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Rebuilding Together Alexandria's Volunteer Training

February 11th, 2017

GFCI Outlets & 3-Way Switches

Instructed by David Throckmorton & Andrea Viñas

Grab Bars/Handrails

Instructed by Brent Crabtree

Drywall Patching

Instructed by Haig Paul



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Electrical Training: GFCI Outlets and Three-Way Switches

*****Before performing any electrical work, ALWAYS shut off the circuit that you will be working on!**

Basics: -Attack black or red (hot) wires to the brass screw
-Attach white (neutral) wires to the silver screw

***Reversing the hot with the neutral you could blow the fuse**
-Attach bare or green (ground) wire to the green screw

GFCIs

A Ground-Fault Circuit-Interrupter (GFCI) is a device that shuts off an electric power circuit when it detects that current is flowing along an unintended path, such as through water or a person. Its essential purpose is to help prevent electric shock and it is a basic requirement for homes built today. Most of the homes our homeowners live in were built long before this requirement, and have not been updated.

The National Electrical Code (NEC) requires that GFCIs be placed in a number of locations, but Rebuilding Together Alexandria simply strives to upgrade outlets near sinks in kitchens and bathrooms. These locations satisfy the most basic needs for GFCI outlets.

Replacing a regular (3-prong) grounded outlet with a GFCI:

- Before replacing the outlet, you will have to figure out which wires are the “line” and which are the “load.” You should find a set of hot and neutral wires coming from the power source (this is the line) and another set of hot and neutral wires going to another device (this is the load). In order to figure out which is which, you will need a voltage tester/detector.
- The GFCI outlet will have a brass and silver screw labeled “line” and a brass and silver screw labeled “load” so that you can wire it accordingly. Hint: if the GFCI does not work after this, you may have it backward!

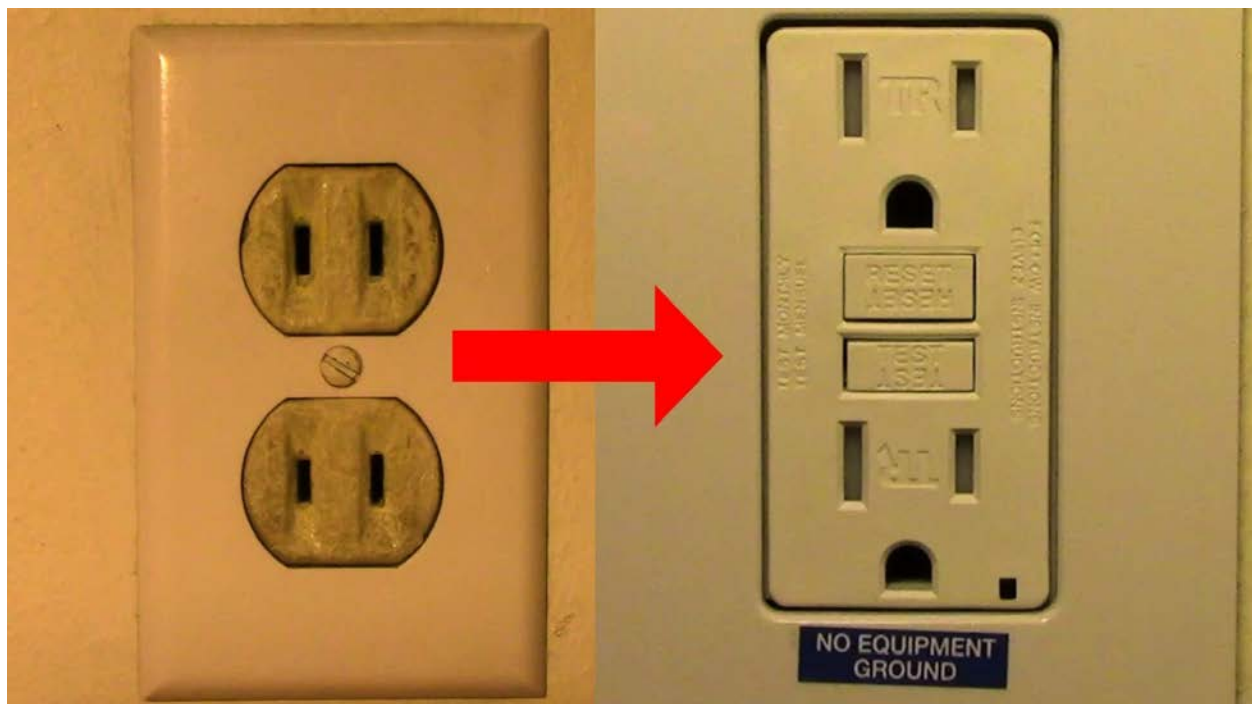


Replacing a non-grounding type receptacle (2-prong outlet) with a GFCI outlet:

- Where no ground exists, a GFCI can be grounded to a screw on the electrical box **only if** the box is made of metal. Otherwise, see below.

(From the NEC)

- *“A non-grounding type receptacle(s) shall be permitted to be replaced with a ground-fault circuit interrupter-type of receptacle(s). These receptacles shall be marked “No Equipment Ground.” An equipment grounding conductor shall not be connected from the ground-fault circuit interrupter-type receptacle to any other outlet supplied from the ground-fault circuit interrupter receptacle.*
- *A non-grounding-type receptacle(s) shall be permitted to be replaced with a grounding-type receptacle(s) where supplied through a ground-fault circuit interrupter. Grounding-type receptacles supplied through the ground-fault circuit interrupter shall be marked “GFCI Protected” and “No Equipment Ground.” An equipment grounding conductor shall not be connected between the grounding type receptacles.”*



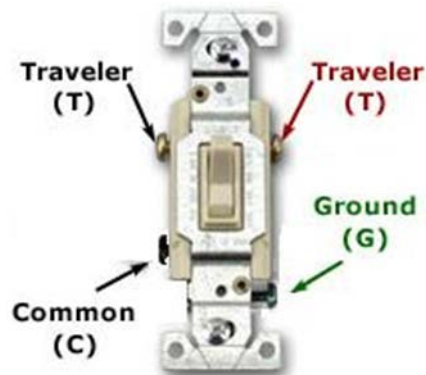
Three-Way Switches:

Basics: -NEVER attach a neutral wire to a switch! (This will cause a short circuit).

A three-way switch is a switch that can turn on/off one or more lights from multiple locations. These are typically found with rooms that have multiple entries, or at the top and bottom of a stairway. Some of the homeowners that we serve have three-way switches that are wired incorrectly. This can be an inconvenience, but also a safety hazard if a person is trying to navigate through a room or down a stairway that is not lit.

Common vs. travelers:

- The common terminal is one of three electrically live terminals on a 3-way switch (not including the ground terminal). The common terminal is the "bridge" between the power supply and the load (typically a light fixture). With this in mind, the wire that attaches to the common terminal is either (1) a hot wire from the main board or (2) leads to the load (fixture).
- The travelers are two wires connecting the two 3-way switches together. The two traveler terminals on one 3-way switch are connected to the two traveler terminals on the other 3-way switch by the two traveler wires. Either traveler wire can be connected to either traveler terminal... it doesn't make a difference!



Usually, the switches do not function accordingly when one of the "traveler" wires is attached to the "common" screw (and the common wire has been attached to a traveler screw). In some cases, you may find a regular switch where a three-way should be installed. Regular light switches have one less terminal screw than a three-way.

Fun facts:

- A GFCI will only trip when there is a difference of at least 7 milliamps between the hot and neutral wire.
- New outlets and switches will always come with detailed instructions if you forget what goes where. 😊
- You can distinguish a three-way switch from a regular light switch without removing the switch plate! Regular switches have the words “on” and “off” printed on the switch, three-ways do not.
- For information about wiring a GFCI outlet combination switch visit this website:
<http://www.do-it-yourself-help.com/gfci-outlet-switch-wiring.html>



