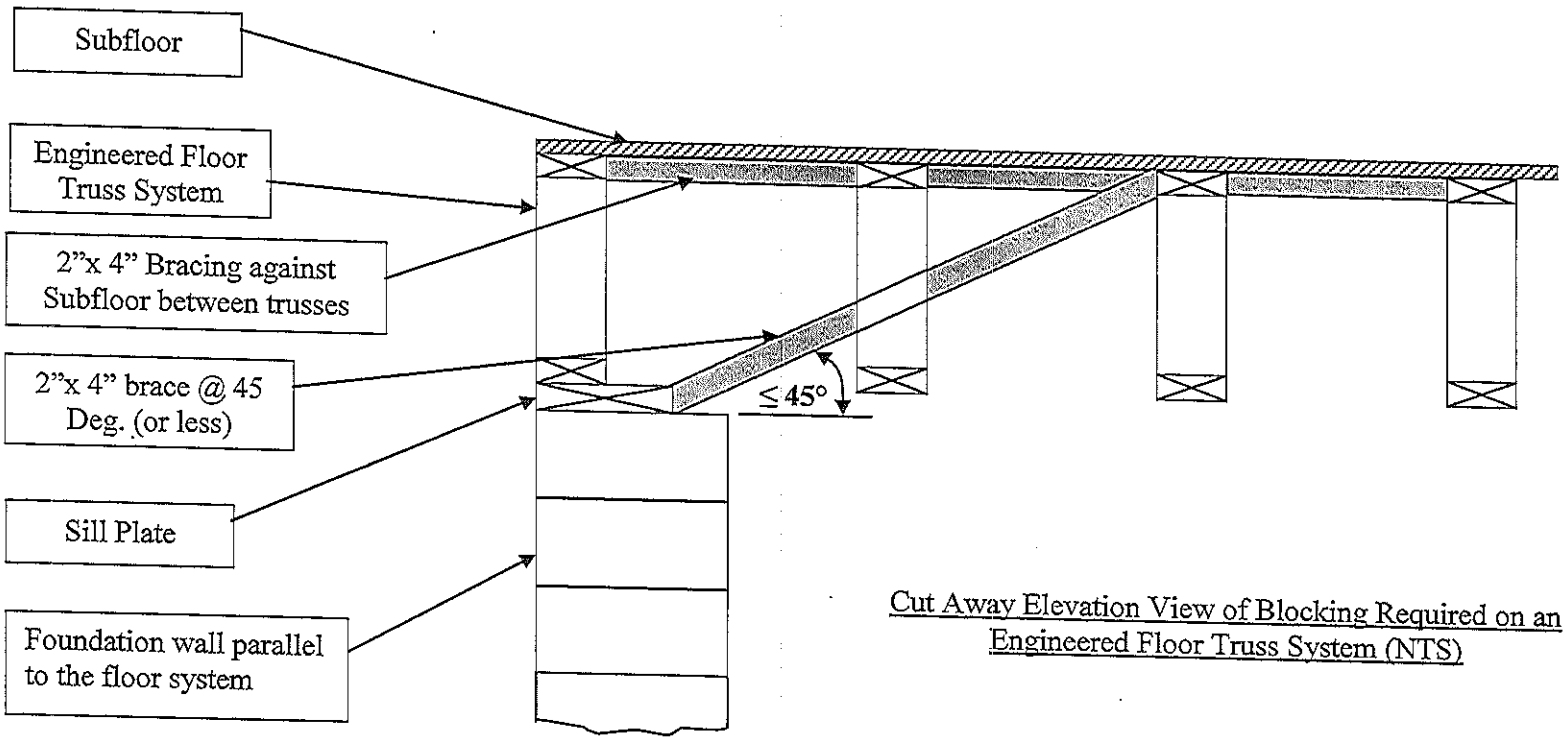
This section of the code has been amended and requires the foundation walls to be braced at the top as follows when the floor structure is parallel to the foundation wall.

1. For foundation walls that have no backfill or have less than 4 feet of backfill, blocking is required at 4 feet on center in the first two floor joist spaces from the foundation wall.
2. For 4 feet or more of backfill, blocking is required 2 feet on center in the first three joist spaces from the foundation wall.

Fasteners shall be installed as listed in the 2012 International Residential Code. Blocking shall be fastened in accordance to the requirements for floor joists. Subfloor shall be glued to the blocking and nailed or screwed @ 4" O.C.

NOTE: "I" JOIST INFORMATION

Floor systems that use wood "I" joists will need to install blocking (per manufacturer's instructions) against the webs of the "I" joists for proper attachment of the foundation wall bracing blocks. Follow instructions listed above for blocking installation and attachment.



Cut Away Elevation View of Blocking Required on an Engineered Floor Truss System (NTS)

INSTRUCTIONS:
1. Install a 2" x 4" brace from the inside edge of the sill plate to the side of the top cord at the second truss at less than or equal to 45° (as shown).
2. Install 2"x 4" flat bracing on the underside of the subfloor anchored at each end to the top cords of the trusses (as shown).
3. For foundation walls that have no backfill or have less than 4 feet of backfill, blocking is required at 4 feet on center.
4. Backfill of 4 feet or more requires blocking 2 feet on center in the first three truss spaces from the foundation wall.
5. Fasteners shall be installed as listed in the 2012 International Residential Code. Blocking shall be fastened in accordance to the requirements for floor joists. Subfloor shall be glued to the blocking and nailed or screwed @ 4" O.C.

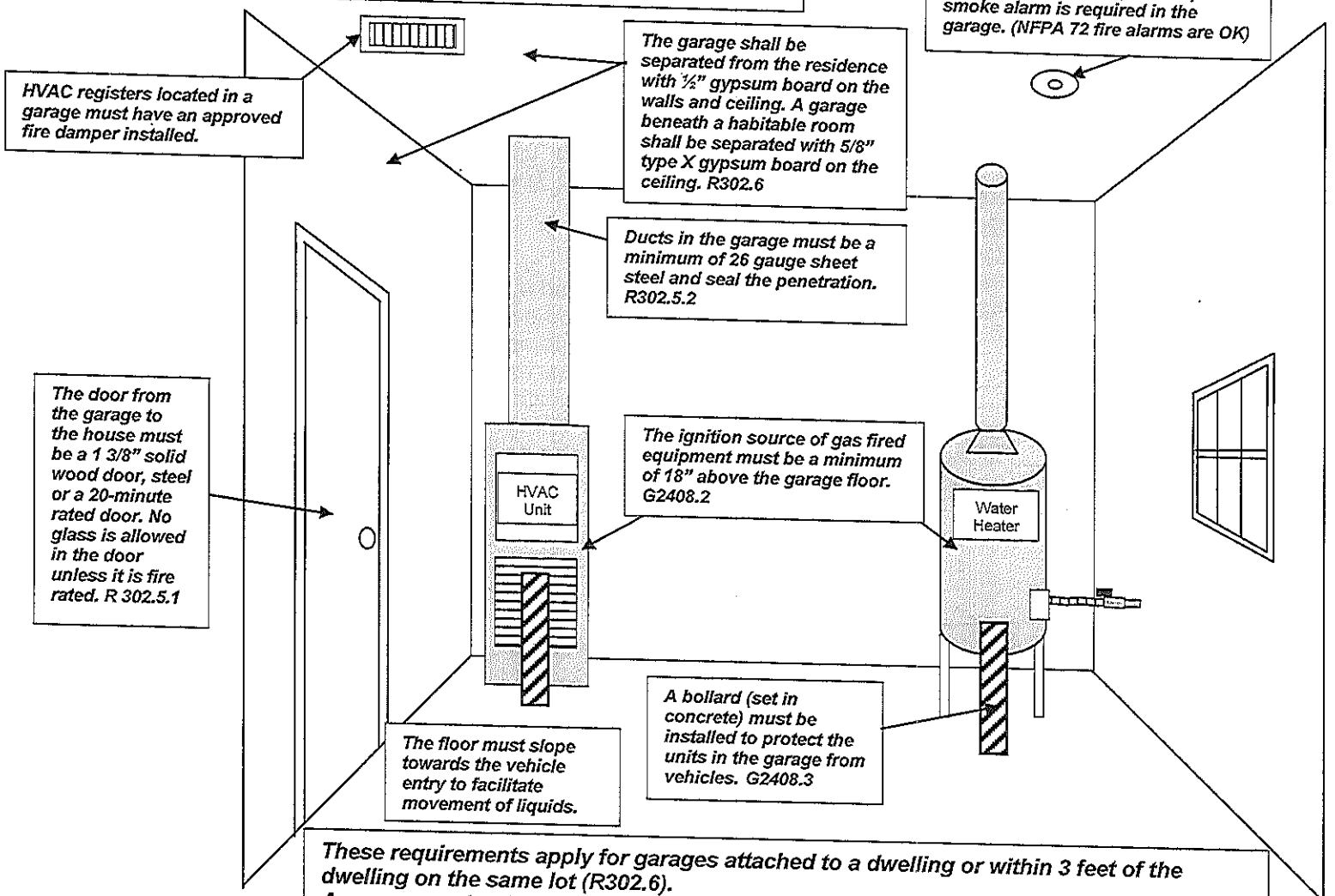
Knox County Code Administration & Inspection

