



COMMUNITY PLANNING & ECONOMIC DEVELOPMENT

Planning ~ Zoning ~ Inspection ~ Code Compliance
125 S 2nd Street, Odessa, MO 64076 – (816) 230-5577 – Fax (816) 633-4985

ONE AND TWO FAMILY DWELLINGS

Construction basics based on the 2012 International Residential Code

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 Odessa, MO. Builders and contractors are encouraged to become knowledgeable of the provisions of the 2012 International Residential Code (IRC), Chapters 7, 8, and 9 of the Odessa Community Development Code. The 2012 IRC may be purchased online at www.iccsafe.org or by calling the International Code Council Store at 1-800-786-4452.

GENERAL

1. **Fees** – The amount of all building related fees is available upon request.
2. **Contractor Licenses** – All contractors/builders are required to have a business license. Possession of an Odessa Craftsman License is a requirement as a prerequisite to obtaining electrical, plumbing, and new mechanical permits. **EXCEPTION:** Owner/occupants of a single family dwelling may obtain all categories of permits without a craftsman license to erect, alter, or demolish their home, and/or accessory structures to be erected on the site on which the owner/occupant resides or will reside upon completion of construction of his or her own home. Such work is limited to private residential property but does not include:
 - a) Work in public right-of-way or on public utilities;
 - b) New homes for the expressed purpose of selling the same upon completion thereof.
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. Construction documents shall be dimensioned/scaled and drawn upon suitable material, of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of the 2012 IRC and other ordinances of the City of Odessa.
4. **Permits** – Permits are required for the construction of one and two family dwellings. Permit applications, available in the Codes Administration Department at Odessa City Hall and online at www.cityofodessamo.com, must be submitted with a copy of the building plans, including a plot

plan with drainage arrows. In addition, other fees such as water service, sewer connection, and electrical service fees 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. (IRC 105.5) Permits for residential construction shall be limited to 180 days. Permits for commercial projects shall be limited to 2 years. (Requests for extensions are available)

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 until completion of the project.

7. Erosion Control – Erosion control devices shall be installed and maintained throughout the construction process in accordance with the City of Odessa Storm Water Management Plan. 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 109.1 - 109.1.6.1)

- 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 in excess of 4 feet in height shall be inspected. This inspection shall be made after all forms and steel are in place but prior to the placement of concrete.
- c) Underground Plumbing – Water supply lines and drain/waste/vent pipe shall remain exposed for inspection and supported per IPC 306.1
- d) 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.
- e) 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.
- f) Electrical Service – Shall be made after the service equipment is installed, including grounding and service entrance conductors.
- g) Sheetrock/Drywall Inspection – Inspection shall be made after insulation and sheetrock is installed but prior to any finish to the sheetrock that would obscure nailing or screws.
- h) Gas Test – Shall be made after all gas piping is installed and approved. Piping shall be tested for a minimum of 10 minutes and at not less than 10 psi. Gas Service will not be released until gas appliances and equipment have been vented and approved. Gas piping shall be under test after all sheetrock is installed.
- i) Water Service – Please contact Inspections or Public Works Department at 816-633-4662.
- j) Sewer Service – Please contact Public Works Department at 816-633-4662.
- k) 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.

- l) Suspended Slabs with Useable Space Below – Shall be inspected after all forms and reinforcements are in place but prior to the placement of concrete. Sealed plans must be on site at the time of inspection.
- m) 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 Odessa Storm Water Management Plan, 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.
- n) 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.
- o) 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. Work Exempt From Permit – (IRC 105.2) Permits shall not be required for the following

Building:

- a) One-story detached accessory structures, provided the floor area does not exceed 120 square feet.
- b) Fences not over 3.5 feet high.
- c) Retaining walls that are not over 4 feet in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.
- d) Water tanks supported directly upon grade if the capacity does not exceed 5,000 gallons and the ratio of height to diameter or width does not exceed 2 to 1.
- e) Sidewalks and driveways.
- f) Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
- g) Prefabricated swimming pools that are less than 24 inches deep.
- h) Swings and other playground equipment accessory to a one or two family dwelling.
- i) Window awnings supported by an exterior wall which do not project more than 54 inches from the exterior wall and do not require additional support.