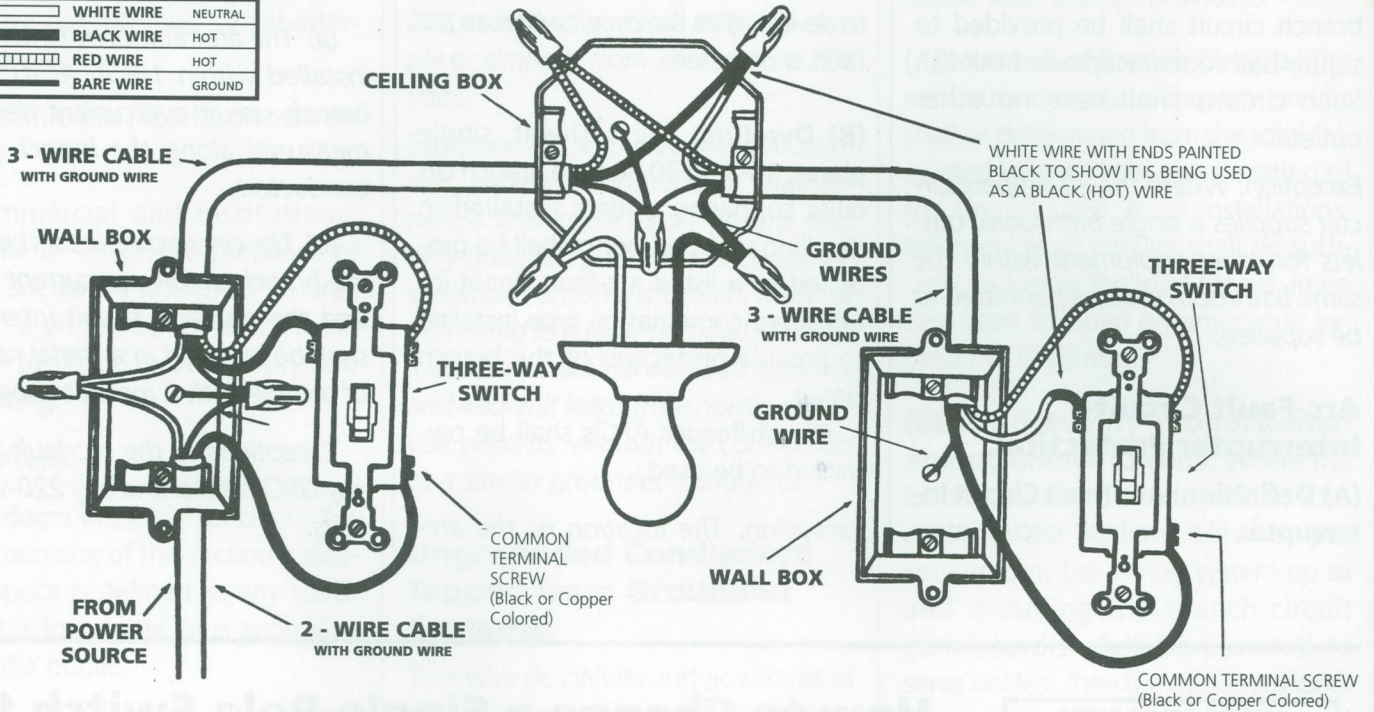
Do not hesitate to call or email with any questions:
av@rebuildingtogetheralex.org