IRC – Residential Garage Requirements

(865) 215-2325

Rev: 112012

The below information is based on the 2012 International Residential Code. This is not an all inclusive document and the Codes office should be contacted for further information.



These requirements apply for garages attached to a dwelling or within 3 feet of the dwelling on the same lot (R302.6).
A garage can be defined as a room or space (not part of the living space) that directly communicates with a private garage or has an opening that is greater than 6'-0" in clear width that directly communicates to the outdoors or another garage.

Knox County Code Administration & Inspection
Gas Pipe Sizing - International Fuel Gas Code

REV. 012013

SECTION 402.4.1 International Fuel Gas Code
Pipe Sizing (partial listing of code section)

Longest Length Method-The pipe size of each section of gas piping shall be determined using the longest length of piping from the point of delivery to the most remote outlet and the load of the section.

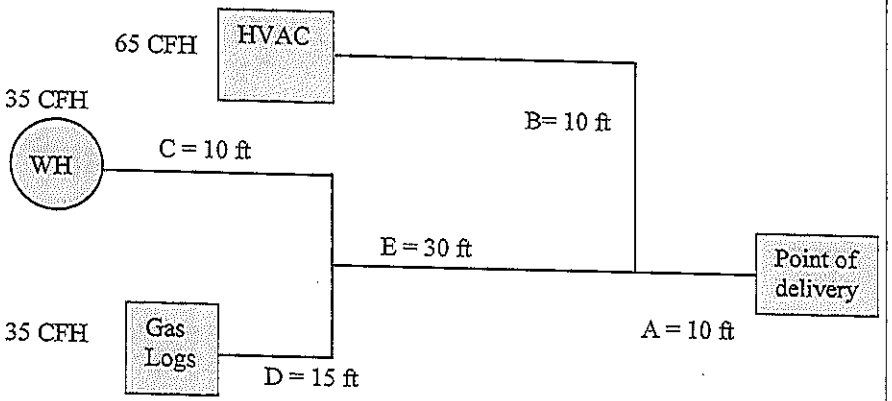
1. Measure the length of piping from the point of delivery to the most remote outlet in the building. This is the only distance used.
2. In the first column of the table, select that length or the next longer length if the table does not give the exact length.
3. Using this horizontal line, locate all gas demand figures for this particular system of piping (CFH's/ BTU's).
4. Starting at the most remote outlet, determine the gas demand for that outlet. Then locate this demand in the table or the next larger demand.
5. Above this demand figure in the top horizontal line in the table will be found the nominal pipe size required.
6. For each succeeding section of pipe, determine the total gas demand for each section and then proceed in the manner outlined above to determine the proper size of each.

IMPORTANT

Knox County Mechanical/ Gas inspectors will be sizing all gas piping using the longest length method. In the event where corrugated stainless steel tubing (CSST) and schedule 40 pipe are used within the same system or branch, the sizing table for the CSST will be used. In the event where there is hybrid pressure, the pipe size for each section of higher pressure gas piping shall be determined using the longest length of piping from the point of delivery to the most remote line pressure regulator. The pipe size from the regulator to each outlet shall be determined using the length of piping from the regulator to the most remote outlet served by the regulator.

9.2

Example



CSST SYSTEM (less than 2 PSI)

1. The longest run is 55 feet to the gas logs. Go to 60' line.
2. Using the CSST table, section D is ½".
3. Using the CSST table, section C is ½".
4. Section E is supplying both the WH and Gas Logs, using the CSST table; ½" will only supply 55 CFH. Section E is ¾".
5. Using the CSST table section B is ¾".
6. Section A is carrying the entire load of 135 CFH. Using the table, ¾" CSST will only supply 121 CFH. Section A is 1".

SCHEDULE 40 PIPE SYSTEM (less than 2 PSI)

1. Using the schedule 40 pipe table 402.4(2) with .5 inch water column and a .6 specific gravity.
2. Using the table section D is ½".
3. Using the table section C is ½".
4. Using the table section E is ¾".
5. Using the table section B is ½".
6. Using the table section A is ¾".

October 22, 2012

Knox County Residential Plans Review and Inspections Information

The information in this package is for reference only. Refer to the 2012 International Residential Code for complete code regulations
Additional information is available online at www.knoxcounty.org , www.knoxmpc.org and www.iccsafe.org

Required inspections: 1. Pre-pour footings. 2. Slab plumbing 3. Slab prep 4. Framing & plumbing. 5. Fire wall for duplexes & townhouses. 6. Insulation/energy efficiency 7. Special inspections for alternate materials and methods or unusual construction. 8. Final & gas. 9. Reinspections for rejected items or extra inspections for an extra $30 fee. 10. Electrical permit & inspections by the State of Tennessee. 11. KUB sewer inspection requirements and details are in the attached construction handouts

THESE PLANS ARE REQUIRED TO BE ON SITE AT THE TIME OF ALL INSPECTIONS

Section R106.3.1 of the 2012 International Residential Code requires that "one set of the approved plans shall be kept at the site of work and shall be open to inspection by the building inspector". Plans approved in this office along with other information such as drawings for trusses or other engineered components and manufacturers instructions or code compliance reports for appliances or other specific construction materials, methods or components not specifically covered in the code are required to be on site.

INSPECTORS ARE AUTHORIZED TO REJECT INSPECTIONS IF PLANS ARE NOT AVAILABLE ON SITE.

