

The roof joists' span shall not exceed those tabulated on the following table:

Size	Spacing	Grade no. 1	Grade no. 2
2 × 6	12"	13'0"	10'6"
2 × 6	16"	11'6"	9'6"
2 × 6	18"	10'0"	8'6"
2 × 6	24"	9'0"	7'6"
2 × 8	12"	18'0"	14'6"
2 × 8	16"	16'0"	12'6"
2 × 8	18"	14'6"	11'6"
2 × 8	24"	13'0"	10'6"
2 × 10	12"	23'0"	19'6"
2 × 10	16"	20'0"	16'6"
2 × 10	18"	18'6"	15'0"
2 × 10	24"	16'6"	13'6"
2 × 12	12"	28'6"	24'6"
2 × 12	16"	24'6"	21'6"
2 × 12	18"	22'6"	19'0"
2 × 12	24"	20'6"	17'6"

Roofing materials, rafter spacing and plywood thicknesses. Roofing materials, rafter spacing and plywood thickness shall be according to the following table:

Roofing Material	Rafter Spacing (inches)	Plywood Thickness (inches)
Wood and asphalt shingles	18	3/8
	16	5/16
	24	1/2
Slate, tile and asbestos, cement	18	1/2
	16	1/2
	24	5/8
Flat roofs	18	1/2
	16	3/8
	24	5/8

Electrical Requirements

Temporary power service:

- #8 copper ground is required from base to grounding rod.
- Receptacles are to be GFCI protected.
- Panel is to be a weatherproof enclosure with interior cover around breaker.

Permanent power service:

- #6 or #8 copper ground from grounding rod through meter base to panel board. The ground rod shall be copperweld or copper clad, no smaller than 5/8" by 6feet long, driven at least 12 inches below ground level and a distance of at least 2 feet outside of the foundation. The Ground wire shall run underground from the foundation to the grounding rod.
- Water lines shall not be used as ground.
- The service entrance shall be no smaller than 3-wire #2 copper types R or T or the equivalent. No more than 6 feet of unprotected service entrance cable shall be inside of the building without an over current protected main disconnect.
- The service shall have a minimum capacity of 100 amperes and shall terminate in an over current protected breaker main disconnect.
- Panel board is to have a cover shield.
- All underground service shall have an over current protected disconnect before entering the ground. Conductors can be direct burial type in 6 inches of sand, but must be mechanically protected where exposed at the pole and the house with schedule 80.
- The electric ditch is to be minimum 24" deep.
- Conduit in the ditch must be glued and water tight.
- To prevent condensation, all masts leading from the roof into the heated area shall be sealed around the conductors.
- Contractor is to supply meter base.
- Meter base from ground level must be between 5 and 5-1/2 feet.
- All meter bases are to have ground wire looped through it and then run to the panel.
- All conductors from city power source to the meter base and all conductors from meter base to panel are to be marked as follows.
 - Neutral legs are to be marked with white tape.
 - Hot legs are to be marked with red tape.
- Call City utilities for work order to inspect trench before backfill.