How to Wire Three-Way Switches

WITH SWITCHES CONTROLLING ONE LIGHT

WIRING COLOR GUIDE		
	WHITE WIRE	NEUTRAL
	BLACK WIRE	HOT
	RED WIRE	HOT
	BARE WIRE	GROUND



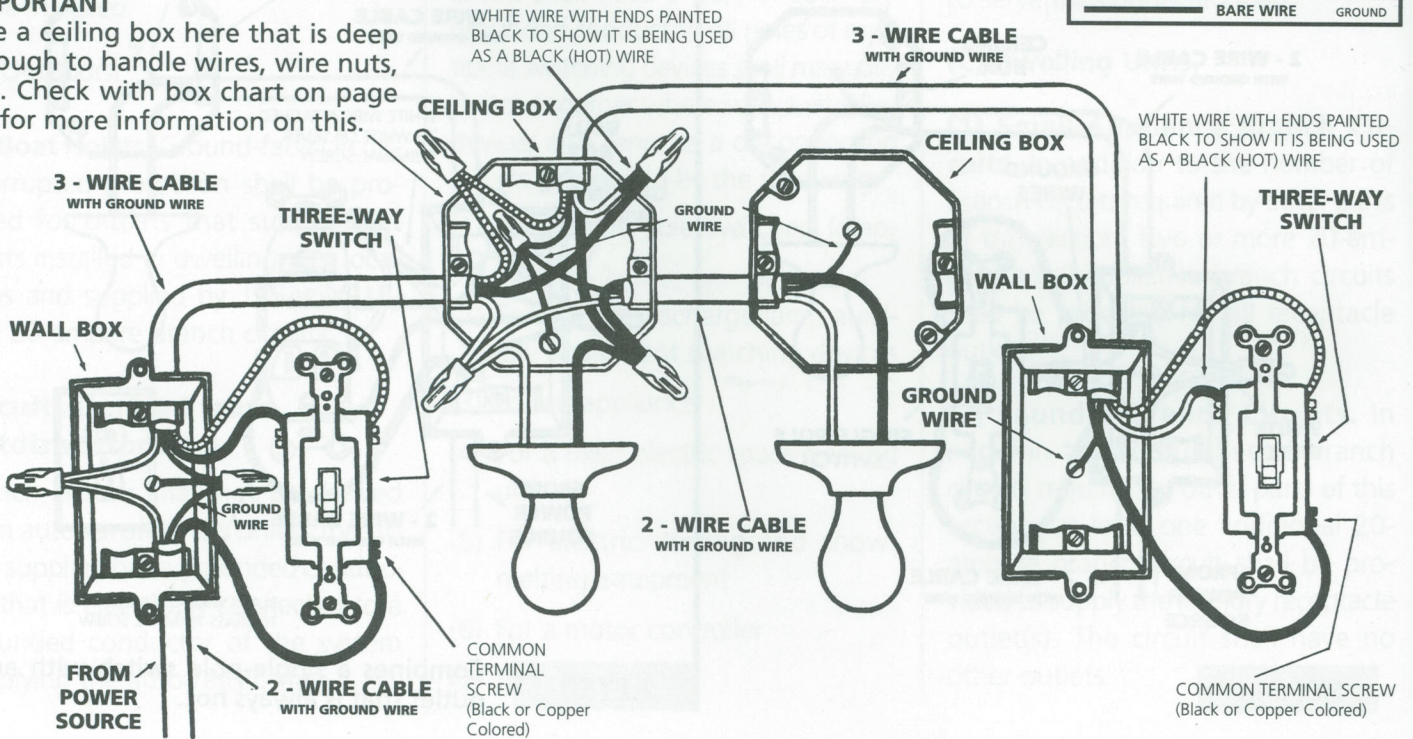
How to Wire Three-Way Switches

WITH SWITCHES CONTROLLING TWO LIGHTS

WIRING COLOR GUIDE		
	WHITE WIRE	NEUTRAL
	BLACK WIRE	HOT
	RED WIRE	HOT
	BARE WIRE	GROUND

IMPORTANT

Use a ceiling box here that is deep enough to handle wires, wire nuts, etc. Check with box chart on page 23 for more information on this.



Installing Grab Bars with Snap Toggles



1 **BATHTUB**

Inside a bathtub enclosure, position a grab bar horizontally, approximately **32 - 36** inches from the bottom of the tub, so that a homeowner can stabilize themselves while showering. It is best to get input from the homeowner as to the best location. For maximum strength, Grab bars should not be installed on a diagonal. For a vertical installation, position the bar just inside the tub enclosure. Check with the homeowner to determine which end of the tub would best facilitate entering and exiting the tub. Grab Bars cannot be installed on a tub enclosure wall that is the prefab kind that is made out of fiberglass.

2 **USE Snap Toggles FOR MOUNTING THE BAR**

The Snap Toggle anchors flare out behind the wall to hold firmly. You should install the fastener on a sound wall made of 5/8-inch-thick wallboard or tile over plaster, cement board, or 1/2-inch wallboard. Grab Bars should not be installed directly to standard sheetrock as it is not thick enough to provide sufficient support. Snap Toggles will need at least 2" of air space behind the wall material to properly activate. When installing grab bars it is important to ***“Measure Twice and Cut Once”***.

