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HOMEOWNER PERMITS AND ELECTRICAL WIRING GUIDE

This pamphlet is only a guide. It describes methods of installation that have been tried and tested and which have been successful over a number of years. Other methods of wiring a home can be used, but the installation must meet the requirements of the Canadian Electric Code.

Who is Eligible?
The owner of a single-family dwelling who:

- Lives in the dwelling, owns the property, and
- Will complete the wiring him/herself.

Homeowners need at least a basic knowledge of electric wiring:
The Electrical inspection Section strongly recommends that Homeowners without a basic knowledge of electrical wiring hire a qualified electrical contractor (who is responsible for obtaining the permit).
Due to the hazards involved, homeowners who are not certified electricians cannot do the following work:

- Installing the pool/hot tub grounding and connecting the electrical equipment for permanently installed swimming pools/hot tubs; **OR**
- Installing or making changes to solar or photo voltaic systems; **OR**
- Any work to be completed in an apartment style condo.

When Homeowner Permits will not be issued
Homeowner Electric Permits cannot be issued if:

- Proof of ownership of the house is not presented.
- The home is or will be used for rental purposes.
- The wiring has been concealed (walls have been covered with drywall), and the homeowner does not want to expose the wiring (remove all drywall/insulation).

Permit Conditions:
If work within the scope of this permit has not commenced within 180 days of the date of issue, or if the work is suspended or abandoned for a period of 180 days prior to completion, the permit may be cancelled per the Alberta Safety Codes Act. No further work is to commence unless you, or a licensed electrical contractor, have first obtained a new permit.

Should you require a time extension for this permit, you must make written application to Building Regulations prior to permit expiry.

Any permits fees charged are non-refundable, and entitle the permit holder to two inspections only. Additional inspection fees will be charged, in accordance with the Electrical Installation and Inspection Bylaw, and billed to the permit holder in instances where additional inspections are completed.

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When Permits can be cancelled
Homeowner Electric Permits can be cancelled if, at the discretion of the Safety Codes Officer (Electrical Inspector), the installation could be hazardous to life or property.

The homeowner will then be responsible to hire a qualified licensed electrical contractor to complete the electrical installation, and the electrical contractor will obtain a separate electrical permit to complete the work.

Requesting Inspections:
Please notify Planning & Development Services for ALL inspection phases of construction. Rough-in inspection must be performed on a homeowners permit.

How to request an inspection:

- Phone (403) 529-8208 to make your inspection request on our 24-hour automated line. Call received prior to 1:00 PM can book inspection for the following business day.
- Call for inspection at least one business day in advance.
- Arrange for access to the premises for the Safety Codes Office. Note: Someone over the age of 18 must be present for an inspection on occupied premises.
- Inspections are available Monday to Friday, with all statutory holidays excluded.
- Appointments or time specific inspections are not possible.

The number and types of inspections vary according to the work you are completing but may include the following:

1. **Underground Inspection**
   - Call for this inspection once the underground installation is complete.
   - Do not backfill until the Safety Codes Officer (Electrical Inspector) has approved the installation.
   - FOR GARAGES, please coordinate the underground and rough writing inspections, if possible. Electrical wiring in the trench is required to be buried to a min depth of 18” if conduit is used, 24” if direct buried.
2. **Rough Wiring Inspection**

   This inspection requires:
   - All electrical boxes to be secured in place, flush with the finished wall or ceiling.
   - All wiring to be installed in the electrical boxes and secured to the building structure (see diagrams).
   - All grounding conductors to be terminated in electrical boxes and splices completed (see diagrams).
   - All recessed lighting fixtures (unless fixtures are “retrofit” type) shall be installed and wiring terminated in fixture junction boxes.
   - Do not install insulation or vapor barrier (if it is required) until the Electrical Inspector has approved the installation.
   - Wiring may be installed in the panel (turn the main breaker off before the panel-board is covered). Ensure the cables installed are isolated from the energized equipment inside the pane-board and the covers are re-installed BEFORE turning the main breaker back on.

