

City of Monett

Residential Building Handout

These are some features of the 2000 ICC International Residential Building Code. Complete regulations are contained in the Code volumes, at the Barry-Lawrence Library or at the Monett City Clerk's office, 217 5th Street, City Hall, Monett. These items are mandatory for new residential construction in Monett. This is also the best way to build a high-quality house, to give the home-owner the best value for the money.

www.cityofmonett.com

September 18, 2008

House Numbers

Mandatory for safety and emergency response; 3½" tall letters, in contrasting colors.

Anchor Bolts

½"-diameter, 7" imbedment, located 12" from corner ends of walls, and every 6' O.C.. (NOTE: Ordinary ½" steel anchor bolts are approved for ACQ-treated lumber.)

Anti-Scald Faucets; Required for all domestic showers. See "Bathrooms".

Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers; Required for all bedroom receptacle outlet circuits; See 'Bedrooms' below.

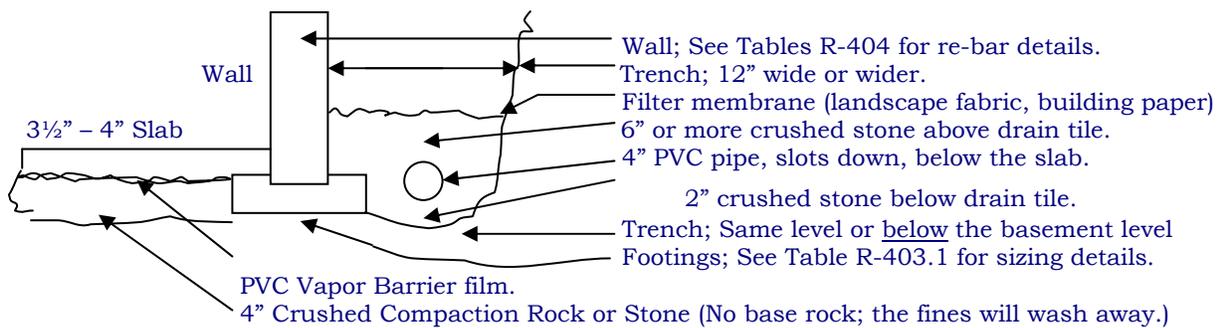
Attic Ventilation & Rafter Ventilation;

Attic Ventilation; (Later)

Rafter Ventilation; Install a ventilation channel in each channel between all rafters in cathedral ceilings, or wherever the underside of the rafter is insulated and dry-walled.

Basements;

- Backfill; Do not backfill until floor framing is in place. Concrete walls will move.
- Bedroom in Basement; Provide an emergency escape window inside the bedroom.
- Damp-proofing; Usually sufficient; shall consist of 2 layers mopped roofing tar.
- Door; Door between the basement and residence may be any ordinary door.
- Foundation Drains; 4" PVC pipes, holes down, with the bottom below the basement floor surface, bedded in crushed stone (no base rock) 2" below the tile and 6" above the tile, with a filter membrane on top to keep the backfill dirt out.



- Emergency Escape Windows; One escape window (or a second set of stairs) is now required in basements if all four sides of the habitable basement are below grade, whether or not there are bedrooms in the basement.

<u>Open Area In The Clear</u>	5.0 square feet
<u>Minimum Width</u>	20"
<u>Minimum Height</u>	24"
<u>Maximum Sill Height Above Floor</u>	44"
<u>Window Well</u>	36" x 36", and if window well depth exceeds 44" below grade, must provide steps up to grade.
 <u>Window Well Steps</u>	 Must provide steps up to grade if well is 44" deep. Steps must be accessible with the window open. Steps are to be 12" wide, 3" deep, or more.

(A basement with an exterior door at grade level, or with steps leading up to grade level is exempt. However each bedroom in a basement must have an emergency escape window.)

- Floor; Minimum concrete thickness 3½", on 6-mil PVC vapor barrier film, on 4" of crushed stone. (No base rock, as the fines may wash out, settle and cause cracks).
- Sump Pump; 18" sump, with tight-fit cover, with a check valve in the pump discharge line, and fed from a dedicated electrical circuit. Sump pump cannot pump into the sanitary sewer system.
- Smoke Alarm; Install at least one smoke alarm in all basements. If there are bedrooms, install one smoke alarm inside each bedroom and one outside each bedroom. See "Smoke Alarms" for further information.
- Walls & Reinforcing Steel;
 - Plain Concrete Walls, 6" – 12" Table R-404.1.1.1
 - 8" Reinforced Concrete Walls Table R-404.1.1.2
 - 10" Reinforced Concrete Walls Table R-404.1.1.4
 - 12" Reinforced Concrete Walls Table R-404.1.1.3
 - Reinforcing steel installed in the middle of the wall.
- Wiring in Unfinished Basements;
 - GFCI-protect all receptacle outlets in unfinished basements, as long as the basement is to be used for a storage area, work area, or the like (per NEC).
 - 8-2/w/G and larger wiring may be stapled to the bottom of the floor joists.
 - 10-2/w/G and smaller wiring must be run through bored holes in the center of the joists, or stapled every 4½' to guard boards.
- Water-proofing; Only required if ground water is present. Various methods of waterproofing are; 2-ply hot-mop felt, 6-mil PVC film, etc. The basement wall / footing joint requires a multi-ply tarred membrane. Pipe penetrations require lead/oakum sleeve wrapped in a tarred membrane.

Bathrooms

- Required Outlet; Provide one 20-amp 120-volt GFCI outlet within 3' of the lavatory.
- GFCI Protection; All other bathroom outlets must also be GFCI protected.
- Receptacle outlets may not be installed inside bathtubs or showers. (NEC 406.8.C)
- Single-Lever -- Anti-Scald (Thermostatic / Pressure-Balancing) Shower Faucet; Required for all showers, set at 120 F maximum. If individual shower faucet knobs are still desired, a common anti-scald mixing valve such as Honeywell "Sparcomix" valve (Harry Cooper Supply) may be installed.

- Light & Ventilation; Either an exterior window or a 50 cfm exhaust fan is required.
- Exhaust Fan; Fan shall be rated 50 cfm or larger, and vented outside, not in attic.
- Shut-Off Valves; For all hot and cold water lines supplying all plumbing fixtures.
- S-Traps are never approved. (They will self-siphon and allow sewer fumes in room.)
- P-Traps must always be installed, then they must be properly vented.
- ½" Water-Proof Drywall (Green-Board);
Residential; Required only in showers if within 6' of the floor, and only behind ceramic tile or similar material with joints. If ceramic tile is hung on the ceiling, the ceiling-joists must be on 12" centers. However green-board is recommended for all potentially wet areas and walls; hot tubs, spas, toilets, lavatories, etc.
Commercial; Required behind all toilets, urinals, tubs, spas, etc.

Beams & Girders

Beam pockets must have tapered or over-sized sides, and be at least 3" deep.

Bedrooms

Two means of escape are required out of each bedroom. One is the bedroom door. The other may be either an emergency escape window, as follows, or another exterior exit door directly outside.

	<u>Emergency Escape Window</u>	
	<u>First Floor</u>	<u>Second Floor & Above</u>
Open Area In The Clear	5.0 square feet	5.7 square feet
Minimum Width	20"	20"
Minimum Height	24"	24"
Maximum Sill Height Above Floor	44"	44"
Window Well	36" x 36", and if window well depth exceeds 44" below grade, must provide steps up to final grade.	
Window Well Steps	Must provide steps up to grade if well is 44" deep. Steps must be accessible with the window open. Steps are to be 12" wide, 3" deep, or more.	

(Only one of the bedroom windows has to be the escape-window size.)

(An escape window is not required if an exterior bedroom door exits directly outside.)

- Closet Lights;
 Surface-Mount Incandescent Bulb Fixtures –
 12" away vertically and horizontally from all shelf locations.
 Recessed / Enclosed Incandescent Bulb Fixtures –
 6" away vertically and horizontally from all shelf locations.
 Surface-Mounted Fluorescent Tube Fixtures-
 6" away vertically and horizontally from all shelf locations.
 Bare Exposed Bulbs - cannot be installed in closets.
 Hanging Pendant Fixtures - cannot be installed in closets.
- AFCI (Arc-Fault Circuit Interrupter) Circuit Breakers; Required to protect all bedroom receptacle outlet circuits from arc faulting, which causes fires.
- Smoke Alarms; 120-volt w/ 9-volt battery-backup smoke alarms are required on each floor, inside each bedroom, outside each bedroom, and they shall all be electrically interconnected.

Brick Veneer

Brick Ties; Install corrugated metal ties every 24" horizontally and 20" vertically.

Underlayment; 15# or 30# felt-paper, Tyvek or other approved water-barrier underlayment is required as a water-proofing to cover wood-framing.

Wicks; Install 3/16” wicks not over 33” O.C. in the bottom course, if above grade.

Do not install below grade.

Wall Thickness; Supporting concrete wall thickness shall be 8” minimum width.

Waterproofing; Acrylic-polymer waterproofing sealer is recommended.

Clothes Dryer Vents:

The connector (transition) duct shall be flexible metal, not over 8’ long. Plastic is not allowed.

Clothes-dryer vents shall be 4” diameter, 0.016” sheet metal ducts, 25’ long maximum, with a smooth interior finish, lapped going downstream. Sheet metal screws are not allowed.