Electrical:

Repairs and Maintenance – A permit shall not be required for minor repair work, including the replacement of lamps or the connection of approved portable electrical equipment to approved permanently installed receptacles

Gas:

- a) Portable heating, cooking or clothes drying appliances.
- b) Replacement of any minor part that does not alter approval of equipment or make such equipment unsafe
- c) Portable fuel cell appliances that are not connected to a fixed piping system and are not interconnected to a power grid.

Mechanical:

- a) Portable heating appliance.
- b) Portable ventilation appliances.
- c) Portable cooling unit.
- d) Steam, hot or chilled water piping within any heating or cooling equipment regulated by code.
- e) Replacement of any minor part that does not alter approval of equipment or make such equipment unsafe.

- f) Portable evaporative coolers.
- g) Self-contained refrigeration systems containing 10 pounds or less of refrigerant or that are actuated by motors of 1 horsepower or less.
- h) Portable fuel cell appliances that are not interconnected to a power grid.

Plumbing:

The stopping of leaks in drains, water, soil, waste or vent pipe; provided, however, that if any concealed trap, drainpipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a permit shall be obtained and inspection made as provided in this code. The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures, and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes, or fixtures.

10. Appeals/Interpretations/Disputes – Concerns caused as a result of inspection activities should first be addressed with the Director of Community Planning. Concerns or disputes regarding permit issuance or plan approval should first be addressed with the Director of Community Planning. The Director of Community Planning is available to address any concerns regarding any facet of the Codes Administration Department. In order to hear and decide upon appeals of orders, decisions or determinations made by the Director, an application may be filed to be heard before 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.

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 Category: A
- Decay: moderate to heavy
- Winter Design Temp: 6 Degrees F
- Ice Barrier Underlayment Required: Yes
- Air Freezing Index: 1017
- Mean Annual Temperature: 55.8

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.

5. Driveway Approaches and Public Sidewalks – Must be constructed in accordance with the City of Odessa’s Standard Practices and approved by the Public Works Director.

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 630 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:

- a) Garages shall be separated from the residence and its attic area by not less than 1/2 inch type X sheetrock applied to the garage side. (IRC 302.6)
- b) Garages beneath habitable rooms shall be separated from all habitable rooms by not less than 5/8 Type X gypsum board or equivalent. Where the separation is a floor-ceiling assembly, the structure supporting (beams and columns) the separation shall also be protected by not less than 1/2 inch gypsum board or equivalent. (IRC 302.6)
- c) Pull down stairs located within garages shall be rated or be adequately protected with materials approved for one-hour fire-resistive construction.
- d) Attic access panels located within garages shall be of 5/8 type X sheetrock or other materials approved for one-hour fire-resistive construction.
- e) Doors between the living or other unprotected areas and the garage shall be insulated metal doors or 1 3/8 inch solid core wood doors, or 20-minute fire-rated doors. Most raised panel wood doors do not comply. Doors shall be self-closing/self-latching.
- f) A garage shall not open directly into a room used for sleeping purposes. (IRC R302.5.1)
- g) 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 – Basements with habitable space and every sleeping room shall have at least one openable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room but shall not be required in adjoining areas of the basement. Where 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. 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 311.2)

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. (IRC 312.1.1)

15. Guard Openings – Required guards on open stair risers, porches, raised floor areas, and balconies shall have intermediate rails or ornamental closures that do not 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 312.1.2)

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. (IRC 311.7.8.2)

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 widths varies 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 311.7.5.1) 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 311.7.5.1) 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 311.3) 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.