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Please note: Do not secure plugs, switches, and lights to outlet boxes on first inspection. If you wish to terminate the devices and surface mount light fixtures to the wires for this inspection, do not fasten to the electrical boxes. For heavy or large light fixtures that require additional support, please do not install prior to the final inspection.

3. **Final Inspection**

   CAUTION: Before entering the electrical pane, be sure the main switch is OFF.

   - All devices should be connected and secured to outlet boxes.
   - All branch circuits should be installed in the panel and terminated on the circuit breakers.

Deficiencies:

The deficiencies noted by the Electrical Safety Codes Officer need to be corrected and re-inspected prior to the construction project proceeding (unless instructions are otherwise given by the Electrical Safety Codes Officer).

Cautionary Notes:

- When developing the basement or renovating existing areas, do not design the development so that panel-boards are placed in clothes closets, bathrooms, stairways or any other area where moisture or location may present a hazard. These areas are not acceptable and may result in relocating the panel-board under a separate permit.
- Ensure that a minimum 1 m (39 inches) clearance is maintained from the face of the panel-board.
- Ensure that circuits are not left in an energized state during construction when children or persons requiring constant care are present, unless all light fixtures, devices and cover plates have been installed.

General Rules for Non-Metallic Sheathed Cables:

- Use only copper conductors. Use 14 AWG copper wires for general purpose wiring (lights and receptacles).
- Provide over-current protection of 15 amperes for general purpose circuit (lights and receptacles).
- Install a maximum of 12 outlets on a general purpose circuit (lights and receptacles).
- Run cable as a loop system in continuous lengths between outlet boxes, junction boxes, and panel boxes. Make joints, splices and taps in the outlet boxes.
- Where cables pass through a hole in a joist or stud, bore the hole 32 mm (1.25 inches) back from the face of the stud or joist, or protect the wires from driven nails by using metal plates.
- Secure wires every 1.5 m (five feet) when run on the sides of joists or studs and 300 mm (12 inches) from each outlet box.
- Staples are only rated for a certain number of cables – ensure proper staples are used.
- Protect wires that are exposed within 1.5 m (five feet) of the floor.
- Keep cables a minimum of 25 mm (one inch) from heating ducts.
- Where cables run through or along metallic studs, joists, sheathing or cladding, ensure that the cables are protected from mechanical damage both during and after installation. Ensure cables are protected by an insulation insert secured to the opening in the stud.

- Protect cables from mechanical damage and from driven nails and screws when they are installed behind baseboards or horizontally behind cupboards.
- Where communication cables are to be installed in joists or studs, maintain a minimum separation of 50 mm (two inches) from any power non-metallic sheathed cable.
- Ensure that a neutral is present in every switch box.

Outlet Boxes:

- Boxes over 4 inches in length must be secured on two sides.
- Set outlet boxes flush with the finished wall or ceiling and secure them to studs or joists.
- Ground all outlet boxes (see diagram 3 on page 8).
- Ensure all junction boxes are accessible after installation.
- Leave at least 150 mm (6 inches) of wire out of each outlet box for joints and connection of equipment.
- Surround the outlet boxes with a moisture resistant barrier when the wall or ceiling requires a vapour barrier.
- Houses built to the Energy Code require boxes in the exterior envelope to have backing for poly joints.

The maximum number of conductors permitted in outlet boxes are:

Common Types	Dimensions	Capacity ml (cu-in)	#14	General Usage
Octagonal	4 x 1 ½”	245 (15)	8	light or junction
Square	4 x 1 ½”	344 (21)	12	junction
Rectangular	3 x 2 x 1 ½”	131 (8)	3	switch or plug
	3 x 2 x 2”	163 (10)	4	switch or plug
	3 x 2 x 2 ½”	204 (12.5)	5	switch or plug
	3 x 2 x 3”	245 (15)	7	switch or plug

Note: When a dimmer switch, timer, or GFCI receptacle is used in an outlet box, reduce the number of permitted conductors by three.

