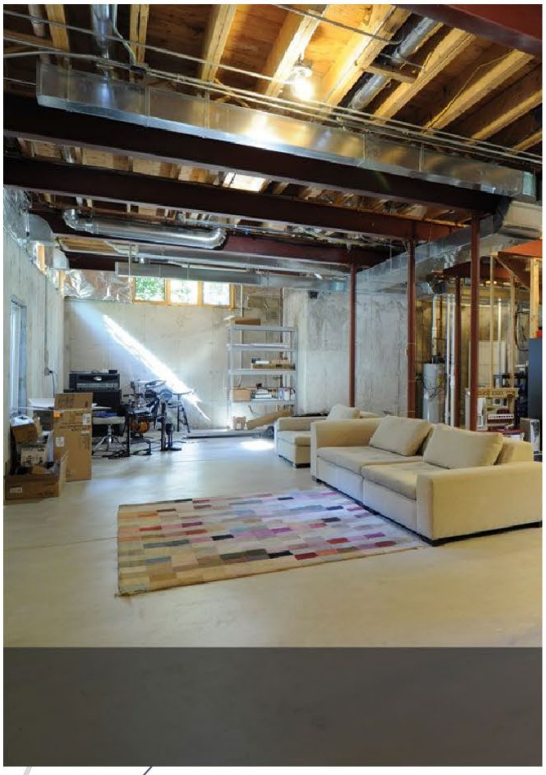
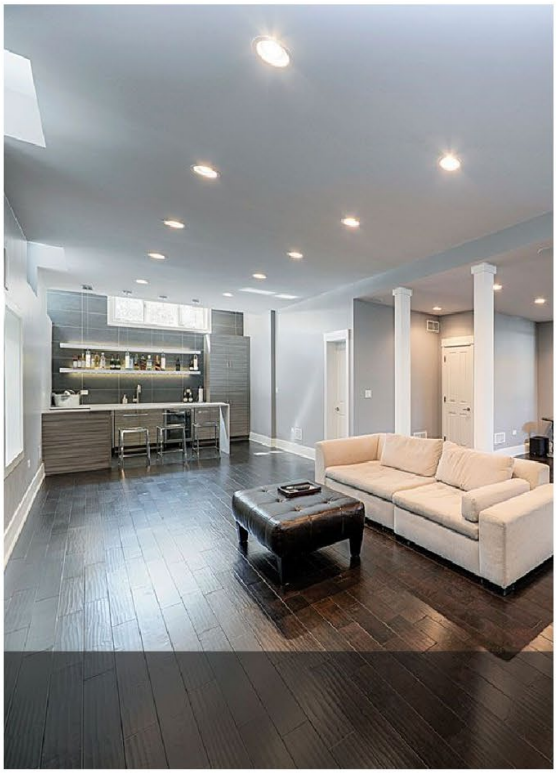
Residential Basement Remodel

Permit and Construction Guidelines
2018 International Residential Code





Johnson County Contractor Licensing Program

BASEMENT ADDITION, REMODELING and REPAIR CODE GUIDELINES

Developed by the Johnson County Building Officials

One of the objectives of the Johnson County Building Officials Association is to enhance construction uniformity and the adoption of common construction codes and procedures. This document is intended to assist contractors and homeowners in understanding the basic code requirements for basement finish projects. It is also intended to provide guidance for obtaining permits and inspections.

The information provided should not be considered a complete list of code requirements. Structural modifications, such as relocation of support columns, relocation of bearing walls, or reframing floor joists are not within the scope of this document. A registered design professional should be hired to provide review and design services for structural projects. Permit requirements may vary from city to city. Complete information is available in the codes and ordinances adopted by each city. Check with your city for complete requirements prior to obtaining a permit and before starting any work.

BUILDING PERMITS AND PERMIT REQUIREMENTS

Permits – A permit is required for addition, alteration and repair of a basement that involves construction of walls or installation or extension of electrical circuits, plumbing drains or vents, or HVAC ductwork.

> **Exempt Work (Section R105 of IRC 2018) –** Repair and maintenance work, such as carpeting, painting, wallpaper, receptacle replacement, fixture replacement of previously installed (sinks, stools, lighting fixtures), vanities and cabinetry do not require a permit.

Contractors – Most municipalities allow a homeowner to obtain a permit to do work in the house they own and occupy. If the homeowner is hiring a contractor to do the work, this document suggests that the contractor be required to obtain the permit. To obtain a permit, most cities require the contractor to be licensed with Johnson County. Licensing assures that contractors have met the minimum requirements for code knowledge, and maintain workman's compensation and general liability insurance. Code deficiencies or failure to complete the work in compliance with the code requirements is the responsibility of the person who obtained the permit. **Licensed Contractor information contact and searches can be found under the following link:** http://cls.jocogov.org/clsCourseReg/searchcontractor.aspx

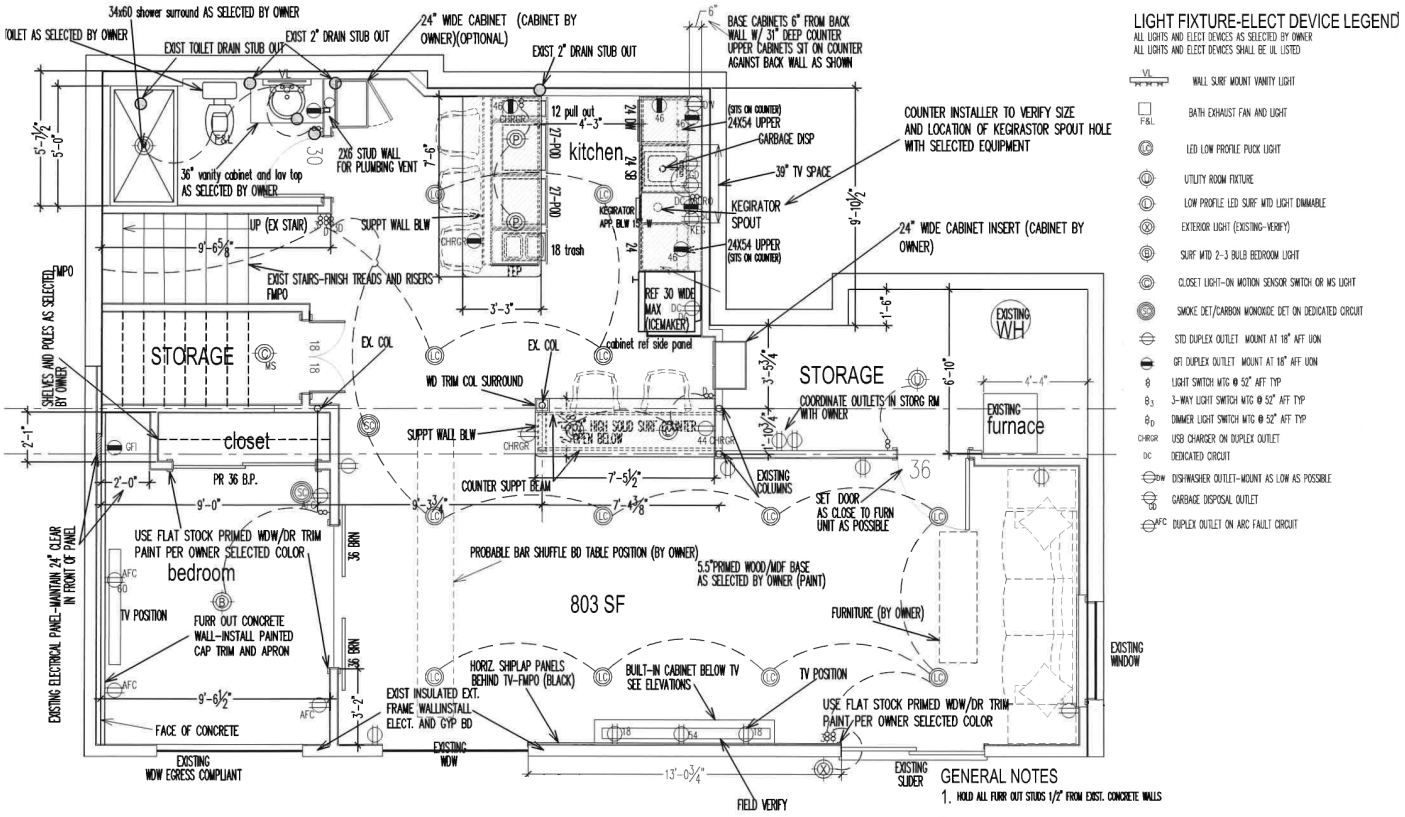
Codes – This document is based on the 2018 International Residential Code (IRC) and accepted engineering and construction practices. Please check with your local jurisdiction regarding the specific code that has been adopted, and any code amendments that may affect the use of this document as a construction guide.