19. Smoke Alarms – Smoke alarms shall be installed in the following areas:

- a) Each sleeping room.
- b) Outside each sleeping area in the immediate vicinity of the bedrooms.
- c) 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)

20. 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 1-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. (IRC 302.3)

21. Address – Buildings shall have approved address numbers placed in a position to be plainly legible and visible from the street or road fronting the property. These numbers shall be Arabic numerals or alphabet letters. Numbers shall be a minimum of 4 inches high with a minimum stroke width of 0.5 inch (12.7mm) (IPMC 304.3)

22. 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) 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 703.9.4.1)

23. Drainage – Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection so as to not create a hazard. Lots shall be graded so as to drain surface water away from foundation walls. The grade away from foundations walls shall fall a minimum of 6 inches within the first 10 feet. Where lot lines, walls, slopes or other physical barriers prohibit 6 inches or fall within 10 feet, drains or swales shall be provided to ensure drainage away from the structure. (IRC 401.3)

24. Site Preparation – The area within the foundation walls shall have all vegetation, topsoil and foreign matter removed. (IRC 506.2)

25. Roof Drainage – In areas where expansive or collapsible soils are known to exist, all dwellings shall have a controlled method of water disposal from roofs that will collect and discharge all roof drainage to the ground surface at least 5 feet from foundation walls or to an approved drainage system. (IRC 801.3)

26. 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. (OCDC 7.205)

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. Footings – shall be designed per Section R403 of the 2012 International Residential Code.

4. Stepped Footings – Stepped footings shall be continuous (in plain view). Cantilevering of foundation walls, unless in accordance with an engineered design, is not permitted.

5. Foundation Walls in Excess of 10 Feet in Height – Foundation walls over 10’-0” in height shall be designed by a registered architect/engineer and shall be constructed accordingly.

6. 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)

7. 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. (IRC 405.1)

8. 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)

9. Waterproofing/Damp-Proofing – Foundation walls that enclose interior spaces shall be damp-proofed 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)

10. 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)

11. 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)

12. 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. (IRC 506.2.1)

WOOD FRAMING

1. Span Tables – See span tables provided in Chapters 5, 6, and 8 of the 2012 International Residential Code

2. Protection from Decay – For a full listing of areas required to be protected from decay and the required materials see IRC 319. 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 AWPAs standards or shall be naturally durable wood. (IRC 319)

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 cannot be verified during inspection, decks shall be self-supporting. (IRC 507.1)

FOUNDATION PLATES OR SILL

1. All sills and foundation plates shall be of decay resistant wood per IRC 319.
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 provided in Chapter 5 of the 2012 International Residential Code.

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 1/4 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 by framing anchors or on a ledger strip not less than 2 inches by 2 inches. (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 in Chapter 5 of the 2012 IRC) when the cantilever only supports a light framed bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with table R502.3.3(2).

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** – Wood stud 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 eight 10d nails at each side. (IRC 602.6.1)
- 6. Fire-blocking** – Fire-blocking shall be provided to cut off all concealed draft openings in accordance with IRC 302.11.
- 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 sheathed with wood structural panel fastened to both the top and bottom plate in accordance with IRC Table 602.3(1) 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
- 9. Headers** – Headers located in bearing walls shall consist of 2, 3 or 4 members and be supported by 1 or 2 trimmers on each end per IRC tables 502.5(1) and 502.5(2) and 602.7.1.
- 10. Stud Size and Heights** – 2x4 studs 16” on center are permitted up to 10 feet in length when supporting a floor, roof and ceiling. 2x6 studs 16” on center are permitted up to 10 feet in length when supporting two floors, a roof and ceiling. Walls in excess of 10 feet in height require engineered analysis. (IRC Table 602.3(5)).
- 11. Windows** – Windows shall be installed and flashed in accordance with the manufacturer’s written installation instructions. Written installation instructions shall be provided by the manufacturer for each window. (IRC 612.1)

12. Panel Siding – Vertical joints in panel siding shall occur over framing members, unless wood or wood structural panels are used, and shall be ship lapped or covered with a batten. Horizontal joints shall be lapped a minimum of 1 inch, or be ship lapped 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 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 R703.1. (703.2)

17. Weep-holes – Shall be provided in the outside wythe of masonry walls at a maximum spacing of 33 inches on center. Weep-holes 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 – See Chapter 8 of the 2012 International Residential Code.