3 **TOOLS NEEDED TO INSTALL THE BAR**

To install a Grab Bar, you will need the following tools for most installations:

- 4 Snap Toggles and eight 2½-inch screws per Grab Bar. Screws may be ¼ inch or 3/16 inch in diameter as long as they have matching screw hole diameters in the toggle.
- Tube of Silicone (one full tube will suffice for 4 Grab Bars)
- Drill with ¼-inch glass/masonry bit (pilot hole) and ½-inch carbide-tipped drill bit
- Felt-tipped pen, stud finder, center punch, hammer, pencil, measuring tape, flashlight, 1-4 foot level, rubber mallet (or rubber butt on your hammer handle), masking tape, Phillips and flat-tipped screw driver
- Drop cloth to protect bathtub and collect dirt, cleaning rag or sponge, shop vacuum (or wisk broom with pan)
- 8" length of coat hanger

Some installations will require extra tools and materials: Eight 4-inch screws per Grab Bar, Two ¼-inch threaded rods, Eight ¼-inch nuts, vice grips, small crescent wrench, hacksaw

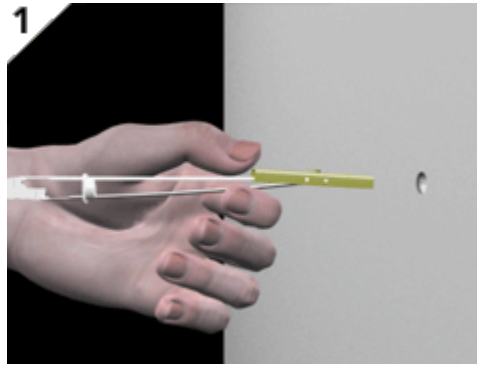
4

HERE'S HOW TO INSTALL THE BAR

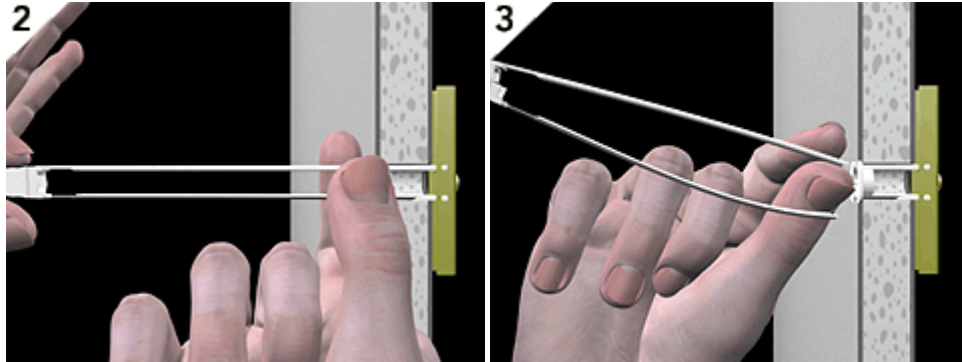
1. Verify the length of the Grab Bar by measuring the Grab Bar from the outside of the Grab Bar flange to the inside of the other flange. Grab Bars typically run 36", 30", 24", 18", and 16" in length. **NOTE: Rebuilding Together encourages the use of 18" (for vertical) and 30" or 36" (for horizontal) grab bars. Additional sizes and styles are also available. If needed – contact the office.**
2. Determine location of Grab Bar. Grab Bars must be installed at least 2 ½" **away from a stud.** Remember – studs typically run every 16" on center. Use a stud finder to locate the studs and make a pencil line on the wall designating the stud locations. If you do not have a stud finder, use a rubber mallet and "sound" for the studs. **NOTE: For the older homes in Alexandria – there is nothing standard about the walls.**
3. Place masking tape on tub wall in general proximity to where grab bar will be installed. Masking tape allows you to mark the tile wall and also stops the drill from "walking". Then mark where your drill point will be. Mark the center of the two slotted holes in each flange. The mounted flange will be similar to the figure below. Use a level to make sure the Grab Bar is either level or plumb. **Remember – Measure Twice – Cut Once.**



4. Use a center punch to mark the tile location for the four drill holes. This will stop the drill from "walking". Be careful not to crack the tile. A few small taps with a hammer will be sufficient. Then use the ¼" pilot hole bit to make a starter hole. Drill completely through the tile and backer board. Verify that there is no stud in the way. Insert a wire with a 1 ¼" bend into the pilot hole and turn the wire making a complete circle. If you hit a stud, move over the appropriate distance. Also verify the depth of the air gap behind the wall. If the gap is less than 2 inches, you will need to improvise.
5. Carefully drill a 1/2" hole in the wall using the special carbide drill bit. Keep the drill level and straight and go slowly. Going fast will chip the bathroom tile. Remove any masking tape from wall and clean tile surface.
6. Take Snap Toggle and position metal channel horizontal so you can insert it into the hole. Push until the channel enters the void area. Then hold end of straps between your fingers and pull towards you until channel rests flush behind wall. You may need to play with the snap toggle until it engages.