Light Fixtures:

- Install 3-way switches according to diagram 4 on page 8.
- Light fixtures that are installed in closets must have a protected lamp.

Lighting:

- Three-way switching is required on stairway lighting, when a stairway has four or more risers AND is leading to a finished area or to an outside entrance. Refer to diagram 4 on page 8 for a simple three-way switching wiring diagram.
- Switches cannot be located within 500 mm from a bathtub or shower. Switches located within 1 m of a bathtub or shower shall be protected by a ground circuit interrupter of the class “A” type.

Smoke Alarms & Carbon Monoxide Alarms:

- Install smoke alarms in every bedroom, on each floor level, including basement.
- Install carbon monoxide alarms on each floor level and within 5 m of bedrooms.
- Smoke alarms and carbon monoxide alarms are to be powered from a branch circuit containing lighting.
- Smoke alarms and carbon monoxide alarms are not to be installed on a circuit protected by a Ground Fault Circuit Interrupter or Arc Fault Circuit Interrupter.
- When more than one smoke alarm is being installed, interconnect the smoke alarms with 14/3 NMD-90 cable and connect according to manufacturer's instructions.

Note: The Alberta Building Code permits only wired-in smoke and carbon monoxide alarms (Alberta Building Code – Article 9.10.18.3).

Garages:

- Install the underground wiring to a garage according to Table 1 on page 7 and Diagram 2 on page 8.
- Provide at least one separate circuit to the garage and one duplex receptacle for each car space. The lighting may come off this circuit.
- One receptacle shall be provided for each garage door opener and be located within 1 m (39 inches) of the opener.
- Using the same trench for gas sub-service lines and electrical power conductors is permitted only when 12" of separation is provided between them.

Electric Dryer:

- Provide a 30 Amp circuit breaker with a 2-pole common trip.
- Use #10 copper wires (NMD-90).
- Use a 30 Amp receptacle rated 125/250 volt (14-30 R).

Electric Range:

- Provide a 40 Amp circuit breaker with a 2-pole common trip.
- Use #8 copper wires (NMD-90).
- Use a 50 Amp receptacle rated 125/250 volt (14-50 R).

Receptacles (General):

- Install duplex receptacles in the walls of every finished room or area, so that no point along the floor line of any usable wall space is more than 1.8 m (6 feet) horizontally from a receptacle. The usable wall space includes a wall space of 900 mm (3 feet) or more in width, but doesn't include doorways, windows that extend to the floor, fireplaces or other permanent installations that would limit the use of the wall space. Ground all receptacles (see sketches).
- Connect the receptacles so that the silver terminal screw (or the screw identified as "white") on the receptacle is connected to the white circuit wire; the brass terminal screw (or the screw identified as "black" or "hot") on the receptacle is connected to the black (or red) circuit wire.
- Connect only one wire under each terminal screw. Do not use the terminal screws and the "quick connect."

- Receptacles shall be of the tamper resistant type (except receptacles dedicated to stationary appliances (e.g. microwaves, washing machines) or receptacles located above 2 m from the floor).
- Each branch circuit supplying 125V receptacles rated 20 amps or less shall be protected by a combination type arc-fault circuit interrupter, except for branch circuits supplying a bathroom receptacle, fridge, counter and island/peninsula receptacles in a kitchen and a sump pump receptacle. The sump pump must have a single receptacle and be labeled as sump pump only. The fridge and counter receptacles in a kitchen are the only ones that do not require arc fault protection. Any other fridges/counter receptacles require AFCI protection.
- Receptacles installed in a dining area must be on a designated circuit supplying only those receptacles.