TELEPHONE NUMBERS

Inspection Scheduling	Codes Office Personnel	865-215-2325	
Building Inspectors	Codes Office	865-215-2325	
Building Permit Information	Codes Office Personnel	865-215-2325	knoxcounty.org/codes
Commercial Grading Permits	Engineering & Public Works	865-215-5800	
Flood Plain and Drainage Plans	Engineering & Public Works	865-215-5800	
Septic and Drainfield Layout	Health Department	865-215-5200	
State Electrical Inspections	Knoxville Utilities Board	865-558-2504	
State Electrical Inspections	Lenoir City Utilities Board	865-986-6591	
State Electrical Inspections	Clinton Utilities Board	865-457-9232	
Plans Review - Residential	Bill Pierce or Sean Payne	865-215-2325	
Plans Review - Commercial	Ron Mauer	865-215-2325	
Plans Review – Fire Bureau	Mike Brown or Travis Evans	865-215-4660	
Zoning complaints	Office of Neighborhoods	865-215-4357	
Addressing	Metropolitan Planning Commission	865-215-2500	knoxmpc.org
Contractor Licenses	State of Tennessee	1-800-785-3563	
Call before you dig	Tennessee One Call	1-800-351-1111	
Code Books	International Code Council	1-800-786-4452	iccsafe.org
Water & Sewer	Knoxville Utilities Board	865-558-2523	
Water & Sewer	Northeast Knox Utility District	865-688-4070	
Water & Sewer	West Knox Utility District	865-690-2521	
Water & Sewer	Knox-Chapman Utility District	865-577-4497	
Water & Sewer	Hallsdale/Powell Utility District	865-922-7547	
Water & Sewer	Luttrell-Blaine-Corryton Util. Dist.	865-992-8611	
Water & Sewer	First Knox Utility District	865-966-9741	
Gas Service	Knoxville Utilities Board	865-558-2523	
KUB Sewer Inspection	KUB Field Services	865-558-2786	

Schedule KUB Sewer Inspection Before Backfill Covers Pipe

KUB must inspect all connections to its wastewater facilities before the pipe is covered by backfill. KUB inspects based on the International Plumbing Code.

Please call KUB Field Services at **865-558-2786** to schedule an inspection at least one day before the desired inspection time. KUB inspects connections Monday through Friday between 7 a.m. and 3:30 p.m.

Please note: Connections not inspected before they are covered must be re-excavated at the customer's expense to expose the line for inspection.

Other Important Information About Your Sewer Lateral

Install a Two-Way Sewer Lateral Cleanout

A lateral is a customer-owned pipe that connects a property to the sewer system. A cleanout is a vertical pipe from the underground lateral to the surface. The cleanout has a removable cap for maintenance access.

KUB requires a two-way lateral cleanout at the property line for easier access toward your home and the main sewer to clear blockages if there is an overflow or building backup. The lateral must tie into the tee at the bottom of the cleanout. Laterals that tie into the vertical stack of the cleanout will not pass inspection.

Don't Make Prohibited Connections

KUB regulations and area plumbing codes prohibit connections that direct stormwater to the sanitary sewer. That extra stormwater costs more to treat, and it may overload the sewer system, causing messy, costly sewer overflows or building backups.

Prohibited connections include roof downspouts, groundwater sump pumps, foundation drains, and drains from window wells, driveways, etc. Don't connect a source of stormwater to your sewer lateral.

Direct stormwater to storm drains or drainage ditches, or let it soak into the ground.

Protect Your Property and Our Environment With These Sewer Lateral Tips:

- Maintain/repair your sewer lateral to meet KUB regulations and area plumbing codes.
- Remember: You own the lateral from the end of your home's internal plumbing to the connection with KUB's sewer.
- Remove any prohibited stormwater connections.
- Clear any roots or blockages in the lateral all the way to the connection with the sewer main.
- Know where your cleanout is for quick access to clear blockages or stop backups.
- Install a two-way cleanout at your property line, if you don't already have one. The lateral must tie into the tee at the bottom of the cleanout, not into the vertical stack of the cleanout.
- Keep your cleanout cap on and in good shape to keep out debris and stop blockages.

KUB

4-16-09

2 copies of detailed plans including the items highlighted below are required to be submitted for review. See attachments for additional information.

- ☐ Basement floor plan with door and window sizes
- ☐ Basement construction details
- ☐ Building minimum setbacks
- ☐ Drive side setback 5' min. at front property line
- ☐ Building height and area
- ☐ Floor plans with room names
- ☐ Bath with toilet, sink and tub or shower
- ☐ Kitchen with stove, refrigerator and sink
- ☐ Kitchen cabinets and counters
- ☐ Door and window sizes
- ☐ Wall section
- ☐ Foundation plan for basement
- ☐ Footer 12" deep x 8" thick x 12" to 24" wide
- ☐ Footer drain
- ☐ Pier size, height spacing and solid cap
- ☐ Pier footer size
- ☐ Slab 4" gravel and vapor barrier
- ☐ Slab 3 ½" thick
- ☐ Radon vent
- ☐ Foundation wall block size
- ☐ Foundation wall lateral support
- ☐ Foundation wall reinforcing for backfill
- ☐ Basement wall waterproofing
- ☐ Backfill height
- ☐ Crawl space 12" minimum to girder
- ☐ Crawl space 18" minimum to joists
- ☐ Crawl space vents within 3 feet of each corner
- ☐ Crawl vent area 1:150 or 1:1500 with poly
- ☐ Crawl space access 18" x 24"
- ☐ Pressure treated sill
- ☐ Anchor bolts ½" at 6' embedded 7" minimum
- ☐ Girder size and span
- ☐ Floor structure size, spacing and span
- ☐ Subflooring type and thickness
- ☐ Deck/porch joist size, spacing and span
- ☐ Deck to house connection details
- ☐ Deck/porch column and footer sizes
- ☐ 36" deck/porch rails with less than 4" between
- ☐ Wall studs size and spacing
- ☐ Tall wall framing detail
- ☐ Wall bracing/sheathing type and thickness
- ☐ Alternate wall bracing adjacent to garage door nailed 3" on center
- ☐ Header and beam sizes
- ☐ Jack studs/cripples
- ☐ Ceiling structure sizes, spacing and spans
- ☐ Attic access size 22"x 30"
- ☐ Attic vents
- ☐ Roof structure sizes, spacing and spans
- ☐ Rafter ties/ceiling joists on every rafter or properly designed ridge ***beam***
- ☐ Collar ties 48" on center
- ☐ Insulation R-13 wall
- ☐ Insulation R-19floor
- ☐ Insulation R-38 attic
- ☐ Insulation R-10 2" x 24" slab edge
- ☐ Insulation R-8 ducts
- ☐ Insulation R-3 refrigerant lines
- ☐ Fireplace spec for gas
- ☐ Fireplace foundation and structure
- ☐ Fireplace clearance to combustibles
- ☐ Hearth size, material and non combustible support
- ☐ Chimney height and parging
- ☐ Chimney clearance to combustibles
- ☐ 3'-0" exit
- ☐ 3' x 3' landings
- ☐ 1 3/8" solid door from garage to house
- ☐ ½" gypsum on garage wall
- ☐ ½" gypsum on garage ceiling
- ☐ 5/8" type x gypsum on garage ceiling
- ☐ 3'-0" clear stair width
- ☐ 6'-8" stair headroom
- ☐ 8" riser height maximum
- ☐ 9" tread depth minimum
- ☐ Winders 6" minimum width
- ☐ ¾" to 1 ¼" nosing
- ☐ Handrail 34" to 38" above nose of tread
- ☐ Handrail return to wall/terminate in post
- ☐ Handrail from over bottom riser to over top riser
- ☐ Open stair rail less than 4 3/8" between
- ☐ 36" high balcony guardrails
- ☐ Less than 4" between balcony guardrails
- ☐ Smoke detectors in bedrooms
- ☐ Smoke detector outside bedrooms
- ☐ Smoke detector on every level
- ☐ Smoke detector in garage
- ☐ Smoke detectors electric and interconnected
- ☐ Smoke detector battery back-up
- ☐ Carbon monoxide detector
- ☐ Egress windows sizes
- ☐ Safety glass @ tub/door/18" to floor
- ☐ Plumbing supply
- ☐ Plumbing drain, waste and vent
- ☐ HVAC unit type and location
- ☐ HVAC duct 26 ga. sheet steel in garage
- ☐ Water heater type and location
- ☐ Protection for gas appliances in garage
- ☐ Gas vents, piping size and grounding
- ☐ Roof covering underlayment
- ☐ Roof sheathing type and thickness
- ☐ Wall covering/underlayment. Water resistive barrier required under all exterior wall finishes.
- ☐ Veneer wall tie spacing, lintel sizes, flashing and weepholes.
- ☐ Bath exhaust vent in toilet rooms
- ☐ Bath exhaust vent in tub/shower rooms
- ☐ Dryer vent 25' maximum developed length
- ☐ Tenant separation
- ☐ Grade slope away from walls 6" drop within 10ft.
- ☐ Finished grade 6" below wood framing including wall sheathing
- ☐ Retaining wall design
- ☐ One-hour fire resistant rating required on the underside of overhang where less than 5 feet to the property line