Concrete

- Concrete Slabs; All vegetation, top soil and foreign material must be removed. Minimum slab thickness is 3½”, on 4” of compacted base rock, or 8” maximum of compacted earth fill or 24” maximum of compacted rock fill.
- Vapor Barrier; 6-mil plastic vapor barrier is required under all slabs for all habitable, occupied, heated structures.
- Shrinkage-Crack Control; Good practice is to use 6x6 reinforcing mesh, ½” rebar mats, ‘Fibermesh’ or ‘Stealth’ polypropylene fibers, or saw-cut joints in squares every 15’ – 30’. However there are no specific Code requirements. Note that concrete will shrinkage-crack and settlement-crack.
- Weather; Must be 28°F and rising to pour concrete. Cannot pour on frozen ground.
- Footings & Foundations; See below.

Concrete Block & Brick Waterproofing:

Acrylic-polymer waterproofing sealer is recommended, but is not a Code requirement.

Combustion Air ----- For Gas-Fired Furnaces and Appliances

Two Outside Openings, one high and one low, ending 1’ from floor/ceiling.

<u>Direct Outside Openings</u>	<u>Horizontal Duct Openings</u>	<u>Vertical Duct Openings</u>
1 sq. inch / 4000 BTUH	1 sq. inch / 2000 BTUH	1 sq. inch / 4000 BTUH

The minimum is two openings, each of which is at least 100 square inches.

Size is based on the total BTU rating of all appliances in the space.

One Outside Opening, sized at 1 sq. inch per 3000 BTUH in the space, ducted directly to a well-ventilated attic or crawl space, or outside.

Two Inside Openings:

In certain types of exceptionally-open construction (no storm windows, no weather-stripping, no caulking, no vapor barrier or perm rating on the inside of the walls, etc.) air from adjacent inside spaces may be used if the adjacent volume equals at least 50 cubic feet / 1000 BTUH.

Two *inside* openings are then required to the adjacent space, one high and one low.

<u>Direct Inside Openings</u>
1 sq. inch / 1000 BTUH

The minimum is two openings, each of which is at least 100 square inches.

ATTIC Openings:

Same as vertical openings. Attic must be 30” tall or taller. Openings must not be able to be blocked by snow or ice. Ducts must extend up into attic in 26 Gage steel ducts, and must be 6” or more above the insulation.

PROHIBITED Locations;

Do not pull air from spaces where an exhaust fan might interfere with air flow.
Do not pull air from hazardous locations.
Do not pull air from a refrigeration machinery space.

In certain situations the outside air and the inside air may be combined; see the Mechanical Code.

Compacted Fill; See **Fill** below.

Crawl Spaces

- All vegetation shall be removed.
- Access hatch openings shall be 18" x 24", or larger. Window wells used at access hatch openings shall be the same size, or larger.
- Clearances; >18" between floor joists and ground, or use CCA-treated joists.
>12" between wood beams and ground, or use CCA-treated beams.
- Ventilation Openings;

WITH 6-Mil Plastic Film
1 sq.ft. vent openings per
1500 sq. ft. floor space.

WITHOUT 6-Mil Plastic Film
1 sq. ft. vent openings per
150 sq. ft. floor space.

Locate the vent openings at corners, then equally spaced along the walls, with cross ventilation through opposite sides.

Gravel is recommended on top of the plastic film.

- GFCI Outlets; All electrical outlets in crawl spaces shall be GFCI-protected.

Cutting & Notching (later);

Cutting Studs	Notching	Boring Joists
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Simpson's "Stud Shoes" are approved to reinforce bored studs.

Decks & Outside Stairs

Lumber; Treated yellow pine, redwood, or other decay-resistant lumber.

Hardware; Hot-dipped galvanized steel or other corrosion-resistant material.

Floor Joist Allowable Spans;

Treated Yellow Pine, No. 3 floor joists @ 16" O. C., 2x6 size 8' span.

Treated Yellow Pine, No. 3 floor joists @ 16" O. C., 2x8 size 11' span.

(Allowable spans are based on live load of 40# / square foot.)

Floor Joist Hangers;

Joist hangers are mandatory. (Toe-nailed pressure blocks are not allowed.)

All holes in joist hangers must be filled with 10-d galvanized joist hanger nails.

Stairs;

The minimum required width of stairs is 36".

The allowable riser and tread dimensions are;

- | | | |
|--------------------------------------|----------------------------|-------------------|
| | <u>Residential</u> | <u>Commercial</u> |
| • Riser Height | Maximum 7¾" | 4" to 7" |
| • Tread Width | Minimum 10" | Minimum 11" |
| • Tolerances | Plus/minus 3/8" tolerance. | |
| • Headroom Above Toe of Stairs | Minimum 6' 8" headroom. | |

Uniform design live load is 100#/sq. ft. Concentrated design live load is 300#.

Guards; (Mandatory for landings/decks/stairs more than 30" above grade.)

(Optional for landings/decks/stairs 30" or less above grade.)

Guards for landings or decks shall be 36" tall, not over 4" between spindles.

Guards for stairs shall be on both sides, and at least 34" tall above the nose of the stairs. Not over 4" between spindles, and no more than a 6" triangle between riser and tread.

Handrails;

Required on at least one side of the stairs, 34" to 38" above the toe of treads.

Handrail diameter shall be between 1 1/4" to 2 5/8", radiused to 1/8".

May protrude 4 1/2" into the required stair width.

Must have 1 1/2" between handrail and wall.

Electrical;

All outside outlets shall be GFCI protected, and all covers shall be wet-proof.

All outside wiring shall be enclosed in steel conduit, gray Carlon PVC conduit, or flexible steel or flexible non-metallic conduit. (Exposed Romex is not allowed.)

Weather;

After lumber thoroughly dries, a water-proofing sealer or deck paint is strongly recommended as a lumber preservative.

Demolition - City of Monett Requirements

A demolition permit is required. Get one from City Utilities office, and fill it out.

Electrical Service; City Utilities of Monett will disconnect the service.

Water Service; City Utilities of Monett will disconnect the service.

Sewer Service; Contractor shall locate the sewer line at the property line, and plug the line with a concrete plug at 3' deep or deeper below grade. Call Monett City Utilities at 235-3300 to observe the plug.

Gas Service/Telephone/Cable TV; These are the owner's responsibility.

Written Notice; The contractor must notify adjacent property owners in writing.

Monett Building Board; A demolition that is ordered by the Monett Building Board must follow the Board's "Findings of Fact & Orders". The demolition must be begun immediately and proceed continuously. Foundation walls are to be removed, basements filled in, grade re-established, and grass seed put down. Grass must be kept mowed not over 8" high.

Completion; Demolition is incomplete "whenever any portion of a building or structure remains on site when demolition work is abandoned", and this is a City Code violation.

Landfills & Dumpsters (Subject to change from time to time.)

- Prairie View Landfill, Lamar, Mo., 1-417-682-6379
- American Disposal, 1-800-201-7613 / 1-800-627-1717
- Jack Stanphill's Sanitation, Pierce City, Mo. 1-417-476-2953
- Wolf Pack Containers, 847-5502, 574-6558
- Advantage Waste (Tate's Transfer) (CHP), 14062 Lawrence 2170, Verona, Mo., 65769
1-417-498-6921 / 1-417-498-2301, 1-417-866-8700 / 1-877-861-8700

Demolition - State of Missouri Requirements;

Notification; Missouri DNR may require notification 20 days in advance of the demolition of 4 or more residences, a commercial or industrial building, or a building with >160 sq.ft., >260 linear feet or >35 cubic meters of friable asbestos.

MoDNR may require notification of demolition of single family houses.

MoDNR may require notification of more than 1 house demolition/block/year.

Call 1-573-751-4817, fax - 2706, or 1-417-891-4300.

Asbestos Sheets / Asbestos Shingles / Transite Siding;

Wet the siding, remove the nails or clip the nailheads, remove the sheets / shingles one by one, place them in double plastic trash bags, then place them in double cardboard boxes. Haul all the materials to an approved landfill.

Missouri DNR Regulations

Click on the Missouri DNR web site www.dnr.mo.gov for environmental information and regulations. Check these out;

- Publication 484 What You Should Know Before You Build
- Publication 2157 Asbestos
- Publication 2002 Demolition Waste Contaminated with Lead and Heavy Metals
- Publication 2045 Construction and Demolition Waste
- Publication 2047 Open Burning
- Publication 2009 Stormwater Permit Requirements for Land Disturbance

Call 1-800-361-4827 for further information.

Drywall

- ½” Drywall; Required throughout house and throughout attached garages.
- ½” Water-Proof Drywall (Green-Board);
Residential; Only required in residential showers, within 6’ of the shower/tub drain outlet, and is only required behind ceramic tile or similar material with joints. If ceramic tile is hung on the ceiling, then the ½” green-board must be on 12” ceiling-joint centers. (However green-board is *recommended* near all wet areas, lavatories, sinks, hot tubs, toilets, etc.)
Commercial; Green-board is required behind all toilets, urinals, tubs, spas, etc.
 - 5/8” Fire-Proof Drywall; No longer required for residential garages, but it is recommended. It is required in many commercial buildings.

Duplexes / Apartments:

Lot Area per Family; Depends on the zoning district in town; usually 7500 square feet of lot area per two-unit duplex, and 1000 square feet per unit for apartments.

Architect’s Prints; Required for a 3-plex, a 4-plex or larger apartment building.

Fire Separation Wall;

- Build a stud wall all the way up to the roof deck, then install 1 layer 5/8” Type ‘X’ Fire-Proof drywall on each side, all the way up to the roof deck.

Fire Doors;

- Stairwell doors must be steel or solid-core 20-minute fire doors, with self-closers.