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 Tables 602.3.1 and 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 (IRC 802.10.3). Trusses shall be connected to wall plates by the use of approved connectors having a resistance to uplift of not less than 175 pounds and shall be installed in accordance with the manufacturer's specifications. (IRC 802.10.5)

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 806.2)

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 – Roofs shall be covered with materials as set forth in Sections R904 and R905 of the 2003 International Residential Code. Class A, B, or C roofing shall be installed in areas designated by law as requiring their use or when the edge of the roof is less than 3 feet from a property line. Fire-retardant-treated wood shakes and shingles shall be treated by impregnation with chemicals by the full-cell-vacuum-pressure process, in accordance with AWPA, C1. Each bundle shall be marked to identify the manufactured unit and the manufacturer, and shall also be labeled to identify the classification of the material in accordance with the testing required in Section R902.1 of the 2003 IRC, the treating company and the quality control agency.

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 3/4 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 905.2.8.3) See table R1001.17 for sizing.

5. Sidewall Flashing – Flashing against a vertical sidewall shall be the step flashing method. (IRC 905.2.8.4)

6. Clay and Concrete Tiles – Clay roof tile shall comply with ASTM C 1167. Concrete roof tile shall comply with ASTM C 1492. The roof must be designed in accordance with accepted engineering practice when either clay or concrete roof tiles are being utilized.

7. Roof Drainage – In areas where expansive or collapsible soils are known to exist, all dwellings shall have a controlled method of water disposal from roofs that will collect and discharge all roof drainage to the ground surface at least 5 feet from foundation walls or to an approved drainage system. (IRC 801.3)

8. Ice Barriers – Consisting of at least two layers of underlayment cemented together or a self-adhering polymer modified bitumen sheet from lowest edge of all roof surfaces to a point at least 24” inside exterior wall line of the building. (IRC 905.2.7.1)

FACTORY-BUILT FIREPLACES

1. General – Factory-built fireplaces all shall be listed and labeled in accordance with UL127 and shall be installed in accordance with the conditions of the listing. (IRC1004.1)

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 1005.1) 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 1005.2)

INSULATION

1. Walls – Wall assemblies forming portions of a building envelope shall meet or exceed an R factor rating of 18. (IRC Table 1101.2, Table N1102.1).

2. Floors – Floor assemblies forming portions of a building envelope shall meet or exceed an R factor rating of 19 (IRC Table 1101.2, Table N1102.1).

3. Crawl Space Walls – Where the floor above the crawl space is un-insulated, insulation shall be installed on crawl space walls when the crawl space is not vented to outside air. The required R-value (R-17) shall be applied inside of the crawl space wall, downward from the sill plate to the exterior finished grade level and then vertically and/or horizontally for at least an additional 24 inches. The exposed earth in all crawl space foundations, shall be covered with a continuous vapor retarder, having a maximum permeance rating of 1.0 perm when tested in accordance with ASTM E 96. (IRC N 1102.1.7)

4. Ceilings – Ceiling assemblies forming a portion of the building envelope shall meet or exceed an R factor rating of 38 at the time of installation (IRC Table 1101.2, Table N1102.1).The required “Ceiling R-Value” assumes standard truss or rafter construction and shall apply to all roof/ceiling portions of the building thermal envelope including cathedral ceilings. Where the construction technique allows the required R-value of ceilings insulation to be obtained over the wall or top plate, R-30 shall be permitted to be used where R-38 is required. (IRC N1102.1.2)