7. Slide plastic cap along straps until flange of cap is flush with the wall. Snap off straps at wall by pushing side to side, snapping off straps level with flange of cap.



8. Dry fit the 2½-inch screw into the snap toggle to make sure it threads into the channel, then remove. Take care to avoid cross-threading the screw. You may need to use the longer 4-inch screws for one or more of the Snap Toggles.

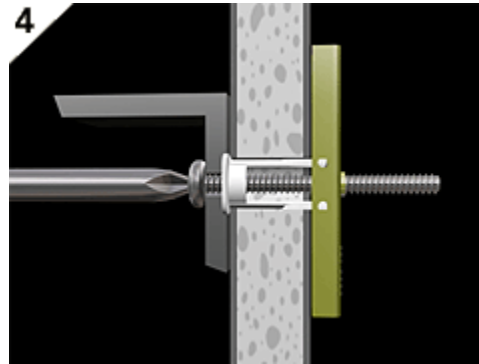
9. Check to make sure the screws fit cleanly through the two slotted holes in the mounting flange. You must be able to easily slide the screw in and out of the hole and turn the screw with your fingers. If the screw binds in the hole, it will be exceedingly difficult to get the threads started without cross-threading the screws. If the screws bind in the hole, use a ¼-inch drill bit to ream out the holes slightly.

10. Apply a ¼-inch bead of silicone along the flange of the grab bar - the side that will be touching the wall.



5**Diagrams showing installation of Snap Toggle**

Insert screws through grab bar and into snap toggle. Get all four screws started before beginning to tighten any. When tightened, the screws should look like Diagram # 4. Apply additional silicone around flange as needed to ensure a water tight fit. Remove any excess silicone and secure collar over flange - use rubber mallet (or hammer butt). Check entire unit for stability.

**6**

Clean up the dust you have created.

Special note: If you have any questions/concerns regarding the installation of the grab bars, or have a unique situation that may need a special sized grab bar, contact the office.

A simplified video of a Snap Toggle installation:

<https://www.youtube.com/watch?v=SC1ZuxuZ2PU>

Patching Small Holes in Drywall

For small holes, like those created by a doorknob, a patch kit may be used.

Step 1



Place the self-adhesive mesh patch over the hole.

Step 2



Use a drywall knife to cover the patch with lightweight joint compound in a crisscross pattern, feathering the edges so it blends with the wall. To feather the edge, increase pressure and angle on the drywall knife as you reach the outer edges of the patch area to minimize, or thin, the joint compound on the drywall.

Step 3



Let the patch dry and apply a second coat of compound if needed. Sand smooth.

Tools needed for any drywall patching:

- Ready mix joint compound
- Joint knives
- Mixing pan
- Utility knife
- Drywall saw
- Paper joint tape/mesh tape
- Tape measure
- Pencil
- Straight edge
- 2' level
- 1.25" drywall screws
- 1/2" drywall sheet
- Phillips bits & drill/driver
- Stud finder
- Drill bits
- Pieces of 1' x 2'
- Handsaw or circular saw

Patching Large Holes

For holes larger than 6 inches, you'll create a drywall patch with a different attachment method for the repair.

Step 1



Cut a piece of drywall into a square a little bit bigger than the hole.

Step 2



Hold the square over the hole in the drywall and trace around the edges.

Step 3



Cut along the lines on the wall with a drywall knife.