Knox County Code Administration & Inspection

Radon Control Methods

REV. 012013

2012 IRC REQUIREMENTS

1. Place the 3" or 4" tee below the slab and vapor barrier in at least 4" of gravel (i.e. #57 stone).
2. Seal around the pipe where it passes through the slab and all other slab penetrations and joints. Sealant is recommended to be silicon based.
3. The 3" or 4" vent pipe needs to be routed up to the attic area vertically as much as possible. If a horizontal run must be installed it shall be sloped a minimum of 1/8" per foot towards the low point of the pipe. The horizontal run should never exceed the vertical length of pipe.
4. The pipe may terminate in the attic and be capped. Label the pipe as "RADON PIPE" at each floor level and in the attic. A 110 outlet is recommended to be roughed in if a future vent fan is required. *NOTE: A mechanical vent may be required in a crawl space if the ventilation does not meet the code requirements.*

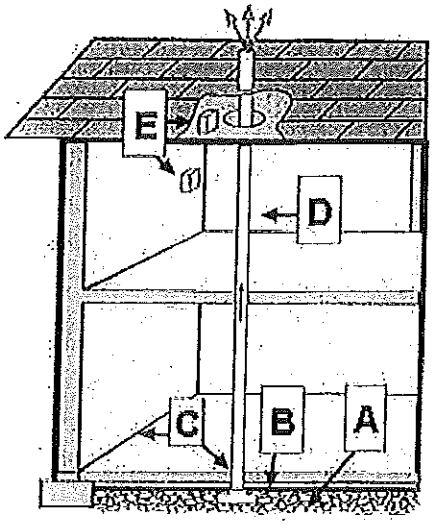
EPA RADON RECOMENDATIONS

What are Radon-resistant construction techniques?
The techniques may vary for different foundations and site requirements, but the basic elements are:

A. Gas Permeable Layer
This layer is placed beneath the slab or flooring system to allow the soil gas to move freely underneath the house. In many cases, the material used is a 4-inch layer of clean gravel.

B. Plastic Sheeting
Plastic sheeting is placed on top of the gas permeable layer (at least 6 mil) and under the slab to help prevent the soil gas from entering the home. In crawlspaces, the sheeting is placed over the crawlspace floor and up the stem walls 12" with all joints taped.

C. Sealing and Caulking
All openings in the concrete foundation floor are sealed to reduce soil gas entry into the home.

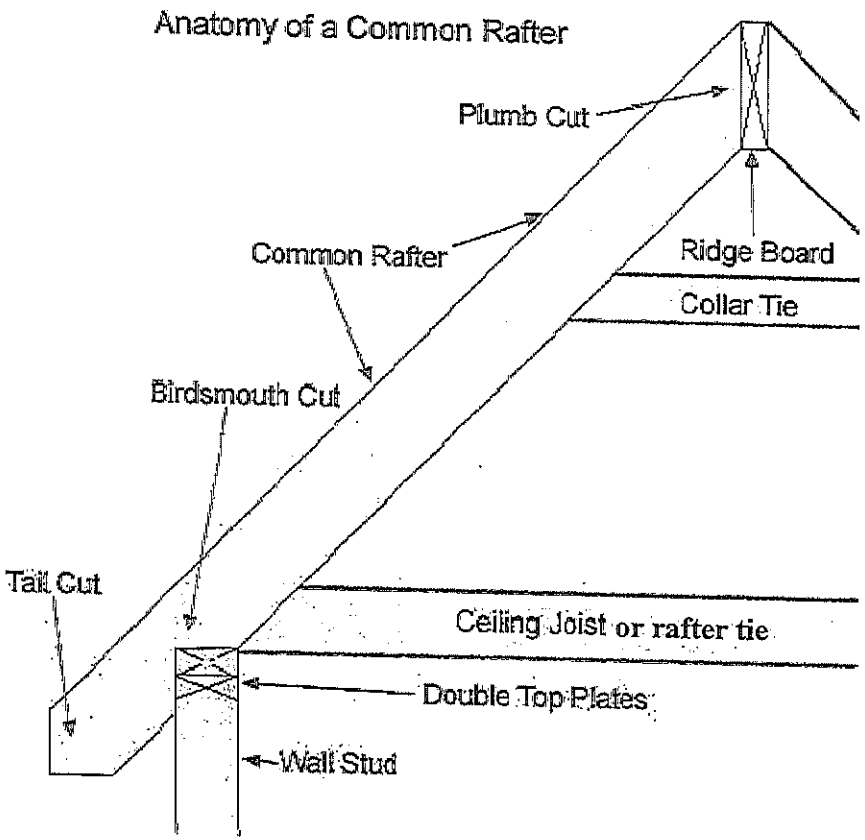


D. Vent Pipe
A 3 or 4 inch gas-tight or PVC pipe (commonly used for plumbing) runs from the gas permeable layer through the house to a point 12" above the roof, to safely vent radon and other soil gases above the house.

E. Junction Box
An electrical junction box is installed in case an electric venting fan is needed later.

Knox County Code Administration & Inspection
RAFTER & FRAMING Handout

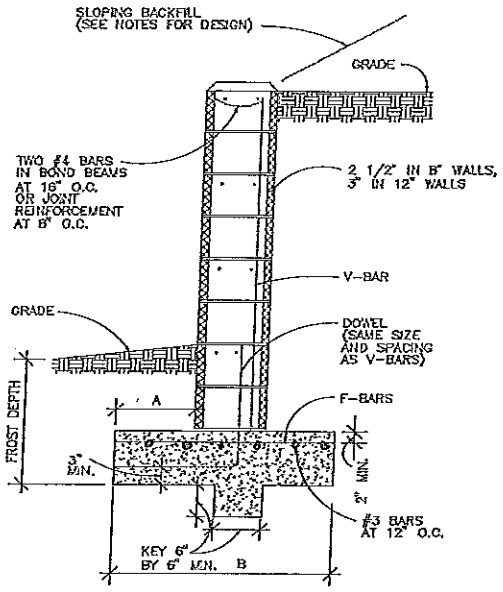
Rev. 012013



The diagram (to the left) illustrates a typical framing layout of a rafter type roof system with some of the typical components shown.