Fire-Penetrations of Fire Separation Wall (R-321.1 thru .3);

- Steel/copper/metal pipe through penetrations through masonry;
Completely fill the annular space with mortar.
- Steel/ copper/metal pipe through penetrations through wood framing;
Completely fill the annular space with fire rated caulk.
- CPVC/PVC penetrations; (later – fire penetration annular ring)
- Membrane Penetrations (Of One Layer of Drywall); -- *later* --.
- No single electrical box can exceed 16 square inches in area.
- Must separate 4x4 electrical boxes by at least 24” along the wall.
- Electrical boxes on opposite sides of wall must be offset by 24 inches. If closer, then the wall must be filled with loose-fill cellulose or mineral-fiber insulation.
- Plastic electrical boxes not allowed in wall. Steel or 2-hour-rated fiberglass boxes are OK.
- See Section R321.3.2 for further details.

Sound Transmission;

- Walls - Air-borne sound transmission not less than 50 per ASTM-E-90.
The Gypsum Fire Resistance Design Manual GA-600 shows several methods.
- Floors – Impact- insulation class IIC rating not less than 50 per ASTM-E-492.
The Gypsum Fire Resistance Design Manual GA-600 shows several methods.
The typical method is to screw steel furring channels to the underside of floor

joists, then screw ½” or 5/8” Type “X” drywall to the furring channels.

Electric Meters; Separate electric meters are required for each unit.

Water Meters; Separate water meters for each unit are optional.

Sewer Taps; Each building must have a separate sewer tap and separate service line.

Off-Street Parking; One off-street space required per unit. Garages/carports optional.

Addressing; Suites will normally be addressed A-B-C-D.

Electrical Circuits (Residential):

Air Conditioner Compressors; 2002 NEC 440.32 & 440.22

- Follow the manufacturer’s instructions on the data nameplate. Wire size shall be based on ‘ampacity’, and circuit breaker size or fuse size shall be as specified. Otherwise, or for older units, proceed as follows;
- Determine compressor motor and condenser motor full load currents.
- Conductor load equals (125%) x (compressor full load current) plus (100%) x (condenser motor full load current).
- Conductor wire is sized per Table 310.16 after the load is determined.
- Temperature rating 60°C is adequate unless the manufacturer specifies 75°C.
- Circuit breaker is sized for (175%) x (compressor full load current) plus (100%) x (condenser motor full load current), but no larger.
- If unit will not start and run, circuit breaker size may be increased up to (225%) x (compressor full load current) plus (100%) x (condenser motor full load current), but no larger.
- Disconnect shall be accessible, within sight, and with 3’ clearances all around.

AFCI (Arc Fault) Protection;

- All bedroom receptacle outlet circuits shall be AFCI-protected, using an AFCI circuit breaker.

Baseboard Heaters;

- Circuit wiring for baseboard heat must be sized for 125% of the heater size.
- Circuit breakers must be sized for the ampacity of the wiring.
- Baseboard heaters cannot have any receptacle outlets located above them.

Bathrooms;

- One dedicated 20-amp circuit shall be provided, with no other uses.
- All bathroom outlets shall be GFCI-protected.
- Receptacle outlets may not be installed inside bathtubs, showers, etc.
(NEC 406.8.C)

Bedrooms;

- All bedroom outlet circuits shall be AFCI-protected, and smoke alarms installed correctly. Wall outlets shall be 12’ apart or closer.

Circuit Breaker Size vs Minimum Wire Size;

Breaker....	15 Amp	20 Amp	30 Amp	40 Amp	50-55 Amp	70 Amp
Romex	14 Gage	12 Gage	10 Gage	8 Gage	6 Gage	4 Gage

(For SE or THHN in conduit, see Table 310.16 National Electrical Code.)

Clothes Closets; Incandescent Lights;

- Surface-mount enclosed incandescent bulb fixtures must be 12” away from nearest point of closet shelving.
- Recessed enclosed incandescent bulb fixtures must be 6” away from nearest point of closet shelving.
- Bare incandescent bulbs are not allowed.

Clothes Closets; Fluorescent Lights;

- Surface-mount fluorescent fixtures must be 6” away from nearest point of closet shelving.

Clothes Dryer;

- Provide one dedicated 4-wire / 30-amp / 240-volt circuit. (Neutral must be separated from ground wire.)
- Exposed wiring must be Type MC, or enclosed in similar conduit. Romex NM cannot be exposed.

Clothes Washer;

- Provide one dedicated 20-amp / 120-volt circuit.
- Exposed wiring must be Type MC, or enclosed in similar conduit. Romex NM cannot be exposed.

Dedicated Circuits;

Provide two dedicated 20-amp circuits for kitchen countertops.

Provide one dedicated 20-amp circuit for each clothes washer.

Provide one dedicated 20-amp circuit for each bathroom.

Provide one dedicated 30-amp circuit for each clothes dryer.

Dishwasher; May not be on the 120-volt small appliance branch circuit.

Furnace/Heat Pumps;

- Follow the manufacturer's instructions on the data nameplate. Wire size shall be based on 'ampacity', and circuit breaker size or fuse size shall be as specified. Otherwise, proceed as follows;
- Heat pump furnaces may require 75°C conductors; Romex NM would not be allowed.
- Heat pump furnaces are labeled with maximum circuit breaker size and minimum ampacity wire size. These must be followed.
- Exposed Romex NM is never allowed; if used, it must be concealed inside conduit.
- The electrical disconnect shall be accessible, within sight, and have 3' clearances all around. It may be built into the unit.

Hot Tubs;

- Must be GFCI protected.
- A plug-in or receptacle outlet must be accessible to the occupants of the building.
- Motor must be bonded to a metal water pipe, if provided, but to nothing else.

Garages; All 120-volt outlets must be GFCI protected, except for garage door openers, freezers and refrigerators.

Garbage Disposals; Type MC cable (no Romex). May not be on the small appliance branch circuit.

GFCI (Ground Fault) Protection; GFCI protection is required for all 120-volt receptacle outlets on all kitchen countertops, on wet bars, in bathrooms, garages, crawl spaces, unfinished basements (no habitable rooms, only storage, work areas, etc.) , and outdoors. Either GFCI outlets or GFCI circuit breakers may be used.

(GFCI protection is not required for single-outlet receptacles dedicated to refrigerators or freezers, or for electric roof-top ice-melt outlets, or for clothes washers.)

Grounding;

An 8' copper-coated steel ground rod shall be driven (later).

Bare No. 6 copper ground wire

Installation of Romex; Staple Romex within 12" of each electrical box, then staple it every 4½' to guard boards. Run through bored holes in the center of studs. If within 1¼" of the edge of a stud, provide a steel guard plate.

Exposed Romex wiring in unfinished basements shall be run through bored holes in the center of the floor joists, except some wiring as large as 8-2/w/G and larger may be stapled to the bottom of the floor joists.

See handout sketch.

Kitchens; 4-wire electrical circuits and 4-prong plugs-&-cords are required for kitchen ranges, counter-top cooking units, and wall-mount ovens, and clothes dryers. (This separates the ground conductor from any neutral conductor current.)

Kitchen Counter-tops;

- All outlets on all kitchen countertops shall be GFCI protected.
- Must provide two or more 20-amp small-appliance branch circuits on countertops.

Kitchen Islands & Peninsulas; Provide one GFCI outlet if the island or the peninsula exceeds 12" x 24" in size.

Microwave; May be on the small appliance branch circuit.

Motors;

2002 NEC

- Determine the motor's "locked-rotor indicating code-letter" (not the design-letter) from the designated block on the manufacturer's nameplate.
- The locked-rotor KVA/Hp is then determined per Table 430.7-B of 2002 NEC.
- Full load current FLC is then determined per Tables 430.148 (1Ø) or 430.150 (3Ø).
- For continuous-duty (3-hours or greater), the conductor wire is sized at 125% of full load current per 2002 NEC §430.22.
- Inverse-time circuit breaker is sized at 250% x FLC per Table 430.52.
- Dual element (time-delay) fuse is sized at 175% x FLC per Table 430.52. Other short-circuit devices may be per Table 430.52.
- Disconnect shall be located within sight, rated at 115% x FLC, with 3' clearances.
- Motor controller as overload protection; Section 430.39.
- Overload device shall be rated at (125%) x (full-load-current) for motors with service factor 1.15 or greater, and for motors rated 40°C or less. Overloads shall be rated 115% of full load current for other motors.
- Temperature rating of wire shall be 75°C or larger.

Panelboard;

- Cannot be in clothes closets or in bathrooms. (NEC Sect. 240.24.D & E.)
- Must have 3' x 3' front floor space clearances, and 6' 5" up from the floor.

Refrigerator; May be on the small appliance branch circuit.

Outlets;

- Room Outlets; Located every 12', so no part of a room is more than 6' away.
- Commercial; 10 outlets on a 15-amp circuit, 13 outlets on a 20-amp circuit.
- Residential; 600 sf floor area for 15-amp lighting circuit, 800 sf for 20-amp circuit.
- Bathroom Outlet; Provide one 120-volt GFCI outlet within 3' of edge of sink.

- Countertop Outlets; Two 120-volt GFCI circuits, with outlets not over 4' apart.
- Unfinished Rooms; Provide one 120-volt outlet in each unfinished room.
- Hallways; Provide one 120-volt outlet in each hallway over 10' long.
- HVAC Equipment; Provide one 120-volt outlet within 25' of HVAC equipment.
- Outside; Provide one 120-volt outlet in front and back of each dwelling unit.

Smoke Alarms;

- Shall be 120-volt with 9-volt battery backup.
- Must be inside all bedrooms, outside all bedrooms, on each floor, and they shall all be electrically interconnected so if one goes off they all go off.
- These smoke alarms must be retro-fitted in older homes when an addition is added, to protect the entire house.