Kitchen Receptacles:

- Provide a sufficient number of receptacles (15A split or 20A T-slot) along the wall behind counter work surfaces (excluding sinks, built-in equipment, and isolated work surfaces less than 300 mm long at the wall line) so that no point along the wall line is more than 900 mm from a receptacle measured horizontally along the wall line.
- Receptacles within 1.5 m of sinks (wash basins complete with drain) shall be protected by a ground fault circuit interrupter.
- Provide at least on receptacle (15A split or 20A T-slot) installed at each permanently fixed island counter space with a long dimension of 600 mm or greater and a short dimension of 300 mm or greater.
- Provide at least one receptacle (15A split or 20A T-slot) installed at each peninsula counter space with a long dimension of 600 mm or greater and a short dimension of 300 mm or greater.
- Refrigerators, dishwashers, microwaves, freezers, garburators, jet tubs, electric fire places, furnaces, and air conditioners require separate circuits.

Reasons for Tamper Resistant Receptacles:

- There are a significant number of electrical shock incidents that occur when children insert conductive objects into electrical receptacles. Most of these incidents take place in living areas of the home. Tamper resistant receptacles are designed to prevent contact with live electrical contacts when an object, other than a plug, is inserted into one of the receptacle slots.

Laundry Room or Area:

- Install a separate circuit and include at least one receptacle for the washing machine and another one in a convenient location.

Utility Room or Area:

- Install at least one receptacle on a separate circuit for the utility room.
- Install on receptacle in each undeveloped area.
- Each utility room shall have a light fixture controlled by a wall switch.

Note: Built-in vacuum motors require a receptacle on a separate circuit located adjacent to the unit.

Bathrooms and Washrooms:

- Install one duplex receptacle, protected by a Class “A” Ground Fault Circuit Interrupter (GFCI) within 1 m (39 inches) of the wash basin. This receptacle must be located at

least 1 m (39 inches) from a bathtub or shower stall. Measure the distance between the receptacle and the inside edge of the bathtub or shower without piercing a wall, partition or similar obstacle.

Outdoor:

- Provide at least one receptacle on a separate circuit. Receptacles located on the dwelling including attached carports and attached garages, are to be protected by a Ground Fault Circuit Interrupter.
- All receptacles (except for automobile heater receptacles) installed outdoors and within 2.5 m of finished grade shall be protected by a Ground Fault Circuit.
- Receptacles exposed to weather shall be provided with wet location cover plates, whether or not a plug is inserted into the receptacle.

TAMPER RESISTANT RECEPTACLES:

DIAGRAM 1

RULE 26-712(g) AND (h) AND NEW APPENDIX B NOTE

Shutters restrict access in closed position

Insertion of object in any one side will not open shutters

Insertion of two-bladed plug or grounding plug will open shutters

UNDERGROUND WIRING TO GARAGE:

TABLE 1

BREAKER SIZE (HOUSE)	TYPE OF CIRCUIT (GARAGE)	SIZE OF CABLE	SIZE OF CONDUIT AND FITTINGS
15 Amps 1 Pole	Single Circuit	2-14 NMWU	3/4" P.V.C.
15 Amps 2 Pole	Double Circuit	3-14 NMWU	3/4" P.V.C.
30 Amps 2 Pole	{ Feeder Circuit for Sub-panel in Garage	3-10 NMWU	1" P.V.C.
40 Amps 2 Pole		3-8 NMWU	1-1/4" P.V.C.
60 Amps 2 Pole		3-6 NMWU	1-1/2" P.V.C.