Application and Fees – Application to your local jurisdiction is required to obtain a permit. In addition to completing an application for a permit, plans showing the work to be performed and payment of permit and plan review fees are generally required. Plan review and permit fees vary for each jurisdiction.

Construction Plans – A sample plan has been provided showing the basic information necessary on the plans. Plans by hand or digitally shall be drawn to a scale (1/4 inch or 1/8 inch equals one foot is preferred).

- ☐ Describe the new work to be done with basic dimensions on the plan.
- ☐ Distinguish between new and existing partitions
- ☐ Show the use of each area.
- ☐ Show where exterior concrete walls will be furred out to provide the required insulation.
- ☐ Show insulation values for exterior walls adjacent to finished space.
- ☐ Show the secondary means of egress. If a window well is added, show the depth and dimensions.
- ☐ Show where combustion air grills will be located.
- ☐ Show where the electrical panel, water heater, washer/dryer, and HVAC equipment is located.

SAMPLE PLAN Note: this plan does not show all items listed above (depth/dimensions of window well, new/existing, insulation values, electrical panel, wash/dryer, etc.)



Basement Layout Plan

* The plans can be hand or computer drawn

INSPECTIONS – Inspections at various stages of the work are required as the work progresses. The jurisdiction issuing the permit will provide information to specify when inspections are required and how they will be scheduled. The project is not considered complete until a satisfactory final inspection has been obtained. When the final inspection is approved, the permit is closed and the space can be occupied. Failure to call for a required inspection is a violation of most municipalities' building code. Inspections are generally required as follows:

- **Underslab plumbing** – Where under-floor plumbing is required for backwater valves, floor drains, bathrooms and kitchens a plumbing under-slab inspection is required after the under-floor piping is installed to above the floor and prior to filling the trench and replacing the floor.
- **Rough-in –** This inspection is done before any wiring, plumbing piping, or mechanical ducts in walls and ceilings is covered with insulation, sheet rock, paneling, etc. All piping, ductwork, sub-panels, wiring, junction boxes, and outlet boxes shall be installed. Do not install switches or receptacles.
- **Insulation –** This is inspected after insulation is installed and prior to installing drywall. This inspection is not required by all jurisdictions although compliance is still required.
- **Drywall –** This inspection is performed after all drywall is installed and prior to painting. A partial inspection for water resistant drywall around tubs and showers may be requested prior to inspection of other areas. Make sure access to valves, junction boxes, etc. remain accessible. Not all jurisdictions require a drywall inspection.
- **Final –** This inspection is scheduled when insulation, drywall, doors, and all fixtures, receptacles and devices have been installed so the space is ready to occupy and use. Cosmetic items that are not regulated by the building code, such as trim, painting, and other finish work, does not have to be completed to obtain the final inspection.

EXISTING CONSTRUCTION THAT MAY NOT MEET THE CURRENT CODE

Sometimes homeowners question what might happen if the building inspector comes for an inspection and notices something that does not comply with the building code. A common question is if they will required to change everything the inspector finds wrong, even if it is not part of the basement-remodeling project. The building code addresses remodeling existing buildings with the following language:

R102.7.1 Additions, alterations or repairs.
Additions, alterations or repairs to any structure shall conform to that required for a new structure without requiring the existing structure to comply with all of the requirements of this code, unless otherwise stated. Additions, alterations or repairs shall not cause an existing structure to become unsafe or adversely affect the performance of the building."

Generally, the inspectors look at the new work, and check to see that it meets the building codes. Existing noncompliant parts of the home (except for smoke and carbon monoxide detectors) are allowed to stay the same, unless the problem is severe enough to be dangerous.

The building code specifically requires that the smoke and CO detection system throughout the house be upgraded to meet the current code requirements when you remodel your basement. This special requirement is in the building codes because of the importance of smoke and co detectors and the lives that they save every year. The details of this requirement are listed in the **RESIDENTIAL ELECTRICAL** section of this document.

PLANNING YOUR BASEMENT REMODELING PROJECT

It is important to consider code requirements when planning your basement-remodeling project. Some of the more common issues to consider are listed below. Please be aware that this is not a comprehensive list.

The furnace and water heater must be provided with access that would allow the equipment to be replaced or to be serviced. The manufacturer's instructions will include required clearances on all sides of the equipment and other important details that may impact how much space must be maintained around the equipment. Do not plan to build walls that will reduce this required space.

Many components of a house require access for servicing and replacement. Your plans should take into account that this access will be provided. The main water shutoff, the drain valve, and the electrical grounding connection to the water line and or UFER Ground must remain accessible. All electric junction boxes, floor drains, cleanout fittings, backwater valves, gas line unions, and valves for water and gas lines are required to remain accessible.

Electric panels are not allowed within clothes closets or bathrooms. A required working clearance of at least 30" wide and 36" deep in front of the panels must be provided. The panels should remain accessible so that the cover can be removed and accessed for future wiring needs or repair and maintenance. Electrical panel cannot be located over steps.