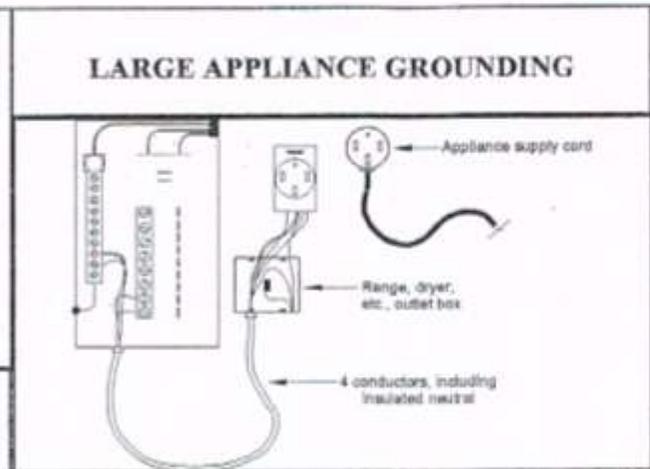
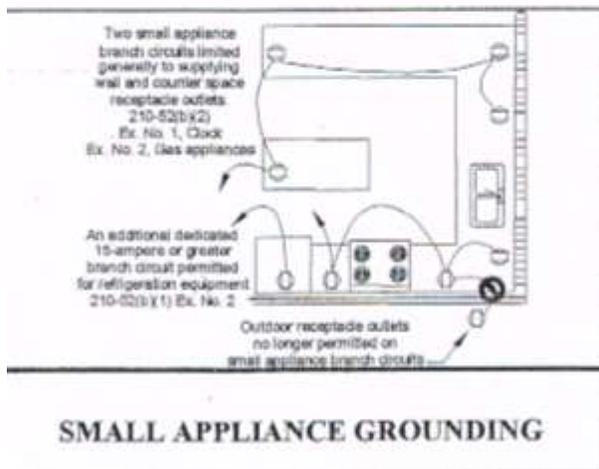
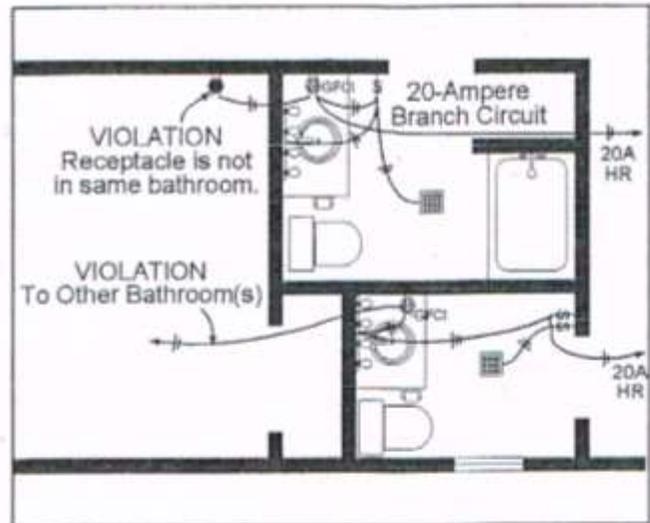
Electrical Requirements:

- Applications shall be made in writing to city utilities for service.
- **All wiring shall be no smaller than #12** and shall be of the approved grounded type or equivalent.
- All branch circuits, except special circuits, shall be protected by no more than a 20A rated device.
- Special circuits must be load matched and properly protected.
- All receptacles shall be self grounding and have a minimum rating of 15A.
- All 125 volt, single phase, 15 & 20 amp receptacles in these areas are to be GFCI protected: bathrooms, garages, crawl spaces, unfinished basements, kitchen where the receptacles are installed to serve the countertop services, laundry, utility, wet bar sinks where the receptacles are within 6 feet of the outside edge of a sink, boathouses, outlets in general that may be exposed to water, and outlets servicing outside areas. EXCEPTION: Outdoor receptacles not readily acceptable.
- Outside receptacles are not allowed on kitchen small branch circuits or bathroom GFCI circuits
- All 120 volt, single phase, 15 & 20 amp branch circuits supplying outlets installed in dwelling unit bedrooms shall be protected by a listed arc-fault circuit interrupter.
- One 20 Amp (#12 wire) branch circuit shall be provided to supply the laundry area. This circuit shall have no other outlets.
- Receptacles are to be computed at a load of 1-1/2 Amps each and limited to 80% of the rating. EXAMPLE: 15A at 80% = 12A (1440W). which limits receptacles to 8. (20A would be 10 receptacles).
- Large appliance (220V) must have 4 conductors (including an insulated neutral).
- All electrical wiring must have nail protection (shield plates) across all studs and top and bottom plates where wires pass within 1-1/2" of the edge {NEC 300-4(a)(1)}.
- A minimum of one lighting circuit shall be provided for each 500 square ft of living area.
- Pull chain receptacle may be utilized except in closets.
- Stairway lights must be controlled by a three way switch.
- Each outside entrance shall have a light installed. Weatherproof fixtures must be used where otherwise not protected.
- See attached diagrams for additional requirements:

BATHROOM RECEPTACLE CIRCUIT(S)- Dwelling

Section 210-11(C)(3) Exception

Where a 20-ampere circuit supplies a single bathroom, outlets for other equipment within the same bathroom can be supplied in accordance with Section 210-23(a)



Meter/Main Hardware

Fig. e6 • Panel Clearances

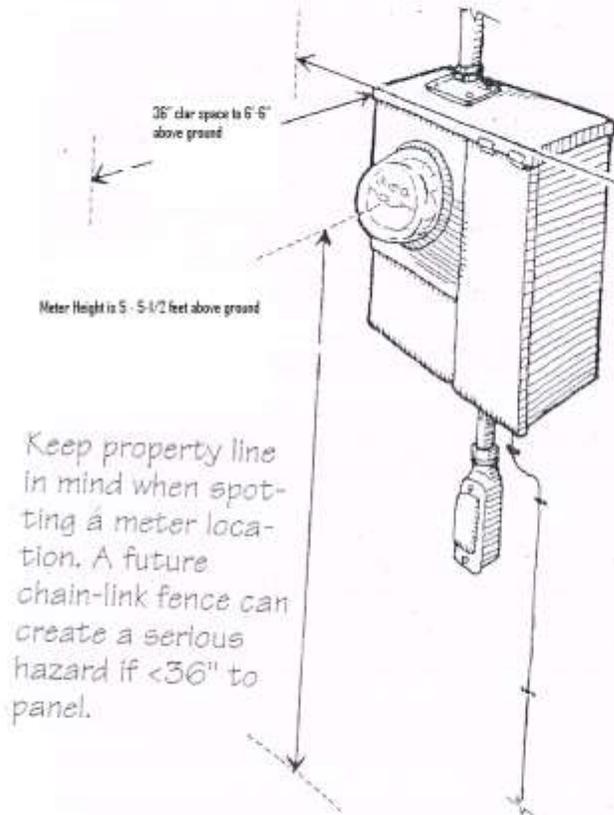


Fig. e7
Grounding Locknut

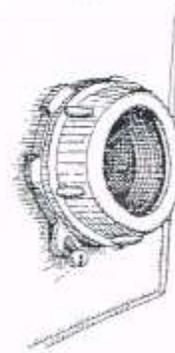
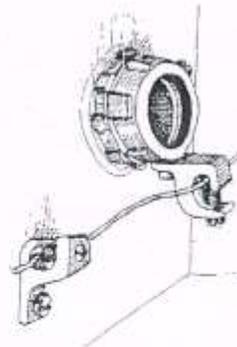


Fig. e8
Bonding Bushing



With knock-outs remaining, use bonding locknut and jumper.

Bonding

- Bond each end of metal raceway enclosing GEC Figs. e5 & e6 [3510.2] {250-64e}
- Threaded fittings, bonding bushings, or grounding locknuts (no standard locknuts) on supply side of service Figs. e7 & e8 [3509.4] {250-94}
- Bond all metal piping, hot, cold, and gas [3509.6,7,8] {250-104}

ELECTRICAL

CONDUCTOR TYPES AND SIZES		
COPPER	ALUMINUM	RATING IN AMPS
1/0	2/0	100
1/0	2/0	110
1/0	2/0	125
1/0	2/0	150
1/0	3/0	175
2/0	4/0	200
3/0	250 KCMIL	225
4/0	300 KCMIL	250
250 KCMIL	350 KCMIL	300
350 KCMIL	500 KCMIL	350
400 KCMIL	600 KCMIL	400

