



# LEE'S SUMMIT MISSOURI

## **ONE AND TWO FAMILY DWELLINGS**

### **Building Planning, Concrete, Framing, Roof Coverings, Fireplaces, Insulation**

March 2014

The following are general requirements pertaining to the construction of one and two family dwellings. This does not represent all the provisions regulating construction of one and two family dwellings and is not intended to replace the adopted codes and ordinances of the City of Lee's Summit, MO. Builders and contractors are encouraged to become knowledgeable of the provisions of the 2012 International Residential Code (IRC), Chapter 7 of the Lee's Summit Code of Ordinances and the Unified Development Ordinance.

The 2012 IRC may be purchased online at [www.iccsafe.org](http://www.iccsafe.org) or by calling the International Code Council Store at 1-800-786-4452.

Chapter 7 of the Lee's Summit Code of Ordinances, which contains the local amendments to the 2012 IRC, can be found on the City of Lee's Summit website at [www.cityofls.net](http://www.cityofls.net), or may be viewed at the Planning and Codes Administration Department at City Hall.

#### **GENERAL:**

1. Fees- The amount of all building related fees and excise tax is available upon request.
2. Contractor Licenses - All contractors/builders are required to have a business license. Certification of at least one employee of the company as a master electrician, master plumber, master mechanical or class A, B, or C contractor shall be a pre-requisite for licensing. The certification of the master and the business license must remain current throughout the period of construction. The right of a company to do work as a general, building, residential, electrical, plumbing or mechanical contractor depends upon the retention of the person holding the master certification as an employee, member or officer of the company. Except persons doing work on their own residence, no person, other than a licensed contractor or employee of a licensed contractor shall engage in building, electrical, plumbing or mechanical business, construction or installations. (LSCO 7-130)

3. Permit Submittal Documents – Construction documents and other data shall be submitted with each application for permit. A registered design professional licensed by the State of Missouri shall prepare the construction documents. Where special conditions exist, the building official is authorized to require additional documents to be prepared by a registered design professional licensed by the State of Missouri.

Exception: The building official is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that reviewing of construction documents is not necessary to obtain compliance with the code. (LSCO 7-137)

4. Permits - Permits are required for the construction of one and two family dwellings. Permit applications, available in the Codes Administration Dept or at [www.cityofls.net](http://www.cityofls.net) must be submitted with two copies of the building plans, two copies of the plot plan and a completed excise tax form. Building related permit fees are charged based upon the City of Lee's Summit, MO Schedule of Fees and Charges and LSCO Chapter 7. In addition, other fees such as water tap, sewer connection fees and excise tax are collected at the time of permit issuance.
5. Permit Expiration - Permits for one and two family dwellings shall become invalid unless the work is commenced within 180 days after the date of issuance, or if the work is suspended or abandoned for a period of 180 days after the work is commenced. (LSCO 7-134)
6. Placement of Permit – Permits for one and two family dwellings shall be posted on site and visible from the street or the property address clearly identified and visible from the street. Failure to clearly identify the property or post the permit may result in inspections not being performed. (LSCO 7-136)
7. Erosion Control – Erosion control devices shall be installed and maintained throughout the construction process in accordance with the City of Lee's Summit Design and Construction Manual. Failure to install or maintain erosion control devices may result in inspections not being performed, stop work orders being issued or court actions taken.
8. Required Inspections – The following inspections are required for one and two family dwelling structures; (IRC 7-160)
  - A. Footing Inspection – Footing inspections shall be made after excavations are complete and forms and reinforcing steel are in place, but prior to the placement of concrete.

- B. Foundation Walls – Foundation walls 10 feet in height or higher shall be inspected. This inspection will be made in order to determine the walls are constructed in accordance with the engineered design. This inspection shall be made after all forms and steel are in place but prior to the placement of concrete.
- C. Concrete Slab/Under Floor Inspection – Shall be made after in slab or under slab conduit, piping and other equipment is in place but prior to being covered by either concrete or gravel.
- D. Frame Inspection – Framing inspections shall be made after all roof deck, framing, fire blocking and bracing are in place and pipes, chimneys and vents to be concealed are complete and the rough electrical, plumbing, mechanical and HVAC are in place and approved. In cases where truss systems or fabricated products are being utilized, the approved design for these systems shall be on site at the time of inspection.
- E. Electrical Service – Shall be made after the service equipment is installed, including grounding and service entrance conductors.
- F. Gas Test – Shall be made after, or at the same time, all gas piping is installed and approved. Piping shall be tested for a minimum of 10 minutes and at not less than 10 psi or 6 inches of mercury. Gas Service will not be released until gas appliances and equipment have been vented and approved.
- G. Water Service – Shall be made after the water service piping and meter assembly has been installed but prior to being covered.
- H. Sewer Service – Shall be made after the sewer service piping has been installed but prior to being covered.
- I. Driveway/Sidewalks – Shall be made after all forms and reinforcing steel are in place but prior to the placement of concrete. As applicable, all manholes, valve boxes and other equipment shall be adjusted per the Design and Construction manual prior to approval. These inspections are performed by the Public Works Department (816-969-1800).
- J. Suspended Slabs with Useable Space Below – Shall be inspected after all forms and reinforcement are in place but prior to the placement of concrete. Sealed plans must be on site at the time of inspection.
- K. Erosion Control – Erosion control devices will be inspected each time an inspector is on site. If erosion is not being controlled in accordance with the City

of Lee's Summit Design and Construction Manual, requested inspections may not be performed until corrections have been made. In addition, stop work orders and court actions may also be initiated if adjacent property, streams and streets are not being adequately protected from erosion.