Ridge Board, shall be a minimum of 1" nominal thickness and not less in depth than the cut end of the rafter.
Rafter(s), the rafters shall be sized in accordance to the tables in the 2012 IRC ® or by using the span calculator at the American Wood Council ®, (i.e. www.awc.org/calculators/span/calc/timbercalcstyle.asp). If using this calculator, the following values will need to be utilized; Grade = (normally is 2), member type = rafters (live load), deflection limit = L/240, live load = 20 and dead load = 10.
Rafters need to be flush to the ridge board and toe nail fastened with 4-16D nails. The birdmouth cut must not be over cut and have full bearing on the top plate and fastened with 2-16d nails.
Collar Tie(s), shall be a minimum of 1" x 4" nominal thickness and installed in the upper third of the attic space. Collar ties shall be spaced not more than 4 feet on center. The collar ties shall be fastened to the rafters with 3-10D nails.
Rafter Tie(s), shall be a minimum of a 2"x4" member and (installed in the lower third of the attic space) face nailed to the rafters with 3-8D nails.
Ceiling Joist(s), shall be sized in accordance to the 2012 IRC ® code and fastened to the rafters with usually 3-16D nails (see table R802.5.1(9) for specific fastener schedule).

Retaining Wall Reference Information



Cross Section

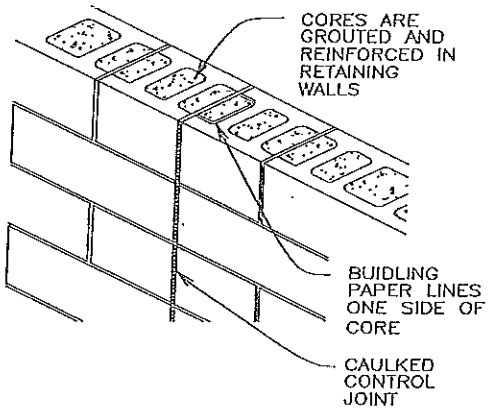
DIMENSIONS AND REINFORCEMENT FOR CMU RETAINING WALLS

WALL	H	B	T	A	V-BARS	F-BARS
8"	3'-4"	2'-4"	8"	8"	#3 @ 32"	#3 @ 27"
	4'-0"	2'-9"	8"	10"	#4 @ 32"	#3 @ 27"
	4'-8"	3'-4"	10"	12"	#5 @ 32"	#3 @ 27"
	5'-4"	3'-8"	10"	14"	#4 @ 16"	#4 @ 30"
	6'-0"	4'-2"	12"	16"	#6 @ 24"	#4 @ 25"
12"	5'-4"	3'-8"	10"	14"	#4 @ 24"	#3 @ 25"
	6'-0"	4'-2"	12"	15"	#4 @ 16"	#4 @ 30"
	6'-8"	4'-6"	12"	16"	#6 @ 24"	#4 @ 22"
	7'-4"	4'-10"	12"	18"	#5 @ 16"	#5 @ 26"
	8'-0"	5'-4"	12"	20"	#7 @ 24"	#5 @ 21"
	8'-8"	5'-10"	14"	22"	#6 @ 8"	#6 @ 26"
	9'-4"	6'-2"	14"	24"	#8 @ 8"	#6 @ 21"

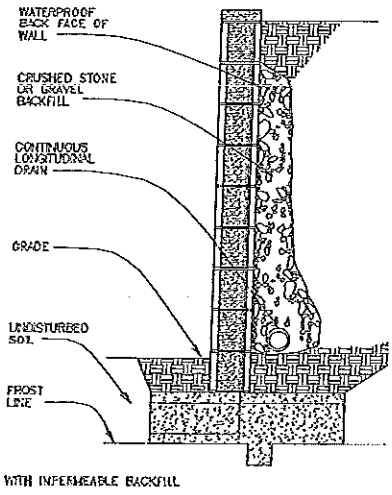
TYPICAL CANTILEVER RETAINING WALL

H = Height of wall above top of footer

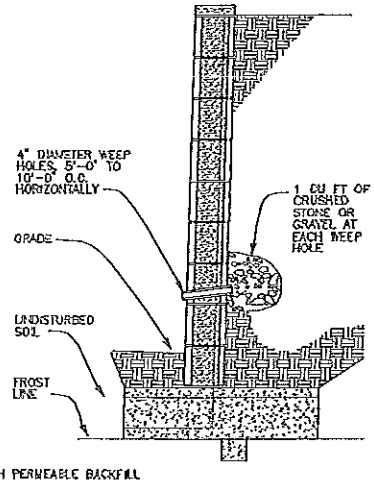
T = Thickness of footer



Control Joint



Drain Pipe



Weep Holes

Notes

1. Long retaining walls should be broken with vertical control joints into panels 20 to 30 feet long. These panels must be designed to resist shear and other lateral forces while permitting longitudinal movement.
2. Materials and construction practices for concrete masonry retaining walls should comply with "Building Code Requirements for Concrete Masonry Structures (ACI 531)."
3. Use fine grout when grout space is less than 3 in. in the least dimension. Use coarse grout when the least dimension of the grout space is 3 in. or more.
4. Steel reinforcement bars should be clean, free from harmful rust, and in compliance with applicable ASTM standards for deformed bars and steel wire.
5. Alternate vertical bars may be stopped at the mid height of the wall. Vertical reinforcement is usually secured in place after the masonry work has been completed and before grouting.
6. Designs shown are based on an assumed soil weight (vertical pressure) of 100 pcf. Horizontal pressure is based on an equivalent fluid weight for the soil of 45 pcf.
7. The walls illustrated are designed with a safety factor against overturning of not less than 2 and a safety factor against horizontal sliding of not less than 1.5. Computations in the table for wall heights are based on level backfill. One method of providing for additional loads from sloping backfill or surface loads is to consider them as additional depth of soil. In other words, an extra load of 300 psf can be treated as 3 ft. of extra soil weighing 100 psf.
8. The top of masonry retaining walls should be capped or otherwise protected to prevent water from entering unfilled hollow cells and spaces. If bond beams are used, steel is placed in the beams as the wall is constructed. However, horizontal joint reinforcement may be placed in each joint (8"o.c.) and the bond beams omitted.
9. Allow 24 hours for masonry to set before grouting. Pour grout in 4 ft. layers, with one hour between each pour. Break long walls into panels 20 to 30 feet long with vertical control joints. Allow 7 days for finished walls to set before backfilling. Prevent water from accumulating behind walls by means of 4 in. diameter weep holes spaced 5 to 10 ft. apart (with screen and graded stone) or by a continuous drain with felt covered open joints combined with waterproofing.
10. When backfill height exceeds 6 ft., provide a key under the footing base to resist the tendency of the wall to slide horizontally.
11. Heavy equipment used in backfilling should not come closer to the top of the wall than a distance equal to the wall height.
12. A structural engineer should be consulted for the final design.