Sub-Panels; Must be fed by a 4-wire feeder, with the neutral wire separated from the ground wire. Steel conduit may be used as the ground.

Swimming Pools; See 'Swimming Pools' below.

Wiring in Unfinished Basements;

- All receptacle outlets in unfinished basements must be GFCI-protected, as long as the basement is to be used for a storage area, work area, or the like (2002 NEC).

- 8-2/w/G and larger wiring may be stapled to the bottom of the floor joists.
 - 10-2/w/G and smaller wiring must be run through bored holes in the center of the joists, or stapled every 4½' to guard boards.
- Water Heater; One 30-amp, 10-gage circuit for conventional residential water heater, with an electrical disconnect within sight.

Exit Door

Provide one 36" exit door, and provide one exit door with a thumb-turn deadbolt. (At least one exit door must be able to be quickly unlocked in any emergency without searching for keys.)

Excavations:

Concrete Slab on Ground; Remove all vegetation, top soil and foreign matter.

Footings; Shall extend 12" below undisturbed ground and 24" below frost line.

Fences:

Locations; Fences must be located on private property. Fences cannot be built on the street or alley right-of-way or on the parkway. If the property owner does not know where the lot lines or property corners are, a licensed engineer or surveyor can locate them.

Easements; Locating fences in easements is strongly discouraged. Fences that must cross electrical, water or sewer easements must have removable panels or gates across the easement, otherwise the fence may have to be removed when City Utilities trucks enter. In newer subdivisions there is an additional 10' easement along the street right-of-way line.

Underground Utilities; Call 1-800-DIG-RITE and 235-3300 to locate utilities.

Height; Fences along streets or within 15' of the street right-of-way line cannot be taller than 3' 6" for traffic visibility reasons. In most areas this normally means that fences within 25' of the curb cannot exceed 3' 6" height.

Barbed Wire / Electric Fences; Barbed wire fences or electric fences are prohibited except in the Agricultural "AG" (4th Residential) Zoning District.

Gates; Gates are required if a utilities meter is fenced in.

Swimming Pools / Spas / Hot Tubs;

Swimming pools / spas / hot tubs over 24" deep shall have special fences;

- Fence height above grade = 48" or more.
- Space below the fence = 2" or less.
- Spindle spacing = 4" in-the-clear between spindles, or less.
- Gates must be out-swing, spring-loaded, self-closing, self-latching, and the latch must be 48" or more above grade.
- If the latch is within 54" of the bottom of the gate, it shall be on the inside the gate, it shall be 3" or more below the top of the gate, and there shall be no openings larger than ½" within 18" of the latch.
- Chain-link fences cannot have more than 2¼" spacing. (2003 IRC)
- Chain-link fences with slats inserted cannot have more than 1¾" spacing.
- If a house wall forms part of the fence around the pool, either a powered pool cover or door alarms are required; see Section AG-1.5.2 – 9.2.

Fireplaces:

Masonry fireplaces shall be built to Section 2111 of the International Building Code. All masonry must rest on concrete footings / foundations (not on wood framing.)

Manufactured fireplaces shall be installed per the manufacturer's instructions, and have a chimney and supporting structure per those instructions.

Zero-clearance fireplaces shall be installed per the manufacturer's instructions.

A 20" hearth extension shall be built in front of fireplaces as required by the manufacturer.

Fill

- Footings on Less Than 12" Compacted Fill; Shall be compacted to 90% Modified Proctor per ASTM-D-1557, verified by a qualified inspector.
- Footings on More Than 12" Compacted Fill; A soils investigation report from a soils engineering company is required.
- Concrete Slab on Fill; (later) Fill shall be deposited in 8" - 10" lifts, and compacted with a vibratory roller or sheeps-foot roller, and the next lift brought in. Fill over --- feet deep shall be tested by an engineering firm, to 95% compaction

Final Grade; This final grade is required on each side of every structure;

- Final grade shall start 6" down from the siding. (In other words 6" of concrete foundation shall be exposed.) Otherwise all wood framing, siding and sheathing shall be CCA treated.
- Final grade shall then slope 6" down in the first 10' away from the foundation, plus 12", plus 2% to the point of discharge from the lot or the street gutter.
- Provide 6" or more clearance between the exterior wall sheathing and final grade. Otherwise the sheathing and framing must be CCA-treated.

The building must be elevated enough to accomplish these goals.

Flood Damage Prevention;

Flooding damage at your residence might be minimized if you take a few precautions;

- Seal up all penetrations through basement walls or crawl space walls.
- Get the downspout rainwater totally away from the house, as far as possible.
- Bring in black dirt and re-establish final grade with the ground, dropping 6" - 12" or more in 10' to 15' away from the house.
- Install steel or masonry window-wells at basement windows or crawl space openings and bank the dirt up as high as possible. Make sure to leave 6" foundation wall showing, so termites do not crawl up into the framing.
- Make sure water drains off of your building lot, to the street or drainage way. Clean out fence rows, chain-link fences, brush lines etc. to get a drain path off your lot. Some lots may require a small swale cut to get the water off the lot.
- Install sump pumps in the low spots in your basement or crawl space. Make sure the floats operate freely, a check valve is installed at the pump base, and make sure water freely drains to the sump pump. Install a 1" or 1½" pump discharge line; do not use a larger line. Pumped water must drain away from the house.
- Waterproofing of basement or crawl space walls sometimes helps, but it should be outside the wall and many times that's difficult.
- The City of Monett enforces flood plain development regulations, and so you can purchase flood plain insurance. Even if you only live in a low-lying area, it is always recommended.

Check the FEMA FIRM flood plain maps and see where your house is.

Remember the purpose of the floodway is to carry the high-velocity flood waters away.

Remember the purpose of the floodplain is to store water during very heavy rainfalls.

100-Year Flood Plain Regulations;

Residential buildings, garages and storage buildings must be elevated 1' or more above the base flood elevation. A surveyor or engineer must certify the elevations. Buildings cannot be located in the high-velocity floodway except in very limited circumstances. Commercial or industrial buildings must be either elevated 1' or more above the base flood elevation or flood-proofed. The flood-proofing must be designed by a registered engineer. Special permits are required.

Floodway; An engineer must also certify that there is no increase in 100-year flood plain levels to adjacent property.

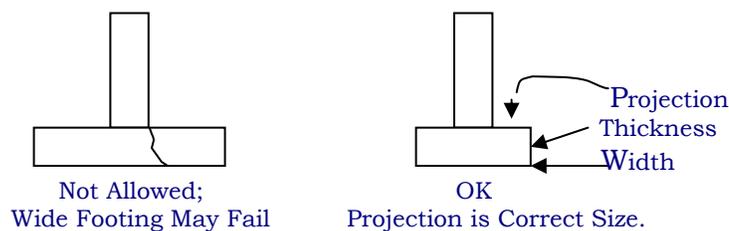
Check with the Building Inspector for full details, permits, & etc.

See www.fema.gov to buy flood plain maps for Monett, or Barry or Lawrence Counties.

Footings;

Table R-403.1

- Examples of Minimum Footing Width;
 - 2-Story residence, Brick veneer, wood-frame, 2000# soil; 19" wide footing.
 - 2-Story residence, vinyl siding, wood-frame, 2000# soil, 15" wide footing.
- Smallest Minimum Width = Stem wall thickness + 4".
- Maximum Width = Stem wall thickness + 2 X footing thickness.
(In other words, the footing projection shall extend out past the wall a minimum of 2" up to a maximum of the wall thickness, but not beyond.)
- Minimum Thickness of Footing (depth) = 6".
 - Projection can range from 2" up to the footing thickness, but no more.



Install two ½" rebar in bottom of trench, supported on chairs or bricks.

Foundation Drain; Required for all basements, whether walkout basements or with all four sides in the ground. See 'Basements' above.

Foundation Vents;

Located *in the corners* of crawl spaces; see "Crawl Spaces" below for the details.

Floodway Regulations; Buildings may be built in the floodplain if they are elevated enough or floodproofed. Buildings may only be built in the floodway if the engineer can certify there is no increase in the 100-year flood levels to adjacent property.

Footings

Bottom of Footing; Extend 12" down into undisturbed soil, also 24" below final grade.

Maximum allowable slope of bottom of footings is 10%.

Width of Footing; International Residential Code, Table R403.1.

Thickness of Footing; 6" minimum.

Allowable Projection Beyond The Foundation Wall; From 2" (minimum) up to the footing thickness (maximum), but not more than that thickness. (Cannot extend so far out that it may break.)

Ground; Concrete cannot be poured on frozen ground. See sketch.

Foundation Walls;

Plain Concrete Walls;Table R-404.1.1.1.
8” Reinforced Concrete Walls;Table R-404.1.1.2.
12” Reinforced Concrete Walls;Table R-404.1.1.3.
10” Reinforced Concrete Walls;Table R-404.1.1.4.
Drainage, Damp-Proofing, Water-Proofing; See ‘Basements’ above.

Framing

Floor Joists Spans,

Living Areas, 40 psf; Table R-502.3.1.2.
Bedrooms, 30 psf; Table R-502-3.1.1.

Ceiling Joist Spans,

No Storage; Table R-802.4.1.
Limited storage; Table R-802.4.2.

Wall Bracing; Table R-602.10.3., top section.

Rafter Spans;

Ceiling Not Attached 10 psf ‘DL’ Column of Table 802.5.1.1.
Ceiling Attached 10 psf ‘DL’ Column of Table 802.5.1.2.

Rafter Cuts; Must be plumb, square, straight and tight.

DO NOT cut rafters so half bears on the wall and half hangs out into the room.

Otherwise gusset panels must be glued-and-screwed on, or joist hangars installed.