- L. Special Inspections – In addition to the above inspections, the Codes Administration Department may make or require special inspections to be made. Some of which may be required to be made by registered design professionals.
  - M. Final Inspection – The final inspection shall be made after all work required by the permit is completed but prior to occupancy. Occupancy includes moving furniture and other items into the house that may interfere with the inspection process.
9. Appeals/Interpretations/Disputes – Appeals/Interpretations/Disputes pertaining to inspection should first be addressed with the Manager of Inspections. Appeals/Interpretations/Disputes during the plan review process should first be addressed with the Assistant Director Codes Administration. The Director of Planning and Codes Administration is also available to address any concerns regarding any facet of the Planning and Codes Administration Department. All Appeals/Interpretations/Disputes may be heard in front of the Board of Appeals.

Applications for appeal to the Board of Appeals shall be based upon a claim that the true intent of the code has been incorrectly interpreted, the provisions of the code do not fully apply, or an equally good or better form of construction is proposed. The Board of Appeals may not waive the requirements of the code. However, they may recommend waivers of the code to the City Council, which may waive the requirements of the code. (LSCO 7-173)

10. Temporary Certificates of Occupancy – TCO's may be issued contingent upon the following;
- A. The TCO has been specifically requested.
  - B. No outstanding life safety issues exist.
  - C. The lot is either permanently stabilized or adequate erosion control devices have been installed
  - D. The structure is not in danger of being flooded due to improper drainage of the site.
  - E. All outstanding fees have been paid.
  - F. Required sidewalks are installed or sidewalk escrow has been deposited.
  - G. The driveway is installed or specific approval granted otherwise due to weather conditions.
  - H. Any required structural engineering reports have been submitted and approved.
  - I. All required inspections have been performed and approved.

- J. All applicable utilities have been connected and are in service.

TCO's will be routinely issued for 30-day periods unless known circumstances will prevent completion of the project within the initial 30-day timeframe. Prior to expiration of the TCO the permit applicant shall request a final re-inspection or file a written request for an extension.

If the necessary work has not been completed within the established timeframe or an extension has not been requested and approved, a Notice of Violation will be mailed to the permit applicant placing them on official notice that corrective actions must occur within 10 days. If the issue is not resolved within 10 days the matter will be submitted to municipal court for resolution.

### **BUILDING PLANNING:**

1. Adopted Climatic and Geographic Design Criteria
  - Ground Snow load: 20 psf
  - Wind Speed: 90 mph
  - Weathering: Severe
  - Frost Line Depth: 36 inches
  - Termite Infestation: Moderate to Heavy
  - Seismic Design Category: A
  - Decay: Slight to Moderate
  - Winter Design Temp: 6 Degrees F
  - Ice Shield Underlayment Required: No
  - Mean Annual Temperature: 55.5 degrees Fahrenheit
2. Design – The construction of buildings shall result in a system that provides a complete load path capable of transferring all loads from their point of origin through the load resisting-elements to the foundation. (IRC 301.1)
3. Engineered Design – The requirements of the code are based upon platform and balloon type framing. When buildings or building elements are constructed otherwise, these elements must be constructed in accordance with accepted engineering practice. (IRC 301.1.3)
4. Driveways – Must be a hard surface constructed of asphalt or concrete. There are exceptions for lots 1 acre or larger. See UDO for additional information.
5. Drive Approaches and Public Sidewalks – Must be constructed in accordance with the City of Lee's Summit Design and Construction manual.
6. Light/Ventilation – With exceptions, all habitable rooms shall be provided with an aggregate glazing area of not less than 8% of the floor area of the room. Natural

ventilation shall be through windows, doors or other approved openings to the outside air. (For a full listing and exceptions, see IRC 303.1)

7. Bathtub and Shower Spaces – Walls surrounding showers and bathtubs installed with showerheads shall be finished with a nonabsorbent surface. Such wall surface shall extend to a height of not less than 6 feet above the floor of the bathtub or shower. (IRC 307.2)

Cement, fiber-cement or glass mat gypsum backers in compliance with ASTM C 1288, D 1325 or C 1178 and installed in accordance with manufacturers' recommendations shall be used as backers for wall tile in tub and shower areas and wall panels in shower areas. (IRC 702.4.2)

8. Safety/Tempered Glazing Requirements – Based upon the location and use of glazing, many areas within a house are required to be provided with safety or tempered glass. For a full listing of these requirements see IRC Section 308.4.
9. Light Activation – Where lighting outlets are installed in interior stairways, there shall be a wall switch at each floor level to control the lighting outlet where the stairway has six or more risers. The illumination of exterior stairways shall be controlled from inside the dwelling unit. (IRC 303.7.1)