CODE ADMINISTRATION ★ BUILDING INSPECTION ★ CODE ENFORCEMENT

www.knoxcounty.org/codes

INSPECTION REPORT

p.865-215-2325, f. 865-215-4255

PERMIT / ITEM #		RESIDENTIAL		COMMERCIAL	DATE:	
NAME:			ADDRESS:			
OK:		REJECT:		SBDV:		LOT#

SAMPLE

R02102011

INSPECTOR:		SHEET:		A/TIME:		D/TIME:	

Commercial facilities must be inspected and approved by both Knox County Code Administration and Knox County Fire Prevention Bureau

SITE	34. Copper pipe cannot touch dissimilar metals	69. Insulate refrigerant lines their full length
1. Install erosion control, construction entrance	35. Check auto vents on final – Must be listed type	69a. Install R-6 duct insulation (R-8 in attic)
2. Install a portable restroom	36. No leak test on ____DWV ____Water Supply	70. Seal all air leaks at the 'A' coil
3. Post lot number & building permit	37. Support all plumbing supply lines per code	71. Submit manufacturer's instructions w/ equipment
FOOTING / SLAB	38. Support DWV at every 4' on center minimum	**LETTERS**
4. Trim roots & all vegetation	39. No 'S' traps are allowed	72. Submit footing letter / engineer footing letter
5. Remove standing water	40. Complete plumbing setout	73. Submit letter on fireplace/ fire stop installation
6. Remove mud and / or loose soil	41. Install T&P relief pipe to 6" above floor	74. Submit letter: plumbing test / License Plumber
7. Soil is soft when probed	42. Anchor exterior hose bibbs	75. Submit letter for smoke detectors on alarm system
8. Install bulkheads @ 12" from step down	43. Anchor the laundry sink.	76. Submit engineer letter for cut truss or TJI repair
9. Install grade pins / vapor barrier	**ELECTRICAL**	77. Submit letter on window film installation
10. Install R-10 perimeter slab insulation	44. Support wires in crawl space per code	**FINAL**
FRAMING	45. Install all outlet and switch plate covers	78. Install address on building with 4" numerals
11. Vent exhaust fans to exterior	46. Need power on to perform a final inspection	79. Seal garage wall & ceiling penetrations
12. Seal all vertical penetrations	47. Smoke det. must be 3' from supply / return vents	79a. Install 5/8" type 'X" sheetrock on garage ceiling
13. Fill all nail holes in hangers	48. Smoke det. must be series wired/battery backup	80. Seal all exterior penetrations
14. Shim gaps between headers & studs.	49. Install GFCI outlets per code	81. Install: splash blocks / piping / gutters etc.
15. Support girders full width of piers	50. Install wire splices in junction box with cover	82. Complete grade work / slope grade 6" within 10'
16. Install a lintel over the HVAC opening	**GAS / MECHANICAL**	83. Anchor & seal vent wells to house
17. Install three nails per joist into ledger strip	51. Ground gas pipe (8 foot rod & #6 copper wire)	84. Install screens for crawl space vents
18. Install lateral bracing at: roof / floor trusses	52. Strap electrical wires away from gas vent	85. Install a 6 mil. vapor barrier in the crawl space
19. Install studs at: truss ends / girder ends	53. Anchor draft hood to water heater	86. Install dryer/ exhaust vent covers & seal around
20. Window at tub area must be tempered	54.Gas vents must meet clearances to combustibles	87. Insulate attic to R38 (raised heel roof truss R30)
21. Install weather resistant house wrap	55. Support gas vents per mfg instructions	88. Insulate the floor system in crawl space to R19
22. Bolt deck to house 12"oc 16"oc 24"oc	56. Support gas piping per the code	89. Remove all debris & vegetation from crawl space
23. Install steel or solid wood shims on piers	56a. Anchor gas line at shut off valves securely	90. Install 3'x3' landing at door & steps
24. Install fire blocking at floor/ ceiling level	57. Protect all pipe within 6" of the soil	91. Install whirlpool access and/or ventilation
24a. Install foundation wall bracing: 24" 48"	58. Vents must terminate at least 12" above grade	92. Install fire retardant paint on pull down stairs
25. Install all joist / roof / truss / girder hangers	59. Terminate vents per manufacturers instructions	93. Install radon system / label pipe all levels
26. Install fire stop at: fireplace roof / ceiling	60. Protect flex pipe where it enters furnace housing	94. Windows within 2' of door must be tempered
27. Install (3) nails at roof member ends	61. The gas pipe failed a pressure leak test	95. Weep holes not installed in brick per code
28. Install anchor bolts per code ½" x 7"	62. Install light & outlet for attic / crawl space unit	96. Post energy tag inside the electrical panel
29. Install collar ties & rafter ties per code	63. Clean out the pan under the attic HVAC unit	**ZONING**
30. Ridge/Valley boards must = rafter end depth	64. Install 30" platform at HVAC unit	97. Overgrown lot needs mowed, grass exceeds 12".
31. Remove water from crawl space	65. Install 2' walkway to HVAC unit	98. Remove inoperable vehicles.
PLUMBING	66. Install drain line or float switch from pan	99. Remove trash and debris
32. Install all nail guards	67. Install condensate drain line and trap	100. Too many commercial vehicles
33. Install stud brackets at cut stud(s)	68.Terminate condensate drain away from the house	101. Too many recreational vehicles / trailer

Knox County Code Administration & Inspection

Smoke & Carbon Monoxide Alarms

REV.012013

Smoke Detection and Notification. All smoke alarms shall be listed in accordance with UL 217 and installed in accordance with the provisions of this code and the household fire warning equipment provisions of NFPA 72.

Household fire alarm systems installed in accordance with NFPA 72 that include smoke alarms, or a combination of smoke detector and audible notification device installed as required by this section for smoke alarms, shall be permitted. The household fire alarm systems shall provide the same level of smoke detection and alarm as required by this section for smoke alarms in the event the fire alarm panel is removed or the system is not connected to a central station.

Location. Smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms. (Within twenty (20) feet of bedroom door per Knox County Building Official).
3. On each additional story of the dwelling, including basements but not including crawl space and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.
4. In each garage or storage area with a six foot or wider door to the outside. These smoke alarms shall be specifically approved for use in garages in the manufacturers written instructions. **Exception:** Heat detectors interconnected with the alarm system and having battery back up may be used in a garage or storage area.
5. Smoke detectors shall be placed in all new additions or renovations.

When more than one smoke alarms is required to be installed within an individual dwelling unit, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual **unit.**

Carbon Monoxide Alarms

For new construction, an approved carbon monoxide alarm shall be installed outside of each separate sleeping area in the immediate vicinity if the bedrooms in dwelling units within which fuel fired appliances are installed and in dwelling units that have attached garages.

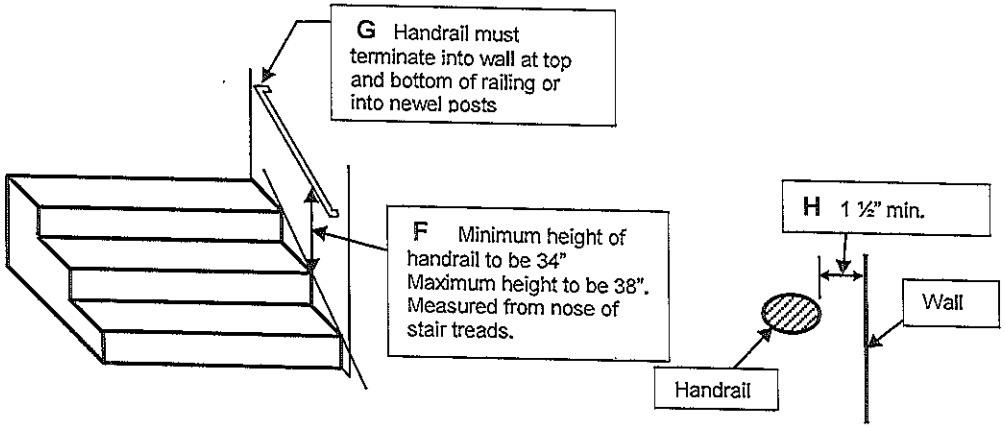
- All smoke detectors must be series hard wired with A/C and have battery back up. If hard wired smoke detectors cannot be installed, wireless interconnected smoke detectors are acceptable.
- A smoke detector must be installed in all attached garages.
- Mount all smoke detectors high on walls or ceilings. Flat ceiling mounted alarms should be installed at least four inches away from the nearest wall; wall-mounted alarms should be installed four to 12 inches away from ceiling.
- If mounted on pitched ceilings, install alarm within 12 inches of the ceilings highest point.
- Alarms must be at least 3 foot away from all HVAC air registers and HVAC returns.