Plumbing fixture drain lines are required to be sloped not less than ¼ inch per foot for 2-1/2 inch or less drain lines, and not less than 1/8 inch per foot for 3 inch and larger drain lines. Be sure to consider the distance your drain lines must travel, and the elevation of the drain line you want to tie into, when planning the location of your plumbing fixtures.

New bedrooms are required to have direct access to the exterior by way of a properly sized window or door. Take advantage of existing doors or compliant windows when planning your room layouts.

FRAMING* – Walls, Boring and notching of studs and joists, Wall finishes

Wall Framing – Wood or metal studs may be used. Non-bearing walls may be constructed of 2x4 or 2x3 studs spaced a maximum of 24 inches on center, or with 2x4 flat studs (long dimension of the stud parallel to the wall) spaced a maximum of 16 inches on center. Utility grade studs are permitted for non-bearing walls up to a height of 10 feet. Non-bearing walls may be constructed with a single top plate. Exterior walls shall be of sufficient depth to accommodate a minimum R-13 insulation (minimum 2x4 studs walls or R-10 minimum if continuous insulation is installed).

*** Before framing, find and seal all water and air infiltration/penetrations spots around the basement where accessible. This will greatly help to avoid heat loss and insect intrusion.**

Sole Plates – The wood sole plates that are not separated from the slab by an approved moisture barrier (such as a polyethylene plastic 6 mils or more in thickness) are required to be pressure treated or naturally decay resistant wood. Studs or other framing members in direct contact with a concrete foundation wall also are required to be pressure treated or naturally decay resistant wood.

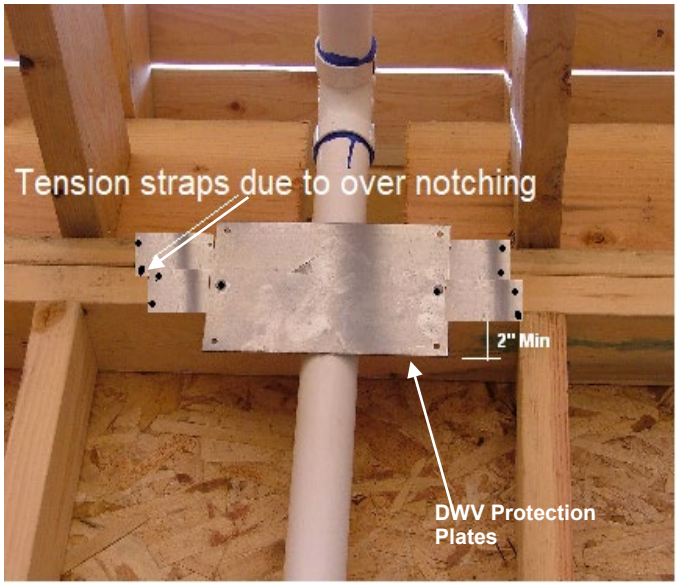
NAILS – Fasteners used in preservative treated wood (ACQ) should be hot dipped galvanized nails or other approved fasteners. Nailing schedule:

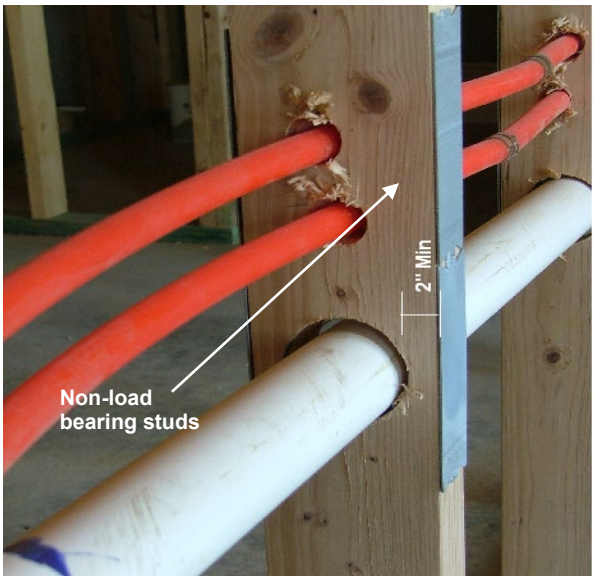
- Sole plates shall be attached to the floor with equivalent of 16d nail at 16" o.c. Some options include powder actuated fasteners, expansion anchors, and concrete nails.
- Top or sole plate to studs – 2-16d; toenails 3-8d or 2-16d
- Double studs face nail – 10d at 24" o.c.

Fireblocking – Fireblocking is a code-mandated technique that would slow the spread of fire in a concealed location. Without it, a fire may spread rapidly, using the chimney effect to move up in concealed chases. Fireblocking is typically done with 2-inch thick nominal lumber**,** ¾-inch plywood, or fiberglass insulation. Fireblocking is required in concealed locations, such as walls, wall/ceiling interconnections with soffits, concealed stairs, and around pipes and other penetrations at the floor/ceiling level. This is a frequently misunderstood requirement. A very good explanation of this issue can be found at the following internet web site:

http://www.awc.org/HelpOutreach/eCourses/MAT110/Section10-Firestopping.pdf#search='fireblocking'

Protection of Wiring and Piping from Physical Damage – Wiring and piping within walls must be protected from physical damage from nails and other objects driven into the studs and joists. Holes bored in joists and studs must be kept located to provide a minimum 1-1/4 inches of clearance for wires, such as type NM cable, and 1-1/2 inches for plumbing and water piping. Where the clearance is less, a 1/16 inch plate to cover the area shall protect the area. For plumbing and water piping the plate shall extend a minimum 2 inches above sole plates and below top plates.





Cutting, Boring, and Notching

Location	Holes[1, 2]		Notches[1, 2]
	Edge distance	Diameter	
Wall stud nonbearing	Min 5/8”	40% of width – (1/3/8” for 2x4 stud)	40% of width
Wall stud nonbearing	Min 5/8”	60% with double studs and max 2 successive studs – (2-1/16” for 2x4 stud)	40% of width
Wall stud bearing	Min 5/8”	25% of width – (7/8” for 2x4 stud)	25% of width
Wall stud bearing	Min 5/8”	60% with double studs and max 2 successive studs	25% of width
Top plate – load bearing wall		Maximum 50% of stud width	Maximum 50% of stud width
Floor Joist[3]	Minimum 2-inch clearance from the top and bottom edge of the joist.	Maximum 1/3 joist depth and not closer than 2 inches to the top or bottom; separate successive holes by 4 times the holes diameter.	Maximum depth of the notch is 1/6 joist depth and the maximum width of the notch is 1/3 joist depth. Notches are not permitted in middle 1/3 of the joist span; maximum notch at support is ¼-joist depth. Notching not permitted for I-joists