10. Garages (LSCO 7-904)

- A. Garages shall be separated from the residence and its attic area by not less than ½-inch gypsum board applied to the garage side and from all habitable rooms above the garage by not less than 5/8-inch type X gypsum board or equivalent.
- B. When the separation is a floor ceiling assembly, the structure supporting (beams and columns) the separation shall also be protected by not less than 5/8 inch type X sheetrock.
- C. Doors between the living or other unprotected areas and the garage shall be minimum 1 3/8 inch solid core wood doors, solid or honeycomb core steel doors not less than 1 1/18ths inches thick, or 20 minute fire-rated doors, equipped with a self closing device.
- D. A garage shall not open directly into a room used for sleeping purposes.
- E. Ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum No. 26 gage sheet steel or other approved material. Such ducts shall have no openings into the garage. (IRC R302.5.2)

11. Emergency Escape and Rescue Openings – Every sleeping room and every new basement or basement addition shall have at least one openable emergency and rescue window or exterior door. Where openings are provided as a means of escape and rescue they shall have a sill height of not more than 44 inches above the floor or adjacent interior standing surface. The interior standing surface shall be

permanently attached to the structure, be the full width of the opening, provide a minimum tread depth of 10 inches and be not more than 7-3/4 inches above the floor. (LSCO 7-910)

Emergency escape window wells – Window wells with a vertical height greater than 44 inches shall be provided with permanently affixed steps or a ladder. (IRC 310.2.1)

Emergency escape, minimum opening area – All emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet, except for grade floor openings, which may have a minimum net clear opening of 5.0 square feet. The minimum net clear opening height is 24 inches and the minimum net clear opening width is 20 inches. (IRC Section 310)

12. Exit doors – Not less than one exit door conforming to the 2012 IRC shall be provided from every dwelling unit. The required exit door shall provide direct access to the outside without travel through the garage. Exit doors shall be side hinged, not less than 3 feet in width, not less than 6 feet 8 inches in height and shall be openable from the inside without the use of a key or special knowledge. (IRC 311)
13. Hallways – The minimum width shall not be less than 3 feet. (IRC 311.6)
14. Guards – Porches, balconies or raised floor surfaces located more than 30 inches above the floor or grade 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 grade below shall have guards not less than 34 inches in height measured vertically from the nosing of the treads. Where the top of the guard also serves as a handrail on the open sides of the stairs, the top of the guard shall not be less than 34 inches and not more than 38 inches measured vertically from the nosing of the treads. (LSCO 7-915)
15. Guard and Window Fall Protection – Required guards on open stair risers, porches, raised floor areas, and balconies shall not have openings that allow the passage of a sphere 4 (four) inches in diameter. Required guards on open-sided stairways shall not allow the passage of a sphere 4-3/8 inches in diameter. The triangular openings formed by the riser, tread and bottom rail of a guard on the open side of a stairway are permitted to be of such size that a sphere 6 inches in diameter cannot pass. (IRC 312.1.3)

In dwelling units, where the opening of an operable window is located more than 72 inches above the finished grade or surface below, the lowest part of the clear opening of the window shall be a minimum of 24 inches above the finished floor of the room in which the window is located. Window opening control devices may be used only if they comply with ASTM F-2090 and do not reduce the minimum net clear opening area required by R310.1.1.

16. Handrails – Handrails shall be provided on at least one side of all stairways consisting of 4 or more risers. Handrails shall have a minimum height of 34 inches and a maximum height of 38 inches measured vertically from the sloped plane adjoining the tread nosing. Handrails shall run the full length of the stairs from a point directly above the top riser to a point directly above the bottom riser. Ends of handrails shall terminate into the wall or shall terminate into a newel post or safety terminal. Handrails adjacent to a wall shall have a space of not less than 1.5 inches. (LSCO 7-913)

17. Stairways – Stairways shall not be less than 36 inches in clear width at all points above the permitted handrail height and below the required headroom height. Required stairway width vary dependent upon the configuration, for additional information regarding stairway widths see IRC Section 311.7.

The maximum riser height shall be 7-3/4 inches; the minimum tread depth shall be 10 inches. The riser heights shall be measured vertically from the leading edges of the adjacent treads. The tread depths shall be measured horizontally between the vertical planes of the foremost projections (nosings) and at a right angle to the tread's leading edge. Stairways and landings shall not be sloped greater than 1 inch in 48 inches (2% slope). Riser heights and tread depths shall not differ more than 3/8 of an inch. (IRC 311.7)

A nosing not less than 3/4 inch but not more than 1 1/4 inches shall be provided on all stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than 3/8 of an inch. Risers shall be vertical or sloped from the underside of the tread above at an angle not more than 30 degrees from vertical. Open risers are permitted, provided the opening between treads does not permit the passage of a 4-inch diameter sphere. (IRC 311.7.5.3)

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. (IRC 311.7.2)

Enclosed accessible space under stairs shall be protected on the enclosed side with 1/2 inch gypsum board. (IRC 302.7)

18. Landings – There shall be a landing at the top and bottom of each stairway except for the top of an interior flight of stairs, provided a door does not swing over the stairs. (IRC 311.7.6)

There shall be a floor or landing on each side of an exterior door and the landing shall not be more than 1.5 inches lower than the top of the threshold.