NOTE: FOLLOW ALL MANUFACTURES INSTALLATION INSTRUCTIONS INCLUDED WITH THE PURCHASE OF ALL SMOKE ALARMS.

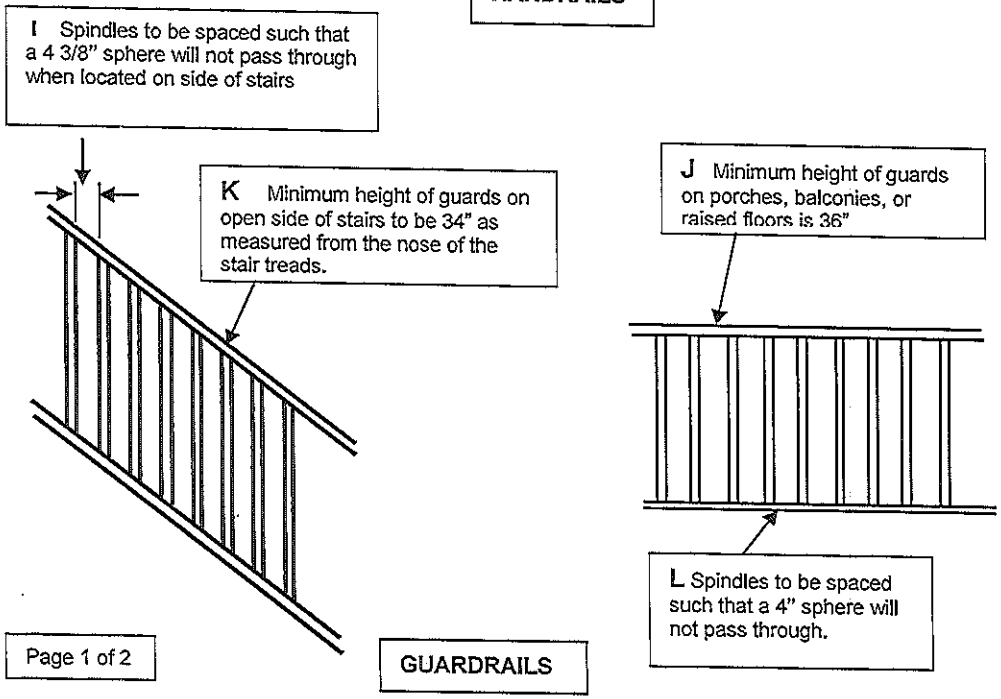
Knox County Code Administration & Inspection

IRC Residential Stairs Information

Rev 112012



HANDRAILS



GUARDRAILS

Page 1 of 2

2012 IRC Section R311.7.8 HANDRAILS

R311.7.8 (Handrails) **F** Handrails having a minimum and maximum heights of 34 inches and 38 inches respectively, measured vertically from the sloped plain adjoining the tread nosing or finished surface of ramp slope. Shall be provided on at least one side of stairways with a total rise of 30" or more. Spiral stairways shall have the required handrail located on the outside radius. All required handrails shall be continuous the full length of the stairs. **G** Ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall **H** shall have a space of not less than 1½ inch between the wall and the handrail.

Exceptions:

1. Handrails shall be permitted to be interrupted by a newel post at a turn.
2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.

R311.7.8.3 (Handrail grip size) Handrails shall have either a circular cross section with a diameter of 1 ¼ inches to 2 inches, or a noncircular cross section with a perimeter dimension of at least 4 inches but not more than 6 ¼ inches and a largest cross section dimension not exceeding 2 ¼ inches.

R 311.7.9 Illumination. All stairs shall be provided with illumination in accordance with Section R303.6.

2012 IRC Section R312 GUARDS

R312.1 (Guards) **J** Porches, balconies, ramps or raised floor surfaces located more than 30 inches above the floor or ground below shall have guards not less than 36 inches in height. Open sides of stairs with a total rise of more than 30 inches above the floor or ground below **K** shall have guards not less than 34 inches in height measured vertically from the nosing of the treads. Porches and decks which are enclosed with insect screening shall be equipped with guards where the walking surface is located more than 30 inches from the floor or grade below.

R312.1.3 (Guardrail opening limitations) **L** required guards on open sides of stairways, raised floor areas, balconies and porches shall have intermediate rails or ornamental closures which do not allow passage of a sphere 4 inches or more in diameter.

Exceptions:

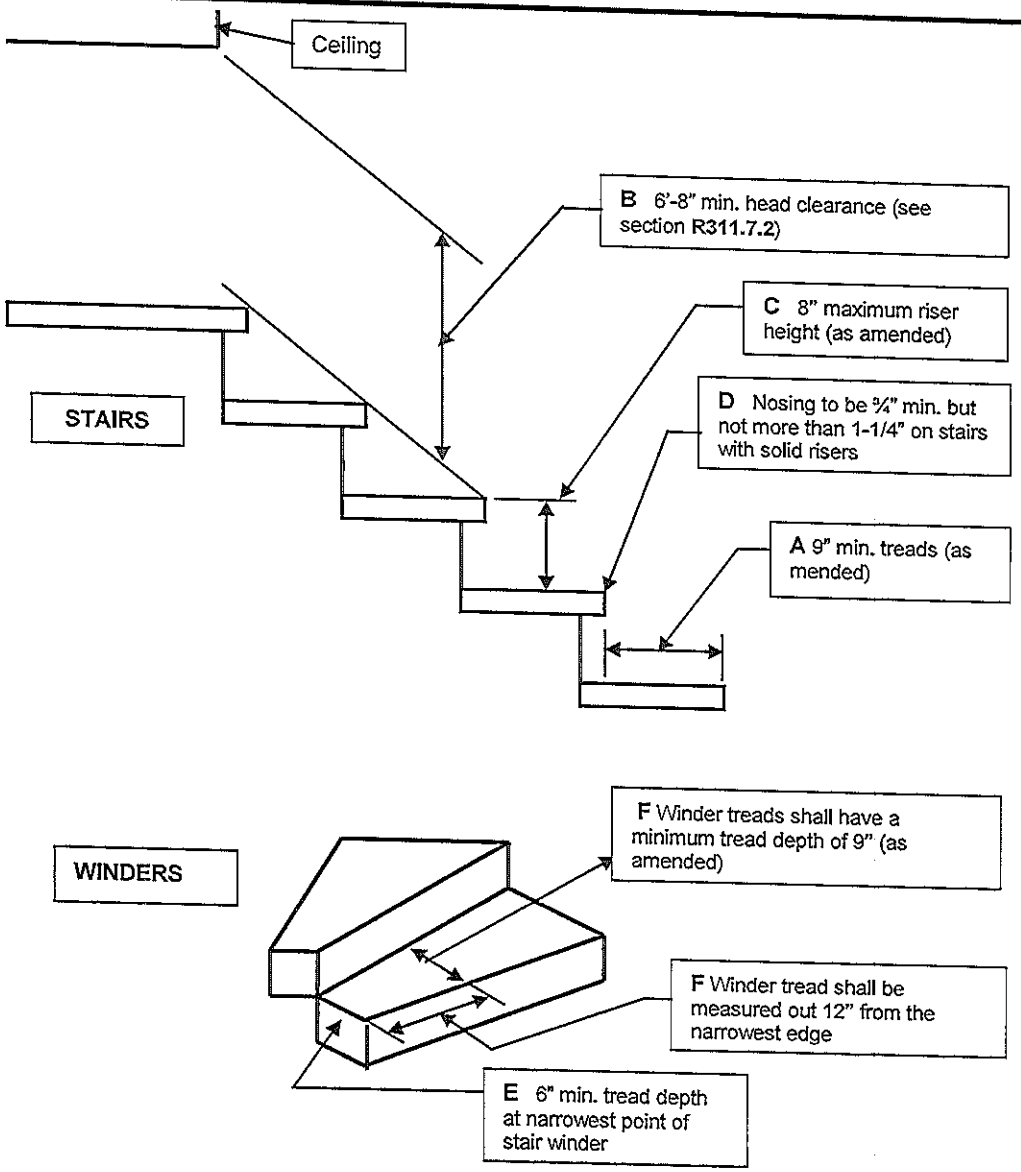
1. The triangular openings formed by the riser, tread and bottom rail of a guard at the open side of a stairway may be of such a size that a sphere 6 inches cannot pass through.
2. Openings for required guards on the sides of stair treads shall not allow a sphere 4 3/8" inches to pass through. **I**