Purlins; Must divide up rafter lengths into no more than the allowable span lengths.

Purlin Braces; Locate braces every 4’ O.C., with a maximum unbraced length of 8’.

Must bear down to a bearing wall, not to ceiling joists.

Cannot be set at less than a 45° angle.

See Figure R-802.5.1.

Rafter Ventilation; Every rafter cavity shall be cross-ventilated where drywall or insulation is applied, if it would prevent free air flow.

Hips & Ridges; Must be supported at the ridge by a brace down to a bearing wall.

Engineered Trusses; Designed for 75 mph wind speed, 90 mph 3-second gust speed, 15 psf ground snow load, Exposure ‘C’ (usually), 20 psf live load, and with various reduction factors.

Joist Hangars, Pressure Blocks; Floor joists must squarely bear on 1½” on wooden beams or girders, on 1½” steel, on joist hangars, or on 3” masonry or concrete (3”-deep beam pockets).

Pressure blocks are not approved for floor joists, only for ceiling joists.

Garages

Floor Drainage; Garage floor must slope outdoors, or to a floor drain.

Step-Down; A 4” – 6” step-down into the garage is recommended but is not a Code requirement.

Fire Separation Between Garage & Residence; ½” regular drywall.

GFCI Outlets; All 120-volt receptacle outlets must be GFCI-protected, except for single-receptacle outlets behind refrigerators, freezers, or for overhead door openers.

Garage Door into Residence; 1 3/8” solid-core wood door, 1 3/8” steel door, or 20-minute fire door. Glazing must be wired glass, UL-approved for a 20-minute fire door.

Water Heaters, Furnaces; The combustion chambers must be elevated 18” above the garage floor.

Gas Piping

Materials & Specifications

K or L Copper Tubing ASTM B75 / B88 / B280
Copper Pipe ASTM B42 / B302

Copper is only allowed where hydrogen sulfide concentration is less than 0.3 grains / 100 SFC (a trace determined under ASTM-D-2420.)

Plastic Pipe or Tubing ASTM D2513 / D2517

Yellow or black fused plastic.

Plastic pipe and connections are allowed only outside, underground.

Steel Pipe ASTM A53 / A106

Steel Tubing ASTM A539 / A254

Black steel; galvanized pipe or galvanized fittings are not allowed.

Propane

Polyethylene is the only plastic piping material allowed for propane (NFPA-58).

Outside Lines

18" burial for service lines to houses, 8" burial for service lines to appliances.

Service lines shall be sleeved where passing through foundation walls.

Gas piping shall not be in contact with ground under a building.

Plastic is only allowed outside, underground. Connections between plastic and metal piping are only allowed outside, underground.

Gas piping in concrete slabs shall be encased in 1½ " or more of concrete.

Gas piping may be in a separate trench, with no other utilities, or same trench.

Tracer wire shall be yellow-insulated, copper, THW/THHW/THWN, direct burial, 18 AWG or bigger, installed next to plastic pipe, and terminate aboveground at each end.

Inside Lines

All copper and plastic gas lines in stud walls shall be protected by 1/16" steel plates or by 1¼" wood.

Branch connections shall be made only on the top or side of service lines.

Gas piping cannot be run through air ducts, chimneys, chutes, dumbwaiters, or elevator shafts.

Valves cannot be located in air plenums.

Unions, tube fittings or running threads cannot be located in concealed spaces or stud spaces. Ordinary pipe-thread joints may be located in such spaces.

Supports; Pipe supports 10' apart or less.

Tube supports 6' apart or less.

Shutoff Valves

Every structure and every appliance shall have an accessible, adjacent gas shut-off valve. Valve shall be within 6' of appliance.

Every meter shall have a supply side gas shutoff valve.

Testing (NFPA-54.)

Gas piping test pressure = 1½ times working pressure, 3 psi minimum, 10 minutes.

Gas Vent Piping (Gas-Fired Appliances) (Type "B" Vent Piping)

Always strictly follow the manufacturer's instructions.

Failure to do so can result in fire, carbon monoxide poisoning, or death.

Power-Draft/Force-Draft Exhaust Systems; Follow all manufacturer's instructions.

Natural-Draft Exhaust Systems; To size Type "B" gas vent piping, refer to the IBC International Fuel Gas Code tables;

Example; Single-Wall Connector, Natural Ventilation, 30' Height with 10' Offset;

<u>Type "B" Vent Size</u>	<u>One Category 1 Appliance</u>	<u>Two or More Appliances</u>
4" Diameter	98,000 BTUH Max. Capacity	57,000 BTUH Max. Capacity
5" Diameter	168,000 BTUH Max. Capacity	89,000 BTUH Max. Capacity
6" Diameter	257,000 BTUH Max. Capacity	129,000 BTUH Max. Capacity
8" Diameter		230,000 BTUH Max. Capacity

Offsets; Not over 45-degree elbows, except one 60-degree elbow is allowed.

Separation From Wood Framing; 1" or more, or follow manufacturer's instructions.

Supplemental Screws in Joints; Follow the manufacturer's instructions.

Fire-Stopping at Floors; 26 gage sheet metal pan, or manufacturer's instructions.

Termination Above The Roof;

Up To & Including 12" Size; 16" to 30", above roof, depending on roof pitch.

Above 12" Size; 2' above the closest roof, within 10' distance.

GFCI Protection;

Residential;

GFCI-protection is required for all 120-volt receptacle outlets on all kitchen countertops, on wet bars, in bathrooms, garages, crawl spaces, unfinished basements (with only storage areas, work areas, etc., and no habitable rooms per the NEC), outdoors, for rooftop photovoltaic cells, certain RV circuits, outdoor spas and tubs, and swimming pool receptacle outlets, pump motor outlets, and underwater light circuits. Either GFCI outlets or GFCI circuit breakers may be used.

(GFCI protection is not required for single-outlet receptacles dedicated to refrigerators or freezers, or for electric roof-top ice-melt outlets, or for clothes washers.)

(Note also that kitchen countertops must be fed by 2 or more 20-amp circuits.)

Commercial;

GFCI-protection is required for all 120-volt receptacle outlets at construction sites, on rooftops, in kitchens and bathrooms, for ice-melting equipment over 30 volts AC, in commercial service garages, health care facilities (517.17) and many other locations. See the index of the latest National Electric Code.

Hurricane Straps; Recommended for trusses or rafters to help resist tornadoes.

Insulation;

Slightly more crawl space insulation and ceiling insulation is required in Lawrence County (north of Cleveland Avenue) than in Barry County (south of Cleveland Avenue).

Concrete Slab Insulation ----- R-5 for 2 feet depth, inside the foundation wall.

Fully-Exposed Basement Walls ----- R-8

(Crawl Space Wall Insulation ----- R-10 (3½" fiberglass batts) Barry County)

(R-11 (3½" fiberglass batts) Lawrence County)

(Only required if floor joists are not insulated and crawl space is not ventilated.)

Exterior Walls ----- R-13 (3 5/8" fiberglass batts)

(3½" sprayed cellulose)

Floor Joist Insulation ----- R-19 (6 – 6½" fiberglass batts)

(The vapor barrier / Kraft paper goes UP towards the living space.)

Ceilings ----- R-30 (9½" fiberglass batts) Barry County

R-38 (12" fiberglass batts) Lawrence County

Inspections

Three inspections are required. Call 235-3300 or 235-5306 to schedule your initial footing inspection, open-wall inspection and final inspection.

Irrigation Systems / Lawn Sprinkler Systems; RPZ backflow preventer devices are required if chemicals are injected. Double-check DC devices are required otherwise. The test certificate must be provided before permanent water service is furnished.

Joist Hangers & Pressure Blocks

Pressure Blocks; Only approved for ceiling joists, not for floor or deck joists, or rafters.

Joist Hangers;

Floor joists must bear 1½” on wooden beams or girders, on 3” of concrete, or be hung from joist hangers.

Rafter ends must bear at least 1½” on top plates, or be hung from joist hangers.

Landings;

Landings at Stairs;

A 36” landing is required at a stairway door if the door opens out onto the stairs.

The 36” landing is optional if the stairway door opens away from the stairs.

The interior landing can have a 1½” drop, maximum.

An exterior doorway landing can have an 8” drop landing, maximum.

Landings at Exterior Doors;

A 36” landing is required outside each exterior side-swing exit door.

The landing is optional at exterior sliding doors.

The maximum step-down is 8”, if the door swings into the residence.

(The storm door may still out-swing regardless.)

The maximum step-down is 1½”, if the door swings out of the residence.

Log Heaters;

See Unvented Space Heaters below.

Also, the fireplace must have been certified to meet UL-127.

Missouri Department of Natural Resources - Regulations

Click on the Missouri DNR web site www.dnr.mo.gov for environmental information and regulations. Call 1-800-361-4827 for further information.