Exception: The landing at an exterior door shall not be more than 7-3/4 inches (1 riser) below the top of the threshold at the required exit door, or more than 30 inches below the top of the threshold at other exterior doors, provided the door, other than an exterior storm or screen door, does not swing over the landing.

The width of landings shall not be less than the door or stairway it serves and shall have a minimum dimension of 36 inches measured in the direction of travel. (LSCO 7-911)

19. Carbon Monoxide Alarms – An approved carbon monoxide alarm shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms in dwelling units within which fuel-fired appliances are installed and in dwelling units that have attached garages.

20. Smoke Alarms shall be installed in the following areas:

1. Each sleeping room.
2. Outside each sleeping area in the immediate vicinity of the bedrooms.
3. On each additional story, including basements.

The alarm devices shall be interconnected in such a manner that the activation of one alarm will activate all the alarms in one individual dwelling unit. Smoke alarms, in new construction, shall receive primary power from the building wiring and secondary power from a battery. (IRC 314)

21. Two-Family Dwelling Separation – Dwelling units in two-family dwellings shall be separated from each other by wall and/or floor assemblies having not less than 2-hour fire-resistance rating when tested in accordance with ASTM E 119. Fire-resistance-rated floor-ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend to the underside of the roof sheathing. (LSCO 7-903)

22. Address – Addresses shall be provided for all new buildings in such a position as to be plainly visible from the street or road. Numbers shall be a minimum of 4 inches high with a minimum stroke width of ½ inch. (IRC 319.1)

23. Foundation Elevation - The top of any exterior foundation shall extend above the elevation of the street curb or approved drainage device a minimum of 12” (twelve inches) plus 2%. Alternative elevations are permitted subject to approval of the building official, provided it can be demonstrated that required drainage to the point of discharge and away from the structure is provided at all locations on site. (IRC 403.1.7.3)

An “as built” grading survey and elevation certification for each individual lot may be required if deemed necessary by Public Works Engineering or the Building Inspector. The survey must be prepared by a registered land surveyor after utility installation, final grading and all associated storm water drainage improvements required for the site have been completed. The survey shall include information necessary to substantiate conformance with the Master Drainage Plan. (LSCO 7-160 C)

Foundation walls shall extend above the finished grade a minimum of 4 inches where masonry veneer is used and a minimum of 6 inches elsewhere. (IRC 404.1.6) Exterior Insulation Finish Systems, EFIS, shall terminate not less than 6 inches above finished grade. (IRC 703)

24. Surface drainage - shall be diverted to the curb or other point of conveyance so as not to create a hazard. Lots shall be graded so as to drain surface water away from the foundation walls. The grade away from foundation walls shall fall a minimum of 6 inches within the first 10 feet. (IRC 401.3) In addition, all drainage shall be designed to carry waters to the nearest drainage way, storm sewer conveyance, or other approved point of collection and conveyance (LSCO 9-923)
25. Excavations – Any excavation for foundations and or footings shall be backfilled within 28 days from the date of permit issuance, unless otherwise approved by the building official. (LSCO 7-122)
26. Site Preparation – The area within the foundation walls shall have all vegetation, topsoil and foreign matter removed. (IRC 506.2)
27. Roof Drainage – All dwellings shall have a controlled method of water disposal from the roof that will collect and discharge all roof drainage to the ground at least 3 feet from the foundation walls or to an approved drainage system. (LSCO 7-936)
28. Certificates of Occupancy – Certificates of Occupancy will be mailed to the permit applicant upon completion and final approval of the project.

## **CONCRETE**

1. Frost Line - Footings are required to extend below frost line, a minimum of 36” below grade. (LSCO 7-902)
2. Soils - Footings shall be supported upon undisturbed soils or engineered fill. Fill soils that support footings shall be designed, installed and tested in accordance with accepted engineering practice. (IRC 401.2)

Soils tests may be required in areas likely to have expansive, compressive, shifting or other unknown soil characteristics. (R401.4)

3. Footing Reinforcement - All footings shall have a minimum of two #4 reinforcement bar run continuously through the footing. Bars shall be uniformly spaced and located not closer than 3 inches from the side or bottom of the footing. (LSCO 7-925)
4. Column Pads - Column pier pads shall be a minimum of 24 inches square and 8 inches deep (24"x24"x8") and be reinforced with a minimum of 3 uniformly spaced #4 bars run each direction. (LSCO 7-926)
5. Stepped Footings - Stepped footings shall be continuous (in plan view). Cantilevering of foundation walls, unless in accordance with an engineered design, is not permitted.
6. Foundation Walls in Excess of 10 Feet in Height - Foundation walls 10'-0" in height or over shall be designed by a registered architect/engineer and shall be constructed accordingly. (LSCO 7-160)
7. Required Concrete Mixtures - Concrete basement walls, foundations, basement slabs, interior slabs on grade except garage slabs, and other concrete not exposed to the weather shall have a minimum compressive strength of 2500 psi and shall be air entrained if subject to freezing during construction. (IRC Table 402.2)