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. (IRC N1103.3)

ELECTRICAL WIRING

1. Branch circuits for heating – Central heating equipment other than fixed electrical space heating shall be supplied by an individual branch circuit. Auxiliary equipment such as pumps, motorized valves, humidifiers and electrostatic air cleaners directly associated with the central heating equipment shall not be prohibited from connection to the same branch circuit as the central heating equipment. (IRC 3603.1)

2. Kitchen and Dining Receptacles – A minimum of two 20- ampere-rated branch circuits shall be provided to serve receptacles located in the kitchen, pantry, breakfast area, dining area or similar area of a dwelling. The kitchen countertop receptacles shall be served by a minimum of two 20-ampere-rated branch circuits, either or both of which shall also be permitted to supply other receptacle outlets in the kitchen, pantry, breakfast and dining area including receptacle outlets for refrigeration appliances. (IRC 3603.2)

3. Laundry Circuit – A minimum of one 20-ampere-rated branch circuit shall be provided for receptacles located in the laundry area and shall serve only receptacle outlets in the laundry area. (IRC 3603.3)

4. Bathroom branch circuits – A minimum of one 20-ampere branch circuit shall be provided to supply the bathroom receptacle outlet(s). Such circuits shall have no other outlets except where the 20-ampere circuit supplies a single bathroom. Outlets for other equipment within the same bathroom shall be permitted to be supplied. (IRC 3603.4, see also Section 3602)

5. Bedroom circuits – All branch circuits that supply 125-volt, single phase, 15 and 20 ampere outlets installed in dwelling unit bedrooms shall be protected by an arc-fault circuit interrupter listed to provide protection of the entire branch circuit.

6. Ground-Fault Circuit Interrupter Protection – In dwelling units, all 125-volt single-phase, 15 and 20-ampere receptacles installed in the following locations are required to have ground fault interrupter protection:

- a) Bathrooms
- b) Garages, and also accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use*
- c) Outdoors*(one at the front and at the rear of each dwelling)
- d) Crawl spaces-at or below grade level
- e) Unfinished basements *
- f) Kitchens-where the receptacles are installed to serve countertop surfaces
- g) Wet bar sinks
- h) Boathouses

*There are exceptions to some of these requirements, see 2002 National Electric Code 210.8

7. Receptacle Spacing – Receptacles shall be spaced so that no point measured horizontally along the floor line any wall space is more than 6 feet from a receptacle outlet. Wall space shall include any space more than 2 feet (including space measured around corners) and unbroken along the floor line by doorways, fireplaces, and similar openings. It also includes the space occupied by fixed panels in exterior walls. Receptacles in floor shall not be counted as part of

the required number of receptacle outlets unless located within 18 inches of the wall. (2002 NEC 210.52)

8. Kitchen Counters – In kitchen and dining rooms, receptacle outlets for counter spaces shall be installed at each wall counter space that is more than 12 inches or wider. Receptacles shall be installed so that no point along the wall line is more than 24 inches measured horizontally from a receptacle outlet in that space. Receptacle outlets shall be located above, but not more than 20 inches above the countertop. (See 2002 NEC 210.52C for exceptions)

9. Islands and Peninsulas in Kitchens – At least one receptacle outlet shall be installed at each island or peninsula counter space if the space has a long dimension of 24 inches or greater and a short dimension of 12 inches or greater. (NEC 210.52C)

10. Hallways – Hallways of 10 feet or more in length shall have at least one receptacle outlet. (NEC 210.52H)

11. Basements and Garages – At least one receptacle outlet, in addition to any provided for laundry equipment, shall be installed in each basement and in each attached garage, and in each detached garage with electric power. Where a portion of the basement is finished into one or more habitable rooms, each separate unfinished portion shall have a receptacle outlet installed in accordance with this section. (Refer to complete section of NEC 210.52, 210.8)

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