- Publication 484 What You Should Know Before You Build
- Publication 2157 Asbestos
- Publication 2002 Demolition Waste Contaminated with Lead and Heavy Metals
- Publication 2045 Construction and Demolition Waste
- Publication 2047 Open Burning
- Publication 2009 Stormwater Permit Requirements for Land Disturbance

Modular Homes vs. Mobile Homes (Manufactured Homes);

Modular Homes

- **MAY be located in any zone of the City of Monett**, in accordance with all zoning regulations and setbacks. Must be located on permanent footing and foundation, with site grading, drainage, crawl-space ventilation, etc. built to BOCA National Building Code regulations.
- Has the silver-with-red-seal Missouri Public Service Commission seal mounted inside the home, at the electrical panel-board, reading “*The Manufacturer Certifies That This Unit Complies with the Missouri Uniform Standard Code for Factory-Manufactured Modular Homes Regulated by the Missouri Public Service Commission.*”
- Manufactured to Missouri Public Service Commission standards, the BOCA National Building Code, and inspected by a third-party engineering inspection service.
- American Family (Taylor) Homes, Anderson, MO., 1-417-845-3311
28’ wide, 38’ – 68’ length, average \$40.00+ / sq.ft. (1998 building costs), exclusive of the foundation.
- Mo. Dept. of Manufactured Housing, R.V. & Modular Units, Public Service Commission, P. O. Box 360, Jefferson City, MO. 1-573-751-2557 / -7119

Manufactured Homes (Mobile Homes)

- **MAY NOT be located in the City of Monett** except in mobile home parks, in Zoning District “MH”, on existing mobile home sites, or in existing mobile home parks in Zones “C” or “D”. Must be located in accordance with Monett City Code Chapters 405 and 410.
- Usually has a permanent steel-frame chassis and has removable wheels.
- Has a Missouri Department of Revenue title.
- Has the 2” x 4” red “HUD” seal mounted on an exterior corner of the unit.
- Manufactured to the Federal Manufactured Home Construction & Safety Act, the Housing and Urban Development (HUD) Code. Does not meet the BOCA National Building Code.
- Factory-built, 8+ feet wide, 40+ feet long, movable, built on a steel chassis, and designed to be used with or without a permanent foundation.
- Missouri Manufactured Housing Institute, P O Box 1365, Jefferson City, MO. 1-800-392-0654
- Mo. Dept. of Manufactured Housing, R.V. & Modular Units, Public Service Commission, P. O. Box 360, Jefferson City, MO. 1-573-751-2557 / -7119

Patio Homes (“Zero-Lot-Line” Homes);

Two-unit patio homes are allowed, with each unit separately owned and located on its own separate lot. Units are separated from each other by a residential fire wall.

Zoning; Patio homes are allowed in Multi-Family District Zone “B” and other zones, but not in Single-Family District Zone “A”.

Minimum lot area per unit is 3750 square feet, equal to 7500 sq. feet per structure. Setbacks are the same as in other Zones, except the side setback on one side is zero.

Fire Wall; The fire wall is built as an independent, free-standing structure, with a separate concrete footing and foundation. Rating must be 2-hour or more. (One unit can burn and collapse, and not affect the fire wall or the adjacent structure.)

The fire wall is not connected in any way to either unit; they are three independent structures, however roof decking and shingles may overlap over the top of the fire wall.

Fire Wall Construction; There are several options for a 2-hour fire wall;

1. 8” concrete block.
2. Wood frame with two layers of 5/8” Type “X” fire-proof drywall on each side.

Fire Wall Vertical Continuity; There are several options. (705.6.6)

1. Wall shall extend 30” above both roofs, or
2. Roof structure shall be built of fire-retardant treated wood within 4’ of fire wall, or
3. Roof shall be protected inside with 5/8” Type “X” drywall within 4’ of the fire wall.

Fire Wall Horizontal Continuity; There are several options. (705.5)

1. If Brick Veneer Siding; No special fire proof framing or sheathing is required. No openings allowed within 4’ of the fire wall, or else they shall be ¾-hour rated.
2. If Vinyl or Wood Siding; Fire wall shall extend 18” beyond both of the exterior walls, or the interior drywall must be 5/8” Type “X” fire-proof drywall within 4’ of the fire wall. No openings within 4’ of the fire wall, or else they shall be ¾-hour rated.

Openings / Penetrations Through the Fire Wall; None allowed. (503.2)

Openings / Penetrations Through the Roof; None allowed within 4’ of the fire wall; no plumbing vents, no skylights, no exhaust ductwork, no chimneys, no flues, etc.

Utilities; Since each unit is individually owned, separate gas / water / electrical meters and sewer taps, separate addresses, legal descriptions and lot numbers, separate driveways and separate sanitation containers are all required.

Patio homes larger than two-units are not approved at this time.

Plumbing

Traps;

Traps; S-traps are always Code violations. Use P-traps and only P-traps.
Minimum Size; 1¼", or at least half the size of the drain pipe.

Vents;

Fixture Vents; Every trap must be vented;

<u>Size of Trap</u>	<u>Size of Fixture Drain</u>	<u>Distance From Trap to Vent</u>	
1¼"	1¼"	3½'	
1¼"	1½"	5'	
1½"	1½"	5'	
1½"	2"	6'	(Table P-906.1)

2" Combination Vent & Drain; P-trap, into a 2" elbow, turned down into a 2" drain.

This will eliminate cutting studs, and is very useful at islands and kitchen windows.

Studor Mini-Vent Air-Admittance Valves; APPROVED. Seals against escaping gas by gravity. May be used to replace vents for individual fixtures only. Cannot replace the main vent. Install per manufacturer's instructions. (These seal against gas by the force of gravity.)

Sure-Vent Air-Admittance Valve; APPROVED. Same reasons.

J&B PRO-Vent; NOT APPROVED; Approved only for mobile homes. Cannot be used in IBC Code-built homes. (Seals against escaping gas by a flapper or a spring, both of which can fail.) Not tested by a third-party testing agency.

Nova-Vent, Genova, Michigan; NOT APPROVED; Same reasons.

Materials;

PVC; Only allowed for water service pipes underground.

Not allowed for water distribution piping inside.

Do not use PVC or any plastic for compressed air service.

CPVC; Approved for all hot and cold water plumbing lines, and for drain lines.

Drains;

Tees & Wyes; Sanitary tees are NOT ALLOWED, unless used for venting upwards/drainage down. DO NOT lay sanitary tees down flat on their sides for drainage.

Testing; Sewer lines -- 10' water head or 5 psi air, for 15 minutes.

Water lines -- System pressure for 15 minutes.

Foundation Wall Sleeve;

Sleeves through foundation walls shall be 2 pipe sizes larger. (Normally a 6" sewer service line sleeve and a 3" water service line sleeve.)

Sleeves/sheathing/wrapping are also required in concrete slabs to isolate metal pipes from concrete corrosion.

Sewer Service Line;

Must be 4" Sch. 40 PVC, 12" minimum bury, on smooth even compacted fill, free of large rocks.

Clean-outs at the foundation wall, at every 60° and 90° bend, and then every 100'.

In separate trench from water service line, and separated by 5' undisturbed soil.

Minimum sewer line slope 1/8 inch per foot.

Backfill shall be free of rocks, frozen rubble or concrete.

Backfill in streets or alleys shall be 5/8" full depth bedding rock. Public Works Department permit and street/alley repair fees are also required.

Testing; 10' water head, or 5psi air pressure.

Water Service Line;

$\frac{3}{4}$ " minimum size, 24" bury, on smooth even compacted fill, free of large rocks. An accessible shutoff valve is required inside the structure for the residents to use.

Connection of a water meter to a PVC service line must be by means of a short threaded brass nipple, and a plastic Dresser-type flexible connector (no galvanized iron is permitted.)

Pressure Blocks & Joist Hangers See 'Joist Hangers' above.

Prohibited Items; These are some items that are not approved for use inside the City of Monett, and this is the reason;

- **PRO-Vent** small black plumbing vent fittings. The legal reason is these are not listed by a third-party testing agency. The real reason the Code does not allow them is they will fail in use due to the spring wearing out, and/or the rubber flapper wearing out. Use "Mini-Vent" fittings made by Studor, or equal.
- **NOV-A-VENT** white plastic plumbing vent fittings. Same reason.
- **S-Traps**. Have never been approved. They will self-siphon, drain the trap, and allow sewer fumes back up into the building. They will "burble" in use. The only place they may be used is to replace old existing S-traps in older homes build before codes. Even then, there is a better way; a P-trap leading to a 2" drain pipe, which will function as a combination vent-and-drain.
- **Magnetic Water Purifiers;** The legal reason is they are not tested by a third-party agency, such as UL, FM or NSF. The real reason is because it's fraud and they don't work. If they did, every City Utilities Department throughout the country would install them at every City well-house to purify the water.

Rafter Ventilation; See 'Attic Ventilation' above.

Reinforcing Steel; See 'Basements' above.

Roofing (Code Chapter 9)

Layers; No more than two layers of roofing on a roof.

No re-roofing is allowed over waterlogged or decayed materials.

Roof Decking; Spanned in accordance with manufacturer's span rating.

Plywood Clips; Clips are required for 24" rafter spacing with $\frac{1}{2}$ " or less decking.

Underlayment; 15# or 30# underlayment is required under all roofing materials.

Valley Flashing;

Open Valley –

- 24" wide metal, 0.024" aluminum, 26-gage galvanized steel, 1# copper, or other metals (see Table R-905.2.8.2.)
- Two plies of roll roofing to ASTM-D-249 Type II or III, with bottom layer 18" wide, and top layer 36" wide.

Closed Valley –

- One ply of 36" smooth roll roofing to ASTM-D-224 Type II or III.
- Any flashings listed above for open valleys.
- Specialty flashings of ASTM-D-1970.

NOTE; Tamko **Slate Roll Roofing** is not approved for valleys, and Tamko **SE Slate Roll Roofing** is not approved for valleys.

Tamko **ASTM Slate Roll Roofing** complies with ASTM-D-249 for open / closed valleys.

Tamko **Master Smooth Roll Roofing** complies with ASTM-D-224 for closed valleys.