Concrete basement walls, foundation walls and other vertical concrete exposed to the weather shall have a minimum compressive strength of 3000 psi and be air entrained. (IRC Table 402.2)

Concrete porches, carport slabs and steps exposed to the weather and garage floor slabs shall have a minimum compressive strength of 3500 psi and be air entrained. (IRC Table 402.2)

8. Drains – Drains shall be provided around all concrete or masonry foundations that retain earth and enclose habitable or useable space. Drainage tiles, gravel drains or perforated pipe drainage systems shall be installed at or below the area to be protected and discharge by gravity or mechanical means. Perforated pipe shall be placed upon at least 2 inches of washed gravel or crushed rock and covered with not less than 6 inches of the same material. (LSCO 7-929)
9. Base for Basement Floor – A porous layer of gravel, crushed stone or coarse sand shall be placed to a minimum thickness of 4 inches under the basement floor. Provisions shall be made for automatic draining of this layer and the gravel or crushed stone wall footings. (IRC 405.2.1)

10. Waterproofing/Dampproofing – Foundation walls that enclose interior spaces shall be dampproofed from the top of the footing to the finished grade (IRC 406.1). Foundation walls located in areas where water tables or other severe water-soil conditions are known to exist shall be waterproofed with a membrane extending from the top of the footing to finished grade. (IRC 406.2)
11. Columns – Wood columns shall be not less than 4 inches by 4 inches and be protected from decay as required in IRC 319. Steel columns shall be not less than 3 inches in diameter and given a shop coat of rust-inhibitive paint. All columns shall be restrained to prevent lateral displacement at the bottom. (IRC 407)
12. Concrete Floors – Concrete slab on grade floors shall be a minimum of 3.5 inches thick (IRC 506.1) and placed upon a 4 inch base of clean gravel or sand if located below grade. (IRC 506.2.2)
13. Fill Under Slabs – Fill material shall be free of vegetation and foreign material. The fill shall be compacted to ensure uniform support of the slab, and except where approved, shall not exceed 24 inches for clean sand or gravel and 8 inches for earth. Slabs may be engineered to span soils not in compliance with the above. (LSCO 7-931)

#### **WOOD FRAMING:**

1. Span Tables – See span tables provided under separate cover.
2. Protection from Decay – For a full listing of areas required to be protected from decay and the required materials see IRC 317. The most common areas that must be protected from decay are as follows:
  - A. Wood joists when closer than 18 inches to exposed ground when located within the periphery of the building foundation.
  - B. All wood framing members that rest on concrete or masonry exterior walls when less than 8 inches from exposed ground.
  - C. Sills and sleepers on a concrete or masonry slab that is in direct contact with the ground unless separated from the slab by an impervious moisture barrier.
  - D. Wood siding, sheathing and wall framing on the exterior of a building having a clearance of less than 6 inches from ground.
  - E. Wood furring strips or other wood framing attached directly to the interior of exterior masonry or concrete walls except where an approved vapor barrier has been installed.
  - F. Vertical and horizontal members of exterior decks and balconies.
  - G. Exterior posts, poles or columns.
  - H. All wood in direct contact with the ground.

- I. The ends of wood girders entering exterior masonry or concrete walls having clearances of less than ½ inch on the tops, sides and ends.

Decay resistant materials shall be treated in accordance with AWPA standards or shall be naturally durable wood. (IRC 317)

3. Decks – Shall be positively anchored (bolted) to the primary structure and designed for both vertical and lateral loads as applicable. Such attachment **shall not** be made by the use of nails subject to withdraw. Where positive connection to the building can not be verified during inspection, decks shall be self-supporting. (IRC 507)

#### Foundation Plates or Sill;

1. All sills and foundation plates shall be of decay resistant wood per IRC 317.
2. Foundation sills and exterior wall sole plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet on center. Anchor bolts shall be located not more than 12 inches or less than 7 bolt diameters from the end of each plate section. Anchor bolts shall be ½ inch in diameter and shall extend a minimum of 7 inches into the concrete. A nut and washer shall be tightened on each bolt to the plate. (IRC 403.1.6)