1. Where the hole or notching limitations are exceeded studs shall be: replaced; protected with approved stud shoes installed per the manufacturer’s installation

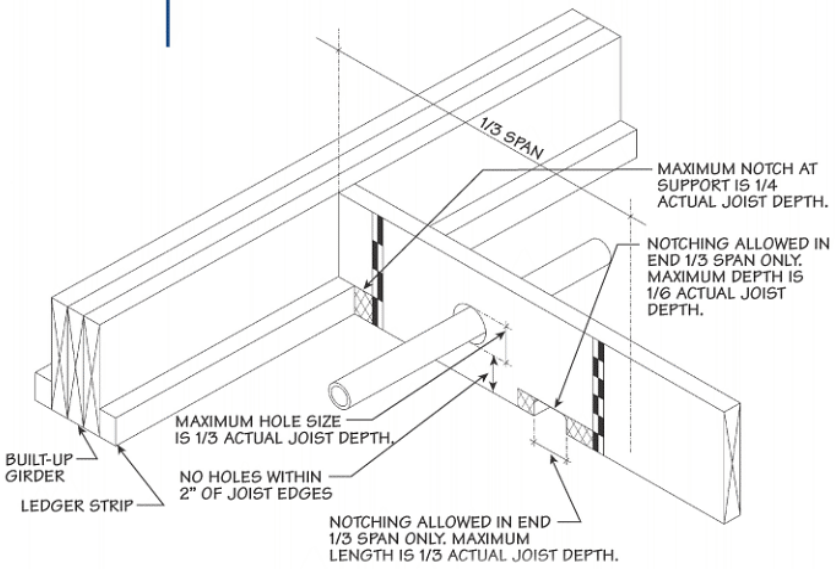
instructions; or repaired per an engineered design.

2. Provide protective plates where required edge clearances (1-1/4 inches for wires and 1-1/2 inches for plumbing) for wiring and plumbing is not maintained.
3. Holes in engineered wood joists shall be per the manufacturer's instructions.

Floor Joists – (note: floor joists are structural members and should not be cut unless approved by the jurisdiction).

- Bored holes conventional wood framing
  - Holes shall not be located closer than 2 inches from the top or bottom of joist.
  - Successive holes shall be separated by not less 2 inches.
  - The diameter of holes shall not exceed 1/3 the depth of the joist.

- Use only pre-punched knockout holes Bored holes in engineered I-joists
  - Hole placement shall follow the manufacturer's installation instructions. Instructions should be available from the manufacturer's web site or consult with the local jurisdiction. Never cut, notch or alter the top or bottom chord of the truss or I-joist.



Top of Wall Support / Isolation – Non-bearing walls shall be laterally supported at the top by bracing or attached to the supporting framing. Some cities also require an isolation joint at the top of the wall (hold the wall below the bottom of the floor joists and beams) to minimize floor movement caused by expansive soils, from being transferred to the first floor framing. In our area, most houses are sitting on clay soils that are highly expansive. Soil expansion and contraction can cause the floor to move up and down even though the floor may not crack. If wall framing is tight to the floor above, this movement may result in similar up and down movement of the floor and walls above. Check with your local jurisdiction regarding requirements for isolation joints.

Ceiling Heights – The minimum clearance requirement in all habitable rooms is 7 feet. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable rooms. Habitable rooms should have a minimum floor area of 70 square feet. If a room has a sloped ceiling, the required ceiling height (7 feet) shall be maintained in at least 35 square feet. Beams, HVAC ducts, and plumbing piping shall maintain a minimum height of 6 feet, 6 inches. Talk to your local building inspector if there is a problem maintaining ceiling heights. You may be eligible for an exception.

Wall Finishes – Gypsum Wallboard (data shown is for ½ inch wallboard with studs at 24 inches o.c.) – Gypsum wallboard may be installed with the long side either horizontal or perpendicular to the framing. Adhesive is not required.

Wallboard Applications			
Location	Nails	Screws	Comments
Walls – ½" gypsum board	8" o.c.	12" o.c.	Type S or W screws – min. 5/8" penetration Gypsum board nail - Min. 1-5/8" .086" dia. Ring shank nail – 1-1/4" .098 dia.
Ceiling – ½" gypsum board	7" o.c	12" o.c.	

Where ceramic tile or other non-absorbent finish materials may be applied, the wall covering should be water-resistant gypsum board or concrete backer-board. This is usually applied around tubs, showers, sinks and counter tops. Note: Water-resistant gypsum board cannot be applied over a vapor barrier in a shower or tub compartment.

Maintain access to all valves, unions and junction boxes.

STAIRWAYS -

Stairway accidents are the leading cause of home injuries. To minimize falls on stairways, complying with the basic code requirements for stair construction is essential.

Stairways – The rise and run requirements for stairways has changed over the years. Many stairs of older homes were constructed with treads and risers that do not meet current codes. Newer homes are constructed to a 7-3/4 inch riser and 10-inch run standard. The basic rise and run do not have to be upgraded to meet current code requirements as part of the basement finish for older homes. Floor covering materials should be carefully considered because the maximum variation between the highest and lowest riser is 3/8 inch. Adding a finish material more than 3/8 inch in thickness to the floor in front of the stairs might reduce the height of the first riser too much and create a code violation.

Open risers are not permitted. As part of the basement finish, any existing open risers shall be blocked solid. Where possible the blocking shall be installed to provide a ¾-inch nosing for each tread.

The minimum stairway width is 36 inches measured above the handrail. The minimum clear width at or below the handrails is 31-1/2 inches.

Handrail – A handrail shall be provided on at least one side of each stairway that consists of three or more risers between landings. Handrails shall be continuous along each flight of stairs (from landing to landing) from the top riser to the bottom riser. Handrails shall be placed between 34 and 38 inches above the nosing of steps and provide a graspable surface. The

handrail shall have a circular cross-section with an outside diameter between 1-1/4 and 2 inches with a circumference of between 4 and 6 inches. The space between the handrail and wall shall be not less than 1-1/2 inches.

Guardrail – Where the height of any riser on the open side of a stair or landing is more than 30 inches above the floor, guardrails are required to prevent falling off the stairs. Guardrails shall be not less than 34 inches in height measured at the nosing of treads. The guardrail shall have intermediate railings below the guardrail spaced so a sphere greater than 4 inches in diameter cannot pass through at any point, except that a 6 inch limitation is permitted at the triangular opening formed by the intersection of the tread and riser at the bottom of the guardrail.

Additional Information – The Stairway Manufacturers' Association publishes an excellent aid to understanding the code requirements and terminology relating to stair construction. This FREE document may be found on the internet at https://stairways.org/store/

Enclosed Usable Space Under Stairways – Enclosed accessible space under stairs shall have walls, under-stair surfaces and any soffits protected on the enclosed side with ½-inch gypsum board.