Shingles, Slopes & Underlayment;

	<u>Flat</u>	<u>1:12</u>	<u>2:12 to 4:12</u>	<u>4:12 +</u>
<u>Underlayment</u>	<u>Double-Layer</u>	<u>Double</u>	<u>Double-Layer</u>	<u>Single-Layer</u>
Asphalt Shingles	Not Allowed	Not Allowed	OK	OK
Fiberglass Shingles	Not Allowed	Not Allowed	OK	OK
Roll Roofing	Not Allowed	OK	--	--
Wood Shakes	Not Allowed	Not Allowed	OK for 3:12 & Up	

Ice Barriers; 24" double-layer

Step-Shingles; Right-angle step shingles must be interlaced in each course of shingles.

Counter-Flashing; Required to cover over the vertical ends of the step shingles.

Setbacks (Zoning Districts 'A' & 'B')

Setback measurements are measured to the roof overhang.

House

Front Yard; Setback is 20% of lot depth, but does not have to exceed 25'.

Rear Yard; Setback is 20% of lot depth, but does not have to exceed 20'.

Side yard; Setback is 10% of lot width, but has to be at least 7' setback.

Corner Lots; Setback is 12 ½' side setback instead of 10% side setback.

Outbuildings;

Front Yard & Rear Yard; -later-

Side Yard; -later-

See the complete 'Zoning' handout and the Zoning ordinance for all details.

Shear Paneling;

Install one of these shear-panel items at every corner and every 25' along a wall;

- 5/16" or thicker plywood paneling,
- 1X4 let-in bracing, running from top plate to bottom plate, or
- metal strapping, per the manufacturer's instructions.
- See Table R-602.10.1, Category A&B, for further details.

Siding; See Table R-703.4 in the Residential Building Code for details.

Site; See "Excavations" above.

Stairs

	<u>Residential</u>	<u>Commercial</u>
<u>Risers;</u>	4" – 7¾ "	4" – 7"

<u>Treads;</u>	10" minimum*	11" minimum
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*Note; Residential treads 10" to 11" width, with solid risers, must have 1" +/- ¼" nose.

Tolerances; Treads and risers must be within 3/8" of adjacent treads and risers.

Handrails;

Required on one side of the stairs, located 34" – 38" above the stair tread nosings, diameter 1¼" - 2", positioned 1½" from the wall, and extending from the top riser to the bottom riser. Not required for only one riser.

Electrical; Three-way light switches are required at top-and-bottom for stairs with more than 6 risers (NEC 210.70.A.2).

Stairway Landings;

A 36" landing is required at a stairway door if the door opens out onto the stairs.

The 36" landing is optional if the stairway door opens away from the stairs.

The interior landing can have a 1½" drop below the door, maximum.

An exterior outside landing can have an 8" drop, outside the door, maximum.

Spindles; Whenever the stairs are 30" or more above grade, spindles cannot be more than 4" in-the-clear, and must be at least 34" high.

Smoke Alarms (Residential)

Install 120-volt / 9-volt battery-backup smoke alarms on each floor, inside each bedroom, and outside each bedroom. They shall all be electrically interconnected.

Smoke alarms are also recommended in garages, crawl spaces and utility rooms, and heart sensors are recommended in furnace rooms.

Swimming Pools

Electrical;

- Bonding conductor must be bonded to steel re-bar, and to all fixtures and features, with acorn nuts or split-bolts. (No hose clamps, no water pipe clamps.)
- GFCI protection is required for all outside electrical circuits.
- Underwater lights, underground wiring, overhead wiring, and pool pumps / motors have other special requirements.

Fence & Gate Barrier

Swimming pools / spas / hot tubs over 24" deep shall have special barriers;

- Fence height above grade = 48" or more.
- Space below the fence = 2" or less.
- Spindle spacing = 4" in-the-clear between spindles, or less.
- Gates must be out-swing, spring-loaded, self-closing, self-latching, and the latch must be 48" or more above grade.
- If the latch is within 54" of the bottom of the gate, it shall be on the inside the gate, it shall be 3" or more below the top of the gate, and there shall be no openings larger than ½" within 18" of the latch.
- Chain-link fences cannot have more than a 2¼" x 2¼" square spacing.
- Chain-link fences with inserted slats may leave as much as a 1¾" spaced opening.
- If a house wall forms part of the barrier around the pool, either a motorized pool cover or a door alarm is required; see Section AG-1.5.2 – 9.2, or call us for details.
- A 48" tall barrier, with a removable access ladder an up-and-locked-position ladder is an alternative.

Separation From The House; An approved door alarm or an approved pool cover is also required. See above.

Spas & Hot Tubs;

(680-40)

Tornado Shelters;

FEMA-design tornado shelter plans are available in FEMA's "FEMA-320" publication. The shelters are designed for a 250 mph wind load, the impact of a 100-mph 2x4, for 5 square feet of floor area per person, and replacement air of ½ volume per hour.

DON'T forget your emergency supplies; water, food, First-Aid kit, blankets, flashlights, battery-radio, big Channel-lock pliers, leather gloves, medicine, baby supplies / blankets / diapers / formula, spare glasses, etc.

This is a brief description;

- In-Ground Concrete Manholes; There are several in-ground manhole designs.
 - Pre-cast concrete manhole rings, with ladder rungs, concrete top and bottom, 2' or larger vent pipe, and external waterproofing.
 - Pre-cast concrete box, with same features.

- 8" concrete block box, with horizontal trellis wire every other course, and 5/8" vertical re-bar @ 24" O. C. Same features.
- Wood Frame Lean-To;
 - Shed of 2x6 No. 2 joists set at a 45° angle, spaced 12" O. C., sheathed in 14-gage steel, covered with 2 layers of 3/4" plywood secured with 3" screws or 16d nails. Doors to be sheathed in 14-gage steel and two layers 3/4" plywood.
- Concrete Block Basement Room;
 - 8" concrete blocks with horizontal trellis wire, 1/2" rebar 8" O. C., solid-grout, and ceiling of 14-gage steel and two layers of 3/4" plywood.
- Wood Frame Basement Room;
 - Double-2x4 studs, then either two layers 3/4" plywood inside / one layer outside, or 14-gage steel covered over with two layers 3/4" plywood.

(NOTE: IF the 14-gage steel can be touched, it must be grounded with bare No. 6 copper wire to an 8' ground rod, fully driven into the earth.)
See FEMA publication "FEMA-320" for all details.

Treated Lumber

ACQ-treatment, MCQ-treatment, and others have replaced most CCA-treated lumber. The chemicals may be slightly more corrosive to steel. Plain un-galvanized steel bolts may be used if they are 1/2" or larger. Smaller bolts, nails or other fasteners must be hot-dipped galvanized steel, stainless steel, copper, bronze, or triple-coat zinc-polymer steel, or equal.
(Electro-galvanized steel is not allowed.)

Treated lumber is required in the following locations;

- All wood bottom plates that rest on concrete slabs, that in turn rest on earth.
- All wood bottom plates that rest on concrete stem walls, if within 6" of earth (residential).
- All wood bottom plates that rest on concrete stem walls in commercial use (no exceptions.)
- All wood columns that rest on concrete, either inside or outside a structure. (Exception; if the wood column sits 1" or more above the concrete on a metal pedestal.)
- All posts/columns embedded in concrete, where exposed to the weather or where resting on the earth.
- All wooden floor joists within 18" of earth.
- All wooden floor beams and girders within 12" of earth.
- All exterior wood framing, siding and sheathing that is within 6" of earth.
- All exterior joists, decking, girders, posts, poles, columns, etc., exposed to weather.

Ordinary untreated framing lumber will mold and rot away in those locations.

Minimum amounts of chemical must be;

- 1X Fences Boards 0.15 pcf MCQ or 0.25 pcf ACQ
- 2X Deck joists, beams, sill plates (Above-Ground)..... 0.25 pcf
- 4X Fence Posts (In-Ground) 0.40 pcf
- 5X / 6X Pole Barn Posts / Building Posts **0.60 pcf**
(MIGHT BE SPECIAL ORDER)

Un-vented Space Heaters;

(Fuel Gas Code Section 620)

- Unvented space heaters must be tested to meet ANSI Standard Z-21.11.2.
- Cannot be “the sole source of comfort heat in a dwelling unit.”
- Cannot exceed 20 Btu/hour/cubic foot of room space.
- An individual unvented space heater cannot exceed 40,000 Btu/hour.
- Cannot be installed in educational, institutional or public assembly occupancies.
- Must be located in main rooms. Cannot be located in bedrooms, bathrooms, storage closets, etc.
- Must have an oxygen-depletion safety-shutoff-system, which switches off at 18% oxygen or lower, and which cannot be re-adjusted in the house.
- An un-vented fireplace log heater cannot be installed in a factory-built fireplace unless the fireplace has been built and tested to meet UL-127.
- All equipment shall then be installed per the manufacturer’s instructions.

Valley Flashing;

Open valley –

- 24” wide metal, 0.024” aluminum, 26-gage galvanized steel, 1# copper, or other metals (see Table R-905.2.8.2.)
- Two plies of roll roofing to ASTM-D-249 Type II or III, with bottom layer 18” wide, and top layer 36” wide.

Closed valley –

- One ply of 36” smooth roll roofing to ASTM-D-224 Type II or III.
- Any flashings listed above for open valleys.
- Specialty flashings of ASTM-D-1970.

NOTE: Tamko Slate Roll Roofing is not approved for valleys, and Tamko SE Slate Roll Roofing is not approved for valleys.

Tamko **ASTM** Slate Roll Roofing complies with ASTM-D-249 for open / closed valleys.

Tamko **Master Smooth** Roll Roofing complies with ASTM-D-224 for closed valleys.