Plumbing Requirements

- Applications shall be made in writing to city utilities for service.
- Before installing a service extension and providing water, the city may require the applicant to pipe their home and be ready to accept service.
- The service shall serve no more than one residence.
- All service lines shall be located 36” below the ground, and cannot be laid in sewer or electric ditches. The water trench shall be separated by at least 18” horizontally of undisturbed earth from other trenches.
- A separate connection fee is required for water hook up.
- *Services.* The city will install all water service pipes from its mains to the meters on property abutting the right-of-way along which the main is installed insofar as its current financial responsibilities, obligations and conditions will permit, and insofar as adequate water pressure is available at the point of delivery requested by the applicant or water user. The service pipe shall not be less than three-quarter of an inch in size, and the city will also install and pay for the city’s main connection, meter and meter setting. The meter will be set at the point on the water user's premises designated by the city. The charge for services to be made by the city shall be that amount specified in the municipal code, or as otherwise provided by the city, but in no event shall it be less than the cost to the city. {98-36-e}
- Any repairs or maintenance necessary to the service pipe or any pipe or fixture in or upon the water user's premises shall be performed by the water user at his sole expense and risk. Service pipes must be kept and maintained in good condition and free from all leaks, and for failure to do so the water supply may be discontinued. The city shall in no event be liable for any damage done or inconvenience caused by reason of any break, leak or defect in, or by water escaping from, service pipes, or from fixtures on the premises of the owner or water user. The water user shall be billed in the usual manner for the cost of all such water according to the rate schedule of the city, as provided for in the municipal code.{98-36-k}
- New plumbing work and parts of existing systems affected by new work or alterations shall be inspected to ensure compliance with code requirements
- A plumbing or drainage system or any part thereof shall not be covered, concealed, or put into service until it has been tested, inspected and approved.
- Each dwelling unit shall be provided with an accessible main shut off valve near the entrance of the water service. The valve shall be of the full way type.

- Equipment used for heating or storing of hot water shall be protected by a relief valve and shall have a discharge tube on relief valve to within 6" of floor.
- There shall be a clean out near the junction of the building drain and building sewer. Such clean outs may be installed outside of the building within 5 feet of the building wall.
- The accessible minimum clearance to the clean out shall be 18" on 3" or larger pipes and 12" on smaller pipes.
- Horizontal draining piping shall be installed in a uniform alignment at uniform slopes not less than $\frac{1}{4}$ " per foot for 3" diameter pipes or less, and not less than $\frac{1}{8}$ " per foot for larger pipes.
- Building shall have at least one soil stack running from the building drain up through the building, with the stack terminating outdoors above the topmost branch.
- Vent stacks shall connect full size at their base to the drainage system, below the lowest fixture branch.
- All vent pipes shall be sloped and connected so as to drain back to the soil or waste pipe by gravity.
- All drain, waste venting, and supply piping must have nail protection (shield plates) across all studs and top and bottom plates where these pipes pass within 1-1/2" of the edges. {IPC305.8}
- All pipes going under the footing shall be encased in gravel, and all pipes going through the footing shall be in a sleeve.
- All bath tubs and showers shall be equipped with control valves of the pressure balance, thermostatic mixing, or the combination pressure balance/thermostatic mixing valve types with high limit stops, set to a maximum temperature of 120 degrees F.
- Floor drains shall have a waste outlet of not less than 2" in diameter with a removable strainer
- Whirlpool bathtubs shall be installed with an access panel or door to provide access to the pump for repair and or replacement.

Miscellaneous Requirements:

Attic Ventilation:

- Enclosed attics and rafter spaces where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space.
- The net free ventilation area shall not be less than 1:150 of the area of the space ventilated, except that the area may be 1:300 provided that at least 50% of the required ventilating area has ventilators located in the upper portion of the space to be ventilated at least three (3) feet above eave or cornice vents

Attic Access:

- A readily accessible attic access framed opening, not less than 22 inches by 30 inches, shall be provided to any attic area having a clear height of over 30 inches.

Attached Garages:

- Openings from a garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residential area shall be equipped with either solid wood doors not less than 1-3/8" or 20 minute fire rated doors or equivalent. No window is allowed in the door.
- The garage shall be completely separated from the residence and its attic area by means of 1/2" type x gypsum board or equivalent applied to the garage side.

Landings:

- A minimum 3 foot x 3 foot landing shall be required at each side of an egress door. The floor shall not be more than 1-1/2" lower than the top of the threshold. EXCEPTION: The landing at the exterior of an exterior doorway shall not be more than 7-3/4" below the top of the threshold.
- Stairways and shall have a 3 foot x 3 foot landing at top and bottom.