EMERGENCY ESCAPE AND EGRESS OPENINGS R310

Basements with sleeping room(s) shall have at least one openable emergency escape and rescue opening of 5.7 sq. ft and 5SF for grade or below floor opening.
Exceptions:
1. Storm protection area and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet.

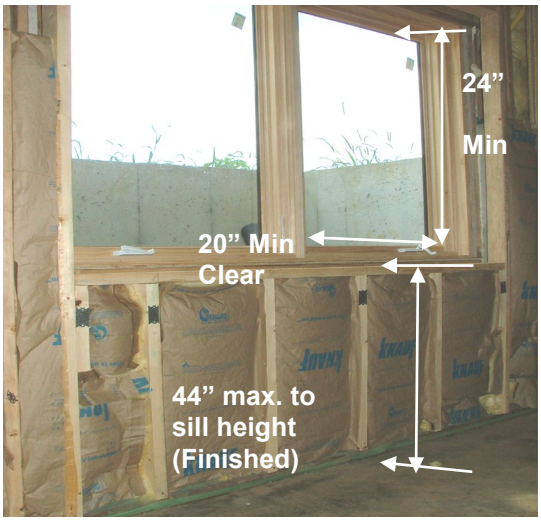
2. Where the dwelling or townhouse is equipped with an automatic sprinkler system installed in accordance with Section P2903, sleeping room in basement shall not be required to have an emergency escape and rescue opening provided that the basement has one of the following:

2.1 One means of egress complying with Section 311 and one emergency escape and rescue opening.

2.2 Two mean of egress complying with R311.

When a secondary egress is required, it may be a door or window leading directly to the exterior. Your local window supplier will be able to verify if the window you selected meets the egress requirements:

- Secondary egress may be provided by a 3' x 6' 8" door with landing and steps to grade, or by an approved window.
- **Egress windows** shall provide a minimum openable area of 5.7 square feet; however, 5.0 square feet is permitted for windows within 44 inches of grade. The opening shall have a minimum height of 24 inches and minimum width of 20 inches with the bottom of the openable portion being not more than 44 inches above the floor.
- **Window wells** shall provide a minimum area in front of the window of 36 inches x 36 inches. Wells more than 44 inches deep shall provide a permanent affixed ladder usable with the window in the fully open position. The ladder may encroach a maximum of 6 inches into the required dimensions of the window well. Ladders 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. If a cover is provided over the well, it shall be openable from the egress side and provide the same clear areas as required for the window.



- Where **casement windows** are used, the clear opening width shall be measured with the window in the open position.
- Where **double hung windows** are used, the required clear openable area shall be provided without using a removal or tilt out sash.
- Standard window wells may be of any materials approved for ground contact.
- **Note: Where windows are adjacent to engineered swales that require minimum low opening elevations, a continuous concrete window well, extending from the footing level to required minimum elevation, is required. Check with your local jurisdiction for details.**

Addition, Alteration or Repair of Existing Basements R310.6

An emergency escape and rescue opening is not required where existing basements undergo alterations or repairs.

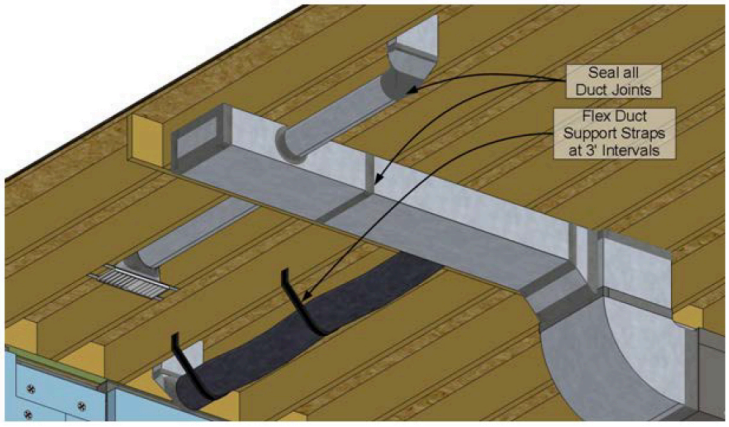
Exception: New sleeping room created in an existing basement shall be provided with emergency escape and rescue opening in accordance with R310.1

ENERGY EFFICIENCY –

Insulation – Approximately 20% of the dwelling heat loss occurs through un-insulated basement walls. Leaving these walls un-insulated can result in condensation occurring on these cool basement wall surfaces. Basement wall insulation is an essential consideration to save energy, keep basement walls warm and reduce the potential for moisture problems. Additional information on this topic can be found in books, magazines or on internet web sites such as:
https://www.buildingscience.com/documents/digests/bsd-103-understanding-basements

Exterior walls adjacent to finished space shall be insulated. Insulating basement walls is inexpensive and provides a significant reduction in energy usage. When insulating the walls, do not forget to insulate the exposed rim joist at the top of the walls.

The basement duct sealing and insulation shall be per. IRC N1103.3.2. This step should be ready at insulation inspection.



Wood framed walls (including the joist cavity at the rim joist) shall be insulated to provide a minimum R-13 insulation.

Concrete walls shall be furred out to accommodate minimum R-13 insulation or R-10 ci.

Vapor Barrier – Vapor barriers are required on the **wood framed exterior walls**. The vapor barrier helps control air infiltration, and keeps moisture on the warm side (interior side) of the wall where it can be effectively controlled. **Note:** Vapor barriers (including foam board and polyethylene) are highly flammable therefore; they are not permitted to be exposed. A wall finish material shall be applied to separate these products from the usable space. The recommended covering material is ½-inch gypsum board.

A vapor barrier is not recommended on the warm side of concrete walls between the insulation and the basement space because moisture that migrates through the concrete wall may be restricted from being dissipated because of a vapor barrier. This may lead to mold and other moisture related problems in the wall cavity. Moisture that may accumulate with cavities adjacent to foundations should be allowed to dry to the interior through the gypsum board therefore the vapor barrier should not be installed. Foam board used as an insulating material should be applied directly to the concrete wall.

Windows – Windows contribute significantly to energy efficiency. New windows shall have an energy efficiency (U-value) of U = 0.32 or less (minimum double glazed window). Single pane windows with storms are not permitted.

If new doors or windows are installed it is extremely important to install them so they are effectively flashed and sealed to keep water from penetrating the structure. Read and follow the window installation instructions. Caulk liberally under the nailing fin so the caulk oozes out around the edges of the fin. Exterior flashing is required above the exterior trim piece above the window. The flashing must extend under the siding and over trim piece (Note: Panel siding may require notching so the flashing can be applied). Additional information can be found in publications, or internet web sites, such as

https://www.buildingscience.com/documents/insights/bsi-085-windows-can-be-a-pain

Air infiltration – Controlling air infiltration significantly increases overall comfort, reduces energy usage, and minimizes moisture migration that contributes to mold and other detrimental effects. Holes for water spigots, air conditioner lines, electrical conductors, cable TV, and exhaust ducts should be sealed with foams or caulks that are made for protection of penetration that are exposed to weather. Doors and windows should be sealed between the frame and the rough opening with approved insulation or foam. Weather stripping should be applied around door openings.