Vapor Barrier;

A vapor barrier must be installed on the inside (warm side) of all exterior walls. This prevents moisture from penetrating into the wall, where it will condense during cold weather. This trapped moisture will grow mildew and mold, rot out wood framing, and corrode metal. (In well-ventilated ceilings and crawl spaces a vapor barrier is optional.) There are several vapor barrier options;

- PVC film, such as Visqueen, either clear or black, 4 mil, 6 mil or larger, always installed on the inside (warm side) of the exterior walls.
- Fiberglass batts with Kraft paper backing always installed on the inside (warm side) of the exterior wall.
- Vapor barrier paint, always painted on the inside (warm side) of the drywall, as long as the Perm rating of the paint is less than 1.0 Perm.
- Certain foam insulations, if the insulation has been tested by a third-party agency to have a total installed Perm rating of less than 1.0 Perm (depends on thickness.)
- The vapor barrier may be omitted from ceilings and crawl spaces if the ceiling area or crawl space area is well ventilated.
- Kraft paper backing may be omitted from floor joist insulation if the crawl space area is well ventilated. If installed, the Kraft paper backing must be on the top side of the insulation. Use wire batt hangers to hold the fiberglass batts up in place.
- (Perm rating is the number of grains of water vapor that permeates through 1 square foot of wall area in 1 hour, when the water vapor difference across the wall equals 1 inch of mercury. A grain equals 1/7000 pound. (ASTM-E-96))

Ventilation; See Attic Ventilation, Crawl Space Ventilation, Rafter Ventilation.

Vents; See “Plumbing” above for plumbing vents.

Vinyl Siding;

Minimum thickness is 0.035”, and vinyl siding must be labeled “ASTM-D-3679”. Underlayment is optional, but should consist of 15# or 30# felt, or Tyvek or equal. DO NOT use PVC plastic sheeting, as it will trap moisture and rot out the wall.

Water Service Pipe;

Copper, PVC, CPVC and PEX are all allowed. Minimum rated working pressure shall be 160 psi.

An accessible shutoff valve is required inside the structure.

24” minimum bury, on compacted smooth trench, with no large rocks in the backfill.

White PVC is only allowed outside, underground, as the water service pipe.

(White PVC is not allowed inside the structure as water supply piping.)

Tan CPVC is allowed inside structures for both hot and cold water supply piping.

Connection of a water meter to a PVC service line must be by means of a short threaded brass nipple, and a plastic Dresser-type flexible connector (no galvanized iron permitted.)

Water Heaters

Shut-off Valve; A cold-water inlet pipe shutoff valve must be within sight, serving only the water heater.

PEX Tubing; Must be located 18” or more away from all water heaters.

Wiring; Exposed electric water heater wiring must be 4-wire Types AC, BX, MC cable, or THHN in flexible conduit, steel conduit or nonmetallic conduit. (Bare Romex is not allowed exposed outside the wall.) Use a 30-amp circuit breaker with 10-3 WG wire.

Disconnecting Means; Appliances over 300 watts, such as all water heaters, shall have an electrical disconnect within sight. (NEC 422.31)

T&P Relief Valve; Install a T&P relief valve, with ¾” or larger discharge piping, leading to a floor drain or to a drain pan. The pipe end must be exposed, and cannot have a valve, threads, or a trap. The pipe may drain to a funnel for visibility, then elsewhere.

Drain Pan; Required on wood frame floors. 1½”-deep, 24-gage galvanized steel pan, or plastic pan, with a ¾” drain pipe draining to either (1) outside the building, terminating 6” – 24” above grade, (2) to the sewer system with a trap, or (3) to a floor drain. (Optional on commercial concrete floor slabs, garage floor slabs, etc.)

Drain Pan Materials;

- Gas-Fired Water Heaters; Use only 24-gage galvanized metal drain pans.
- Electric Water Heaters; Either 24-gage galvanized metal or plastic drain pans.

Locations;

- Gas-Fired Water Heaters Inside; DO not locate in bathrooms, bedrooms, or in the adjoining closets. (Direct-vent water heaters or electric water heaters may be located there.)
- Gas-Fired Water Heaters In Garages; In enclosed garages they must be elevated 18” or more above the floor, and must be protected from impact by bumpers, concrete-filled pipe bollards, or framed construction.
- Attic Locations; Provide a minimum 22” x 30” hatchway, no longer than a 20’ passageway, with 24”-wide solid flooring, and a minimum 30” x 30” service floor area in front of the water heater. Beware of freezing.

Windows;

See “Bedrooms” above for specific requirements.
Windows must be labeled to conform to AAMA / NWWDA 101 / I.S.2.

Workmanship;

Work must be plumb, level, straight and square.
Foundations should be plumb, level, straight and square within a small fraction of an inch.
Walls must be plumb.
Top and bottom plates must run string-line straight.
Hips and valleys must run straight.
Framing cuts in lumber must be cut flush and straight.
Rafter plumb cuts must lie flush against the full width of the ridge. There should be no gap, but if there is any gap it must be at the top point or long point; the bottom of all rafter cuts (the short point) must bear against the ridge.

Plumbing must be cut square, de-burred and clean. Cleaner-primer must be used.
The cut-off ends of electric wire must wrap around screws in the same direction as tightening the screw; clockwise.

Disclaimer;

This handout is intended as a guide to some 2000 International Residential Code requirements, and various other Monett City Code requirements. This is an informational guide only, is incomplete, contains errors, and in the interest of space this handout does omit many items.

The complete regulations are contained in the Monett City Code, and the 2000 International Residential Building Code, both available for review at Monett City Hall or at the Barry-Lawrence County Library. Full compliance with the complete Codes is required.

This is also the best way to build a high-quality house,
to give the owner the best value for the money.

City of Monett

217 5th Street

Monett, MO. 65708

417-235-5306, 235-4635 fax, 236-2990 mobile
george.rausch@cityofmonett.com

January 9, 2002

To Monett Area Contractors & Developers
Subject; Final Inspections

There has been a problem in Monett for some time now; many contractors or builders are not calling for inspections, including final inspections. Many times even if we do perform final inspection, the final list is not getting finished. Certificates of Occupancy are not being written in some cases.

The system has been abused by a few contractors and we are sorry it has come to this, but now everyone must suffer the consequences. Any contractor who finishes construction and allows the owners to move in without inspection is in violation of the Monett City Code.

From now on, the Monett City Utilities Department WILL NOT transfer utilities over to the new homeowners or the new occupants, unless we have preformed the final inspection, all work has been completed, and a Certificate of Occupancy has been issued.

It is possible that some future cases will be referred to the Monett City Attorney.

Call 235-5306 or 235-3300 24-hours in advance 3 times to schedule inspections.

- Initial / Footing Inspection
- Open-Wall Inspection
- Final Inspection

DO NOT conceal / cover anything unless you have called for inspection, and have been given approval to proceed.

Thank you for your cooperation.

George Rausch

Wade Ennes

City of Monett

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February 8, 2002

Monett Area Contractors

I'm sending two handouts;

Garages and Outbuildings

Pay particular attention. Some of you are forgetting to install ground rods and ground wires, and some of you are building without a thickened edge. Some of you even forget the anchor bolts.

2000 IBC Changes

There've been a few additions.

Please pay attention to each item, and call if you have any questions. Thanks.

George Rausch

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February 8, 2002

The City of Monett has recently adopted the 2000 International Building Codes and the 2000 International Residential Code. The Residential Code volume is for sale here at City Hall, and a contractor's handout is now being prepared to highlight the more significant changes. This is a preliminary list of some of the changes (**in bold.**)

- **Arc-fault circuit breakers** are now required for all bedroom branch circuits.
- **4-wire-electrical-circuits and 4-prong plugs-&-cords** are now required for kitchen ranges, clothes dryers, counter-top cooking units, and wall-mount ovens. (This separates the ground conductor from any neutral conductor current.)
- Ground-fault protection is now required for **all outlets on kitchen countertops, all outlets in crawl spaces, in unfinished basements, and on rooftops**, as well as all outlets in bathrooms, garages, and outdoors.
- **Smoke alarms** must now be installed **inside all the bedrooms**, as well as in the immediate vicinity outside all bedrooms, and on each floor. Smoke alarms shall be 120-volt with a 9-volt battery back-up, and shall all be interconnected.
- **Smoke alarms shall be installed throughout every house**, as specified above, whenever any house is added onto or remodeled when a building permit is written.
- **Anchor bolts** shall be 12" from ends of walls, and **every 6' O. C. thereafter**.
- **Drywall in an attached garage can be ordinary ½" drywall**. The requirement for 5/8" Type-X Fire-Proof drywall in garages have been eliminated.
- **Water-proof drywall (green-board) is no longer required in bathrooms** except behind ceramic tile, when within 6' of the bath-tub floor or shower floor. (However it is always still recommended throughout bathrooms and wet areas.)
- **Emergency escape windows are now required in all basements**, whether or not the basement contains bedrooms. (An alternative would be **two** sets of stairs, one going directly outside.) Windows shall be same size as regular emergency escape bedroom windows. **Window wells** are also required outside all such basement windows.
- **No unlicensed/unregistered/dilapidated motor vehicles** are allowed outside.

2000 International Residential Code books are for sale for \$44.00, plus \$2.96 tax. I have one left at this time. There is a lot of very useful information on framing, lumber spans, steel framing, concrete, steel reinforcing, etc.

George Rausch
Building Inspector

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January 14, 2003

To Lumber Yards, and Plumbing Supply Stores

Would you please let all customers know that S-traps are always Code violations in new construction. They may be used only when replacing existing S-traps in older homes.

P-traps are required for all new construction.

Also, let customers know that sanitary tees may only be used in vertical position. They can never be used in horizontal drain lines.

Thanks.

George Rausch