#### Wood Floor Framing;

1. Spans – See span tables under separate cover.
2. Joists under Parallel Bearing Walls - Shall be doubled or of adequate size to support the imposed load. Double joists that are separated to permit the installation of piping or vents shall be full depth solid blocked with 2-inch lumber spaced not more than 4 feet on center. Bearing partitions perpendicular to joists shall not be offset from supporting girders, walls or partitions more than the joist depth unless joists are sized to carry the additional load. (IRC 502.4)
3. Joist Bearing – The ends of joists shall have not less than 1.5 inches of bearing on wood or metal and not less than 3 inches on masonry or concrete unless supported by a ribbon strip and nailed to the adjacent stud or supported by approved joist hangers. (IRC 502.6)
4. Joist Framing - Joists framing into the side of a wood girder shall be supported by approved framing anchors or on ledger strips (IRC 502.6.2)
5. Joist Connection over a Beam or Support – Joists framing from opposite directions shall be lapped a minimum of 3 inches and nailed with a minimum of 3 10d nails. A

wood or metal strip splice with strength equal to or greater than that provided by the nailed lap is permitted. (IRC 502.6.1)

6. Joist Lateral Restraint – Joists shall be supported laterally at the ends by full depth, 2 inch, solid blocking or by attachment to a full-depth header, rim joist or adjoining stud. (IRC 502.7)
7. Joist Drilling and Notching; Solid Lumber (IRC 502.8.1)
  - A. Notches shall not exceed 1/6 the depth of the joist, shall not be longer than 1/3 the depth of the joist and shall not be located in the middle 1/3 of the span. Notches at the ends of the joists shall not exceed ¼ the depth of the joist.
  - B. The diameter of holes shall not exceed 1/3 the depth of the joist, shall not be closer than 2 inches to the top or bottom of the joist or within 2 inches of any other hole in the joist. When the joist is also notched, holes may not be located closer than 2 inches from the notch.
8. Engineered Wood Joists – Cuts, notches and holes bored in trusses, structural composite lumber, structural glue-laminated members or I-joists are prohibited except where permitted by the manufacturer’s recommendations or where the effects of such alterations are specifically considered in the design of the member by a registered design professional. (IRC 502.8.2)
9. Floor Framing Around Openings – Openings in floor framing shall be framed with a header joist and trimmer joists. When the header joist exceeds 4 feet in length the header and trimmer joists shall be doubled. Header joists shall be connected to the trimmer joists with approved hangers when the header joist span exceeds 6 feet. Tail joists over 12 feet in length shall be supported at the header joist with approved joist hangers. (IRC 502.10)
10. Manufactured Wood “I” Joists – When using manufactured wood floor joists, framing details and lay-out plans provided by the supplier shall be available on site at the time of the framing inspection.
11. Floor Cantilevers – Spans for floor cantilevers shall not exceed the depth of the joist, except cantilevers may be constructed in accordance with table 502.3.3(1) (included with span tables under separate cover) when the cantilever only supports a light-framed bearing wall and roof covered with a light roof covering or table 502.3.3(2) when supporting a floor surface only, such as a balcony or deck.

## **WALLS**

1. Stud Grade – Bearing studs shall be a minimum of No. 3 standard or stud grade lumber. Bearing studs not supporting a floor and non-bearing studs may be utility grade lumber. (IRC 602.2)

2. Top Plates – Exterior walls and bearing walls shall be capped with a double top plate installed to provide overlapping at corners and intersections with bearing partitions. End joints in top plates shall be offset 24 inches. (IRC 602.3.2) Single top plates may be used in exterior and bearing walls if installed in accordance with the exception listed in IRC 602.3.2. Interior nonbearing walls shall be capped with at least a single top plate. (IRC 602.5)
3. Bottom Plate – Studs shall have full bearing on a nominal 2x or larger plate having a width equal to the width of the studs. (IRC 602.3.4)
4. Drilling/Notching Studs – Any stud in an exterior wall or bearing partition may be cut or notched to a depth not exceeding 25% of its width. Studs in nonbearing walls may be notched not to exceed 40% of the stud width. Any stud may be bored or drilled provided the hole does not exceed 40% of the width of the stud, the edge of the hole is no more than 5/8 inch to the edge of the stud, and the hole is not located in the same section as a cut or notch. When studs are doubled or approved stud shoes are used, studs may be bored to 60% of the stud width for a maximum of two successive studs. (IRC 602.6)
5. Notching Top Plates – When top plates are notched more than 50% of its width, a galvanized metal tie not less than .054 thick (16 gage) and 1.5 inches wide shall be fastened to each plate across and to each side of the opening with not less than six 16d nails at each side. (IRC 602.6.1)
6. Fireblocking – Fireblocking shall be provided to cut off all concealed draft openings in accordance with IRC 602.8.
7. Cripple Walls – Foundation cripple walls shall be framed of studs no smaller than the studding above. When exceeding 4 feet, cripple walls shall be framed of studs having the size required for an additional story. Cripple walls less than 14 inches in height shall be continuously sheathed with wood structural panel fastened to both the top and bottom plate in accordance with IRC Table 602.3(1), or shall be constructed of solid blocking. All cripple walls shall be supported on continuous foundations. (IRC 602.9)
8. Braced Wall Lines – Braced wall lines shall consist of wall panel construction methods in accordance with IRC section 602.10. The amount and location of bracing shall be in accordance with Table 602.10.1.3.
9. Headers – Headers located in bearing walls shall consist of 2, 3 or 4 members and be supported by 1, 2 or 3 trimmers on each end per IRC tables 502.5(1) and 502.5(2).
10. Stud Size, Spacing & Heights – Shall be installed in accordance with Table 602.3.1.