RESIDENTIAL ELECTRICAL –
This document contains limited information regarding circuit installation and wiring. Additional information is needed to properly install wiring. Circuit installation and wiring require knowledge and expertise to maintain electrical safety. When in doubt, installations should be performed by professionals. All electrical work shall comply with the jurisdiction's adopted Electrical Code.

Clearances and Access to Electrical Panels – Equipment shall not be installed in front of electrical panels. Electrical panels shall not be installed in storage closets or bathrooms.

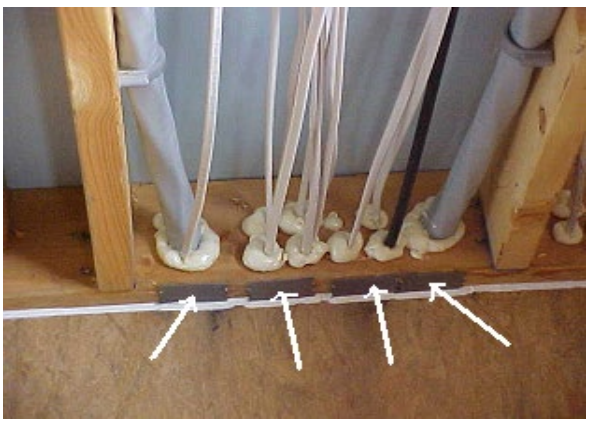
Circuits required –

- General lighting – One 15 amp circuit for each 600 square feet of space.
- Bathroom receptacles – One separate 20 amp circuit; receptacles shall be GFCI protected.
- Laundry area – One separate 20-amp circuit.
- Kitchens – Two separate 20-amp circuits for the counter top. Counter top receptacles shall be GFCI protected.

Note: Separate circuits may be required for other appliances based on the manufacturer's installation instructions. A separate circuit for large appliances, such as dishwashers, space heaters, etc… may also be required.

Protection of wires – Non-metallic sheathed cable (Romex, NM cable)

- Plastic cables must be secured with approved electrical staples to studs within 8 inches of boxes and at intervals of not more than 4-1/2 feet.
- Plastic cables and holes for cables through studs and joists cannot be closer than 1-1/4 inches to the face of the studs (to prevent nails from damaging the cables).
- Cables closer than 1-1/4 inches must be protected with approved metal plates.
- Cables must be kept away from sharp edges or protected with approved grommets.



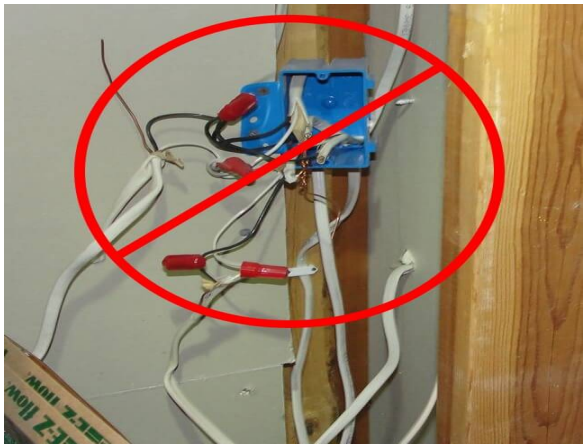
Switch controlled lighting –

- At least one wall switch-controlled light fixture must be installed in every habitable room and bathroom. In other than kitchens and bathrooms, one or more receptacles controlled by a wall switch shall be substituted for the lighting outlet.
- A wall switch-controlled lighting fixture must be installed in hallways.
- Lighting for stairways shall have wall switch-controls at each floor level.

Junction boxes – All splices for wiring must be made within approved outlet boxes or junction boxes that are readily accessible for inspection and repair.

- Do not install junction boxes in the attic or conceal them within walls.
- Make sure all boxes are correctly sized for the number of wires entering and exiting the boxes.

To simplify installations, purchase outlet boxes with the largest volume compatible with the type of fixture being used



As a general rule, plan your wiring to receptacles in a continuous series, and avoid using the boxes for dual purposes such as having the box serve receptacles and as a junction box to branch in more than one direction. For homeowners doing their own work, selecting a box with the volume of space for the type of receptacle being installed is advisable. Boxes are sized by assigning a minimum volume to each conductor entering and exiting the boxes and for each device in the box. Additional information can be found in publications, or internet web sites, such as http://ecmweb.com/mag/electric_box_box_box/index.html

Smoke detectors/CO detectors – Finishing your basement triggers a requirement to upgrade and to retrofit the smoke detectors throughout your home to new dwelling standards of 2018 IRC. The NEW required CO Detectors may be either: battery powered, plug-in with battery backup, hardwired with battery backup, or system type are acceptable for any addition, alteration and repair. The location of CO is outside of sleeping areas (vicinity of bedrooms), and within the room if fuel-burning appliance is located inside the room.
Check with your local jurisdiction for specific issues on your project for any possible local amendments.

(GFCI) Ground fault circuit interrupter protected outlets are required in the following locations:

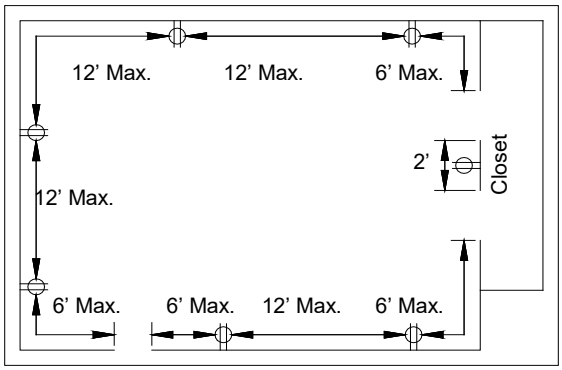
- Bathrooms
- Unfinished basement areas (areas used as workrooms, storage and mechanical equipment) – Note: Dedicated circuits for a washer, dryer, furnace, sump pump, refrigerator or freezer does not require GFCI protection.
- Receptacles serving bar sinks, sinks, kitchen counter top and kitchen islands.

(AFCI) Arc fault circuit interrupter protected outlets –
Arc-fault circuit-interrupter (AFCI) 2018 IRC E309.2.16 requires AFCI protection for all 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in

dwelling units. Note: Some cities have not adopted the AFCI requirements; therefore, consult with your local jurisdiction if you are considering not installing these devices.

Receptacle outlet spacing –
Note: Receptacles shall be of the grounding type.