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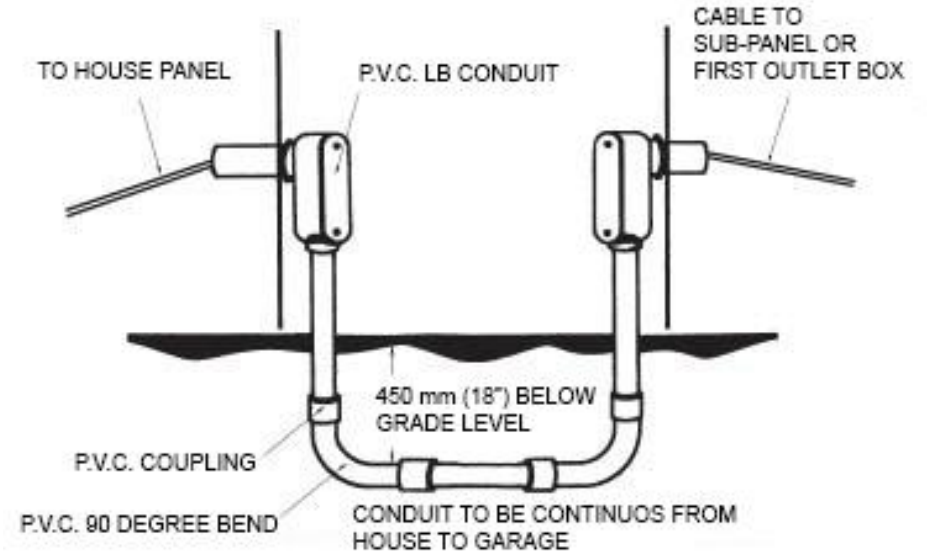
DIAGRAM 2



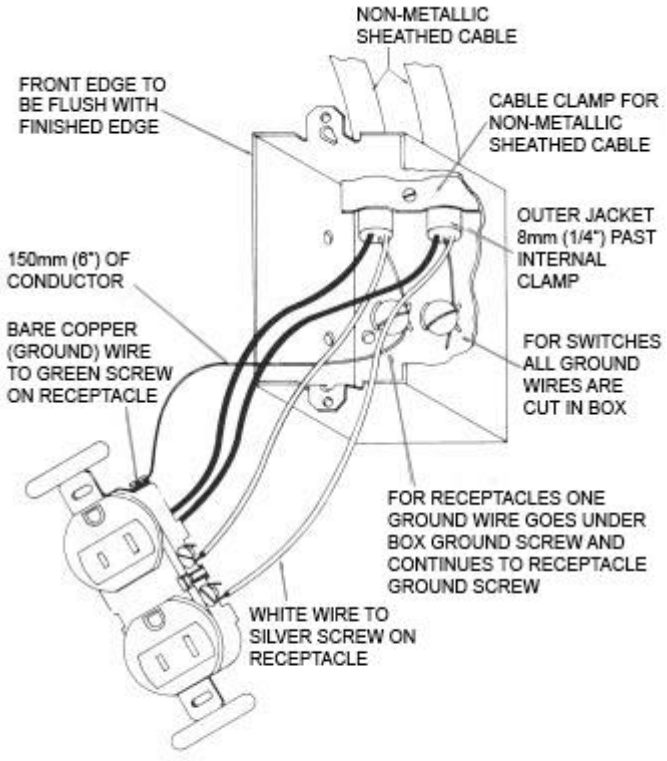
NOTE: OTHER UNDERGROUND WIRING METHODS ARE ACCEPTED BY THE CANADIAN ELECTRICAL CODE. NMD 90 CABLE IS NOT ACCEPTABLE FOR UNDERGROUND INSTALLATIONS.

NOTE: DO NOT BACKFILL THE TRENCHPRIOR TO THE FIRST INSPECTION

- No separation is required between gas and electrical lines in some trenches.
- Underground conduit to be buried to a depth of 18” deep.

TYPICAL OUTLET BOX:

DIAGRAM 3



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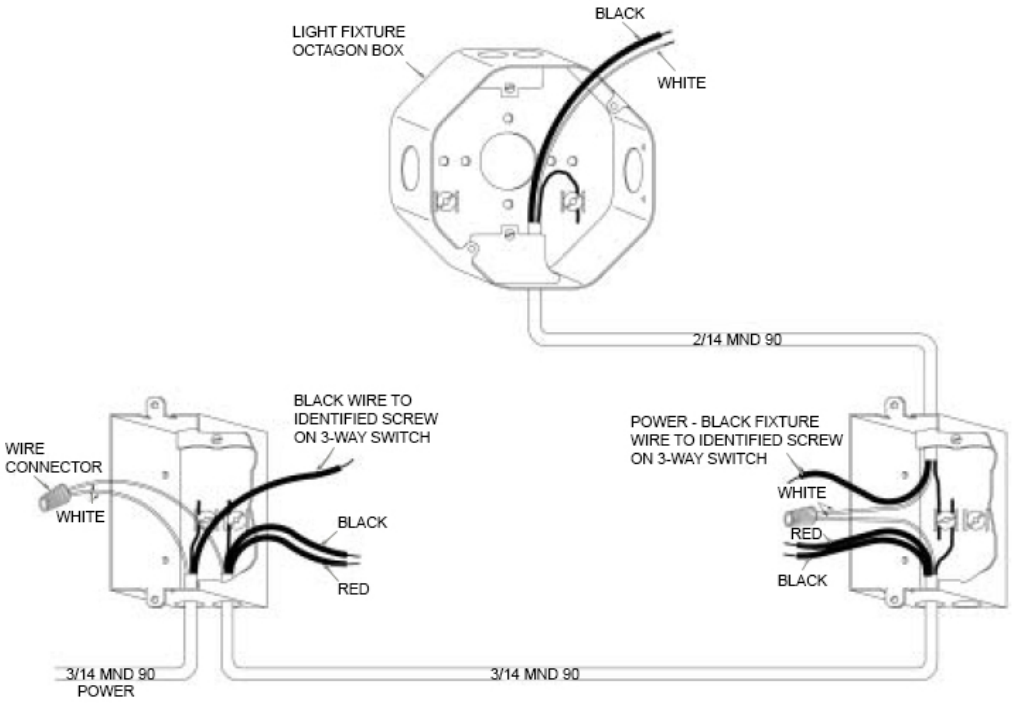
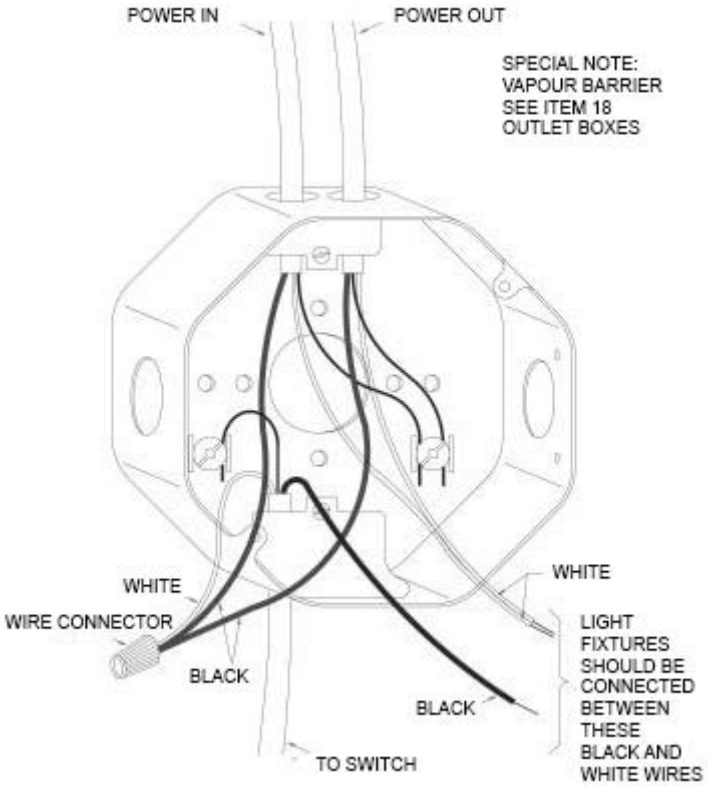
SIMPLE WIRING FOR 3-WAY SWITCH:

DIAGRAM 4



TYPICAL OCTAGON BOX FOR LIGHT FIXTURE INSTALLATION:

DIAGRAM 5



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