11. Exterior Windows/Doors – Windows & doors shall be installed and flashed in accordance with the manufacturer’s written installation instructions and IRC 703.8. Written installation instructions shall be provided by the manufacturer for each window. (IRC 612)
12. Panel Siding – Vertical joints in panel siding shall occur over framing members, unless wood or wood structural panels are used, and shall be shiplapped or covered with a batten. Horizontal joints shall be lapped a minimum of 1 inch, or be shiplapped or shall be flashed with Z-flashing and occur over solid blocking, wood, or wood structural panels. (IRC 703.3.1)
13. Horizontal Siding – Shall be lapped 1 inch, ½ inch if rabbeted, and shall have the ends caulked, covered with a batten or sealed and installed over flashing. (IRC 703.3.2)
14. EIFS - All EIFS systems shall be installed in accordance with the manufacturer's installation instructions, have a weather-resistive barrier applied between the underlying water-sensitive building components and the exterior insulation, and a means of draining water to the exterior of the veneer. (IRC 703.9)
15. Flashing – Approved corrosion resistive flashing shall be installed at all of the following locations; (IRC 703.8)
  - a. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage.
  - b. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
  - c. Under and at the ends of masonry, wood or metal copings and sills.
  - d. Continuously above all projecting wood trim.
  - e. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood frame construction.
  - f. At wall and roof intersections.
  - g. At built-in gutters.
  - h. Beneath the first course of masonry veneer above the foundation wall or slab and at other points of support. (IRC 703.7.5)
16. Water-Resistive Barrier – One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt, or other approved water resistive barrier shall be approved over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches. Where joints occur, felt shall be lapped not less than 6 inches. The felt or other approved material shall be continuous to the top of

walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.2.

17. Weepholes – Shall be provided in the outside wythe of masonry walls at a maximum spacing of 33 inches on center. Weepholes shall not be less than 3/16 inch in diameter and shall be located immediately above the flashing. (IRC 703.7.6)

## **CEILING AND ROOFS**

*The framing details required in this section apply to roofs having a minimum slope of 3 units vertical in 12 units horizontal (25% slope) or greater. When the roof slope is less than 3 units vertical in 12 units horizontal (25% slope), members supporting rafters and ceiling joists such as ridge boards, hips, and valleys shall be designed as beams.*

1. Span Tables – Available under separate cover.
2. Rafters – Ridge boards shall not be less in depth than the cut end of the rafter. Hip and valley rafters shall be supported at the ridge by a brace to a bearing partition or be designed to carry and distribute the specific load at that point. (IRC 802.3)
3. Ceiling and Rafter Connection – Ceiling joists and rafters shall be nailed to each other and the top plate in accordance with IRC Table 802.5.1(9). Ceiling joists shall be continuous or securely joined where they meet over interior walls and nailed to adjoining rafters in order to provide a continuous tie across the building. When rafters are not parallel to ceiling joists, rafter ties shall be provided and spaced not more than 4 feet on center. When ceiling joists or rafter ties are not provided, the ridge shall be supported by a wall or girder designed in accordance with accepted engineering practice. Collar ties or ridge straps to resist wind uplift shall be **connected** in the upper third of the attic space in accordance with Table R602.3(1). Collar ties shall be a minimum of 1-inch by 4-inch, spaced not more than 4 feet on center. (IRC 802.3.1)
4. Notches and Holes - Notches located at the ends of rafters or ceiling joists shall not exceed 1/4 the depth of the member. Notches in the top or bottom of the rafter or ceiling joist shall not exceed 1/6 the depth and shall not be located in the middle 1/3 of the span. Holes bored in rafters or ceiling joists shall not be within 2" of the top or bottom of the member, or to any other hole located in the member. Hole diameters shall not exceed 1/3 the depth of the member. (IRC 802.7.1)
5. Purlins – Purlins shall be sized no less than the size of the rafter that they support. Purlin braces shall not be less in size than 2x4's, shall be installed at not less than 45 degrees, be spaced at not more than 4 feet on center, and shall be installed to a bearing wall. The unbraced length of braces shall not exceed 8 feet. (IRC 802.5.1)