- General use outlets (bedrooms, dens, kitchens, family rooms, sunrooms, recreation rooms, etc.) – Receptacles shall be provided for unbroken wall spaces over two feet wide. Receptacles shall be located so that no point on the floor line is more than 6 feet, measured horizontally from an outlet.



- Kitchens and counter tops – One receptacle for each wall space wider than 12 inches; no space along the wall shall be more than 24 inches from a receptacle; at islands or peninsula counters provide one receptacle when the counter has a long dimension more than 24 inches or a short dimension more than 12 inches.
- Bathrooms – Provide one receptacle for each bathroom within 3 feet of the outside edge of each lavatory/sink.
- Hallways – Provide one receptacle for each hallway more than 10 feet in length.

Lighting fixtures – Where ceiling heights are less than 7 feet above the floor, recessed fixtures should be used to minimize damage to fixtures and potential fire and safety hazards.
In closets and storage spaces, care should be taken to assure lighting fixtures do not come in contact with combustible materials. Surface mounted incandescent lighting fixtures (including pendant fixtures) shall provide a minimum 12 inches of clearance from the front of shelves and any point where storage can occur. The clearance can be reduced to 6 inches for recessed and/or fluorescent fixtures.

Bar areas, kitchenettes and kitchens – For these types of spaces each jurisdiction should be consulted to assure you are complying with local codes regarding the number of required circuits. Kitchens by definition have a range, sink, and refrigerator. The code prohibits return air vents in kitchens. Generally, since kitchens in basements are installed for convenience and are secondary food preparation areas, return air grills are permitted.
Many basement finishes have spaces that duplicate many of the appliances found in kitchens even if they do not meet the strict definition of a kitchen (sink, refrigerator and range). Where a full kitchen is installed, it shall be wired to meet the requirements of a kitchen. Where a secondary space is provided to serve as a space for small cooking appliances such as popcorn poppers, coffee makers, icemakers, microwaves, blenders, etc., the space should also be provided with circuits as if the space was a kitchen.

Tamper-resistant receptacles

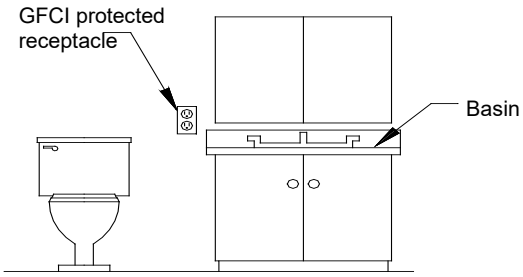
As an additional safety measure, most municipalities now require tamper-resistant outlets for general areas of the home. The recessed letters "TR" on the face of the outlet identify these outlets. In tamper-resistant outlets, a spring-loaded gate within the outlet prevents young children from pushing objects such as knives into the outlet slots.

Tamper-resistant outlet receptacles are usually are not required:

■ For outlets located 66 inches or more above the floor

■ For outlets behind large appliances that are difficult to move (such as a refrigerator)

■ For outlets that are part of a light fixture or appliance

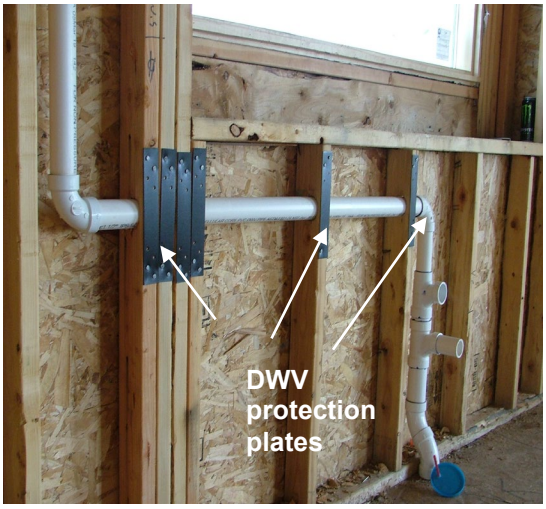


If your kitchenette may contain a variety of appliances such as microwaves, refrigerator, garbage disposal, toaster ovens, or icemakers, wiring the area to meet all of the requirements of a kitchen is recommended. To wire the kitchenette to meet the requirements for kitchens provide:

- Two 20-amp small appliance circuits to serve the countertop receptacles – GFCI protection required.
    - Receptacle required for each counter space wider than 12 inches.
    - Receptacles shall be spaced so no counter space is more than 24 inches measured horizontally along the wall or counter edge from a receptacle.
- 15- or 20- amp circuits to serve individual appliances (it is not recommended that these be provided with GFCI protection):
- 20-amp circuit for dishwasher
- Garbage disposal circuit.
- It is recommended that a separate 15- or 20- amp circuit for the refrigerator be provided.

PLUMBING SYSTEMS –

All plumbing fixtures shall be provided with approved drains and vents. Vents shall be connected to the venting system for the building or where installed compatible with the listing, approved air admittance valves may be used.



Materials:
Approved water piping materials include welded or seamless copper tubing (WK, WL, WM, K, L or M), ABS plastic, polybutylene (PB), chlorinated polyvinyl chloride (CPVC), polyethylene (PE) and other materials as listed in the code. Underground building

drain and vent piping may be ABS plastic, polyvinyl chloride (PVC-Type DWV) and other materials as listed in the code. Above ground sanitary drains and vent piping may be ABS plastic, polyvinyl chloride (PVC-Type DWV) and other materials as listed in the code. All piping materials shall be labeled with the manufacturer's mark or name and the quality or grade of the product.

Access – Valves and Cleanouts

Readily accessible access for use and maintenance must be maintained to plumbing drain clean-outs and floor drains. A door or removable panel is acceptable for providing access.

Venting – Air Admittance valve

Where plumbing fixtures are installed for kitchenettes, bathrooms, and sinks, venting of the fixtures is required. On new homes, a vent connection is required to be provided to connect the fixture vents. When this is not available, an air admittance valve may be used. Air admittance valve must be accessible for inspection and maintenance; therefore, they may not be concealed within walls (a readily openable access panel is permitted). Install the valves a minimum 4 inches above the horizontal branch drain of the fixture being vented. Stack type air-admittance valves must be installed at least 6 inches above the flood level rim of the highest fixture being vented.

Backwater Valve

Where plumbing fixtures are installed in the basement and the flood level rim of the fixture is located below the elevation of the next upstream manhole cover, the public sewer serving the fixtures shall be protected from backflow by installing an approved backwater valve. Fixtures having flood level rims above the next upstream manhole cover shall not discharge through the backwater valve. Access is required to maintain the valves.

Note: **Some cities** have amended their codes to make sewer district responsible for identifying where backwater valves are required. Consult with your city for their application of this requirement.