Caution

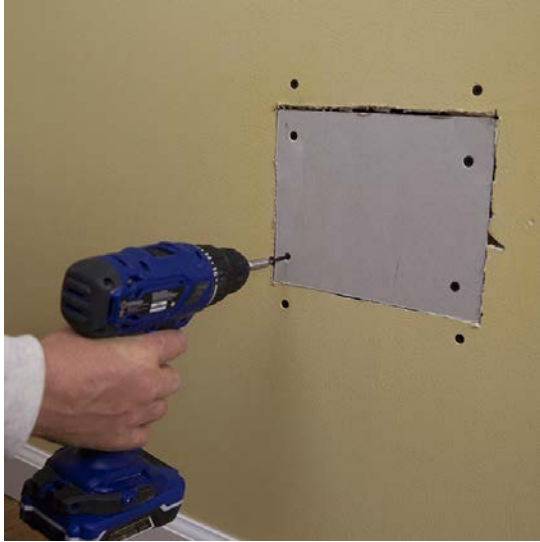
Before cutting, check the hole for electrical wires. Typically, they are attached to studs.

Step 4



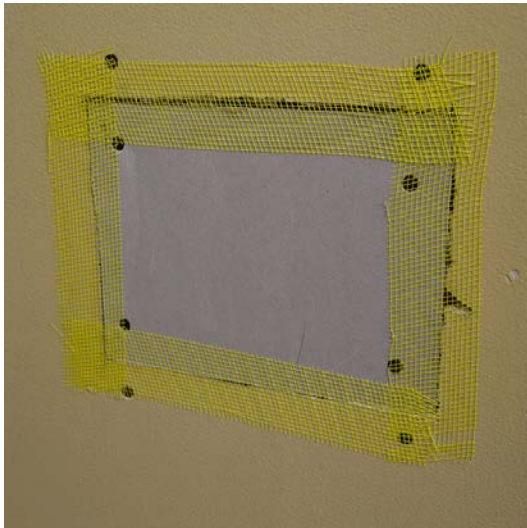
Inside the hole, attach a furring strip, a small, thin piece of wood, to either side of the hole with screws. Sink the screws beneath the surface of the drywall.

Step 5



Set the drywall patch in place and screw it into the furring strips, sinking the screws beneath the surface of the drywall.

Step 6



Apply joint tape to the borders of the patch. Joint tape is made of mesh and strengthens the bond between the patch and the wall, reducing movement and helping to prevent future cracks.

Step 7



Cover the patch and tape with joint compound, feathering the edges. Allow the compound to dry according to the manufacturer's instructions. Apply a second coat if needed. Sand smooth.

APPENDIX C

Project Impact Summary Report

Rebuilding Together Health and Safety Priorities	BEFORE	AFTER	CHANGE
	Y / N	Y / N	★
1. The homeowner has safe ingress and egress to the home			
2. The roof is watertight			
3. Rainwater is effectively shed and directed away from the structure			
4. Exterior walls have no gaps, cracks or holes larger than 1/8 inch			
5. Windows and exterior doors open and close, lock securely and seal well			
6. Home is free of live infestation of pests, and sources of attraction are removed			
7. The numerals in the property's street address are clearly visible from the street			
8. Working smoke detector is on each floor and in or near bedrooms to meet code			
9. A working CO detector protects home with gas appliances or attached garage			
10. A currently dated Class ABC fire extinguisher is available in or near the kitchen			
11. Water heaters, furnaces and space heaters that produce CO exhaust outside			
12. No known electrical hazards are present, and kitchens and baths have GFCIs			
13. The homeowner has access to a working water heater, refrigerator and range			
14. The kitchen and bathrooms have an exhaust fan vented outside			
15. The homeowner has access to a working sink, toilet and bathtub or shower			
16. Modifications to toilets and tubs assist those who need help			
17. Grab bars are strategically placed for those at risk of falls			
18. Stairs and steps have secure handrails that meet occupants' needs			
19. Main rooms and stairs are free of tripping hazards			
20. Old, filthy carpeting has been replaced, preferably with durable flooring			
21. Clothes dryer, if present, vents outside w/ metal duct and unobstructed airflow			
22. The homeowner can maintain the interior temperature in a comfortable range			
23. Main rooms and stairs have adequate lighting for occupants to move safely			
24. Interior paint and wall covering is intact			
25. The home is free of active water leaks and serious moisture problems			

- KEY**
- Yes/No columns show each priority before and after repairs have been completed.
 - The third + column highlights the results of repairs that change a priority from No to Yes.