6. Lateral Support - Rafters and ceiling joists having a depth-to-thickness ratio exceeding 5 to 1 based on nominal dimensions (2x10), shall be provided with lateral supports at points of bearing to prevent lateral rotation. (IRC 802.8)
7. Bridging – Bridging shall be provided every 8 feet when rafters or ceiling joists exceed a depth-to-thickness ratio of 6 to 1, (2x12). (IRC 802.8.1)
8. Openings – Openings in roofs and ceilings shall be framed with header and trimmer joists. When header joists exceed 4 feet, the header and the trimmer joists shall be doubled. Approved hangers shall be used for the header joist to trimmer joist connection when the header joist exceeds 6 feet. Tail joists over 12 feet in length shall be supported at the header with approved hangers or ledger strips. (IRC 802.9)
9. Wood Trusses – Wood trusses shall be designed in accordance with accepted engineering practice. The design and manufacture of metal-plate-connected wood trusses shall comply with ANSI/TPI 1. The truss design drawings shall be prepared by a registered design professional and shall be provided with the shipment of trusses to the jobsite. (IRC 802.10)
10. Truss Bracing and Connections – Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the truss design drawings. In the absence of specific bracing requirements, trusses shall be braced in accordance with accepted industry practice. (IRC 802.10.3).
11. Alterations to Trusses – Truss members shall not be cut, notched, bored, drilled, spliced or otherwise altered in any way without the approval of a registered design professional. (IRC 802.10.4)
12. Ventilation – Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of the roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. (IRC 806.1)
13. Vent Clearance – Insulation shall not block the free flow of air from soffit vents. A minimum of 1 inch shall be provided between the insulation and the roof sheathing and at the location of the vent. (IRC 806.3)
14. Attic Access – In combustible buildings, an attic access opening shall be provided to attic areas that exceed 30 square feet and have a vertical height of 30 inches or greater. The rough-framed opening shall not be less than 22x30 inches and shall be located in a hallway or other readily accessible location. A 30-inch minimum unobstructed headroom in attic space shall be provided at some point above the access opening. (IRC 807.1) Attics containing appliances shall be provided with openings large enough to allow removal of the largest appliance. (M1305.1.3)

## ROOF COVERINGS

1. General – Except where the code requires greater protection, roof coverings for new buildings or structures or additions thereto, or roof coverings utilized for re-roofing shall be a minimum of Class C (LSCO 7-937). This prohibits the use of wood shakes or wood shingles unless they are chemically treated with fire retardant chemicals in the manufacturing process. Documentation of a Class C rating will be required when wood shakes or wood shingles are being used.
2. Product Identification - Roof coverings shall be delivered in packages bearing the manufacturers identifying marks and approved testing agency labels when required. (IRC 904.4)
3. Asphalt Shingles – Asphalt shingles shall be fastened to solidly sheathed decks, shall only be used on roofs with slopes greater than 2:12, shall comply with ASTM D225 or D 3462, shall be fastened with 12 gage nails with a minimum of a 3/8 inch diameter head and of a length to penetrate through the roofing material and ¾ inch into the roof sheathing, shall have a minimum number of fasteners as required by the manufacturer and in normal applications shall be fastened with not less than 4 nails per strip shingle, and shall be provided with underlayment felt, in accordance with IRC 905.2.7.
4. Crickets and Saddles – Shall be provided on the ridge side of any chimney greater than 30 inches wide. (IRC 1003.20)
5. Sidewall Flashing – Base flashing against a vertical sidewall shall be continuous or the step flashing method and shall be a minimum of 4 inches in height and 4 inches in width and shall direct water away from the vertical sidewall onto the roof and/or into the gutter. (IRC 905.2.8.3)
6. Clay and Concrete Tiles – Clay roof tile shall comply with ASTM C 1167. (IRC 905.3.4) Concrete roof tile shall comply with ASTM C 1492. (IRC 905.3.5) The roof must be designed in accordance with accepted engineering practice when either clay or concrete roof tiles are being utilized.

## FACTORY-BUILT FIREPLACES

1. General – Factory-built fireplaces shall be listed and labeled in accordance with UL 127 and shall be installed in accordance with the conditions of the listing. (IRC 1004.1)

2. Hearth Extensions – Shall be readily distinguishable from the surrounding floor area and installed in accordance with the listing of the fireplace.(IRC 1004.2)
3. Unvented Gas Log Heaters – An unvented gas log heater shall not be installed in a factory-built fireplace unless the system has been specifically tested and labeled for such use in accordance with UL 127. (IRC 1004.4)
4. Exterior Air Supply – Factory-built fireplaces shall be equipped with an exterior air supply unless the room is ventilated and controlled so that the indoor pressure is neutral or positive. (IRC 1006.1) Exterior air intakes shall not be located in the garage or basement of the dwelling nor shall the intake be located at an elevation higher than the firebox. (IRC 1006.2)
5. Factory-Built Chimneys – Shall be listed and labeled and installed and terminated in accordance with the manufacturer’s instructions. (IRC 1005.1)

## **INSULATION**

1. Walls - Wall assemblies forming portions of a building envelope shall meet or exceed an R factor rating of 13. (LSCO 7-802.a).
2. Floors - Floor assemblies forming portions of a building envelope shall meet or exceed an R factor rating of 19. (LSCO 7-802.b)
3. Roofs – Roofs assemblies forming a portion of the building envelope shall meet or exceed an R factor rating of 19. (LCSO 7-802.c)
4. Ceilings – Ceiling assemblies forming a portion of the building envelope shall meet or exceed an R factor rating of 30 at the time of installation. (LCSO 7-802.d)
5. Ducts – Shall be insulated to an R factor rating of 5 when installed within the building but outside of a conditioned space and shall be insulated to an R factor of 8 when located outside of the building. (LSCO 7-802.e)