- The minimum slope for drain lines is ¼ inch of fall for each 12 inches of run for drain pipe that is 2 inches or smaller, and must slope at least 1/8 inch of fall for each 12 inches of run for drain pipe that is 2-1/2 inches or larger.
- Access panels must be provided for hydro massage bathtubs and air admittance valves (studor vents) as required by the manufacturer.
- An individual shutoff valve is required on the fixture supply water pipe to each plumbing fixture other than a bathtub or a shower.
- All shower control valves must be the anti-scald type (pressure balance, thermostatic mixing, or combination pressure balance/thermostatic mixing per ASSE 1016).
- Some municipalities require the use of purple primers and solvent cements for PVC drain waste and vent piping connections.
- **ALWAYS** follow the manufacturers' installation instructions.

MECHANICAL SYSTEMS –

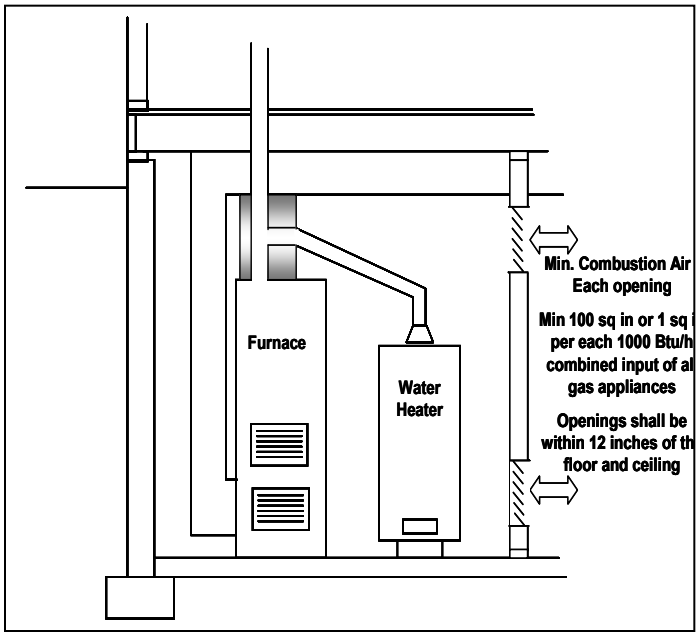
Access – Access must be maintained to unions, valves, equipment in the ceilings, walls and floor, such as water valves, unions in gas piping, sump pump pits, etc. Provide an identified readily accessible opening with enough clearance to maintain and inspect the devices.

Clearances for Furnaces and Water Heaters – Clearances around appliances to elements of permanent construction including other installed equipment and appliances, shall be sufficient to allow inspection, service, and repair or replacement without removing such elements or appliances. Clearances shall be provided on the sides and rear of each appliance to comply with the manufacturer's installation instructions or a minimum of 3 inches, whichever is greater.

Combustion Air – If walls are to be placed around the furnace and hot water heater areas, adequate combustion air must be maintained to the appliance for proper operation. Access and clearance must also be maintained to access, replace and service the equipment without the removal of other equipment. Comply with the manufacturer's installation instructions for minimum clearance. Generally, at least 30 inches of clearance is required in front of a furnace or water heater unless the manufacturer requires more.

For air from inside the building, the room occupied by a gas appliance must have a total volume of 50 square feet for each 1000BTU/h combined input rating of the appliances. An adjacent room may be included in the minimum volume if openings between the room are provided as noted below for inside air (see diagram).

- Outside air - the opening area depends on the method used. Contact the city if you have specific questions regarding this method.
- Inside air - inside air may also be provided from an adjoining room through openings located within 12 inches of the floor and ceiling. Each opening shall equal 1 square inch for each 1,000 BTU/hr of total input rating of all appliances and a total minimum of 100 square inches. The adjoining room must have a volume equal to at least 50 cubic feet for each 1,000 BTU/hr of aggregate input rating of the appliances.



Bathroom Exhaust Fans - Each room containing a water closet, bathtub or shower shall be provided with a mechanical ventilation system with an intermittent capacity of not less than 50 cfm. Ventilation air from the space shall discharge directly to the outside and 3 feet of an opening.

Common Requirements That Are Overlooked

- ALWAYS follow the manufacturer's installation instructions.
- Everything metallic that is part of the electrical circuit should be properly bonded to the equipment grounding conductor (the bare or green wire).
- Attach junction boxes to studs so that the edge of the box will end up flush with the sheetrock.
- All connections for wiring shall be within approved electrical boxes. All junction boxes shall remain accessible and shall not be concealed within walls or ceilings.
- The gap between the edge of the junction box and the sheetrock should be no larger than 1/8".
- Access to the grounding electrode conductor (large bare copper wire) connection to the water line must be provided/maintained.
- Properly label new circuits in the breaker panel box.
- Electrical conductors (wires) are required to be properly color-coded. The most common coding is white for the grounded conductor (neutral), green for the equipment grounding conductor, and black or red for the ungrounded (hot) conductor.
- The maximum size of breaker to protect the circuit conductors is 15 amps for #14 gauge conductors, 20 amp for #12 gauge conductors, and 30 amps for #10 gauge conductors.
- Do not mix conductor sizes on a single circuit.
- Normally, only one conductor is allowed under each screw on the breaker.
- Switches and outlets (plugs) must be securely fastened to the junction box, and covered with a compatible cover.
- GFCI protection is required for receptacles in unfinished portions of the basement.
- A cover is required for all junction boxes.
- Breaker boxes are not allowed in closets or bathrooms.
- Vent bathroom exhaust fans to the exterior.
- Provide adequate combustion air to the gas furnace/hot water heater room.
- New duct joints should be made airtight by using tapes or mastics that are UL listed.
- *Note- This item is just a recommendation.* When works allows, install a stub to allow a 3" or 4"PVC pipe for future RADON mitigation abatement. Radon—an invisible, odorless, and tasteless gas—comes from the breakdown of naturally occurring uranium found within soil, rocks, and groundwater. Elevated radon levels are found throughout Kansas per EPA and the University of Kansas.

HELPFUL LINKS

Johnson County Contractor Licensing Program - Search database
http://cls.jocogov.org/clsCourseReg/searchcontractor.aspx

Johnson County Building Officials Association
http://jocobo.jocogov.org

Johnson County (Unincorporated areas of the county)
https://www.jocogov.org/dept/planning-and-codes/bld/permits/building

City of Lenexa, KS
https://www.lenexa.com/government/departments___divisions/community_development/building_construction/residential_building_permits

City of Leawood, KS
https://www.leawood.org/community-development/codes-administration/

City of Overland Park
https://www.opkansas.org/city-services/building-construction/building-codes/

City of Olathe
https://www.olatheks.org/government/building-codes

City of Shawnee, KS
https://www.cityofshawnee.com/Departments/Community_Development/Building_Permits_and_Inspections

Building Science Corporation Website
https://www.buildingscience.com/

Graphic interpretation of stair construction codes 2000-2018 IRC (some are free)
https://stairways.org/store/