This handout is intended to be a guide. It is by no means all-inclusive or has all code related sections listed. The IRC 2012 Residential Code with amendments was used to prepare this document. Contact the Knox County Code Administration for any additional information. (865) 215-2325.

Knox County Code Administration & Inspection

IRC Residential Stairs Information

Rev 112012



2012 IRC Section R311.7

STAIRWAYS

R311.7.2 (Tread Depth) **A** The minimum tread depth shall be 9". The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8".

R311.7.2 (Headroom) **B** The minimum headroom in all parts of the stairway shall not be less than 6 feet 8 inches measured vertically from the sloped plane adjoining the tread nosing or from the floor surface of the landing or platform.

R311.7.5.1 (Riser Height) **C** The maximum riser height shall be 8". The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8".

R311.7.5.3. (Profile) **D** Nosing of not less than ¾" but not more than 1 ¼" shall be provided on stairways with solid risers.

WINDERS

R311.7.5.2.1 (Minimum Tread Depth at Narrow Edges) **E** Winder treads shall have a minimum tread depth of 4" at any point.

R311.7.5.2.1 (Minimum Tread Depth 12" Out From Narrow Edges) **F** Winder tread shall have a minimum tread depth of 9" inches at a point 12" from the side where the treads are narrower. The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. Within any flight of stairs, the largest winder tread depth at the 12" walk line shall not exceed the smallest by more than 3/8".

NOTES:

1. **A door cannot swing out over steps.**
2. **Guardrails / Handrails shall be designed and constructed as to withstand a concentrated load of 200 lbs. applied at any point in any direction.**

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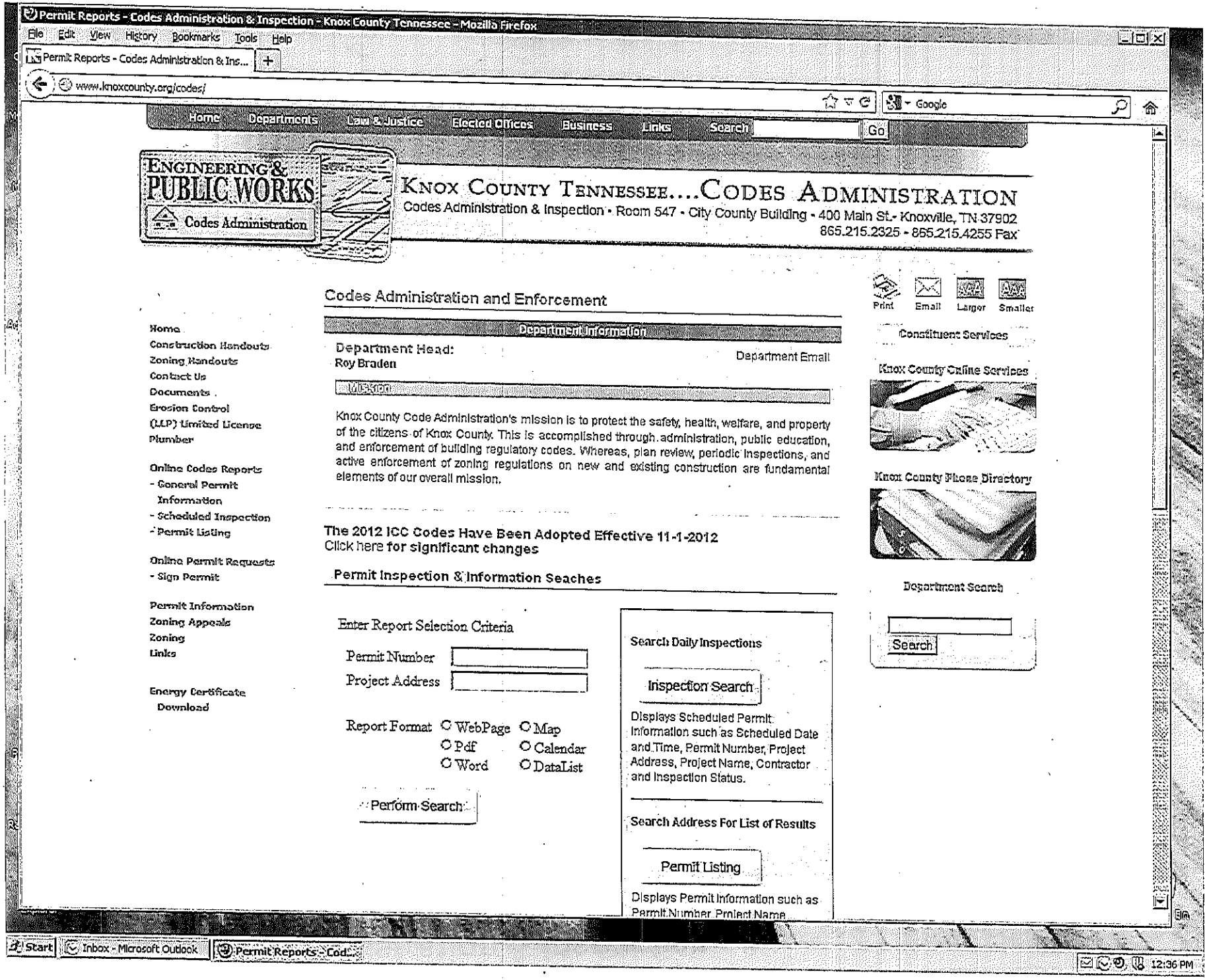
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Department Information
Department Head:
Roy Braden
Department Email
Mission
Knox County Code Administration's mission is to protect the safety, health, welfare, and property of the citizens of Knox County. This is accomplished through administration, public education, and enforcement of building regulatory codes. Whereas, plan review, periodic inspections, and active enforcement of zoning regulations on new and existing construction are fundamental elements of our overall mission.
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Zoning Handouts
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(LLP) Limited License
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- Scheduled Inspection
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