Stairways:

- Stairways shall not be less than 3 feet in clear width, and the minimum headroom shall not be less than 6'8". The maximum riser height shall not be more than 7-3/4" and the minimum tread width shall not be less than 10". The greatest riser height in any set of stairs shall not exceed the smallest by more than 3/8".
- Handrails shall be provided on all stairs having four or more risers. Handrails shall be continuous the full length of the stairs, without interruption. The ends shall return to the adjacent wall or terminate at newel posts or safety terminals.

- Handrails are to be provided on at least one side of the stair and on the outside radius of spiral or wider stairs. Handrails projecting from a wall shall have a space of not less than 1-1/2" between the rail and the wall. A 34" minimum and 38" maximum height from the nose of the stair tread is required.

Guard Rails:

- Guard rails shall be provided on porches, balconies, or raised floor surfaces located more than 30" above the floor or finish grade below. And shall be at least 34" in height. Openings in vertical and horizontal members shall be such that a 4" sphere cannot pass through. Where the guard is for a stair case, a 6" sphere shall not be able to pass through the triangle formed by the tread riser and bottom rail.

Ramps:

- All egress ramps shall have a maximum slope of one vertical in eight horizontal units (12.5% slope).
- A minimum 3' x 3' landing shall be provided at doorways and where the ramp changes direction.

HVAC:

- The installation of all HVAC appliances shall conform to the conditions of their label and the manufacturer's installation instructions. **The manufacturer's installation and operating instructions shall remain attached to the appliance.**
- All appliances located in a garage or basement that generate a glow, spark, or flame capable of igniting flammable vapors shall be installed so that their burners, burner ignition devices, heating elements and switches are at least 18" above the floor level.
- Appliances located in a garage shall have combustion air taken from, and products of combustion discharged to, the exterior of the garage.
- Doors on a furnace room that open into a garage shall have a threshold or a sweep and be 1-3/8" thick solid wood, 20-min fire rated or equivalent.
- When equipment is located in an attic or crawl space, an opening or passageway 20" x 30" minimum is required for access and servicing.
- When equipment is located in an attic or crawl space solid flooring shall extend a minimum of 30 inches in width along the control side of the equipment. There shall also be a 30 inch wide by 30inch high clear working space on all sides.
- When equipment is located in an attic or crawl space a permanent electrical outlet and light fixture shall be provided near the equipment which shall be operated by a switch located at the passageway opening.
- Gas appliances and equipment shall be connected by rigid pipe, tubing, or flexible connection. A union shall be installed between the shut off valve and appliance.

- Each connection shall have its own shut off valve located within 4 feet of the appliance. The shut off valve shall be accessible.
- Zero clearance fireplaces, fireplaces, and stoves shall be installed according to the manufacturer's installation instructions.
- Chimneys and vents shall terminate at least 2 feet higher than any portion of the building within 10 feet, but shall not be less than 3 feet.
- The horizontal run of an un-insulated connector to a natural draft chimney shall not exceed 75% of the height of the vertical portion of the chimney above the connection point.
- The horizontal run of an insulated connector to a natural draft chimney shall not exceed 100% of the height of the vertical portion of the chimney above the connection point.
- Combustion Air: volume of space where a furnace is located shall not be less than 50 cubic feet per 1,000 BTU/h. If the space does not meet this requirement, two openings one within 12" of the top, and one within 12" of the bottom are required. Each will have an area equal to 1 square inch for each 1,000 BTU/h.

Bathroom Ventilation:

- Bathrooms, water closets, and other similar rooms shall be provided with aggregate glazing area in windows of no less than 3 square feet, one half of which must be open able. EXCEPTION: The glazed areas shall not be required where artificial light and an approved mechanical ventilation system capable of producing a change of air every 12 minutes are provided. Bathroom vents shall be exhausted to the outside.

Clothes Dryer exhausts:

- Dryer vent systems shall be independent of all other systems and shall convey the products of combustion and moisture to the outdoors. The maximum length of a 4" diameter exhaust vent shall not exceed 25 feet from the dryer location to the wall termination. A reduction of 2.5 feet for each 45 degree bend, and 5 feet for each 90 degree bend shall apply

Residential range hoods:

- Residential range hoods shall exhaust to the outside with an independent system.

Safety Requirements

Smoke detectors:

- Smoke detectors shall be installed in each sleeping room.
- Smoke detectors shall be installed in every room in the path of the means of egress.
- At minimum each story shall have 1 smoke detector including basements.
- All detectors shall be interconnected so that if one alarm activated, then all alarms activate.
- Smoke detectors shall receive their primary power from the building wiring and shall have a battery backup.

A-8-1.2.4 Location and Type of Devices.

(a) *Smoke Detector Mounting — Dead Air Space.* The smoke from a fire generally rises to the ceiling, spreads out across the ceiling surface, and begins to bank down from the ceiling. The corner where the ceiling and wall meet is an air space into which the smoke could have difficulty penetrating. In most fires, this dead air space measures about 4 in. (0.1 m) along the ceiling from the corner and about 4 in. (0.1 m) down the wall, as shown in Figure A-8-1.2.4(a). Detectors should not be placed in this dead air space.

Figure A-8-1.2.4(a) Example of proper mounting of detectors.

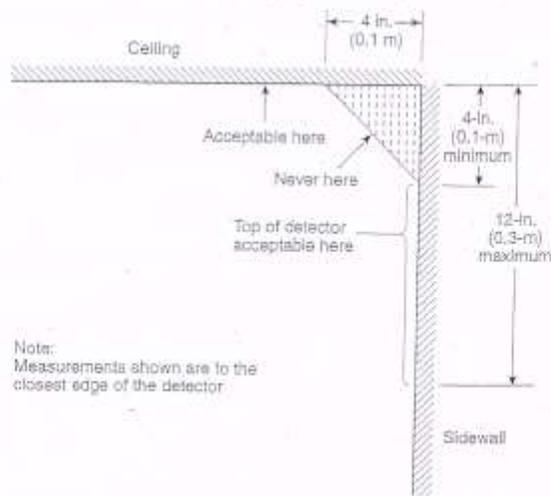
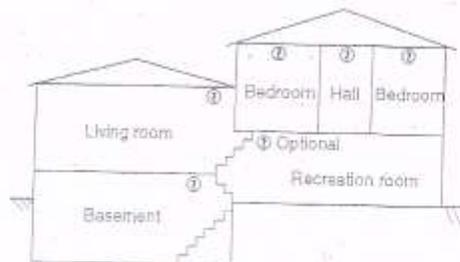


Figure A-8-1.4.1 Split level arrangement.



Emergency Exit:

- All egress or rescue windows from sleeping rooms must have a minimum net clear opening of 5.7 square feet .EXCEPTION: Grade floor windows may have a net clear opening of 5 square feet.
- The minimum net clear opening height shall be 24 inches.
- The minimum net clear opening width shall be 20 inches.
- Where windows are provided as a means of egress, they shall have a sill height of no more than 44 inches above the floor.

Glazing:

The following shall be considered specific hazardous locations for the purpose of glazing:

- Where the area of a single pane is greater than 9 square feet and the bottom edge is less than 18 inches above the floor and the top edge is greater than 36 inches above the floor, and there is a walking surface within 36 inches horizontally of the glazing.
- Glazing required in any part of a building enclosing hot tubs, showers, whirlpools, saunas, and bath tubs where the bottom edge of the glazing is less than 60 inches above the drain.

Miscellaneous:

- All work is to be performed in a manner as to not be a nuisance to others. The City of Ava has a noise ordinance that restricts from 10p.m. to 8a.m.
- All debris is to be disposed of properly **NO OPEN BURNING IS ALLOWED.**
- If demolition of an existing structure is required, a Demolition Permit is required. Receipts for proper disposal of demolition debris are required to be submitted to the building department.
- Inspections should be scheduled 24 hours in advance by calling 417-683-5516.

Disclaimer: The information contained within is subject to change. Governing rules of City ordinances and adopted codes will override any information in this handout.